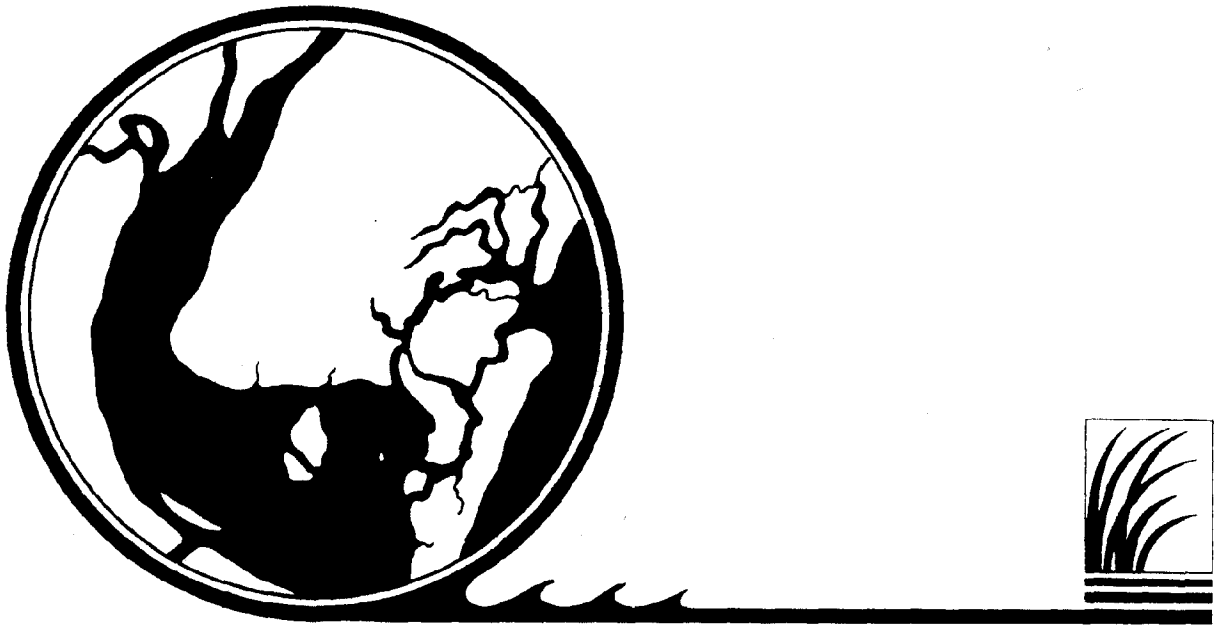
North Inlet-Winyah Bay
National Estuarine Research Reserve

Final Environmental Impact Statement
and
Draft Management Plan



U.S. Department of Commerce
National Oceanic and Atmospheric Administration
National Ocean Service
Office of Ocean and Coastal Resource Management
Sanctuaries and Reserves Division
Washington, D.C. 20235

State of South Carolina
Belle W. Baruch Institute
University of Southern Carolina
Columbia, S.C. 29208

S.C. Coastal Council
Ashley Corporate Center
4130 Faber Place, Suite 300
Charleston, S.C. 29405

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
OFFICE OF OCEAN AND COASTAL RESOURCE MANAGEMENT
Washington, D.C. 20235

APR 24 1992

MEMORANDUM FOR: DISTRIBUTION

FROM: Annie Hillary
Acting Chief
Atlantic and Great Lakes Region
Sanctuaries and Reserves Division

SUBJECT: Final Environmental Impact Statement/Draft Management Plan (FEIS/DMP) for Proposed North Inlet/Winyah Bay National Estuarine Research Reserve

Attached for your review is the FEIS/DMP for the proposed North Inlet/Winyah Bay National Estuarine Research Reserve in Georgetown, South Carolina.

Major concerns expressed at the public hearing and in correspondence involved continued public access to the North Inlet portion of the Reserve for fishing, maintenance dredging for commercial shipping purposes, and dredge disposal sites. Appendix M addresses written and oral comments received during the review process.

Please provide any comments you may have to Dolores Washington, Sanctuaries and Reserves Division, (202) 606-4122, by May 2, 1992.

Attachment

Distribution:

T. Coxe, OCRM
J. Burgess, CPD
V. Allin, PCD
E. Ozturgut, OME
C. Ehler, ORCA
M. O'Connell, GCOS
D. Cottingham, CSES
N. Foster, F/PR1
R. Kifer, NMFS, F/SEC8

UNITED STATES

DEPARTMENT OF COMMERCE

FINAL ENVIRONMENTAL IMPACT

AND

DRAFT MANAGEMENT PLAN

NORTH INLET/WINYAH BAY

NATIONAL ESTUARINE RESEARCH RESERVE

APRIL 1992

Prepared by:
U.S. Department of Commerce
National Oceanic and Atmospheric
Administration
National Ocean Service
1825 Connecticut Avenue, NW
Washington, DC 20235

State of South Carolina
Belle W. Baruch Institute
University of South Carolina
Columbia, SC 29208

DESIGNATION: Final Environmental Impact Statement

TITLE: Proposed designation of the North Inlet and Mud Bay region of Winyah Bay estuaries as a National Estuarine Research Reserve and preparation of a draft management plan.

ABSTRACT: The state of South Carolina proposes the designation of a site in the North Inlet/Winyah Bay estuaries as a component of the National Estuarine Research Reserve System. The core area of the site encompasses 9,000 acres of uplands, wetlands and open waters and a buffer zone of about 80 acres.

Federal financial assistance for operations, management, and development are requested by the state of South Carolina. These funds accompanied by the required 30 percent state match will be used for basic program activities, including research and educational projects, and for the preparation of a final management plan for the NI/WB NERR in South Carolina. Appropriate Memorandums of Understanding are included for those portions of the site which are on state government or private property. The proposed reserve will be managed by the Belle W. Baruch Institute for Marine Biology and Coastal Research, the University of South Carolina.

Approval of this proposal will allow for the establishment of an estuarine research reserve in South Carolina representing the Subregion of the Carolinian Biogeographic Region. The proposed reserve will be used primarily for research and education purposes, particularly as a tool for improving coastal decision making. No new regulations are proposed as a result of this action. Traditional uses within the proposed reserve boundaries will continue under existing local and state laws and private landowner policies. The educational programs will increase public awareness of estuarine resources and their importance. The research plan will establish a baseline monitoring program for the North Inlet and Winyah Bay region and encourage research projects consistent with the reserve's role as a natural field laboratory.

Submit any written comments to the contact identified below.

Applicant: South Carolina Coastal Council
Ashley Corporate Center
4130 Faber Place
Suite 300
Charleston, SC 29405

Contact: Mr. Steven Snyder

Applicant: Belle W. Baruch Institute or Marine Biology and Coastal Research
University of South Carolina
Columbia, SC 29208

Contact: Dr. F. John Vernberg, Project Manager

Lead Agency: U.S. Department of Commerce
National Oceanic and Atmospheric
Administration
Office of Ocean and Coastal Resource Management

Contact: Ms. Annie Hillary
Acting Chief, Atlantic and Great Lakes Region, Sanctuaries and Reserves Division
Office of Ocean and Coastal Resource Management
1825 Connecticut Avenue, N.W.
Washington, D.C. 20235

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ACRONYMS

BI	Belle W. Baruch Institute for Marine Biology and Coastal Research
DMP	Draft Management Plan
EPA	Environmental Protection Agency
FEIS/DMP	Final Environmental Impact Statement/Draft Management Plan
LTER	Long-Term Ecological Research
MOU	Memorandum of Understanding
NERRS	National Estuarine Research Reserve System
NI/WB NERR	North Inlet/Winyah Bay National Estuarine Research Reserve
NOAA	National Oceanic and Atmospheric Administration
OCRM	Office of Ocean and Coastal Resource Management (NOAA)
ORW	Outstanding Resource Waters
SCDHEC	South Carolina Department of Health and Environmental Control
SCDWMR	South Carolina Department of Wildlife and Marine Resources
SFH	Shellfish Harvesting Waters
SRD	Sanctuaries and Reserves Division (NOAA)
USC	The University of South Carolina

EXECUTIVE SUMMARY

Section 315 of the Federal Coastal Zone Management Act of 1972 established the National Estuarine Research Reserve System (originally called the National Estuarine Sanctuary Program) as a Federal/state cooperative venture. Federal matching funds are available to coastal states to develop and manage a national system of estuarine research reserves which are representative of various regions and estuarine types in the United States. In addition, annual Federal matching funds for research and education projects are available. The goal of the program is to protect areas of representative estuaries, including valuable wetland habitat, for use as natural field laboratories. National Estuarine Research Reserves (NERRS) are established to: 1) provide opportunities for long-term estuarine research and monitoring; 2) provide opportunities for estuarine education and interpretation; 3) provide a basis for more informed coastal management decisions; and 4) promote public awareness, understanding and appreciation of estuarine ecosystems and their relationships to the environment as a whole.

The National Estuarine Research Reserve System (NERRS) has established a classification scheme that reflects differences in regional biogeography and estuarine typology to ensure that established sites are representative and that a variety of ecosystem types are included. The biogeographic classification scheme and estuarine typology system are shown in Appendix D. The North Inlet/Winyah Bay NERRS (NI/WB NERR) is in Northern Carolinas section of the Carolinian Biogeographic Classification Scheme.

The North Inlet/Winyah Bay NERR is being proposed by the Belle W. Baruch Institute for Marine Biology and Coastal Research, University of South Carolina, a State agency, in cooperation with the South Carolina Coastal Council (SCCC), the state's lead agency in coastal zone management. In 1990 the Governor of South Carolina nominated the site to NOAA and it was approved.

The NI/WB NERR encompasses a core area of approximately 9,000 acres of tidally flushed wetland, raparian habitats, and a limited amount of upland habitats (the Marsh Islands and lands associated with the laboratory complex, the Kimbel Living Center and the Clambank Landing area). Portions of the proposed Reserve are owned by the Belle W. Baruch Foundation which was established in perpetuity to preserve and conserve the environmental qualities of their property as well as to preserve its historical and cultural value. The Baruch Institute, USC, through a long-term agreement with the Foundation and signed by the SC Attorney General manages that portion of their lands which are proposed to be part of the Reserve. The Foundation has given their approval for their lands described in this plan to be included in the Reserve. This area is in Georgetown County immediately east of Winyah Bay near Georgetown, SC and south of the Debordieu Colony property located on the

Waccamaw Neck peninsula. This area was selected after an exhaustive selection process and a series of public meetings. It includes an undisturbed estuary (North Inlet) and an estuary which has been influenced by human activities (Winyah Bay). The Belle W. Baruch Institute for Marine Biology and Coastal Research, The University of South Carolina, as stated in a MOU with the South Carolina Coastal Council and NOAA, is the lead agency.

The purpose of the proposed NI/WB NERR is to establish and manage the areas within the boundaries as natural field laboratories and to develop a coordinated program of research and education for the reserve. Comparative ecosystem studies involving an undisturbed system and a man-influenced estuary will provide valuable scientific insights in the ecological processes controlling estuaries. Under the preferred alternative, the SC Coastal Council designated the Baruch Institute of the University of South Carolina (a state agency) to be the lead agency operating the Reserve in cooperation with the Belle W. Baruch Foundation, neighboring landowners, private citizens, state and Federal agencies, and advisory committees.

Proposed reserve staff will initially include a Reserve Manager, Research/Resource Coordinator, Education Coordinator, and Secretary/Data Processor. The Reserve Manager will be the principal administrator of the Reserve and will be responsible for ensuring that the policies contained in the Reserve Management Plan are followed. This person will be employed and supervised by the Director of the Baruch Institute, USC. The Research/Resource Coordinator will develop and implement a resource assessment program, including long-term monitoring and research activities. The Education Coordinator will develop and coordinate education program activities that are consistent with the goals and objectives of the Reserve and the NERRS Network. The secretary/data processor will assist the program staff by providing secretarial service and also assisting with data processing.

Research and education programs will gather and make available information necessary to improve understanding, appreciation, and management of the reserve site and national research and management issues. The NI/WB Reserve activities will augment, not replace, activities of other government agencies and the site owners. Traditional uses of the sites will continue and current site access policies will be enforced to protect the integrity of the reserve. Facilities will be developed as necessary to aid in research and education.

In addition to the preferred alternative, four other alternatives are discussed including no action/status quo, alternative sites, alternative boundaries, and alternative management strategies. Under the no action/status quo alternative, the designation of this site would not be pursued, and there would be no change in the current management direction or level of management activity. Several other sites were considered early in the site selection process. However, they were rejected in favor of the North Inlet/Winyah Bay site because no alternative site in this section of the

Carolinian Biogeographic Classification Scheme has the unique characteristics of the proposed North Inlet/Winyah Bay site. Alternative boundaries were considered and discarded for scientific, ownership, or management reasons. Three alternative management strategies were considered but they proved to be less efficient from a management viewpoint and less scientifically productive.

Valuable natural resources will be protected for long-term research and education by designation of the reserve. Natural resources affected by the proposed action include diverse, highly productive estuarine system (North Inlet) made up of wetlands and open water. The comparison of responses of an undisturbed estuary (North Inlet) with those responses of an estuarine system influenced by human activities (Winyah Bay) will provide useful data on resource utilization, protection, and restoration. In addition to the natural resources, the proposed Reserve is endowed with nearby cultural reservoirs, including important historical and archaeological sites located on adjacent highlands.

Traditional public uses of the proposed site will not be altered. These uses include boating, fishing, observation of wildlife, swimming and recreational harvesting of oysters and clams as permitted by state laws. Traditional uses of Winyah Bay permitted by state and Federal agencies will continue, including those associated with existing shipping channels.

The environmental consequences of the proposed action are strongly positive, the primary impact will be long-term protection of the natural resources. No resources will be irreversibly or irretrievably lost. On the contrary, these precious resources will be provided with long-term protection and will serve both now and in the future as sites for important estuarine research and education.

The proposed action is in accordance with all relevant state, local and Federal regulations and is consistent with the objectives of Federal, state, regional and local land use plans, policies and controls for the areas concerned.

I. PURPOSE OF AND NEED FOR ACTION

A. National Estuarine Research Reserve System (NERRS)

1. Federal Legislation/Authority

In response to intense pressures on the coastal resources of the United States, Congress enacted the Coastal Zone Management Act (CZMA). The Act was signed into law in 1972, and amended in 1975, 1976, 1977, 1978, 1980, 1986, and 1990. The CZMA authorized a Federal grant-in-aid and assistance program to be administered by the Secretary of Commerce, who in turn delegated this responsibility to the National Oceanic and Atmospheric Administration's (NOAA's) Assistant Administrator for Ocean Services and Coastal Zone Management.

The Act and its amendments affirm a national interest in the effective protection and careful development of the coastal zone by providing financial and technical assistance to U.S. coastal states and territories to voluntarily develop and implement coastal zone management programs. The Act established a variety of grant-in-aid programs to coastal states for purposes of:

- Developing coastal zone management programs. (Sec. 305)
- Implementing, administering, and funding coastal management programs that receive Federal approval. (Sec. 306)
- Establishing and funding coastal zone enhancement objectives. (Sec. 309)
- Conducting research, study and training programs to provide scientific and technical support to state coastal zone management programs. (Sec. 310)
- Establishing national estuarine research reserves. Funds are available to assist in the acquisition, development, and operation of reserves, and to support educational or interpretive activities and research and monitoring programs. (Sec. 315)

2. NERRS Program

Recognizing the need to address threats to the country's important and sensitive estuarine areas, Congress established the National Estuarine Sanctuary Program as Section 315 of the CZMA. (See Appendix C) The reauthorization of the CZMA in 1986 included an amendment changing the name of the program to the National Estuarine Research Reserve System, reflecting a stronger emphasis on research. What were formerly "sanctuaries" are now called "research reserves." The goal of the program is to create a system of reserves that represents distinct estuarine

ecosystems found nationally and to manage these areas for long-term research and education. Although the program is national in scope, individual states are responsible for implementing and administering their own programs. The CZMA was reauthorized in 1990. Regulations revised the process for designation of research reserves. Greater emphasis is placed on the use of reserves to address national estuarine research and management issues, and to make maximum use of the System for research purposes through coordination with NOAA and other Federal and state agencies which are sponsoring estuarine research. Other activities were emphasized: (a) providing financial assistance to states to enhance public awareness and understanding of estuarine areas; (b) providing new guidance for delineating reserve boundaries and new procedures for arriving at the most effective and least costly approach to acquisition of land; and (c) clarifying the amount of financial assistance authorized for each national estuarine reserve and criteria for withdrawing the designation of a reserve.

Coordination of the National Estuarine Research Reserve System (NERRS) is provided by the National Oceanic and Atmospheric Administration (NOAA), specifically the Sanctuaries and Reserves Division (SRD). In this Final Environmental Impact Statement (FEIS)/Draft Management Plan (DMP), the coordinating entity will be referred to simply as NOAA, with the understanding that SRD is actually the responsible division within NOAA.

Regulations revising the existing rules for the NERRS were proposed in Vol. 55, No. 141, pp 29942-29962 of the Federal Register in July 23, 1990. This DMP is consistent with these proposed regulations.

3. Concept of Biogeographic Zones

To ensure that the National Estuarine Research Reserve System (NERRS) includes sites that adequately represent regional and ecological differences, the NERRS regulations establish a biogeographical classification scheme that reflects regional differences in biogeography and an estuarine typology system which includes a variety of ecosystem types. (See Appendix C for a description of the biogeographic regions of the United States.). Upon completion, the NERRS will contain representation of the 27 biogeographic regions of the Nation's coastal zone. The North Inlet/Winyah Bay National Estuarine Research Reserve (NI/WB NERR) lies in the Northern Carolinas sub-region of the Carolinian biogeographic region.

4. Existing National Estuarine Research Reserves

At the present time, nineteen reserve sites have been designated across the country (Figure 1). Designated sites are:

The National Estuarine Research Reserve System

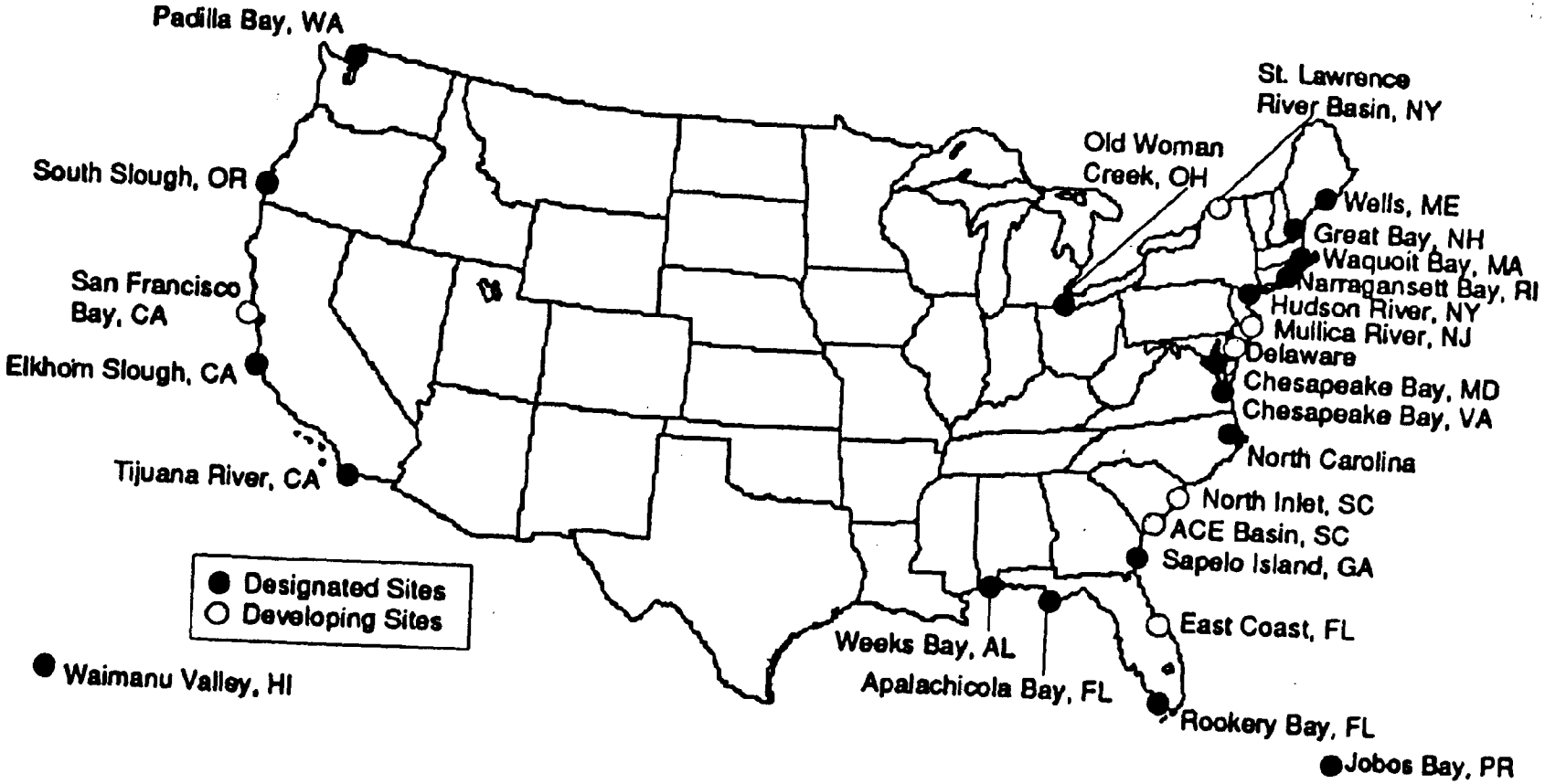


Figure 1. Designated and Proposed National Estuarine Research Reserves

Research Reserve	Biogeographic Classification
Wells York County, Maine	Acadian
Great Bay Great Bay, New Hampshire	Acadian
Waquoit Bay Mashpee and Falmouth, Massachusetts	Virginian
Narragansett Bay Newport County, Rhode Island	Virginian
Hudson River (4 components) Stockport Flats, Tivoli Bays, Iona Island, Piermont Marsh Hudson River, New York	Virginian
Chesapeake Bay, Maryland (3 components) Anne Arundel, Harford, Prince Georges, and Somerset Counties	Virginian
Chesapeake Bay, Virginia, (4 components) York, Gloucester, James City, and King William Counties	Virginian
North Carolina (4 components) Brunswick, Carteret, Currituck and New Hanover Counties	Virginian/Carolinian
Sapelo Island McIntosh County, Georgia	Carolinian
Rookery Bay Collier County, Florida	West Indian
Jobos Bay Guayama, Puerto Rico	West Indian
Apalachicola River/Bay Franklin County, Florida	Louisianan

Weeks Bay Baldwin County, Alabama	Louisianan
Tijuana River San Diego County, California	Californian
Elkhorn Slough Monterey County, California	Californian
South Slough Coos Bay, Oregon	Columbian
Padilla Bay Skagit County, Washington	Columbian
Old Woman Creek Erie County, Ohio	Great Lakes
Waimanu Valley Island of Hawaii, Hawaii	Insular

In addition, California-San Francisco Bay (San Francisco Bay), New York-St. Lawrence River Basin (Acadian), Delaware (Virginian), South Carolina (Carolinian), East Coast, Florida (Carolinian) have proposed sites to be included as National Estuarine Research Reserves and are in the process of producing environmental impact statements and management plans.

5. NERRS Funding Types and Limits (according to Interim Final regulations 15 CFR Part 921)

Federal funding for a NERR is described in detail below. Briefly, five categories of Federal awards are available from NOAA: predesignation awards; acquisition and development awards; operation and management awards; research and monitoring awards; and education and interpretation awards. The amount of Federal financial assistance provided may vary according to program areas; most of the Federal funds must be matched by the state or other entities.

Although Federal funding has and will be used for initial operation and staffing of the NI/WB NERR, the reserve is a state program and must ultimately be funded by the state. At a minimum, long-term funds must be provided to help cover general operating expenses and the salaries of the reserve manager and support staff. The reserve staff will work cooperatively with other agencies to pool resources. Efforts will also be made to obtain outside grants and other sources of program revenue.

These include the creation of support groups and endowment funds for the program. Support groups have been successfully utilized at other Reserves and may be used as models (e.g. the Friends of the Reserve at the Apalachicola Reserve in Florida, the Elkhorn Slough Foundation at the Elkhorn Slough Reserve in California, and Friends of Jug Bay at JBWS in Maryland).

Predesignation awards are available for site selection and post site selection. Acquisition and development awards are available prior to reserve designation for acquiring interest in land and water areas, performing minor construction, preparing plans and specifications, developing the final management plan, and hiring necessary staff.

After a reserve receives Federal designation, a supplemental acquisition and development award is available for acquisition of additional property interests, construction of research and education facilities, and restoration projects. Operation and management awards are available to manage the reserve and operate programs detailed in the management plan. The Federal portion of operation and management awards may be used for the support of staff positions.

Research and monitoring awards are available on a competitive basis to conduct estuarine research and monitoring within the NERR. Any coastal state or qualified public or private person may compete for these awards which are available annually. Financial assistance awards are available for conducting educational and interpretive activities within the NERR. These are available annually on a competitive basis to any coastal state entity.

More detailed information on NOAA funding can be found in the Federal Register 15 CFR Part 921 (Appendix C). As CZMA regulations are amended, funding limits and types may change.

6. Federal Role in the Research Reserve After Designation

According to current, Interim Final NERRS regulations, after designation, NOAA will conduct periodic performance evaluations of a reserve at least once every three years. Evaluations may be conducted more frequently as determined necessary by NOAA. These evaluations are required by Sections 312 and 315 of the Coastal Zone Management Act (CZMA) and will follow the evaluations procedures described in Section 312. Evaluations may assess all aspects of reserve operation and management, or they may focus on selected issues. Evaluations may also examine whether a reserve is in compliance with NERR designation regulations, and particularly whether the operations and management of the reserve are consistent with and further the mission and goals of the NERRS.

Federal officials will conduct the performance evaluations. When necessary, NOAA may request Federal and non-Federal experts to participate in the evaluations. Performance evaluations will be conducted in accordance with procedural and public participation provisions of CZMA regulations. The state must submit a report on operation and management of the reserve to NOAA during the last year of Federal operation and management funds and annually thereafter.

If performance evaluations reveal that the operation and management of the reserve is deficient or the research is inconsistent with the Reserve Guidelines, the eligibility of the reserve for Federal financial assistance may be suspended until the situation is remedied. If major deficiencies are not remedied within a reasonable amount of time, NOAA may initiate a process to withdraw designation of the reserve.

B. The Proposed NI/WB NERR

The North Inlet/Winyah Bay NERR is being proposed by the Baruch Institute of the University of South Carolina (a state agency) in cooperation with the SCCC, the state's lead agency in coastal zone management.

The North Inlet/Winyah Bay ecosystems, located near Georgetown, SC, have been recognized at the state and national level as sites of particular interest for comparative ecological studies. The North Inlet estuary, an ecosystem which is relatively unperturbed by humans, has been the site of intensive study for 20 years. The Institute of Ecology and the National Science Foundation have given this area a rating of 98% for site quality and the SC Department of Health and Environmental Control designated North Inlet as an Outstanding Resource Waters (ORW), an area possessing unique ecological qualities. For 11 years, this site has served as the only estuarine site in a network of 18 sites supported by the National Science Foundation for long-term ecological research. In contrast, the nearby Winyah Bay is an estuary which has been subjected to the influence of human activities. It is the connection to the sea of one of the largest watersheds on the eastcoast south of Chesapeake Bay. This proposed NERRS is viewed as an excellent site to provide a long-term database for valuable management of coastal resources. Early in the site selection process, other areas (Santee Bay and Port Royal Sound) were considered as possible NERR sites but were eliminated. The Site Selection Committee felt that the comparative study of an undisturbed and a disturbed estuary would provide a unique potential for research and education and would augment the variety of estuarine systems currently part of the NERRS system. The South Carolina Attorney General's Office has affirmed that the State has adequate protective control over the Reserve's resources (see Appendix K).

1. Background

This proposed management plan has been developed according to NOAA regulations (15 CFR Part 912) given in Appendix C, using information derived from research and public input. It is consistent with the Congressional intent of the National Estuarine Research Reserve System (NERRS); the National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce-State of South Carolina Memorandum of Understanding (MOU) concerning the North Inlet-Winyah Bay National Estuarine Research Reserve Site (NI/WB NERRS); and the provisions of the South Carolina Coastal Zone Management Program.

The purpose of this proposed management plan is to inform interested parties about the reserve and activities that will be conducted. The draft management plan establishes goals, program and facility needs, and frameworks, policies, and timetables to meet the goals. The plan is flexible and allows for review to make improvements in the program. Though it is long-term in scope, the plan will be reviewed by NOAA every two years and revised every five years.

The NI/WB NERR encompasses a core area of approximately 9,000 acres of tidally flushed wetlands, riparian habitats, portions of open water of North Inlet Estuary and Winyah Bay, a limited amount of upland habitats (the Marsh Islands and lands associated with the laboratory complex, the Kimbel Living Center and the Clambank Landing area). This area is in Georgetown County immediately east of Winyah Bay near Georgetown, SC, and south of the Debordieu Colony property located on the Waccamaw Neck peninsula (Figure 2). Surrounding this core area is a buffer zone (about 80 acres) consisting of (a) the ecotone region of transitional vegetation between the dominant marsh grasses and the forest vegetation and (b) State controlled waters. The core area of the Reserve consists of lands owned by the Belle W. Baruch Foundation, known as the Hobcaw Barony, and state-owned navigable waters. The Belle W. Baruch Foundation has been established in perpetuity to preserve and conserve the ecological and environmental qualities of Hobcaw Barony as well as to preserve its historical value.

This site, whose goals and objectives are consistent with those of the NERR program, was nominated to be a NERR site for the following major reasons:

I. The program of the Baruch Institute since it began in 1969 is well known for its studies on long-term ecological research--for the past 12 years the National Science Foundation has funded the Baruch Institute program as part of the long-term ecological research network of national sites. In addition a well-established educational program exists. A continuing education program associated with both the Foundation's Nature Center and USC involved approximately 29,000 persons in 1990

Figure 2. NI-WB Site

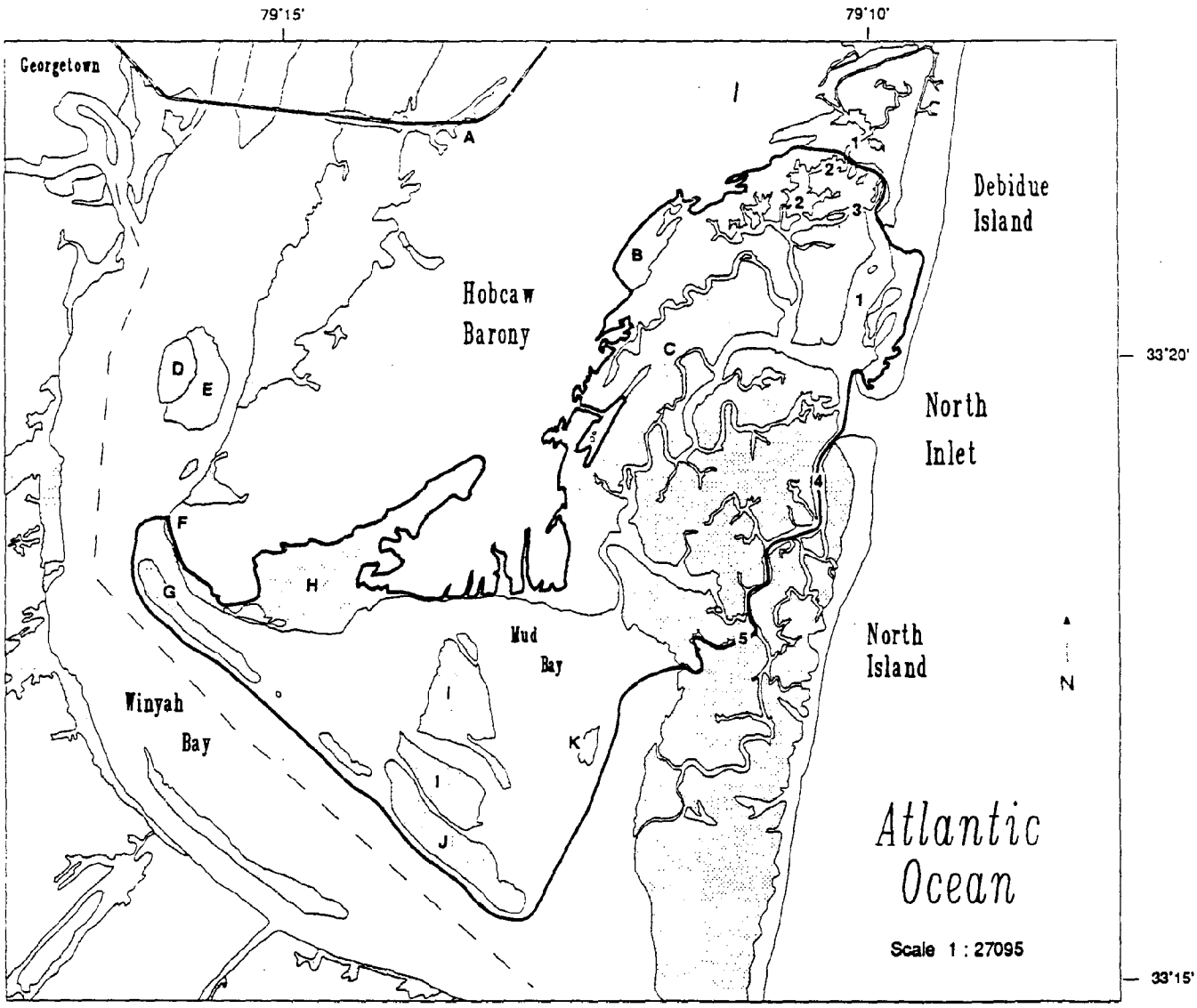


Fig. 2. Map of proposed North Inlet/Winyah Bay NERRS and surrounding area. Marshlands are shaded. Waterways, lands, and sites referenced in the text are designated as follows:

1	Debidue Creek	A	Hobcaw entrance, Bellefield Nature Center, and Kimbel Living and Learning Center	F	Frazier Point
2	Bass Hole Bay			G	Ranger Island
3	Cooks Creek	E	Field Laboratory complex	H	1,000 Acre Rice Field
4	Jones Creek	C	Clambank Landing	I	Marsh Islands
5	Haulover Creek	D	Rabbit Island	J	Malady Bush Island
— —	shipping channel	E	Hare Island	K	Pumpkinseed Island

and the Marine Science Program (BS, MS, Ph.D.) is ranked fourth in the country. In addition, at the USC field laboratory exists research and teaching facilities and the Kimbel Living Center, consisting of dormitories and a meeting center.

2. The site, an excellent example of an undeveloped estuary (North Inlet) being located next to a highly developed estuary (Winyah Bay), allows comparative estuarine studies on how natural and disturbed estuarine ecosystems function. Results of these studies will be applicable when addressing national management questions, a new focus of the 1990 reauthorization.

3. The Belle W. Baruch Foundation was established in 1964 "for the purposes of teaching and/or research in forestry, marine biology, and the care and propagation of wildlife and flora and fauna in South Carolina, in connection with colleges and/or universities in the State of South Carolina". A Tripartite Agreement between the Foundation, the University of South Carolina, and Clemson University and approved by the South Carolina Attorney General in 1975 established a formal long-term agreement for management of the Hobcaw Barony and states that its purpose and programs are to preserve and conserve the ecological and environmental qualities of its property and to preserve its historical value (see Appendix A for a copy of this agreement). As part of this agreement, specific regions of Hobcaw Barony were delineated for each university to manage and use in conjunction with the Foundation (map of areas included in Appendix A).

The Baruch Institute of the University of South Carolina (a state agency) is responsible for the marsh-marine portion on the Hobcaw Barony and it is these lands which form part of the Reserve. The Trustees discussed the NERR Program at various meetings beginning in 1988 and in detail at their December 7, 1990 meeting. They approved by mail vote the request that the Baruch Institute, USC enter into an agreement with the SC Coastal Council and NOAA to establish the North Inlet/Winyah Bay Reserve in accordance with NOAA regulations. The Tripartite Agreement is to be renewed in the year 2000 and no significant changes are anticipated. In keeping with the spirit of the Tripartite Agreement both universities and the Foundation have made long-term commitments to the existing programs. For example, with the approval of the Trustees, Clemson University has invested funds in staff to undertake long-term projects and to construct a laboratory facility. Also, the University of South Carolina has expended $3.2 million for dormitory-meeting center/laboratory complex and is funding an extensive teaching and long-term research program that is heavily dependent on the availability of Hobcaw Barony. Since the Foundation has allowed certain of their lands which the Baruch Institute manages for estuarine research and teaching to be included in the Reserve, no funds are requested from NOAA for land acquisition, an action consistent with the new 1990 regulations.

4. The environmental integrity is assured by existing Federal and State legislation (see section II A 4 d (3) for more details).

The regions of Hobcaw Barony which are proposed for inclusion on the Reserve were nominated in 1989 as a National Estuarine Research Reserve in accordance with Section 315 of the Coastal Zone Management Act of 1972. The Research Reserve Site nomination serves to bring together a complex of state and privately owned areas in Georgetown County under a coordinated resource management framework.

National Estuarine Research Reserve Sites are areas designated for long-term research and education through a joint Federal-state effort and allows for continuation of traditional uses as provided by state and Federal law (see Section III B). A primary objective of these areas is to provide to the state, region and nation information that is useful for decision-making, with respect to the development and/or protection of the coast and associated resources. The NI/WB NERR is one of two proposed reserves in South Carolina, the other being the ACE River Basin south of Charleston. General procedures for selecting, nominating, and administering these sites are presented in the National Estuarine Research Regulations (15 CFR Part 921, July 23, 1990, see Appendix C). The preparation of a management plan is a key requirement of these regulations and a means of ensuring that planned activities and development within a reserve conform to the original intent of the program.

As the southernmost estuarine systems in the Northern Carolinas section of the Carolinian Biogeographic Classification Scheme, the NI/WB NERRS includes one of the few remaining examples of a relatively undisturbed estuary (North Inlet) and a portion of a large, man-influenced estuary (Winyah Bay). Having portions of these two very distinct estuarine systems as part of the reserve allows for the development of research and educational programs comparing a wide spectrum of estuarine uses and ecological processes, from pristine to developed regions. In contrast to North Inlet, Winyah Bay has undergone substantial changes in the past, including episodes of increased or decreased freshwater flow, increased sedimentation, and measurable deterioration of water quality. These changes and the unique character of the freshwater, brackish, and high salinity wetlands provide a basis for research which will contribute to our understanding the ecology of a full range of diverse southeastern estuarine systems.

The plan provides the basis for various government agencies, universities, industry representatives, and private groups of concerned citizens to make recommendations about the protection and careful use of the estuaries. The management plan complements existing SC Coastal Council policies and is consistent with state and Federal jurisdiction over tidal waters within the Reserve, and the objectives and regulations established by the Belle W. Baruch Foundation for the marshlands they own which are included in the Reserve. It includes general policies

concerning resources and resource-use that will guide the NI/WB NERRS management team over the next five to ten years. Specific actions are also described for resource protection, research, education, and facility development.

The successful implementation of this plan depends heavily on cooperation and coordination among the Belle W. Baruch Foundation, The University of South Carolina, the South Carolina Coastal Council and other relevant state and Federal agencies. An Advisory Committee, consisting of representatives from government agencies, the Belle W. Baruch Foundation, The University of South Carolina, and the local community, will advise the Reserve staff. In addition, the Reserve staff will hold periodic public forums on the status of the Reserve.

Variable funding for staff and program development may affect specific aspects of Reserve management as described in this plan and the scale of programs may have to be adjusted based on unforeseeable factors. Nonetheless, the overall goals and management objectives of this plan will not be affected by variable funding.

2. Site Selection Process

On October 29, 1988, the S.C. NERRS Site Selection Advisory Committee was appointed by Senator John C. Hayes, III, Chairman of the SCCC.

The purpose of the committee was to consider potential NERR sites in South Carolina and to make a recommendation to the SCCC of one or more sites for inclusion in the national system. Staff of the SCCC served as staff to the Committee.

At an organizational meeting on November 14, 1988, the committee appointed two subcommittees to study two potential sites - the ACE Basin, which had been recommended by Governor Carroll Campbell, and the North Inlet-Winyah Bay site, an area which had been considered in the past as a potential reserve site. At the next meeting on February 6, 1989, both sub-committees gave reports on their respective sites. The sub-committee reports indicated both sites appeared to meet criteria for the NERRS Program and public comments should be sought. The Site Selection Advisory Committee voted to approve the sub-committees' reports for both the ACE Basin and North Inlet-Winyah Bay sites and moved to proceed with obtaining public comment.

A public hearing on the NI/WB site was held on May 17, 1989, in Georgetown, South Carolina. Concern was expressed about a possible impact on the shipping industry as well as public access. On July 17, 1989, the Site Selection Committee voted unanimously to recommend to the SCCC that both sites be nominated for inclusion in the NERRS. The committee also recommended that all public concerns must be thoroughly addressed during development of a management plan. At its

meeting of July 21, 1989, the SCCC, on recommendation of the site selection committee, approved the ACE Basin site and the North Inlet/Winyah Bay site for nomination to NERRS. Upon this decision, Council staff, in conjunction with staff from the South Carolina Wildlife and Marine Resources Department and Belle W. Baruch Institute, began preparation of the nomination package for submittal to NOAA under signature of Governor Campbell. On January 24, 1990, Governor Carroll Campbell nominated the ACE Basin and the North Inlet/Winyah Bay as separate Reserves because each site is located in a different biogeographic region (Appendix G and Figure 3). These two areas represent different zones of Biogeographic Classification Scheme: NI/WB site is in the Northern Carolinian Province and the ACE Basin site the South Atlantic portion of this province. The sites differ in their ecology and habitat types.

Nomination of these sites was made only after a thorough review of site evaluation criteria and the input of coastal scientists, state and local officials, affected landowners and the general public. Site selection criteria included:

a. Biogeographical Representation - whether the site represents the ecological conditions of the biogeographic zone of the Carolinian-South Atlantic Sub-Region in which it is found, fills a void in biogeographic representation in the state of S.C. and does not duplicate biogeographic representation in the Region;

b. Ecosystem Representation - whether the site encompasses an entire ecological unit, represents a significant component of the coastal ecosystem in light of the types of geomorphic features and biotic communities which are found in the state's coastal zone, fills a void in ecosystem representation in the state, and does not duplicate ecosystem representation in the Region;

c. Ecological Characteristics - whether the area's ecological characteristics contribute substantially to the quality of the estuarine environment through its biological productivity, diversity of flora and fauna, and other demonstrated ecological values and functions;

d. Naturalness - whether the site is relatively unaffected by past and present human activities and approximates a natural ecological unit where ecosystem processes can be studied in an undisturbed setting;

e. Research Potential - whether the site provides a natural field laboratory, has a history of research use or is desirable for use as a research site, and is important for addressing fundamental ecological questions and local coastal resource problems;

f. Educational Opportunities - whether the site is accessible and provides opportunities for educational and interpretive programs which are compatible with the research reserve character as a natural field laboratory; and

g. Management Considerations - whether the site available for incorporation into the NERRS can be protected under some type of formal mechanism (long-term management agreement, MOU), is of adequate size to assure effective protection from activities outside its boundaries, and will provide a stable environment for research and educational activities.

NOAA approved the site nomination on March 27, 1990 (Appendix H). This approval moved the Baruch Institute into the next phase of the designation process for the NI/WB NERR; preparation of this FEIS and final management plan (FMP). NOAA awarded SCCC $50,000 in Federal pre-designation funds to complete the DEIS/DMP and site characterization for the NI/WB site. The state is providing the required match through the Baruch Institute and SCCC. On November 20, 1991, a public hearing to review the DEIS/DMP was held. Comments at this meeting and subsequent written comments were addressed in the FEIS distributed in April, 1992.

Figure 3. Location Map for Proposed NERR Sites in South Carolina

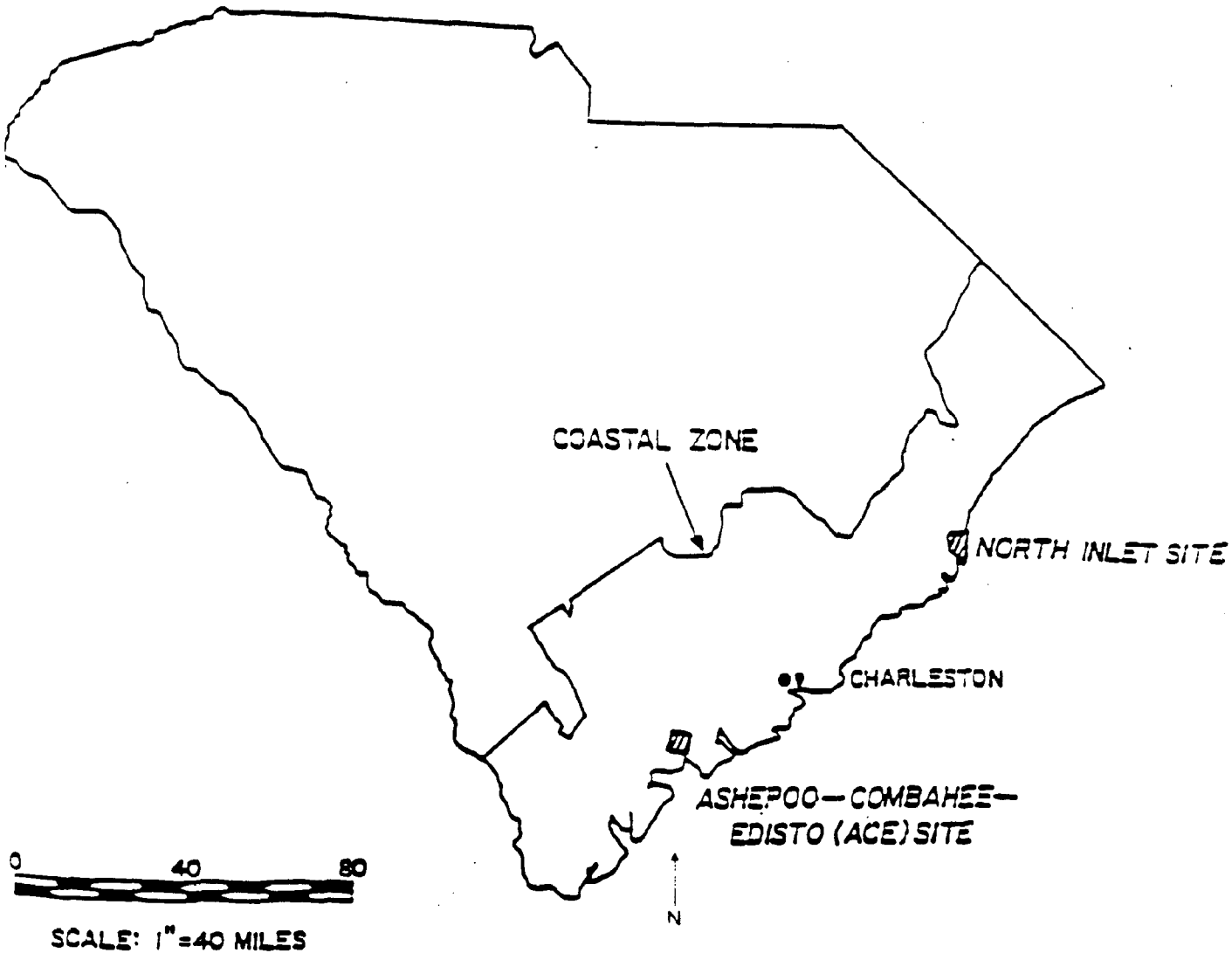


Figure 3. Location Map for Proposed NERRS Sites in South Carolina.

C. Reserve Goals and Management Objectives

The purpose of the NI/WB NERR is to establish and operate a Reserve consisting of two estuaries which represent the diversity of coastal ecosystems found within the region: an undeveloped high salinity estuary and a human-influenced, large salt-wedge estuary. This National Estuarine Research Reserve will be managed by the Belle W. Baruch Institute for Marine Biology and Coastal Research of The University of South Carolina (a state agency) in agreement with the MOU between NOAA, the South Carolina Coastal Council and the Baruch Institute (see Appendix B). Although the Baruch Institute, USC will be the lead agency, it will work closely with the SC Coastal Council and NOAA. Within the areas owned by the Belle W. Baruch Foundation, only those activities which are consistent with the objectives of the Foundation, the Reserve Program and state and Federal regulations and approved by the Foundation will be permitted (see Section II A for details).

NI/WB NERR will be managed to meet specific goals and objectives. The goals are long-term and somewhat open-ended, focusing on desired conditions rather than specific actions; the objectives are short-term, measurable steps that can be taken to fulfill the goals. The various activities and programs recommended for implementation under this plan are aimed at achieving the objectives and thereby fulfilling the goals. Each of the following four programs and activities are discussed in greater detail in Section II.

1. Resource Protection Program

This program is to protect the natural status of the ecosystem of the Reserve from disruptive activities. The site will be managed to afford the maximum protection of this environmental integrity to achieve the goals described in this management plan. The SC Coastal Council is responsible under Act 123 (Coastal Zone Management Act) of the 1977 South Carolina General Assembly to protect and improve coastal tidelands and wetlands. The entire core area of the NI/WB NERR, with the exception of the high ground portion of the few scatter islands located in Winyah Bay proper, owned by the Baruch Foundation, is under the protection of the SC Coastal Council according to authority under the CZMA (see Section II A for details of management program). The lands of the Baruch Foundation to be included in the NERR have been set aside in perpetuity for conservation and the study of marine biology and forestry. The Baruch Institute has a long-term agreement with the Foundation to manage the lands to be included in the NERR (see Appendix A). The Foundation provides security for the protection of their resources.

2. Research and Monitoring Program

The Research and Monitoring Program will conduct comparative research on an undisturbed estuary (North Inlet) and a man-influenced estuary (Winyah Bay) in order to achieve an understanding of the entire estuarine system and its watershed. Research results will provide a scientific basis for making decisions about coastal zone management. Various environmental parameters will be monitored on a long-term basis to detect natural interannual variation.

3. Education, Interpretation and Recreation

This program is to enhance public awareness, understanding, and wise use of estuarine resources in the North Inlet and Winyah Bay estuaries. In addition, this program will provide for traditional uses of Reserve as provided by state and Federal laws.

4. Facility Development

This program is to provide the necessary facilities for research and educational activities.

5. Public Access

This program is to provide public access following existing practices and NERRS regulations. NERRS regulations require that reserves shall be open to the public to the extent permitted under State and Federal law. Public access may be restricted to certain areas within a research reserve. The Reserve policy will continue the current practice that the public has access to the North Inlet and Winyah Bay portions of the Reserve by boat, including power boats. According to Federal and State laws, no tidal waters can be restricted to public access. Currently, public access to the uplands portions of the property, including areas designated to be included in the Reserve boundaries is restricted. However, authorized individuals involved in approved projects utilizing the resources of the Reserve can gain access to the upland laboratory area by entering through an electrically controlled gate near U.S. 17. Other members of the public will be welcomed at the Nature Center and will be provided access to the uplands through scheduled tours of the Reserve. For further details of this program see IIAa 4c (10) and IV 5B i.

II. Alternatives (Including the Proposed Action)

The action under consideration by NOAA is a proposal from the State of South Carolina to establish a NERR in the North Inlet/Winyah Bay region of Georgetown County.

This section considers a number of reasonable alternatives which were analyzed during development of this document. The "preferred alternative" is the one the Baruch Institute believes would fulfill its mission and responsibilities in the North Inlet/Winyah Bay estuarine systems. It has been developed in detail as the proposed management plan, giving consideration to economic, environmental, traditional uses and other factors. The "no action" alternative proposes that the NI/WB site not be designated as a NERR and there is no change from current management direction or level of management intensity. Other alternatives discussed include boundary modifications and different management options.

A. Preferred Alternative

1. General Description and Biogeographic Classification of the North Inlet/Winyah Bay NERR

The proposed NI/WB NERR is the southernmost estuarine system in the Northern Carolinas section of the Carolinian Biogeographic Classification Scheme. It is unique in a local, regional, and national context. It consists of parts of two estuarine systems, an undisturbed estuary (North Inlet) and portions of an estuary which has been influenced by human activities (Winyah Bay). The North Inlet Estuary represents a discrete, high salinity estuarine system that is surrounded almost entirely (90%) by highlands owned by the Belle W. Baruch Foundation. The wetland portion of the estuary is managed by the Baruch Institute, University of South Carolina, a state agency, and the State of South Carolina. The remaining highlands that are part of the Debordieu Colony, an exclusive residential development, and North Island, owned by the Yawkey Foundation and managed by the SC Wildlife and Marine Resources Department, do not border on the core region of the reserve. Winyah Bay is one of the major estuarine ecosystems in the southeastern United States. The entire Winyah Bay watershed is approximately 18,000 square miles. Only the Mud Bay region of Winyah Bay, which interconnects with North Inlet estuary, is included as part of the reserve.

The North Inlet system offers outstanding examples of coastal wetland habitats that have been subjected to a minimum of human disturbances. In contrast, the neighboring Winyah Bay has been subjected to various industrial, residential, commercial, shipping, and dredging activities in addition to receiving drainage waters from vast regions of North and South Carolina. Together these two estuaries present an excellent opportunity to compare and contrast ecosystem responses of an undisturbed estuary with those of a disturbed system. Differences in the salinity regimes and associated flora and fauna between the North Inlet Estuary and sections of Winyah Bay also provide opportunities to conduct comparative research regarding ecosystem structure and fisheries habitat utilization.

2. Location and Access

The proposed North Inlet/Winyah Bay site, consisting of a core area and a buffer zone, is located in Georgetown County, SC. The North Inlet Estuary portion of the Reserve is a semi-enclosed body of water surrounded by terrestrial areas (Waccamaw Neck, North Island, and Debidue Island), with a major aquatic connection to the Atlantic Ocean and minor connections to Winyah Bay. Other areas in the Reserve include portions of the wetlands bordering Winyah Bay on the southern side of Waccamaw Neck, including the 1000 acre Rice Field, and the Marsh Islands, Malady Bush Island, Pumpkinseed Island, and Ranger Islands.

Access to the Reserve by land is from highway US 17 about 1 mile north of Georgetown. Immediately off the highway is the Nature Center of the Baruch Foundation and the USC Kimbel Living Center. An electric gate near the Nature Center limits entrance to the main part of the Hobcaw Barony without authorization. Research investigators and official visitors utilizing the Reserve facilities will be permitted entrance. The research facilities are located approximately 2 miles from the entrance gate. Hobcaw Barony is approximately 30 miles south of Myrtle Beach and 50 miles north of Charleston. Major airlines service both cities.

3. Boundaries and Acquisition Plan

Boundaries for a NERR site must include "an adequate portion of the land and water areas of the natural system to approximate an ecological unit and to ensure effective conservation" (Federal Register, Vol. 53, No. 209, Section 921.11). These areas must be discrete enough to be effectively managed, but large enough to make long-term research possible. To help focus management efforts, site boundaries encompass two zones; key land and water areas (core areas) and buffer zones.

NOAA's Guidelines for Establishing Proposed Boundaries for National Estuarine Reserves define core areas as areas which contain "critical estuarine ecological units for research purposes, encompassing a full range of significant physical, chemical and biological factors contributing to the diversity of fauna, flora and natural processes occurring within the estuary." The core area is "so vital to the functioning of the estuarine ecosystem that it must be under state control sufficient to ensure the long term viability of the reserve for research on natural estuarine processes. [These areas] should encompass resources that are representative of the total ecosystem which, if compromised, could endanger the research objectives of the reserve." A buffer zone is defined as an "area adjacent to or surrounding the core and on which the integrity of the core depends. This area protects the core and provides additional protection for estuarine dependent species." It may include an area for research and education facilities.

Site surveys have been conducted to establish proposed boundaries for the NI/WB site. The original boundary lines as described in the nomination document have been changed based on recommendations made by: advisory committee, NOAA, site property owners, and through public comments. Management and acquisition strategies, including an MOU with the SC Coastal Council and Tripartite Agreement with the Baruch Foundation, establish adequate state control to provide long-term protection for reserve resources within these boundaries. No expenditure of Federal and state funds will be required for acquisition. No condemnation procedures will be used.

The North Inlet - Winyah Bay Site boundaries are indicated on Figure 2. The northern boundary of the North Inlet Estuary portion of the Reserve begins in the northwest at the upper edge of the marsh abutting the uplands of the property of the Belle W. Baruch Foundation immediately west of the confluence of Bass Hole Bay and Debidue Creek. From this point the northern boundary is the Debidue Creek east to where Cooks Creek enters Debidue Creek, then the boundary line extends east to Debidue Island. The eastern border extends southward along Debidue Island to North Inlet, then continues down Jones Creek to Haulover Creek where the boundary line follows Haulover Creek to Mud Bay. The boundary line then extends southward and east of the marsh land into Mud Bay past Pumpkinseed Island to a point 150 yards north of the existing shipping channel.

The southern boundary extends westward from this point, paralleling a line which crosses the southern end of the island complex of Malady Bush Island-Marsh Islands and Ranger Island at the mean low water mark, a line north of the existing shipping channel. West of Ranger Island the boundary line continues north to Frazier Point

The landward boundary on the North Inlet segment of the reserve is the uppermost reaches of existing Spartina alterniflora and includes the highlands surrounding the Baruch Institute, USC, laboratory complex and the Clambank Landing portions of Goat Island. The landward boundary on the Mud Bay segment of Winyah Bay is the dominant wetlands vegetation. In addition the uplands associated with the Kimbel Living Center and managed by the Baruch Institute are part of the reserve. It is estimated that the core area occupies approximately 9,000 acres.

The buffer zone between the core area of wetlands and the upland forested ecosystem is that ecotone region of transitional vegetation (approximately 50 m wide, approximately 80 acres) between the dominant marsh grasses and the forest vegetation. Portions of Debidue Island, marshlands immediately adjacent to the northern boundary line, the waters of the Atlantic Ocean adjacent to the mouth of North Inlet, North Island (a wildlife refuge owned by the Yawkey Foundation) which is south of North Inlet and east of south Jones Creek, and the waters of Winyah Bay

north of the ship channel form the outer boundary of the buffer zone. These waters are subject to state and Federal environmental protection laws and regulations. Aquatic areas within the Reserve can be reached by boat via tidal waters which are part of the public domain.

No acquisition of land is being proposed at present. However, if additional parcels are identified that are essential for an expanded research program, it would be possible to adjust the Reserve's priorities to consider adding to the Reserve as required by NOAA regulations. Through a long-term agreement with the Baruch Foundation, the Baruch Institute (a state agency) manages the portion of the Foundation's lands to be included in the reserve and the State owns the remaining areas of the reserve. The Trustees of the Baruch Foundation have approved the Institute's participation in the NERRS program by letter vote after presentation of the Draft Management Plan at their December 7, 1990 meeting. This approval is in accordance with the Tripartite Agreement. In allowing us to participate in this program, they understand the long-term commitment to the NERRS program which is consistent with the Foundation goal of establishing their marshlands in perpetuity for marine studies.

4. Draft Management Plan

a. Overall Management and Development Concept

Management of the North Inlet-Winyah Bay Reserve involves the following functions: administration; resource protection; research, monitoring; education; and facilities development and land acquisition. The administrative framework ensures oversight and coordination of the various functions. The proposed management structure of the NI/WB NERR is graphically presented in Figure 4.

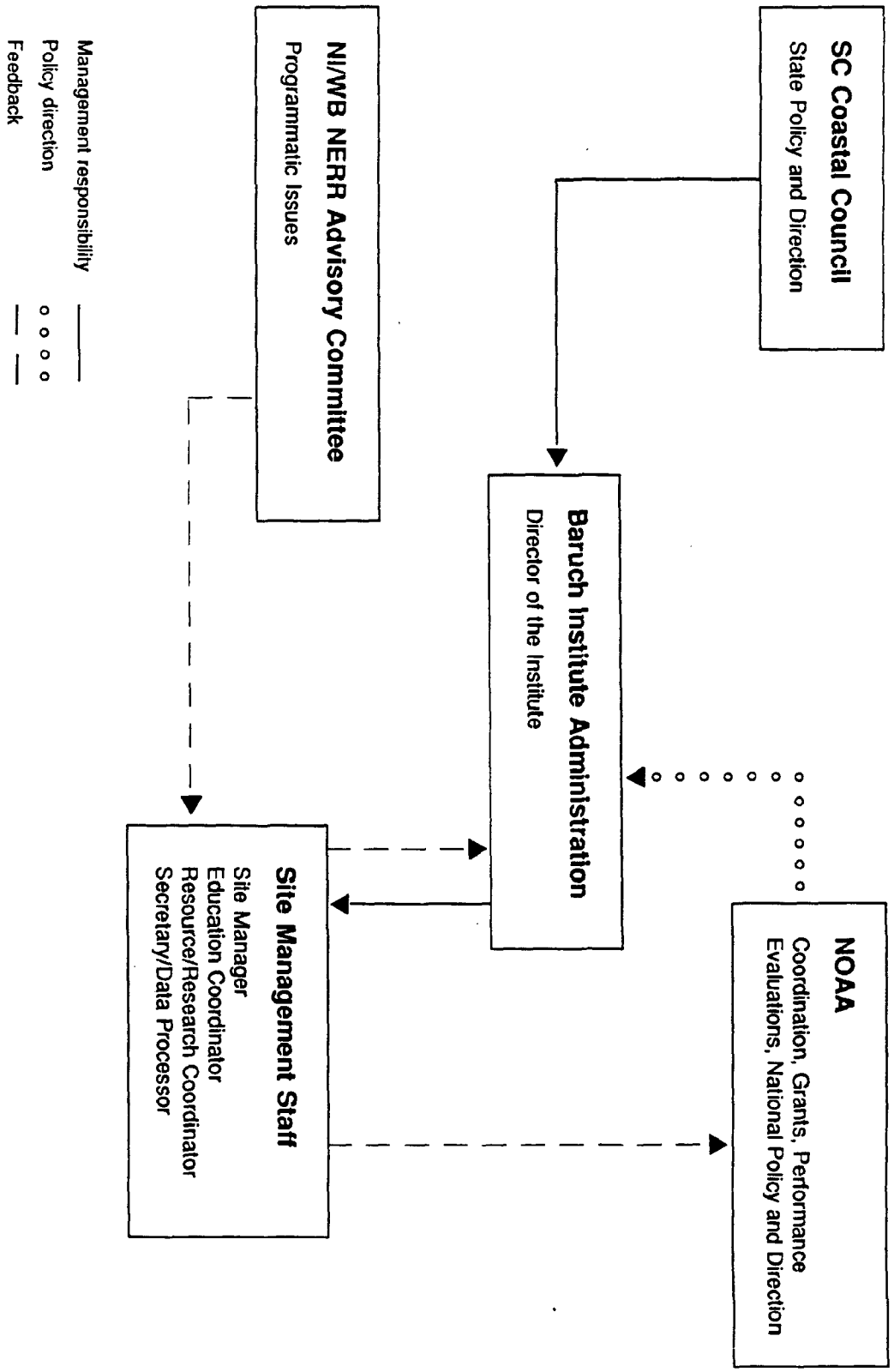
The primary management goals of the reserve are to:

- Establish and manage the North Inlet area within the boundaries of the Reserve as a natural field laboratory and the other area (Winyah Bay) as an area influenced by human activities. Having these two areas will permit comparative ecosystem research on two distinctly different types of estuaries which are in close proximity.

- Protect research sites and make them available for continuous long-term and future studies of the natural processes and ecological relationships shaping and sustaining the estuarine system.

- Conduct, coordinate and facilitate short- and long-term estuarine research and monitoring.

Fig. 4. North Inlet/Winyah Bay NERRS Proposed Management Structure



- Gather and distribute information on estuarine ecosystems that is essential to sound decisions regarding the management of coastal resources.

- Conduct and coordinate educational activities that increase the public's awareness and understanding of estuarine ecosystems, human effects on them, and their importance to the State and the nation.

- Provide for traditional multiple uses that are consistent with Reserve research in order to ensure the continuation of existing traditional uses described elsewhere in this document.

- Facilitate site access as appropriate for research, education and compatible uses, and control access for unallowed uses.

- Develop facilities as necessary to aid in research and education.

- Promote cooperative management among Federal, state and local agencies and reserve property owner.

- Coordinate with existing programs in the areas of the reserve to maximize the research and educational potentials of the site.

b. General Policies

The following highlights the general policies of the NI/WB NERR. More specific policies are detailed throughout this document in the appropriate sections, (e.g. specific research policies are detailed in the Research section).

(1) Research reserve activities and facilities at the Reserve will augment, not replace, the conservation, research, education, and other functions of the basic programs currently in operation. Programs should also be complementary to the traditional public recreational uses of the area.

(2) Unless otherwise stated in a Memorandum of Understanding (MOU) or other management document, site property owner will continue to fund, operate, and administer its lands and facilities, including those portions designated in the reserve, and will continue to conduct activities and programs under its mandate. Goals of the site property owner and goals of the Reserve are compatible. Reserve status does not limit an owner's ability to conduct such activities as long as the activities do not adversely affect implementation of the NI/WB NERR Management Plan, conflict with reserve goals, or have any adverse impact on the natural resources of the reserve.

(3) The NI/WB NERR uses a cooperative approach involving the Baruch Institute, SC Coastal Council, site owner, local government agencies and private organizations. An Advisory Committee will assist in providing a forum for input from various interest groups for management of the Reserve. Arrangements will be made to share use of existing facilities and to provide basic support services to carry out the NI/WB NERR Management Plan.

(4) Although the SC Coastal Council is the designated State Agency to administer SC Coastal Zone Management Program and to receive fiscal awards, the Council, through an MOU, has named the Belle W. Baruch Institute, USC (a state agency) as the management agency for the NI/WB NERR (see Appendix B).

(5) Present levels of traditional, public, compatible uses at and adjacent to the site will continue as provided for by local, state, and Federal law. The activities of adjacent property owners will not be restricted by reserve designation.

c. Administration

(1) Administrative Framework

Since NERR programs are delegated by the CZMA to states, the overall program responsibility resides with the SC Coastal Council. However the SCCC has designated the Baruch Institute, USC (a state agency) to be the management agency, (see MOU, Appendix B). Implementation of the various facets of the program, from land planning to site management, program development, and enforcement, is accomplished through a coordinated and cooperative effort by the Baruch Institute and several state and county agencies, universities, private organizations and NI/WB NERR Advisory Committees. This type of effort is essential because much of the management structure involves existing agencies, laws, and programs.

(a) Management Agency.

The primary responsibility for management of this site will be undertaken by the Belle W. Baruch Institute for Marine Biology and Coastal Research, University of South Carolina (a state agency). The Institute interacts closely with the Belle W. Baruch Foundation in that the Institute has a long-term contract with the Foundation which was approved by the SC Attorney General to manage marine lands belonging to the Foundation. In addition the Foundation has approved the Institute to participate in the NERRS program. The Institute was established in 1969 through the joint action of the Baruch Foundation and the University of South Carolina-Columbia. Estuarine research was initiated in 1969 and a year-round program with a resident staff started in 1972 when the first field laboratory was built. Since 1969 the Institute has administered

over $13 million in grants, contracts, and awards involving multidisciplinary research and education. The Institute is a research branch of the University of South Carolina-Columbia and the Director reports to the Dean of the College of Science and Mathematics. The Institute is funded by state appropriated funds as well as funds from Federal and private sources. The Institute will administer funds provided to the South Carolina Coastal Council by NOAA and from other state sources. Every attempt will be made to obtain additional funds from private sources to enable the Reserve to be as self-sufficient as possible. The personnel associated with the Reserve will be employees of USC. Because the objectives of existing programs are very similar to those of the NERRS program, no major changes in the existing management strategy are planned except for the important addition of Reserve personnel as described below. Also, no new state or Federal regulations will be proposed because existing Federal, state, and foundation regulations already protect the area proposed to be within the site boundaries.

(b) Other Involved Agencies/Organizations

(i) Relationship between SC Coastal Council and Management Agency

Although the South Carolina Coastal Council is the designated State agency to administer programs and receive fiscal awards under the Federal Coastal Zone Management Act, the Council chooses not to be involved in direct land acquisition and management. Therefore, the Council has designated the Belle W. Baruch Institute for Marine Biology and Coastal Research, a state agency and an arm of the University of South Carolina, as the management agency for the NI/WB NERR site. Under contract with the Council and in cooperation with NOAA, the Institute will be responsible for development and implementation of the Management Plan and day-to-day operation of the reserve site. The Council will serve as the fiscal agent in acquiring funds from NOAA and will provide increased surveillance and enforcement to ensure compliance with the Coastal Zone Management Act and the NI/WB NERR Management Plan. The Council will also serve on the Reserve's advisory committee and provide input into identifying coastal research needs.

The purposes of Act 123 of the 1977 South Carolina General Assembly were to "establish the South Carolina Coastal Council and provide for its powers and duties for the protection and improvement of coastal tidelands and wetlands under a coastal zone management plan; provide for enforcement of policies of the Council and penalties for violations; and authorize legal proceedings for the determination of tideland properties." Act 123, better known as the South Carolina Coastal Management Act, was implemented in accordance with the Federal Coastal Zone Management Act as amended (P.L. 92-583, 94-370) and a subsequent coastal zone

management program was developed and approved by the U.S. Secretary of Commerce in 1979 which met the requirements of 15 CFR part 923 (Federal Register, March 1, 1978).

(ii) Other agencies/organizations

Although the Institute will manage the site, interactions with state regulatory agencies (i.e., SC Wildlife and Marine Resources Department and the SC Department of Health and Environmental Control) will be maintained to ensure protection of the site. In addition to interactions with state regulatory agencies, the Baruch Institute, USC, has an agreement with the Belle W. Baruch Foundation to manage the marsh-marine portions of Hobcaw Barony included in the Reserve under the terms of a Tripartite Agreement which exists between the Belle W. Baruch Foundation, The University of South Carolina, and Clemson University. This agreement describes the role of the two universities in managing the lands associated with the Hobcaw Barony. None of the lands managed by Clemson University are included in the Reserve. The trustees of the Foundation have established most of the terrestrial habitats adjoining the western border of North Inlet and much of the land bordering the Mud Bay section of the Reserve as an area for systems ecology research.

SC Wildlife and Marine Resources Department, Division of Marine Resources (SCWMR)

The Division of Marine Resources is responsible for the conservation and orderly development of the state's marine resources through planning, research, management, and public education. The Division also has the primary responsibilities for management and development of commercial and recreational fisheries in the coastal area, including the regulation and control of commercial fishing seasons (areas and equipment), management of public shellfish grounds, and records of fisheries statistics. The Division is also active in environmental and ecological concerns, especially those which impact coastal fisheries habitats.

SC Department of Health and Environmental Control (SCDHEC)

The goal of the SCDHEC Shellfish Sanitation Program in South Carolina is to ensure that shellfish and the areas from which they are harvested meet the health and environmental quality standards provided by Federal and state regulations, laws, and guidelines. Additionally, the Department promotes and encourages coastal quality management programs consistent with protected uses established through the state water classifications and standards program.

Belle W. Baruch Institute Forest Science Institute of Clemson University

The Belle W. Baruch Forest Science Institute was established to implement an agreement between the Belle W. Baruch Foundation and Clemson University to accomplish the objectives of The Belle W. Baruch Foundation and of Clemson University relative to education and research in forestry and closely related sciences. Although Clemson has no management jurisdiction over the Reserve, it is responsible for maintenance of Hobcaw Barony except for the USC Field Laboratory. The Reserve will interact with Clemson in matters of mutual interest, as is the current practice.

Others

Over the course of time, the Reserve Management will interact with other local, state, Federal, and private organizations in respect to management activities.

(iii) Advisory Committees

An Advisory Committee will be established which will have one member selected (except as noted) from the following agencies and local interest groups:

- the Belle W. Baruch Foundation
- the marine scientific community (2)
- the education community (2)
- management of harbor-related industries
- labor from harbor-related industries
- representative of the Georgetown Sportfishing Association
- Georgetown County Chamber of Commerce
- South Carolina State Ports Authority
- an environmental interest group
- the League of Women Voters
- a Debordieu Colony land owner
- the Yawkey Wildlife Center, SC Wildlife and Marine Resources Department
- the Waccamaw Regional Planning Office
- the Belle W. Baruch Forestry Institute, Clemson University
- the Georgetown County Council
- the Georgetown City Council
- representative of SC Sea Grant Consortium
- representative from SC Waterfowl Association
- general public (2)
- any others deemed appropriate by the Nominating Committee

In addition, a representative of the SC Coastal Council, NOAA (SRD), and the Dean of the College of Science and Mathematics, USC, will serve as ex-officio,

non-voting members. The Director of the Baruch Institute, USC, will serve as chairperson and will vote in case of ties.

The activities of the Advisory Committee will include:

- Advising the Reserve Manager on matters of policy relating to planning and operation of the Reserve;

- Assisting in seeking support for the research and educational programs and other financial matters;

- Assisting in the preparation of any periodic summary or annual reports on the operations of the Reserve; and

- Representing the interests of the users of the Reserve, its neighbors, and the users of information and educational materials generated by the Reserve

The Advisory Committee will have regular meetings at least twice a year. Special meetings may be called by the chairperson and/or upon the request of five committee members. The committee members will receive four weeks written notice of regular meetings and two weeks written notice of special meetings.

A Nominating Committee, consisting of the Reserve Manager, Education Coordinator, Chairman of the Georgetown County Council, President of the Debidue Property Owners Association, Executive Director of the Georgetown Chamber of Commerce, Superintendent of The Georgetown County School System, President of the Georgetown Sportfishing Association, and Director of USC Field Laboratory, will submit a list of potential Advisory Committee members to the Chairperson of the SC Coastal Council for action. Appointments to the Advisory Committee will be for one year with a limit of three successive reappointments. Upon the advice of the Advisory Committee, the Chairperson will appoint subcommittees. Initially a Research and Monitoring Subcommittee and Education Subcommittee will be established.

Research and Monitoring Subcommittee

The Research and Monitoring Subcommittee will consist of appropriate Advisory Committee members and other technical representatives from the scientific and academic communities. The Subcommittee will advise the full Committee on research and monitoring activities with the reserve and will be responsible for the following:

Review and approval of priorities for research and monitoring projects;

Review research and monitoring proposals and interim and final research and monitoring reports;

Monitor and provide advice on local issues and new opportunities for cooperative research and monitoring; and

Evaluate overall progress toward achieving research and monitoring priorities and adjust long-term direction accordingly.

Education Subcommittee

The Education Advisory Subcommittee will be composed of appropriate Advisory Committee members and representatives from area institutions of education, state agencies involved with education and others. This Subcommittee will be responsible for the following:

Review and approval of the list of annual priorities for education and interpretation activities for the reserve;

Review of education proposals and design proposals for all education and interpretive facilities, displays, media curriculum, training programs, etc., and monitor progress of specific activities to ensure that they are consistent with the goals of the reserve program and this management plan; and

Evaluation progress toward achieving priorities for education and interpretation and adjust long-term priorities accordingly.

(2) Resource Protection

The resource protection goal of the North Inlet/Winyah Bay Reserve is to protect the natural ecosystem integrity of the Reserve. This goal is consistent with the present protection goal of the SC Coastal Council (as described previously), the Belle W. Baruch Foundation, and the Baruch Institute, USC. Existing state and Federal laws and regulations also provide for protection of the Reserve. Hence no departure from existing practices will occur from designation of the NI/WB NERR. At present the Belle W. Baruch Foundation provides funds for personnel to protect the resources of Foundation property to be included in the Reserve and the Reserve does not currently plan to request funds for this purpose. State and Federal agencies currently enforce their regulations in areas under their jurisdiction and will continue to do so after the Reserve is established. Reserve personnel will work closely with both the Foundation and state and Federal enforcement agencies to increase resource protection when necessary.

(3) Research and Monitoring

The Reserve research and monitoring goal is to utilize this site for long-term studies to gain a better scientific understanding of how natural and human processes influence the ecological dynamics of estuaries and associated habitats. In addition, information will be developed which could be useful in the process of decision-making by various levels of government. The Reserve's research and monitoring activities would augment the Long-Term Ecological Research Program (LTER) currently funded by the National Science Foundation. The LTER Database will be continued to provide a basis for understanding long-term phenomena. The Reserve will encourage multidisciplinary research on the flora, fauna, water quality and nutrients, geology, and physical oceanography of estuaries to help explain ecosystem-level dynamics. Modelling at various levels of ecological complexity ranging from populations to sub-components of the estuarine system to estuaries to landscapes will be promoted. Studies utilizing past research results to address data gaps in our database will be encouraged. The Reserve will stimulate the effective use and communication of research results.

(4) Education

The Reserve will strive to enhance public awareness, understanding, and wise use of estuarine resources. It will promote knowledge of the National Estuarine Research Reserve System, the NI/WB Research Reserve, its resources, and its programs as well as knowledge of broader coastal issues and concerns related to estuarine management and protection. In collaboration with the Baruch Nature Center and other organizations, it will provide educational and interpretive services to user groups, including teachers, civic groups, and student groups. The Reserve will encourage the development of volunteer programs and assist in providing facilities and expertise.

(5) Facilities Development

As the program develops, it may be necessary to expand the existing research and/or educational facilities. Any expansion will conform to the existing state practices, as well as approval by the Baruch Foundation and various university and state committees. If facility funds are provided by NOAA, the development must also conform with NOAA regulations (see Appendix C for more details).

(6) Proposed Administrative Staff

An adequate staff is essential to meeting the research, education, and other objectives of the NI/WB NERR. Staffing will be met through a combination of support from Federal, state, and private organizations. All staff members will be employees

of USC will be hired according to established university/state policies. The Reserve Manager will be the principal administrator of the Reserve and will be responsible for ensuring that the NERR policies and regulations contained in the Reserve Management Plan are followed. This individual, who will be employed and supervised by the Baruch Institute, USC, will report directly to the Institute Director, will be responsible for the following activities:

(a) developing and implementing resource management, research and monitoring, and education programs.

(b) managing of the Reserve's program on a day-to-day basis.

(c) coordinating the NI/WB NERR programs with SC Coastal Council and NOAA staff

(d) supervising Reserve funded staff

(e) maintaining records and preparing reports and proposals associated with Reserve program

(f) coordinating local programs with state and Federal programs, and attending appropriate meetings

(g) preparing budget and being responsible for expenditures

(h) conducting public relations programs and working with media and local groups

(i) participating in advisory and management committees

(j) coordinating Reserve research activities (visiting and collaborating scientists) with existing research programs and facilities

In addition to the Reserve Manager, two key administrative staff members are the Research/Resource Coordinator and the Education Coordinator. Their duties are as follows:

Research/Resource Coordinator

(a) develop and implement resource assessment program

(b) measure environmental variables as part of long-term monitoring effort

(c) prepare description and maps of vegetation and faunal resources

(d) maintain field instruments and accesses to research and education areas

(e) assist research and education staff with Reserve's field programs

(f) assist protection and regulatory personnel in safe-guarding the environmental integrity of the site

Education Coordinator

(a) develop and coordinate education program activities that are consistent with the goals and objectives of the Reserve and NERRS

(b) evaluate the effectiveness of the education program and modify activities accordingly

(c) monitor and adjust education program activities as necessary to assure that they do not negatively impact the research and management goals of the reserve

(d) coordinate reserve education activities with education program activities of the Bellefield Nature Center, operated by the Belle W. Baruch Foundation

(e) conduct periodic needs assessments to determine new areas for program development

(f) assist in the establishment of and serve as a liaison to the Education Advisory Sub-committee

(g) assist in the establishment and coordination of a volunteer program

(h) assist in the development of grant proposals to support the continuation and expansion of the education program

(i) coordinate activities with NOAA (SRD) national education program coordinator

In addition to these three positions a secretary-data processor needs to be hired who will be responsible to the Reserve Manager, will handle the various secretarial tasks associated with the program, and assist the existing data management program

with those topics relating to the Reserve's activities. As the program develops, the need for additional personnel will be evident. It is anticipated that a research technician(s) will be needed to assist in field studies and monitoring of living resources and of physical/chemical/geological factors.

(7) Enabling Agreements

A Memorandum of Understanding (MOU) is established between NOAA, the State of South Carolina, and the Baruch Institute, USC for management purposes (see Appendix B). This document describes the interaction between NOAA (SRD), SC Coastal Council, and the Baruch Institute, USC, a state agency. The MOU establishes a commitment on the part of the State and the Baruch Institute, acting for the property owners, to protect the natural processes and resources of the site for research and education purposes. The MOU describes in detail the relationship between the SC Coastal Council and the Baruch Institute and includes information on the responsibilities of each party, conditions of financial assistance, and other arrangements. The proposed MOU is included in Appendix B.

In addition, the Baruch Institute has a long-term tripartite agreement with the Baruch Foundation (Appendix A) to manage their marine program, including its lands associated with the marine program which are to be included within the boundary of the Reserve. The Belle W. Baruch Foundation has been established in perpetuity to preserve and conserve the ecological and environmental qualities of Hobcaw Barony as well as to preserve its historical value. The Foundation has approved the Institute's participation in the NERR system. The other portions of the Reserve are owned by the State of South Carolina. No property acquisition is required at present.

(8) Federal Government - NOAA Program Review

The research reserve program operates as a Federal/state partnership. Although the management of a reserve is a state's responsibility in the long term, NOAA cooperates with and assists the states on a day-to-day basis, and reviews state programs regularly. The purpose of the NOAA review is to ensure that a state is complying with Federal NERR goals, approved work plans, and reserve management plans. The primary mechanisms used by NOAA to review state programs, as well as NOAA responsibilities pertaining to reviews, include the following:

NOAA staff, in particular the project manager for a state's reserve, communicates directly and regularly with state reserve staff. Communication builds a level of trust between Federal and state staff, and familiarizes both NOAA and the state personnel with reserve management procedures and policies. This cooperative approach is needed for a research reserve to be successful. Both oral and written communication are necessary, and site visits, as travel funding allows, is advisable.

Another mechanism available to NOAA is its research reserve funding program. NOAA provides different categories of funding to a reserve, and for each cooperative agreement, quarterly progress reports and a final report are required. NOAA personnel carefully review the reports and associated communications to ensure compliance with program policies and specific award conditions.

The site designation process was also a primary avenue through which NOAA reviews actions. A state's site nominations must be assessed and endorsed by NOAA prior to formally beginning the designation process. As part of this preliminary stage, the site selection and public participation processes are evaluated by NOAA. When the DMP and DEIS have been completed they must also be approved by NOAA before the final versions of each document are written. NOAA staff have the responsibility of working with the state to select and designate national estuarine reserve sites.

Finally, pursuant to CZMA enabling legislation (Sections 312 and 315), NOAA must conduct performance evaluations of the operation and management of each reserve, every three years while Federal financial assistance continues. If deficiencies in the operation or types of research conducted at a reserve are found, NOAA may withdraw financial assistance to the reserve until remedies are in place. National Estuarine Research Reserve designation can be withdrawn by NOAA when a reserve is found to be deficient and fails to correct deficiencies within a reasonable time.

The state must submit an annual report after Federal financial assistance for operations and management has been discontinued. NOAA will conduct performance evaluations at least once every four years after Federal financial assistance for operations has stopped.

(9) Proposed Implementation Timetable

The following tables outline the timetable for implementation of the final management plan. Table 1 outlines the development of reserve operations and facilities. Table 2 outlines annual staff needs for the reserve. The implementation of this plan does not represent duplication of previous research nor research currently funded by other agencies. Monitoring inventory programs require periodic sampling on a long-term basis to establish patterns of interannual variation.

(10) Public Access

Section 921.13 (a) (5) of the NERRS regulations requires a plan for public access as part of the overall management plan; however, the regulations do not specify what the public access plan must contain nor the extent to which the reserve must be available for public visitation. The regulations do state that use levels are set

by individual states and that acceptable uses must be consistent with the program mission and goals. In aggregate, the site will contribute to balanced access to the whole reserve system.

Opportunities for public access are evaluated on the basis of the following criteria: (1) sensitivity of resources to human activities; (2) compatibility with research activities; (3) comparability with traditional uses; (4) compatibility with adjacent land uses; (5) existing degree of public access. Decisions on access also consider the policies of affected property owners.

Public access to the Reserve will follow existing practices in that the Public has access to the North Inlet and Winyah Bay portions of the Reserve by boat, including power boats. Research plots, which will be studied for a finite period of time, will be marked with signs requesting that they not be disturbed by the public. According to Federal and State laws, no tidal waters can be restricted to public access. The South Carolina Coastal Council reaffirmed this policy on public access in a Resolution passed on December 13, 1991 (Appendix M).

Currently, public access to the upland portions of the property, including areas designated to be included in the reserve boundaries, is restricted. The property consists of 90 miles of single lane dirt road. In order to protect the habitat and sensitive resources from human activities, to protect the integrity of ongoing and projected research activities, and maintain the integrity of the adjacent property owners, unrestricted use of the uplands portion of the Reserve is not permitted. This policy is consistent with current practices for the Foundation property and will remain in effect. However, authorized individuals involved in approved projects utilizing the resources of the Reserve can gain access to the upland laboratory area by entering through an electrically controlled gate near U.S. 17.

Table 1. IMPLEMENTATION: OPERATION AND FACILITIES

Predesignation	* DEIS/DMP completed * DMP Advisory Committee * Some coordination of research projects * Some coordination of education projects * Receive comments on DEIS/DMP; then work to complete FEIS/DMP and FMP
First year after FMP approval	* Management plan approved * Appoint Advisory Committee * Increase coordination of education program with Nature Center * Increase coordination of research/monitoring programs with ongoing research * Initiate monitoring and baseline inventory programs * Integrate data management system with LTER data management system * Develop brochures * Staff participation in research and education workshops * Initiate intersite cooperative programs * Planning for second year
Second year	* Continue coordination of site education programs as they develop * Increase coordination of research/monitoring/baseline inventory with ongoing non-NOAA programs * Develop year round monitoring/baseline inventory studies * Expand research program * Increase research and education workshops * Conduct evaluation of facilities * Planning for third year
Third year	* Continuation of research, education, monitoring, and baseline inventory activities * Planning for fourth year
Fourth year	* Continuation of established programs * Planning for fifth year

Table 2 IMPLEMENTATION: STAFF

Predesignation	Development of DEIS/DMP, FEIS/DMP and FMP by J. Vernberg, D. Allen, W. Allen M. Crosby, and A. Miller
First year after FMP approval	Reserve Manager (full-time, NOAA funded) Education Coordinator (1/2-time, NOAA) Resource/Research Coordinator (full-time, NOAA funded) Secretary/Data Processor (8 months NOAA, 1 month State)
Second year	Reserve Manager (full-time, NOAA funded) Education Coordinator (3/4-time, 1/2 NOAA, 1/4 State) Education Specialist (part-time, NOAA funded) Resource/Research Coordinator (full-time, NOAA funded) Secretary/Data Processor (8 months NOAA, 1 month State)
Third year	Reserve Manager (full-time, NOAA funded) Education Coordinator (3/4-time, 1/2 NOAA, 1/4 State) Education Specialist (part-time, NOAA funded) Resource/Research Coordinator (full-time, NOAA funded) Secretary/Data Processor (8 months NOAA, 1 month State)
Fourth year	Reserve Manager (full-time, NOAA funded) Education Coordinator (3/4-time, 1/2 NOAA, 1/4 State) Education Specialist (part-time, NOAA funded) Resource/Research Coordinator (full-time, NOAA funded) Secretary/Data Processor (8 months NOAA, 1 month State)

Visits by student groups, participants in workshops and symposia, and other special groups can be arranged through formal programs associated with The University of South Carolina or the Belle W. Baruch Foundation. Tours of the site will be coordinated with the Nature Center of the Belle W. Baruch Foundation. The general public can visit the Bellefield Nature Center at the US Highway 17 entrance to Hobcaw Barony (approximately 1 mile north of Georgetown and 8 miles south of Pawleys Island). The Belle W. Baruch Foundation has been established in perpetuity to preserve and conserve the ecological and environmental qualities of Hobcaw Barony as well as to preserve its historical value.

Access by water to the wetland areas of the Reserve via tidal waters under the jurisdiction of state and Federal agencies, however, is permissible by boat, including power boats. Members of the public are welcome to carry out traditional recreational activities in the tidal waters and marshes, but must adhere to state laws. Thus, traditional public uses such as hunting in the marshes, fishing and shellfishing will not be infringed upon by the NI/WB NERRS and people are free to access these areas by water (see section II A and III B for description of traditional uses).

(11) General Permits and Licenses

(a) Existing Permits and Licenses

Existing requirements for local, state, and federal permits and licenses will be observed and normal application procedures will be followed.

(b) Research Reserve Permits

Permits will be issued by the Baruch Institute, USC for research activities conducted in the reserve. Scientific permit requests will be carefully reviewed through the system now in place in the Institute. The Institute has a permit from the SCWMRD to collect biological samples in the NI/WB region. New research projects not covered by this permit will have to obtain a special permit from the appropriate governmental agency. Appropriate enforcement personnel will be notified prior to conducting research.

d. Resource Protection

(1) Rationale and Goals

The health, productivity, and integrity of the estuarine reserve resources must be protected in order to provide a stable environment for research and education programs which are used to address coastal management issues. The goals of

resource protection are to protect the natural status of the ecosystem(s) of the Reserve. Specific goals are:

-Identifying priority resources, gathering baseline information on them, and establishing them as indicators of change.

-Developing facilities and equipment as necessary to aid in research.

-Seeking agreements with research organizations to facilitate and augment research projects.

-Assisting in the collections of important baseline data to use in monitoring differences over time and for making comparisons with other areas.

-Preserving estuarine ecosystems for continuous future use as natural field laboratories where information essential to coastal management decisions can be gathered and disseminated.

-Ensuring a stable environment for research through long-term protection of estuarine areas, including open water and transitional area wetlands.

-Protecting natural, pristine estuarine sites for education and interpretation programs.

-Protecting the habitats of estuarine wildlife as an integral part of the natural system.

-Controlling access to Hobcaw Barony in accordance with the Tripartite Agreement between the USC Institute, Clemson University and the Foundation.

-Preventing degradation of the Reserve by outside activities.

-Coordinating activities with the Baruch Foundation, local, state and Federal authorities.

(2) General Policy Areas

Resource protection will rely on the tripartite agreement between the Foundation, USC, and Clemson University as well as a number of existing Federal, state and local laws and regulations, enforced by regulatory agencies and Reserve and Baruch Foundation staff. It is also the responsibility of reserve staff to be knowledgeable of and involved with land use issues in the vicinity of the Reserve.

The NERRS regulations allow for multiple uses of reserves to the degree compatible with each reserve's management plan and consistent with the mission and goals of the NERRS. Traditional existing activities in the NI/WB NERRS will continue at levels currently permitted under local and state laws (see Section III B for details on uses). It is not the intent, objective nor desire of the NI/WB NERRS to restrict in any manner the legal traditional uses of public waterways that are currently under state and Federal jurisdiction and included in the Reserve. The Baruch Foundation will continue to regulate activities on its private property which is also included in the Reserve. Specific objectives are to:

- Coordinate with existing surveillance and enforcement activities provided by the Belle W. Baruch Foundation, state and Federal agencies, and establish a mechanism to increase resource protection, when necessary;

- Provide for adequate public participation as a means to promote compatible uses of the Reserve and awareness of the need to protect sensitive resources; and

- Rehabilitate Reserve habitats where necessary to restore natural bio-diversity and prevent further degradation of resources.

Research is one of the primary goals of the Reserve, and it is given highest priority in the management plan. Sometimes the success of a research project depends on the study site remaining undisturbed. To prevent trampling or other unnatural physical disturbances, the researcher may request that signs requesting avoidance of the study area be posted. The request would be made to the Reserve Manager and reviewed by the Advisory Committee. Typically, study plots are small and located in infrequently visited or remote areas so that public travel or access patterns would not be disturbed. An information program will be initiated to inform the public about the importance of the research sites.

(3) Management and Administration

Management of the NERR Site Through the South Carolina Coastal Zone Management Program

The purposes of ACT 123 of the 1977 South Carolina General Assembly were to "establish the South Carolina Coastal Council and provide for its powers and duties for the protection and improvement of coastal tidelands and wetlands under a coastal zone management plan; provide for enforcement of policies of the Council and penalties for violations; and authorize legal proceedings for the determination of tideland properties." Act 123, better known as the South Carolina Coastal Management Act, was implemented in accordance with the Federal Coastal Zone Management Act as amended (P.L. 92-583, 94-370) and a subsequent coastal zone

management program was developed and approved by the U.S. Secretary of Commerce in 1979 which met the requirements of 15 CFR part 923 (Federal Register, March 1, 1978). The South Carolina Attorney General's office has affirmed that the State has adequate protective control over the NI/WB NERR (see Appendix K).

Management of the Critical Areas

The South Carolina Coastal Management Act defines the critical area as all coastal waters, tidelands, beaches, and primary ocean front sand dunes within the coastal zone of the State. A permit is required for any activity which impacts a critical area; in order to receive a permit the activity must be evaluated in accordance with a strict set of policies and regulations. In summary the policies for wetland areas prohibit the permanent alteration of productive salt, brackish, or freshwater wetlands unless there is an overriding public interest, no feasible alternatives, and all environmental impacts are minimized. Regulated activities include not only major activities, such as dredging or filling, but also activities such as pipelines, powerlines, docks, piers, intake structures and many others. Table 3 provides a listing of all activities which are governed by specific coastal zone management policies.

With the exception of the high ground portion of the few scattered islands located in Winyah Bay proper, the entire core area of the North Inlet/Winyah Bay NERR site is classified as critical area. Any activity which occurs in the critical area of the NERR site will be regulated by permit through the South Carolina Coastal Zone Management Program.

Management of Upland Areas (Non-critical area)

Both the Federal Coastal Zone Management Act and the South Carolina Coastal Management Act require consistency of all direct and regulated State and Federal activities which occur in the designated coastal zone of South Carolina. In South Carolina the coastal zone includes the entirety of all eight coastal counties which border the Atlantic Ocean. Therefore any activity which requires a state or federal permit must undergo a coastal zone management consistency determination by the South Carolina Coastal Council before the permit can be issued by the issuing State or Federal agency. The policies utilized to make a consistency determination are similar to those required for critical areas.

Federal regulations (15 CFR 930) establish a review procedure with federal agencies. The Council has a memorandum of agreement with all regulatory state agencies that establishes a consistency determination review procedure. State permits which are reviewed for coastal zone management consistency are included in Table 3 along with the responsible agency.

Table 3. Summary of "Networking" Activities

AGENCIES WITH PERMITTING OR PLANNING/MANAGEMENT AUTHORITY FOR ACTIVITIES WITH A DIRECT AND SIGNIFICANT IMPACT ACTIVITY	Coastal Council	Aeronautics Comm.	Arch. & Anthropology	*Budget & Control Bd.*	DIIEC	Development Bd.	Forestry Comm.	Highway Dept.	Land Resources	PRT	Patriot's Point	Railways Comm.	PSA	PSC	State Housing Auth.	SPA	Water Resources	Wildlife/Marine Resources	LOCAL	FEDERAL
RESIDENTIAL DEVELOPMENT	X			X	X										X				X	X
TRANSPORTATION																				
Ports	X			X												X				X
Roads & Highways	X			X		X		X								X			X	X
Airports	X	X		X		X													X	X
Railways	X			X		X						X				X			X	X
Parking Facilities	X			X	X														X	
COASTAL INDUSTRIES																				
Agriculture	X						X		X											X
Forestry	X						X													
Mineral Extraction	X			X					X											X
Manufacturing	X				X														X	
Fish & Seafood Processing	X				X															
Aquaculture	X			X	X													X		
COMMERCIAL DEVELOPMENT	X			X	X														X	
RECREATION & TOURISM																				
Parks	X					X				X	X								X	X
Tourist Attractions	X				X					X	X								X	
MARINE RELATED FACILITIES																				
Marinas	X			X							X					X			X	
Boat ramps	X			X							X							X	X	
Docks and piers	X			X						X						X				
WILDLIFE AND FISHERIES MAN.	X																X	X		
Artificial reefs	X			X														X		
Impoundments	X			X														X		
DREDGING	X			X																X
Dredge Material Disposal	X			X																X
Underwater Salvage	X		X																	
PUBLIC SERVICES & FACILITIES																				
Sewage treatment	X			X	X														X	X
Solid waste disposal	X				X														X	
Public/Quasi-public buildings	X				X					X	X								X	X
Dams & Reservoirs	X												X							X
Water supply	X				X												X		X	X
EROSION CONTROL	X						X	X								X			X	X
ENERGY ACTIVITIES	X			X	X	X	X						X	X			X		X	X

In addition to meeting normal rules and regulations, activities associated with the above permits which result in a land disturbance (i.e., subdivisions, malls, gas stations, etc.) must submit specific plans to address policies and approved guidelines of the Coastal Zone Management Program. These plans must conform to coastal zone policies before any permits can be issued. These plans include:

Stormwater management plan
Wetland management plan
Dock master plan (if adjacent to coastal waters)

In reference to the North Inlet/Winyah Bay NERR, the entire site falls within the coastal zone of South Carolina; therefore, any activity which requires one of the referenced permits must be consistent with the coastal zone management program and the specific policies of the NERRS.

Enforcement

Under the South Carolina Coastal Management Act, the South Carolina Coastal Council has responsibility for the protection of coastal tide lands and wetlands. To fulfill its enforcement responsibilities, the Council may impose penalties and may take legal proceedings, as necessary. This responsibilities covers all coastal waters, tidelands, beaches, and primary ocean front sand dunes within the state's coastal zone. Nevertheless, the Reserve Manager has first line of enforcement responsibility for ensuring that all activities conducted within the Reserve conform with NERRS guidelines, and the Foundation's rules for resource protection. The Reserve Manager will contact the SCCC, as necessary, and will be a full partner in the review of any permit affecting the Reserve resources.

The South Carolina Coastal Council has an enforcement section of specially trained field biologists to ensure enforcement of the coastal zone management program. Weekly aerial flights and daily routine patrolling by motor vehicle represent the first level of enforcement. The Coastal Council is also in alliance with the S.C. Department of Wildlife and Marine Resources whose conservation officers patrol the waters and land of the coast on a daily basis. Noted violations are reported to Coastal Council enforcement staff who conduct a field inspection; State conservation officers are available for backup if needed. The Council also has a Memorandum of Agreement with the U.S. Army Corps of Engineers to assist in enforcement in freshwater wetland projects requiring coastal zone management consistency certification. Fines for violations of the Coastal Zone Management Act are up to $1,000 per day.

Enforcement compliance of activities requiring coastal zone consistency certification can also take place through the agency issuing the permit. The majority of activities require a final Coastal Council sign-off prior to permit issuance; for example, a Coastal Council staff engineer conducts a site inspection to ensure the stormwater system is constructed according to the approved design before the applicant can operate his/her water or wastewater system. This provides a strong incentive to comply with coastal zone management program.

Additionally, the Coastal Council has an active Beach and Creek Watch program to provide a forum for citizen awareness and violation reporting.

Table 4

Activities Regulated Through Direct Permit
and/or Consistency Certification by
The S.C. Coastal Council
(reference SCCZMP, pp. III-1 - III-74)

- Residential Development
- Roads and highways
- Railways
- Agriculture activities
- Mineral extraction
- Fish and seafood processing
- Commercial development
- Commercial recreational
- Boat ramps
- Wildlife and fishery management activities
- Dredging
- Underwater salvage
- Solid waste disposal
- Dams and reservoirs
- Erosion control activities
- Construction in critical areas or wetlands
- Ports
- Airports
- Parking facilities
- Forestry activities
- Manufacturing
- Aquaculture
- Parks
- Marinas
- Docks and piers
- Artificial reefs
- Impoundments
- Dredge material disposal
- Sewage treatment
- Public/quasi-public bldgs.
- Water supply facilities
- Energy and related facilities

Table 5

State Agency Permits Subject to
Coastal Zone Consistency Review by
The S.C. Coastal Council
(reference SCCZMP, p. V-5)

1.	S.C. Aeronautics Commission	Certificates of approval for airports and other air traffic facilities.
2.	S.C. Budget and Control Board	Permits for activities below the ordinary high water mark which are within the coastal zone but out of the critical area.
3.	S.C. Department of Health and Environmental Control	Permits for construction of wastewater treatment facilities or septic tanks of 1500 gallons per day.
		National Pollutant Discharge Elimination System (NPDES) permits.
		Section 401 of the Federal Water Pollution Control Act certification.
		Permits for air emissions.
		Water supply permits.
		Landfill permits.
		Oil and gas facilities registration certificates.
		Underground storage tank permits.

4.	S.C. Land Resources Conservation commission	Mining operations permits.
		Sediment control permits (pending implementation).
5.	S.C. Public Service Commission	Certificates for major utility facilities.
6.	S.C. Water Resources Commission	Oil and gas facilities permits.
		Groundwater capacity use area permits.
		Interbasin transfer permits.

(4) Habitat Restoration

NERRS regulations recognize that many estuarine areas have undergone ecological change as a result of human activities. Although restoration of degraded areas is not a primary purpose of NERRS, some restorative activities may be permitted in research reserves as specified in their management plan. Generally, restoration for single-species resource management or enhancement is not permissible; restoration must be community or ecosystem oriented.

The areas included within the boundaries of the Reserve are in a high state of ecological quality, therefore no plans have been developed to undertake habitat restoration. Results of research conducted within the Reserve on relatively pristine areas will be applied to other (disturbed) sites in order to develop a scientific basis for habitat restoration.

(5) Relationships to Other Program Areas

Although resource protection is an extremely important program component, it is not an independent program area. All other parts of the Reserve program contribute to the protection of this site. Researchers play a role in identifying especially sensitive areas of the estuary and their research results will be useful in site protection by monitoring for potential degradation. The educational program will develop printed information and conduct meetings which will inform the public of the need to protect and wisely use estuarine resources. The volunteer program will

educate and utilize persons to assist in resource protection. The high degree of interaction between the various segments of the NI/WB Reserve necessitates a fairly broad and balanced perspective on resource protection by the Reserve.

e. Research and Monitoring

(1) Rationale and Goals

The research and monitoring program will rely on the results of scientific research to achieve an understanding of the entire estuarine system and its watershed. The goal of the research/monitoring program is to utilize the Reserve for long-term studies to gain a better scientific understanding of natural and human processes occurring within the estuaries and to develop information for the use of coastal decision-making agencies. National and state agencies responsible for management and protection of coastal environments and resources are aware of the potential for increasing man-induced stress in our coastal ecosystems. Some programs have been initiated or proposed to address aspects of the enormous and complex problems associated with intense coastal development. For example, EPA has a program involving the Great Lakes and certain large estuarine systems, and recently initiated the Environmental Monitoring and Assessment Program. In addition, NOAA has started a Coastal Ocean Program. However, a recent study of marine coastal environmental protection by the National Research Council emphasized that a close link must exist between monitoring (constant measuring of environmental parameters) and research programs (determination of processes, mechanisms, predictive models, etc.) in order to produce information which is essential for interpreting monitoring results by environmental regulatory agencies. The proposed NI/WB NERRS will help fill this void.

Despite past efforts, little attention has been specifically directed to long-term ecosystem-level studies dealing with southern coastal aquatic systems and the interaction between uplands and these aquatic systems. A significant data gap exists in understanding the interactive relationship of the stress created in these ecosystems by the growing human activity in the coastal regions of the southeastern U.S. In the southern region of the United States there are few large estuarine systems -- most of the estuaries and freshwater systems are relatively small and are surrounded by extensive wetlands. For example, there are over 320 small, high salinity creeks, inlets, and estuaries between Cape Fear, NC, and Cape Canaveral, FL. Nearly half occur in South Carolina. Approximately 500,000 acres of wetlands are found in the coastal region of South Carolina, and the southeastern sector of the United States has a large percentage of the nation's coastal wetlands. Much of the present and future development of coastal areas is occurring, and is predicted to continue to occur, on highlands adjacent to these estuarine and freshwater systems. There is a need for a holistic, ecological, landscape-level approach involving the integrative analysis of the

status and stress levels of southeastern coastal ecosystems. Coordination of research projects oriented toward this approach is of paramount importance in order both to understand the influences of human activities and inputs on diverse coastal systems of the southeast and to develop the ability to anticipate or predict potential problems associated with these activities and inputs.

To adequately study complex coastal systems impacted by society requires a level of integration and organization not traditionally found in universities, which tend to be organized according to traditional disciplines. Because of the nature of research funding, most projects usually involve one or a few investigators working on one facet of a broader question. Traditionally, formal institutional mechanisms do not exist which allow integration of studies and a continuity of research themes. Frequently, valuable data from single- investigator oriented research is lost because of the lack of a long-term data management system. The Baruch Institute, USC has more than 20 years of experience with multidisciplinary, multi-investigator research projects. It has developed the facility and administrative structure to conduct research at this level. The research/monitoring program will not duplicate past or present research projects. There are several reasons why organization of research on southeastern ecosystems will be more cost-efficient and scientifically effective with the proposed NI/WB NERR, as opposed to individual research projects. The NI/WB NERR will:

- provide a rapid and efficient means of disseminating new knowledge related to coastal ecosystems (by means of public presentations, publications, information transfer to Reserve education programs etc.),

- respond in setting research priorities to accommodate either external individual grants or in-house research programs,

- provide a collaborative environment which would foster multidisciplinary as well as multi-institutional projects,

- provide an additional level of quality assurance at all stages of research performance,

- channel scientific information (through technical reports, presentations, etc.) to NOAA, other Federal and state agencies, environmental groups, the public, and the press so that research findings can be utilized in a practical manner, and

- have a long-term, holistic perspective and focus on fundamental problems facing southeastern US coastal ecosystems.

Knowledge of how ecosystem processes function on a long-term basis in an unperturbed system is important in assessing the impact of human activities. Long-term comparative studies are essential to delineate between interannual variation in system responses due to natural variability (i.e., a prolonged cold spell or a drought) and variation resulting from human perturbation. These important scientific data are extremely limited and their scarcity has hampered regulatory/management agencies in assessing environmental impacts. North Inlet Estuary is an ideal site to use as a standard against which to compare other coastal systems: 1) it is relatively free of man-influenced disturbances, 2) it has been studied for 22 years, the last 12 years as part of the NSF program on Long-Term Ecological Research, 3) an extensive data base exists to study ecosystem processes, and 4) the Baruch Institute Field Laboratory and resident staff are located there.

Specific objectives of the NI/WB NERR Research Program will be to:

- establish and manage the areas of the reserve for long-term use as natural field laboratories by state, local and private organizations, while maintaining traditional uses of the reserve by individuals and various groups;

- conduct both state-of-the-art and basic environmental research which will provide both significant information to the public, scientific, and regulatory communities and a data base for use in long-term and interdisciplinary studies;

- enhance the scientific understanding of southeastern estuarine ecosystem processes and functions which can then be used for planning and standard-setting by reserve managers and coastal decision-makers;

- provide education and experience to young scientists considering environmental careers by utilizing volunteers to achieve research goals.

These objectives will be met by the Reserve staff promoting:

- long-term baseline studies to characterize flora and fauna within the Reserve and gain an understanding of the ecological interrelationships between organisms and their environments;

- a better understanding of tributary water quality conditions, particularly spatial and temporal dynamics, requirements for growth and survival of living resources, and contribution and effects of point and non-point source pollution;

- a better understanding of physical processes operating within the estuary, such as tidal influence, circulation dynamics, freshwater inflow, stratification patterns, and sediment dynamics;

- the Reserve as a site for estuarine research by providing essential services and facilities;

- studies that make effective use of past research and address data gaps in the Reserve's information base; and

- the effective use and communication of research results.

(2) Research and Monitoring Priorities

Establishment of the NI/WB NERR will create a long-term opportunity for temporal and spatial sampling in wetlands, upland, and open water estuarine habitats, as well as a greater opportunity for the development and use of new observational and analytical techniques in protected estuarine subsystems. NI/WB NERR sponsored research will be directed towards 1) water management, 2) soil management, 3) nutrients and other chemical inputs, 4) coupling of primary and secondary productivity and 5) estuarine fishery habitat requirements. General research priorities include:

- ascertaining which ecological resources are at risk and what level of human-induced stress exists in two southeastern coastal ecosystems, and developing accurate and sensitive bio-markers of pollutant exposure;

- determining the condition of two southeast coastal ecosystems, and how they change (i.e., developing baseline characteristics that define a healthy, low stressed coastal ecosystem for comparisons with more polluted, highly stressed coastal ecosystems as regards organismal physiology, end point indicators, population and ecosystem structure, and determining the classes and specific types of anthropogenic activities and inputs which characterize and lead to unhealthy, stressed coastal ecosystems); and

- formulating specific computer models for predicting the effects of long-term, indirect and direct exposures to pollutants and other human activities in two southeastern coastal ecosystems (i.e., the coordination of exposure and effects studies under both laboratory and field conditions, using cornerstone species, to characterize real effects of pollutants at the ecosystem level, and determining how accurately end point indicators, bio-markers, and physiological measurements in cornerstone species can be extrapolated to meaningful effects at the ecosystem level).

Initial short-term research priorities include analysis of living resource data sets; stock assessments; evaluation and analysis of monitoring capabilities, oyster production and diseases; salinity and circulation patterns; nutrient levels in marsh areas versus nutrient levels in open water; land use patterns; and sublethal responses to toxin. Research priorities include providing support facilities to conduct research, including advanced analytical chemical equipment (particularly for identification of organic and metallo-organic compounds); remote sensing; and automated data analysis technologies. Sometimes the success of a research project depends on the study site remaining undisturbed. To prevent trampling or other unnatural physical disturbances, the researcher may request that signs requesting avoidance of the study area be posted. The request would be made to the Reserve Manager and reviewed by the Advisory Committee. Typically, study plots are small and located in infrequently visited or remote areas so that public travel or access patterns would not be disturbed.

Longer term research needs include improved understanding of structure and function of coastal habitats (i.e., emergent saline marshes, tidal freshwater habitats, non-vegetated wetlands, benthic habitats, oyster reefs); impacts of modification of coastal and contiguous habitats; water column processes (i.e., plankton communities, inorganic nutrient cycling, replenishment, and storage, micro-circulation, and interactions among main stem and adjacent water bodies); toxins; genetic variability and structure of organisms within NI/WB NERR; watershed processes (i.e., transport, fate and processing of dissolved and particulate material; and effects of land-use activities); ground water contribution, including spatial and temporal input and outflows; chemical characteristics, extent and magnitude of pesticide, nutrient, and other pollutant contamination; impact on sediment-water column pollution interactions; and methods to reduce ground water pollution; impacts of population growth development; temporal and spatial variability in the use of marsh tidal creek ecosystems as nursery areas; wetland formation and production relative to sea level rise; archaeological studies; loss of wetlands habitat and mitigation approaches; buffering effect of wetlands on sediment and heavy metal/toxic chemical loads; basic marsh processes such as accretion and erosion; effects of human water activities on shorelines; buffering effects of wetlands on flooding and erosion; wetland production relative to sea level rise; and plant community succession.

Although no manipulative research projects are planned, it is possible that small scale manipulative studies, limited in nature and to the minimum extent necessary to accomplish the stated research objectives, could be approved but only after a thorough review of the project by the Institute, the SCCC, NOAA, and after all necessary permits are obtained. Manipulative research activities with a significant or long-term impact on reserve resources require prior approval of the SCCC and NOAA.

Habitat manipulation for resource management purposes is not permitted within reserves, except as allowed for restoration activities consistent with NOAA regulations. An exception may be allowed to this prohibition if NOAA determines that specific manipulative activity is necessary for the protection of public health or the preservation of other sensitive resources which have been listed or are eligible for protection under relevant Federal or state authority (e..g., threatened/endangered species or significant historical or cultural resources).

In addition to research activities described above, program-wide research priorities have been developed for the NERR System for Fiscal Years 1993-2002. Research at the NI/WB NERR will be planned and proposals submitted which will part of these priorities. These research priorities are:

FY 1993, 1994	Non-point source pollution (non-focused or non-identifiable sources of pollution inputs and alterations within watersheds).
FY 1995, 1996	Habitat restoration (restoration of coastal habitats that have been altered by anthropogenic activities and/or inputs).
FY 1997, 1998	Alterations in habitat utilization by coastal biota (exotic species, commercial species, non-commercial species).
FY 1999, 2000	Alterations in water circulation, transportation and quality (tidal exchange, fresh water diversion, hydrological budgets, ground water intrusion, biotic species transportation).
FY 2001, 2002	Anthropogenic inputs and activities (focused and identifiable - i.e., dredge spoils, HAZMAT, recreational uses, commercial uses).

Specific means for incorporating program elements into existing and new monitoring programs will be developed. The reserve manager will work to incorporate the following elements into all monitoring programs:

-hypothesis testing

-relationship to management issues

-quality assurance/quality control

-means of determining program effectiveness

-periodic review

-data management and analysis

-publication of data

The proposed NI/WB NERR monitoring program consist of a three-phase approach as follows:

- Environmental Characterization, which involves literature review and/or field research to acquire all available information on hydrology, geology, water chemistry, water quality, biological resources, and the problems and issues confronting the reserve environment;

- Site Profile, which involves a synthesis of information gathered to provide an overall picture of the reserve in terms of its resources, issues, management constraints, and research needs; and

- Monitoring Program Initiation, which involves identifying parameters to be measured, procedures to be used (criteria for measurements, quality control, and standard procedures where they already exist), sampling strategy for selected parameters (spatial and temporal intervals), storage and retrieval of data (reporting, formatting, and analytical requirements), manpower requirements, logistics, and cost; followed by pilot projects and, upon successful evaluation, full-scale monitoring of selected parameters.

The NI/WB NERR phased monitoring program will be integrated with the South Carolina Department of Health and Environmental Control (SC DHEC) and South Carolina Wildlife and Marine Resources (SCWMR) monitoring program for water quality, living marine resources, toxic chemicals, and other parameters. It will also be integrated with other monitoring programs conducted by Federal agencies including NOAA and EPA.

(3) Management and Administration

Research opportunities at NI/WB NERR are available to qualified scientists and students affiliated with a college, university or school; non-profit, non-academic research institutions (e.g., research laboratory, independent museum, professional society); profit organizations; or state, local or Federal government agencies.

Research opportunities will be available to all applicants without regard to manner of funding. Support may come through South Carolina state agencies, the NOAA Office of Ocean and Coastal Resource Management (OCRM), NOAA Sea Grant, the Environmental Protection Agency, NSF, and other sources. Researchers may

apply to do research at any time, however, scientists seeking financial support from NOAA/OCRM must follow NOAA's research and monitoring guidelines.

All research proposals will be evaluated by the Reserve Manager for consistency with NI/WB NERRS goals, and by the Baruch Foundation and the USC, to ensure that the proposed research will not interfere with other research at the Reserve. No proposed research at the Reserve will be approved unless it is consistent with the Tripartite Agreement discussed earlier. Projects would be selected based on their importance to coastal zone management issues, scientific/educational merit, and technical approach. Other project selection criteria include: the environmental consequences of the project; immediacy of need; and the proposed project's relationship to other available information and studies.

Proposals requesting funds from NOAA will be evaluated using established NERRS guidelines. In order to qualify for NOAA funding, NI/WB NERRS research proposals must address one or more of the NERRS National Research Priorities and fulfill the requirement of the appropriate Request for Proposal. NOAA funds are awarded on a competitive basis and proposals will be competing with other research proposals in reserves throughout the National Estuarine Research Reserve System.

Funding for national research priorities in the reserve is available through NOAA on a competitive basis to qualified researchers and must be matched equally by the recipient according to current NERRS regulations. An annual announcement of research opportunities, reflecting priority needs and levels of funding, will be distributed. This announcement will include: a) specific statements about the types of research that will be funded including the national research priorities set by NOAA; b) clear and specific guidelines for preparation; c) clear statements on procedures and criteria used in proposal review; d) level of funding; and e) a schedule of the proposed process. The distribution list will include local, state, and regional entities covering all eligible potential applicants. Also, a research prospectus will be provided to potential researchers, including basic information on reserve resources, unusual features, support facilities and a listing of research reports from the NI/WB NERR.

Activities permitted in the core area are limited to research activities which do not manipulate habitats except in rare instances where small scale manipulative studies, with limited scope and clearly stated research objectives, may be approved, after thorough review by the Institute, the SCCC and NOAA. Manipulative research activities may be permitted in the buffer zone of the reserve as long as they address identified research or management needs. Any research activities which, in the estimation of the State and NOAA, may result in impacts on reserve resources or habitats require prior approval of the State and private property owners.

To assist new researchers at the reserve, information packets will be available from the reserve manager. These packets will contain background information pertaining to the Reserve and an area map, designating reserve boundaries. New researchers will also be given a tour of the reserve area to gain familiarity with the research surroundings and general location.

Research, monitoring and education projects will receive first priority within the reserve boundaries. Traditional uses of public areas will continue as currently regulated under Federal, state, or local authority. The Reserve Manager is responsible for carefully balancing uses of the reserve to ensure that the objectives of the reserve program are protected and sustained. The power of the Reserve Manager needed to meet other specified management responsibilities will not in any way be diminished by the NI/WB NERR research and monitoring plan.

The NI/WB NERR Reserve Manager is responsible for coordinating all research and monitoring activities for the Reserve. To facilitate this, NOAA will maintain close contact with the NI/WB NERR Reserve Manager and will keep him/her informed of the progress of NOAA-funded researchers. The NI/WB NERR Reserve Manager will maintain regular communication with the researchers. He/she will aid in coordinating research activities in the Reserve and, when possible, will aid in fulfilling the needs of the researchers.

To achieve the NERRS goals of 1) "making available information necessary for improved understanding and management of estuarine areas" and 2) "enhancing public awareness and understanding of the estuarine environment"; NOAA-funded research will be available to the general public and researchers will be requested to provide a presentation on their research findings at regularly scheduled meetings.

The NI/WB NERR requests that researchers provide the Reserve Manager with quarterly progress reports, a final report, and an abstract and one copy of any publications resulting from any research at the Reserve. The final report will include an abstract, a literature review, methods, analyses, results, and conclusions. It will include a summary of the gathered data and a list of the analyses completed. In addition to a final report, the researcher will keep the Reserve Manager updated on the progress of the project by means of quarterly written progress reports. These presentations will help to achieve the Reserve's goal of providing information necessary for improved understanding and management of estuarine systems to coastal decision-makers and the public. Records, data, reports, publications, and other relevant materials will be kept at the NI/WB NERR. Research information will also be forwarded to NOAA, which will act as a central clearinghouse and the center of the information network of the National Estuarine Research Reserve System.

Recruitment of researchers is important to build the NI/WB NERR data base and to establish the sites as long-term natural field laboratories. Recruitment of researchers with an established interest and capability will be one of the functions of the Reserve Manager. Recruitment strategies will include:

- coordination through scientific/technical advisory committees;

- participation of NI/WB NERRS staff in research symposia, conferences and workshops;

- intern programs for graduate students or upper division college students; and

- annual announcements of research opportunities in scientific association newsletters, meetings and through NOAA's Sanctuaries and Reserves Division.

The NI/WB NERR will work closely with NOAA staff to develop and assess National Research Priorities. NOAA will also be involved with the Reserve through research funding and proposal evaluation. The Reserve Manager will communicate with other reserve managers and will work with NOAA and other reserve managers to establish a national information exchange network.

Data from the NI/WB NERR will contribute to the national network long-term study to monitor the status and trends of estuarine ecosystems. Data from the National Estuarine Research Reserve System makes a substantial contribution to the understanding of long-term ecological effects on estuaries and is useful in predictive trend analysis of ecological stresses. The coordinated research network aids greatly in understanding the theoretical and practical aspects of conservation and coastal resources management.

Information gathered in NI/WB NERR research and monitoring and the management implications of this information will be made available to decision-makers and the public in understandable forms (i.e. in laymen's language-not scientific jargon) through public forums, etc. Both NOAA and NI/WB NERR will encourage the dissemination of research results. Methods will include journal articles in the peer-reviewed literature; presentations at professional societies; and special symposia arranged by NOAA or reserves, often in association with other meetings such as the biennial meetings of the Estuarine Research Federation or Coastal Zone Managers. Additional avenues of information exchange will include a distribution of a summary of research at the Reserve, workshops, conferences and teach-ins at the reserve; a NI/WB NERR brochure, distributed with an annual call for proposals and at appropriate conferences and other events; press releases to local media; articles in journals of

local organizations; direct mailihgs to state and local decision-makers; and regular contact with representatives of other state and Federal agencies, local government agencies, and planning boards.

f. Education and Interpretation

Education/interpretation will serve as the integrator for all functions of the NI/WB NERR. As the general public becomes more aware of how an estuarine system functions and why it is such an important natural resource, the more likely they are to support the reserve and other estuarine protection programs. A well-planned education/interpretation program will create a constituency for the Reserve and bring about positive attitudes and values in the user community.

The program will focus on the values of the NI/WB estuaries and its wise use. The Reserve is an ideal setting for interpreting estuarine food webs, general biological principals and coastal processes. Opportunities exist for focusing on the national significance of the NI/WB site. It is also an appropriate place to learn about Federal and state endangered and threatened species. Overall, the program content will be broad-based, dealing with general concepts and specific issues related to reserve management.

(1) Goal

One of the primary goals of the NI/WB NERR is to enhance public awareness, understanding, and wise use of estuarine resources in the North Inlet and Winyah Bay estuaries. Specific objectives will be to:

- promote knowledge of the research reserve, its resources, and its programs as well as knowledge of broader coastal issues and concerns related to estuarine management and protection;

- collaborate with other organizations to provide educational and interpretive services at this site;

- disseminate information gained from research on the Reserve to public audiences, including government officials, planners, and other decision-makers.

- provide opportunities for teacher training, student projects, internships, and assistantships where enrolles work jointly with scientists, gain field experience, and learn about the importance of research results;

- enhance interest in and commitment to South Carolina estuaries and their tributaries through volunteer programs and personal contact with reserve, resources;

- provide for traditional uses of Reserve sites as provided by state and Federal law.

- broaden public support for the Reserve by continuing on-going programs suited to visitors of diverse interests, ages, and backgrounds.

(2) General Context for Management

The NI/WB NERR includes both the marsh/marine part of the 17,500-acre wildlife refuge (Hobcaw Barony), which was set aside in perpetuity by the late Belle W. Baruch for the purposes of research and education, and the public waterways of North Inlet Estuary and Mud Bay. Establishment of the Reserve on this site is consistent with Belle Baruch's Will and provides a unique opportunity for exchange of information between scientists and public audiences. A delicate balance must be struck to maintain the special research integrity of the site while providing opportunities for people to see and learn from the research program. Extreme care will be taken to develop an education program that is sensitive to and protects the significant research value of the Reserve. A number of policies and areas for education program development are outlined which should complement the research and management goals of the Reserve.

(3) General Policies

Several policies will guide the development of the education program:

- Only educational activities which will have no negative impacts on the Reserve environment and its research projects will be implemented. Activities will be discontinued or changed if, after review by the site management team, the Advisory Committee and the Belle W. Baruch Foundation Trustees, they are found to conflict with this policy.

- Much of the content for the programs will be based on the findings from research at the North Inlet-Winyah Bay Reserve and other estuarine reserves. Findings will be shared with general audiences and specific target groups such as teachers, K-12 students, policy-makers, and community leaders.

- Reserve educational activities will be coordinated with and complement the Public Education Program of the Belle W. Baruch Foundation administered through the Bellefield Nature Center. The Nature Center currently sponsors a

diverse program that focuses on several ecosystems in the coastal plain of South Carolina. The Reserve's educational program will expand offerings in subjects pertaining to estuaries and coastal zone management.

- The Reserve's education program will also be coordinated with other local and state organizations that are involved with coastal education programs.

(4) Interpretive Themes and Messages

Our understanding of estuaries changes as new information is added to the relatively young field of estuarine research. Consequently, themes and messages for program content need to be flexible and sensitive to new discoveries about estuaries. Fortunately, North Inlet Estuary has been studied fairly intensively over the past decade, providing a foundation for supporting some initial themes and messages that will be incorporated into the education program:

- Estuaries are complex ecosystems that are intricately linked to neighboring landward and seaward ecosystems.

- Complex interactions, involving nutrient cycling, water movements, and energy flows through food webs contribute to the dynamic functioning of estuaries.

- Estuaries serve important functions as nurseries for fish and shellfish, as feeding and nesting areas for birds, and as buffers from storms.

- People are members of the estuarine ecosystem and also affect its functioning through interactions with the system.

- The North Inlet-Winyah Bay National Estuarine Research Reserve serves an important role as a site for research, management, and education about estuaries.

Specific examples that relate to these themes will be incorporated into program activities and materials.

(5) Printed and Audiovisual Materials

Brochures, special publications, and a regular newsletter are planned to promote knowledge of the Reserve, its resources, and its program, and to disseminate information gained from research to public audiences. A general brochure about the Reserve, its goals, and opportunities available for researchers and the public, will be one of the first materials developed once the site is designated. It will be consistent with the "common look" site brochure developed by NOAA, SRD. The Baruch

Institute currently publishes the newsletter, "TIDINGS", which is distributed to members of Friends of the Baruch Institute. Research, education and management activities of the Reserve program will be featured in this established newsletter. In addition to the mailings to members, copies of the newsletter will be disseminated to interested people upon request, including visitors to the Bellefield Nature Center. Special publications on selected topics will be developed as needs are identified. Printing these publications on recycled paper is encouraged.

Instructional materials for teachers are also planned to complement teacher training activities and field study programs for school classes. The Bellefield Nature Center currently provides information to teachers participating in its field study and outreach programs. These materials provide background information on the subjects, pre- and post-visit activities, and lists of resource materials. Additional instructional materials will be developed to increase the learning experiences of teachers and students who participate in new programs developed for the Reserve.

In addition to printed materials, audiovisual presentations will be created for use at the Nature Center and in outreach programs. A video program about the Reserve and its activities would be very beneficial in expanding public awareness and understanding of estuaries and the value of research at the reserve site. The program would be shown on a regular schedule to visitors of the Center and would also be available on a loan basis to interested schools, civic groups, or other organizations. Slide presentations are another medium that would be developed to further people's understanding of estuaries. The slide shows would be available to staff members who will make presentations at meetings of interested groups.

(6) Exhibits, Signs and Promotional Materials

The Bellefield Nature Center currently houses a variety of exhibits pertaining to the history and ecology of the wildlife refuge, Hobcaw Barony, and the research activities of the Baruch Institute of Clemson University and the University of South Carolina. Additional interpretive displays that relate specifically to estuaries and the goals and programs of the Reserve will be developed at the Nature Center. A portable exhibit about the reserve is also planned which can be taken to professional meetings and festivals to help promote the site to a wide spectrum of people.

The Reserve will also be promoted through distribution of the general brochure described in the printed materials section. In addition, NI/WB NERR signs identifying the Reserve and the appropriate supporting agencies will help draw public attention to the special designation of the site. A sign will be constructed and placed near the highway entrance to the property and other smaller signs are planned to help identify the Reserve from the water.

(7) Program Activities and Services

Many of the education program goals will be achieved through program activities and services provided to general audiences and specific target groups. The Reserve's education program will build on and expand upon successful activities and services already in place through the Belle W. Baruch Foundation's Bellefield Nature Center and the University of South Carolina's Continuing Education Program (see Appendix I for summary of 1990 activities). In addition, there will be a maximum effort made for interaction with education programs at other NERR sites.

The Baruch Foundation currently provides a very popular field study program for school groups. Thousands of students each year participate in the program and learn about one or more of the coastal ecosystems on the property. Salt marshes are one of the systems covered in the field study program. As funds become available to increase staff for the field study program, more salt marsh studies can be scheduled.

A wider selection of short courses dealing with estuaries will also be offered for members of the public and educators. Some of the topics for future short courses include, but are not limited to, coastal birds, fishes; life in the pluff mud, oysters and clams, shrimps, crabs and other crusty creatures; coastal photography; historical uses of estuaries; and coastal management. Teachers may elect to take the courses to receive credit towards re-certification.

Special college-credit workshops and courses for teachers are also planned to provide teachers with information and field and classroom experiences pertaining to estuaries and coastal zone management. These programs will be designed to provide teachers with the information and skills needed to lead their students in studies of salt marshes anywhere in the state without the help of an outside resource person.

Public lectures and forums that address topics and issues of current public interest and concern will also be continued and expanded at the reserve site. These programs will be designed to provide factual information on various aspects of the issues so that people can make informed decisions.

Guided tours of the property are presently conducted on a weekly basis for interested members of the public. Information about the research and educational activities of the Reserve will be incorporated into this tour led by Nature Center employees. This information will be easy to insert since the tour includes stops along marsh areas to be designated in the Reserve.

The education program, in addition to field studies, tours, short courses, teacher workshops and public forums conducted on-site, will encompass outreach efforts into surrounding communities. The successful school "Outreach Program" of

the Bellefield Nature Center brings hands-on nature experiences into local classrooms. This program will be expanded to include more offerings pertaining to estuaries. Teacher information packets will be developed to enhance these programs. Reserve scientists and other staff members will also present programs at meetings of area organizations upon request. In addition, efforts will be made to assist outside tour guides in the area with up-to-date information about the Reserve and the area's rich coastal resources that they can incorporate into their guided programs.

The Nature Center does not currently have a volunteer program. After the site has been designated, a volunteer program will be developed to provide opportunities for interested members of the public to interact more closely with both the education and research activities of the Reserve. The education volunteer program will be coordinated with the Nature Center administration and supervised by the NERR education coordinator. The research volunteer program will also be administered by the Reserve staff and will be consistent with policies of the Baruch Foundation. A limited number of volunteers (to be approved by the Baruch Foundation) will be involved in the program. Education program volunteers will be particularly useful in greeting visitors and answering questions at the Nature Center building, thus allowing NI/WB NERR staff members to conduct more programs in the field.

A student internship program will also be implemented, as funds become available, in order to complement the education program. Student interns would become involved in and assist with on-going education programs as well as the development of printed educational materials and exhibits.

(8) Public Access and Recreation

Traditional public access policies and recreational activities that pertain to the Belle W. Baruch Foundation's property (Hobcaw Barony) included in the Reserve will be maintained. Currently, public access to the upland portions of the property is restricted. Authorized individuals, including researchers and students involved in approved projects utilizing the resources of the Reserve can enter through an electrically controlled gate near U.S. 17. Visits by student groups, participants in workshops and symposia, and other special groups can be arranged through formal programs associated with The University of South Carolina or the Belle W. Baruch Foundation. Tours of the site will be coordinated with the Nature Center of the Belle W. Baruch Foundation. The general public can visit the Bellefield Nature Center at the US Highway 17 entrance to Hobcaw Barony (approximately 1 mile north of Georgetown and 8 miles south of Pawleys Island). Access by water to the wetland areas of the Reserve via tidal waters under the jurisdiction of state and Federal agencies, however, is permissible by boat including power boats. Members of the public are able to carry out traditional recreational activities in the tidal waters and marshes, but must adhere to state laws. Thus, traditional uses such as hunting on the marshes, fishing and shellfishing will not be infringed upon by the establishment

of NI/WB NERR and people are free to access these areas by water (see section II A and III B for description of traditional uses). Traditional public use will be encouraged to the extent that is consistent with Reserve goals and objectives.

g. Facilities Development and Staff Requirements

(1) Facilities

Funding is provided by NOAA and matched by the state for the construction or renovation of a visitor center, research facility, education center, or other improvements associated with research, education, and access to reserve sites. Facilities and improvements must be located within the boundaries of the designated research reserve. Major construction projects (i.e., buildings) require the preparation of architectural and engineering plans and state approval of capital outlay proposals. Funding for planning and developing architectural and engineering plans for buildings may come from initial acquisition and development grants which are awarded after approval of the DEIS/DMP (i.e., in the predesignation phase). Funds for constructing buildings come from acquisition and development grants which are awarded after approval of the final management plan. Minor construction activities that aid in implementing portions of the management plan (such as nature trails, boardwalks, boat ramps) do not require architectural or engineering plans. Funding for planning and constructing nature trails, boardwalks, boat ramps, and other minor improvements can be awarded under initial acquisition and development grants as well as under later acquisition and cooperative agreements.

Research facilities in the Reserve are temporarily housed in trailers but the Institute will be constructing a new 16,000 sq ft research laboratory in 1992 to replace the two laboratories destroyed by Hurricane Hugo. These facilities will be constructed to confirm with FEMA regulations, since FEMA will provide partial funding for these buildings. This facility will have space for administrative offices, the computer center, teaching and continuing education rooms, chemical laboratories, 13 laboratories for visiting and resident scientists, seminar/library room, balance room, museum, and common equipment room. At the entrance to the Hobcaw Barony and adjacent to the proposed NI/WB NERR is the Nature Center, which is owned and operated by the Belle W. Baruch Foundation and functions as a visitor center. In addition to a reception and display area, a separate classroom building is used for instructional purposes. The adjacent USC Kimbel Living Center, that is part of the Reserve, consists of housing accommodations for 80 persons and a meeting center. It is also available for Reserve exhibits and displays, workshops, seminars, and visiting groups and researchers. Other facilities contribute to the overall experience of visitors to the site. Examples of these include interpretive exhibits, a collection of flora and fauna, and a boardwalk.

In the future as the program expands, the need for additional facilities will be assessed. Construction or expansion of facilities within the Reserve will be conducted only upon approval of NOAA, the Belle W. Baruch Foundation, the University of South Carolina and with any necessary Federal and State permits or agency approvals.

(2) Goal

The goal of the NI/WB NERR Facility Development program is to provide the necessary facilities for research and educational activities. Although research and educational facilities are presently available, the Reserve will seek funds to provide new facilities as they are needed to update and/or expand to meet new demands. These facilities should not interfere with the natural appearance of the site.

The headquarters of the NI/WB NERR will be located in offices in the new laboratory located on the edge of North Inlet. This facility will serve to centralize reserve activities with those of the NI/WB project involving all participants, i.e., USC personnel, visiting scientists and students, visitors, representatives of various agencies, and the Baruch Foundation. The continuing education office will be located in the new laboratory. Activities of this office will be closely coordinated with the personnel of the Baruch Foundation located in the Bellefield Nature Center, located at the entrance to the Hobcaw Barony as described in section II A 4 f. The Nature Center attracts thousands of visitors each year and provides information about the region and the available programs.

(3) Staffing Requirements

Initially four positions will be required to begin the basic programs at the Reserve: Reserve Manager, Research/Resource Coordinator, Education Coordinator, and Secretary/Data Processor. The duties and responsibilities of the first three positions were described earlier in the management plan. The secretary/data processor, who will be responsible to the Reserve Manager, will handle the various secretarial tasks associated with the program and assist the existing data management program with those topics relating to the Reserve's activities. As the program develops, the need for additional personnel will be evident. It is anticipated that as the program develops and funding becomes a research technician(s) will be added to assist in field studies and monitoring of living resources and of physical/chemical/geological factors. Additionally, an education specialist will be needed to further coordinate and implement the reserve's education program.

B. Other Alternatives Considered

Before reaching a decision on the preferred alternative, several options were carefully reviewed and evaluated. They are discussed below along with the reasons for not pursuing each of these alternatives.

1. No Action/Status Quo

Under this option, no portions of North Inlet and Winyah Bay Estuaries would be designated as part of the National Estuarine Research Reserve System. Implementation of this option would severely limit or entirely prevent the establishment and operation of Federally funded comparative research and educational opportunities unique to the proposed NI/WB NERR. The unique character of the proposed site is due in great part to the inclusion of both a nationally and internationally recognized pristine salt marsh ecosystem (North Inlet), and a classic drowned river type estuarine system that is heavily influenced by human activity and inputs.

Continuing development pressures on South Carolina coastal ecosystems necessitates a better understanding of coastal resources, interactions within coastal ecosystems and the ability of these systems to withstand human disturbances. The comparative research and education programs planned for the preferred alternative of creating the NI/WB NERR will make a valuable contribution to understanding and protecting sensitive coastal resources and improving coastal planning and decision making. The No Action/Status Quo alternative is an illogical choice and runs counter to Federal, South Carolina and Georgetown County goals for studying, protecting and managing coastal ecosystems.

2. Alternative Sites

As the southernmost estuarine systems in the Northern Carolinas section of the Carolinian Biogeographic Classification Scheme, the NI/WB NERR includes one of the few remaining examples of a relatively undisturbed estuary (North Inlet) and a portion of a large, man-influenced estuary (Winyah Bay). There are no other sites in the southeastern U.S. that provide this unique combination of ecosystem types in conjunction with an already established research program. In addition, the selection of the NI/WB site is very cost effective in that no Federal funds will be required for land acquisition and there exists excellent research and education facilities that can accommodate the NERR program requirements. An extensive data base on the environment of the NI/WB system exists which is not found in any other site in this region. The research program has been in effect since 1969.

3. Alternative Boundaries

Alternative boundaries for the proposed NI/WB NERR were considered during the early planning stages of site selection.

a. Inclusion of Debidue Island and the northern marsh region

Inclusion of sections of Debidue Island and the northern marsh region of the North Inlet Estuary was considered during the early planning stages of site selection. Due to the development that has occurred adjacent to the northern boundary of these properties, it was felt that these areas would be better utilized as a buffer region outside of the NI/WB NERR proper. Both the southern portion of Debidue Island and the northern regions of the North Inlet Estuary are part of the B.W. Baruch Foundation properties and as such are protected from any future development. These areas will therefore make for an ideal buffer region adjacent to the NI/WB NERR.

b. Inclusion of the upland forest

Early in the site selection process the inclusion of the upland forest portions of Hobcaw Barony was considered. However, after discussions between Clemson University (which under the Tripartite Agreement manages the upland regions of Hobcaw Barony), the B.W. Baruch Foundation Board of Trustees, and the USC Baruch Institute, it was decided that inclusion of the uplands into the proposed NERR would present management and administration difficulties. This does not preclude the possibility of future inclusion of the uplands, including the Bellefield Nature Center, into the NI/WB NERR should all concerned parties agree to propose an increase in the Reserve area and subject to Baruch Foundation approval. Any expansion of the Reserve's boundaries must be approved by NOAA, SRD and follow its guidelines. If determined necessary, NOAA may require public notice in the Federal Register and in the local media to provide an opportunity for public comment.

c. Inclusion of all of Winyah Bay

Inclusion of all of Winyah Bay into the proposed NI/WB NERR was also considered early in the site selection process. However, this would mean the inclusion of major shipping channels into the proposed NERR. This option was of great concern to the industries of Georgetown that depend upon shipping for their existence. These industries felt that (despite assurances to the contrary) inclusion of shipping channels into the NERR may somehow infringe on the future use and/or maintenance of these channels. Therefore, inclusion of all of Winyah Bay into the NERRS was not considered to be a viable option.

d. Exclusion of Winyah Bay

Having portions of two very distinct estuarine systems as part of the Reserve allows for the development of research and educational programs comparing a wide spectrum of estuarine uses and ecological processes, from pristine to developed regions. In contrast to North Inlet, Winyah Bay has undergone substantial changes in the past, including episodes of increased or decreased freshwater flow, increased sedimentation, and measurable deterioration of water quality. These changes and the unique character of the freshwater, brackish, and high salinity wetlands provide a basis for research which will contribute to our understanding the ecology of a full range of diverse southeastern estuarine systems. The diversity of habitats of the Reserve into heavily impacted (Winyah Bay) and relatively pristine (North Inlet) sections also provides an excellent opportunity to study human effects on estuaries. Winyah Bay is subjected to agricultural, municipal, and industrial inputs and the continuing use of the Bay for shipping and dredged material disposal further impacts the environment. These uses are characteristic of many southeastern estuaries. Studying these areas will provide useful data for management. One of the primary goals of the proposed NI/WB NERR is to identify and integrate the needs of both natural systems and traditional human uses in order to promote the best possible long-term balance. The exclusion of Winyah Bay from the proposed NI/WB NERR would preclude these research and educational opportunities, and is not a viable option.

4. Alternative Management Strategies

Although other potential lead institutions were considered (SC Water Resources and SC Wildlife and Marine Resources), these alternatives were rejected in the preliminary planning stages. The USC Baruch Institute for Marine Biology and Coastal Research was chosen because the Institute is currently, and has for over two decades, conducted multi-disciplinary monitoring and research studies in the proposed NI/WB NERR and is charged by the Belle W. Baruch Foundation to manage the natural resources of Foundation marsh-marine lands. It is the most logical choice and no other institute is as qualified to act as the lead organization for the NI/WB NERR.

Another possible alternative management strategy would be for the Reserve Manager to be located in Columbia, SC at the Baruch Institute main office. This is seen as a major disadvantage to the Reserve Manager's primary duties of managing the daily operation of the NI/WB NERR as well as the oversight and coordination of the various research projects that will be ongoing at the NI/WB NERR.

A third alternative management strategy would be to give the NI/WB NERR complete autonomy from both the Belle W. Baruch Foundation and the USC Baruch Institute. This alternative is impractical because the Reserve could not benefit from the use of data, educational and laboratory facilities, and support from these two

organizations. In addition, this strategy is not acceptable, because it would not be in compliance with the goals and regulations of the NERRS or the tripartite agreement of the Belle W. Baruch Foundation.

III. AFFECTED ENVIRONMENT

A. Resources

1. Environmental Conditions

a. Uniqueness

The Reserve has several unique aspects. Most of the undisturbed marsh and adjacent uplands are owned by the Belle W. Baruch Foundation and the State of South Carolina, which have established these lands in perpetuity for conservation and research. The North Inlet Estuary was designated a prime coastal ecosystem and included as an Experimental Ecological Reserve by the Institute of Ecology and the National Science Foundation with a site rating of 98%. In 1980, the North Inlet Estuary was selected as the marine-estuarine site in the National Science Foundation's nationwide Long-Term Ecological Research Program. The portion of North Inlet to be designated as a National Estuarine Research Reserve covers a 3,200 hectare area, with the majority classified as Outstanding Resource Waters (ORW) by the South Carolina Department of Health and Environmental Control (SCDHEC). This special category is for tidal salt waters which constitute an outstanding recreational or ecological resource and will be maintained and protected in its natural condition. The remainder of the areas of North Inlet Estuary is classified Shellfish Harvesting Waters (SFH) by SCDHEC, while the waters directly adjacent to Mud Bay are classified as SB, (no harvesting of clams, oysters, or oysters for human consumption) the same classification as Winyah Bay.

b. Hydrology

(i) North Inlet Estuary

The circulation pattern of North Inlet is tidally dominated. The circulation structure resembles a Pritchards (1955) type D vertically homogeneous estuary, although in several creeks a lateral net circulation exists similar to the type C estuary. The maximum spring tide range is 2.5 m and the neap range about 1.0 m, the maximum tidal current is 1.7 m/sec with the net currents being as great as 26 cm/sec. There is limited exchange of water between Winyah Bay and North Inlet; the greatest exchange of water occurs between North Inlet Estuary and the Atlantic Ocean through North Inlet. In the mouth of the inlet, salinity varies from 30 to 35 ppt; however, after severe rainstorms the salinity may temporarily drop to 20 ppt.

Generally, salinities in all waterways are lowest in winter and spring. Water temperatures range from 3° to 30°C. Detailed analyses of many aspects of the physical oceanography of North Inlet have been published by Dr. B. Kjerfve and his students (see Appendix J for a partial listing of selected papers).

A long-term data base (approximately 11 years) exists which includes continuous recordings of precipitation, wind speed, barometric pressure, solar radiation, water and air temperatures, conductivity, and salinity. A daily water sample is taken from two or more locations and is analyzed for dissolved organic matter, N, P, C, chlorophyll, and particulate N, P, C, PO_4, NH_4, and NO_3/NO_2. Dr. E. Blood and her associates have published various studies regarding nutrient dynamics in the area (see bibliography of Long-Term Ecological Research publications Appendix J)

There are four distinct watersheds on the adjacent upland area; two drain west into Winyah Bay, one south into Mud Bay (Winyah Bay) and one east into the North Inlet Estuary. Extensive studies on hydrology have been undertaken by Dr. T. Williams and his associates from the Baruch Forest Science Institute of Clemson University. The natural drainage patterns of about 60% of the upland area have been interrupted by man-made ditches and dikes that date back to the rice culture days. All watersheds drain into intertidal areas and therefore are influenced to a certain degree by tidal fluctuations.

(ii) Winyah Bay Estuary

Winyah Bay is one of the major estuarine ecosystems in the southeastern United States. It is a class B type estuary according to Pritchard's classification (1955). The axis of Winyah Bay is roughly oriented in a northwest-southeast direction. The estuary is narrowest near its confluence with the ocean (1.5 km) and widest in the center (7 km). At the upper end of the bay where the major rivers (Black, Pee Dee, and Waccamaw rivers) converge, the width is about 2 km. Prominent features of Winyah Bay include: long rock jetties which project more than a mile into the ocean from North and South islands, several large islands within the bay, and a large shallow mid-section known as Mud Bay. Winyah Bay has a mean depth of only 15 ft (4.2 m) and many hectares of open waterways are less than 6 ft (2 m) in depth. A ship channel which is maintained at 27 ft (8.2 m) runs along the axis of the bay from the end of the jetties to Georgetown Harbor. Details of the bathymetry of Winyah Bay are available from Coast and Geodetic Survey navigation map No. 787 and several U.S. Army Corps of Engineers documents (e.g., Trawle, 1978).

The entire Winyah Bay watershed is approximately 18,000 square miles. Four major rivers drain into the system. More than 16,000 sq miles of this drainage area is associated with the Pee Dee-Yadkin river system which originates in the Blue Ridge Mountains area of North Carolina. Water from this area flows across the piedmont

region of both North and South Carolina, over the coastal plain of eastern South Carolina, and into Winyah Bay through the Pee Dee River. The Waccamaw River also receives water from the Pee Dee as the poorly defined, shallow, wide, swampy waterways merge upstream of the US Highway 17 bridges. The Black and Sampit rivers drain much smaller watersheds. Other characteristics of these watersheds are given by the Conservation Foundation (1980).

According to Johnson (1972), the freshwater input to Winyah Bay Estuary ranges from 2,000 to about 1,000,000 cubic feet per second (cfs), and mean runoff is approximately 15,000 cfs. Superimposed on this unidirectional freshwater flow toward the ocean is the regular semi-diurnal tidal pattern. Mean tidal amplitude is on the order of 1.4 m at the ocean end of Winyah Bay and 1 m at the Sampit River (1.6 m and 1.2 m on spring tides, respectively; Trawle, 1969). A salt wedge effect occurs as heavier salt water moves up estuary along the bottom with a flooding tide, even though the overlying freshwater may be flowing toward the ocean. During periods of low freshwater inflow, flooding tides move salt water more than 15 miles upstream of the US Highway 17 bridges, but under average river flow, the penetration is usually within a mile of the bridges. Differences between surface and bottom salinities during these periods may be more than 20 ppt. U.S. Army Corps of Engineers' measurements (Trawle, 1978) indicate that while surface water salinities are usually 29-32 ppt near the ocean entrance during most flow conditions, surface salinities in Georgetown Harbor range from about 0 to 10 ppt. Salinity patterns in the mixing zone between these ends of the system are highly variable as a result of changing freshwater inflow, tidal amplitude, wind conditions, and bottom topography. Further information on the hydrography of Winyah Bay is available in Trawle (1969), Johnson (1970), and Bloomer (1973).

Almost the entire shore of Winyah Bay is vegetated by marshes. Approximately 31,867 acres (12,747 hectares) of marsh are associated with this estuary. More than 77% of these marshes are regularly flushed through tidal action; the remaining 13% are impounded (Tiner, 1977). Some 80% of the marshes are vegetated by freshwater plants while most of the other 20% are inhabited by the brackish water grass Spartina cynosuroides and black rush, Juncus roemerianus. Of the 17 estuarine systems in South Carolina, Winyah Bay is most important in terms of freshwater marshes. In fact, about 35% of the state's freshwater marsh lands occur there (Tiner, 1977). Relatively small stands of salt marsh cordgrass (Spartina alterniflora) occur near the entrance of Winyah Bay, and a narrow band occurs adjacent to major waterways upstream to the middle bay.

Water quality in Winyah Bay is directly influenced by inputs from the Georgetown area. Georgetown is one of the most extensively developed areas of the Sea Island Coastal Region (Mathews et al., 1980). Winyah Bay has been classified as SB, meaning that its waters are not suitable for harvesting of clams, oysters, or mussels for market purposes or human consumption (South Carolina Department of

Health and Environmental Control 1977; South Carolina Pollution Control Authority, 1972). Shellfishing in Winyah Bay has been restricted since 1964 (U.S. Department of Commerce, 1979). It is not the intent, objective nor desire of the NI/WB NERR to restrict the shipping activities of the port of Georgetown. Rather, the traditional and future port activities (i.e. commercial shipping and dredging of channels) in Winyah Bay are expected to be the major focus of comparative research projects with North Inlet.

c. Geology

North Inlet waters drain a very large marsh located between Debidue and North islands and the mainland. The mainland consists of Pleistocene Storm Beach Terrain with ridges oriented in a northeasterly-southwesterly direction. These ridges intersect the Atlantic Ocean at the north end of Debidue Beach. These surficial mainland features are underlain by a complex sequence of older coastal plain sediments, a sequence which is poorly understood in the immediate area at the present time.

Debidue Beach and North Island represent part of a Holocene Barrier Beach System. This system has migrated southward in recent times, with principal evidence here being the major spit along the northern entrance to Winyah Bay, and smaller spit migration land forms along the northern border of North Inlet.

North Inlet drains numerous tidal creeks, and two of these extend back through the marsh to lie in close proximity to the Pleistocene mainland. The creeks are very shallow in depth, never exceeding 30 ft below mean sea level, and commonly showing floors which are occupied by sand bars. The marsh areas are underlain by silts and clays which extend an unknown depth below the surface.

Relief is generally flat; the western third of the peninsula has the most relief with bluffs adjacent to Winyah Bay as high as 15 m. Geologically, Winyah Bay represents a drowned river basin and receives water from an extensive drainage basin (see previous description).

d. Climate

The climate is temperate or subtropical with air and water temperatures ranging from -13°C to +41°C and 3°C to 30°C , respectively. Winter temperatures are highly variable but generally mild. Ice occasionally forms on high marsh pools, but snow is a rare event. Rainfall is about 45 inches (114 cm) per year. Daytime temperatures are usually above 20°C from May through November.

Hobcaw Barony. During Mr. Baruch's ownership, many famous world leaders visited the Barony, including President Roosevelt and Sir Winston Churchill. Ownership of the Barony was transferred to Belle Baruch, Mr. Baruch's daughter, and when she died in 1964, the property was included as part of the newly established Belle W. Baruch Foundation.

B. Uses

1. Prior

Until the Foundation was established and universities started research and educational programs on Hobcaw, the Barony was exclusively for the private use of the Baruch family.

Traditional public uses of the proposed site will not be altered. These uses include boating, fishing, wildlife observation, swimming and recreational harvesting of oysters and clams as permitted by state laws. Seasonal hunting for waterfowl and rails in the tidal waters of the Reserve is a legal activity. Traditional uses of Winyah Bay permitted by state and Federal agencies will continue, including existing shipping channels.

2. Existing

a. Recreation.

Public recreational activities are not allowed on the upland areas of the Hobcaw Barony. Since Hobcaw Barony is a designated wildlife refuge, no hunting or trapping is allowed on the upland portions of the property. However, the tidal waters are open under state and Federal jurisdiction and used by the public for boating, fishing, swimming and recreational harvesting of oysters and clams. However, seasonal hunting on the marshlands for waterfowl and rails in the tidal waterways of the Reserve is a legal activity, regulated by State laws, and will not be altered. This activity does not take place in areas of the Reserve that will conflict with other traditional activities such as fishing and swimming. .

b. Agricultural and Residential.

No agriculture takes place on the Barony. At present, Hobcaw House is operated as a historical house - museum; however, Bellefield House is the residence of Miss Ella Severin, a trustee of the Foundation. There are five other residences on the property used by resident research, security, and forestry personnel. Dormitory facilities for approximately 80 persons are available for visiting scientists and students.

2. Living Resources

The North Inlet-Winyah Bay complex contains a diverse but representative assemblage of southeastern coastal habitats and associated biological communities.

The proposed site includes a range of habitats ranging from salinity-dominated freshwater wetlands to ocean-dominated salt marshes. In addition, a series of habitats extending from the open ocean across a barrier island and an extensive salt marsh to the uplands are included. Island habitats which are used as bird nesting sites as well as a portion of a barrier island are to be part of the reserve.

Since 1969, numerous studies have been conducted on the ecology of the North Inlet system; however, fewer studies exist for the Winyah Bay portion of the proposed estuarine reserve. To date, there are 846 publications representing marine and coastal studies completed by Baruch associates (see Appendix J); many deal exclusively with the North Inlet-Winyah Bay system. Extensive faunal species lists and distribution information has been developed (see Zingmark, 1978; Fox and Ruppert, 1985; Ogburn et al., 1988) and much of the phytoplankton, macroalgae, marsh plants, zooplankton, and meiofauna has been identified (see papers in Appendix E and Zingmark, 1978). The area includes many commercial and recreational species of fish and shellfish. A variety of resident and migratory birds inhabit this estuarine system (see Bildstein publications in Appendix J). A detailed characterization of the existing literature on the physical, chemical, and biological conditions of Winyah Bay and North Inlet Estuary is available (Blood and Vernberg, 1992).

Although Winyah Bay habitats have not been extensively studied, Allen et al. (1982, 1984) have described the temporal and spatial patterns of water column biota from the ocean to the mouth of the rivers.

3. Cultural and Historical Resources

Hobcaw Barony has a rich history. There is strong evidence indicating that an early Spanish settlement was located on the Barony in 1526. For various reasons, the Spanish left in 1527. By the 17th century English influence had spread from Virginia, and in 1718 King George II granted the Hobcaw Barony to Lord Carteret. This area became well-known for rice culture and the general region of Georgetown County was one of the richest areas in the colonies. On the Barony is located remnants of a colonial fort and cemetery, remains of three slave villages, and old cemeteries. Artifacts of early Indian settlements are found throughout the area. The King's Highway, which was the coastal road from Wilmington, NC, to Charleston, SC, crosses the property; George Washington used this road in 1791. In more recent time, Mr. Bernard Baruch, famous financier and advisor to presidents, purchased land in 1905 and 1907 which comprises the present 17,500 acres tract known as the

c. Industrial and Port-Related.

No industrial activities occur or are allowed on Hobcaw Barony, although designated dredge spoil sites have existed elsewhere on B.W. Baruch Foundation uplands bordering Winyah Bay since 1968; these sites are not part of the Reserve. It is not the intent, objective nor desire of the NI/WB NERRS to interfere with the use of these spoil sites by the South Carolina State Ports Authority. The shipping lanes adjacent to the south-western border of the Winyah Bay portion of the Reserve are used extensively for activities related to industries located in Georgetown, as well as import/export activities centered at the Port of Georgetown. Industries located in Georgetown which are dependent upon the continued use of the Port include Georgetown Steel, International Paper, Santee Cement and AKZO Salt, all of which are important to the local and regional economy. In addition, future potential long-term Port users and transit type cargoes under long-term contracts may consist of lumber, ore, scrap metals and general cargo which have been handled in the past. In order to maintain the shipping channel at the authorized depth, the U.S. Army Corps of Engineers must dredge the channel on a regularly scheduled basis. The creation of the Reserve will not alter the current or future use of any of these areas designated for dredged spoils. The Reserve Draft Management Plan does not call for a change from existing or traditional uses of the areas of the Reserve. It is not the intent, goal nor desire of the Reserve to restrict shipping and dredging activities of the Port of Georgetown which provide a major portion of Georgetown's industrial-based economy. The proposed NI/WB NERR is unique in the U.S. in that no other NERR is located in such close proximity to Federally maintained shipping channels. One of the objectives of the Reserve is to study the relationship between natural ecosystems and these shipping/industrial activities in order to establish an information base for the wise management and coexistence of both in the future. Hence the establishment of the Reserve would not limit the maintenance of existing shipping channels.

d. Research and Education.

The North Inlet Estuary-Winyah Bay site serves as a research and instructional facility for the Belle W. Baruch Institute for Marine Biology and Coastal Research of The University of South Carolina. It functions as a national and international site for estuarine and coastal research and education.

Since 1969, a comprehensive research program ranging from studies of molecules to ecological landscapes has evolved. The research approach has developed from quantifying various physical, chemical, and biological components and interactions between these components, to incorporating exchange of substances across ecosystem boundaries and exchanges between different subsystems. Initial research efforts emphasized wetland and estuarine processes, but studies have

expanded to encompass an entire coastal landscape, from ocean to diverse upland and freshwater habitats. There is also a continuing emphasis on molecular and organismic studies.

Undergraduate, graduate, and post-graduate instruction has been given at Hobcaw Barony. In 1980, the Baruch Institute, USC, established a Continuing Education Program at its field site in Georgetown to serve area residents and visitors. This program has included short courses for children and adults, public lectures and forums, and marine science workshops and courses for teachers. Additional public education activities are conducted at the site through the Bellefield Nature Center, a part of the Belle W. Baruch Foundation. The Nature Center is open to visitors 6 days a week and contains aquaria; exhibits featuring coastal life, ecology and research conducted on-site; and audiovisual programs that are shown daily. In addition, the Nature Center also conducts field studies of salt marsh, forest, and freshwater habitats on the property and brings nature programs to local schools.

Although significant progress has been made in developing broad-based monitoring, research, and education programs, a distinct need exists to improve and expand the program to educate more people about the cultural, economic, and ecological values of our coastal area and to develop a more comprehensive scientific basis to deal with the ever-increasing environmental pressure resulting from continuing growth in the coastal zone.

e. Present Land Use.

The present land uses have been described in the previous section on existing uses. The area to be included in the Reserve is primarily used for research and education, but the tidal waters are used by the public for recreational purposes as provided by state and Federal law.

3. Future Land and Resource Use

No change in land and resource use is proposed as a result of the creation of the NI/WB NERR, except to strengthen and expand research and teaching facilities and programs to meet future demands. Existing uses of the land and resources by the public will be continued in the Hobcaw Barony, as provided by Baruch Foundation regulations and State law, and in the tidal waters, as provided by State and Federal laws. Traditional uses include sail and power boating, recreational fishing and gathering of shellfish, hunting in marshes, etc., that currently exist as provided for by the above regulations and laws.

IV. ENVIRONMENTAL CONSEQUENCES

A. General

Establishment of NI/WB NERR will have a net positive benefit to both the natural environment and the human environment. The primary positive impact on the natural environment will be long-term protection of the natural resources. This will have an obvious positive impact on biota, habitats, and water quality. Research and education programs will have a positive impact because they will improve understanding, management, and use of coastal resources.

The impacts of visitor use and facilities development which may occur at the Reserve will be negligible. The impact of littering will also be negligible, if not reduced, through education campaigns.

Impacts on the human environment will be positive. Research and education will result in positive benefits to society. Traditional uses of reserve land and water areas will not be hampered. Public contact with the estuarine environment will be enhanced. Effects on employment and tax revenues will be positive. Aesthetic impacts will not be negative. Cultural resources will be protected and not adversely impacted.

B. Specific Impacts

1. Visitor Use

No change from the existing research and traditional use of the Reserve lands and waters will occur. Visitors will be received at the Nature Center, which is located at the gate on US Highway 17. All tours of the property will be conducted by personnel associated with the Nature Center and the Reserve. Because of the large expanse of Hobcaw Barony (it has approximately 90 miles of single lane roads), ongoing wildlife and other research projects which require minimal human disturbances, and the liability concerns of the primary landowners (Belle W. Baruch Foundation), it is not feasible to allow unrestricted access to the property. Water access to the Reserve tidal waters is possible under existing state and Federal regulations. No additional regulations or restrictions are being proposed.

No significant increase in the use of the Hobcaw Barony and the proposed Reserve is expected over the usage during 1990 when the education programs of the Foundation and the Baruch Institute served about 35,000 people, including more than 2,900 school children from around the state who participated in field studies of salt

marsh, pond and forest ecosystems. Approximately 200 teachers from various school systems participated in workshops presented by staff members. The carrying capacity for visitor use will be determined and any environmental effects of additional visitors will be carefully monitored. Only increases in visitor use which have none or only minimal effects on the environment will be permitted.

2. Construction

Research facilities are available and the Institute will be constructing a new research laboratory in 1992 to replace the two laboratories destroyed by Hurricane Hugo. At the entrance to the Hobcaw Barony is the Nature Center which is owned and operated by the Belle W. Baruch Foundation and functions as a visitor center. In addition to a reception and display area, a separate classroom building is used for instructional purposes. The adjacent USC Kimbel Living Center, consisting of housing accommodations for 80 persons and a meeting center, is available for workshops, seminars, and visiting groups and researchers. Other facilities contribute to the overall experience of visitors to the site. Examples of these include interpretive exhibits, printed educational materials, a collection of flora and fauna, and a boardwalk.

If NI/WB NERR builds or renovates a structure, development activities will take place on a very small area of land in the least sensitive zone of the reserve. A feasibility study will be conducted to take into account soil suitability, geology, vegetative community development, wildlife use, presence of rare, threatened and endangered species, and historical land use patterns. Land cover and land use categories will be mapped and defined according to suitable uses. The environmental impact of any construction and improvements will be fully assessed as part of a site design plan. Building will be constructed to conform with federal (i.e. FEMA) and state regulations. Any necessary permits or agency and Foundation approval will be obtained and applicable state and local guidelines will be followed to avoid environmental damage. Overall, impacts from construction and improvements will be negligible.

3. Litter

Litter barrels will be provided at the Nature Center that is also the primary point of land access to the site. Periodic litter patrol and dumping of receptacle contents will be accomplished by reserve staff and volunteers. Since visitors will arrive in small controlled group situations, a major problem with litter should not occur. In addition, land access to the site is strictly regulated by gates and fencing installed by the Baruch Foundation.

4. Impacts on the Natural Environment

a. General

Establishment of Reserve will ensure long-term protection of wetland, upland, and open-water habitats associated with the research core areas of the Reserve. Habitats in the buffer areas will be protected also, but with fewer restrictions on land use. Because the reserves' habitats support diverse and productive flora and fauna populations and help protect water quality, this protection will have a significant positive impact on the natural environment.

Research and education programs will have net positive effects on the habitats, populations, and water quality of Winyah Bay in that these programs will increase the knowledge and understanding of estuarine systems which, in turn, will lead to improved care and management of estuaries. Only non-manipulative research will be permitted except in special research projects involving a small area of the Reserve and often extensive review of proposed research by the management team, the Baruch Institute, and SCCC. In addition appropriate permits will need to be obtained. Research and education projects will be approved through the permit process and managed to minimize disturbance to the environment.

b. Adjacent Uplands

Research and educational activities associated with the Reserve will not have negative impact on lands adjacent to the Reserve's boundary lines. These adjacent lands are:

(i) The uplands of the Belle W. Baruch Foundation, that have been established in perpetuity for the purposes of the study of marine biology, forestry, and conservation of wildlife;

(ii) The uplands and marsh lands of North Island that are owned by the State of South Carolina and have been set aside as an area of no development; and

(iii) The marsh lands and uplands of the DeBordieu Colony. These uplands have been developed for residences.

c. Adjacent Uplands and Open Water.

The creation of the Reserve will not have a negative impact on shipping channels in Winyah Bay. The management plan clearly indicates that the boundary

lines do not impinge on existing shipping channels. At the point of closest proximity (the region immediately south of the Marsh Islands) the boundary line is the mean low water level adjacent to the marsh vegetation. Under state and Federal guidelines, no dredging or other disturbances of marsh vegetation would be allowed here even if the Reserve did not exist. If these guidelines are changed, the goals of the Reserve would not be altered in that one of the research objectives is to compare ecological responses of a man-influenced estuary (Winyah Bay) with an undisturbed estuary (North Inlet). Hence the establishment of the Reserve would not limit the maintenance of existing shipping channels. (For a more detailed description of state regulations, see Section II. A. 4. c.(1)(b)(i) Relationship between the South Carolina Coastal Council and the Management Agency.)

The management plan does not call for a change from existing and traditional uses of the water areas of the Reserve nor will the creation of the Reserve have any effect on existing dredge disposal areas which are located well outside the boundaries of the Reserve. These dredge sites do not have an apparent effect on North Inlet. Existing dredge spoil areas are being used under a long-term contract involving the U.S. Army Corps of Engineers. It is not the intent, goal nor desire of the Reserve to restrict shipping and dredging activities of the Port of Georgetown. Rather, it is the objective of the Reserve to study the relationship between natural ecosystems and these activities in order to establish an information base for the wise management and co-existence of both in the future.

d. Biota

Governmental regulations and owner policies dealing with the harvesting of natural resources within the NI/WB NERR will not be altered by the creation of this Reserve. The comparative research and educational projects that will result from the creation of the NI/WB NERR will serve to increase public awareness and proper use of the natural resources within the site. Overall impact on the biota will be positive.

e. Water Quality

Winyah Bay has undergone substantial changes in the past, including episodes of increased or decreased freshwater flow, increased sedimentation, and measurable deterioration of water quality. North Inlet, by contrast, has been classified by the South Carolina Department of Health and Environmental Control as having the highest possible water quality status. Immediate impacts on the overall water quality in the NI/WB NERR will be negligible. Water quality monitoring will be part of the research and monitoring programs of the Reserve. This monitoring may lead to better management practices in the future which could improve overall water quality of the site.

5. Impacts on the Human Environment

a. Scientific and Educational

Designation of the NI/WB NERR will make a valuable resource available on a long-term basis to local public and private research organizations and institutions. Reserve education programs will be useful to local school systems and higher education institutions. Education programs will benefit the local communities by providing opportunities for groups and individual citizens to increase their understanding and awareness of estuarine systems. Sound, informed coastal management decisions resulting from dissemination of research results to coastal managers will benefit the local community, the state, the region, and the Nation.

b. Traditional Uses

Establishment of the Reserve will not restrict traditional uses of the environment. Traditional uses include observation of wildlife, swimming, hunting in marshes, fishing, and shellfishing. Protection of natural habitats and water quality may actually enhance traditional uses by enhancing natural diversity and productivity of reserve resources. Designation will ensure that the area will be available and protected for future use and enjoyment.

(i) Hunting.

Hunting in marshes is allowed in the Reserve subject to state and Federal jurisdiction and no change in existing practices will occur.

(ii) Fishing.

Recreational fishing is currently permitted under state regulation in tidal waters. It is not the intent, objective, nor the desire of the NI/WB NERR to change existing policies. Both recreational and commercial fishing activities are subject to the laws of South Carolina and regulations enforced by the SC Wildlife and Marine Resources Department.

(iii) Shellfishing.

Shellfishing in the Reserve is governed by state rules and regulations which exclude commercial harvesting in North Inlet's tidal waters. State recreational harvesting regulations apply throughout this area. It is not the intent, objective nor the desire of the Reserve to change existing policies.

c. Employment

No jobs will be eliminated by the designation of the reserve site. In contrast, four new positions will initially be created to begin the basic programs at the Reserve: Reserve Manager, Research/Resource Coordinator, Education Coordinator, and Secretary/Data Processor. The duties and responsibilities of these positions were described earlier. The secretary/data processor, who will be responsible to the Reserve Manager, will handle the various secretarial tasks associated with the program and assist the existing data management program with those topics relating to the Reserve's activities. As the program develops, the need for additional personnel will be evident. It is anticipated that a research technician(s) will be needed to assist in field studies and monitoring of living resources and of physical/chemical/geological factors. Overall impact on area employment will be positive.

d. Public Participation

The designation of the NI/WB NERR will create excellent opportunities to enhance public awareness, understanding, and wise use of estuarine resources in the North Inlet and Winyah Bay Estuaries. These opportunities will be attained by the NI/WB NERR staff through:

(i) promoting knowledge of the research reserve, its resources, and its programs as well as knowledge of broader coastal issues and concerns related to estuarine management and protection;

(ii) collaborating with other organizations to provide educational and interpretive services at this site;

(iii) disseminating information gained from research on the Reserve to public audiences, including government officials, planners, and other decision-makers;

(iv) providing opportunities for teacher training, student projects, internships, and assistantships where enrolles work jointly with scientists, gain field experience, and learn about the importance of research results;

(v) enhancing interest in and commitment to South Carolina estuaries and their tributaries through volunteer programs and personal contact with Reserve resources; and

(vi) broadening public support for the Reserve by continuing on-going programs suited to visitors of diverse interests, ages, and backgrounds.

e. Fiscal

Designation of the NI/WB NERR will not cause any loss of tax revenues to the counties or state because no change in existing land ownership and tax status will occur. The existence of a National Estuarine Research Reserve site in Georgetown County could have positive impacts on the tax base of lands in the immediate area by making the nearby properties more desirable and valuable. In addition, new employment opportunities and an increase in the number of visitors to the Nature Center will mean an increase in taxable salaries and dollars spent within the county.

f. Infrastructure: Public Roads and Parking Areas, Potable Water Supplies, Sewer Systems, and Energy Supplies

No impacts on the infrastructure of the NI/WB NERR area will occur. No new public roads, parking areas potable water supplies, sewer systems nor energy supplies are necessary since these facilities currently exist at the Hobcaw Nature Center and the Baruch Marine Laboratory.

g. Aesthetic

Designation of the Reserve will protect the existing natural beauty of the site, and will make this beauty more available to the surrounding communities through public access. Reserve interpretation and education programs will enhance the Scenic Rivers Act of 1968. Reserve interpretation and education programs will enhance the public's awareness and appreciation of the aesthetic as well as the practical values of estuaries. Many education activities will use a multisensory approach, helping people to gain familiarity with and enjoy the resources of the estuary through seeing, hearing, smelling and feeling. Passive enjoyment activities, such as watching and listening to birds or sketching estuarine scenes, will be encouraged. Designation will have a significant positive impact on aesthetics.

h. Cultural Resources

Cultural resources such as historical and archaeological sites and artifacts will be protected and enhanced. These resources will also be made more available to the public through education programs. Designation of the site will have a significant positive impact on cultural resources.

i. Public Access

Access to the Reserve by land will be monitored and controlled and current access policies and regulations will be enforced. As noted previously (see Section III B) access to the Reserve's tidal waters by boat is a traditional use and this practice will not be altered. The South Carolina Coastal Council reaffirmed this policy on public access in a Resolution adopted on December 13, 1991 (Appendix M).

C. Irreversible or Irretrievable Commitment of Resources

No resources will be irreversibly or irretrievable lost since no change in land ownership will occur. The Reserve management plan does not attempt to change existing local, state or Federal laws/regulations relating to current and traditional uses. To allow for future growth or change, the NI/WB NERRS program is flexible. The plan can only be rewritten or the boundaries changed, subject to a complete public review process and NOAA guidelines. The entire program can be terminated in accordance with NOAA regulations, should it be desired.

D. Possible Conflicts Between the Proposed Action and the Objectives of the Belle W. Baruch Foundation, Federal, State, Regional, and Local Use Plans, Policies and Controls for the Area Concerned

The establishment of the proposed NI/WB NERR will not be in conflict with the objectives of Belle W. Baruch Foundation, Federal, State, regional and local land use plans, policies, and controls. Many of these agencies and the Belle W. Baruch Foundation have existing goals which are in common with the National Estuarine Research Reserve Program. The proposed action is consistent with all relevant regulations. The NI/WB NERR will cooperate with these agencies and the Belle W. Baruch Foundation and comply with their regulations. All necessary permits and agency or Foundation approval will be obtained for reserve activities. The NI/WB NERRS management plan clearly emphasizes coordination and cooperation with existing local, state, regional, Federal and Belle W. Baruch Foundation programs; with local and state education systems; and with Federal marine and estuarine programs.

V. LIST OF PREPARERS

State of South Carolina
Baruch Institute, USC

Dr. Dennis M. Allen, Assistant Director
Belle W. Baruch Institute for Marine Biology and Coastal Research
Baruch Marine Field Laboratory, University of South Carolina
P.O. Box 1630
Georgetown, SC 29442

Mrs. Wendy Allen, Continuing Education Director
Bellefield Nature Center
Rt. 5, Box 1003
Georgetown, SC 29440

Dr. Michael P. Crosby, Research Assistant Professor
Belle W. Baruch Institute for Marine Biology and Coastal Research
Baruch Marine Field Laboratory, University of South Carolina
P.O. Box 1630
Georgetown, SC 29442

Dr. F. John Vernberg, Director
Belle W. Baruch Institute for Marine Biology and Coastal Research
University of South Carolina
Columbia, SC 29208

SC Coastal Council

Mr. Steve Snyder
SC Coastal Council
4130 Faber Place, Suite 300
Charleston, SC 29405

NOAA

Mrs. Dolores Washington
Program Specialist
Sanctuaries and Reserves Division
National Ocean Service
Office of Ocean and Coastal Resource Management
NOAA
Washington, D.C. 20235

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VI. LIST OF AGENCIES, ORGANIZATIONS, AND PERSONS RECEIVING COPIES OF THE FEIS/DMP

Federal Agencies

Advisory Council of Historic Preservation
Army Corps of Engineers, South Atlantic Division
Department of Agriculture
Department of Commerce, National Marine Fisheries Service
Department of Defense
Department of Energy
Department of Health and Human Services
Department of the Interior, U.S. Fish and Wildlife Service
Department of Justice
Department of Labor
Department of Transportation, U.S. Coast Guard and Federal Highway Administration
Environmental Protection Agency, Permits Branch, Region IV
Federal Energy Regulatory Commission
General Services Administration
Nuclear Regulatory Commission

Congressional

Senator Ernest F. Hollings
Senator Strom Thurmond
Representative Arthur Ravenel

State Distribution

Governor
Attorney General
Archaeology Institute
South Carolina Coastal Council
South Carolina Department of Archives and History
South Carolina Department of Health and Environmental Control
South Carolina Department of Highways and Public Transportation
South Carolina Department of Parks, Recreation, and Tourism
South Carolina Forestry Commission
South Carolina Land Resources Conservation Commission
South Carolina Public Railways Commission
South Carolina Public Service Authority

South Carolina Public Service Commission
South Carolina State Budget and Control Board
South Carolina State Development Board
South Carolina State Ports Authority
South Carolina Water Resources Commission

Local Distribution
Georgetown County

Georgetown County Development Commission
Beaufort County Joint Planning Commission
Georgetown County Administrator
Waccamaw Regional Planning Commission
Mayor, Georgetown
Senator Doug Hinds
Representative Linwood Altman

Environmental Interest Groups

Center for Environmental Education
Environmental Defense Fund
The Nature Conservancy
National Wildlife Federation
Sierra Club
South Carolina Chamber of Commerce
South Carolina Coastal Conservation League
South Carolina Environmental Coalition
South Carolina Wildlife Federation
League of Women Voters, Georgetown Chapter

Libraries

Georgetown County Library
South Carolina State Library

NI/WB NERR Advisory Committee Members

Mr. John McMillan, Director
Division of Energy, Governor's Office
State House
P.O. Box 11369
Columbia, SC 29211

Dr. James Halpin
Belle W. Baruch Foundation at Georgetown
104 Barre Hall
Clemson University
Clemson, SC 29634-0351

Ms. Betsy Haskin
League of Women Voters
218 Cannon Street
Georgetown, SC 29440

Mr. Jimmy Chandler
SC Environmental Law Project
P.O. Box 279
Pawleys Island, SC 29585

Mr. D. Claude Baker
SC State Ports Authority
P.O. Box 601
Georgetown, SC 29440

Mr. Bob Joyner
Yawkey Wildlife Center
SC Wildlife and Marine Resources Department
Route 2, P.O. Box 181
Georgetown, SC 29442

Mr. Bill Doar
P.O. Box 418
Georgetown, SC 29442

The Honorable Linwood Altman
P.O. Box 164
Pawleys Island, SC 29585

Mr. Tommy Strange
Santee Coastal Reserve, SCWMR
P.O. Box 37
McClellanville, SC 29458

Mr. Alfred Schooler, Chairman
Georgetown County Council
P.O. Drawer 1270
Georgetown, SC 29442

Mr. Charles Lucquire
International Paper Corporation
P.O. Box 538
Georgetown, SC 29442

Mr. Dan Avant
Edens & Avant
930 Richland Street
Columbia, SC 29201

The Honorable H.E. Bonnoitt, Jr.
Mayor, City of Georgetown
P.O. Box 164
Georgetown, SC 29442

Mr. Jack Kendree
Georgetown County Development Commission
P.O. Box 689
Georgetown, SC 29442

Mr. Ingell H. Doyle
Georgetown Bar and Harbor Pilots Association
P.O. Box 404
Georgetown, SC 29442

Mr. James B. Moore, Jr.
P.O. Drawer 418
Georgetown, SC 29442

Mr. Dean C. Cain
SC Wildlife and Marine Resources Department
P.O. Box 839
Georgetown, SC 29442

Mr. Charles Stockly
Georgetown Sportfishing Association
603 Whitehall Drive
North Belle Isle
Georgetown, SC 29440

Mr. Stuart Hope
12 Lafayette Blvd West
Debordieu Colony
Georgetown, SC 29440

Mr. Reed M. Bohne, Manager
Gray's Reef National Marine Sanctuary, NOAA
P.O. Box 13687
Savannah, GA 31416

VII. SELECTED REFERENCES

Allen, D.M., S.E. Stancyk,, and W.K. Michener, eds. 1982. Ecology of Winyah Bay, SC and Potential Impacts of Energy Development. Baruch Institute Special Publication No. 82-1. 275 pp.

Allen, D.M., W.K. Michener, and S.E. Stancyk, eds. 1984. Pollution Ecology of Winyah Bay, SC: Characterization of the Estuary and Potential Impacts of Petroleum. Baruch Institute Special Publication No. 84-1. 271 pp.

Blood, L. and F.J. Vernberg. (1992). Characterization of the physical, chemical, and biological conditions and trends in Winyah Bay and North Inlet Estuaries: 1970-1985. In: Characterization of the physical, chemical, and biological conditions and trends of three South Carolina estuaries. SC Sea Grant Consortium.

Bloomer, D.R. 1973. A hydrographic investigation of Winyah Bay, South Carolina and the adjacent waters. Masters Thesis, Georgia Institute of Technology. 57 pp.

Conservation Foundation, The. 1980. A reconnaissance of the structure and dynamics of the Winyah Bay ecosystem. pp. 1-36, In: The Conservation Foundation. Winyah Bay Reconnaissance Study (Technical Supplement). Washington, D.C.

Fox, R.S. and E.E. Ruppert. 1985. Shallow-water Marine Benthic Macroinvertebrates of South Carolina. Belle W. Baruch Library in Marine Science, Number 14. University of South Carolina Press, Columbia, SC. 329 pp.

Johnson, F.A. 1970. A reconnaissance of the Winyah Bay estuarine zone, South Carolina. S.C. Water Resources Commission. Report No. 4. 36 pp.

Johnson, F.A. 1972. A reconnaissance of the Winyah By estuarine zone, South Carolina. S.C. Water Resources Commission. Report No. 4. 36 pp.

Mathews, T.D., F.W. Stapor, Jr., C.R. Richter, J.V. Miglarese, M.D. McKenzie, L.A. Barclay, E.B. Joseph, and M.D. McKenzie (eds). 1980. Ecological characterization of the Sea Island coastal region of South Carolina and Georgia. Vol. I: Physical features of the characterization area. U.S. Fish and Wildlife Service, Office of Biol. Serv., Washington, D.C. FWS/OBS-79/40. 212 pp.

Ogburn, M.V., D.M. Allen, and W.K. Michener. 1988. Fishes, shrimps, and crabs of the North Inlet Estuary, SC: A four-year seine and trawl survey. Baruch Institute Technical Report. No. 88-1. 299 pp. University of South Carolina, Columbia.

Pritchard, D.W. 1955. Estuarine circulation patterns. Proc. Am. Soc. Civ. Eng. 81(717):1-11.

South Carolina Department of Health and Environmental Control. 1977. Water classification standards system for the state of South Carolina.

South Carolina Pollution Control Authority. 1972. Stream classifications for the state of South Carolina, Columbia, SC. 24 pp.

Tiner, R.W., Jr. 1977. An inventory of South Carolina's coastal marshes. S.C. Mar. Res. Cent. Tech. Rep. No. 23. 33 pp.

Trawle, J.J. 1978. Georgetown Harbor, South Carolina; Report I, hydraulic, salinity, and shoaling verification; hydraulic model investigation. U.S. Army Engineer District, Charleston, S.C. Miscellaneous paper H-78-6, Report I of a series.

U.S. Department Commerce. 1979. Final environmental impact statement proposed coastal management program for the State of South Carolina.

Zingmark, R.G. ed. 1978. An Annotated Checklist of the Biota of the Coastal Zone of South Carolina. University of South Carolina Press, Columbia, SC. 364 pp.

For more information see *Publications of the Belle W. Baruch Institute for Marine Biology and Coastal Research 1969 - 1989* which contains citations of 750 papers published by Baruch Institute personnel.

APPENDIX A

Tripartite Agreement

STATE OF SOUTH CAROLINA)
)
COUNTY OF)

AGREEMENT

THIS AGREEMENT made this 22 day of February, 1975, among THE BELLE W. BARUCH FOUNDATION (the "Foundation"), CLEMSON UNIVERSITY, and the UNIVERSITY OF SOUTH CAROLINA,

WITNESSETH:

WHEREAS, the FOUNDATION owns over 16,000 acres of maritime properties in Georgetown County, South Carolina, and is a charitable organization declared exempt from Federal income taxation by an Internal Revenue Service ruling dated December 24, 1964, and an operating foundation by an Internal Revenue Service ruling dated January 17, 1973;

WHEREAS, the FOUNDATION was created pursuant to the last will and testament of Belle W. Baruch, (which will was duly admitted to probate by the Surrogate's Court of the County of New York, State of New York), the pertinent provisions of said will, (a copy of which is annexed hereto) stating as follows:

> ***To invest and reinvest the trust property, and, in perpetuity, to collect the income therefrom, and, after paying to the Trustees such commissions for the administration of the Trust as are allowable under the laws of the State of South Carolina, and such other expenses of the administration of the Trust, and other proper legitimate expenses, to use said net income for the purposes of teaching and/or research in forestry, marine biology, and the care and propagation of wildlife and flora and fauna in South Carolina, in connection with colleges and/or universities in the State of South Carolina. The college or colleges or universities in South Carolina, and the teaching and research for the charitable uses and purposes above set forth in this Article shall be selected from time to time by the Trustees, or a majority of those serving at any time. The Trustees, in addition to all other powers given under this Will, are authorized to pay all or part of the expenses of teaching and/or research in connection with any college or colleges and/or universities in South Carolina selected by the Trustees, which will, as a part of its research or educational program, assist in the carrying out of the educational and charitable uses and purposes of this Trust***
>
> ***I definitely wish the house at Hobcaw to be used as a laboratory for the teaching and/or research in forestry and/or marine life in connection with a college or university in the State of South Carolina.
>
> ***I specifically empower my said Trustees to keep, maintain and improve any lands or building that may be a part of the corpus of the ***TRUST, and to make such additions and permanent improvements to the property as will increase its productivity and its usefulness for the charitable purposes of this Foundation Trust***;

and

WHEREAS, an agreement was entered into between the FOUNDATION and CLEMSON UNIVERSITY on November 14, 1968, designed to implement a program developed by the FOUNDATION in conjunction with the UNIVERSITY and pursuant to which CLEMSON UNIVERSITY has furnished professional advice to the FOUNDATION with respect to the scientific management of forested lands, beach areas, and aquatic environments, and the operation and management thereof in their use as a research and teaching facility; assembled data with respect to trees and vegetation, and the succession and interaction of plant and wildlife populations; made studies of soil types, insects and diseases; developed and implemented programs of research on forestry; and conducted biological investigations of the FOUNDATION'S property; and

WHEREAS, an agreement was entered into on March 22, 1972, between the FOUNDATION and the UNIVERSITY OF SOUTH CAROLINA, designed to implement a program developed by the FOUNDATION in conjunction with the UNIVERSITY and pursuant to which the UNIVERSITY OF SOUTH CAROLINA has furnished professional advice to the FOUNDATION with respect to the preservation of marsh and estuarine areas and the operation and management thereof in their use as a research facility; made studies on the functioning of high salinity marshes; developed programs of research in marine biology; and erected a laboratory for the conduct of such research on the FOUNDATION'S property; and

WHEREAS, the FOUNDATION has reviewed with CLEMSON UNIVERSITY and the UNIVERSITY OF SOUTH CAROLINA the desirability of a long-range joint program directed towards the coordination of activities and procedures of the UNIVERSITIES and FOUNDATION in inter-related spheres of interest and pursuit with a view to assuring the preservation and conservation of the ecological and environmental qualities of the FOUNDATION'S property and the preservation of its historical value as a whole; and

WHEREAS, in recognition of the identity of the interests of the FOUNDATION and the UNIVERSITIES as state universities in the preservation and conservation in perpetuity for the benefit of the State of South Carolina and the public of the valuable resources of the FOUNDATION'S property, the FOUNDATION has concentrated and is desirous of continuing to concentrate its available funds towards

this objective and special research and teaching projects in forestry, marine biology and the care and propagation of wildlife and flora and fauna in the State of South Carolina it conducts on its property; and

WHEREAS, in recognition of the value to the public of the coordination of the activities of the FOUNDATION, and the UNIVERSITIES, and their continuance, the FOUNDATION has determined that its purposes would be furthered by the operation, management, and use of its property as provided for in this agreement.

NOW, THEREFORE, in consideration of the mutual agreements contained herein, the parties hereto hereby agree as follows:

1. Use of Property

Subject to the terms and conditions of this agreement, the FOUNDATION shall from time to time with the aid and consultation of CLEMSON UNIVERSITY and the UNIVERSITY OF SOUTH CAROLINA, delineate by zones depicted on appropriate maps the specific areas within the FOUNDATION'S property which the UNIVERSITIES can manage and use in conjunction with the FOUNDATION. Delineation of these areas may be changed or modified in accordance with Article 19 of this agreement and in such manner as shall seem to the FOUNDATION most appropriate for the achievement of its goals, but such delineation shall be made only after the UNIVERSITIES have each had opportunity to relate to the FOUNDATION both the status of their research activities and the nature of and extent of any increases or decreases they may wish to seek in the scope of their activities or responsibilities, or which may be necessitated by change of circumstances.

Subject to the terms and conditions of this agreement, and for the purpose of conducting a joint project with the FOUNDATION, the FOUNDATION shall permit CLEMSON UNIVERSITY to use and occupy in conjunction with the FOUNDATION, the areas within the portion of the FOUNDATION'S property herein described as the FOREST-MARINE AREA at the locations marked in green on the map of the FOUNDATION'S property attached hereto as Exhibit "A." The FOUNDATION, subject to the terms and conditions of this agreement, shall further permit CLEMSON UNIVERSITY, to use and occupy the building on the FOREST-MARINE AREA provided for its resident director, and the building provided on such area for its resident forester,

and other buildings on such area as the FOUNDATION may designate, and to use the equipment, furniture, furnishings and other personal property of the FOUNDATION located therein or used in connection therewith provided, however, that the UNIVERSITY OF SOUTH CAROLINA in accordance with use plans developed by CLEMSON UNIVERSITY in coordination with the UNIVERSITY OF SOUTH CAROLINA and the FOUNDATION, shall have the right to conduct meetings, discussions, seminars, exhibitions, and other such activities at Hobcaw House, and for such purposes also to use the equipment, furniture, furnishings and other personal property of the FOUNDATION located therein or used in connection therewith in such manner as shall not interfere with the effective use and maintenance thereof by CLEMSON UNIVERSITY. CLEMSON UNIVERSITY shall have the responsibility for initiating the consultations necessary for development of a coordinated plan for the use of Hobcaw House, and the UNIVERSITY OF SOUTH CAROLINA and the FOUNDATION shall be responsible for making timely responses to the initiatives of CLEMSON UNIVERSITY in this regard; and CLEMSON UNIVERSITY shall have the discretion to resolve schedule conflicts in such manner as in its judgment shall seem most reasonable in effecting the purposes of this agreement but in each instance shall coordinate its decision with the FOUNDATION.

CLEMSON UNIVERSITY, subject to the terms and conditions of this agreement shall with the FOUNDATION use the FOREST-MARINE AREA, and shall use and occupy the said buildings provided for its resident director and its resident forester, shall use and occupy Hobcaw House and other buildings designated by the FOUNDATION in accordance with the terms stated above and shall use the said equipment, furniture, furnishings and other personal property of the FOUNDATION located therein or used in connection therewith, and shall use and occupy the portion of the boat building in MARSH-MARINE AREA now in use and occupied by it, in accordance with the terms stated below, exclusively for the purposes enumerated in this agreement, such use and/or occupancy to be conducted in a manner serving and in furtherance of the FOUNDATION'S purposes and programs to preserve and conserve the ecological and environmental qualities of its property (of which the FOREST-MARINE AREA forms a part) and the preservation of its historical value.

Subject to the terms and conditions of this agreement, the FOUNDATION shall permit the UNIVERSITY OF SOUTH CAROLINA to use and occupy, in conjunction with the FOUNDATION, the areas within the portion of the FOUNDATION'S property herein described as the MARSH-MARINE AREA at the locations marked in blue on the map of the FOUNDATION'S property attached hereto as Exhibit "A." The UNIVERSITY OF SOUTH CAROLINA, in conjunction with the FOUNDATION, shall also have the use of and shall occupy the marine biology laboratory building and other buildings as the FOUNDATION may designate on the MARSH-MARINE AREA and shall also use and occupy the boat building on the MARSH-MARINE AREA; provided, however, that CLEMSON UNIVERSITY shall continue to have the use and occupancy of the portion of said boat building on the MARSH-MARINE AREA which is now in use and occupied by it, and provided further that such use and occupancy of the boat house by CLEMSON UNIVERSITY shall not interfere with the effective use thereof by the UNIVERSITY OF SOUTH CAROLINA. The UNIVERSITY OF SOUTH CAROLINA, subject to the terms and conditions of this agreement, shall, with the FOUNDATION, use the MARSH-MARINE AREA, and shall use and occupy the marine biology laboratory building situated on such area and other buildings as the FOUNDATION may designate and shall use and occupy the boat building thereon (other than the portion of such boat building now in use and occupied by CLEMSON UNIVERSITY), exclusively for purposes enumerated in this agreement, such use and/or occupancy to be conducted in a manner serving and in furtherance of the FOUNDATION'S purpose and programs to preserve and conserve the ecological and environmental qualities of its property (of which the MARSH-MARINE AREA forms a part) and the preservation of its historical imporance.

CLEMSON UNIVERSITY shall have, in conjunction with the FOUNDATION, the custody and use of maintenance and safety equipment of the FOUNDATION located on or within the FOREST-MARINE AREA or used in connection with maintenance of roads, buildings and equipment. CLEMSON UNIVERSITY shall also have, in conjunction with the FOUNDATION, the use of boat landings, docks, piers, boats and other transportation equipment and maintenance and safety equipment of the FOUNDATION located on or within the MARSH-MARINE AREA in connection with the performance

by it of its obligations under this agreement in respect to roads and land areas within the MARSH-MARINE AREA.

The UNIVERSITY OF SOUTH CAROLINA shall, in conjunction with the FOUNDATION, have the use of boat landings, docks, piers, boats and other transportation and safety equipment of the FOUNDATION located on or within the MARSH-MARINE AREA in connection with the performance by it of its obligations under this agreement in respect to areas within the MARSH-MARINE AREA; provided, however, that CLEMSON UNIVERSITY, in accordance with use plans developed by the UNIVERSITY OF SOUTH CAROLINA in coordination with CLEMSON UNIVERSITY and the FOUNDATION, shall have the right to use the boat landings, docks, piers, boats and other transportation equipment of the FOUNDATION located on the MARSH-MARINE AREA, in such manner and at such times as shall not interfere with the effective use thereof by the UNIVERSITY OF SOUTH CAROLINA. The UNIVERSITY OF SOUTH CAROLINA shall have the responsibility for initiating the consultations necessary for development of a coordinated plan for the use of these facilities and CLEMSON UNIVERSITY and the FOUNDATION shall be responsible for making timely responses to the initiatives of the UNIVERSITY OF SOUTH CAROLINA in this regard, and the UNIVERSITY OF SOUTH CAROLINA shall have the discretion to resolve schedule conflicts in such manner as in its judgment shall seem most reasonable in effecting the purposes of this agreement but in each instance shall coordinate its decision with the FOUNDATION.

Access roads and water routes to and within the FOREST-MARINE AREA and the MARSH-MARINE AREA and parking sites within such areas (except parking sites for buildings in use or occupied by the resident director and resident forester of CLEMSON UNIVERSITY and for the marine biology laboratory building in use and occupied by the UNIVERSITY OF SOUTH CAROLINA), shall be used in common by the UNIVERSITIES and the FOUNDATION; provided, however, that CLEMSON UNIVERSITY, in consultation with the UNIVERSITY OF SOUTH CAROLINA and the FOUNDATION, shall have the authority to regulate traffic so as to ensure the efficient maintenance of facilities and a minimum of traffic conflicts for efficient and safe use of the properties, and the UNIVERSITY OF SOUTH CAROLINA shall have comparable authority and responsibility with respect to water routes.

The FOUNDATION may from time to time grant easements and other rights to others over the FOREST-MARINE AREA and/or MARSH-MARINE AREA and may make such additional uses of the FOREST-MARINE AREA and MARSH-MARINE AREA as in each case shall not interfere with the effective use of the same by the UNIVERSITIES for the purposes enumerated in this agreement. Any such use of FOREST-MARINE AREA and/or MARSH-MARINE AREA by the FOUNDATION shall be subject to safety regulations prepared by the UNIVERSITIES and approved by the FOUNDATION as provided in Article 2 of this agreement.

The boundaries of the FOREST-MARINE AREA and the MARSH-MARINE AREA, determined by the FOUNDATION in consultation with the UNIVERSITIES, shall at all times encompass not less than the entire acreage of the FOUNDATION'S property. Any contiguous property hereafter acquired by the FOUNDATION shall, if the FOUNDATION in its sole discretion so determines, be added to either area and shall be subject to the terms and conditions of this agreement. (It is recognized that a portion of the FOUNDATION'S property is subject to the legal life tenancy granted to Miss Ella A. Severin by the will of Belle W. Baruch, and that no provisions of this agreement shall in any wise affect such legal life tenancy.)

2. Safety Regulations

Each UNIVERSITY shall prepare and submit for approval by the FOUNDATION comprehensive safety regulations appertaining to its area(s) of responsibility. These shall include, without being limited to, fire rules and precautions, emergency warning systems, communication procedures, admission restrictions, permits and identification badges. Regulations on road use, speed limits, traffic control and their enforcement, shall be the responsibility solely of CLEMSON UNIVERSITY. Enforcement of safety regulations with respect to the use of water routes shall be the responsibility solely of the UNIVERSITY OF SOUTH CAROLINA.

3. Protection of Property

It is recognized by the parties to this agreement that the primary value of the FOUNDATION'S property is the availability of the diverse environmental and ecological characteristics of the FOREST-MARINE and MARSH-MARINE AREAS, with their wildlife populations, for the purposes of teaching and research.

Therefore, it is essential that these physical qualities be conserved and preserved in such a manner as to offer the widest range of benefits from use of the property for teaching and/or research in forestry and marine biology, and the care and propagation of wildlife and flora and fauna in perpetuity. In the event any activity shall be engaged in on the FOREST-MARINE AREA and/or MARSH-MARINE AREA that adversely affects the teaching and research values of the FOUNDATION'S property, the UNIVERSITIES shall take such steps as are necessary to cause the cessation of such activity or to compel its discontinuance and to prevent its recurrence.

UNIVERSITIES shall attempt to secure assistance and services available from law enforcement officials of the state, local and federal governments for the protection of the FOUNDATION'S property.

UNIVERSITIES shall cooperate with the FOUNDATION, upon its request, in attempting to have its properties declared a sanctuary both state and federal, and ı otherwise affording to FOUNDATION'S property the protection provided by conservation and similar laws.

4. Operations and Activities

CLEMSON UNIVERSITY, in accordance with its past practice, shall continue to provide professional advice to the FOUNDATION with respect to the scientific management of the FOREST-MARINE AREA, and the operation thereof in its use as a research facility, and, in accordance with programs and policies heretofore and hereafter initiated and/or approved by the FOUNDATION, shall continue, in conjunction with the FOUNDATION, to conduct research and provide teaching in forestry and the care and propagation of wildlife, flora and fauna within the FOREST-MARINE AREA, as depicted on the map attached hereto as Exhibit "A," and to develop and implement management concepts and procedures within the FOREST-MARINE AREA.

The UNIVERSITY OF SOUTH CAROLINA, in accordance with its past practice, shall continue to provide professional advice to the FOUNDATION with respect to the preservation of the MARSH-MARINE AREA and the operation thereof in its use as a research facility, and in accordance with programs and

policies heretofore and hereafter initiated and/or approved by FOUNDATION, shall continue, in conjunction with the FOUNDATION, to conduct research and provide teaching in marine biology and the care and propagation of wildlife, flora and fauna within the MARSH-MARINE AREA, as depicted on the map attached hereto as Exhibit "A," and to develop and implement management concepts and procedures within the MARSH-MARINE AREA.

All activities conducted by the UNIVERSITIES on the FOUNDATION'S property and all decisions of the UNIVERSITIES which involve the conservation, preservation or use of the FOUNDATION'S property must be approved by the FOUNDATION in advance.

After consultation with and the approval of the FOUNDATION, each of CLEMSON UNIVERSITY and the UNIVERSITY OF SOUTH CAROLINA shall:

(i) Conduct special seminars, lectures and symposia within its field of interest for scientists and advanced students.

(ii) Engage in teaching and research programs determined to be of value in carrying out the purposes of this agreement.

(iii) Each of CLEMSON UNIVERSITY and the UNIVERSITY OF SOUTH CAROLINA shall provide the FOUNDATION with progress and completion reports on approved proposals; prepare timely technical, administrative, and financial reports on its activities for the FOUNDATION and application of funds received from the FOUNDATION not less frequently than annually; furnish the FOUNDATION copies of project outlines, completed reports, and articles and other material appearing in scientific journals and other publications with respect to the progress and results of research and other activities supported through this agreement.

All activities of the UNIVERSITIES listed above, including all research, teaching, etc., shall be for the purpose of preserving and conserving the ecological and educational qualities of the FOREST-MARINE and MARSH-MARINE AREAS for teaching and research in forestry and the care and propagation of wildlife, flora and fauna within the FOREST-MARINE AREA and in marine biology and the care and propagation of wildlife, flora and fauna within the MARSH-MARINE AREA.

5. Disbursement of Income - Contribution of Funds

After reviewing the proposals for research projects, teaching and other activities made by the UNIVERSITIES to the FOUNDATION, and after allocating to the UNIVERSITIES funds required for maintenance and upkeep of the FOUNDATION'S property, the FOUNDATION shall determine which portion of its income for the year will be used to support such research, teaching and other activities of the two UNIVERSITIES and will notify the UNIVERSITIES as to the funds available to them.

The FOUNDATION shall make no distribution of income for teaching or research purposes during the term of this agreement which are independent of the teaching and research programs of the UNIVERSITIES conducted in conjunction with the FOUNDATION.

6. Maintenance, Repairs and Taxes

Except as otherwise provided herein, CLEMSON UNIVERSITY shall keep and maintain in good order and repair and in safe condition all buildings, roads, vehicle entries, drives and parking areas, boat landings, docks, piers, boats and other transportation equipment and maintenance equipment of the FOUNDATION. The costs of maintaining aforementioned buildings, roads, capital improvements; costs of maintenance, repair, and replacement of service vehicles used jointly by all parties or for general maintenance of the property; and costs of taxes, shall be paid by the FOUNDATION. CLEMSON UNIVERSITY, in consultation with the UNIVERSITY OF SOUTH CAROLINA and the FOUNDATION, shall prepare and submit to the FOUNDATION prior to the beginning of each fiscal year a budget estimate of the costs for the forthcoming year for the expenditures defined in this Article.

The UNIVERSITY OF SOUTH CAROLINA shall, except as otherwise required by this Article of CLEMSON UNIVERSITY, keep and maintain the interior areas of the marine biology laboratory building in use and occupied by it in the MARSH-MARINE AREA, and the fixtures and appurtenances thereto, and any equipment or other personal property of the FOUNDATION located therein or used in connection therewith in good order and repair and in safe and clean condition and shall further keep and maintain in good order and safe condition, free from obstruction, the entry, drive, and parking areas of the building.

7. Alterations and Improvements

Recognizing that future building and expansion may be necessary to carry out effectively the purposes of the UNIVERSITIES and the FOUNDATION, neither UNIVERSITY shall make any alterations, installations, additions or

improvements on, in or to FOREST-MARINE AREA and MARSH-MARINE AREA, including any buildings, structures or improvements now or hereafter erected thereon, and the fixtures and appurtenances thereto, without the FOUNDATION'S prior written consent, nor shall either UNIVERSITY demolish any part thereof or remove any equipment, furniture, furnishings or other personal property of the FOUNDATION, without the FOUNDATION'S prior written consent.

All buildings, structures and improvements now or hereafter erected on FOREST-MARINE AREA and MARSH-MARINE AREA, and the fixtures and appurtenances thereto, shall be part of the realty and freehold, and shall not be removed by either UNIVERSITY, without the prior written consent of the FOUNDATION (The movable scientific, research, office and other equipment and the movable furniture and furnishings of each UNIVERSITY, however, shall remain its property at all times and may be removed prior to or at the expiration of the term hereof. Any damage to the FOUNDATION'S property in the course of such removal by either UNIVERSITY of its movable property shall be repaired by the UNIVERSITY concerned at its sole expense and cost. Maintenance, repair, transportation and safety equipment purchased by or through either UNIVERSITY with funds provided by the FOUNDATION and at the FOUNDATION'S specific request or with its approval, shall be deemed property of the FOUNDATION.)

Neither UNIVERSITY shall have any power to do any act or make any contract which may create or bind the FOUNDATION for any lien, mortgage or other encumbrance upon FOREST-MARINE AREA and/or MARSH-MARINE AREA, or upon any part thereof or upon the estate of FOUNDATION therein.

3. Utilities and Services

Each UNIVERSITY shall pay or cause to be paid all charges for utilities and services (including but without being limited to heat, electric current or power, pump and well, septic tank, telephone and refuse removal), furnished to the occupants of any building, structure or improvement exclusively occupied by it, and the FOUNDATION shall not supply or be responsible or liable for any such utilities or services.

9. Laws and Orders

The UNIVERSITIES, and each of them, shall promptly observe and comply with all present or future laws, ordinances, orders, rules, requirements, and regulations of each and every governmental and lawful authority having jurisdiction over all or any part of FOREST-MARINE AREA and/or MARSH-MARINE AREA, and of the Fire Department, Board of Fire Underwriters and/or similar body exercising functions over the same, and of all insurance companies writing policies covering the same or any part thereof.

10. Fire

In case of fire and damage caused thereby to any building, structure, or improvement, the FOUNDATION (except as herein otherwise provided) shall repair the same, or the part thereof damaged, with reasonable diligence. Due allowance shall be made, however, for any delay which may be caused in connection with the adjustment of fire insurance or by reason of governmental regulations, accidents or other causes beyond the FOUNDATION'S control. If the damage or destruction shall affect the whole of FOREST-MARINE AREA and/or MARSH-MARINE AREA or shall in the sole judgment of the UNIVERSITY concerned be deemed so extensive that the UNIVERSITY concerned cannot reasonably continue the conduct of its activities thereon, then this agreement and the term hereof shall cease and terminate as to such UNIVERSITY upon the date of such damage or destruction; if, however, only a part of FOREST-MARINE AREA and/or MARSH-MARINE AREA shall be so damaged or destroyed as to be rendered unusable, and the part not so affected shall be sufficient to permit the UNIVERSITY concerned reasonably to continue the conduct of its activities, or if any building or improvement shall be so damaged or destroyed that the FOUNDATION shall decide not to repair or shall decide to demolish the same, then in either such event, such UNIVERSITY may elect to terminate this agreement by giving FOUNDATION notice of such intention, in which case this agreement shall terminate as to such UNIVERSITY upon the expiration of the time fixed in such notice, or if the UNIVERSITY concerned shall not elect

to so terminate this agreement, this agreement shall continue in full force and effect as to the part of the area concerned remaining usable by such UNIVERSITY.

11. Condemnation or Taking

If during the term of this agreement, the whole of FOREST-MARINE AREA and/or MARSH-MARINE AREA shall be taken for any public or quasi-public use under any statute, by right of eminent domain or if a part thereof shall be so taken and the part not so taken is insufficient, in the sole judgment of the UNIVERSITY concerned, for the reasonable continuance of its activities thereon, then in such event, this agreement and the term hereof shall cease and terminate as to such UNIVERSITY on the date when possession by eminent domain shall be taken. If only part of FOREST-MARINE AREA and/or MARSH-MARINE AREA shall be so taken and the part not so taken shall be sufficient for the reasonable continuance of activities thereon by the UNIVERSITY concerned, then such UNIVERSITY may nevertheless elect to terminate this agreement by giving the FOUNDATION notice of such intention, in which case this agreement shall terminate as to such UNIVERSITY upon the expiration of the time fixed in such notice; or if the UNIVERSITY concerned shall not elect to so terminate this agreement, this agreement shall continue in full force and effect as to such UNIVERSITY and as to the part of FOREST-MARINE AREA and/or MARSH-MARINE AREA without affecting such UNIVERSITY'S obligations and privileges under this agreement.

In no event shall the UNIVERSITIES or either of them have any claim against the FOUNDATION by reason of any taking by eminent domain as aforesaid of FOREST-MARINE AREA and/or MARSH-MARINE AREA or any part thereof, nor shall the UNIVERSITIES or either of them have any claim to the amount of any portion thereof that may be awarded as damages or paid as a result of such taking; provided, however, that each UNIVERSITY shall be entitled to receive any part of such damages which is reasonably attributable to the interruption of research or teaching projects in existence, or for which start-up costs have been incurred. Subject to this proviso, each UNIVERSITY hereby assigns to the FOUNDATION any and all other rights or interests of such UNIVERSITY in and to any and all amounts awarded or paid by reason or as a result of such taking.

12. Termination

(a) This agreement may be terminated by mutual agreement among the parties hereto, or as to either UNIVERSITY, by agreement between such UNIVERSITY and the FOUNDATION.

(b) In the event of any failure by the FOUNDATION to perform any of its obligations under this agreement, which failure shall continue uncorrected for a period of twenty (20) days after notice thereof and which shall not be caused directly or indirectly, by governmental regulations, accidents or causes beyond the FOUNDATION'S control, either UNIVERSITY may elect to terminate this agreement by giving the FOUNDATION notice of such intention, and upon the expiration of the time fixed in such notice, this agreement shall cease and terminate as to such UNIVERSITY.

(c) The FOUNDATION may upon five (5) days notice to the UNIVERSITY concerned, terminate this agreement and the term hereof as to such UNIVERSITY upon or at any time after the happening of one or more of the following events:

> Failure by such UNIVERSITY to perform any of its obligations under Article 1 hereof, under Article 3 hereof, under Article 4 hereof, under Article 5 hereof, under Article 6 hereof, under Article 8 hereof, under Article 9 hereof, and under classes (a) and (b) of Article 16 hereof, which failure and its effects shall continue uncorrected for a period of twenty (20) days after the FOUNDATION shall have given such UNIVERSITY notice thereof; provided that if such failure and its effects cannot with due diligence be corrected within twenty (20) days after such notice and if such UNIVERSITY shall promptly commence and shall thereafter diligently proceed to take all action reasonably required to correct the same, then such period shall be extended to forty (40) days.

(d) In case of the termination of this agreement as to only one UNIVERSITY, the rights and obligations of such UNIVERSITY under this agreement (in respect to the use or occupancy of property, the payment of funds and otherwise) shall become those of the other UNIVERSITY if accepted by the other UNIVERSITY.

(e) Upon the effective date of the termination of this agreement, whether by the FOUNDATION and/or the UNIVERSITIES or either of them, or by reason of extensive damage or destruction by fire, or upon the expiration of the term of this agreement, the UNIVERSITY concerned shall have the right to terminate long-term research projects in a reasonable period of time but shall immediately cease all short-term research and terminate its occupancy of FOREST-MARINE AREA and/or MARSH-MARINE AREA and of every building, structure, and improvement

thereon, and its use of equipment, furniture, furnishings, and other personal property of the FOUNDATION, and shall at its sole expense and cost, promptly remove from the FOREST-MARINE AREA and/or MARSH-MARINE AREA all movable equipment and furniture and furnishings put in by it at its sole expense and cost and repair any and all damage done to the FOREST-MARINE AREA and/or MARSH-MARINE AREA by reason of such removal; however, the UNIVERSITY concerned shall retain the right to re-enter the property solely for the purposes of completing the orderly termination of long-term research projects, providing it notifies the FOUNDATION prior to entry and specifies the length of time and area in which it will be conducting necessary tasks. Also, the UNIVERSITY concerned shall have the right to publish all data collected at the time of termination and any additional data collected in the process of orderly terminating long-term research.

13. Consultation

The UNIVERSITIES shall consult with the FOUNDATION with respect to the use of FOREST-MARINE AREA and MARSH-MARINE AREA, and shall keep the FOUNDATION advised of their respective activities thereon and such matters as may reasonably be expected to affect the interests of the FOUNDATION. Either of the UNIVERSITIES shall have the right to release general information to the public concerning their research and educational programs on FOUNDATION property to scientific and lay publications and to advertise for legitimate purposes so long as such information does not contain opinions or statements concerning the policy or the operations of the FOUNDATION or contain information which would in any way impair or threaten to impair the value of the FOUNDATION'S properties, or which would in any way jeopardize or threaten to jeopardize the FOUNDATION'S status as an operating foundation described in Section 4942 or as an organization exempt from Federal Income Taxation under Section 501(c) (3) of the Internal Revenue Code of 1954, or any successor to said section. Any release of material

either printed, written, or oral by the UNIVERSITIES which contains information that relates to the policies of the FOUNDATION or might be detrimental to the FOUNDATION as described within this Article must have written approval by the FOUNDATION before such information can be released. If either UNIVERSITY fails to adhere to the policy of advertising and publicity described in this Article, the FOUNDATION, at its discretion, may terminate the agreement with the UNIVERSITY concerned according to Article 12 hereof.

14. General Restrictions

The UNIVERSITIES and each of them shall not use FOREST-MARINE AREA and/or MARSH-MARINE AREA for any purpose, or permit any condition or activity thereof: (a) which has not been authorized by this agreement in accordance with its terms and approved by the FOUNDATION, (b) which is prohibited under any applicable law, ordinance, order, rule, requirement or regulation of any governmental or lawful authority having jurisdiction over, or similar body exercising functions over the FOUNDATION or UNIVERSITIES, (c) which is detrimental to the interests of the FOUNDATION, (d) which interferes or conflicts with any purpose of the FOUNDATION, or (e) which interferes with the value of the FOUNDATION'S property as a whole. The existence of detriment referred to in (c) of this Article and the existence of interference or conflict referred to in (d) and (e) of this Article shall be determined solely by the FOUNDATION.

Moreover,

(i) No part of the property or any use thereof or of any funds received or payable under this agreement shall inure or be payable to any private shareholder or individual or otherwise to or for any purpose which is not an exempt purpose within the meaning of Section 501 (c) (3) of the Internal Revenue Code of 1954, as now in force or hereafter amended, and which is further not exclusively within the scope of the exempt purposes of the FOUNDATION as an organization described in said section.

(ii) No part of the property or the use thereof or any funds, materials or services contributed by the FOUNDATION under this agreement shall be used directly or indirectly for the carrying on of propaganda or otherwise attempting to influence legislation or to influence the outcome of any specific public election or for any partisan political activity or to further the election or defeat of any candidate for public or political party office.

or otherwise for the participation in or intervention (including publishing or distributing of statements) in any political campaign on behalf of any candidate for public office.

(iii) No person in the United States shall, on the ground of race, creed, sex, color, or national origin, be excluded from participation in, be denied any benefits of, or be subject to discrimination in the performance of this agreement.

(iv) There shall be no religious worship, instruction or proselytization as part of or in connection with the performance of this agreement.

15. No Assignment

Neither UNIVERSITY shall assign, mortgage or encumber any interest herein granted without the prior written consent of the FOUNDATION in each instance.

16. Governing Law

This agreement shall be governed by and construed in accordance with the laws of the State of South Carolina which are applicable to the FOUNDATION'S real property situated in such state. It is understood, however, that the Trustees of the FOUNDATION are subject to the jurisdiction of the Surrogate's Court of the County of New York, and that this agreement is subject to approval by such Court should the Trustees of the FOUNDATION determine at any time that such approval should be obtained.

17. Term of Agreement

The term hereof shall commence on February 22, 1975, and shall continue for a period of twenty-five (25) years and end on February 22, 2000 //1999, unless sooner terminated as provided in this agreement.

18. Rulings and Determinations

If any party hereto shall determine at any time to seek a ruling or other determination by the Internal Revenue Service or by any court, governmental or lawful authority with respect to the effect of this agreement or of the performance of any obligation imposed by this agreement upon the tax liability or tax exempt status of such party, notice of such intention shall be given to each other party hereto and each such other party, at its sole expense and cost, shall cooperate with and shall assist the party seeking such ruling or determination, such cooperation and assistance to include, without limitation, assistance in the preparation of any statement, description or portion thereof which shall be deemed necessary by the

party seeking such ruling or determination and which shall deal with the activities of each other party hereto or any other matter of which each such party shall have special knowledge.

19. Changes in Agreement

This agreement contains the entire agreement between the parties hereto with respect to the subject matter hereof. Accordingly, the prior agreements between the FOUNDATION and CLEMSON UNIVERSITY, and the FOUNDATION and the UNIVERSITY OF SOUTH CAROLINA of November 14, 1968 and March 22, 1972, respectively, will terminate and cease to be in effect and be replaced by this agreement as of the effective date hereof. Neither this agreement nor any provision hereof may be changed, amended, modified, waived, discharged or terminated except by an instrument in writing signed by the parties hereto.

If as a result of any tax ruling, determination, or advice issued to or obtained by the FOUNDATION, from the Internal Revenue Service or any judicial determination obtained by the FOUNDATION, this agreement or any provision hereof shall in the opinion of counsel for the FOUNDATION require modification in order to conform to such ruling or determination, the parties hereto agree to enter into and execute such modifications for such purpose. In the event that counsel for both UNIVERSITIES shall disagree with counsel for the FOUNDATION as to the need for, or the terms of, or the extent of any modification of the agreement, the parties shall submit the matter to the Attorney General of South Carolina for his opinion, which opinion shall be binding upon the parties.

20. (a) No delay or omission by any party hereto to exercise any right or power accruing upon any noncompliance or default by any other party with respect to any of the terms hereof shall impair any such right or power or be construed to be a waiver thereof. No waiver by any party hereto of any of the covenants and agreements hereof to be performed by any other party shall be construed to be a waiver of a succeeding default or breach thereof or of any other covenants or agreements herein contained.

(b) No termination of this agreement shall discharge, release or in any way affect any liability or obligation of any party hereto which shall have

accrued or which may accrue, in whole or in part, by reason of any such termination or of any matter which shall have occurred prior to such termination.

(c) This agreement shall bind and inure to the benefit of the parties hereto and their respective successors and, except as otherwise provided herein, their assigns.

(d) Headings or captions are for purposes of convenience in reference only and shall not limit, describe or otherwise affect any of the terms hereof.

(e) Addresses:

THE BELLE W. BARUCH FOUNDATION
Bellefield Plantation
Georgetown, South Carolina 29440

CLEMSON UNIVERSITY
Clemson, South Carolina 29631

UNIVERSITY OF SOUTH CAROLINA
Columbia, South Carolina 29208

IN WITNESS WHEREOF, this agreement has been duly executed as of the day and year first above mentioned in the State of South Carolina.

THE BELLE W. BARUCH FOUNDATION

/s/ Ella A. Severin
Trustee

Trustee

/s/ H. M. Arthur
Trustee

/s/ Leonard T. Scully
Trustee

/s/ E. Craig Wall, Sr.
Trustee

Trustee

CLEMSON UNIVERSITY

By: /s/ Robert C. Edwards
President

UNIVERSITY OF SOUTH CAROLINA

By: /s/ William H. Patterson
President

ATTORNEY GENERAL OF SOUTH CAROLINA

By: /s/ Daniel R. McLeod

Memorandum of Understanding
between
The Belle W. Baruch Foundation
Clemson University
The University of South Carolina

The Trustees of The Belle W. Baruch Foundation, the President of Clemson University, and the President of the University of South Carolina have on February 22, 1975 signed an Agreement establishing a tripartite working relationship among the two Universities and the Foundation toward joint efforts in teaching and research in Forestry, Marine Biology, and the care and propagation of wildlife, flora and fauna of South Carolina.

When the agreement was signed, certain operational procedures were left to be arranged under a separate Memorandum of Understanding. Therefore, it is understood and agreed that:

Receipts from FOREST-MARINE AREA

The proceeds from harvesting operations within the FOREST-MARINE AREA shall be allocated by the FOUNDATION to CLEMSON UNIVERSITY to be used for scientific management of the FOREST-MARINE AREA.

Receipts from the MARSH-MARINE AREA

The proceeds of harvesting operations in the MARSH-MARINE AREA shall be allocated by the FOUNDATION to the UNIVERSITY OF SOUTH CAROLINA to be used for scientific management of the MARSH-MARINE AREA.

Notification and Request for State Funding

On July first of each year, the FOUNDATION will notify each UNIVERSITY of the amount of funds it estimates will be distributed from its net income to each UNIVERSITY for the fiscal year beginning on the following July first. This will enable each UNIVERSITY to include in its normal budgetary submission to the General Assembly a request for such additional funds as are considered necessary for carrying out its programs. The FOUNDATION will be notified by the UNIVERSITIES of the amount of state support granted by the legislature as soon as the General Appropriation Bill passes each year.

Thousand-Acre Marsh

In the area known as Thousand-Acre Marsh, neither UNIVERSITY shall initiate projects within the marsh directly affecting the marsh or adjacent forest areas without prior written concurrence of the other UNIVERSITY.

IN WITNESS WHEREOF, this Understanding has been duly executed as of the 18th day of July, 1975.

CLEMSON UNIVERSITY

By: _____
President

UNIVERSITY OF SOUTH CAROLINA

By: _____
President

THE BELLE W. BARUCH FOUNDATION

By: _____

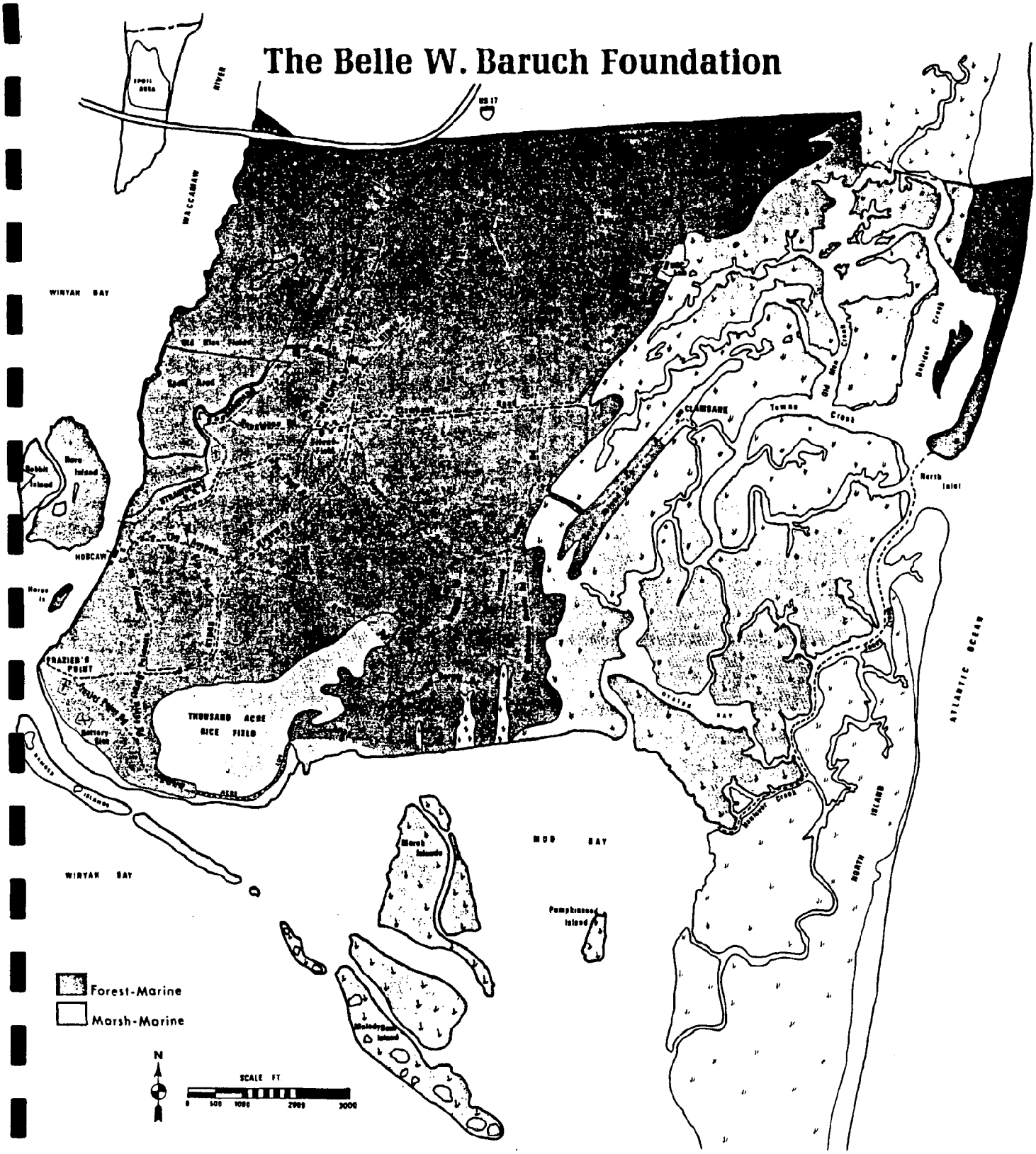

Figure 5. Property of Belle W. Baruch Foundation. The Marsh-Marine Area is managed by the Baruch Institute, USC and is part of the NI/WB NERR. The Forest-Marine Area is managed by Clemson University.

APPENDIX B

Memoranda of Understanding

Draft of Proposed
Memorandum of Understanding
Between
The State of South Carolina
and
The National Oceanic and Atmospheric Administration
Concerning the
Establishment and Administration
of the North Inlet-Winyah Bay
National Estuarine Reserve Research

WHEREAS, the State of South Carolina has determined that the waters and related coastal habitats of North Inlet and a portion of Winyah Bay provide unique opportunities to study natural and human processes occurring within estuarine ecosystems; and

WHEREAS, it is the finding of the State of South Carolina that the resources of North Inlet and portions of Winyah Bay and the values they represent to the citizens of South Carolina and the United States will benefit from the management of these sites as part of the National Estuarine Reserve Research System (NERRS); and

WHEREAS, the National Oceanic and Atmospheric Administration (NOAA), U.S. Department of Commerce has concurred with that finding and pursuant to its authority under Section 315 of the Coastal Zone Management Act of 1972, as amended, (CZMA, P.L. 92-583, 16 U.S.C. 1461) and in accordance with implementing regulations at 15 CFR 921.30, may designate North Inlet/Winyah Bay as a National Estuarine Research Reserve in South Carolina; and

WHEREAS, the South Carolina Coastal Council (Council) is the Governor's designee under Section 315 of the Federal Coastal Zone Management Act and the recipient state entity in matters concerning all programs and financial awards authorized under the CZMA and the implementing regulations, and is responsible for ensuring compliance with the rules and regulations of such law in South Carolina as authorized in the South Carolina Coastal Zone Management Program (Section 48-39-50(B), Code of Laws of South Carolina, 1976, as amended); and

WHEREAS, the Belle W. Baruch Institute for Marine Biology and Coastal Research, University of South Carolina (Institute) is the agency designated by the South Carolina Coastal Council in the North Inlet/Winyah Bay National Estuarine Reserve Research System Management Plan (Management Plan) as being responsible for managing the North Inlet/Winyah Bay National Estuarine Reserve Research System in South Carolina and acknowledges the need and requirement for continuing State-Federal cooperation in the long-term management of the site in a manner consistent with the purposes sought through their designation.

NOW, THEREFORE, in consideration of the mutual covenants contained herein it is agreed by and between the State of South Carolina and NOAA, effective on the date of the designation of North Inlet and portion of Winyah Bay as components of the Reserve as follows:

ARTICLE I: STATE-FEDERAL ROLES IN RESERVE MANAGEMENT

A. The Council, serving as the grants award office for the State of South Carolina under Section 315 of the CZMA, and responsible for compliance with the rules and regulations of the South Carolina Coastal Zone Management Program, shall:

1. In cooperation with the Institute, apply for such funds authorized under Section 315 of the CZMA for acquisition and development, operation and management, and research monitoring and education in accordance with the Management Plan and annual work plan. The funds received by the Council for these purposes, with the exception of acquisition, shall be contracted to the Institute for Plan implementation with the exception of an amount not to exceed ten (10) percent to be retained by the Council for administrative and enforcement costs as documented in the annual work plan. Land acquisition will be handled by the Council with no administrative costs and all lands and properties will be deeded directly to the Institute or appropriate State agency.

2. Ensure the Management Plan and annual work plan is consistent with the South Carolina Coastal Zone Management Program.

3. Provide increased surveillance and monitoring to ensure protection of the NERR site and enforcement of the rules and regulations of the South Carolina Coastal Zone Management Program.

B. The Institute, serving as the managing agency for the Council to implement the Management Plan, shall be the principal contact with NOAA for the State of South Carolina in all matters concerning the Reserve, with the exception of fiscal awards, and will serve to ensure that the Reserve is managed in a manner consistent with the goals of the National Estuarine Reserve Research System and the management objectives of the Management Plan. The Institute's responsibilities for Plan implementation will include the following:

1. Effect and maintain a process for coordinating and facilitating the roles and responsibilities of all local, state, and federal agencies involved in the management of the Reserve, including but not limited to:

   a. Enforcement programs regulating water quality, fish and wildlife habitat protection, sport and commercial fisheries, and non-consumptive recreational activities;

   b. The on-site administration of facilities, programs, and tasks related to Reserve management;

   c. Activities and programs conducted pursuant to the State's Federally-approved coastal management program; and

   d. Research and educational agenda developed and implemented in accordance with corresponding elements of the Management Plan;

2. In cooperation with the Council, prepare and submit to NOAA for approval an operational strategy which in coordination with the Plan describes how the State of South Carolina intends to meet its long-term commitment to the management of the Reserve. The strategy, at a minimum, will describe the following:

   a. Specific mediation procedures and resolution mechanisms, developed jointly with the Sanctuaries and Reserves Division (SRD) of NOAA, for reaching mutually acceptable solutions for correcting or avoiding conflicts requiring action under the CZMA and regulations;

   b. The procedures developed in accordance with SRD guidelines and proposed by the State as a means for prescribing contingency responses to emergency conditions that exceed routine Plan implementation; and

   c. The Plan's continuing functioning, after Federal financial assistance for operations and management ends, as a vehicle for carrying out the mission of the national program, i.e., (i) how the State intends to coordinate Reserve management with its coastal resource management decision-making process; (ii) the anticipated work program, priorities, and sources of funding for ensuring the continued maintenance of the Reserve, and (iii) the means relied upon by the State to assure NOAA that real property acquired with Federal Funds for the purposes of the Reserve will continue to be used in a manner consistent with 15 CFR 921;

3. Serve as principal negotiator on issues involving proposed boundary changes and/or amendments to the Plan;

4. Submit periodic reports as required to the Council and NOAA on the Reserve describing the program and fiscal performance in Plan implementation and a detailed work program for the following year of operations, including budget projections and research efforts;

5. Respond to NOAA's requests for information and to evaluate findings made pursuant to Section 312 of the CZMA; and

6. In the event that it should become necessary, based on findings of deficiency, serve as the point-of-contact in conjunction with the Council for the State of South Carolina in actions involving the possible withdrawal of Reserve designation, as provided at 15 CFR 921.35.

C. With NOAA, the Sanctuaries and Reserves Division(SRD), Office of Ocean and Coastal Resource Management (OCRM), will serve to administer the provisions of Section 315 of the CZMA to ensure that the Reserve is managed in accordance with the goals of the National Estuarine Reserve Research System and the Plan. In carrying out its responsibilities, the SRD will:

1. Subject to appropriation, provide financial assistance to the SCCC, consistent with 15 CFR 921 for acquisition, development, management and operation of the Reserve;

2. Subject to appropriation, provide financial assistance to the state on a competitive basis for research, monitoring and education programs at the Reserve;

3. Serve as the point-of-contact for NOAA in discussions regarding applications for any financial assistance received by the State under Section 315 of the CZMA, including any and all performance standards, compliance schedules, or Special Award Conditions deemed appropriate by NOAA to ensure the timely and proper execution of the proposed work program;

4. Participate in periodic evaluations scheduled by OCRM in accordance with Section 312 of the CZMA to measure the State's performance in Plan implementation and its compliance with the terms and conditions prescribed in financial assistance awards granted by NOAA for the purposes of the Reserve and advise appropriate OCRM staff of existing or emerging issues which might affect the State's coastal management program; and

5. Establish an information exchange network cataloging all available research data and educational material developed on each site included within the national system of estuarine research reserves.

ARTICLE II: REAL PROPERTY ACQUIRED FOR THE PURPOSES OF THE RESERVE

The State of South Carolina agrees to the conditions set forth at 15 CFR 921.21(e) which specify the legal documentation requirements concerning the use and disposition of real property acquired for Reserve purposes with Federal funds under Section 315 of the CZMA.

ARTICLE III: PROGRAM EVALUATION

A. During the period that Federal financial assistance is available for Reserve operations and management, OCRM will schedule, periodic evaluations of the State's evaluations of the State's performance in meeting the conditions of such awards and performance in meeting the conditions of this MOU. Where findings of deficiency occur, NOAA may initiate action in accordance with the designation withdraw procedures established at 15 CFR 921.

B. After Federal financial assistance under Section 315 of the CZMA is no longer available for the operation and management of the Reserve, OCRM will continue to evaluate, pursuant to Section 312 of the CZMA and the corresponding provisions of 15 CFR 921, the Institute's and the Council's performance in implementing the Plan and developing strategy to assist the State in the long-term management of the Reserve. Where findings of deficiency occur, NOAA may initiate action in accordance with designation withdrawal procedures established at 15 CFR 921.

IN WITNESS THEREOF, the parties hereto have caused this Memorandum to be executed.

Director
Office of Ocean and Coastal
Resource Management
National Oceanic and Atmospheric
Administration
U.S. Department of Commerce

Date

William Harrigan
Acting Chief
Sanctuaries and Reserves
Division
Office of Ocean and Coastal
Resource Management
National Oceanic and Atmospheric
Administration
U.S. Department of Commerce

Date

Witness

Date

H. Wayne Beam, PhD
Executive Director
South Carolina Coastal Council

Date

John C. Hayes, III
Chairman
South Carolina Coastal Council

Date

Ardis M. Savory
Office of Sponsored
Programs and Research
University of South Carolina

Date

F. John Vernberg, PhD
Baruch Institute
University of South Carolina

Date

APPENDIX C

National Estuarine Research Reserve Program Regulations

federal register

Monday
July 23, 1990

Part II

Department of Commerce

National Oceanic and Atmospheric Administration

15 CFR Part 921

National Estuarine Reserve Research System Program Regulations; Interim Final Rule

DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration

15 CFR Part 921

[Docket No. 70874-0133]

National Estuarine Reserve Research System Program Regulations

AGENCY: Office of Ocean and Coastal Resource Management (OCRM), National Ocean Service (NOS), National Oceanic and Atmospheric Administration (NOAA), Department of Commerce.

ACTION: Interim final rule.

SUMMARY: The regulations revise existing rules for national estuarine reserves in accordance with the Coastal Zone Management Reauthorization Act of 1985 (title IV, subtitle D, Pub. L. 99-272) and recommendations contained in the U.S. Department of Commerce, Office of Inspector General Report No. F-726-5-010, "Opportunities to Strengthen the Administration of the Estuarine Sanctuary Program." Effective with the signing of Public Law 99-272 on April 7, 1986, the name of the Estuarine Sanctuary Program changed to the National Estuarine Reserve Research System Program; estuarine sanctuary sites are now referred to as national estuarine research reserves. These regulations revise the process for designation of research reserves. Greater emphasis is placed on the use of reserves to address national estuarine research and management issues, and to make maximum use of the System for research purposes through coordination with NOAA and other Federal and state agencies which are sponsoring estuarine research. Additional emphasis is also given to providing financial assistance to states to enhance public awareness and understanding of estuarine areas by providing opportunities for public education and interpretation. The regulations provide new guidance for delineating reserve boundaries and new procedures for arriving at the most effective and least costly approach to acquisition of land. Clarifications in the total amount of financial assistance authorized for each national estuarine reserve, and criteria for withdrawing the designation of a reserve, have also been added.

DATES: *Effective Date:* These interim final regulations are effective July 23, 1990.

Comments: Comments are invited and will be considered if submitted on or before September 21, 1990.

ADDRESSES: Mr. Joseph A. Uravitch, Chief; Marine and Estuarine Management Division; Office of Ocean and Coastal Resource Management, NOS/NOAA; 1825 Connecticut Avenue NW.; Suite 714; Washington, DC 20235, (202) 673-5126.

FOR FURTHER INFORMATION CONTACT: Mr. Joseph A. Uravitch, (202) 673-5126.

SUPPLEMENTARY INFORMATION:

I. Authority

This notice of interim final rulemaking is issued under the authority of section 315(a) of the Coastal Zone Management Act of 1972 as amended, 16 U.S.C. 1461 (the Act). The National Estuarine Reserve Research System has been operating under regulations published June 27, 1984 (49 FR 26510).

II. General Background

On October 28, 1988 (53 FR 43816) NOAA published proposed regulations for continued implementation of the National Estuarine Reserve Research System (NERRS) Program pursuant to section 315 of the Act, 16 U.S.C. 1461. Written comments were accepted until December 30, 1988. These comments have been considered in preparing these final regulations. A summary of the significant changes to the proposed regulations is presented below.

These interim final regulations establish the Program's mission and goals and revise procedures for selecting, designating and operating national estuarine research reserves.

III. Changing the Name and Emphasis of the Program

The 1985 Coastal Zone Management Act and its amendments established the National Estuarine Reserve Research System (System). The System consists of (1) each estuarine sanctuary designated prior to April 7, 1986 which is the date of enactment of the Coastal Zone Management Reauthorization Act of 1985, and (2) each estuarine area designated after the Act. The term estuarine sanctuary no longer appears in regulations; the term research reserve or reserve appears in its place.

The Mission Statement for the System is much the same as for the National Estuarine Sanctuary Program which existed prior to the 1985 amendments. However, the goals for the National Estuarine Reserve Research System stress the use of reserve sites for promotion and coordination of estuarine research on a national level as the highest priority and reason for establishing the System. The protection and management of estuarine areas and resources are clearly intended to support the research mission, not as ends in themselves. Consultation by the Secretary with other Federal and state agencies to promote use of one or more reserves within the System by such agencies when conducting estuarine research is also a clearly defined goal of the System. The regulations also emphasize the use of a reserve's natural resources and ecology to enhance public awareness and understanding of estuarine areas, and to provide suitable opportunities for public education and interpretation. This education goal has been elevated to become one of the essential criteria for designation of a reserve.

IV. Revision of the Procedures for Selecting, Designating and Operating National Estuarine Research Reserves

(A) *Revision of Designation Criteria.* The Coastal Zone Management Reauthorization Act of 1985 established, for the first time, statutory criteria for designating an area as a national estuarine research reserve. An area may be designated by the Secretary of Commerce as a national estuarine research reserve if:

(1) the Governor of the coastal state in which the area is located nominates the area for that designation; and

(2) the Secretary finds that:

(A) the area is a representative estuarine ecosystem that is suitable for long-term research and contributes to the biogeographical and typological balance of the System;

(B) the law of the coastal State provides long-term protection for reserve resources to ensure a stable environment for research;

(C) designation of the area as a reserve will serve to enhance public awareness and understanding of estuarine areas, and provide suitable opportunities for public education and interpretation; and

(D) the coastal State in which the area is located has complied with the requirements of any regulations issued by the Secretary to implement this section.

Some of these criteria for designation are either new or substantially more specific than those contained in the former regulations. For example, under these regulations the Governor of a coastal state must nominate an estuarine area for designation, and findings are required that the law of the coastal state provides long-term protection for reserve resources to ensure a stable environment for research and that designation of the area will serve to enhance public awareness and understanding of estuarine areas. The criteria in the existing regulations have been revised accordingly.

(B) *Revision of Site Criteria and Procedures.* The criteria for selecting an estuarine area for designation as a national estuarine research reserve have been expanded to provide guidance for determining boundaries for the proposed site. The Office of Inspector General Report No. F-726-5-010 criticized the lack of specific guidelines for setting limits on boundaries around estuarine sanctuaries to ensure that only land essential to the mission of the program be included inside the sanctuary. References in the existing regulations to ensure that the boundaries encompass an adequate portion of the key land and water areas of the natural system to approximate an ecological unit are too vague, particularly since terms are not defined. The proposed regulations define key land and water areas as a "core area" within the reserve which is so vital to the functioning of the estuarine ecosystem that it must be under a level of control sufficient to ensure the long-term viability of the reserve for research on natural processes. The determination of key land and water areas must be based on scientific knowledge of the area. The concept of a "buffer" zone to protect the core area and provide additional protection for estuarine-dependent species has also been defined in the regulations. The buffer zone may include an area necessary for facilities required for research and interpretation, and additionally, to accommodate a shift of the core area as a result of biological, ecological or geomorphological change which reasonably could be expected to occur. States will be required to use scientific criteria to justify the boundaries selected for a proposed site.

The information requirements for NOAA approval of a proposed site under existing regulations were confusing and now have been clarified.

NOAA has recognized the need to conduct studies to develop a basic description of the physical, chemical, and biological characteristics of the site. As a result, states may now be eligible for Federal funding of these studies after NOAA approval of a proposed site.

(C) *Management Plan Development.* Once NOAA approves the proposed site and decides to proceed with designation, the state must develop a draft management plan. The contents of the plan, including the memorandum of understanding (MOU) between NOAA and the state, are specified in the regulations. The acquisition portion of the plan has been greatly expanded to implement recommendations in the Office of Inspector General Report No. F-726-5-010. It is proposed that states be required to justify the use of fee simple acquisition methods and make greater use of non-fee simple methods to conserve expenditure of funds. For each parcel, both in the core area and the buffer zone, states must determine, with appropriate justification (1) the minimum level of control(s) required, (2) the level of existing state control, and (3) the level of additional state control(s) required; states must also examine all reasonable alternatives for attaining the additional level of control required, perform a cost analysis of each, and rank, in order of cost, the alternative methods of acquisition which were considered. The cost-effectiveness assessment must also compare short-term and long-term costs. The state shall give priority consideration to the least costly method(s) of attaining the minimum level of long-term control required, which is sufficient to meet the statutory requirement that "the law of the coastal state provides long-term protection for reserve resources to ensure a stable environment for research. See 16 U.S.C. § 1461(b)(2)(B).

(D) *Financial Assistance Awards for Site Selection and Post Site Selection.*

The first of five types of awards under the National Estuarine Reserve Research System is for site selection and post-site selection, which includes preparation of a draft management plan (including MOU) and the collection of information necessary for preparation of the environmental impact statement. The maximum total Federal share of these awards has been raised to $100,000 as described in § 921.20. Of this amount, up to $25,000 may be used to conduct the site selection process as described in § 921.11. After NOAA's approval of a proposed site and decision to proceed with the designation process, the state may expend (1) up to $40,000 of this amount to develop the draft management plan and collect information for preparation of the environmental impact statement; and (2) up to the remainder of available funds to conduct studies to develop a basic description of the physical, chemical, and biological characteristics of the site.

(E) *Financial Assistance Awards for Acquisition, Development, and Initial Management.* The regulations divide eligibility for financial assistance awards for acquisition and development into two phases. In the initial phase, states are working to meet the criteria required for formal research reserve designation, *i.e.*, establishing adequate state control over key land and water areas in accordance with the draft management plan and preparing a final management plan. In this predesignation phase, funds are available for acquiring interest in land, which is the primary purpose of this award, and for minor construction (*e.g.*, nature trails and boat ramps), preparation of architectural and engineering plans and specifications, development of the final management plan, and hiring a reserve manager and other staff as necessary to implement the NOAA approved draft management plan.

The length of time for this initial phase of acquisition and development may be up to three years. After the site receives Federal designation as a national estuarine research reserve, the state may request additional financial assistance to acquire additional property interests (*e.g.*, for the buffer zone), for construction of research and interpretive facilities, and for restorative activities in accordance with the approved final management plan.

The Coastal Zone Management Reauthorization Act of 1985 specifies that the amount of financial assistance provided with respect to the acquisition of land and waters, or interests therein, for any one national estuarine research reserve may not exceed an amount equal to 50 per centum of the costs of the lands, waters, and interests therein or $4,000,000, whichever amount is less.

The amount of Federal financial assistance provided under the regulations for development costs directly associated with major facility construction (*i.e.*, other than land acquisition) for any one national estuarine research reserve must not exceed 50 per centum of the costs of such construction or $1,500,000, whichever amount is less.

(F) *Financial Assistance Awards for Operation and Management.* The amount of Federal financial assistance available to a state to manage the reserve and operate programs consistent with the mission and goals of the National Estuarine Reserve Research System has been raised from $50,000 to $70,000 for each twelve month period. Up to ten per cent of the total award (Federal and state) each year may be used for construction-type activities.

(G) *Financial Assistance for Research.* The Coastal Zone Management Reauthorization Act of 1985 specifically affects the conduct of the System's research program by establishing the requirement for developing Estuarine Research Guidelines for the conduct of research within the system and specifying what these guidelines shall include. The legislation also requires the Secretary of Commerce to require that NOAA, in conducting or supporting estuarine

research, give priority consideration to research that uses reserves in the System, and that NOAA consult with other Federal and state agencies to promote use of one or more reserves by such agencies when conducting estuarine research.

The research guidelines, which are referred to in the regulations, but are not part of them, state that NOAA will provide research grants only for proposals which address research questions and coastal management issues that have highest national priority as determined by NOAA, in consultation with prominent members of the estuarine research community.

One significant addition to the regulations is that research awards are available on a competitive basis to any coastal state or qualified public or private person, thus making it possible for public or private persons, organizations or institutions to compete with coastal states and coastal state universities for NOAA research funding to work in research reserves.

(H) *Financial Assistance for Monitoring.* The Coastal Zone Management Reauthorization Act of 1985 authorizes the award of grants for the purposes of conducting research and monitoring. While objectives in estuarine research and estuarine monitoring are mutually supportive, monitoring is generally designed to provide information over longer time frames and in a different spatial context. Consequently a separate subpart addressing specifically the development and implementation of monitoring projects has been included in the regulations.

(I) *Financial Assistance Awards for Interpretation and Education.* The Coastal Zone Management Reauthorization Act of 1985 authorizes the award of grants for the purposes of conducting educational and interpretive activities. To stimulate the development of innovative or creative interpretive and educational projects and materials which will enhance public awareness and understanding of estuarine areas, the regulations provide for funds to be available on a competitive basis to any coastal State entity. These funds are provided in addition to any other funds available to a coastal state under these regulations.

Categories of potential educational and interpretive projects include:

(1) Design, development and distribution/placement of interpretive or educational media (*i.e.*, the development of tangible items such as exhibits/displays, publications, posters, signs, audio-visuals, computer software, and maps, which have an educational or interpretive purpose, and techniques for making available or locating information concerning reserve resources, activities, or issues);

(2) Development and presentation of curricula, workshops, lectures, seminars, and other structured programs or presentations for on-site facility or field use;

(3) Extension/outreach programs; or

(4) Creative and innovative methods and technologies for implementing interpretive or educational projects.

Interpretive and educational projects may be oriented to one or more research reserves or the entire System. Those projects which would benefit more than one research reserve, and, if practical, the entire National Estuarine Reserve Research System, shall receive priority consideration for funding.

V. Summary of Significant Comments on the Proposed Regulations and NOAA's Responses

NOAA received comments from 16 sources. Reviewers included Federal and state agencies, academic institutions, and the National Estuarine Research Reserve Association. The comments of the National Estuarine Research Reserve Association (NERRA) are a summary of comments submitted to NERRA by most of the managers of the existing and proposed national estuarine research reserves. All comments received are on file at the Marine and Estuarine Management Division, Office of Ocean and Coastal Resource Management and are available at that office for review upon request. Each of the major issues raised by the reviewers has been summarized and NOAA's responses are provided under the relevant subheading in this section.

General:

Three reviewers recommended that more emphasis be placed on developing an information network among research reserves and between research reserves and research and educational groups and institutions. Two of these reviewers noted the absence in the proposed regulations of a paragraph which had addressed this subject in the existing regulations (49 FR 26502, June 27, 1984). The deleted paragraph concerned the development and Federal administration of a research and education information exchange network for the System.

Response: NOAA agrees. The section referring to information exchange between NOAA and the Reserves has been reinstated in § 921.1(h).

Specific:

Section 921.1—Mission, Goals, and General Provisions

Proposed § 921.1(c)—One reviewer suggested the deletion of the first sentence of this provision which states, "National estuarine research reserves shall be open to the public." This reviewer noted that in multiple component reserves some components may not be appropriate for general public access; either because of the purpose or emphasis of management at that site (*e.g.*, research) or due to the limited interest which the managing entity has in the component (*e.g.*, a conservation easement which does not provide for unlimited public access). This reviewer expressed concern that state denial of general public access at such components of a reserve could be challenged on the basis of this provision.

Response: Consistent with the goal of the National Estuarine Reserve Research System to "enhance public awareness and understanding of the estuarine environment and provide suitable opportunities for public education and interpretation," public access should be allowed to the greatest extent possible permitted under State and Federal law within national estuarine research reserves. However, the statement, "National estuarine research reserves shall be open to the public", does not require that all components of a multi-component reserve or the entire area within the boundaries of a single component reserve be open to the general public unconditionally. The last sentence of § 921.1(c) reads, "Consistent with resource protection and research objectives, public access may be restricted to certain areas within a research reserve." Where unconditional public access is not consistent with resource protection and research objectives as stated in the approved management plan (*e.g.*, public access would interfere with reserve research or is likely to diminish the value of reserve resources for future research) it must be limited accordingly. Just as certain areas are identified in reserve management plans as being more or less sensitive to public access impacts in single component reserves, the same is true of components in multi-component reserves. Frequently in management plans for multi-component reserves one or more components will be identified as those for which the relative management emphasis will be public education and interpretation. Similarly, other components are identified as those

which emphasize research and resource protection.

Proposed § 921.1(d) and § 921.1(e)—Seven reviewers commented on these provisions. These comments ranged from one sentence requesting clarification to approximately six pages of comments dedicated to these provisions alone. These comments also ranged from expressing concern or objection regarding the proposed limitations on habitat manipulation to suggesting a more restrictive approach.

One reviewer expressed strong support for an outright prohibition on habitat manipulation, whether for management or research, except for restoration activities where such restoration can avoid long-term adverse impacts. Another reviewer commented extensively on this provision; expressing strong objections to a prohibition on habitat manipulation activities for management purposes. This reviewer stated that the "preservation" of a habitat requires active management involving habitat manipulation.

One reviewer requested clarification of the difference between restoration activities and habitat manipulation for research or management purposes. One reviewer suggested criteria for assessing the degree of "manipulation" a proposed research project may involve. One reviewer requested clarification of the intent of this provision and how it may apply to: (1) actions necessary to protect public health; (2) protection of existing species; and (3) allowance for restorative activities for historical preservation. One reviewer stated that whatever type of habitat manipulation determined allowable by NOAA, day-to-day site management decisions are best made by the professional staff of each reserve.

One reviewer requested clarification of the intent of this provision and of the differences between habitat manipulation for research, habitat manipulation for management, and habitat manipulation for restoration. This same reviewer stressed the primary importance of the ecological and representative integrity of a reserve.

Response: The mission of the National Estuarine Reserve Research System, as stated in § 921.1(a), "is the establishment and management, through Federal-state cooperation, of a national system of estuarine research reserves *representative of the various regions and estuarine types in the United States*" (emphasis added). The first Secretarial finding required for designation of an estuarine area as a national estuarine reserve under section 315(b)(2)(A) of the Act, 16 U.S.C. 1461(b)(2)(A), is that "the area is a *representative estuarine ecosystem that is suitable for long-term research and contributes to the biogeographical and typological balance of the System*" (emphasis added).

The primary intent of § 921.1(d) and § 921.1(e) is to restrict and allow activities involving habitat manipulation to the degree necessary to ensure that reserves are, and continue to be, *representative estuarine ecosystems*. It is this mission, and requirement of the statute, that the System goals of § 921.1(b) are meant to support. This mission, and requirement of the statute, is the foundation upon which the System is built, the primary basis on which estuarine areas are selected and designated as reserves, and the underlying principle with which all other aspects of reserve development and operation must be consistent. As one reviewer stated, in no case should the ecological or representative integrity of a reserve be comprised.

Habitat manipulation activities conducted for a purpose other than (1) restoring the representative integrity of a reserve or (2) estuarine research, are not consistent with this requirement of the statute or the mission of the System. A reasonable limitation on the nature and extent of habitat manipulation activities conducted as a part of estuarine research is necessary to ensure that the representative integrity of a reserve is protected. Likewise, reasonable exceptions to these limitations on habitat manipulation activities are appropriate for reasons of public health and the protection of other sensitive resources (e.g., endangered/threatened wildlife and significant historical and cultural resources). If habitat manipulation is determined to be necessary in such a case, then such activities should be limited so as not to significantly impact the representative and ecological integrity of the reserve.

Contrary to the assertion of one reviewer, the intent of designating and managing a research reserve is not to "preserve" that particular habitat in a stasis condition. Estuarine ecosystems are naturally dynamic habitats which we have yet to fully understand. NOAA's intent in designating estuarine areas as national estuarine research reserves is to protect the representative character of each individual reserve and thereby establish a national system of estuarine areas representative of the biogeographic regions and estuarine types of the United States. These representative estuarine research reserves then provide opportunities for long-term research, education, and interpretation.

Generally, it is NOAA's belief that, given the less-than-perfect state of knowledge regarding both the functioning of estuarine ecosystems and the effects of natural and anthropogenic change that manipulation should be carefully limited within estuarine research reserves. Outside the context of a carefully planned, and peer reviewed, research or restoration activity, NOAA believes that habitat manipulation for management purposes involves a significant risk to the representative integrity and character of a national estuarine research reserve. As a result, the phrase in the proposed regulations "habitat manipulation for resource management purposes" is intended to mean habitat management for the promotion of a particular species or habitat, or for some purpose other than research involving or restoration of a representative "natural" estuarine ecosystem.

NOAA acknowledges that much research involves some degree of manipulation of the resource(s) and habitat(s) which are the subject of study. In this regard, reserves are not intended to be "control" habitats only, and some degree of habitat manipulation is recognized as an essential aspect of much important estuarine research. However, research activities conducted within a reserve should not involve manipulative activities that, because of their nature or extent, would significantly impair the "natural" representative value (i.e., representative character) of the reserve.

NOAA also acknowledges that restoration efforts may involve extensive habitat manipulation activities. Many estuarine areas have undergone some ecological change as a result of human activities (*e.g.*, hydrological changes, intentional/unintentional species composition changes—introduced and exotic species, etc.). In those areas designated as national estuarine research reserves, such changes may have diminished the representative character and integrity of the site. Where restoration of such degraded areas is determined necessary within this context, such activities must be carefully planned. Much research is necessary to determine the "natural" representative state of an estuarine area (*i.e.*, an estuarine ecosystem minimally affected by human activity or influence). Frequently, such restoration activities provide excellent opportunities for management oriented research.

In response to reviewers requests for clarification and consistent with the response provided above, § 921.1(d) and

§ 921.1(e) have been revised appropriately.

Proposed § 921.1(f)—(1) One reviewer recommended that a formula be established that would "pre-determine the minimum level (percentage) of funds that would be set aside within the total [System] budget for specific categories (Research, Education, Monitoring, Operation/Management, Acquisition, and Development)." In addition, this same reviewer recommended that the allocation of acquisition/development funds should be made on the basis of greatest need measured against predetermined criteria.

Response: NOAA acknowledges that under certain conditions establishment of predetermined percentages for allocating funds among programmatic categories could provide greater predictability in the distribution of Federal funds among reserves. However, the advantages of such an approach depend on a predictability in both the level of annual appropriations as well as major acquisition and development needs for the Reserve system. The uncertainties in appropriation levels and acquisition needs are sufficient enough to make an allocation formula among the six major funding categories (research, education, monitoring, predesignation, acquisition/development, operations) unfeasible.

NOAA attaches primary importance to long term support for the operational needs at each reserve as described in § 921.32 of these regulations, and to fulfilling the research, education and monitoring objectives of the program. unlimited eligibility for these for the awards.

(2) Four reviewers expressed concern or objection to limiting the funding eligibility of any one reserve under any type of award, particularly operation/management awards. These reviewer's comments ranged from general concern to recommending that all funding caps be removed from all types of awards. These reviewers also stated their general concern regarding a perceived lack of long term Federal financial commitment to the System.

Response: Annual appropriations are limited, not unlimited. Funding eligibility limits for each reserve have been established in regulations only where determined appropriate and necessary for the establishment and on-going support of the mission and goals of the System. These regulations establish annual eligibility limits for operations ($70,000 per year, per reserve) and program-life limits for site acquisition ($4 million per reserve). Funding eligibility limits have not been established for research, monitoring, and education grant funds. See subparts F, G, H. Site acquisition limits are statutory. (16 U.S.C. 1461(e)(3)(A))

Funding limits ensure that some funding is available for those types of awards which support most directly the mission and goals of the System (*i.e.*, generally, after designation of a reserve, the competitive awards). As importantly, funding limits are necessary to ensure that available funds are awarded in a relatively fair and proportional manner among national estuarine research reserves. In the absence of such limits, one or a few research reserves could receive the bulk of available funds at the expense of all other reserves. These limits prevent such a substantially disproportionate distribution of limited funding.

At present, some of the existing research reserves in the System are approaching the eligibility limits for acquisition and facility development awards, while most have received less than 50 per cent, and a number less than 25 per cent, of the eligibility limits of these type of awards—a difference between these categories of approximately one to three million dollars. These differences are justifiable on the basis of relative need, reserve size, property values, construction costs, etc. A greater difference in relative allocation of funds between reserves would favor disproportionally some reserves and, as a result, be detrimental to the System as a whole.

Eligibility limits are established for the purposes noted above and not to unreasonably restrict a research reserve from access to available Federal funds. On the basis of NOAA's experience in administering Federal financial assistance for the System and because of comments from many research reserves, the eligibility limit for operation/management awards was raised to a maximum of $70,000 per site per year. In response to comments on the proposed regulations, the eligibility limit for major facility construction has been raised 50 per cent in these final regulations (see response under proposed § 921.31 below).

Proposed § 921.1(g)—One reviewer disagreed with the requirement that land already in a protected status can be included within a reserve only if the managing entity commits to long-term non-manipulative management.

Response: NOAA believes this requirement is necessary consistent with the mission and goals of the System. Essentially this same subject is discussed in the response to comments on proposed § 921.1(d) and § 921.1(e). In order to clarify the intent of this provision, NOAA has revised this sentence to include a reference to the revised § 921.1(d) and § 921.1(e).

Section 921.2—Definitions

Proposed § 921.2(b)—It was noted that the Secretary of Commerce recently delegated authority for matters relating to National Estuarine Research Reserves to the Under Secretary for Oceans and Atmosphere.

Response: NOAA agrees with the recommended modification and has changed references from the Assistant Administrator to the Under Secretary throughout.

Proposed § 921.2(d)—One reviewer recommended a modification to the second sentence of the definition of estuary to include the term measurably diluted with freshwater rather than minimally diluted.

Response: NOAA agrees with the recommended modification the recommended term "minimal" should be the term "measurable". The definition has been changed accordingly.

Proposed § 921.2(e)—Five reviewers stated that some confusion has resulted in the reversed order of the terms research and reserve in the name of the System, National Estuarine Reserve Research System, and the name of each individual reserve, national estuarine research reserve.

Response: NOAA acknowledges that some confusion has arisen as a result of this difference. However, this is statutory language which only can be changed by amending the Act.

Section 921.4—Relationship to Other Provisions of the Coastal Zone Management Act.

It was noted that the existing program regulations describe this section as "Relationship to other provisions of the Coastal Zone Management Act and to the National Marine Sanctuary Program". Text describing the relationship between the Reserve and Sanctuary Programs was omitted. New marine sanctuaries and estuarine research reserves are being designated in close geographic proximity to one another and therefore improved coordination between the two programs is warranted.

Response: NOAA agrees. The revision of the Section heading and text should be adopted and strengthened. The omission of this information from the proposed regulations was an oversight. The Section heading and text have been revised appropriately.

Section 921.10—General

Proposed § 921.10(a)—Five reviewers objected to two or more states which

share a biogeographic region being limited to the development of a single reserve, even if it was a multicomponent reserve with components in each respective state (*e.g.*, Maryland and Virginia in the Chesapeake Bay subregion of the Virginia biogeographic region). These reviewers specifically objected to the eligibility limit on land acquisition funding (see § 921.10(b) and § 921.20) as it applies to any individual reserve, single or multiple component.

Response: NOAA agrees. Some of the System's biogeographic subregions are represented by more than one reserve in more than one state. As a result, in the case of a biogeographic region (see Appendix 1) shared by two or more states, each such state should be eligible for Federal financial assistance to establish a national estuarine research reserve within their respective portion of the shared biogeographic region. Section 921.10(a) has been amended to reflect this revision. Because of this revision, the phrase which begins "In the case of a multicomponent national estuarine * * *" in § 921.10(a), § 921.31, and § 921.32(c) is no longer necessary and has been deleted.

Proposed § 921.10(b)—Two reviewers commented that NOAA should consider a higher eligibility limit or relative greater funding for awards to multi-component reserves than to single component reserves.

Response: NOAA disagrees. Funding for the System is limited. A State elects to establish a multi-component reserve or expand a single component reserve with full knowledge of the identical eligibility limits on any individual reserve, whether single or multiple component. Establishing separate funding eligibility limits for, or disproportionally funding, multicomponent reserves would be likely to have a significant adverse impact on single-component reserves and, as a result, the System as a whole. Further, acquisition and development funds are limited by the Act.

Section 921.11—Site Selection

Proposed § 921.11(c)(2)—One reviewer recommended that the last sentence be revised to eliminate reference to "a natural system."

Response: NOAA agrees that a minor revision is necessary to clarify the intent of this sentence. The sentence has been revised in a manner consistent with corresponding clarifying revisions to § 921.1(d) and § 921.1(e).

Proposed § 921.11(c)(3)—Three reviewers commented on the concept of "core" and "buffer" areas or zones. Two of these reviewers recommended deleting the concept of a buffer zone. The remaining reviewer recommended extensive revisions to the subsection to provide guidance on where habitat manipulation would be allowed.

Response: After careful review of this subsection, NOAA does not believe that the buffer zone concept should be deleted or that substantive revisions are appropriate. The basic approach presented is sound. A critical concept and distinction between the two areas which may have been overlooked is that key land and water areas ("core") and a buffer zone will likely require significantly different levels of control (see § 921.13 (a)(7)). In addition to the basic principles established in the regulations, NOAA has developed more detailed boundary guidance which is available to states attempting to conduct the difficult process of boundary delineation of a proposed site.

Proposed § 921.11(c)(5)—One reviewer recommended amending this site selection principle to include "the support of ongoing or planned management activities in nearby estuaries, including those in the National Estuary Program."

Response: NOAA considers § 921.11(c)(5) to encompass this concern in that the State is required to demonstrate how the proposed site is consistent with existing and potential land and water uses. Both the designation by NOAA of a reserve under the Act and management plans developed through the National Estuary Program of the U.S. EPA are submitted to the States for a determination of consistency under section 307(c)(1) of the Coastal Zone Management Act of 1972, as amended. NOAA views this mechanism as an effective means for ensuring that Reserves support and advance the relevant coastal and estuarine management objectives including those of the National Estuary Program. Therefore, § 921.11(c)(5) has been amended to make more specific our intent that the site support estuarine management objectives.

Section 921.12—Post Site Selection

Proposed § 921.12(a)—Two reviewers recommended a separate type of award for monitoring that would provide long-term support for these activities.

Response: NOAA agrees. A new subpart G—Monitoring has been added to the regulations (subparts G and H of the proposed regulations being relettered as subparts H and I, respectively; and the section numbers being renumbered accordingly). Initial funding for basic characterization of the physical, geological, chemical, and biological characteristics of the site will continue to be provided under § 921.12—Post site selection. In addition, however, under the new subpart G, NOAA may provide financial assistance on a competitive basis for each phase of a monitoring program. These grant awards will be separate from those provided for estuarine research under subpart F.

Section 921.13—Management Plan and Environmental Impact Statement Development

Proposed § 921.13(a)(7)—Three reviewers provided comment on the acquisition plan guidance of this subsection. Two reviewers requested additional guidance on what constitutes "adequate state control" and commented that the requirement to assess the cost effectiveness of control alternatives is excessively burdensome. The remaining reviewer stated that having four million dollars in funds available for land acquisition is not consistent with the requirement to conduct an assessment of the cost effectiveness of acquisition alternatives.

Response: What constitutes "adequate State control" is dependent on site-specific circumstances and requirements. The most efficient use of available acquisition funds can only be ensured through the identification of reasonable control, or acquisition alternatives and an assessment of their relative cost and effectiveness. This does not necessarily mean that the least costly option in dollars is the alternative that must be selected. It does mean, however, that all reasonable control alternatives should be thoroughly examined and their relative costs identified. The development of an acquisition plan is an allowable cost (Federal or matching share). Four million dollars is not "available," but is the eligibility limit for land acquisition funds for any one reserve. Regardless of the amount of funding available, for land acquisition, a thorough assessment of acquisition alternatives and their cost effectiveness is necessary to ensure responsible and efficient use of Federal grant funds. At a minimum the degree of state control must provide adequate long term protection to ensure for reserve resources a stable environment for research.

Proposed § 921.13(a)(11)—One reviewer stated that NOAA's responsibility to make a consistency determination should be made clear early in the regulations.

Response: NOAA agrees. A reference to § 921.30(b) has been added to this subsection to clarify NOAA's consistency determination responsibilities early in preparation of the management plan.

Section 921.20—General

Proposed § 921.20—Two reviewers requested a clarifying revision to the last sentence of this subsection; the addition of the phrase "to a coastal state."

Response: NOAA agrees and the section has been revised accordingly.

Section 921.21(e)—Initial Acquisition and Development Awards

Two reviewers provided comment on this section. The first reviewer requested clarification that the provision regarding de-designation of a site applies only to properties acquired with Federal funds. The second reviewer stated that the provision to compensate the Federal government for its share of the acquisition cost in the event of de-designation, may be contrary to overall coastal protection objectives because the state may have to sell the property to development interests in order to fully compensate the Federal interest.

Response: Regarding the first comment, NOAA does not believe additional clarification is necessary. This subsection states specifically that these provisions apply to "any real property acquired in whole or part with Federal funds * * *." The second commenter acknowledges correctly that these requirements are designed to accomplish the goals of the National Estuarine Research Reserve System and that this provision helps ensure that reserves maintain the standards established for the system and, if they do not, that a percentage of the fair market value is available to other reserves. It should also be noted that these provisions are not new and have been in place since the inception of the Reserve program through grant directives contained in OMB Circular A-102. The provisions in the Reserve regulations are taken directly from the A-102 Circular and apply to all real property acquired in whole or part with Federal funds. It should also be noted that there are other alternatives aside from sale of the property. In the event of de-designation the state may retain title or transfer title to the Federal government. In these instances it is likely that the resources of the reserve could continue to be protected. While none of these alternatives are inexpensive they do, as noted by the commenter, help ensure that the site continues to be managed and maintained in conformance with research reserve goals and objectives.

Section 921.30—Designation of National Estuarine Research Reserves

Proposed § 921.30(a)—Two reviewers provided comments on the designation criteria listed in this subsection. One reviewer recommended a change in (a)(4) at variance with the Act. The other reviewer recommended an addition to the designation findings to include a requirement that, in the case of a State which contains, in whole or part, a national estuary program convened pursuant to section 320 of the Clean Water Act, suitable consideration has been given to integration of research and public education programs of the estuarine research reserve and the national estuary program. It has also been noted that the final management plan as the governing document for subsequent operations and management of the reserve should contain the signed designation findings. Subpart (a) of this section should also be revised to show that the Under Secretary is responsible for designation of reserves in accordance with the delegation of that authority from the Secretary of Commerce.

Response: The terms for designation of a National Estuarine Research Reserve are set forth in the statute. NOAA agrees that research and education programs should be integrated between the Environmental Protection Agency's National Estuary Program and NOAA's National Estuarine Reserve Research System. This effort has already been initiated through a memorandum of understanding between the programs at the National level and is being pursued at the local level, where appropriate. Therefore, NOAA believes it does not require restatement in the program regulations. However, NOAA agrees that the management plan should contain the findings of designation and the regulations should show that the Under Secretary is responsible for designation. The regulations have been revised accordingly.

Section 921.31—Supplemental Acquisition and Development Awards

Proposed § 921.31—Four reviewers expressed concerns that the eligibility limit of $1,000,000 in Federal financial assistance for facility construction may not be adequate to meet anticipated long term needs and should be increased or eliminated.

Response: NOAA agrees. The eligibility limit for facility construction has been increased 50 percent to $1,500,000.

Section 921.32—Operation and Management: Implementation of the Management Plan

Proposed § 921.32(a–d)—Seven reviewers objected to the eligibility limit on operations and management awards. They noted that the statute contains no provision for withdrawal of Federal support for continued operation of the reserves. The termination of Federal support for the individual sites is viewed as a lack of Federal commitment to the long-term maintenance of a representative system of estuarine research and education sites.

Response: The Reserve Program was designed and continues to be a State-Federal partnership. The key to this partnership is the requirement that NOAA share with the State reserve program the financial needs associated with site designation, land acquisition, research, education and operations.

As discussed previously, appropriate eligibility limits ensure that funding is available for competitive research education and monitoring awards. If, as some reviewers suggested, NOAA removed the annual monetary ceiling for operations and other awards, an inequitable and disproportionate distribution of the limited funds for the program could result. Annual operational eligibility limits in addition to ensuring the availability of funds for competitive projects provide a stability and even distribution among designated and developing reserves. Consequently NOAA is retaining the eligibility limit of $70,000 for operations and management per site per year.

NOAA concurs with the reviewers' assertion that the statute does not direct the Federal Government to abandon its support and financial commitment to reserve operations at the conclusion of a prescribed period of time or when an arbitrary cumulative funding ceiling for Federal support of operations has been met. By imposing a fixed duration for Federal support of Reserve operations NOAA may undermine its ability to participate effectively with the Reserve system to address coastal and estuarine management issues of national significance. The previously proposed three year support per position allocated through a $420,000 operations ceiling also established a complex and burdensome administrative process which is further complicated when allocated among Reserves which have already received operations support, and the newly designated sites which have yet to receive such support. To simplify, streamline and improve NOAA's effectiveness in support of

Reserve operations, the three year restriction and other references to cessation of Federal support for operations and management at the reserves have been removed throughout the regulations.

Section 921.33—Boundary Changes, Amendments to the Management Plan, and Addition of Multiple-site Components

Proposed § 921.33(c)—One reviewer recommended deletion or substantial modification of this subsection to recognize the State's right and ability to appropriately plan and legislate its legal charge—the research reserve. In summary, this reviewer objected to NOAA's approval authority/requirement for activities discussed in this subsection. The reviewer suggested that it should be sufficient if the State provides NOAA an opportunity for review and comment on proposed changes.

Response: NOAA disagrees. NOAA is responsible for Federal oversight of the System and each designated research reserve. As long as a State wishes for a reserve to remain a part of the System and to retain Federal designation, NOAA will continue to require Federal approval of changes in that research reserve's boundaries and management.

General

Proposed § 921.40, § 921.41, and § 921.42—Several reviewers recommended clarification of the criteria to be used during performance evaluations. Performance criteria should clearly state what constitutes adequate or inadequate performance. One commenter provided a list of items suggested for inclusion in an evaluation. Three reviewers made suggestions on the composition of the evaluation team recommending non-Federal and private individual participation while another commenter suggested the regulations indicate criteria for choosing the members of the evaluation team. Finally a recommendation was offered that the evaluation stress integration of the Reserve program with other state coastal/research programs and that the regulations provide for other dispute resolution mechanisms short of litigation.

Response: The periodic evaluation of a national estuarine research reserve is central to NOAA's ability to ensure that reserve operation and management is being conducted in a manner fully consistent with program goals and objectives as defined in section 315 of the Act, 16 U.S.C. 1461, and its implementing regulations. The criteria for an evaluation corresponds directly with the program goals as specified in § 921.1 of these regulations. The five goals described in this section are nearly identical to the criteria proposed by one commenter. The commenter added cost-effectiveness in using Federal funds as an additional criteria which, while not directly stated as a program goal in the regulations is implicit in any evaluation of efficient management of the total reserve program.

It is not feasible to establish a checklist for any evaluation to predetermine what constitutes adequate versus inadequate performance. Each reserve has very unique administrative structures, environmental resources, and corresponding management needs. NOAA views the evaluation process to be a highly collaborative effort with the State such that the evaluation can be used to focus on particular and specific problem areas. It is not appropriate to attempt to construct a litmus test for inadequate or adequate performance which could reasonably anticipate the substantial variety of issues that are addressed in the evaluation process. NOAA would be justifiably criticized for applying an artificial measure against unique and site-specific circumstances.

NOAA agrees with the comments made regarding participation of other officials in the evaluation process. Such officials provide recommendations to NOAA on specific issues in the evaluation. To ensure that Reserve personnel are directly involved in selection of the evaluation team, § 921.40(c) has been revised to indicate that NOAA will consult with and request recommendations from the Reserve on the appropriate non-NOAA participants prior to the evaluation.

The recommendation that the evaluation examine coordination between the Reserve program and other coastal research efforts is fully consistent with NOAA objectives for the evaluation process and is currently considered under Reserve program criteria to "promote Federal, State, public and private use of one or more reserves within the System when such entities conduct estuarine research." NOAA however, does not agree with the comment that other dispute resolution mechanisms should be devised short of litigation in the event of an unfavorable evaluation that may lead to withdrawal of designation. The provisions contained in both § 921.41 and § 921.42 provide a lengthy and elaborate process for addressing major differences between the NOAA and the Reserve relative to suspension of financial assistance or withdrawal of designation. This process is expressly designed to avoid litigation on these issues. Therefore, NOAA does not agree that additional mechanisms for dispute resolution are warranted.

Proposed § 921.40(e)—Two reviewers recommended a ninety-day requirement for State submittal of an annual report instead of sixty days.

Response: NOAA agrees. Section 921.40(e) has been revised accordingly. NOAA also notes that this section indicates that inadequate annual reports will trigger a full scale performance evaluation. This provision is no longer needed since § 921.32 has been changed to provide long term eligibility for operations support. Evaluations consequently will be conducted generally at least every 3 years. The statement has therefore been deleted.

Section 921.50—General

Proposed § 921.50(a)—Four reviewers commented on this subsection. Three reviewers recommended that research funded under this subpart be allowed in an area larger than the boundaries of the research reserve. One of these reviewers also recommended that the managing entity of the reserve approve all research prior to NOAA funding. One reviewer expressed concern that funding eligibility is tied to NOAA approval of a final management plan.

Response: NOAA agrees that greater flexibility should be provided for the area in which federally funded research under this subpart may be conducted. The regulations have been revised to allow research activity in the immediate watershed of the reserve while still requiring the majority of funded activities to be conducted within the boundaries. NOAA also agrees that the managing entity of the reserve should directly indicate approval or disapproval of proposed research project. Currently each reserve is requested to review and assign priority to research projects proposed for the reserve. If a reserve does not approve of a particular project that information should be expressed directly to NOAA.

NOAA agrees that its review and approval of state submitted final management plans should be as expeditious as possible. However, consistent with NOAA's responsibility to ensure that reserve management is conducted in accordance with the mission and goals of the System, the need for an approved final management plan to qualify for NOAA funded research remains.

Section 921.51—Estuarine Research Guidelines

Proposed § 921.51—Five reviewers recommended that NOAA provide, at

minimum, a more detailed and specific description of the Estuarine Research Guidelines in the regulations. One reviewer objected to NOAA's role in establishing the research priorities for funding under this subpart.

Response: NOAA disagrees. Section 315 of the Act requires NOAA to develop guidelines, not regulations, for the conduct of research within the System. A basic description of these guidelines is provided in both the Act and the regulations. Including the guidelines themselves, or a more detailed and specific description of these guidelines, in the regulations would severely limit flexibility in their implementation. NOAA publishes the guidelines annually in the Federal Register and intends to continue to improve these guidelines within the relatively comprehensive standards of the Act. NOAA develops general research priorities on an annual basis in consultation with the estuarine research and resource management community. The agency foresees no advantage to including more specificity or detail than necessary in the Program regulations. The financial support provided under this subpart for Research is administered by NOAA. As a result, NOAA, in consultation with prominent members of the estuarine research community, will continue to determine research priorities for this funding.

Subpart G—Interpretation and Education

Section 921.60—General

Proposed § 921.60(a)—Two reviewers objected to the requirement that interpretive and education projects be conducted within the research reserve.

Response: NOAA did not intend to limit funding under this Subpart to activities conducted entirely within the boundaries of a research reserve, and has revised the statement to clarify the intent.

Proposed § 921.60(b)—One reviewer suggested NOAA require that all applications for interpretation and education awards be approved by the state.

Response: NOAA agrees that applications under this subpart should have the support of the state managing entity. The regulations have been revised accordingly.

Section 921.71—Allowable Costs

Proposed § 921.71(e)(2)—Two reviewers objected to a one year time limit prior to pre-acquisition being imposed on the allowability for state match of state lands already in a fully-protected status. The commenters noted that properties included within NERR boundaries, particularly the core area, will be subject to restricted uses, and these uses will be subject to NOAA approval (*e.g.*, research, construction, education). Since these properties add real value to the NERR System, but have diminished use for other purposes, they should be allowable as state match. These reviewers therefore recommended elimination of a one-year time limit.

Response: This provision has been adopted in the past to ensure that lands included within the Reserve system are acquired consistent with the purposes and objectives of the Reserve system and, as required by section 315(e)(3)(A) of the Act, to assure that the state has matched the amount of financial assistance provided by the Federal Government for the acquisition of land for a reserve. However, NOAA agrees that the imposition of a one-year time limit may not be the most effective or appropriate method to achieve this purpose. We have therefore eliminated this provision from the regulations and instead allow inclusion of land and submerged lands already in the states' possession as state match irrespective of the date obtained by the state. However, calculation of the amount eligible as match for existing state owned lands will be made by an independent appraiser who will consider the value for match purposes of these lands by calculating the value of benefits foregone by the state, in the use of the land, as a result of new restrictions that may be imposed by Reserve designation.

Proposed § 921.71(e)(4)—One reviewer recommended elimination or simplification of the matching share criteria for research awards.

Response: The matching share requirement cannot be eliminated because it is required by statute. However, the matching share criteria has been simplified to be consistent with the provisions to § 921.50(a) of subpart F.

VI. Other Actions Associated With the Rulemaking

(A) *Classification Under Executive Order 12291.* NOAA has concluded that these regulations are not major because they will not result in:

(1) An annual effect on the economy of $100 million or more;

(2) A major increase in costs or prices for consumers; individual industries; Federal, state, or local government agencies; or geographic regions; or

(3) Significant adverse effects on competition, employment, investment, productivity, innovation or the ability of United States based enterprises to compete with foreign based enterprises in domestic or export markets.

These rules amend existing procedures for identifying, designating, and managing national estuarine research reserves in accordance with the Coastal Zone Management Reauthorization Act of 1985. They will not result in any direct economic or environmental effects nor will they lead to any major indirect economic or environmental impacts.

(B) *Regulatory Flexibility Act Analysis.* A Regulatory Flexibility Analysis is not required for this rulemaking. The regulations set forth procedures for identifying and designating national estuarine research reserves, and managing sites once designated. These rules do not directly affect "small government jurisdictions" as defined by Public Law 96-354, the Regulatory Flexibility Act, and the rules will have no effect on small businesses.

(C) *Paperwork Reduction Act of 1980.* This rule contains collection of information requirements subject to Public Law 96-511, the Paperwork Reduction Act (PRA), which have already been approved by the Office of Management and Budget (approval number 0648-0121). Public reporting burden for the collections of information contained in this rule is estimated to average 2,012 hours per response for management plans and related documentation, 1.25 hours for performance reports, and 15 hours for annual reports and work plans. These estimates include the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of these collections of information, including suggestions for reducing this burden, to Richard Roberts, Room 1235, Department of Commerce, Washington, DC 20230, and to the Office of Information and Regulatory Affairs, Office of Management and Budget, Washington, DC 20503. ATTN: Desk Officer for NOAA.

(D) *Executive Order 12612.* These interim final rules do not contain policies which have sufficient Federalism implications to warrant preparation of a Federalism Assessment pursuant to Executive Order 12612. However, the provisions of the rules setting forth what a state must do or agree to do in order to qualify for the various types of Federal financial assistance available under the rules have been reviewed to ensure that the

rules grant the states the maximum administrative discretion possible in the administration of the National Estuarine Reserve Research System policies embodied in the qualification requirements. In formulating those policies, the NOAA worked with affected states to develop their own policies with respect to the use of National Estuarine Research Reserves. To the maximum extent possible consistent with the NOAA's responsibility to ensure that the objectives of the National Estuarine Reserve Research System provisions of the Coastal Zone Management Act are obtained, the rules refrain from establishing uniform national standards. Extensive consultations with state officials and organizations have been held regarding the financial assistance qualifications imposed. Details regarding awards of financial assistance have been discussed above under the heading "REVISION OF THE PROCEDURES FOR SELECTING, DESIGNATING AND OPERATING NATIONAL ESTUARINE RESEARCH RESERVES" and are not repeated here. Likewise comments from the states regarding qualifications and responses and changes to the regulations regarding same were set forth under the heading SUMMARY OF SIGNIFICANT COMMENTS ON THE PROPOSED REGULATIONS AND NOAA'S RESPONSES. It should be noted that some of the states commented in opposition to conditions or language required by law or by Office of Management and Budget Circular A-102. NOAA does not have the discretion to change such language or conditions.

(E) *National Environmental Policy Act.* NOAA has concluded that publication of these interim final rules does not constitute a major Federal action significantly affecting the quality of the human environment. Therefore, an environmental impact statement is not required.

(F) *Administrative Procedure Act.* These interim final regulations are effective July 23, 1990. To the extent that these regulations relate to grants and cooperative agreements the requirements of the Administrative Procedure Act 5 U.S.C. 553 do not apply. To the extent that any substantive provision does not involve grants or cooperative agreements no useful purpose would be served by delaying the effective date for 30 days. No rights of the participants in this Federal program will be adversely affected by immediate implementation. To the contrary state recipients of financial assistance through this program have submitted program applications that anticipate immediate implementation of these regulations. Public comments on these interim final regulations are invited and will be considered if submitted on or before September 21, 1990.

List of Subjects in 15 CFR Part 921

Administrative practice and procedure, Coastal zone, Environmental impact statements, Grant programs—Natural resources, Reporting and recordkeeping requirements, Research.

(Federal Domestic Assistance Catalog Number 11.420, National Estuarine Reserve Research System)

Dated: July 10, 1990.

Virginia K. Tippie,

Assistant Administrator for Ocean Services and Coastal Zone Management.

For the reasons set forth in the preamble, 15 CFR part 921 is revised to read as follows:

PART 921—NATIONAL ESTUARINE RESERVE RESEARCH SYSTEM REGULATIONS

Sec.

Authority: Sec. 315, Public Law 92-583, as amended; 86 Stat. 1280 (16 U.S.C. 1461).

Subpart A—General

§ 921.1 Mission, goals and general provisions.

(a) The mission of the National Estuarine Reserve Research System is the establishment and management, through Federal-State cooperation, of a national system of estuarine research reserves representative of the various regions and estuarine types in the United States. Estuarine research reserves are established to provide opportunities for long-term research, education, and interpretation.

(b) The goals of the program for carrying out this mission are to:

(1) Ensure a stable environment for research through long-term protection of estuarine reserve resources;

(2) Address coastal management issues identified as significant through coordinated estuarine research within the System;

(3) Enhance public awareness and understanding of the estuarine environment and provide suitable opportunities for public education and interpretation;

(4) Promote Federal, state, public and private use of one or more reserves within the System when such entities conduct estuarine research; and

(5) Conduct and coordinate estuarine research within the System, gathering and making available information necessary for improved understanding and management of estuarine areas.

(c) National estuarine research reserves shall be open to the public to

the extent permitted under State and Federal law. Multiple uses are allowed to the degree compatible with the research reserve's overall purpose as provided in the management plan (see § 921.13) and consistent with paragraphs (a) and (b) of this section. Use levels are set by the individual state and analyzed in the management plan. The research reserve management plan shall describe the uses and establish priorities among these uses. The plan shall identify uses requiring a state permit, as well as areas where uses are encouraged or prohibited. Consistent with resource protection and research objectives, public access may be restricted to certain areas within a research reserve.

(d) Habitat manipulation for research purposes is allowed consistent with the following limitations. Manipulative research activities must be specified in the management plan, be consistent with the mission and goals of the program (see paragraphs (a) and (b) of this section) and the goals and objectives of the affected research reserve, and be limited in nature and extent to the minimum manipulative activity necessary to accomplish the stated research objective. Manipulative research activities with a significant or long-term impact on reserve resources require the prior approval of the state and the National Oceanic and Atmospheric Administration (NOAA). Manipulative research activities which can reasonably be expected to have a significant adverse impact on the estuarine resources and habitat of a reserve, such that the activities themselves or their resulting short- and long-term consequences compromise the representative character and integrity of a reserve, are not allowed. Habitat manipulation for resource management purposes is not permitted within national estuarine research reserves, except as allowed for restoration activities consistent with paragraph (e) of this section. NOAA may allow an exception to this prohibition if manipulative activity is necessary for the protection of public health or the preservation of other sensitive resources which have been listed or are eligible for protection under relevant Federal or state authority (*e.g.*, threatened/endangered species or significant historical or cultural resources). If habitat manipulation is determined to be necessary for the protection of public health or the preservation of sensitive resources, then these activities shall be specified in the Reserve Management Plan and limited to the reasonable alternative which has the least adverse and shortest term impact on the representative and ecological integrity of the reserve.

(e) Under the Act an area may be designated as an estuarine reserve only if the area is a representative estuarine ecosystem that is suitable for long-term research. Many estuarine areas have undergone some ecological change as a result of human activities (*e.g.*, hydrological changes, intentional/unintentional species composition changes—introduced and exotic species). In those areas proposed or designated as national estuarine research reserves, such changes may have diminished the representative character and integrity of the site. Although restoration of degraded areas is not a primary purpose of the System, such activities may be permitted to improve the representative character and integrity of a reserve. Restoration activities must be carefully planned and approved by NOAA through the Reserve Management Plan. Historical research may be necessary to determine the "natural" representative state of an estuarine area (*i.e.*, an estuarine ecosystem minimally affected by human activity or influence). Frequently, restoration of a degraded estuarine area will provide an excellent opportunity for management oriented research.

(f) NOAA may provide financial assistance to coastal states, not to exceed 50 percent of all actual costs or $4 million whichever amount is less, to assist in the acquisition of land and waters, or interests therein. NOAA may provide financial assistance to coastal states not to exceed 50 percent of all actual costs for the management and operation of, and the conduct of educational or interpretive activities concerning, national estuarine research reserves (see subpart I of this part). NOAA may provide financial assistance to any coastal state or public or private person, not to exceed 50 percent of all actual costs, to support research and monitoring within a national estuarine research reserve. Five types of awards are available under the National Estuarine Reserve Research System Program. The predesignation awards are for site selection, draft management plan preparation and conduct of basic characterization studies. Acquisition and development awards are intended primarily for acquisition of interests in land and construction. The operation and management award provides funds to assist in implementing the research, educational, and administrative programs detailed in the research reserve management plan and is reflective of the joint State-Federal partnership in the preservation and protection of estuarine resources. The research and monitoring awards provide funds to conduct estuarine research and monitoring within the System. The educational and interpretive award provides funds to conduct estuarine educational and interpretive activities within the System.

(g) Lands already in protected status managed by other Federal agencies, state or local governments, or private organizations can be included within national estuarine research reserves only if the managing entity commits to long-term non-manipulative management consistent with paragraphs (d) and (e) of this section in the reserve management plan. Federal lands already in protected status cannot comprise the key land and water areas of a research reserve (see § 921.11(c)(3)).

(h) To assist the states in carrying out the Program's goals in an effective manner, the National Oceanic and Atmospheric Administration (NOAA) will coordinate a research and education information exchange throughout the national estuarine research reserve system. As part of this role, NOAA will ensure that information and ideas from one reserve are made available to others in the system. The network will enable reserves to exchange information and research data with each other, with universities engaged in estuarine research, and with Federal and state agencies. NOAA's objective is a system-wide program of research and monitoring capable of addressing the management issues that affect long-term productivity of our Nation's estuaries.

§ 921.2 Definitions.

(a) *Act* means the Coastal Zone Management Act of 1972, as amended, 16 U.S.C. 1451 *et seq.* Section 315 of the Act, 16 U.S.C. 1461, establishes the National Estuarine Reserve Research System.

(b) *Under Secretary* means the Under Secretary for Oceans and Atmosphere, U.S. Department of Commerce, or designee.

(c) *Coastal state* means a state of the United States, in or bordering on, the Atlantic, Pacific, or Arctic Ocean, the Gulf of Mexico, Long Island Sound, or one or more of the Great Lakes. For the purposes of these regulations the term also includes Puerto Rico, the Virgin Islands, Guam, the Commonwealth of the Northern Marianas Islands, the Trust Territories of the Pacific Islands, and American Samoa (see 16 U.S.C. 1453(4)).

(d) *Estuary* means that part of a river or stream or other body of water having

unimpaired connection with the open sea, where the sea water is measurably diluted with fresh water derived from land drainage. The term also includes estuary-type areas with measurable freshwater influence and having unimpaired connections with the open sea, and estuary-type areas of the Great Lakes and their connecting waters. See 16 U.S.C. 1453(7)).

(e) *National Estuarine Research Reserve* means an area that is a representative estuarine ecosystem suitable for long-term research, which may include all or the key land and water portion of an estuary, and adjacent transitional areas and uplands constituting to the extent feasible a natural unit, and which is set aside as a natural field laboratory to provide long-term opportunities for research, education, and interpretation on the ecological relationships within the area (see 16 U.S.C. 1453(8)) and meets the requirements of 16 U.S.C. 1461(b). This includes those areas designated as national estuarine sanctuaries under section 315 of the Act prior to the date of the enactment of the Coastal Zone Management Reauthorization Act of 1985 and each area subsequently designated as a national estuarine research reserve.

§ 921.3 National Estuarine Reserve Research System biogeographic classification scheme and estuarine typologies.

(a) National estuarine research reserves are chosen to reflect regional differences and to include a variety of ecosystem types. A biogeographic classification scheme based on regional variations in the nation's coastal zone has been developed. The biogeographic classification scheme is used to ensure that the National Estuarine Reserve Research System includes at least one site from each region. The estuarine typology system is utilized to ensure that sites in the System reflect the wide range of estuarine types within the United States.

(b) The biogeographic classification scheme, presented in Appendix I to this part, contains 27 regions. Figure 2 graphically depicts the biogeographic regions of the United States.

(c) The typology system is presented in Appendix II to this part.

§ 921.4 Relationship to other provisions of the Coastal Zone Management Act.

(a) The National Estuarine Reserve Research System is intended to provide information to state agencies and other entities involved in addressing coastal management issues. Any coastal state, including those that do not have approved coastal zone management programs under section 306 of the Act, is eligible for an award under the National Estuarine Reserve Research System (see § 921.2(c)).

(b) For purposes of consistency review by states with a federally approved coastal zone management program, the designation of a national estuarine research reserve is deemed to be a Federal activity, which, if directly affecting the state's coastal zone, must be undertaken in a manner consistent to the maximum extent practicable with the approved state coastal zone program as provided by section 1456(c)(1) of the Act, and implementing regulations at 15 CFR part 930, subpart C. In accordance with section 1456(c)(1) of the Act and the applicable regulations NOAA will be responsible for certifying that designation of the reserve is consistent with the State approved coastal zone management program. The State must concur with or object to the certification. It is recommended that the lead State agency for reserve designation consult at the earliest practicable time, with the appropriate State officials concerning the consistency of the proposed national estuarine research reserve.

(c) The National Estuarine Research Reserve Program will be administered in close coordination with the National Marine Sanctuary Program (Title III of the Marine Protection Research and Sanctuaries Act, as amended, 16 U.S.C. 1431–1445), also administered by NOAA. Title III authorizes the Secretary of Commerce to designate discrete areas of the marine environment as marine sanctuaries to protect or restore such areas for their conservation, recreational, ecological, historical, research, educational or esthetic values. National marine sanctuaries and estuarine research reserves may not overlap, though they may be adjacent.

Subpart B—Site Selection, Post Site Selection and Management Plan Development

§ 921.10 General.

(a) A state may apply for Federal financial assistance for the purpose of site selection, preparation of documents specified in § 921.13 (draft management plan and environmental impact statement (EIS)) and the conduct of research necessary to complete basic characterization studies. The total Federal share of this group of predesignation awards may not exceed $100,000, of which up to $25,000 may be used for site selection as described in § 921.11. Federal financial assistance for preacquisition activities under § 921.11 and § 921.12 is subject to the total $4 million for which each reserve is eligible for land acquisition. In the case of a biogeographic region (see Appendix I to this part) shared by two or more states, each state is eligible for Federal financial assistance to establish a national estuarine research reserve within their respective portion of the shared biogeographic region. Financial assistance application procedures are specified in subpart I of this part.

(b) In developing a research reserve program, a state may choose to develop a multiple-site research reserve reflecting a diversity of habitats in a single biogeographic region. A multiple-site research reserve also allows the state to develop complementary research and educational programs within the individual components of its multi-site research reserve. Multiple-site research reserves are treated as one reserve in terms of financial assistance and development of an overall management framework and plan. Each individual site of a proposed multiple-site research reserve shall be evaluated both separately under § 921.11(c) and collectively as part of the site selection process. A state may propose to establish a multiple-site research reserve at the time of the initial site selection, or at any point in the development or operation of the estuarine research reserve, even after Federal funding for the single site research reserve has expired. If the state decides to develop a multiple-site national estuarine research reserve after the initial acquisition and development award is made for a single site, the proposal is subject to the requirements set forth in § 921.33(b). However, a state may not propose to add one or more sites to an already designated research reserve if the operation and management of such research reserve has been found deficient and uncorrected or the research conducted is not consistent with the Estuarine Research Guidelines in accordance with the provisions of subparts E and F of this part. In addition, Federal funds acquisition of a multiple-site research reserve remains limited to $4,000,000 (see § 921.20). The funding for operation of a multiple-site research reserve is limited to $70,000 per year (see § 921.32(c)) and preacquisition funds are limited to $100,000 per reserve.

§ 921.11 Site selection.

(a) A state may use up to $25,000 in Federal funds to establish and implement a site selection process which is approved by NOAA.

(b) In addition to the requirements set forth in subpart I of this part, a request

for Federal funds for site selection must contain the following programmatic information:

(1) A description of the proposed site selection process and how it will be implemented in conformance with the biogeographic classification scheme and typology (§ 921.3);

(2) An identification of the site selection agency and the potential management agency; and

(3) A description of how public participation will be incorporated into the process (see § 921.11(d)).

(c) As part of the site selection process, the state and NOAA shall evaluate and select the final site(s). NOAA has final authority in approving such sites. Site selection shall be guided by the following principles:

(1) The site's contribution to the biogeographical and typological balance of the National Estuarine Reserve Research System. NOAA will give priority consideration to proposals to establish reserves in biogeographic regions or subregions that are not represented in the system (see the biogeographic classification scheme and typology set forth in § 921.3 and appendices I and II to this part);

(2) The site's ecological characteristics, including its biological productivity, diversity of flora and fauna, and capacity to attract a broad range of research and educational interests. The proposed site must be a representative estuarine ecosystem and should, to the maximum extent possible, be an estuarine ecosystem minimally affected by human activity or influence (see § 921.1(e));

(3) Assurance that the site's boundaries encompass an adequate portion of the key land and water areas of the natural system to approximate an ecological unit and to ensure effective conservation. Boundary size will vary greatly depending on the nature of the ecosystem. Research reserve boundaries must encompass the area within which adequate control has or will be established by the managing entity over human activities occurring within the reserve. Generally, reserve boundaries will encompass two areas: key land and water areas (or "core area") and a buffer zone. Key land and water areas and a buffer zone will likely require significantly different levels of control (see § 921.13(a)(7)). The term "key land and water areas" refers to that core area within the reserve that is so vital to the functioning of the estuarine ecosystem that it must be under a level of control sufficient to ensure the long-term viability of the reserve for research on natural processes. Key land and water areas, which comprise the core area, are those ecological units of a natural estuarine system which preserve, for research purposes, a full range of significant physical, chemical and biological factors contributing to the diversity of fauna, flora and natural processes occurring within the estuary. The determination of which land and water areas are "key" to a particular reserve must be based on specific scientific knowledge of the area. A basic principle to follow when deciding upon key land and water areas is that they should encompass resources representative of the total ecosystem, and which if compromised could endanger the research objectives of the reserve. The term "buffer zone" refers to an area adjacent to or surrounding key land and water areas and essential to their integrity. Buffer zones protect the core area and provide additional protection for estuarine-dependent species, including those that are rare or endangered. When determined appropriate by the state and approved by NOAA, the buffer zone may also include an area necessary for facilities required for research and interpretation. Additionally, buffer zones should be established sufficient to accommodate a shift of the core area as a result of biological, ecological or geomorphological change which reasonably could be expected to occur. National estuarine research reserves may include existing Federal or state lands already in a protected status where mutual benefit can be enhanced. However, NOAA will not approve a site for potential national estuarine research reserve status that is dependent primarily upon the inclusion of currently protected Federal lands in order to meet the requirements for research reserve status (such as key land and water areas). Such lands generally will be included within a research reserve to serve as a buffer or for other ancillary purposes;

(4) The site's suitability for long-term estuarine research, including ecological factors and proximity to existing research facilities and educational institutions;

(5) The site's compatibility with existing and potential land and water uses in contiguous areas as well as approved coastal and estuarine management plans; and

(6) The site's importance to education and interpretive efforts, consistent with the need for continued protection of the natural system.

(d) Early in the site selection process the state must seek the views of affected landowners, local governments, other state and Federal agencies and other parties who are interested in the area(s) being considered for selection as a potential national estuarine research reserve. After the local government(s) and affected landowner(s) have been contacted, at least one public meeting shall be held in the area of the proposed site. Notice of such a meeting, including the time, place, and relevant subject matter, shall be announced by the state through the area's principal news media at least 15 days prior to the date of the meeting and by NOAA in the Federal Register.

(e) A state request for NOAA approval of a proposed site (or sites in the case of a multi-site reserve) must contain a description of the proposed site in relationship to each of the site selection principles (§ 921.11(c)) and the following information:

(1) An analysis of the proposed site based on the biogeographical scheme/typology discussed in § 921.3 and set forth in appendices I and II to this part;

(2) A description of the proposed site and its major resources, including location, proposed boundaries, and adjacent land uses. Maps, including aerial photographs, are required;

(3) A description of the public participation process used by the state to solicit the views of interested parties, a summary of comments, and, if interstate issues are involved, documentation that the Governor(s) of the other affected state(s) has been contacted. Copies of all correspondence, including contact letters to all affected landowners must be appended;

(4) A list of all sites considered and a brief statement of the basis for not selecting the non-preferred sites; and

(5) A nomination of the proposed site(s) for designation as a National Estuarine Research Reserve by the Governor of the coastal state in which the area is located.

§ 921.12 Post site selection.

(a) At the time of the state's request for NOAA approval of a proposed site, the state may submit a request for up to $40,000 of the total $100,000 allowed for predesignation funds to develop the draft management plan and for the collection of the information necessary for preparation of the environmental impact statement. At this time, the state may also submit a request for the remainder of the predesignation funds for research necessary to complete a basic characterization of the physical, chemical and biological characteristics of the site approved by NOAA. The state's request for these post site selection funds must be accompanied by the information specified in subpart I of this part and, for draft management plan

development and environmental impact statement information collection, the following programmatic information:

(1) A draft management plan outline (see § 921.13(a) below); and

(2) An outline of a draft memorandum of understanding (MOU) between the state and NOAA detailing the Federal-state role in research reserve management during the initial period of Federal funding and expressing the state's long-term commitment to operate and manage the national estuarine research reserve.

(b) The state is eligible to use the funds referenced in § 921.12(a) after the proposed site is approved by NOAA under the terms of § 921.11.

§ 921.13 Management plan and environmental impact statement development.

(a) After NOAA approves the state's proposed site, the state may request to use additional predesignation funds for draft management plan development and the collection of information necessary for the preparation by NOAA of the environmental impact statement. The state shall develop a draft management plan, including an MOU. The plan will set out in detail:

(1) Research reserve goals and objectives, management issues, and strategies or actions for meeting the goals and objectives;

(2) An administrative section including staff roles in administration, research, education/interpretation, and surveillance and enforcement;

(3) A research plan, including a monitoring design;

(4) An education/interpretive plan;

(5) A plan for public access to the research reserve;

(6) A construction plan, including a proposed construction schedule, general descriptions of proposed developments and preliminary drawings, if appropriate. Information should be provided for proposed minor construction projects in sufficient detail to allow these projects to begin in the initial phase of acquisition and development. If a visitor center, research center or any other facilities are proposed for construction or renovation at the site, or restorative activities which require significant construction are planned, a detailed construction plan including preliminary cost estimates and architectural drawings must be prepared as a part of the final management plan; and

(7) An acquisition plan identifying the ecologically key land and water areas of the research reserve, ranking these areas according to their relative importance, and including a strategy for establishing adequate long-term state control over these areas sufficient to provide protection for reserve resources to ensure a stable environment for research. This plan must include an identification of ownership within the proposed research reserve boundaries, including land already in the public domain; the method(s) of acquisition which the state proposes to use—acquisition (including less-than-fee simple options) to establish adequate long-term state control; an estimate of the fair market value of any property interest—which is proposed for acquisition; a schedule estimating the time required to complete the process of establishing adequate state control of the proposed research reserve; and a discussion of any anticipated problems. In selecting a preferred method(s) for establishing adequate state control over areas within the proposed boundaries of the reserve, the state shall perform the following steps for each parcel determined to be part of the key land and water areas (control over which is necessary to protect the integrity of the reserve for research purposes), and for those parcels required for research and interpretive support facilities or buffer purposes:

(i) Determine, with appropriate justification, the minimum level of control(s) required (*e.g.*, management agreement, regulation, less-than-fee simple property interest (*e.g.*, conservation easement), fee simple property acquisition, or a combination of these approaches;

(ii) Identify the level of existing state control(s);

(iii) Identify the level of additional state control(s), if any, necessary to meet the minimum requirements identified in (a)(7)(i); of this section;

(iv) Examine all reasonable alternatives for attaining the level of control identified in (a)(7)(iii) of this section, and perform a cost analysis of each; and

(v) Rank, in order of cost, the methods (including acquisition) identified in paragraph (a)(7)(iv) of this section.

An assessment of the relative cost-effectiveness of control alternatives shall include a reasonable estimate of both short-term costs (*e.g.*, acquisition of property interests, regulatory program development including associated enforcement costs, negotiation, adjudication, etc.) and long-term costs (*e.g.*, monitoring, enforcement, adjudication, management and coordination). In selecting a preferred method(s) for establishing adequate state control over each parcel examined under the process described above, the state shall give priority consideration to the least costly method(s) of attaining the minimum level of long-term control required. Generally, with the possible exception of buffer areas required for support facilities, the level of control(s) required for buffer areas will be considerably less than that required for key land and water areas. This acquisition plan, after receiving the approval of NOAA, shall serve as a guide for negotiations with landowners. A final boundary for the reserve shall be delineated as a part of the final management plan;

(8) A resource protection plan detailing applicable authorities, including allowable uses, uses requiring a permit and permit requirements, any restrictions on use of the research reserve, and a strategy for research reserve surveillance and enforcement of such use restrictions, including appropriate government enforcement agencies;

(9) If applicable, a restoration plan describing those portions of the site that may require habitat modification to restore natural conditions;

(10) A proposed memorandum of understanding (MOU) between the state and NOAA regarding the Federal-state relationship during the establishment and development of the national estuarine research reserve, and expressing a long-term commitment by the state to maintain and manage the research reserve in accordance with section 315 of the Act 16 U.S.C. 1461, and applicable regulations. In conjunction with the MOU and where possible under state law, the state will consider taking appropriate administrative or legislative action to ensure the long-term protection and operation of the national estuarine research reserve. The MOU shall be signed prior to research reserve designation. If other MOUs are necessary (such as with a Federal agency or another state agency), drafts of such MOUs also must be included in the plan; and

(11) If the state has a federally approved coastal zone management program, documentation that the proposed national estuarine research reserve is consistent to the maximum extent practicable with that program. See § 921.4(b) and § 921.30(b).

(b) Regarding the preparation of an environmental impact statement (EIS) under the National Environmental Policy Act on a national estuarine research reserve proposal, the state shall provide all necessary information to NOAA concerning the socioeconomic and environmental impacts associated with

implementing the draft management plan and feasible alternatives to the plan. Based on this information, NOAA will prepare the draft EIS.

(c) Early in the development of the draft management plan and the draft EIS, the state shall hold a meeting in the area or areas most affected to solicit public and government comments on the significant issues related to the proposed action. NOAA will publish a notice of the meeting in the Federal Register 15 days prior to the meeting. The state shall be responsible for publishing a similar notice in the local media.

(d) NOAA will publish a Federal Register notice of intent to prepare a draft EIS. After the draft EIS is prepared and filed with the Environmental Protection Agency (EPA), a Notice of Availability of the DEIS will appear in the Federal Register. Not less than 30 days after publication of the notice, NOAA will hold at least one public hearing in the area or areas most affected by the proposed national estuarine research reserve. The hearing will be held no sooner than 15 days after appropriate notice of the meeting has been given in the principal news media and in the Federal Register by NOAA and the state, respectively. After a 45-day comment period, a final EIS will be prepared by NOAA.

Subpart C—Acquisition, Development, and Preparation of the Final Management Plan

§ 921.20 General.

The acquisition and development period is separated into two major phases. After NOAA approval of the site, draft management plan and draft MOU, and completion of the final EIS, a state is eligible for an initial acquisition and development award(s). In this initial phase, the state should work to meet the criteria required for formal research reserve designation; *e.g.*, establishing adequate state control over the key land and water areas as specified in the draft management plan and preparing the final management plan. These requirements are specified in § 921.30. Minor construction in accordance with the draft management plan may also be conducted during this initial phase. The initial acquisition and development phase is expected to last no longer than three years. If necessary, a longer time period may be negotiated between the state and NOAA. After research reserve designation, a state is eligible for a supplemental acquisition and development award(s) in accordance with § 921.31. In this post-designation acquisition and development phase, funds may be used in accordance with the final management plan to construct research and educational facilities, complete any remaining land acquisition, and for restorative activities identified in the final management plan. In any case, the amount of Federal financial assistance provided to a coastal state with respect to the acquisition of lands and waters, or interests therein, for any one national estuarine research reserve may not exceed an amount equal to 50 percent of the costs of the lands, waters, and interests therein or $4,000,000, whichever amount is less. The amount of Federal assistance for development and construction activities is $1,500,000.

§ 921.21 Initial acquisition and development awards.

(a) Assistance is provided to aid the recipient in:

(1) Acquiring a fee simple or less-than-fee simple real property interest in land and water areas to be included in the research reserve boundaries (see § 921.13(a)(7); § 921.30(d));

(2) Minor construction, as provided in paragraphs (b) and (c) of this section;

(3) Preparing the final management plan; and

(4) Up to the point of research reserve designation, initial management costs, *e.g.*, for implementing the NOAA approved draft management plan, preparing the final management plan, hiring a reserve manager and other staff as necessary and for other management-related activities. Application procedures are specified in subpart I of this part.

(b) The expenditure of Federal and state funds on major construction activities is not allowed during the initial acquisition and development phase. The preparation of architectural and engineering plans, including specifications, for any proposed construction, or for proposed restorative activities, is permitted. In addition, minor construction activities, consistent with paragraph (c) of this section also are allowed. The NOAA-approved draft management plan must, however, include a construction plan and a public access plan before any award funds can be spent on construction activities.

(c) Only minor construction activities that aid in implementing portions of the management plan (such as boat ramps and nature trails) are permitted during the initial acquisition and development phase. No more than five (5) percent of the initial acquisition and development award may be expended on such facilities. NOAA must make a specific determination, based on the final EIS, that the construction activity will not be detrimental to the environment.

(d) Except as specifically provided in paragraphs (a) through (c) of this section, construction projects, to be funded in whole or in part under an acquisition and development award(s), may not be initiated until the research reserve receives formal designation (see § 921.30). This requirement has been adopted to ensure that substantial progress in establishing adequate state control over key land and waters areas has been made and that a final management plan is completed before major sums are spent on construction. Once substantial progress in establishing adequate state control/acquisition has been made, as defined by the state in the management plan, other activities guided by the final management plan may begin with NOAA's approval.

(e) For any real property acquired in whole or part with Federal funds for the research reserve the state shall execute suitable title documents to include substantially the following provisions, or otherwise append the following provisions in a manner acceptable under applicable state law to the official land record(s):

(1) Title to the property conveyed by this deed shall vest in the [recipient of the award granted pursuant to section 315 of the Act, 16 U.S.C. 1461 or other NOAA approved state agency] subject to the condition that the designation of the [name of National Estuarine Reserve] is not withdrawn and the property remains part of the federally designated [name of National Estuarine Research Reserve].

(2) In the event that the property is no longer included as part of the research reserve, or if the designation of the research reserve of which it is part is withdrawn, then NOAA or its successor agency, after full and reasonable consultation with the State, may exercise the following rights regarding the disposition of the property:

(i) The recipient may retain title after paying the Federal Government an amount computed by applying the Federal percentage of participation in the cost of the original project to the current fair market value of the property;

(ii) If the recipient does not elect to retain title, the Federal Government may either direct the recipient to sell the property and pay the Federal Government an amount computed by applying the Federal percentage of participation in the cost of the original project to the proceeds from the sale (after deducting actual and reasonable

selling and repair or renovation expenses, if any, from the sale proceeds), or direct the recipient to transfer title to the Federal Government. If directed to transfer title to the Federal Government, the recipient shall be entitled to compensation computed by applying the recipient's percentage of participation in the cost of the original project to the current fair market value of the property;

(iii) Fair market value of the property must be determined by an independent appraiser and certified by a responsible official of the state, as provided by Department of Commerce Regulations in 15 CFR part 24, and Uniform Relocation Assistance and Real Property Acquisition for Federal and Federally assisted programs in 15 CFR part 11.

(f) Upon instruction by NOAA, provisions analogous to those of § 921.21(e) shall be included in the documentation underlying less-than-fee-simple interests acquired in whole or part with Federal funds.

(g) Federal funds or non-Federal matching share funds shall not be spent to acquire a real property interest in which the State will own the land concurrently with another entity unless the property interest has been identified as a part of an acquisition strategy pursuant to § 921.13(7) which has been approved by NOAA prior to the effective date of these regulations.

(h) Prior to submitting the final management plan to NOAA for review and approval, the state shall hold a public meeting to receive comment on the plan in the area affected by the estuarine research reserve. NOAA will publish a notice of the meeting in the Federal Register. The state shall be responsible for having a similar notice published in the local media.

Subpart D—Reserve Designation and Subsequent Operation

§ 921.30 Designation of National Estuarine Research Reserves.

(a) The Under Secretary may designate an area as a national estuarine research reserve pursuant to section 315 of the Act, if based on written findings the state has met the following requirements:

(1) The Governor of the coastal state in which the area is located has nominated the area for designation as a national estuarine research reserve;

(2) The area is a representative estuarine ecosystem that is suitable for long-term research and contributes to the biogeographical and typological balance of the System;

(3) Key land and water areas of the proposed research reserve, as identified in the management plan, are under adequate state control sufficient to provide long-term protection for reserve resources and to ensure a stable environment for research;

(4) Designation of the area as a reserve will serve to enhance public awareness and understanding of estuarine areas, and provide suitable opportunities for public education and interpretation;

(5) A final management plan has been approved by NOAA and contains the signed copy of the designation findings;

(6) An MOU has been signed between the state and NOAA ensuring a long-term commitment by the state to the effective operation and implementation of the national estuarine research reserve; and

(7) The coastal state in which the area is located has complied with the requirements of these regulations.

(b) NOAA will determine whether the designation of a national estuarine research reserve in a state with a federally approved coastal zone management program directly affects the coastal zone. If the designation is found to directly affect the coastal zone, NOAA will make a consistency determination pursuant to section 307(c)(1) of the Act, 16 U.S.C. 1456, and 15 CFR part 930, subpart C. See § 921.4(b). The results of this consistency determination will be published in the Federal Register when a notice of designation is published. See § 921.30(c).

(c) NOAA will cause a notice of designation of a national estuarine research reserve to be placed in the Federal Register. The state shall be responsible for having a similar notice published in the local media.

(d) The term "state control" in § 921.30(a)(3) does not necessarily require that key land and water areas be owned by the state in fee simple. Acquisition of less-than-fee-simple interests (*e.g.*, conservation easements) and utilization of existing State regulatory measures are encouraged where the state can demonstrate that these interests and measures assure adequate long-term State control consistent with the purposes of the research reserve (see also § 921.13(a)(7); § 921.21(g)). Should the state later elect to purchase an interest in such lands using NOAA funds, adequate justification as to the need for such acquisition must be provided to NOAA.

§ 921.31 Supplemental acquisition and development awards.

After national estuarine research reserve designation, and as specified in the approved management plan, the state may request a supplemental acquisition and/or development award(s) for acquiring additional property interests identified in the management plan as necessary to enhance long-term protection of the area for research and education, for facility construction, for restorative activities identified in the approved management plan, and for administrative purposes. The amount of Federal financial assistance provided for supplemental development costs directly associated with facility construction other than land acquisition (*i.e.*, major construction activities) for any one national estuarine research reserve may not exceed $1,500,000 and must be matched by the state on a 50/50 basis. Supplemental acquisition awards for the acquisition of lands or waters, or interests therein, for any one National Estuarine Reserve may not exceed an amount equal to 50 per centum of the cost of the lands, waters, and interests therein or $4,000,000 whichever amount is less. In the case of a biogeographic region (see Appendix I to this part) shared by two or more states, each state is eligible for Federal financial assistance to establish a national estuarine research reserve within their respective portion of the shared biogeographic region. Application procedures are specified in subpart I of this part. Land acquisition must follow the procedures specified in § 921.13(a)(7), § 921.21 (e) and (f) and § 921.81.

§ 921.32 Operation and management: Implementation of the management plan.

(a) After the national estuarine research reserve is formally designated, the state is eligible to receive Federal funds to assist the state in the operation and management of the research reserve. The purpose of this Federally funded operation and management phase is to implement the approved final management plan and to take the necessary steps to ensure the continued effective operation of the research reserve.

(b) State operation and management of national estuarine research reserves shall be consistent with the mission, and shall further the goals, of the National Estuarine Research Reserve System (see § 921.1).

(c) Federal funds of up to $70,000 per year, to be matched by the state on a 50/50 basis, are available for the operation and management of the national estuarine research reserve, including the establishment and operation of a basic environmental monitoring program. In the case of a biogeographic region (see appendix I to

this part) shared by two or more states, each state is eligible for Federal financial assistance to establish a national estuarine research reserve within their respective portion of the shared biogeographic region (see § 921.10).

(d) Operation and management funds are subject to the following limitations:

(1) No more than $70,000 in Federal funds may be expended in a twelve month award period (*i.e.*, Federal funds for operation and management may not be expended at a rate greater than $70,000 per year);

(2) No more than ten percent of the total amount (state and Federal shares) of each operation and management award may be used for construction-type activities (*i.e.*, $14,000 maximum per year).

§ 921.33 Boundary changes, amendments to the management plan, and addition of multiple-site components.

(a) Changes in research reserve boundaries and major changes to the final management plan, including state laws or regulations promulgated specifically for the research reserve, may be made only after written approval by NOAA. If determined to be necessary, NOAA may require public notice, including notice in the Federal Register and an opportunity for public comment. Changes in the boundaries of the research reserve involving the acquisition of properties not listed in the management plan or final EIS require public notice and the opportunity for comment; in certain cases, an environmental assessment and possibly, an environmental impact statement, may be required. Where public notice is required, NOAA will place a notice in the Federal Register of any proposed changes in research reserve boundaries or proposed major changes to the final management plan. The state shall be responsible for publishing an equivalent notice in the local media. See also requirements of § 921.4(b) and § 921.13(a)(11).

(b) As discussed in § 921.10(b), a state may choose to develop a multiple-site national estuarine research reserve after the initial acquisition and development award for a single site has been made. Public notice of the proposed addition will be placed by NOAA in the Federal Register. The state shall be responsible for publishing an equivalent notice in the local media. An opportunity for comment, in addition to the preparation of either an environmental assessment or environmental impact statement on the proposal, will also be required. An environmental impact statement, if required, shall be prepared in accordance with section § 921.13 and shall include an administrative framework for the multiple-site research reserve and a description of the complementary research and educational programs within the research reserve. If NOAA determines, based on the scope of the project and the issues associated with the additional site, that an environmental assessment is sufficient to establish a multiple-site research reserve, then the state shall develop a revised management plan which, concerning the additional component, incorporates each of the elements described in § 921.13(a). The revised management plan shall address goals and objectives for all components of the multi-site research reserve and the additional component's relationship to the original site(s).

Subpart E—Performance Evaluation and Withdrawal of Designation

§ 921.40 Evaluation of system performance.

(a) Following designation of a national estuarine research reserve pursuant to § 921.30, periodic performance evaluations shall be conducted concerning the operation and management of each national estuarine research reserve, including the research and monitoring being conducted within the reserve and education and interpretive activities. Evaluations may assess performance in all aspects of research reserve operation and management or may be limited in scope, focusing on selected issues of importance. Performance evaluations in assessing research reserve operation and management may also examine whether a research reserve is in compliance with the requirements of these regulations, particularly whether:

(1) The operation and management of the research reserve is consistent with and furthers the mission and goals of the National Estuarine Reserve Research System (see § 921.1); and

(2) A basis continues to exist to support any one or more of the findings made under § 921.30(a).

(b) Generally, performance will be evaluated at least every three years. More frequent evaluations may be scheduled as determined to be necessary by NOAA.

(c) Performance evaluations will be conducted by Federal officials. When determined to be necessary, Federal and non-Federal experts in natural resource management, estuarine research, interpretation or other aspects of national estuarine research reserve operation and management may be requested by NOAA to participate in performance evaluations. If other experts are to be included in the evaluation, NOAA will first ask the state to recommend appropriate individuals to serve in that capacity.

(d) Performance evaluations will be conducted in accordance with the procedural and public participation provisions of the CZMA regulations on review of performance at 15 CFR part 928 (*i.e.*, § 928.3(b) and § 928.4).

(e) To ensure effective Federal oversight of each research reserve within the National Estuarine Reserve Research System the state is required to submit an annual report on operation and management of the research reserve during the immediately preceding state fiscal year. This annual report must be submitted within a ninety day period following the end of the state fiscal year. The report shall detail program successes and accomplishments, referencing the research reserve management plan and, as appropriate, the work plan for the previous year. A work plan, detailing the projects and activities to be undertaken over the coming year to meet the goals and objectives of the research reserve as described in the management plan and the state's role in ongoing research reserve programs, shall also be included.

§ 921.41 Suspension of eligibility for financial assistance.

(a) If a performance evaluation under § 921.40 reveals that the operation and management of the research reserve is deficient, or that the research being conducted within the reserve is not consistent with the Estuarine Research Guidelines referenced in subpart F of this part, the eligibility of the research reserve for Federal financial assistance as described in these regulations may be suspended until the deficiency or inconsistency is remedied.

(b) NOAA will provide the state with a written notice of the deficiency or inconsistency. This notice will explain the finding, assess the Federal role in contributing to the problem, propose a solution or solutions, provide a schedule by which the state should remedy the deficiency or inconsistency, and state whether the state's eligibility for Federal financial assistance has been suspended in whole or part. In this notice the state shall also be advised that it may comment on this finding and meet with NOAA officials to discuss the results of the performance evaluation and seek to remedy the deficiency or inconsistency.

(c) Eligibility of a research reserve for financial assistance under these regulations shall be restored upon written notice by NOAA to the state

that the deficiency or inconsistency has been remedied.

(d) If, after a reasonable time, a state does not remedy a deficiency in the operation and management of a national estuarine research reserve which has been identified pursuant to a performance evaluation under § 921.40(a), such outstanding deficiency shall be considered a basis for withdrawal of designation (see § 921.42).

§ 921.42 Withdrawal of designation.

(a) Designation of an estuarine area as a national estuarine research reserve may be withdrawn if a performance evaluation conducted pursuant to § 921.40 reveals that:

(1) The basis for any one or more of the findings made under § 921.30(a) in designating the research reserve no longer exists;

(2) A substantial portion of the research conducted within the research reserve, over a period of years, has not been consistent with the Estuarine Research Guidelines referenced in subpart F of this part; or

(3) A state, after a reasonable time, has not remedied a deficiency in the operation and management of a research reserve identified pursuant to an earlier performance evaluation conducted under § 921.40.

(b) If a basis is found under § 921.42(a) for withdrawal of designation, NOAA will provide the state with a written notice of this finding. This notice will explain the basis for the finding, propose a solution or solutions and provide a schedule by which the state should correct the deficiency. In this notice, the state shall also be advised that it may comment on the finding and meet with NOAA officials to discuss the finding and seek to correct the deficiency.

(c) If, within a reasonable period of time, the deficiency is not corrected in a manner acceptable to NOAA, a notice of intent to withdraw designation, with an opportunity for comment, will be placed in the **Federal Register**.

(d) The state shall be provided the opportunity for an informal hearing before the Under Secretary to consider NOAA's finding of deficiency and intent to withdraw designation, as well as the state's comments on and response to NOAA's written notice pursuant to § 921.42(b) and **Federal Register** notice pursuant to § 921.42(c).

(e) Within 30 days after the informal hearing, the Under Secretary shall issue a written decision regarding the designation status of the national estuarine research reserve. If a decision is made to withdraw research reserve designation, the procedures specified in § 921.21(e) regarding the disposition of real property acquired in whole or part with Federal funds shall be followed.

(f) NOAA may not withdraw designation of a national estuarine research reserve if the performance evaluation reveals that the deficiencies in management of the site are a result of inadequate Federal financial support.

Subpart F—Research

§ 921.50 General.

(a) To stimulate high quality research within designated national estuarine research reserves, NOAA may provide financial support for research which is consistent with the Estuarine Research Guidelines referenced in § 921.51. Research awards may be awarded under this subpart to only those designated research reserves with approved final management plans with the following exception: NOAA may award research awards under this subpart to reserves without final management plans that have been designated prior to the effective date of these regulations; in the absence of an approved final management plan, however these reserves will be eligible for research awards during only the first two years after the effective date of these regulations. Although this research may be conducted within the immediate watershed of the research reserve, the majority of research activities of any single research project funded under this subpart must be conducted within reserve boundaries. Research funds are primarily used to support management-related research that will enhance scientific understanding of the research reserve ecosystem, provide information needed by reserve managers and coastal management decision-makers, and improve public awareness and understanding of estuarine ecosystems and estuarine management issues. Research projects may be oriented to specific research reserves; however, research projects that would benefit more than one research reserve in the National Estuarine Reserve Research System are encouraged.

(b) Federal research funds under this subpart are not intended as a source of continuous funding for a particular project over time. Research funds may be used to support start-up costs for long-term projects if an applicant can identify an alternative source of long-term research support.

(c) Research funds are available on a competitive basis to any coastal state or qualified public or private person. A notice of available funds will be published in the **Federal Register**. Research funds are provided in addition to any other funds available to a coastal state under the Act. Federal research funds provided under this subpart must be matched equally by the recipient, consistent with § 921.81(e)(4) ("allowable costs").

§ 921.51 Estuarine research guidelines.

(a) Research within the National Estuarine Reserve Research System shall be conducted in a manner consistent with Estuarine Research Guidelines developed by NOAA.

(b) A summary of the Estuarine Research Guidelines is published in the **Federal Register** as a part of the notice of available funds discussed in § 921.50(c).

(c) The Estuarine Research Guidelines are reviewed annually by NOAA. This review will include an opportunity for comment by the estuarine research community.

§ 921.52 Promotion and coordination of estuarine research.

(a) NOAA will promote and coordinate the use of the National Estuarine Reserve Research System for research purposes.

(b) NOAA will, in conducting or supporting estuarine research other than that authorized under section 315 of the Act, give priority consideration to research that uses the National Estuarine Reserve Research System.

(c) NOAA will consult with other Federal and state agencies to promote use of one or more research reserves within the National Estuarine Reserve Research System when such agencies conduct estuarine research.

Subpart G—Monitoring

§ 921.60 General.

(a) To provide a systematic basis for developing a high quality estuarine resource and ecosystem information base for national estuarine research reserves and, as a result, for the System, NOAA may provide financial support for monitoring programs. Monitoring funds are used to support three major phases of a monitoring program; studies necessary for comprehensive site description/characterization, development of a site profile, and implementation of a monitoring program.

(b) Monitoring funds are available on a competitive basis to the state agency responsible for reserve management or qualified public or private person or entity designated by the Reserve. However, if the applicant is other than the managing entity of a reserve research (coastal state), that applicant must submit as a part of the application

a letter from the reserve manager indicating formal support of the application by the managing entity of the reserve. Monitoring awards will be made on the basis of a five-year performance period; and with initial funding for a twelve (12) month period; and with annual supplemental funding contingent on performance and appropriations under the Act. Monitoring funds are provided in addition to any other funds available to a coastal state under the Act. Federal monitoring funds must be matched equally by the recipient, consistent with § 921.81(e)(4) ("allowable costs").

(c) Monitoring projects funded under this Subpart must focus on the resources within the boundaries of the research reserve and must be consistent with the applicable sections of the Estuarine Research Guidelines referenced in § 921.51. Portions of the project may occur within the immediate watershed of the Reserve beyond the site boundaries. However, the monitoring proposal must demonstrate why this is necessary for the success of the project.

Subpart H—Interpretation and Education

§ 921.70 General.

(a) To stimulate the development of innovative or creative interpretive and educational projects and materials to enhance public awareness and understanding of estuarine areas, NOAA may fund interpretive and educational activities. Interpretive and educational awards may be awarded under this subpart to only those designated research reserves with approved final management plans with the following exception: NOAA may award research awards under this subpart to reserves without final management plans that have been designated prior to the effective date of these regulations; in the absence of an approved final management plan, however these reserves will be eligible for research awards during only the first two years after the effective date of these regulations.

(b) Educational and interpretive funds are available on a competitive basis to any coastal state entity. However, if the applicant is other than the managing entity of a research reserve, that applicant must submit as a part of the application a letter from the reserve manager indicating formal support of the application by the managing entity of the reserve. These funds are provided in addition to any other funds available to a coastal state under the Act. Federal interpretation and educational funds must be matched equally by the recipient, consistent with § 921.81(e)(4) ("allowable costs").

§ 921.71 Categories of potential interpretive and educational projects; evaluation criteria.

(a) Proposals for interpretive or educational projects will be considered under the following categories:

(1) Design, development and distribution/placement of interpretive or educational media (*i.e.*, the development of tangible items, such as exhibits/displays, publications, posters, signs, audio/visuals, computer software and maps which have an educational or interpretive purpose; and techniques for making available or locating information concerning research reserve resources, activities, or issues);

(2) Development and presentation of curricula, workshops, lectures, seminars, and other structured programs or presentations for facility or field use;

(3) Extension/outreach programs; or

(4) Creative and innovative methods and technologies for implementing interpretive or educational projects.

(b) Interpretive and educational projects may be oriented to one or more research reserves or to the entire system. Those projects which would directly benefit more than one research reserve, and, if practicable, the entire National Estuarine Reserve Research System, shall receive priority consideration for funding.

(c) Proposals for interpretive and educational projects in national estuarine research reserves will be evaluated in accordance with criteria listed below:

(1) Educational or interpretive merits;

(2) Relevance or importance to reserve management or coastal decisionmaking;

(3) Educational quality (*e.g.*, soundness of approach, experience related to methodologies);

(4) Importance to the National Estuarine Reserve Research System;

(5) Budget and Institutional Capabilities (*e.g.*, reasonableness of budget, sufficiency of logistical support); and

(6) In addition, in the case of long-term projects, the ability of the state or the grant recipient to support the project beyond this initial funding.

Subpart I—General Financial Assistance Provisions

§ 921.80 Application information.

(a) Only a coastal state may apply for Federal financial assistance awards for preacquisition, acquisition and development, operation and management, and education and interpretation. Any coastal state or public or private person may apply for Federal financial assistance awards for estuarine research or monitoring. The announcement of opportunities to conduct research in the reserve system appears on an annual basis in the Federal Register. If a state is participating in the national Coastal Zone Management Program, the applicant for an award under section 315 of the Act shall notify the state coastal management agency regarding the application.

(b) An original and two copies of the formal application must be submitted at least 120 working days prior to the proposed beginning of the project to the following address: Office of Ocean and Coastal Resource Management, National Ocean Service, National Oceanic and Atmospheric Administration, Universal Building South, 1825 Connecticut Avenue, NW., Suite 714, Washington, DC 20235. The Application for Federal Assistance Standard Form 424 (Non-construction Program) constitutes the formal application for site selection, post-site selection, operation and management, research, and education and interpretive awards. The Application for Federal Financial Assistance Standard Form 424 (Construction Program) constitutes the formal application for land acquisition and development awards. The application must be accompanied by the information required in subpart B (predesignation) of this part, subpart C of this part and § 921.31 (acquisition and development), and § 921.32 (operation and management) as applicable. Applications for development awards for construction projects, or restorative activities involving construction, must include a preliminary engineering report. All applications must contain back up data for budget estimates (Federal and non-Federal shares), and evidence that the application complies with the Executive Order 12372, "Intergovernmental Review of Federal Programs." In addition, applications for acquisition and development awards must contain:

(1) State Historic Preservation Office comments;

(2) Written approval from NOAA of the draft management plan for initial acquisition and development award(s); and

(3) A preliminary engineering report for construction projects, or restorative activities involving construction.

§ 921.81 Allowable costs.

(a) Allowable costs will be determined in accordance with applicable OMB Circulars and guidance

for Federal financial assistance, the financial assistance agreement, these regulations, and other Department of Commerce and NOAA directives. The term "costs" applies to both the Federal and non-Federal shares.

(b) Costs claimed as charges to the award must be reasonable, beneficial and necessary for the proper and efficient administration of the financial assistance award and must be incurred during the award period.

(c) Costs must not be allocable to or included as a cost of any other Federally-financed program in either the current or a prior award period.

(d) General guidelines for the non-Federal share are contained in Department of Commerce Regulations at 15 CFR part 24 and OMB Circular A-110. Copies of Circular A-110 can be obtained from the Marine and Estuarine Management Division; 1825 Connecticut Avenue, NW., Suite 714; Washington DC 20235. The following may be used in satisfying the matching requirement:

(1) Site Selection and Post Site Selection Awards. Cash and in-kind contributions (value of goods and services directly benefiting and specifically identifiable to this part of the project) are allowable. Land may not be used as match.

(2) Acquisition and Development Awards. Cash and in-kind contributions are allowable. In general, the fair market value of lands to be included within the research reserve boundaries and acquired pursuant to the Act, with other than Federal funds, may be used as match. However, the fair market value of real property allowable as match is limited to the fair market value of a real property interest equivalent to, or required to attain, the level of control over such land(s) identified by the state and approved by the Federal Government as that necessary for the protection and management of the national estuarine research reserve. Appraisals must be performed accordin to Federal appraisal standards as detailed in Department of Commerce regulations at 15 CFR part 24 and the Uniform Relocation Assistance and Real Property Acquisition for Federal and Federally Assisted Programs in 15 CFR part 11. The fair market value of privately donated land, at the time of donation, as established by an independent appraiser and certified by a responsible official of the state (pursuant to 15 CFR part 24), may also be used as match. Land, including submerged lands already in the state's possession, may be used as match to establish a national estuarine research reserve. The value of match for these state lands will be calculated by determining the value of the benefits foregone by the state, in the use of the land, as a result of new restrictions that may be imposed by Reserve designation. The appraisal of the benefits foregone must be made by an independent appraiser in accordance with Federal appraisal standards pursuant to 15 CFR part 24 and 15 CFR part 11. A state may initially use as match land valued at greater than the Federal share of the acquisition and development award. The value in excess of the amount required as match for the initial award may be used to match subsequent supplemental acquisition and development awards for the national estuarine research reserve (see also § 921.20). Costs related to land acquisition, such as appraisals, legal fees and surveys, may also be used as match.

(3) Operation and Management Awards. Generally, cash and in kind contributions (directly benefiting and specifically identifiable to operations and management), except land, are allowable.

(4) Research, Monitoring, Education and Interpretive Awards. Cash and in-kind contributions (directly benefiting and specifically identifiable to the scope of work), except land, are allowable.

§ 921.82 Amendments to financial assistance awards.

Actions requiring an amendment to the financial assistance award, such as a request for additional Federal funds, revisions of the approved project budget or original scope of work, or extension of the performance period must be submitted to NOAA on Standard Form 424 and approved in writing.

Appendix I to Part 921—Biogeographic Classification Scheme

Acadian

1. Northern Gulf of Maine (Eastport to the Sheepscot River).
2. Southern Gulf of Maine (Sheepscot River to Cape Cod).

Virginian

3. Southern New England (Cape Cod to Sandy Hook).
4. Middle Atlantic (Sandy Hook to Cape Hatteras).
5. Chesapeake Bay.

Carolinian

6. Northern Carolinas (Cape Hatteras to Santee River).
7. South Atlantic (Santee River to St. John's River).
8. East Florida (St. John's River to Cape Canaveral).

West Indian

9. Caribbean (Cape Canaveral to Ft. Jefferson and south).
10. West Florida (Ft. Jefferson to Cedar Key).

Louisianian

11. Panhandle Coast (Cedar Key to Mobile Bay).
12. Mississippi Delta (Mobile Bay to Galveston).
13. Western Gulf (Galveston to Mexican border).

Californian

14. Southern California (Mexican Border to Point Concepcion).
15. Central California (Point Concepcion to Cape Mendocino).
16. San Francisco Bay.

Columbian

17. Middle Pacific (Cape Mendocino to the Columbia River).
18. Washington Coast (Columbia River to Vancouver Island).
19. Puget Sound.

Great Lakes

20. Western Lakes (Superior, Michigan, Huron).
21. Eastern Lakes (Ontario, Erie).

Fjord

22. Southern Alaska (Prince of Wales Island to Cook Inlet).
23. Aleutian Islands (Cook Inlet to Bristol Bay).

Sub-Arctic

24. Northern Alaska (Bristol Bay to Demarcation Point).

Insular

25. Hawaiian Islands.
26. Western Pacific Island.
27. Eastern Pacific Island.

Appendix II to Part 921—Typology of National Estuarine Research Reserves

This typology system reflects significant differences in estuarine characteristics that are not necessarily related to regional location. The purpose of this type of classification is to maximize ecosystem variety in the selection of national estuarine research reserves. Priority will be given to important ecosystem types as yet unrepresented in the reserve system. It should be noted that any one site may represent several ecosystem types or physical characteristics.

Class I—Ecosystem Types

Group I—Shorelands

A. *Maritime Forest-Woodland:* This type of ecosystem consists of single-stemmed species that have developed under the influence of salt spray. It can be found on coastal uplands or recent features, such as barrier islands and beaches, and may be divided into the following biomes:

1. *Northern Coniferous Forest Biome:* This is an area of predominantly evergreens such as the sitka spruce (Picea), grand fir (Abies), and white cedar (Thuja), with poor development of the shrub and herb layers, but high annual productivity and pronounced seasonal periodicity.

2. *Moist Temperate (Mesothermal) Coniferous Forest Biome:* Found along the west coast of North America from California to Alaska, this area is dominated by conifers, has a relatively small seasonal range, high humidity with rainfall ranging from 30 to 150 inches, and a well-developed understory of vegetation with an abundance of mosses and other moisture-tolerant plants.

3. *Temperate Deciduous Forest Biome:* This biome is characterized by abundant, evenly distributed rainfall, moderate temperatures which exhibit a distinct seasonal pattern, well-developed soil biota and herb and shrub layers, and numerous plants which produce pulpy fruits and nuts. A distant subdivision of this biome is the pine edaphic forest of the southeastern coastal plain, in which only a small portion of the area is occupied by climax vegetation, although it has large areas covered by edaphic climax pines.

4. *Broad-leaved Evergreen Subtropical Forest Biomes:* The main characteristic of this biome is high moisture with less pronounced differences between winter and summer. Examples are the hammocks of Florida and the live oak forests of the Gulf and South Atlantic coasts. Floral dominants include pines, magnolias, bays, hollies, wild tamarind, strangler fig, gumbo limbo, and palms.

B. *Coast Shrublands:* This is a transitional area between the coastal grasslands and woodlands and is characterized by woody species with multiple stems a few centimeters to several meters above the ground developing under the influence of salt spray and occasional sand burial. This includes thickets, scrub, scrub savanna, heathlands, and coastal chaparral. There is a great variety of shrubland vegetation exhibiting regional specificity:

1. *Northern Areas:* Characterized by Hudsonia, various ericaceous species, and thickets of Myrica, Prunus, and Rosa.
2. *Southeast Areas:* Floral dominants include Myrica, Baccharis, and Ilex.
3. *Western Areas:* Adenostoma, Arcotyphylos, and Eucalyptus are the dominant floral species.

C. *Coastal Grasslands:* This area, which possesses sand dunes and coastal flats, has low rainfall (10 to 30 inches per year) and large amounts of humus in the soil. Ecological succession is slow, resulting in the presence of a number of seral stages of community development. Dominant vegetation includes mid-grasses (2 to 4 feet tall), such as Ammophila, Agropyron, and Calamovilfa, tall grasses (5 to 8 feet tall), such as Spartina, and trees such as the willow (Salix sp.), cherry (Prunus sp.), and cottonwood (Populus deltoides). This area is divided into four regions with the following typical strand vegetation:

1. Arctic/Boreal: Elymus;
2. Northeast/West: Ammophila;
3. Southeast/Gulf: Uniola; and
4. Mid-Atlantic/Gulf: Spartina patens.

D. *Coastal Tundra:* This ecosystem, which is found along the Arctic and Boreal coasts of North America, is characterized by low temperatures, a short growing season, and some permafrost, producing a low, treeless mat community made up of mosses, lichens, heath, shrubs, grasses, sedges, rushes, and herbaceous and dwarf woody plants. Common species include arctic/alpine plants such as Empetrum nigrum and Betula nana, the lichens Cetraria and Cladonia, and herbaceous plants such as Potentilla tridentata and Rubus chamaemorus. Common species on the coastal beach ridges of the high arctic desert include Dryas integrifolia and Saxifrage oppositifolia. This area can be divided into two main subdivisions:

1. *Low Tundra:* characterized by a thick, spongy mat of living and undecayed vegetation, often with water and dotted with ponds when not frozen; and

2. *High Tundra:* a bare area except for a scanty growth of lichens and grasses, with underlying ice wedges forming raised polygonal areas.

E. *Coastal Cliffs:* This ecosystem is an important nesting site for many sea and shore birds. It consists of communities of herbaceous, graminoid, or low woody plants (shrubs, heath, etc.) on the top or along rocky faces exposed to salt spray. There is a diversity of plant species including mosses, lichens, liverworts, and "higher" plant representatives.

Group II—Transition Areas

A. *Coastal Marshes:* These are wetland areas dominated by grasses Poacea), sedges (Cyperaceae), rushes (Juncaceae), cattails (Typhaceae), and other graminoid species and is subject to periodic flooding by either salt or freshwater. This ecosystem may be subdivided into: (a) Tidal, which is periodically flooded by either salt or brackish water; (b) non-tidal (freshwater); or (c) tidal freshwater. These are essential habitats for many important estuarine species of fish and invertebrates as well as shorebirds and waterfowl and serves important roles in shore stabilization, flood control, water purification, and nutrient transport and storage.

B. *Coastal Swamps:* These are wet lowland areas that support mosses and shrubs together with large trees such as cypress or gum.

C. *Coastal Mangroves:* This ecosystem experiences regular flooding on either a daily, monthly, or seasonal basis, has low wave action, and is dominated by a variety of salt-tolerant trees, such as the red mangrove (Rhizophora mangle), black mangrove (Avicennia nitida), and the white mangrove (Laguncularia racemosa). It is also an important habitat for large populations of fish, invertebrates, and birds. This type of ecosystem can be found from central Florida to extreme south Texas to the islands of the Western Pacific.

D. *Intertidal Beaches:* This ecosystem has a distinct biota of microscopic animals, bacteria, and unicellular algae along with microscopic crustaceans, mollusks, and worms with a detritus-based nutrient cycle. This area also includes the driftline communities found at high tide levels on the beach. The dominant organisms in this ecosystem include crustaceans such as the mole crab (Emerita), amphipods (Gammaridae), ghost crabs (Ocypode), and bivalve molluscs such as the coquina (Donax) and surf clams (Spisula and Mactra).

E. *Intertidal Mud and Sand Flats:* These areas are composed of unconsolidated, high organic content sediments that function as a short-term storage area for nutrients and organic carbons. Macrophytes are nearly absent in this ecosystem, although it may be heavily colonized by benthic diatoms, dinoflagellates, filamentous blue-green and green algae, and chemosynthetic purple sulfur bacteria. This system may support a considerable population of gastropods, bivalves, and polychaetes, and may serve as a feeding area for a variety of fish and wading birds. In sand, the dominant fauna include the wedge shell Donax, the scallop Pecten, tellin shells Tellina, the heart urchin Echinocardium, the lug worm Arenicola, sand dollar Dendraster, and the sea pansy Renilla. In mud, faunal dominants adapted to low oxygen levels include the terebellid Amphitrite, the boring clam Playdon, the deep sea scallop Placopecten, the quahog Mercenaria, the echiurid worm Urechis, the mud snail Nassarius, and the sea cucumber Thyone.

F. *Intertidal Algal Beds:* These are hard substrates along the marine edge that are dominated by macroscopic algae, usually thalloid, but also filamentous or unicellular in growth form. This also includes the rocky coast tidepools that fall within the intertidal zone. Dominant fauna of these areas are barnacles, mussels, periwinkles, anemones, and chitons. Three regions are apparent:

1. *Northern Latitude Rocky Shores:* It is in this region that the community structure is best developed. The dominant algal species include Chondrus at the low tide level, Fucus and Ascophyllum at the mid-tidal level, and Laminaria and other kelplike algae just beyond the intertidal, although they can be exposed at extremely low tides or found in very deep tidepools.

2. *Southern Latitudes:* The communities in this region are reduced in comparison to those of the northern latitudes and possesses algae consisting mostly of single-celled or filamentous green, blue-green, and red algae, and small thalloid brown algae.

3. *Tropical and Subtropical Latitudes:* The intertidal in this region is very reduced and contains numerous calcareous algae such as Porolithon and Lithothamnion, as well as green algae with calcareous particles such as Halimeda, and numerous other green, red, and brown algae.

Group III—Submerged Bottoms

A. *Subtidal Hardbottoms:* This system is characterized by a consolidated layer of solid rock or large pieces of rock (neither of biotic origin) and is found in association with geomorphological features such as submarine canyons and fjords and is usually covered with assemblages of sponges, sea fans, bivalves, hard corals, tunicates, and other attached organisms. A significant feature of estuaries in many parts of the world is the oyster reef, a type of subtidal hardbottom. Composed of assemblages of organisms (usually bivalves), it is usually found near an estuary's mouth in a zone of moderate wave action, salt content, and turbidity. If light levels are sufficient, a covering of microscopic and attached macroscopic algae, such as kelp, may also be found.

B. *Subtidal Softbottoms:* Major characteristics of this ecosystem are an unconsolidated layer of fine particles of silt, sand, clay, and gravel, high hydrogen sulfide levels, and anaerobic conditions often existing below the surface. Macrophytes are either sparse or absent, although a layer of benthic microalgae may be present if light levels are sufficient. The faunal community is dominated by a diverse population of deposit feeders including polychaetes, bivalves, and burrowing crustaceans.

C. *Subtidal Plants:* This system is found in relatively shallow water (less than 8 to 10 meters) below mean low tide. It is an area of extremely high primary production that provides food and refuge for a diversity of faunal groups, especially juvenile and adult fish, and in some regions, manatees and sea turtles. Along the North Atlantic and Pacific coasts, the seagrass Zostera marina predominates. In the South Atlantic and Gulf coast areas, Thalassia and Diplanthera predominate. The grasses in both areas support a number of epiphytic organisms.

Class II—Physical Characteristics

Group I—Geologic

A. *Basin Type:* Coastal water basins occur in a variety of shapes, sizes, depths, and appearances. The eight basic types discussed below will cover most of the cases:

1. *Exposed Coast:* Solid rock formations or heavy sand deposits characterize exposed ocean shore fronts, which are subject to the full force of ocean storms. The sand beaches are very resilient, although the dunes lying just behind the beaches are fragile and easily damaged. The dunes serve as a sand storage area, making them chief stabilizers of the ocean shorefront.

2. *Sheltered Coast:* Sand or coral barriers, built up by natural forces, provide sheltered areas inside a bar or reef where the ecosystem takes on many characteristics of confined waters—abundant marine grasses, shellfish, and juvenile fish. Water movement is reduced, with the consequent effects of pollution being more severe in this area than in exposed coastal areas.

3. *Bay:* Bays are larger confined bodies of water that are open to the sea and receive strong tidal flow. When stratification is pronounced, the flushing action is augmented by river discharge. Bays vary in size and in type of shorefront.

4. *Embayment:* A confined coastal water body with narrow, restricted inlets and with a significant freshwater inflow can be classified as an embayment. These areas have more restricted inlets than bays, are usually smaller and shallower, have low tidal action, and are subject to sedimentation.

5. *Tidal River:* The lower reach of a coastal river is referred to as a tidal river. The coastal water segment extends from the sea or estuary into which the river discharges to a point as far upstream as there is significant salt content in the water, forming a salt front. A combination of tidal action and freshwater outflow makes tidal rivers well-flushed. The tidal river basin may be a simple channel or a complex of tributaries, small associated embayments marshfronts, tidal flats, and a variety of others.

6. *Lagoon:* Lagoons are confined coastal bodies of water with restricted inlets to the sea and without significant freshwater inflow. Water circulation is limited, resulting in a poorly flushed, relatively stagnant body of water. Sedimentation is rapid with a great potential for basin shoaling. Shores are often gently sloping and marshy.

7. *Perched Coastal Wetlands:* Unique to Pacific islands, this wetland type, found above sea level in volcanic crater remnants, forms as a result of poor drainage characteristics of the crater rather than from sedimentation. Floral assemblages exhibit distinct zonation while the faunal constituents may include freshwater, brackish, and/or marine species. Example: Aunu'u Island, American Samoa.

8. *Anchialine Systems:* These small coastal exposures of brackish water form in lava depressions or elevated fossil reefs, have only a subsurface connection to the ocean, but show tidal fluctuations. Differing from true estuaries in having no surface continuity with streams or ocean, this system is characterized by a distinct biotic community dominated by benthic algae such as Rhizoclonium, the mineral encrusting Schizothrix, and the vascular plant Ruppia maritima. Characteristic fauna, which exhibit a high degree of endemicity, include the mollusks Theodoxus neglectus and T. cariosus, the small red shrimp Metabetaeus lohena and Halocaridina rubra, and the fish Eleotris sandwicensis and Kuhlia sandvicensus. Although found throughout the world, the high islands of the Pacific are the only areas within the U.S. where this system can be found.

B. *Basin Structure:* Estuary Basins may result from the drowning of a river valley (coastal plains estuary), The drowning of a glacial valley (fjord), the occurrence of an offshore barrier (bar-bounded estuary), some tectonic process (tectonic estuary), or volcanic activity (volcanic estuary).

1. *Coastal plains estuary:* Where a drowned valley consists mainly of a single channel, the form of the basin is fairly regular, forming a simple coastal plains estuary. When a channel is flooded with numerous tributaries, an irregular estuary results. Many estuaries of the eastern United States are of this type.

2. *Fjord:* Estuaries that form in elongated, steep headlands that alternate with deep U-shaped valleys resulting from glacial scouring are called fjords. They generally possess rocky floors or very thin veneers of sediment, with deposition generally being restricted to the head where the main river enters. Compared to total fjord volume, river discharge is small. But many fjords have restricted tidal ranges at their mouths, due to sills, or upreaching sections of the bottom which limit free movement of water, often making river flow large with respect to the tidal prism. The deepest portions are in the upstream reaches, where maximum depths can range from 800 m to 1200 m, while sill depths usually range from 40 m to 150 m.

3. *Bar-bounded Estuary:* These result from the development of an offshore barrier, such as a beach strand, a line of barrier islands, reef formations, a line of moraine debris, or the subsiding remnants of a deltaic lobe. The basin is often partially exposed at low tide and is enclosed by a chain of offshore bars or barrier islands, broken at intervals by inlets. These bars may be either deposited offshore or may be coastal dunes that have become isolated by recent sea level rises.

4. *Tectonic Estuary:* These are coastal indentures that have formed through tectonic processes such as slippage along a fault line (San Francisco Bay), folding, or movement of the earth's bedrock, often with a large inflow of freshwater.

5. *Volcanic Estuary:* These coastal bodies of open water, a result of volcanic processes, are depressions or craters that have direct and/or subsurface connections with the ocean and may or may not have surface continuity with streams. These formations are unique to island areas of volcanic origin.

C. *Inlet Type:* Inlets in various forms are an integral part of the estuarine environment, as they regulate, to a certain extent, the velocity and magnitude of tidal exchange, the degree of mixing, and volume of discharge to the sea. There are four major types of inlets:

1. *Unrestricted:* An estuary with a wide unrestricted inlet typically has slow currents, no significant turbulence, and receive the full effect of ocean waves and local disturbances which serve to modify the shoreline. These estuaries are partially mixed, as the open mouth permits the incursion of marine waters to considerable distances upstream, depending on the tidal amplitude and stream gradient.

2. *Restricted:* Restrictions of estuaries can exist in many forms: bars, barrier islands, spits, sills, and more. Restricted inlets result in decreased circulation, more pronounced longitudinal and vertical salinity gradients, and more rapid sedimentation. However, if the estuary mouth is restricted by depositional features or land closures, the incoming tide may be held back until it suddenly breaks forth into the basin as a tidal wave, or bore. Such currents exert profound effects on the nature of the substrate, turbidity, and biota of the estuary.

3. *Permanent:* Permanent inlets are usually opposite the mouths of major rivers and permit river water to flow into the sea. Sedimentation and deposition are minimal.

4. *Temporary (Intermittent):* Temporary inlets are formed by storms and frequently shift position, depending on tidal flow, the depth of the sea and sound waters, the frequency of storms, and the amount of littoral transport.

D. *Bottom Composition:* The bottom composition of estuaries attests to the vigorous, rapid, and complex sedimentation processes characteristic of most coastal regions with low relief. Sediments are derived through the hydrologic processes of erosion, transport, and deposition carried on by the sea and the stream.

1. *Sand:* Near estuary mouths, where the predominating forces of the sea build spits or other depositional features, the shores and substrates of the estuary are sandy. The bottom sediments in this area are usually coarse, with a graduation toward finer particles in the head of the estuary. In the head region and other zones of reduced flow, fine silty sands are deposited. Sand deposition occurs only in wider or deeper regions where velocity is reduced.

2. *Mud:* At the base level of a stream near its mouth, the bottom is typically composed of loose muds, silt, and organic detritus as a result of erosion and transport from the upper stream reaches and organic decomposition. Just inside the estuary entrance, the bottom contains considerable quantities of sand and mud, which support a rich fauna. Mud flats, commonly built up in estuarine basins, are composed of loose, coarse, and fine mud and sand, often dividing the original channe..

3. *Rock:* Rocks usually occur in areas where the stream runs rapidly over a steep gradient with its coarse materials being derived from the higher elevations where the stream slope is greater. The larger fragments are usually found in shallow areas near the stream mouth.

4. *Oyster shell:* Throughout a major portion of the world, the oyster reef is one of the most significant features of estuaries, usually being found near the mouth of the estuary in a zone of moderate wave action, salt content, and turbidity. It is often a major factor in modifying estuarine current systems and sedimentation, and may occur as an elongated island or peninsula oriented across the main current, or may develop parallel to the direction of the current.

Group II—Hydrographic

A. *Circulation:* Circulation patterns are the result of the combined influences of freshwater flow, tidal action, wind and oceanic forces, and serve many functions: nutrient transport, plankton dispersal, ecosystem flushing, salinity control, water mixing, and more.

1. *Stratified:* This is typical of estuaries with a strong freshwater influx and is commonly found in bays formed from "drowned" river valleys, fjords, and other deep basins. There is a net movement of freshwater outward at the top layer and saltwater at the bottom layer, resulting in a net outward transport of surface organisms and net inward transport of bottom organisms.

2. *Non-stratified:* Estuaries of this type are found where water movement is sluggish and flushing rate is low, although there may be sufficient circulation to provide the basis for a high carrying capacity. This is common to shallow embayments and bays lacking a good supply of freshwater from land drainage.

3. *Lagoonal:* An estuary of this type is characterized by low rates of water movement resulting from a lack of significant freshwater influx and a lack of strong tidal exchange because of the typically narrow inlet connecting the lagoon to the sea. Circulation, whose major driving force is wind, is the major limiting factor in biological productivity within lagoons.

B. *Tides:* This is the most important ecological factor in an estuary, as it affects water exchange and its vertical range determines the extent of tidal flats which may be exposed and submerged with each tidal cycle. Tidal action against the volume of river water discharged into an estuary results in a complex system whose properties vary according to estuary structure as well as the magnitude of river flow and tidal range. Tides are usually described in terms of their cycle and their relative heights. In the United States, tide height is reckoned on the basis of average low tide, which is referred to as datum. The tides, although complex, falls into three main categories:

1. *Diurnal:* This refers to a daily change in water level that can be observed along the shoreline. There is one high tide and one low tide per day.

2. *Semidiurnal:* This refers to a twice daily rise and fall in water that can be observed along the shoreline.

3. *Wind/Storm Tides:* This refers to fluctuations in water elevation to wind and storm events, where influence of lunar tides is less.

C. *Freshwater:* According to nearly all the definitions advanced, it is inherent that all estuaries need freshwater, which is drained from the land and measurably dilutes seawater to create a brackish condition. Freshwater enters an estuary as runoff from the land either from a surface and/or subsurface source.

1. *Surface water:* This is water flowing over the ground in the form of streams. Local variation in runoff is dependent upon the nature of the soil (porosity and solubility), degree of surface slope, vegetational type and development, local climatic conditions, and volume and intensity of precipitation.

2. *Subsurface water:* This refers to the precipitation that has been absorbed by the soil and stored below the surface. The distribution of subsurface water depends on local climate, topography, and the porosity and permeability of the underlying soils and rocks. There are two main subtypes of surface water:

a. *Vadose water:* This is water in the soil above the water table. Its volume with respect to the soil, is subject to considerable fluctuation.

b. *Groundwater:* This is water contained in the rocks below the water table, is usually of more uniform volume than vadose water, and generally follows the topographic relief of the land, being high below hills and sloping into valleys.

Group III—Chemical

A. *Salinity:* This reflects a complex mixture of salts, the most abundant being sodium chloride, and is a very critical factor in the distribution and maintenance of many estuarine organisms. Based on salinity, there are two basic estuarine types and eight different salinity zones (expressed in parts per thousand—ppt).

1. *Positive estuary:* This is an estuary in which the freshwater influx is sufficient to maintain mixing, resulting in a pattern of increasing salinity toward the estuary mouth. It is characterized by low oxygen concentration in the deeper waters and considerable organic content in bottom sediments.

2. *Negative estuary:* This is found in particularly arid regions, where estuary evaporation may exceed freshwater inflow, resulting in increased salinity in the upper part of the basin, especially if the estuary mouth is restricted so that tidal flow is inhibited. These are typically very salty (hyperhaline), moderately oxygenated at depth, and possess bottom sediments that are poor in organic content.

3. *Salinity zones (expressed in ppt):*

a. Hyperhaline—greater than 40 ppt.

b. Euhaline—40 ppt to 30 ppt.

c. Mixohaline: 30 ppt to 0.5 ppt.

(1) Mixoeuhaline—greater than 30 ppt but less than the adjacent euhaline sea.

(2) Polyhaline—30 ppt to 18 ppt.

(3) Mesohaline—18 ppt to 5 ppt.

(4) Oligohaline—5 ppt to 0.5 ppt.

d. Limnetic: Less than 0.5 ppt.

B. pH Regime: This is indicative of the mineral richness of estuarine waters and fall into three main categories:

1. Acid: Waters with a pH of less than 5.5.

2. Circumneutral: A condition where the pH ranges from 5.5 to 7.4.

3. Alkaline: Waters with a pH greater than 7.4.

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BILLING CODE 3510-08-M

APPENDIX D

Biogeographic Classification and Typology

Appendix D

Biogeographic Classification and Typology

Biogeographic Classification

Carolinian Region
- 6. Northern Carolinas

Typology

Class I - Ecosystem Types

- Group I - Shorelands
  - A. Maritime Forest-Woodland
    - 3. Temperate Deciduous Forest Biome
  - B. Coast Shrublands
    - 2. Southeast Areas
  - C. Coastal Grasslands
    - 3. Southeast/Gulf

- Groups II
  - A. Coastal Marshes
  - D. Intertidal Beaches
  - E. Intertidal Mud and Sand Flats
  - F. Intertidal Algal Beds

- Group III
  - A. Subtidal Hardbottoms
  - B. Subtidal Softbottoms
  - C. Subtidal Plants

Class II

- Group I - Geologic
  - A. Basin
    - 2. Sheltered Coast
    - 3. Bay
    - 5. Tidal River
  - B. Basin Structure

1. Coastal plains estuary
3. Bar-bounded estuary

C. Inlet Type
2. Restricted
3. Permanent

D. Bottom Composition
1. Sand
2. Mud
4. Oyster shell

Group II - Hydrographic

A. Circulation
2. Non-stratified

B. Tides
2. Semidiurnal

C. Freshwater
1. Surface water
2. Subsurface water

Group III

A. Salinity
1. Positive Estuary
3. Salinity Zones
c. Mixohaline
(1) Mixoeuhaline
(2) Polyhaline

B. pH Regime
2. Circumneutral

APPENDIX E

Species List

Appendix E

Species List

Over the past 25 years, extensive work on the systematics of the biota of the NI/WB NERR has been carried out, resulting in a number of papers published in various scientific journal. In addition, lists and description of the biota are to be found in the books listed below. Because of the extensive number of species found in this site, we have not listed them here but refer you to these references.

An Annotated Checklist of the Biota of the Coastal Zone of South Carolina by Richard G. Zingmark. 1978. 364 pp. University of South Carolina Press, Columbia.

Seashore Animals of the Southeast by Edward E. Ruppert and Richard S. Fox. 1988. 429 pp. University of South Carolina Press, Columbia.

Shallow-Water Marine Benthic Macroinvertebrates of South Carolina: Species Identification, Community Composition and Symbiotic Associations by Richard S. Fox and Edward E. Ruppert. 1985. 330 pp. University of South Carolina Press, Columbia.

The following is a list of the number of species in the major taxonomic categories.

TAXONOMIC GROUPING	NUMBER OF SPECIES
Mammals (including marine)	74
Phytoplankton	832
Benthic Marine Algae	358
Marine Fungi	14
Vascular Plants	1494
Saltmarsh Vascular Plants	66
Porifera	26
Cnidaria	123
Ctenophora	5
Rhynchocoela	15
Gastrotricha	26
Kinorhynca	5
Nematoda	139
Polychaeta	279
Hirudinea	23
Marine Mollusks	385
Chelicerata	8
Copepoda	68
Cirripedia	27

Amphipoda	152
Isopoda	76
Mysidacea	3
Decapoda	272
Tardigrada	4
Phoronida	6
Bryozoa	42
Entoprata	8
Echinodermata	21
Chaetognatha	12
Hemichordata	2
Chondrichthyes	36
Osteichthyes	344
Turtles	3
Birds	430

APPENDIX F

Ecosystems

Appendix F

Ecosystems

Based on the NERRS classification categories, the NI/WB NERR represents a diverse number of ecosystem types. Over the 22 years that the Baruch Institute has been functioning, over 875 papers have been published by Baruch Associates and many of these papers represent studies on some aspect of the NI/WB NERR site. These studies range from the ecosystem level of organization to molecular studies. A few examples of ecological models of the Reserve are represented in Figures 7, 8, and 9. The principal types of ecosystems represented in the Reserve are listed below along with a brief description.

Coastal Marshes

Wetland areas dominated by grasses (especially Spartina), sedges, rushes, cattails, and other species. These areas are subjected to semidiurnal tides. This is a dominant ecosystem on the Reserve. High salinity and low salinity marshes occur. This is an important habitat for estuarine and marine species. Salt marshes have an extremely high rate of primary productivity. Carbon produced by Spartina is highly important in the trophic dynamics of estuaries and coastal waters.

Intertidal Systems

Various types of intertidal communities are represented in the Reserve, including beaches, mud and sand flats, algal beds, and attached vegetation. Many species are restricted to a specific type of intertidal habitat. This is a dynamic area which is subjected to tidal changes, marked differences in oxygen content, fluctuating thermal regimes, and predation pressures.
Organisms living in these intertidal systems exhibit a wide range of morphological, physiological, behavioral, and genetic adaptations.

Submerged Bottoms

A gradient of bottom types ranging from mud to sand to shelly substratum is represented in the Reserve. Different biotic assemblages are associated with each type. In addition to these substrata, a submerged vegetation ecosystem is also present.

Upland Systems

Coastal grasslands and a limited amount of pine edaphic forest are also included in the Reserve. A number of small islands are located within the boundary of the Reserve. One of these islands, Pumpkinseed Island, is one of the best known nesting sites for coastal birds in the southeast.

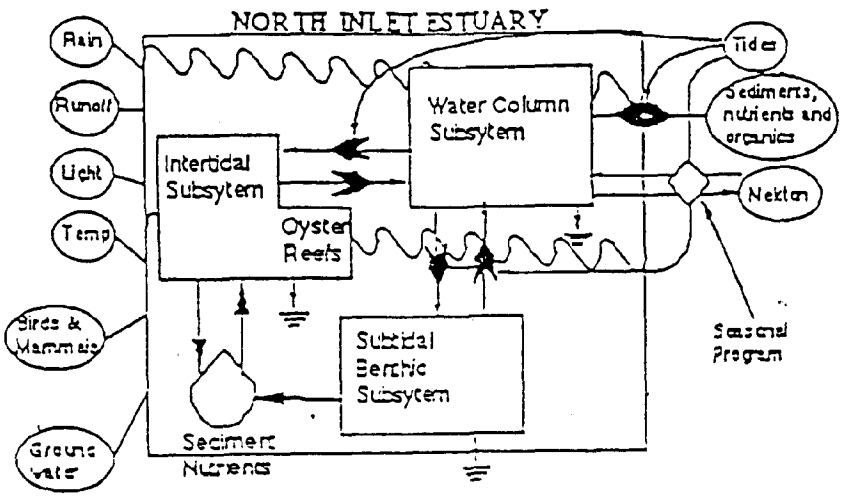


Figure 6. The original North Inlet ecosystem model (Summers and McKellar 1979). This model divides North Inlet into three major subsystems and is still a valid conceptualization. Future enhancements will subdivide this system further by focusing on sediment dynamics, subtidal interactions and plant/animal interactions across subsystems.

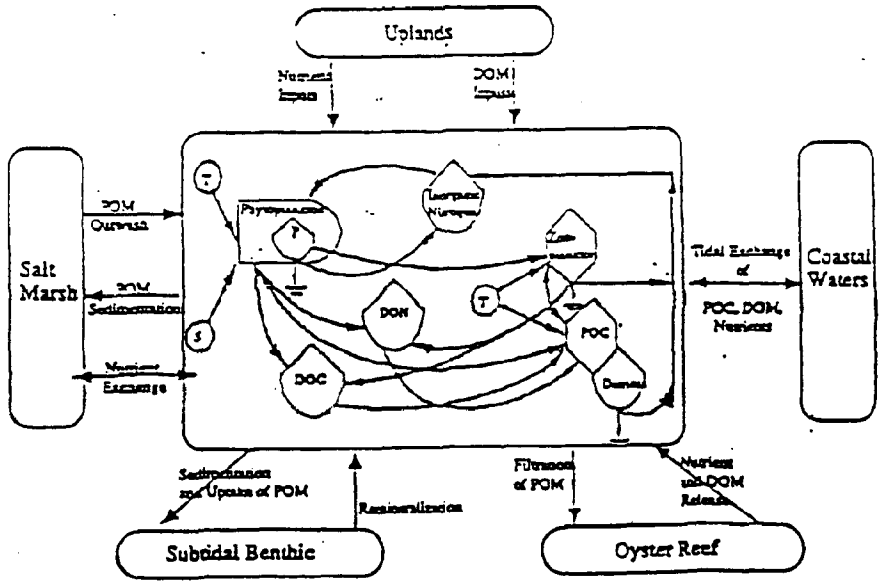


Figure 7. The dynamics of nitrogen and carbon exchange within the tidal creeks of North Inlet were simulated with this model by Childers and McKellar (1987). This model addressed the importance of tidal exchange. Future modeling will emphasize internal exchanges such as, the effects of subtidal remineralization on water column nutrient concentrations and export to marsh and coastal habitats.

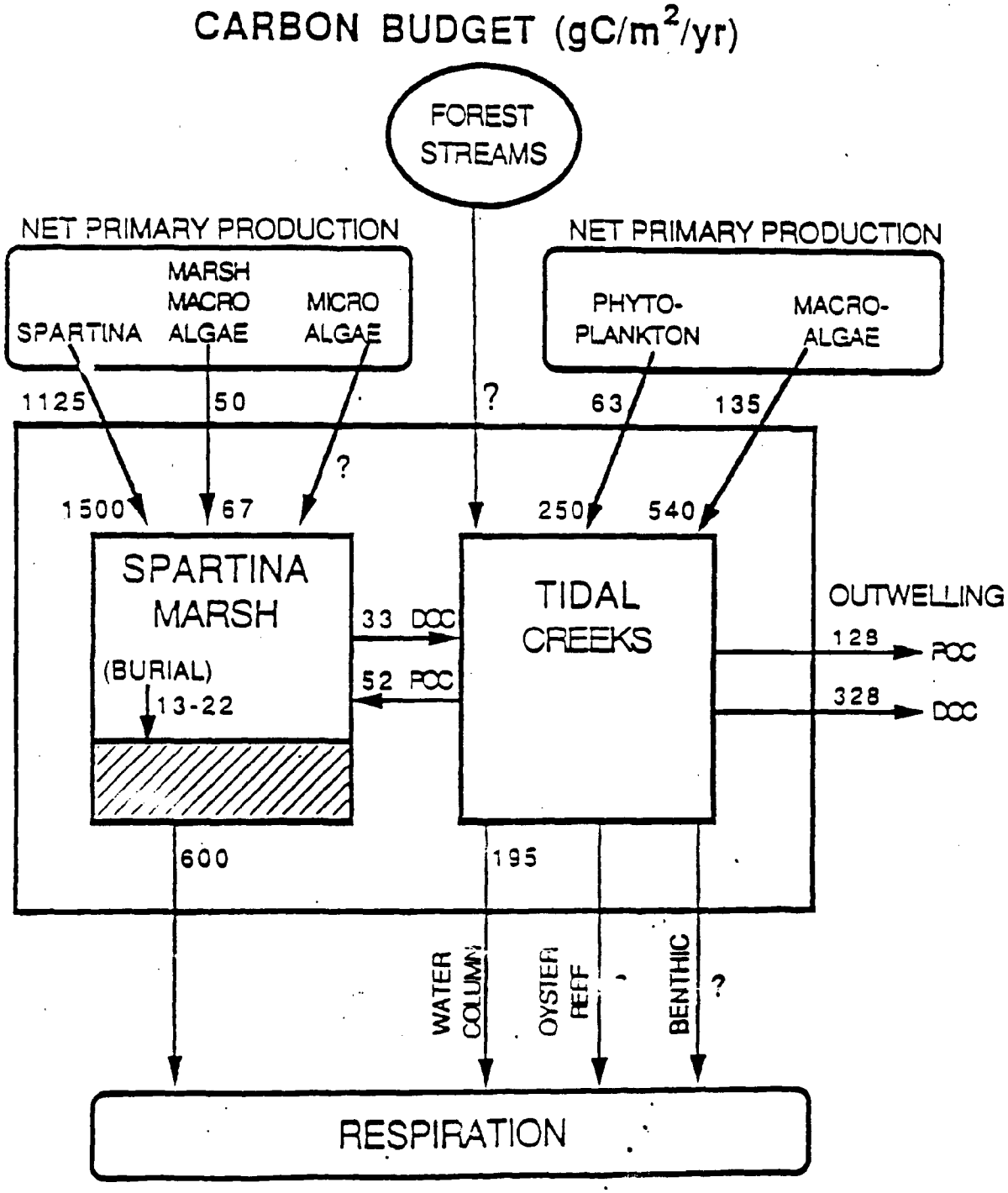


Figure 8. A carbon budget of the North Inlet estuarine system. Values on the outer box are area weighted for the entire marsh-estuarine system. Values on the inner boxes are area weighted for habitat area (i.e., marsh and water column).

APPENDIX G

Nomination Letter

Appendix G.

State of South Carolina

Office of the Governor

CARROLL A. CAMPBELL, JR.
GOVERNOR

POST OFFICE BOX 11369
COLUMBIA 29211

January 24, 1990

Mr. John Knauss
Under Secretary of Oceans and
Atmosphere
National Oceanic and Atmospheric
Administration
Herbert C. Hoover Building, Room 5128
14th and Constitution Ave., NW
Washington, D. C. 20230

Dear Secretary Knauss:

On behalf of the State of South Carolina, I am pleased to submit the attached site nominations and applications for preacquisition assistance for the North Inlet - Winyah Bay National Estuarine Reserve Research System (NERRS) and the Ashepoo - Combahee-Edisto (ACE) Basin National Reserve Research System.

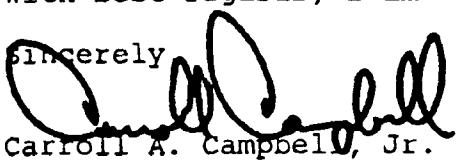
Because these two sites represent different biogeographic classification categories, the State of South Carolina is recommending the sites be managed independently. It is my understanding the State of South Carolina is eligible for up to $50,000 in matching funds for each of the two sites based on proposed changes to your funding regulations.

This effort is the result of a large number of dedicated individuals and organizations from both the private and public sector working together toward common goals. I have personally visited both the North Inlet - Winyah Bay site and ACE site and find them to be of unequaled value due to their pristine quality and diverse and abundant assemblage of natural habitat. The sites should make a significant contribution to the National Estuarine Reserve Research System.

I look forward to your favorable review of this application.

With best regards, I am

Sincerely,



Carroll A. Campbell, Jr.
Governor

CACjr/tad

Attachment

APPENDIX H

NOAA Approval of Nomination

Appendix H.

UNITED STATES DEPARTMENT OF COMMERCE
The Under Secretary for
Oceans and Atmosphere
Washington, D.C. 20230

MAR 27 1990

Honorable Carroll A. Campbell, Jr.
Governor of South Carolina
Columbia, South Carolina 29211

Dear Governor Campbell:

The National Oceanic and Atmospheric Administration (NOAA) has reviewed and approves the proposal to nominate the North Inlet-Winyah Bay and the Ashepoo-Combahee-Edisto (ACE) Basin for inclusion in the National Estuarine Reserve Research System (NERRS). We commend the South Carolina Coastal Council, South Carolina Wildlife and Marine Resources Department and the Belle W. Baruch Institute for Marine Biology and Coastal Resources for developing an excellent nomination report that responds accurately and substantially to each of the review criteria established in the National Estuarine Reserve Research System regulations.

NOAA and South Carolina agree that because the two sites represent different biogeographical classification categories, as identified in the NERRS regulations (Section 921.3), each site will be managed independently. Therefore, each site will be eligible for full Federal funding identified in the regulations.

Included within the site nomination package is an application for Federal assistance to prepare a draft management plan and draft environmental impact statement. NOAA's Marine and Estuarine Management Division is reviewing the application and will work closely with the South Carolina Coastal Council to ensure that the review is conducted in an expeditious and through manner.

I look forward to continued progress in the development of the ACE Basin National Estuarine Research Reserve and the North Inlet-Winyah Bay National Estuarine Research Reserve.

Sincerely,

John A. Knauss

THE ADMINISTRATOR

APPENDIX I

Public Education Program - Summary of 1990 Activities

Appendix I.

Public Education Program
Summary of 1990 Activities

The diverse Public Education Program offered through the Belle W. Baruch Foundation's Bellefield Nature Center and the Continuing Education Program of the Baruch Institute, University of South Carolina provides many valuable services to the Georgetown community and the State of South Carolina:

1. In 1990, a record number of 35,000 people were served by the education programs sponsored by the Belle W. Baruch Foundation and the Baruch Institute, University of South Carolina.

2. The effects of Hurricane Hugo on programs were still observed in 1990. Visitation to the Bellefield Nature Center and attendance in some programs were down over 1989, primarily as a result of the depressed tourism economy inflicted by the hurricane. Even so, the Nature Center had 15,445 visitors during 1990 and more than 100 people visited the Center on peak days during the summer months.

3. More than 2,900 school children from around the state participated in field studies of salt marsh, pond and forest ecosystems conducted on the Baruch Foundation's property, Hobcaw Barony, in 1990. This figure is the highest recorded since the Nature Center opened in 1982.

4. More than 2,100 children from Georgetown County schools were served by Nature Center's 1990 Outreach Program.

5. Outreach activities also extended to local civic organizations. Programs were presented to over 220 people at their meetings and another 12,000 people were reached through staff members' participation in community events.

6. The education program has gained statewide recognition for its excellence in teacher education in the area of marine science. During 1990, 46 teachers from Williamsburg and Georgetown Counties participated in graduate level marine science courses at Hobcaw Barony. Another 150 teachers participated in workshops presented by Nature Center staff members.

Table 1

Public Tours of Hobcaw Barony
1990

Date	Group	Numbers
Thursdays	General Tour - Open to the public	611
1-16	Brunswick Bird Club	13
3-6	John Wesley Methodist Church	14
3-13	Charleston Christian Family	9
3-23	McKissick Museum	14
4-17	Sumter Conservation District	8
5-1	Sumter Conservation District	13
5-8	Tilly Swamp Baptist Church	12
5-11	SC Maps Teachers	40
5-22	St. Lukes Lutheran Church	14
8-31	Extra-General Tour	14
9-7	Extra-General Tour	14
9-11	Extra-General Tour	13
9-18	Newcomers Club	14
9-25	Extra-General Tour	13
9-29	Discovery Place	35
10-30	Watercolors Workshop	14
11-6	Watercolors Workshop	14
11-20	Sea Mist Resort	14
	Total	893

Table 2

Field Studies at the Bellefield Nature Center
1990

Date	Group	Program	No.
1-8	Manning Middle School	Plantation Heritage	12
2-6	Happy Time Pre-School	Exploring The Nature Center	48
2-26	Waccamaw Elementary - Pawleys Is	Plantation Heritage	25
3-1	Socastee Elementary School	Exploring A Pond Community	28
3-2	Socastee High School	Salt Marsh Ecology	17
3-6	Waccamaw Elementary - Conway	Salt Marsh Ecology	31
3-7	Waccamaw Elementary - Pawleys Is	Plantation Heritage	30
3-9	St. Andrews Catholic School	Plantation Heritage	24
3-10	Girl Scouts, Myrtle Beach	Exploring The Nature Center	20
3-16	Maryville Elementary School	Plantation Heritage	31
3-16	Headstart	Exploring The Nature Center	67
3-20	Maryville Elementary School	Coastal Forest Ecology	29
3-21	Bamberg District #1	Coastal Forest Ecology	16
3-21	Pawleys Island Montessori	Exploring The Nature Center	10
3-22	Andrews Primary	Exploring A Pond Community	24
3-23	Myrtle Beach High School	Coastal Forest Ecology	11
3-28	Waccamaw Elementary - Pawleys Is	Plantation Heritage	30
3-27	McDonald Elementary School	Life In a Forest	26
3-30	Andrews Academy	Exploring A Pond Community	32
3-30	Ferrum College	Careers in Outdoors Ed.	29
3-30	Cub Scouts, Pack 346, Gtwn.	Exploring The Nature Center	12
4-10	Charleston Day School	Exploring A Pond Community	25
4-11	Waccamaw Academy	Coastal Forest Ecology	13
4-12	Charleston Day School	Life In A Forest	30
4-13	Heritage Friendship	Life In A Forest	10
4-17	Waccamaw Elementary - Pawleys Is.	Exploring A Pond Community	29
4-18	Andrews Academy	Life In A Forest	13
4-19	Kensington Elementary School	Exploring A Pond Community	29
4-19	Florence School District #3	Exploring The Nature Center	24

4-20	Waccamaw Elementary - Conway	Exploring A Pond Community	28
4-24	Archibald Rutledge Academy	Exploring A Pond Community	19
4-25	Waccamaw Elementary - Pawleys Is.	Exploring A Pond Community	30
4-26	Waccamaw Elementary - Pawleys Is.	Exploring A Pond Community	30
4-27	Greenwood Elementary	Exploring The Nature Center	62
4-27	Andrews Academy	Coastal Forest Ecology	19
5-1	Deep Creek Elementary Sch.	Exploring The Nature Center	55
5-2	Fleming Middle School	Exploring A Pond Community	55
5-3	Andrews Primary	Exploring A Pond Community	24
5-3	Saluda Elementary	Exploring The Nature Center	25
5-8	Sullivan's Island Elementary	Exploring A Pond Community	27
5-9	Kensington Elementary	Exploring A Pond Community	26
5-11	McDonald Elementary	Exploring The Nature Center	23
5-15	Myrtle Beach Primary	Exploring A Pond Community	23
5-16	Heathwood Hall	Plantation Archeology	64
5-17	Maryville Elementary	Exploring A Pond Community	25
5-21	Kingstree Jr. High School	Exploring The Nature Center	35
5-22	Conway Middle School	Coastal Forest Ecology	21
5-25	Kingstree Jr. High School	Exploring The Nature Center	40
5-25	St.Andrews Catholic School	Coastal Forest Ecology	18
5-28	St. James- Santee Elementary School	Exploring The Nature Center	40
5-30	Conway Christian School	Pond Community/Forest Ecol	35
6-5	Adventure Camp (GC Rec. Dept)	Exploring A Pond Community	27
6/5 -	Lou The Loggerhead Club	Beach Creatures, Reptiles	107
8/21	(Waccamaw House Camp)	Alive, & Backbone	
6-20	Clemson Univ. Graduate School	Belle's Legacy & BNC	14
6-21	USC Coastal Carolina Jr. Scholars	Belle's Legacy & BNC	39
6-25	Chapin Memorial Library	Exploring A Pond Community	33
6-29	Bright Beginnings Day Care	Exploring The Nature Center	18
6-29	L.G. Bahai Institute	Exploring The Nature Center	16
7-31	Marion County Elementary Teachers	Exploring A Pond Community	19
8-1	USC - Coastal Carolina Env. Ed. Class	Salt Marsh Ecology	13
8-11	L.G. Bahai Institute	Exploring The Nature Center	23
9-26	Waccamaw Elementary - Pawleys Is.	Exploring The Nature Center	40
9-26	Waccamaw Elementary - Pawleys Is.	Exploring The Nature Center	30
9-27	Waccamaw Elementary - Pawleys Is.	Salt Marsh Discovery	25

9-29	Parents For the Academ. Gifted	Rocky Intertidal Zone	37
10-3	Mc Donald Elementary School	Exploring A Pond Community	25
10-4	Andrews Primary	Exploring A Pond Community	23
10-5	Archibald Rutledge Academy	Plantation Archeology	17
10-9	Archibald Rutledge Academy	Plantation Archeology	26
10-10	Maryville Elementary	Plantation Archeology	24
10-11	West Conway Middle School	Salt Marsh Ecology	22
10-16	Byrnes Academy	Exploring The Nature Center	10
10-16	Happy Times School	Exploring The Nature Center	51
10-17	Kingstree Jr. High	Salt Marsh Discovery	25
10-23	Waccamaw Elementary - Pawleys Is.	Life In A Forest	26
10-24	Charleston Day School	Exploring A Pond Community	27
10-25	Forestbrook Elementary	Plantation Heritage	25
10-30	Myrtle Beach High School	Salt Marsh Ecology	32
10-31	Leesville High School	Salt Marsh Ecology	12
11-1	Waccamaw Elementary - Pawleys Is.	Exploring A Pond Community	24
11-2	Southside Middle School	Plantation Archeology	15
11-6	Chabad Academy	Life In A Forest	30
11-7	Waccamaw Elementary - Conway	Plantation Heritage	27
11-7	Byrnes Academy	Plantation Heritage	15
11-8	Browns Ferry Elementary	Exploring The Nature Center	65
11-8	C.E. Murray	Plantation Archeology	8
11-9	Andrews Academy	Salt Marsh Ecology	21
11-9	Archibald Rutledge Academy	Salt Marsh Ecology	18
11-13	Lake City Elementary	Salt Marsh Ecology	31
11-15	Pawleys Island Montessori	Salt Marsh Discovery	8
11-16	Jonakin Middle School	Coastal Forest Ecology	28
11-20	Beck Middle School	Plantation Archeology	14
11-21	Maryville Elementary School	Plantation Archeology	27
11-27	Lake City Elementary	Salt Marsh Ecology	31
11-28	St. Andrews	Salt Marsh Discovery	18
11-28	Lake City Elementary	Exploring The Nature Center	21
11-29	Waccamaw Elementary - Pawleys Is.	Life In A Forest	25
11-29	Lake City Elementary	Exploring The Nature Center	18
12-4	Woodland Park School	Life In A Forest	28
11-5	Waccamaw Elementary - Conway	Exploring A Pond Community	30

11-5	Woodland Park School	Life In A Forest	28
12-6	Rosemary Elementary	Exploring The Nature Center	61
12-7	Archibald Rutledge Academy	Coastal Forest Ecology	24
12-7	Woodland Park School	Life In A Forest	25
12-12	Williamsburg Academy	Exploring A Pond Community	35
12-14	Myrtle Beach High School	Salt Marsh Ecology	27
		Total	2937

Table 3

Special Programs At The Bellefield Nature Center
1990

Date	Program	Number
1/28-2/2	Ecology and History of the SC Lowcountry	29
2-13	Bluebird Houses	8
4-25	Springtime In The Salt Marsh	14
4-28	Hidden Heroes of the Salt Marsh	21
5-16	Gyotaku	25
5-20	Hidden Heroes of the Salt Marsh	20
5-30	Beach Night Life	25
6-19	Nature Walk In The Hobcaw Forest	3
6-20	Reptiles Alive	51
6-26	Nature Walk In The Hobcaw Forest	2
6-27	Beach Creatures	53
6-28	Beach Night Life	25
7-3	Summertime In The Salt Marsh	10
7-5	Pond Life	8
7-11	Whose Got The Backbone?	14
7-17	Nature Walk In The Hobcaw Forest	5
7-18	Reptiles Alive	13
7-23	Hobcaw Open House	93
7-24	Nature Walk In The Hobcaw Forest	10
7-25	Beach Creatures	6
7-30	Beach Night Life	17
8-1	Whose Got The Backbone?	12
8-7	Nature Walk In The Hobcaw Forest	2
8-8	Reptiles Alive	12
8-15	Beach Creatures	18
9-19	Autumn In The Salt Marsh	8
9-27	Beach Night Life	24
10-3	Coastal Birding	14
10-24	Hobcaw's Woods After Hugo	10
11-13	Winter Birds	13
	Total	565

Table 4

Short Courses

1990

Course Title	No of Participants
Southern Traditions	21
Life in and Around an Oyster Reef	6
Rice Along the River: Georgetown's Plantation Heritage	37
Migration and Ecology of Songbirds	21
Coastal Ecology Classes for Children (5 sessions)	64
African Influences on Southern Culture	11
Loggerhead Sea Turtles	23
History and Architecture of Downtown Georgetown	7
Light Tackle Fishing in Coastal Waters	14
Managing the Coast for the 90's and Beyond	6
Shelling Along South Carolina Shores	27
Total	237

Table 5

Activities and Number of Participants
1988, 1989, and 1990

Activity	1988	1989	1990
Visitors To Bellefield Nature Center	16,636	17,324	15,445
Field Studies	2,457	2,619	2,937
Public Tours	1,027	775	893
Outreach Program	1,353	2,258	2,121
Special Programs	665	650	565
Speaking Engagements	225	361	223
Events - Festivals	10,000	5,500	12,000
Public Lectures, Seminars, Forums	89	250	115
Short Courses	269	262	237
Teacher Education	138	46	196
Totals	32,859	30,045	34,732

APPENDIX J

Publications

Appendix J

Publications

Since 1969 891 scientific papers and books have been published by Associates of the Baruch Institute. A complete list of publications is available upon demand. Included below is a partial listing of selective publications resulting from the National Science Foundation funded Long-Term Ecological Reserch project.

LTER PUBLICATIONS PUBLISHED OR IN PRESS

(Updated 7/19/91)

Abs. Allen, D.M. and D.L. Barker. 1985. Spatial and temporal distributions of grass shrimp larvae (Palaemonetes spp.) in a high salinity estuary. Am. Zool. 25(4): 63A (abstract)

803. Allen, D.M. and D.L. Barker. 1990. Interannual variability in larval fish recruitment to estuarine epibenthic habitats. Mar. Ecol. Prog. Ser. 63: 113-125.

Abs. Allen, D.M., E.R. Blood, and F.J. Vernberg. 1985. Long-Term Ecological Research at the North Inlet Estuarine-Marsh Ecosystem, South Carolina: Program description and trend analysis. Estuaries 8(2B):33A

810. Archambault, J.A. and R.J. Feller. In press. Diel variations in gut fullness of juvenile spot, Leiostomus xanthurus (Pisces). Estuaries

Th. Asmus, M. 1991. Ecological modeling of the North Inlet marsh-estuarine system, South Carolina: Models of year-to-year variability. Ph.D. Dissertation. Marine Science Program, University of South Carolina.

723. Asmus, M. and H.N. McKellar, Jr. 1989. Network analysis of the North Inlet salt marsh ecosystem. Chapter 9. In: Network Analysis in Marine Ecology. Methods and Applications. F. Wulff, J.G. Field, and K.H. Mann (eds.). Coastal and Estuarine Studies. Springer-Verlag, Berlin.

496. Bildstein, K.L. 1983. Age-related differences in the flocking and foraging behavior of white ibises in a South Carolina salt marsh. Colonial Waterbirds 6: 45-53.

549. Bildstein, K.L. 1984. Age-related differences in the foraging behavior of white ibises and the question of deferred maturity. Colonial Waterbirds 7: 146-148.

690. Bildstein, K.L. 1987. Energetic consequences of sexual dimorphism in white ibises. Auk 104: 771-775.

806. Bildstein, K.L. 1990. Status, conservation, and management of the scarlet ibis, Eudocimus ruber, in the Caroni Swamp, Trinidad, West Indies. Biol. Conservation 54: 61-78.

853. Bildstein, K.L., G.T. Bancroft, T.J. Dugan, D.H. Gordon, R.M. Erwin, E. Nol, L.X. Payne, and S.E. Senner. In press. Approaches to the conservation of coastal wetlands in the western hemisphere. Wilson Bull.

825. Bildstein, K.L., E.R. Blood, and P. Frederick. In press. The relative importance of biotic and abiotic vectors in nutrient transport in a South Carolina, USA, estuarine ecosystem. Estuaries

782. Bildstein, K.L. and I.L. Brisbin, Jr. 1990. Lands for long-term research in conservation biology. Conservation Biol. 4(3): 301-308.

573. Bildstein, K.L. and M.W. Collopy. 1985. Escorting flight and agonistic interactions in wintering northern harriers. Condor 87: 398-401.

883. Bildstein, K.L., P.C. Frederick, and M.G. Spaulding. In press. Feeding patterns and aggressive behavior in juvenile and adult American flamingos (Phoenicopterus ruber ruber). Condor

710. Bildstein, K.L., S.G. McDowell, and I.L. Brisbin. 1989. Consequences of sexual dimorphism in sand fiddler crabs: Differential vulnerability to avian predation. Animal Behav. 37: 133-139.

580. Bildstein, K.L., W. Post, P. Frederick, and J.W. Johnston. 1990. Freshwater wetlands and the breeding ecology of white ibises in coastal South Carolina: A lesson for scarlet ibis conservation, p. 57-63. In: Proc. First Intl. Workshop on the Conservation of Scarlet Ibises. P.C. Frederick, L.G. Morales, A.L. Spans, and C.S. Luthin (eds.). ICBP, NY.

790. Bildstein, K.L., W. Post, J. Johnson, and P. Frederick. 1990. Freshwater wetlands, rainfall, and the breeding ecology of white ibises in coastal South Carolina. Wilson Bull. 102: 84-98.

888. Blood, E.R., P. Anderson, P.A. Smith, K.A. Ginsberg, and C. Nybro. In press. The effects of Hurricane Hugo on coastal soil processes. Biotropica

579. Blood, E.R., W.T. Swank, and T. Williams. 1989. Precipitation, throughfall, and stemflow chemistry in a coastal loblolly pine stand, p. 61-78. In Freshwater Wetlands and Wildlife, Conf.-8603101, DOE Symposium Series #61, R.R. Sharitz and J.W. Gibbons (eds.), USDOE Office of Science and Technology Information, Oak Ridge, TN.

773. Blood, E.R., R. Van Dolah, K. Davis, H. McKellar, T. Siccherman, and C. Connelly. 1989. Charleston Harbor water quality, p. 25-35. In: Charleston Harbor: Issues, Resources, Status, and Managment. NOAA Estuary-of-the-Month Seminar Series No. 16. US Dept. of Commerce, NOAA Estuarine Programs Office, Washington, D.C.

847. Blood, E.R. and F.J. Vernberg. In press. Characterization of the physical, chemical, and biological conditions and trends in Winyah Bay and North Inlet Estuaries: 1970-1985. In Characterization of the Physical, Chemical, and Biological Conditions and Trends in Three South Carolina Estuaries. SC Sea Grant Consortium, NOAA.

Abs. Blood, E.R. and T. Williams. 1988. Land-water interfaces: The effect of salt water intrusion on blackwater stream chemistry. Bull. Ecol. Soc. Am. (supple.) 69(2): 75.

Th. Bollinger, M.S. 1983. Radium in a salt marsh - tidal inlet system. M.S. Thesis. Department of Geological Sciences, University of South Carolina.

Th. Bollinger, M.S. 1986. Radium isotopes in salt marshes and estuarine environments. Ph.D. Dissertation. Department of Geological Sciences, University of South Carolina.

TH. Borrero, F. 1991. Environmental correlates of intraspecific variation in physiological performance, energy balance, and allocation among populations of the marine mussel Geukensia demissa across the intertidal zone. Ph.D. dissertation. Department of Biology , University of South Carolina.

769. Boumans, R. and F.H. Sklar. 1990. A polygon-based spatial (PBS) model for simulating landscape change. Landscape Ecol. 4(2/3): 83-97.

Th. Bradley, P. 1991. The influence of oxygen, salinity, and sulfide concentration on the kinetics of NH_4^+ uptake in Spartina alterniflora. The physical characteristics of salt marsh sediments: Ecological implications. Ph.D. Dissertation. Marine Science Program, University of South Carolina.

842. Bradley, P.M. and J.T. Morris. In press. The influence of salinity on the kinetics of NH_4^+ uptake in Spartina alterniflora. Oecologia

Th. Childers, D. 1985. Development and analysis of a simulation model of saltmarsh water column dynamics. M.S. Thesis. Marine Science Program, University of South Carolina.

Abs. Childers, D. and H.N. McKellar, Jr. 1985. Nutrient variability and subsystem interactions in a southeastern saltmarsh. Estuaries 8(2B): 117A (abstract).

613. Childers, D. and H.N. McKellar, Jr. 1987. A simulation of salt marsh water column dynamics. Ecol. Model. 36: 211-238.

616. Chrzanowski, T.H., J. Spurrier, R. Dame, and R. Zingmark. 1986. Processing of microbial biomass by an intertidal reef community. Mar. Ecol. Prog. Ser. 30: 181-189.

585. Chrzanowski, T.H. and R. Zingmark. 1986. Passive filtering of microbial biomass by Spartina alterniflora. Estuarine Coastal Shelf Sci. 22: 545-557

736. Chrzanowski, T.H. and R.G. Zingmark. 1989. Bacterial abundance, biomass, and secondary production along a forest to ocean landscape gradient. J. Exp. Mar. Biol. Ecol. 125(3): 253-266.

Abs. Chrzanowski, T.H., R.G. Zingmark, and J. Spurrier. 1985. Dynamics of microbial populations in saltmarsh transport studies. Proc. 85th Annual Meeting Am. Soc. Microbiol. p. 233.

715. Clements, L.A., K.T. Fielman, and S.E. Stancyk. 1988. Regeneration by an amphiurid brittlestar exposed to different concentrations of dissolved organic material. J. Exp. Mar. Biol. Ecol. 122: 47-61.

668. Collopy, M.W. and K.L. Bildstein. 1987. Foraging behavior of northern harriers wintering in southeastern salt and fresh water marshes. Auk 104: 11-16.

802. Costanza, R., F.H. Sklar, and M.L. White. 1990. Modeling coastal landscape dynamics. BioScience 40(2): 91-107.

526. Coull, B.C. 1985. The use of long-term biological data to generate testable hypotheses. Estuaries 8(2A): 84-92.

575. Coull, B.C. 1985. Long-term variability of estuarine meiobenthos. An 11-year study. Mar. Ecol. Prog. Ser. 24: 205-218.

596. Coull, B.C. 1986. A new species of Pseudobradya and the rediscovery and correction of Quinquelaophonte capillata (Wilson) (Copepoda: Harpacticoida). Trans. Am. Microsc. Soc. 105: 121-129.

618. Coull, B.C. 1986. Long-term variability of meiobenthos: Value, synopsis, hypothesis generation, and predictive modelling. Hydrobiologia 142: 271-279.

700. Coull, B.C. 1988. Ecology of the marine meiofauna, p. 18-38. In: Introduction to the Study of Meiofauna. R.P. Higgins and H. Theil (eds.). Smithsonian Institution Press, Washington, D.C.

797. Coull, B.C. 1990. Are members of meiofauna food for higher trophic levels - Revisited. Trans. Am. Micros. Soc. 109(3): 233-246.

576. Coull, B.C. and B. Dudley. 1985. Dynamics of meiobenthic copepod populations: A long-term study (1973-1983). Mar. Ecol. Prog. Ser. 24: 219-229.

Th. Coutinho, R. 1987. Ecology of macroalgae in North Inlet Estuary, SC. Ph.D. Dissertation. Department of Biology, University of South Carolina.

Abs. Coutinho, R. 1984. Diel variations in photosynthetic responses to light by seaweeds. J. Phycology 20 (supple): 8.

Abs. Coutinho, R. 1986. The effects of interactions of light and nitrogen on growth and photosynthesis vs. irradiance (P-I) curves of Ulva curvata. J. Phycology (supple.)

704. Coutinho, R. and Y. Yoneshigue. 1988. Diurnal variation in photosynthesis vs. irradiance curves from 'sun' and 'shade' plants of Pterocladia capillaca (Gmelin) Bornet et Thuret (Gelidiaciaceae, Rhodophyta) from Cabo Frio, Rio de Janerio, Brazil. J. Exp. Mar. Biol. Ecol. 118: 217-228.

Abs. Coutinho, R. and R. Zingmark. 1984. Taxonomy, distribution, and seasonality of the macroalgae of North Inlet, SC. J. Phycology 20 (supple.): 55.

Abs. Coutinho, R. and R. Zingmark. 1986. Modelling primary production of macroalgae in estuaries. J. Phycology (supple.)

663. Coutinho, R. and R. Zingmark. 1987. Diurnal photosynthetic responses to light by macroalgae. J. Phycology 23: 336-343.

Abs. Coutinho, R. and R. Zingmark. 1987. Ecology of macroalgae in North Inlet, SC. J. Phycology 23 (supple.): 5.

793. Crosby, M.P. 1988. Using bioenergetics of intertidal oyster populations as a measurement of anthropogenic perturbations to shellfish growing waters. J. Shellfish Res. 7: 199-200.

730. Dame, R. 1989. The importance of Spartina alterniflora to Atlantic Coast estuaries. Rev. Aquat. Sci. 1(4): 639-660.

639. Dame, R., T. Chrzanowski, K. Bildstein, B. Kjerfve, H. McKellar, D. Nelson, J. Spurrier, S. Stancyk, H. Stevenson, F.J. Vernberg, and R. Zingmark. 1986. The outwelling hypothesis in North Inlet, South Carolina. Mar. Ecol. Prog. Ser. 33: 217-229.

840. Dame, R.F., N. Dankers, T. Prins, H. Jongsma, and A. Small. In press. The influence of Mussel beds on nutrient cycling in two Dutch estuaries. Estuaries

615. Dame, R.F. and P. Kenny. 1986. The variability of Spartina alterniflora primary production in the euhaline in North Inlet Estuary. Mar. Ecol. Prog. Ser. 37: 70-80.

855. Dame, R., J. Spurrier, T. Williams, B. Kjerfve, R. Zingmark, T. Wolaver, T. Chrzanowski, H.N. McKellar, and F.J. Vernberg. 1991. Annual material processing by a salt marsh-estuarine basin in South Carolina, USA. Mar. Ecol. Prog. Ser. 72: 153-166.

Abs. Dame, R.F., R. Zingmark, D. McCollum, and T. Wolaver. 1984. Nitrogen uptake and release by oyster reefs: A possible cause of heterotrophic control of autotrophs. Limnol. Oceanogr. 29 (supple.): 73.

720. Dankers, N., R.F. Dame, and K. Kersting. 1989. Oxygen consumption of mussel beds in the Dutch Wadden Sea. Scienta Marina 53: 473-476.

800. De Santo, T.L., S.G. McDowell, and K.L. Bildstein. 1990. Plumage and behavioral development of nestling white ibises. Wilson Bull. 102: 226-238.

839. Dobson, W.E. and S.E. Stancyk. In press. Morphology and chronology of early disc regeneration in the brittlestar Microphiopholis gracillima (Stimpson) (Echinodermata: Ophiuroidea). Zoomorphology

830. Dobson, W.E., S.E. Stancyk, L.A. Clements, and R.M. Showman. 1991. Nutrient translocation during early disc regeneration in the brittlestar Microphiopholis gracillima (Stimpson) (Echinodermata: Ophiuroidea). Biol. Bull. 180: 167-184.

676. Edwards, D. and B.C. Coull. 1987. Autoregressive trend analysis: An example using long-term ecological data. Oikos 50: 95-102.

705. Edwards, D. and J.J. Berry. 1987. The efficiency of simulation-based multiple comparisons. Biometrics 43: 913-928.

Abs. Edwards, D.G., R.J. Feller, W.K. Michener, and S.E. Stancyk. 1988. A multidimensional exploration of zooplankton and macrobenthos temporal dynamics in a coastal estuary. Bull. Ecol. Soc. Am. (supple.) 69(2): 126.

Th. Eiser, W.C. 1984. Sheet flow as a component of total water flux in an estuarine marsh. M.S. Thesis. Marine Science Program, University of South Carolina.

612. Eiser, William C., and B. Kjerfve. 1986. Marsh topography and hypsometer characteristics of South Carolina salt marsh basin. Estuarine Coastal Shelf Sci. 23(5): 595-605.

755. Ellis, M.J. and B.C. Coull. 1989. Fish predation on meiobenthos: Field experiments using juvenile spot (Pisces). J. Exp. Mar. Biol. Ecol. 130: 19-32.

Th. Ember, L. 1985. Sources of sedimentary organic matter in Spartina-dominated salt marshes. M.S. Thesis, Marine Science Program, University of South Carolina, Columbia.

Th. Eskin, R.A. 1985. Population dynamics and ecology of the meiobenthic nematodes of North Inlet, South Carolina. Ph.D. Dissertation. Department of Biology, University of South Carolina.

687. Eskin, R.A. and B.C. Coull. 1987. Seasonal and three-year variability of meiobenthic nematodes at two estuarine sites. Mar. Ecol. Prog. Ser. 41: 295-303.

624. Feller, R.J. 1986. Immunological detection of Mercenaria mercenaria in a predator and preparation of size-class specific antibodies. The Veliger 28(4): 341-347.

763. Feller, R.J. In press. Dietary analysis of Penaeid shrimp: The immunoassay approach. Front. Shrimp Res. W.J. Dougherty (ed.). Elsevier.

854. Feller, R.J. In press. Potential applications of immunoassays in studies of flatfish recruitment. Neth. J. Sea Res.

796. Feller, R.J., B.C. Coull, and B.T. Hentschel. 1990. Meiobenthic copepods: Tracers of where juvenile Leiostomus xanthurus (Pisces) feed? Can. J. Fish. Aquat. Sci. 47: 1913-1919.

659. Feller, R.J. and R.B. Ferguson. 1988. Quantifying stomach contents using immunoassays: A critique, p. 295-303. In: Immunochemical Approaches to Estuarine, Coastal and Oceanographic Questions. C.M. Yentsch, F.C. Mague, and P.K. Horan (eds.). Springer-Verlag Coastal Lecture Note Series.

789. Feller, R.J., B.T. Hentschel, and R. Ferguson. 1990. Immunoelectrophoretic assay of mixed species meals: An example using Penaeid shrimp, p. 588-596. Proc. 24th European Marine Biology Syposium. M. Barnes (ed.) Aberdeen University Press.

701. Feller, R.J. and R.M. Warwick. 1988. Energetics. Chapter 13. p. 181-196. In: Introduction to the Study of Meiofauna. R.P. Higgins and H. Theil (eds.). Smithsonian Institution Press, Washington, D.C.

Abs. Fielman, K.T. and E.R. Blood. 1988. Land-water interfaces: The effect of syzygy on soil ion balance. Bull. Ecol. Soc. Am. (supple.) 69(2): 132.

852. Fielman, K.T., S.E. Stancyk, W.E. Dobson, and L.A.J. Clements. In press. The effects of arm and disc loss on regeneration by Microphiopholis gracillima (Echinodermata: Ophiuroidea) in nutrient-free seawater. Mar. Biol.

Th. Flavier, A. 1991. Macroalgal colonization of hard substrates at North Inlet. M.S. Thesis. Department of Biology, University of South Carolina.

578. Fox, R.S. and E.E. Ruppert. 1985. Shallow-water Marine Benthic Macroinvertebrates of South Carolina: Species Identification, Community Composition, Symbiotic Associations. Belle W. Baruch Library in Marine Science, No. 14. University of South Carolina Press, Columbia.

841. Frix, M.S., M.E. Hostetler, and K.L. Bildstein. In press. Intra- and interspecis differences in the responses of sand (Uca pugilator) and mud (Uca pugnax) fiddler crabs to simulated avian predation. J. Crust. Biol.

767. Gardner, L.R. 1990. Simulation of the digenesis of carbon, sulfur, and dissolved oxygen in salt marsh sediments. Ecol. Monogr. 60: 91-111.

779. Gardner, L.R. 1990. Simulation of the diagensis of carbon, sulfur and dissolved oxygen in salt marsh sediments. Ecol. Monogr. (microfiche) See ESA Supplementary Publication Service document #8903. 61 p.

884. Gardner, L.R. 1990. The role of rock weathering in the biogeochemical cycling of phosphorus. Biogeochemistry 11: 97-110.

522. Gardner, L.R. and C. Gorman. 1984. The summertime net transport of dissolved oxygen, salt, and heat in a salt marsh basin, North Inlet, SC. Estuarine Coastal Shelf Science 19: 331-339.

646. Gardner, L.R. and I. Lerche. 1987. Simulation of sulfate dependent sulfate reduction using Monod kinetics. Math. Geol. 19: 219-239.

775. Gardner, L.R. and I. Lerche. 1990. Simulation of sulfur digenesis in anoxic marine sediments using Rickard kinetics for FeS and FeS_2 formation. Computer Geosci. 16: 441-460.

817. Gardner, L.R., W.K. Michener, E.R. Blood, T.M. Williams, D.J. Lipscomb, and W.H. Jefferson. 1991. Ecological impact of Hurricane Hugo - Salinization of a coastal forest. Journal of Coastal Research 8: 301-317.

829. Gardner, L.R., W.K. Michener, B. Kjerfve, and D.A. Karinshak. 1991. The geomorphic effects of Hurricane Hugo on an undeveloped coastal landscape at North Inlet, SC. J. Coastal Res. 8: 181-186.

582. Gardner, L.R., P. Sharma, and W. Moore. 1987. A regeneration model for the effect of fiddler crab burrowing on 210 Pb profiles in salt marsh sediments. J. Environ. Radioactivity 5: 25-36.

759. Gardner, L.R., L. Thombs, D. Edwards, and D. Nelson. 1989. Time series analyses of suspended sediment concentrations at North Inlet, South Carolina. Estuaries 12(4): 211-221

728. Gardner, L.R., T.S. Wolaver, and M. Mitchell. 1988. Spatial variations in the sulfur chemistry of salt marsh sediments at North Inlet, SC. J. Mar. Res. 46: 815-836.

707. Gawlik, D.E., M.E. Hostetler, and K. Bildstein. 1988. Napthalene mothballs do not deter mammalian predators at red-winged blackbird nests. J. Field Ornithol. 59(2): 189-191.

835. Haddad, K.D. and W.K. Michener. In press. Design and implementation of acoastal resource Geographic Information System: Administrative considerations. In: Proceedings, Coastal Zone '91. Symposium on Coastal and Ocean Management/ASCE. O.T. Magoon et al. (eds.).

795. Hentschel, B.T. and R.J. Feller. 1990. Quantitative immunoassay of the proventricular contents of white shrimp (Penaeus setiferous Linnaeus): A laboratory study. J. Exp. Mar. Biol. Ecol. 139: 85-99.

Th. Hunter, J. 1985. Dietary analysis of commercially important juvenile shrimp (Penaeus aztecus [Ives] and P. setiferus [L.]) in saltmarsh tidal creeks. M.S. Thesis, Department of Biology, University of South Carolina, Columbia.

652. Hunter, J. and R. Feller. 1987. Immunological dietary analysis of two penaeid shrimp species from a South Carolina tidal creek. J. Exp. Mar. Biol. Ecol. 107: 61-70.

843. Hwang, Y.H. and J.T. Morris. In press. Evidence for hygrometric pressurization in the internal gas space of Spartina alterniflora. Plant Physiol.

Th. Jefferson, W.H., III. 1990. Factors affecting abundance of mero- and holoplankton in a southeastern estuary. M.S. Thesis, University of South Carolina, Columbia, SC.

889. Jefferson, W.H., III., W.K. Michener, D.A. Karinshak, W. Anderson, and D.E. Porter. In press. Developing GIS data layers for estuarine resource management. Proc., GIS/LIS Annual Conference and Exposition, Atlanta, GA.

754. Johnston, J.W. and K. Bildstein. 1990. Dietary salt marsh as a physiological constraint in white ibises breeding in an estuary. Physiol. Zool. 63: 190-207.

807. Johnson, W.S., D.M. Allen, M.V. Ogburn, and S.E. Stancyk. 1990. Short-term predation responses of adult bay anchovies, Anchoa mitchilli, to estuarine zooplankton availability. Mar. Ecol. Prog. Ser. 64: 55-68.

Abs. Kenny, P.D., W.K. Michener, and D.M. Allen. 1988. Factors affecting settlement of the American oyster (Crassostrea virginica) in a high salinity southeastern estuary. J. Natl. Shellfish Assoc.

822. Kenny, P.D., W.K. Michener, and D.M. Allen. 1990. Spatial and temporal patterns of oyster settlement in a high salinity estuary. J. Shellfish Res. 9: 329-339.

427. Kjerfve, B. 1982. Calibration of estuarine current crosses. Estuarine Coastal Shelf Sci. 15: 553-559.

587. Kjerfve, B. 1984. Hydrographic considerations in estuarine outwelling studies: An example and definitions. p. 37-47. In: Productivity of the Mangrove Ecosystem: Management Implications. Ong Jin Eong and Gong Wooi-Khoon (eds.). UNESCO/UNDP and Universiti Sains Malaysia.

570. Kjerfve, B. 1986. Circulation and salt balance in a well-mixed estuary. p. 22-29. In: Physics of Shallow Estuaries and Bays. Springer-Verlag.

319. Kjerfve, B. and H.N. McKellar, Jr. 1980. Time series measurement of estuarine material fluxes. p. 341-357. In: Estuarine Perspectives. V.S. Kennedy (ed.).. Academic Press, NY.

433. Kjerfve, B., J.A. Proehl, F.B. Schwing, H.E. Seim, and M. Marozas. 1982. Temporal and spatial considerations in measuring estuarine water fluxes. p. 37-51. In: Estuarine Comparisons. V.S. Kennedy (ed.). Academic Press, NY.

532. Kjerfve, B. and H.E. Seim. 1984. Construction of net isopleths in cross sections of tidal estuaries. J. Mar. Res. 42: 503-508.

337. Kjerfve, B., L.H. Stevenson, J.A. Proehl, T. Chrzanowski, and W.M. Kitchens. 1981. Estimation of material fluxes in an estuarine cross-section: A critical analysis of spatial measurement density and errors. Limnol. Oceanogr. 26: 325-335.

654. Kjerfve, B. and T.G. Wolaver. 1988. Sampling optimization for studies of tidal transport in estuaries. Am. Fish. Soc. Sym. 3: 26-33.

885. Kratz, T.K., B.J. Benson, E.R. Blood, G. Cunningham, and R.A. Dahlgren. In press. The influence of landscape position on temporal variability in four North American ecosystems. Am. Midlands Naturalist

879. Leibowitz, S., F.H. Sklar, and R. Costanza. 1990. Perspectives on Louisiana wetland loss modelling, p. 729-754. In Freshwater Wetlands and Wildlife. R.R. Sharitz and J.W. Gibbons (eds.). US Dept. of Energy, Office of Health and Environmental Research. CONF-8603101.

747. Li, Y., J. Morris, and D. Yoch. 1990. Chronic low-level hydrocarbon pollution stimulates plant growth and microbial activity in salt marsh microcosms. J. Appl. Ecol. 27: 1579-171.

669. Marinelli, R.L. and B.C. Coull. 1987. Structural complexity and juvenile fish predation on meiobenthos: An experimental approach. J. Exp. Mar. Biol. Ecol. 108: 67-82.

Th. Martin, J.A. 1990. Chemoreception by white shrimp, Penaeus setiferus: A laboratory and field study of thier response to bait. M.S. Thesis, Univ. of South Carolina, Columbia, SC. 86 p.

Th. McDaniel-Firth, E. 1988. A four-year study of above and below ground decomposition of Spartina alterniflora. M.S. Thesis. Marine Science Program, University of South Carolina.

886. McKellar, H.N., Jr., E.R. Blood, T. Sicherman, K. Connelly, and J. Hussey. 1990. Organic carbon and nutrient dynamics, p. 47-99. In Physical and Ecological Characterization of the CHareslton Harbor Estuarine System. R.F. van Dolah, P.H. Wendt, and E.L. Wenner (eds.). Final Report to South Carolina Coastal Council.

Abs. McKellar, H.N., Jr., T. Jordan, D. Whigham, and D. Correll. 1986. A model of production, mortality, and decomposition in a brackish water cattail marsh. Proc, Eastern Simulation Conf. (abstract)

875. McKellar, H.N., Jr. and W.D. Marshall. 1985. Aquatic productivity and tidal nutrient exchanges in coastal wetland impoundments in South Carolina, P. 85-102. In Proc., 4th Coastal Marsh and Estuarine Management. C.F. Bryan, P.J. Swank, and R.H. Chabreck (eds.). LSU press, Baton Rouge, LA.

643. McLaughlin, R.A. and W.K. Michener. 1985. RS1: Stats, graphs, and data manipulation. Science Software Quarterly 2(2): 54-61.

692. Medeiros, C. and B. Kjerfve. 1988. Tidal characteristics of the Strait of Magellan. Cont. Shelf Res. 8(8): 947-960.

591. Michener, W.K. (ed.). 1986. Research Data Management in the Ecological Sciences. Belle W. Baruch Library in Marine Science, No. 16. University of South Carolina Press, Columbia, SC.

597. Michener, W.K. 1986. Data management and long-term ecological research. p. 1-8. In: Research Data Management in the Ecological Sciences. Belle W. Baruch Library in Marine Science, No. 16. University of South Carolina Press, Columbia, SC.

Th. Michener, W.K. 1990. Crassostrea virginica settlement and recruitment dynamics in the intertidal zone. Ph.D. dissertation. Marine Science Program, University of South Carolina.

778. Michener, W., D. Allen, E. Blood, T. Hiltz, B. Kjerfve, and F. Sklar. 1990. Climatic variability and salt marsh ecosystem response: Relationship to scale, p. 27-33. In Climate Variability and Ecosystem Response. Proc., Long-Term Ecological Research Workshop. D. Greenland and L.W. Swift. Jr. (eds.). USDA Forest Service General Tech. Rep. SE-65. Asheville, NC.

748. Michener, W.K., D. Cowen, and W.L. Shirley. 1989. Geographic information systems for coastal research. In: Proc., Coastal Zone '89 Conference. Sixth Symposium on Coastal and Ocean Management/ASCE. O.T. Magoon, H. Converse, D. Miner, L.T. Tobin, and D. Clark (eds.). Vol. 5: 4791-4805.

611. Michener, W.K., R.J. Feller, and D. Edwards. 1987. Development, management, and analysis of a long-term ecological research information base: Example for marine macrobenthos. p. 173-188. In: New Approaches to Monitoring Aquatic Ecosystems. American Society for Testing and Materials, Philadelphia.

890. Michener, W.K. & K. Haddad. In press. Data administration. In: Proc., Symposium on Data Management for Inland and Coastal Field Stations. G.H. Lauff, J.J. Alberts, and J.B. Gorentz. (eds.). W.K. Kellog Biological Station, Michigan State University.

836. Michener, W.K., W.H. Jefferson, D.A. Karinshak, and C. Gilbert. In press. Incorporationg Global Positioning System technology into coastal mapping and research. In: Proceedings, Coastal Zone '91. Symposium on Coastal and Ocean Management/ASCE. O.T. Magoon et al. (eds.).

874. Michener, W.K. and P.D. Kenny. In press. Spatial and temporal patterns of Crassostrea virginica (Gmelin) recruitment: Relationship to scale and substratum. J. Exp. Mar. Biol. Ecol.

Abs. Michener, W.K., P.D. Kenny, and D.M. Allen. 1988. Factors Affecting settlement of the American oyster (Crassostrea virginica) in North Inlet, SC. Bull. Ecol. Soc. Am. (supple.) 69(2): 232.

724. Michener, W.K. and B. Kjerfve. 1987. North Inlet, SC. p. 56-60. IN: The Climate of the Long-Term Ecological Research Sites. David Greenland (ed.). Occasional Paper No. 44. Institute of Arctic and Alpine Research, Univ. of Colorado, Boulder, CO.

887. Michener, W.K., B. Kjerfve, L.R. Gardner, E. Blood, M. Cablk, W.H. Jefferson, D.A. Karinshak, and D.F. Spoon. In press. GIS assessment of large-scale ecological disturbances(Hurricane Hugo, 1989). Proceedings, GIS/LIS Annual Conference and Exposition. Atlanta, GA.

577. Michener, W.K., R.A. McLaughlin, and M.F. Marozas. 1985. Development of a data management system for long-term ecological research. Proc., SAS Users Group International. p. 468-471.

821. Michener, W.K., A.B. Miller, and R. Nottrott. (eds.) 1990. Long-Term Ecological Research Network Core Data Set Catalog. Belle W. Baruch Institute, University of South Carolina, Columbia. 340 p.

756. Miller, A.B., W.K. Michener, A. Barnard, and F.J. Vernberg. 1989. Publications of the Belle W. Baruch Institute for Marine Biology and Coastal Research 1969-1989. Research Bibliography. Baruch Institute Technical Report 89-02. Columbia, SC.

718. Morris, J.T. 1988. Pathways and controls of the carbon cycle in salt marshes. p. 497-510. In: The Ecology and Management of Wetlands. Vol. 1. Ecology of Wetlands. D.D. Hook et al. (eds.). Croom Helm, London.

733. Morris, J. 1989. Modelling light distribution within the canopy of the marsh grass Spartina alterniflora as a function of canopy biomass and solar angle. Agric. Forest Meteorol. 46: 349-361.

844. Morris, J.T. In press. Effects of nitrogen loading on wetland ecosystems with particular reference to atmospheric deposition. Ann. Rev. Ecol. Syst.

834. Morris, J.T. and E. Haskin. 1990. A 5-year record of aerial primary production and stand characteristics of Spartina alterniflora. Ecology 71(6): 2209-2217.

823. Morris, J.T., B. Kjerfve, and J.M. Dean. 1990. Dependence of estuarine productivity on anomalies in mean sea level. Limnol. Oceanogr. 35(4): 926-930.

809. Myers, P.E. 1990. Space versus other limiting resources for a colonial tunicate, Botrylloides leachii (Savigny), on fouling plates. J. Exp. Mar. Biol. Ecol. 141: 47-52.

Abs. Nelson, D. 1982. Suspended particulate transport, North Inlet, South Carolina. Geol. Soc. Am. (abstract) 14: 575.

Abs. Nelson, D. 1983. Suspended sediment transport, North Inlet, South Carolina. Geol. Soc. Am. (abstract) 15:103.

Abs. Nelson, D. 1983. Resuspension and redistribution of sediments, North Inlet, South Carolina. Estuaries 6: 316.

826. Nehring, S., P. Jensen, and S. Lorenzen. 1990. Tube-dwelling nematodes: Tube construction and possible ecological effects on sediment-water interfaces. Mar. Ecol. Prog. Ser. 64: 123-128.

764. Ogburn, V., D.M. Allen, and W.K. Michener. 1988. Fishes, shrimps, and crabs of the North Inlet Estuary, SC: Results of a four-year LTER seine and trawl survey. Baruch Technical Report 88-01.

750. Ornes, W.H. and D.I. Kaplan. 1989. Long-term macronutrient status of tall and short forms of Spartina alterniflora in North Inlet Estuary, South Carolina; USA. Mar. Ecol. Prog. Ser.55: 63-72.

709. Palmer, M.A. 1988. Epibenthic predators and marine meiofauna: Separating predation, disturbance, and hydrodynamic effects. Ecology 69: 1251-1260.

328. Palmer, M.A., B. Kjerfve, and F.B. Schwing. 1980. Tidal analysis and prediction in a South Carolina estuary. Contrib. Mar. Sci. 23: 17-23.

731. Quick, P. and T.L. De Santo. 1989. Flight speeds and energy requirements for white ibises (Eudocimus albus) flying to foraging sites. Auk 106: 141-144.

876. Pearlstine, L., H.N. McKellar, Jr., and W. Kitchens. 1985. Modelling the impacts of a river diversion on bottomland forest communities in the Santee River floodplain, SC. Ecol. Modell. 29: 283-302.

610. Petit, D.R. and K.L. Bildstein. 1986. Development of formation flying in juvenile white ibises (Eudocimus albus). Auk 103: 244-246.

675. Petit, D.R. and K.L. Bildstein. 1987. The effect of group size and location within the group on the foraging behavior of white ibises. Condor 89: 602-609.

877. Pickett, J., H.N. Mckellar, Jr., and J. Kelley. 1989. Community composition, leaf mortality, and net primary production in a tidal freshwater marsh in South Carolina. in Freshwater Wetlands and Wildlife. R.R. Sharitz (ed.). Dept. of Energy Symp. Ser. No. 61, USDOE Office of Sci. Tech. Inf., Oak Ridge, TN.

873. Pinckney, J. and R.G. Zingmark. In press. Effects of tidal stage and sun angles on intertidal benthic microalgal productivity. Mar. Ecol. Prog. Ser.

Th. Piyatiratitivorkul, S. 1988. The life history and bioenergetic relations in the grass shrimp, Palaemonetes pugio Holthuris. Ph.D. Dissertation. Department of Biology, University of South Carolina.

Th. Powell, W.E. 1985. Groundwater flow patterns beneath a forest - high marsh transect at North Inlet, South Carolina. M.S. Thesis. Department of Geological Sciences, University of South Carolina.

881. Ring, S. and F.H. Sklar. 1989. Simulating the long-term impacts of coastal development and landscape changes on the ecology of the Waccamaw River, SC, p. 3581-3587. In Proc., Coastal Zone '89 Conference, 6th Symp. on Coastal and Ocean Management. O.T. Magoon et al. (eds.). Vol. 5.

838. Scholz, D.S., L.A. Matthews, and R.J. Feller. In press. Detecting selective digestion of meiobenthic prey by juvenile spot Leiostomus xanthurus (Pisces) using immunoassays. Mar. Ecol. Prog. Ser.

309. Schwing, F.B. and B. Kjerfve. 1980. Longitudinal characterization of a tidal marsh creek separating two hydrographically distinct estuaries. Estuaries 3(4): 236-241.

464. Schwing, F.B., B. Kjerfve, and J.E. Sneed. 1983. Nearshore coastal currents on the South Carolina continental shelf. J. Geophys Res. 88: 4719-4729.

500. Schwing, F.B., B. Kjerfve, and J.E. Sneed. 1983. Sea Level oscillations in a salt marsh lagoon system. Anales del Instituto de Ciencias del Mar Y Limnologia 10(1): 231-236.

837. Service, S.K. and R.J. Feller. In press. Long-term trends of subtidal macrobenthos in North Inlet, South Carolina. Hydrobiologia

581. Sharma, P., L.R. Gardner, W.S. Moore, and M.S. Bollinger. 1987. Sedimentation and bioturbation in a salt marsh as revealed by Pb-210, Cs-137, and Be-7 studies. Limnol. Oceanogr. 32(2): 313-326.

870. Shepherd, P. T. Crockett, T. De Santo, and K.L. Bildstein. In press. The impact of Hurricane Hugo on the breeding ecology of wading birds at Pumpkinseed Island, Hobcaw Barony, SC. Colonial Waterbirds

783. Sklar, F.H. and R. Constanza. 1991. The development of dynamic spatial models for landscape ecology: A review and prognosis, p. 239-288. In Quantitative Methods in Landscape Modeling. M.G. Turner and R.H. Gardner. (eds.). Springer-Verlag, NY.

882. Sklar, F.H., R. Costanza, D.L. Childers, E.B. DeBellevue, M.S. Jacobsen, T. Maxwell, an dM.L. White. In press. Developments in regional scale simulation and analysis: Case studies from coastal wetland ecosystems. In: Proc., International Geograph. Union. R.B. Singh (ed.)

880. Sklar, F.H., R. Costanza, and J.W. Day, Jr. 1990. Model conceptualization, p.625-658. In Wetlands and Shallow Continental WAter Bodies, Vol. 1. B.S. Patten et al. (eds.). SPB Academic Publishing, The Hague.

Abs. Sklar, F.H. and S. Ring. 1988. Ecosystem modeling using graphic-oriented programming; An introduction to STELLA and the CLESS model. Ecological Society of America (supple.) 69(2): 298.

878. Sklar, F.H., M.L. White, and R. Costanza. In press. The Coastal Ecological Landscape Spatial Simulation(CELSS) model: User's guide and results for the Atchafalaya/Terrebone study area. NWRC open file report. US Fish and Wildlife Service, Washington, DC.

647. Smith, L.D. and B.C. Coull. 1987. Juvenile spot (Pisces) and grass shrimp predation on meiobenthos in muddy and sandy substrata. J. Exp. Mar. Biol. Ecol. 105: 123-136.

703. Spurrier, J.D. and B. Kjerfve. 1988. Estimating the net flux of nutrients between a salt marsh and a tidal creek. Estuaries 11(1): 10-14.

595. Stancyk, S.E. and R.J. Feller. 1986. Transport of non-decapod larvae in estuaries: An overview. Bull. Mar. Sci. 39(2): 257-268.

385. Summers, J.K. and H.N. McKellar, Jr. 1981. The role of physical forcing functions in an estuarine model of carbon exchange with the sea. ISEM Journal 3: 71-101.

686. Swift, L.W. Jr., and E.R. Blood. 1987. Drought impact research at two LTER sites. Proc., Southeastern Drought Symp. SC State Climatology Office Publ. G-30.

725. Turner, M.G., R. Costanza, and F.H. Sklar. 1989. Methods to evaluate the performance of spatial simulation models. Ecol. Model. 48: 1-18.

623. Uncles, R.J. and B. Kjerfve. 1986. Transverse structure of residual flow in North Inlet, South Carolina. Estuaries 9: 39-42.

634. Vernberg, F.J. 1988. The function of a pristine estuarine ecosystem. p. 15-24. In: The Ecology and Management of Wetlands, Vol. 1. Ecology of Wetlands. D. Hook et al. (eds.). Croom Helm.

788. Vernberg, F.J., R.G. Zingmark, R.F. Dame, S.E. Stancyk, B.C. Coull, R.J. Feller, D.M. Allen, K.L. Bildstein, E.R. Blood, L.R. Gardner, T. Williams, F.H. Sklar, H.N. Mckellar, Jr., D. Childers, and W.K. Michener. 1989. Long-term ecological research on the North Inlet forest-wetlands-marine landscape, Georgetown, SC, p. 53-76. In: Barrier Island/Salt Marsh Estuaries of the Southeast Atlantic Ocean: Issues, Resources, Status and Management. NOAA Estuary-of-the-Month Seminar Series. No. 12.

708. Watwood, M.E., J. Fitzgerald, W.T. Swank, and E.R. Blood. 1988. Factors involved in potential sulfur accumulation in water and soil from a coastal pine forest. Biogeochemistry 6:3-19.

713. Webster, J., E. Blood, K. Cummings, M. Gurtz, and R.E. Sparks. 1985. Long-term research in stream ecology. Bull. Eco. Soc. Am. 66: 346-353.

Th. Whiting, G.J. 1985. Nitrogen cycling in salt marshes: Tidal and gaseous exchanges. Ph.D. Dissertation. Department of Biology, University of South Carolina.

564. Whiting, G.J., H.N. McKellar, Jr., B. Kjerfve, and J.D. Spurrier. 1985. Sampling and computational design of nutrient flux from a southeastern US saltmarsh. Estuarine Coastal Shelf Sci. 21(3): 273-286.

637. Whiting, G.J., H.N. McKellar, Jr., B. Kjerfve, and J.D. Spurrier. 1987. Nitrogen exchange between a southeastern U.S. salt marsh ecosystem and the coastal ocean. Mar. Biol. 95: 173-182.

738. Whiting, G.J., H.N. McKellar, Jr., J.D. Spurrier, and T.G. Wolaver. 1989. Nitrogen exchange between a portion of vegetated salt marsh and the adjoining creek. Limnol. Oceanogr. 34(2): 463-473.

766. Wilbur, A.E. and T.J. Hilbish. 1989. Physiological energetics of the ribbed mussel, Guekensia demissa (Dillwyn), in response to increased temperature. J. Exp. Mar. Biol. Ecol. 131: 161-170.

588. Wolaver, T., S. Hutchinson, and M. Marozas. 1986. Dissolved and particulate organic carbon in the North Inlet Estuary - What controls their concentrations. Estuaries 9: 31-38.

497. Wolaver, T., W. Johnson, and M. Marozas. 1984. Nitrogen and phosphorus concentrations within North Inlet, South Carolina - Speculation as to sources and sinks. Estuarine Coastal Shelf Sci. 19(2): 243-255.

583. Wolaver, T., G. Whiting, B. Kjerfve, J. Spurrier, H. McKellar, Jr., R. Dame, T. Chrzanowski, R. Zingmark, and T. Williams. 1985. The flume design - A methodology for evaluating material fluxes between a vegetated salt marsh and the adjacent tidal creek. J. Exp. Mar. Biol. Ecol. 91: 281-291.

655. Wolfe, D.A., and B. Kjerfve. 1986. Estuarine Variability: An overview. p. 3-17. In: Estuarine Variability. D.A. Wolfe (ed.)., Academic Press, NY.

Th. Young, B.L. 1989. Settlement, early mortality, and growth of sessile marine invertebrates. Ph.D. Dissertation, Department of Biology, University of South Carolina.

784. Young, B.L. In press. Spartina acid zones: Preferred settlement sites of barnacles. J. Exp. Mar. Biol. Ecol.

660. Zagursky, G. and R.J. Feller. 1988. Application of immunoblotting dietary analysis, p. 117-129. In: Immunochemical Approaches to Estuarine, Coastal and Oceanographic Questions. C.M. Yentsch, F.C. Mague, and P.K. Horan (eds.). Springer-Verlag Coastal Lecture Note Series.

697. Zimmerman, K.M., S.E. Stancyk, and L.A. Clements. 1988. Substrate selection by the burrowing brittlestar, Microphiopholis gracillima. Mar. Behav. Physiol. 13: 239-255.

Abs. Zingmark, R. and G. Satcher. 1984. Long-term patterns of phytoplankton standing crop and productivity in a salt marsh estuarine system. J. Phycology 20 (supple.): 58.

645. Zinnel, C.A. and M. Marozas. 1986. Evolution of scientific data entry techniques. p. 61-72. In: Research Data Management in the Ecological Sciences. Belle W. Baruch Library in Marine Science, No. 16. W.K. Michener (ed.). University of South Carolina Press, Columbia.

APPENDIX K

Letter from South Carolina Attorney General
Concerning Protective Control

SOUTH CAROLINA COASTAL COUNCIL

Ashley Corporate Center
4130 Faber Place
Suite 300
Charleston, S.C. 29405
(803) 744-5838
FAX 744-5847

William W. Jones, Jr.
Chairman

H. Wayne Beam, Ph.D.
Executive Director

September 10, 1991

Mr. Ole Varmer
General Counsel
Secretary of Commerce
14th and Constitution Avenue, N.W.
Room 5851
Washington, DC 20230

RE: S.C. N. - Inlet NERR

Dear Mr. Varmer:

Thank you for your memorandum of August 26, 1991, stating the needs of the NOAA in the above referenced matter.

On behalf of the Attorney General's office for the State of South Carolina, I address each of the remaining points of contention:

1. The State of South Carolina has adequate management authority over the areas proposed for the NERR site.

   As shown on the attached Exhibit A, the South Carolina Coastal Council, the state agency responsible for overseeing the project, has full authority over the NERR site. (See Section 48-39-10, et seq., Code of Laws for the State of South Carolina, 1976, as amended.) As it relates to the critical area "environment," there is no question that the state has a legal right of access to those areas for purposes of managing the site and enforcing conditions associated with the federal grant. In terms of access by the state and general public to areas owned by the state, there is a general legal presumption that the state owns all lands below mean high water. This ensures access to the tidelands and marshes which predominate the NERR site. Fast lands held by the Baruch Foundation would require permission for ingress and egress. However, the fast lands and highland portions of the site owned by the Baruch Foundation are legally accessible by the state for research and management pursuant to an easement. Attached Exhibit B is an agreement entered into between Belle W. Baruch Foundation and the University of South Carolina on March 22, 1972. By way of this agreement, the University

has the use of such land as may be required to construct a research facility thereon, and the right-of-way and easement for ingress and egress thereto. Additionally, the University has use of such land so long as the lands are being used for research and other educational purposes. It is my opinion, based upon this agreement and upon the Attorney General's letter of November 13, 1987, Exhibit C provided to you by Dr. Vernberg, that the state has sufficient access to the site to ensure research and management envisioned by the NERR project.

2. The University of South Carolina and Baruch Institute are state entities. (See attached Exhibit D.)

Pursuant to state law, the S. C. Coastal Council employs attorneys for the purpose of enforcement of the provisions of the Coastal Zone Management Act. However, these attorneys are controlled by the State Attorney General's office. On behalf of the Attorney General's office, I am authorized to convey to you that the State of South Carolina will provide the necessary legal service to ensure proper management and enforcement of the NERR management plan. Any such legal service will be primarily provided by South Carolina Coastal Council legal staff with support from the Attorney General's office.

With regard to other questions posed to Mr. Snyder, it appears to me that these matters were adequately dealt with in the August 14, 1991, letter from Dr. Vernberg. Please contact my office should this letter be insufficient for your purposes.

Sincerely,

C. C. Harness, III

C. C. Harness, III
General Counsel

0898A(87)
cc: Dr. H. Wayne Beam
Mr. Christopher L. Brooks
Ms. Nancy B. Tecklenburg, Esquire
Mr. Steve Snyder
Dr. John Vernberg

APPENDIX L

Organizations Endorsing the North Inlet/Winyah Bay Project

ORGANIZATIONS ENDORSING THE NORTH INLET/WINYAH BAY PROJECT

National Science Foundation
NOAA, National Marine Fisheries Service, Southeast Fisheries Science Center
U.S. Department of Interior
South Atlantic Fishery Management Council
S.C. Wildlife and Marine Resources Department, Nongame and Heritage Trust Section
S.C. Water Resources Commission
S.C. Marine Educators Association
S.C. Sea Grant Consortium
Sierra Club South Carolina Chapter
S.C. Institute of Archaeology and Anthropology
S.C. Environmental Law Project
S.C. Aquarium
S.C. Coastal Conservation League
Nature Conservancy of South Carolina
International Center for Public Health Research, USC, McClellanville, SC
Georgetown County League of Women Voters
College of Charleston, Marine Biology Graduate Program
Friends of the Coast
DeBordieu Property Owners Association, Inc.

APPENDIX M

WRITTEN AND ORAL COMMENTS

pertaining to the

North Inlet/Winyah Bay National Estuarine Research Reserve DEIS/DMP

S.C. SEA GRANT CONSORTIUM

287 Meeting Street
Charleston, S.C. 29401

Phone (803) 727-2078
Fax (803) 727-2080

Member Institutions

The Citadel
Clemson University
College of Charleston
Medical University of South Carolina
S.C. State College
S.C. Wildlife and Marine Resources Department
University of South Carolina

Chairman
Dr. James B. Edwards
President
Medical University of South Carolina

Executive Director
Margaret A. Davidson

Working together to strengthen coastal research, education and extension programs.

December 5, 1991

Dr. John Veraberg
Director, Belle Baruch Institute
University of South Carolina
Columbia, SC 29208

Dear John:

I am delighted that after all these years North Inlet is going to be recognized with its inclusion into the National Estuarine Research Reserve system. It is certainly a most appropriate designation and will serve to strengthen the NSF-supported work which has been conducted over the past decade.

We at the S.C. Sea Grant Consortium would be most interested in working cooperatively with you on research and education programs to be conducted within the area. I am confident that we can attain a tremendous amount of accomplishment for a small amount of cooperation and effort.

I am ready to assist you with the process of nomination and implementation in any way that you deem suitable. Please let me know how we may assist you.

Sincerely,

Margaret A. Davidson
Executive Director

MAD/mm

M-12

Response to Margaret A. Davidson

Comments noted. The S.C. Sea Grant Consortium will be represented on the NI/WB Advisory Committee creating a formal avenue of communication. Over the years, Sea Grant has funded research and education projects involving North Inlet and every effort will be made by the Reserve to continue and expand upon these cooperative programs.

South Carolina Environmental Law Project

Office Address
[illegible]
Georgetown, S.C. 29440

Telephone
(803) 527-1078
FAX (803) [illegible]251

Mailing Address
P.O. Box 279
Pawleys Island, S.C. 29585

December 2, 1991

Ms. Susan Durden
National Oceanic and Atmospheric Administration
Sanctuaries and Reserve Division
1825 Connecticut Ave., N.W., Suite 714
Washington, DC 20235

Dr. F. John Vernberg
Baruch Marine Lab
P. O. Box 1630
Georgetown, SC 29442

Re: North Inlet/Winyah Bay NERR

Dear Ms. Durden and Dr. Vernberg:

The South Carolina Environmental Law Project strongly supports the establishment of the North Inlet/Winyah Bay National Estuarine Research Reserve. We urge NOAA to approve the designation of North Inlet and Winyah Bay as a Reserve.

I have utilized the natural resources of North Inlet and Winyah Bay for over 30 years, and for the last 10 years have worked as a concerned citizen and environmental attorney to protect those resources. Designation of this area as a NERR would help to heighten public awareness of both the extent of these resources and the potential threats to this estuary. North Inlet has already been recognized by the National Science Foundation, which has included it in its long-term ecological research program. The close proximity of this relatively undisturbed area to Winyah Bay, which has been impacted by man's activities yet retains notable ecological significance, presents abundant research opportunities to provide guidance to natural resource regulatory agencies such as the South Carolina Coastal Council.

I have heard many of the reservations about this NERR expressed by local hunters and fishermen, who fear that the NERR designation would lead to restrictions on their recreational activities. I believe that these reservations are unwarranted. Nothing in the proposed management plan gives any legal authority to restrict public use of these areas beyond that which already exists under present law. As a recreational boater who believes strongly in public access to public trust resources, I would adamantly oppose any attempt to restrict public access to North Inlet or Winyah Bay. As a member of the advisory committee for this proposed NERR, I know that none of the supporters of this NERR have any intent to restrict public activities in the reserve areas. I hope that you will not allow adverse comments based on misinformation about the NERR to influence your decision on this NERR designation.

The North Inlet/Winyah Bay area would be a worthy addition to the National Estuarine Research Reserve System, and I urge you to approve this proposed NERR.

Yours very truly,

James S. Chandler, Jr.

cc: Dennis M. Allen

M-11

Response to James S. Chandler, Jr.

Comments noted: no response required.

SOUTH CAROLINA
COASTAL
CONSERVATION
LEAGUE

P.O. Box 1765
Charleston, S.C. 29402

Telephone
(803) 723-8035

December 2, 1991

Dr. John Vernberg, Director
The Baruch Institute
University of South Carolina,
Columbia, SC 29298

Dear Dr. Vernberg,

North Inlet is one of the most pristine marsh and estuary systems remaining in the United States. It is well-recognized internationally for the research projects and education programs it affords. It would clearly be in the best interest of the State of South Carolina for North Inlet to be included in the National Estuarine Research Reserve Program, and the South Carolina Coastal Conservation League strongly supports this inclusion.

Sincerely,

Dana Beach, Executive Director
SC Coastal Conservation League

M-10

Response to Dana Beach

Comments noted: no response required.

FRIENDS OF THE COAST
P.O. BOX 11665, COLUMBIA, SOUTH CAROLINA 29211
(803) 799-3847

December 2, 1991

John Vernberg, Ph.D.
Director
Baruch Marine Institute
University of South Carolina
Columbia, South Carolina 29208

Dear Dr. Vernberg:

I have had the opportunity to visit and become familiar with the North Inlet/Winyah Bay site currently being proposed as an estuarine reserve. I know of no other site on South Carolina's coast or along the coast of our southern Atlantic states which will afford better research opportunities.

The site lends itself to the mission of the National Estuarine Research Reserve Program. Not only are the waters and marshes of North Inlet undisturbed, the inclusion of Winyah Bay provides a laboratory of intense interaction between man and nature. The juxtaposition of these environments provides research opportunities to explore long term problems currently confronting us. These research opportunities are limited only by the resources available and the ingenuity of the scientific community.

I heartily endorse the creation of the North Inlet/Winyah Bay Estuarine Reserve.

Sincerely,

T.M. Copeland
Chairman

M-9

Response to T.M. Copeland

Comments noted: no response required.

The South Carolina Marine Educators Association's Endorsement
of the Proposed North Inlet/Winyah Bay National Estuarine Research Reserve

The South Carolina Marine Educators Association (SCMEA) acknowledges and fully supports the University of South Carolina and the South Carolina Coastal Council in their efforts regarding the proposed designation of the North Inlet/Winyah Bay area as a National Estuarine Research Reserve.

The primary goal of SCMEA, which is a chapter of the National Marine Educators Association, is to provide a communications network for those interested in aquatic education throughout South Carolina. This group of over 250 educators, scientists and naturalists fully recognizes the importance of estuarine education and the vital role that it plays in linking together scientists, educators and members of the general public in an effort to increase public awareness and appreciation of our coastal environment.

It is our collective responsibility to educate our youth about the vitally important role that these fragile estuarine ecosystems play. After all, these young people are our future leaders and the protectors of the environment that all too many of us have, unfortunately, taken for granted.

Therefore, be it known that the South Carolina Marine Educators Association hereby endorses the proposed National Estuarine Research Reserve plan for the North Inlet/Winyah Bay system and, through its statewide and national network of educators, scientists and naturalists, the Association will promote the establishment of this irreplaceable ecosystem as a National Estuarine Research Reserve.

Elizabeth A. Day

Elizabeth A. Day
President, SCMEA
November 27, 1991

M-8

Response to Elizabeth A. Day

Comments noted: no response required.

GEORGETOWN COUNTY
LEAGUE OF WOMEN VOTERS
P. O. BOX 18
GEORGETOWN, S. C. 29442

Nov 30 1991

Susan Durden
NOAA
Sanctuaries and Reserves Div.
1825 Conn. Ave. NW, Suite 714
Washington DC 20235

Dear Ms Durden

Our organization which consists of seventy-seven members strongly supports North Inlet - Winyah Bay area becoming a National Estuarine Research Reserve. We have been following this matter for a couple of years now and we know NERR would benefit this community.

Sincerely
Carol Winous
Member of Natural Resources Committee

M-7

Response to Carol Winous

Comments noted: no response required.

Response to Henrietta S. Wilson

Comments noted: no response required.

SOUTH CAROLINA AQUARIUM
CITY OF CHARLESTON
116 MEETING STREET
CHARLESTON, S. C. 29401
TELEPHONE (803) 724-3786
FACSIMILE (803) 724-3772

December 2, 1991

Ms. Susan Durdan
NOAA
Sanctuaries and Reserve Division
1825 Connecticut Avenue, NW, Suite 714
Washington, D. C. 20235

Dear Ms. Durdan:

On behalf of the South Carolina Aquarium, we appreciate this opportunity to comment on the designation of the North Inlet area near Georgetown, South Carolina, as a National Estuarine Research Reserve. We wholeheartedly endorse the designation of this unique biological and cultural resource as a NERR. The area is one of the great natural treasures of South Carolina and the nation. NOAA and South Carolina, through this designation, will be able to offer the public and scientists increased access to one of the finest estuarine systems for education and research.

The Baruch Institute and the Baruch Foundation are leaders in every aspect of the development of environmental education about our marine and estuarine systems in South Carolina. Many of the public and school marine education programs in South Carolina owe their beginnings to efforts that stem from the work of the Baruch staff. As the NERR system throughout the country has greatly contributed to public understanding of the marine and estuarine ecosystem, the North Inlet NERR has the potential to be a star in the national system, given the past record of the work accomplished by the Baruch staff.

The South Carolina Aquarium will be a premier environmental education institution for South Carolina. Without resources throughout the South Atlantic region such as those offered by NOAA's National Estuarine program, however, its mission would be gravely lessened. To adequately continue and strengthen environmental education efforts in the area, the NERR designation is extremely important and we hope that NOAA will recognize this critical role by the designation of North Inlet.

Sincerely,

Henrietta S. Wilson
Coordinator

cc: Mayor Joseph P. Riley
Dr. John Vernberg, Baruch Institute

M-6

SOUTH ATLANTIC FISHERY MANAGEMENT COUNCIL

1 SOUTH PARK CIRCLE, SUITE 306 CHARLESTON, SC 29407-4699

Telephone (803) 571-4366
Fax (803) 769-4520

Susan Shipman, Chairman
Curtis W. Bostick, Vice Chairman

Robert K. Mahood, Executive Director

December 13, 1991

Ms. Susan E. Durden, Regional Manager
Sanctuaries and Reserves Division
Office of Ocean and Coastal Resources Management
NOS/NOAA
1825 Connecticut Avenue, N.W.
Suite 714
Washington, D.C. 20235

Re: Proposed National Estuarine Research Reserve- North Inlet-Winyah Bay, South Carolina

Dear Ms. Durden:

The South Atlantic Fishery Management Council (SAFMC), one of eight Regional Councils established by the Magnuson Fishery Conservation and Management Act of 1976, is charged with developing and monitoring management plans for fisheries from the territorial waters of North and South Carolina, Georgia and Florida's east coast offshore to the 200-mile limit. In this regard, the SAFMC ensures that the United States obtains the best use of the fishery resources in its geographical area of responsibility. Any loss or degradation of estuarine habitat is of concern to the Council because most offshore fishery resources are directly or indirectly dependant upon these habitats.

Recognizing that all species are dependent on the quantity and environmental quality of their essential habitats, it is the policy of the SAFMC to protect, restore and develop habitats upon which all species fisheries depend, to increase their extent and to improve their productive capacity for the benefit of present and future generations. For purposes of this policy, habitat is defined to include all those things physical, chemical and biological that are necessary to the productivity of the species being managed. Further, the SAFMC is directed by the Magnuson Fishery Conservation and Management Act (MFCMA) to consider protection of habitat essential to fisheries under Council jurisdiction. The MFCMA enables the SAFMC to address habitat concerns in two fashions: through the expansion of habitat sections of fishery management plans; and through commenting directly to agencies regarding ongoing or proposed activities affecting essential habitat.

The SAFMC, pursuant to the goals and objectives of our habitat policy and our mandate through the MFCMA, endorses the designation of the North Inlet-Winyah Bay National Estuarine Research Reserve in South Carolina. The SAFMC feels that the preservation of essential estuarine nursery habitat through the reserve program is consistent with the habitat policies of the Council and will enhance achievement of the goals and objectives of fishery management plans and amendments to those plans. This program will facilitate needed research and increase public awareness of the vital role estuaries play in supporting inshore, nearshore and offshore fishery resources. Enclosed are copies of our fishery management plans and amendments that include sections identifying important fishery and habitat research several of which are applicable to the North Inlet research reserve program.

Conservation and management of our nations fishery resources in the Exclusive Economic Zone is the mandate of the Council. Without wise stewardship of habitat that supports these fisheries, the goals and objectives of fishery management plans approved by the Secretary of Commerce cannot be achieved. Thank you for the opportunity to comment.

Sincerely,

Susan Shipman

Susan Shipman
Chairman

enclosure:

cc: SAFMC Members
SAFMC Habitat AP
Kemmerer/Mager SERO
Hall NMFS/NOAA
Graham DOC/NOAA
Vernberg Baruch Inst.USC

M-5

Response to Susan Shipman

Comments noted: no response required.

Response to Robert H. Mitchell, Jr.

Comments noted: no response required.

DeBordieu Property Owners Association, Inc.
Post Office Box 1673
Pawleys Island, S. C. 29585

December 12, 1991

Ms. Susan Durden
NOAA Sanctuaries and Reserve Division
1825 Connecticut Ave NW, Suite 714
Washington, DC 20235

Re: North Inlet/Winyaw Bay NERR

Dear Ms. Durden:

Wendell Hinson, representing the DeBordieu Property Owners Association ("DPOA", an independent homeowners association), attended the public hearing recently and reported to us concerns raised at that meeting relating to public access.

We have been briefed from time to time by Stuart Hope, one of two members from DeBordieu on the committee to draft the management plan. DPOA had two main concerns in the beginning. One, that the present public usage of the North Inlet area not be changed and, secondly, that the DeBordieu canal system not be subjected to any addtional control over that presently in effect.

Mr. Hope has relayed to us the cooperation that was extended to the committee members in answering their concerns and the efforts that were extended to all parties to make the plan address these concerns in very specific language.

Specifically, as respects DeBordieu, the plan's language that all traditional uses will not be changed seems to be clear and unambiguous. The fact the DeBordieu canal system was not included in the research reserve answered the other concern we had.

We have reviewed the proposed plan and feel that it is something we can and do support.

Sincerely yours,

Robert H. Mitchell, Jr.
President

cc: Dr. F. John Vernberg
Stuart Hope
Windell Hinson

YOUR INDEPENDENT PROPERTY OWNERS ASSOCIATION

M-4

South Carolina Water Resources Commission

1201 Main Street, Suite 1100 ☐ Columbia, S.C. 29201 ☐ Telephone (803) 737-0800

Alfred H. Vang
Executive Director

December 2, 1991

Dr. John Vernberg
Baruch Institute
University of South Carolina
Columbia, South Carolina 29208

Dear Dr. Vernberg:

I am writing to support your effort to have North Inlet established as a NOAA Marine Estuarine Research Reserve. Over the years I have followed the work fostered by the Baruch Institute. As an agency we have made use of your research and have hired employees who learned their scientific methodology there.

The long period of data collection for North Inlet is of the utmost value. It gives us an opportunity for estuarine research that exists in comparable form in few other places, none in the Southeast that I am aware of.

Too often I hear in my end of the water business: "Let's use it all before it just runs off into the ocean." What you offer through the many years of data collection is the ability to determine just what it means to an estuary to receive less fresh water. Your information relates to droughts, but it would be the same under any condition that causes low flows. As the water planning agency for South Carolina, the Water Resources Commission must know the estuary needs. Not just an "at first blush" look, but an in depth one with real, long term data support. When there are low flows (freshwater) and animals are stressed, what difference does the quality make then? Does the level of pollution, or type (heavy metals) of pollution make any difference?

There are many other reasons for which I could personally support North Inlet as a Marine Estuarine Reserve; however, I will keep this to my official capacity. Please let me know if there is anything else I can do.

Sincerely,

Alfred H. Vang
Executive Director

AHV/kan

M3

Response to Alfred H. Vang

Comments noted: no response required.

United States Department of the Interior

OFFICE OF THE SECRETARY
Washington, D.C. 20240

In Reply Refer To:
ER 91/984

JAN 2 1992

Ms. Susan E. Durden
Regional Manager
Sanctuaries and Reserves Division
Office of Ocean and Coastal Resource Management
National Ocean Service/NOAA
1825 Connecticut Avenue, N.W., Suite 714
Washington, D.C. 20235

Dear Ms. Durden:

The Department of the Interior (Department) has reviewed the Draft Environmental Impact Statement/Draft Management Plan (DEIS/DMP) for the proposed North Inlet/Winyah Bay National Estuarine Research Reserve. The Department supports designation of North Inlet/Winyah Bay as a National Estuarine Research Reserve.

The Department's Fish and Wildlife Service (FWS) is a key resource management agency in the North Inlet/Winyah Bay geographic area. The FWS has an ongoing long-term Ecological Research project as well as many other educational and research oriented activities which have made many positive contributions to difficult resource management decisions. The establishment of this research reserve will foster the continuation of these important contributions.

The Department agrees that valuable natural resources will be protected for long-term research and education by designation of this research reserve. Moreover, applied research at the reserve will potentially benefit estuarine resource protection over a wide geographic area.

We appreciate the opportunity to comment on the DEIS/DMP for this proposed action and look forward to the future site designation. If you have any additional questions regarding our comments, you may contact Ken Havran in the Office of Environmental Affairs at 208-7116.

Sincerely,

Jonathan P. Deason
Director
Office of Environmental Affairs

M-2

Response to Jonathan P. Deason

Comments noted: no response required.

NATIONAL SCIENCE FOUNDATION
Division of Biotic Systems and Resources
Washington, DC 20550

Ecosystem Studies Program
James T. Callahan

(202) 357-9598
e-mail: jcallaha@note.nsf.gov

2 December 1991

Dr. F. John Vernberg, Director
Belle W. Baruch Institute for Marine Biology and Coastal Research
University of South Carolina
Columbia, SC 29208

Dear Dr. Vernberg:

It has come to my attention that application has been made to include the North Inlet/Winyah Bay system in the National Estuarine Research Reserve network. On behalf of the National Science Foundation's Long-Term Ecological Research and Ecosystem Studies Programs, please let me add our unqualified and enthusiastic endorsement to that application.

The research and education programs of the Baruch Institute, including those having to do with the South Carolina coast, are well recognized at both national and international levels. Inclusion in the NERR network will, undoubtedly, strengthen these programs as well as contribute substantially to national coastal research efforts. Equally, the NERR designation should have a large positive effect on state, county, and local formal and informal education programs.

Of course, the essentiality of first-class basic research to efforts aimed at improved coastal resource management goes almost without saying. The North Inlet/Winyah Bay system offers an excellent, nearly unequaled, opportunity for long-term comparative research based on the contrast between the two parts of the system, North Inlet (nearly pristine) and Winyah Bay (subject to intense human activity).

Let me conclude by saying that the North Inlet/Winyah Bay System is an irreplaceable member of the Foundation's LTER network, and will, I am sure, be equally valuable to the National Estuarine Research Reserve network.

Sincerely,

James T. Callahan

James T. Callahan, Ph.D.
Associate Program Director
Ecosystem Studies

M-1

Response to Dr. Callahan

Comments noted: no response required.

GEORGETOWN
COUNTY
SOUTH
CAROLINA

Post Office Drawer 1270
715 Prince Street
Georgetown, South Carolina 29442
Telephone (803) 546-4189
Fax (803) 546-4730

October 16, 1991

Mrs. Susan Durden
Manager of Atlantic & Great Lakes Region
Sanctuaries and Reserves Division
Office of Ocean and Coastal Resources Management
1825 Connecticut Avenue, N.W., Suite 714
Washington, DC 20235

Dear Mrs. Durden:

I have reviewed the "North Inlet/Winyah Bay Draft Environmental Impact Statement and Draft Management Plan".

Georgetown County has a Flood Damage Prevention Ordinance. This ordinance was modelled after FEMA guidelines and we are regularly inspected by FEMA to insure compliance in flood prone areas. FEMA continues to express concern the structures on the Baruch property do not comply with our ordinance. The draft report indicates the plan includes additional facilities yet it does not address whether these will conform to local ordinances. This issue places the County between FEMA and the State. 1.1

Because the property is in a flood zone FEMA expects full compliance. However, the University as an agency of the State may be exempt from local requirements, at least that appears to be the University's position. I request the issue be resolved so the County will have a clear understanding of our role.

Second, while I know the purpose of a research facility does not always reflect the public's interest in water access and recreational interests those needs are clearly evident in Georgetown County. This morning's newspaper reports that boating needs exceed available public facilities. Is it possible for the Plan to consider dedication of some property to open public access while maintaining the integrity of the Research Reserve? 1.2

Response to County Administrator, Georgetown County, South Carolina

The research laboratory destroyed by Hurricane Hugo is being constructed with support from FEMA and therefore will conform to FEMA regulations.

No plans exist to provide public access by land to accommodate boat usage of the Reserve.

Response to Bruce Rippeteau

Comments noted: no response required.

THE UNIVERSITY OF SOUTH CAROLINA

SOUTH CAROLINA INSTITUTE OF ARCHAEOLOGY AND ANTHROPOLOGY

Bruce E. Rippeteau, Ph.D.
[illegible]
State Archaeologist
Research Professor

27 November 1991

Dr. John Vernberg
Belle W. Baruch Institute
for Marine Biology and Coastal Research
EWS 609
The University of South Carolina
CAMPUS

Dear John:

The North Inlet/Winyah Bay National Estuarine Research Reserve is nearing reality and I again want to add my strong support to your efforts.

Clearly the proposed Reserve would strengthen your very large Baruch program on research in coastal areas. Also it would similarly bolster Baruch and other USC educational programs in Georgetown.

Finally, I'm for the Reserve because it would also serve to enhance protection of our submerged riverine, estuarial, and coastal cultural resources from both prehistory and history, for which, under state law, I am responsible.

North Inlet/Winyah Bay National Estuarine Research Reserve should be favorably acted upon by NOAA, in my opinion.

Sincerely,

Bruce

Bruce Rippeteau
Director and
State Archaeologist

/cs

1321 Pendleton Street • Columbia, S.C. 29208-0071 • (803) 777-8170 • 734-0567 • 799-1963

South Carolina
Wildlife & Marine
Resources Department

James A. Timmerman, Jr., Ph.D.
Executive Director
W. Brock Conrad, Jr.
Director of
Wildlife and Freshwater Fisheries

November 27, 1991

Dr. F. John Vernberg
127 South Edisto Ave.
Columbia, S. C. 29205

Dear Dr. Vernberg:

I am writing to support establishing a National Estuarine Research Reserve at North Inlet, Georgetown County.

In my work directing our Department's programs to protect endangered and threatened wildlife and critical natural areas, I have long been aware of the difficulties involved in assessing the impacts of development and discharges of various pollutants on natural ecosystems. It is almost impossible to make these assessments without having some "benchmark" area which is relatively free of disturbance. In my opinion, North Inlet is one such area, and practically the only one on the northern South Carolina coast. If North Inlet is to fulfill its potential as a control area against which the effects of management practices can be measured, it is essential that this area be afforded a high level of protection. Designation as a National Estuarine Research Reserve is certainly one way to accomplish this, and probably the best way. Contributing to the value of North Inlet as a reserve is its long history of research and baseline of existing data. The long-standing program of research carried out at the Baruch Institute has provided an irreplaceable set of reference data, which provides, in effect, a "calibration" for future research projects.

It is also noteworthy that North Inlet and adjoining properties of the Baruch Institute are part of the "Carolinian - South Atlantic Biosphere Reserve" administered by the U. S. Man and the Biosphere Program (MAB). MAB is an international program administered by UNESCO concerned with the broad question of sustainable development. The U. S. MAB program is an interagency consortium administered by the U. S. Department of State. As part of a worldwide Biosphere Reserve system, the North Inlet Estuary and Baruch Institute lands could be a focus of worldwide attention for future research.

I wholeheartedly endorse inclusion of North Inlet Estuary in the NERRS system.

Sincerely,

Thomas S. Kohlsaat
Chief, Nongame & Heritage Trust Section

Rembert C. Dennis Building ☐ P.O. Box 167 ☐ Columbia, South Carolina 29202 ☐ Telephone: 803 - 734-3886

Response to Thomas S. Kohlsaat

Comments noted. As noted by the commenter, North Inlet is part of the Man and the Biosphere Program (MAB). Because of the pristine nature of North Inlet and the existence of a long record of research, including an extensive database, the NI/WB Reserve anticipates playing an important role in MAB-related research and educational programs.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Southeast Fisheries Science Center
Charleston Laboratory
P. O. Box 12607
Charleston, SC 29422-2607

November 27, 1991

Dr. F. John Vernberg
Director, Baruch Institute
for Marine Biology and Coastal Research
University of South Carolina
Columbia, SC 29208

Dear Dr. Vernberg,

This letter is in support of inclusion of North Inlet in the National Estuarine Research Reserve System. North Inlet is an extremely valuable study site for long term research primarily because of its pristine state and the extensive and long term data base developed to characterize it. There are few, if any, remaining.

If adopted by the Reserve System, North Inlet will become part of a national network that will lead to strengthening of its research and monitoring programs. This is very important to develop the sophisticated environmental research needed. Our laboratory, as you know, is conducting long term ecological research in North Inlet. It is imperative that the estuary remain as it is for us to continue this research. Remaining the same means that no further development is allowed but also requires that traditional uses continue. The Reserve System will maintain the estuary as it is. The Reserve System will also enhance the funding of research in this area leading to improved protection of similar estuaries along our coast. All of our citizens will benefit.

Sincerely,

Robert R. Kifer
Laboratory Director

M-17

Response to Robert R. Kifer

Comments noted: no response required.

Response to Patrick Morgan

Comments noted: no response required.

The Nature Conservancy of South Carolina

2231 Devine Street, Suite 100 • P.O. Box 5475 • Columbia, South Carolina 29250 • 803/254-9049 • FAX 803/252-7134

November 27, 1991

Dr. John Vernberg
Baruch Institute
University of South Carolina
Columbia, SC 29208

RE: Proposed North Inlet/Winyah Bay National Estuarine Research Reserve

Dear Dr. Vernberg,

This letter is to show The Nature Conservancy's support of the proposed National Estuarine Research Reserve status for North Inlet/Winyah Bay. The research and educational activities associated with the NERRS program here will be of great benefit to the citizens of Georgetown County and the state of South Carolina.

The protection of undisturbed estuaries is an important state and national goal. Please call on us if the Conservancy can be of any assistance in the designation process.

Sincerely,

Patrick Morgan
Executive Director

M-16

SIERRA CLUB South Carolina Chapter
to explore, enjoy and preserve the nation's forests, waters, wildlife and wilderness
P.O. Box 12112 Columbia, SC 29211 (803) 256-8487

December 2, 1991

John Vernberg, Ph.D.
Director of Baruch Institute
Earth Water & Science Bldg.
University of South Carolina
Columbia, South Carolina

Dear Dr. Vernberg;

I am writing you in support of the National Estuarine Reserve Site proposed for North Inlet, South Carolina. The educational and research programs associated with a National Estuarine Research Site would be wonderful for South Carolina. Long-term baseline research is especially needed with our rapid coastal development.

It seems logical to build upon the research and educational foundation already established by the Baruch Institute at North Inlet. With no acquisition costs at the North Inlet location, it would seem that NOAA would be making the best use of its funding for a National Estuarine Reserve Site.

Sierra Club whole heartedly supports the establishment of a National Estuarine Reserve Site at North Inlet, South Carolina. Please keep us advised of your progress.

Sincerely,

Nancy Vinson

Nancy Vinson
Chapter Representative

M-15

Response to Nancy Vinson

Comments noted: no response required.

UNIVERSITY OF SOUTH CAROLINA

COLUMBIA, S.C. 29208

OF PUBLIC HEALTH

tional Center for Public Health Research
99
ville, South Carolina 29458
-1371 or 527-1372

December 2, 1991

r. John F. Vernberg, Director
elle W. Baruch Institute for
Marine Biology and Coastal Research
niversity of South Carolina
olumbia, SC 29208

Dear Dr. Vernberg:

I am writing to you in support of the establishment of a National Estuarine Reserve to encompass the North Inlet area of Winyah Bay. South Carolina is fortunate to have such an area available for preservation, recreation and research. There is desperate need for such an area to serve as a baseline when measuring the effects of man on the balance of South Carolina's coastline and when developing meaningful strategies for management of the coastal zone.

Our research amd training activities here at the Center address the potential for mosquito- and tick-borne disease along coastal South Carolina and the effects of the control of pest mosquitoes on the coastal environment. Since development of coastal areas often affects the mosquito/fly production in these areas (often positively), it is important that we have undisturbed areas in which to conduct research and to serve as natural classrooms for demonstrating to students the biological and economical importance of estuarine ecosystems.

This Reserve would be a unique national resource and a focus for further development of ecotourism in the Georgetown area. It should be seen as a step to preserve the quality of life now enjoyed by the area's residents.

Sincerely,

Dwight Williams
Director

M-14

Response to Dwight Williams

Comments noted. The Baruch Institute has cooperative research projects with the School of Public Health. Future research dealing with human health and environmental health is important and will be pursued. The Reserve will welcome the opportunity to continue this interaction especially in the area of vector borne diseases.

Graduate Program
MARINE BIOLOGY
A cooperative graduate program of the College of Charleston

205 Fort Johnson
Charleston, S.C. 29412
(803)795-3716

Response to Robert Karl Johnson

Comments noted: no response required.

December 2, 1991

Dr. John Vernberg, Director
Belle W. Baruch Institute
for Marine Biology
The University of South Carolina
Columbia, SC 29208

Dear Dr. Vernberg:

This is a letter in support of the proposal to establish A North Inlet/Winyah Bay National Estuarine Research Reserve. Within this system is one of the largest virtually pristine and valuable coastal wetland systems in the southeastern United States. Its value is attested to by the inclusion of the system in the National Science Foundation's Longterm Ecological Research Program. The importance and value of the system has been well documented in the continuing series of publications resulting from the LTER program. I believe that designation as a National Estuarine Research Reserve is entirely appropriate and needed. Please distribute this letter as you see fit.

Sincerely yours,

Robert Karl Johnson, Director
Graduate Program in Marine Biology

M-13

I appreciate this opportunity for input.

Sincerely,

Gordon W. Hartwig
County Administrator

GWH:kl

cc: Mr. David Cottingham
Director, Ecology & Environmental Conservation Office
U.S.Department of Commerce, Room 6814
Washington, DC 20230

Mr. Steven Synder
SC Coastal Council
Ashley Corporate Center
4130 Faber Place, Suite 300
Charleston, SC 29405

Mr. F. John Vernberg, Project Manager
Belle W. Baruch Institute
University of South Carolina
Columbia, SC 29208

Federal Emergency Management Agency
Washington, D.C. 20472

December 9, 1991

Ms. Susan E. Durden, Regional Manager
Sanctuaries and Reserves Division
Office of Ocean and Coastal Resource Management
National Oceanic and Atmospheric Administration (NOAA)
1825 Connecticut Avenue, N.W., Suite 714
Washington, D.C. 20230

Dear Ms. Durden:

This is in response to your request for comments on the Draft Environmental Impact Statement and Draft Management Plan for North Inlet/Winyah Bay National Estuarine Research Reserve. Our Regional Office in Atlanta, Georgia reviewed the draft and has provided us with comments which I have attached. Our primary concern is that any structures built as research facilities in the Reserve fully comply with the floodplain management requirements of the National Flood Insurance Program (NFIP). As indicated in the Region's memorandum, the area is a coastal high hazard area or V-zone subject not only flooding, but also to wave impacts resulting from Hurricanes. Both the original laboratories that were destroyed by Hurricane Hugo and the trailers which now temporarily house the labs appear to be constructed in violation of these requirements.

Designation of the area as a National Estuarine Research Reserve and the eligibility of the Reserve for Federal funding makes the plan subject to the requirements of Executive Order 11988, Floodplain Management (copy attached). At a minimum, this requires that NOAA use the Executive Order 11988 planning process to evaluate the plan and that any structures built in the Reserve meet the minimum requirements of the NFIP. These issues should be fully addressed in the Final EIS and management plan.

If you have any questions regarding these comments or require assistance in addressing floodplain management issues, please call me at 202-646-2717 or contact the Natural and Technological Hazards Division of FEMA's Region IV Office. The address and phone number are: 1371 Peachtree Street, NE, Suite 700, Atlanta, Georgia 30309, (404) 853-4400.

Sincerely,

Frank H. Thomas
Assistant Administrator
Office of Loss Reduction
Federal Insurance Administration

M-22

Response to Federal Emergency Management Agency

The new laboratory building on the Reserve site is being constructed with partial funding from FEMA and it conforms to all FEMA regulations and those of Georgetown County and the State of South Carolina. Any future buildings will also conform to these regulations and to NFIP requirements.

EXCERPT OF FEMA LETTER OF OCTOBER 8, 1991, WHICH EXPRESSES THE AGENCY'S ON-GOING CONCERN

7. Baruch Lab- It is unclear as to what the data submitted actually means. The State's legal opinion, number 4439, seems to indicate that the State is required to comply with regulations and ordinances governing construction, but not subject to the enforcement provisions of the local ordinance. Local governing bodies must apply to the courts for injunctive or other relief when it's ordinances are violated.

The County Attorney should offer his interpretation of these issues. The County must monitor all development at the Laboratory site to insure the provisions of the local ordinance are being adhered to and provide a status report to this office.

DEPARTMENT OF THE ARMY
CHARLESTON DISTRICT CORPS OF ENGINEERS
P.O. BOX 919
CHARLESTON, S.C. 29402-0919

REPLY TO ATTENTION OF

December 9, 1991

Planning Branch

Ms. Susan S. Durden, Regional Manager
Sanctuaries and Reserves Division
Office of Ocean and Coastal Resources Mgmt
National Ocean Service/NOAA
1825 Connecticut Ave., N.W. - Suite 714
Washington, DC 20235

Dear Ms. Durden:

The Charleston District has reviewed the North Inlet/Winyah Bay National Estuarine Research Reserve, Draft Environmental Impact Statement (EIS) and Management Plan with particular focus on the relationship of the proposed action to Corps of Engineers activities in the Winyah Bay area. The following observation and recommendation are provided.

Due to increasing scarcity of upland dredged disposal sites for Winyah Bay channel maintenance dredging, the S.C. State Ports Authority has recently completed a ranking of twenty (20) alternative dredge disposal sites for potential future use (Winyah Bay Dredged Material Placement Study: Initial Alternative Site Ranking October 1991). Four of the sites ranked are within the proposed North Inlet/Winyah Bay National Estuarine Research Reserve. Because of their effect on wetlands and open water areas, these four sites dropped from initial consideration but there is high probability that these sites will be required in the future as upland disposal sites become even more scarce. In Appendix C of the Draft EIS (Federal Register) it is stated in some detail on page 29942 Sec. 921.1 that habitat manipulation activities will be carefully limited in the proposed reserve. This Section does not specifically mention dredge disposal, but we believe that the four sites referred to above, which have not been designated for dredge disposal to date, would be prevented. Because of the high probability that at least one of these four sites will be necessary for future maintenance of the Federal channel through Winyah Bay to Georgetown, some provision should be incorporated into the Management Plan to allow for the future establishment of disposal sites. The appropriate NEPA considerations could be accomplished at that time.

Response to Planning Branch, Department of the Army, Charleston District Corps of Engineers

The Management Plan recognized the importance of the Georgetown Port and the continued maintenance of the shipping channel. Page 71 of the Management Plan states: "Under State and Federal guidelines, no dredging or other disturbances of marsh vegetation would be allowed here even if the Reserve did not exist. If these guidelines are changed, the goals of the Reserve would not be altered in that one of the research objectives is to compare ecological responses of a man-influenced estuary (Winyah Bay) with an undisturbed estuary (North Inlet). Hence the establishment of the Reserve would not limit the maintenance of existing shipping channels."

The North Inlet/Winyah Bay NERR, therefore, acknowledges the possible future need for dredged material disposal areas within the Winyah Bay portion of the Reserve, whether existing or yet to be identified, and will abide by any decision to develop and use such sites made under State and Federal laws and the SC Coastal Management Program.

If provisions for future disposal sites within the boundary cannot be made, then the Charleston District would like to be consulted concerning the adverse impacts that the Reserve would have on the Georgetown Harbor project. We would like to reach some consensus on the Reserve and its potential for adverse impacts before the final EIS is filed. Thank you for the opportunity to review the Draft EIS and if you should have any questions concerning this comment and recommendation, please contact Mr. Jim Woody of my staff at 803/724-4264.

Sincerely,

Richard Jackson

Richard M. Jackson, P.E.
Chief, Planning Branch

Copy furnished:
David Cottingham, Director
Ecology and Environmental Conservation
Office
Dennis Barnett, CESAD-PD-R

south carolina state ports authority
Dock Road, State Pier 31, P.O. Box 601, Georgetown, South Carolina 29442, Telephone: (803)527-4476

D. Claude Baker
DIRECTOR

November 20, 1991

Dr. F. John Vernberg
Director, Baruch Institute
University of South Carolina
Columbia, South Carolina 29208

Dear Dr. Vernberg:

As per our telephone conversation today attached you will find the revision as pertains to Industrial and Port Related item under Paragraph B, Section C, on page 70 and 71 of the published Management Plan of the most recent draft to the National Estuarine Research Reserve in North Inlet Winyah Bay.

Sincerely,

D. Claude Baker
Director

Enclosure

DCS:dts

port of georgetown

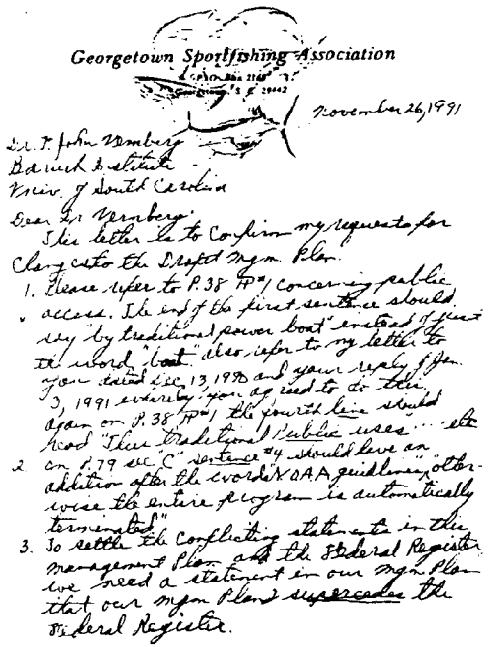
M-26

Response to SC State Ports Authority

To clarify this section of the management plan the following changes were made. The Management Plan now reads as below:

No industrial activities occur or are allowed on Hobcaw Barony, although designated dredge spoil sites have existed elsewhere on B.W. Baruch Foundation uplands bordering Winyah Bay since 1968; these sites are not part of the Reserve. It is not the intent, objective nor desire of the NI/WB NERRS to interfere with the use of these spoil sites by the South Carolina State Ports Authority. The shipping lanes adjacent to the southwestern border of the Winyah Bay portion of the Reserve are used extensively for activities related to industries located in Georgetown, as well as import/export activities centered at the Port of Georgetown. Industries located in Georgetown which are dependent upon the continued use of the Port include Georgetown Steel, International Paper, Santee Cement and AKZO Salt, all of which are important to the local and regional economy. In addition, future potential long-term Port users and transit type cargoes under long-term contracts may consist of lumber, ore, scrap metals and general cargo which have been handled in the past. In order to maintain the shipping channel at the authorized depth, the U.S. Army Corps of Engineers must dredge the channel on a regularly scheduled basis. The creation of the Reserve will not alter the current or future use of any of those areas designated for dredged spoils. The Reserve Draft Management Plan does not call for a change from existing or traditional uses of the areas of the Reserve. It is not the intent, goal nor desire of the Reserve to restrict shipping and dredging activities of the Port of Georgetown which provide a major portion of Georgetown's industrial-based economy. The proposed NI/WB NERR is unique in the U.S. in that no other NERR is located in such close proximity to Federally maintained shipping channels. One of the objectives of the Reserve is to study the relationship between natural ecosystems and these shipping/industrial activities in order to establish an information base for the wise management and coexistence of both in the future. Hence the establishment of the Reserve would not limit the maintenance of existing shipping channels.

In addition see the response to the Department of the Army, Charleston District Corps of Engineers in this document.



Georgetown Sportfishing Association

November 26, 1991

Dr. T. John Nemberg
Baruch Institute
Univ. of South Carolina

Dear Dr. Nemberg:

See letter to confirm my requests for clarification to the Draft Mgm. Plan.

1. Please refer to P. 38 ¶#1 concerning public access. The end of the first sentence should say "by traditional power boat" instead of just the word "boat". Also refer to my letter to you dated Dec 13, 1990 and your reply of Jan 3, 1991 wherein you agreed to do this. Again on P. 38 ¶#1 the fourth line should read "their traditional public uses..." etc.
2. On P. 79 sec "C" sentence #4 should have an addition after the words "NOAA guidelines" otherwise the entire program is automatically terminated."
3. To settle the conflicting statements in the management plan and the Federal Register we need a statement in our Mgm. Plan that our Mgm. Plan supersedes the Federal Register.

M-27

Response to Georgetown Sportfishing Association

The changes suggested in points 1, 4, and 5 have been made to clarify this section of the management plan. The question of public access has been addressed in the FEIS/DMP especialy in Sections I C 5., II A4 c(10), and II A 4f (8). In addition, see Resolution of SC Coastal Council (Appendix N) dealing with this issue.

Specific guidelines have been established by NOAA to deal with termination (de-designation) of the site and the NIWB plan must conform to these regulations. Hence, point 2 in your letter is not necessary.

The guidelines published in the Federal Register govern all of the NERR sites and the NI/WB plan is developed with these guidelines in mind.

P.2

Georgetown Sportfishing Association

P.O. Box 2165
Georgetown, S.C. 29442

#4 A statement needs to be made in our mgm Plan that "tidal creeks will not be closed" as research projects are needed the area can be marked so the Public can take care ~~of a voluntary basis~~ as in the past.

#5 P. 24 P#5 The first sentence in this P. should read: Present levels of traditional public uses at and adjacent to the site will continue as provided for by local, State, + Federal law.

If the above changes are made we should be able to live with the plan.

Should you have any questions on the above, my telephone number is 5462248.

Sincerely Yours,
Charles J. Stockly
603 [illegible] Dr.
Georgetown
S.C. 29440

Catherine K. McFadden
Box 618
Pawleys Island, South Carolina 29585
Dec 1, 1991

Dear Dr Vernberg,

As a resident of Waccamaw Neck, Georgetown County, we are very pleased that North Inlet and Winyah Bay is being considered as a National Estuarine Research Reserve. We feel the Federal declare to conduct research and more educational programs. Thank you for all your hard work on this endeavor.

Sincerely yours,
Catherine McFadden
Sam McFadden

M-29

Response to Catherine & Sam McFadden

Comments noted: no response required

Virginia T. Prevost
102 Buckingham Ave.
Summerville, S.C. 29485

Dr. John Vernberg
Belle Baruch Institute
USC
Columbia, S.C. 29208

Dear Dr. Vernberg,

I am writing to express my overwhelming support of the proposed NERR site for the North Inlet/Winyah Bay area in Georgetown, S.C.

My husbands' family has been in Georgetown for several hundred years and he, being raised there, has utilized the areas of the proposed NERRs designation for recreation all his life. Since we married we have both enjoyed the outstanding recreational opportunities provided by these sites. We look forward to the NERRs designation for the area and view it as an opportunity to preserve the habitat for those who wish to continue the traditional recreational uses (fishing, hunting, crabbing, oyster gathering, bird watching etc.) while providing for the continued traditional economics uses (shipping, commercial fishing, marina operation etc.).

Additionally, as an environmental educator and researcher, I view the NERRs designation as an unparalleled opportunity to ensure the continuance of an ongoing study with a data base which probably has few peers anywhere in the country. The preservation of an economic/environmental/ recreational relationship which has existed since before the turn of the century is a rare opportunity which we cannot afford to miss.

Sincerely,

Virginia T. Prevost

M-30

Response to Virginia T. Prevost

Comments noted: no response required.

Response to Cindy & Bob Renkas

Comments noted: no response required.

December 2, 1991

Susan Durden
National Oceanic & Atmospheric Administration
Sanctuaries and Reserve Division
1825 Connecticutt Ave., NW, Suite 714

Dear Ms. Durden,

We are writing in support of the Draft Management Plan developed to designate North Inlet and Mud Bay (Winyah Bay) in South Carolina as a National Estuarine Research Reserve (NERR).

Cindy is the Coordinator of the "World of Wonders ("WOW") Family Science Program" in Charleston, which is an extremely popular hands-on science education series for elementary age children and their parents to participate in together. NERR designation of the North Inlet and Winyah Bay area is a wonderful educational opportunity for the children of this area, including those in the WOW Program, to learn more about our estuarine resources.

Bob is an avid fisherman and, as such, is excited about the additional research opportunities afforded with NERR status of this area; research which will only benefit those already enjoying the recreational opportunities offered in this area and which will address issues pertinent to the future health and availability of these resources for our children.

We urge you to support the designation of North Inlet and Mud Bay as a National Estuarine Research Reserve.

Sincerely,

Cindy Renkas
1526 Kentwood Circle
Charleston, SC 29412

Bob Renkas

cc: Dr John Tenley

M-31

November 27, 1991

Susan Durden
NOAA
Sanctuaries and Reserve Division
1825 Connecticut Ave., NW, Suite 714
Washington, DC 20235

Dear Ms. Durden:

I am writing you today to urge you to establish the North Inlet/Winyah Bay area as part of the National Estuarine Research Reserve (NERR). The Georgetown area is in desperate need of such a program to promote education and research. The educational programs at the Bellefield Nature Center are always booked up within one day of the curriculum being mailed out, and there are always waiting lists for adult and children's educational classes. The word needs to get out to everyone about our unique coastal environment. The NERR program would certainly fill a void that is present here. I was amazed to hear that many children living in the city of Georgetown have never been to a marsh habitat or even the ocean, and they only live 10 miles away! The research that will also come from NERR is also greatly needed. With all the demands on our water sources from all citizens and industry, we have to increase our knowledge to insure that future generations will have a healthy environment which they can enjoy. We are very lucky to have a place such as North Inlet for all to enjoy and learn about; let's not miss this opportunity!

Thank you for your time and consideration into this matter.

Sincerely,

Ginger Ogburn-Matthews

Ginger Ogburn-Matthews
5-C Chapel Creek Villa
Pawleys Island, SC 29585

M-32

Response to Ginger Ogburn-Matthews

Comments noted: no response required.

PAWLEY'S ISLAND, S. C.
29585

1991

Dear Ms. Durden,

I am thrilled at the prospect of including Hobcaw Barony (Belle W Baruch Foundation) in the NERRS program! I've read & become familiar with the classification and have tried to explain to other Georgetown County residents just how wonderful it can be.

Anything that could expand the research and particularly the educational potential of Hobcaw is a plus. There is no other area near us that offers a site and programming

Response to Lee Gordon Brockington

Comments noted: no response required.

of even high quality. For example, the S.C. Wildlife Federation named the Nature Center director, Henry Allen, top educator of the year — last year. My child and so many others have been provided with positive leadership & a new outlook because of that area & its facilities.

I encourage you to include North Inlet in your program!

Sincerely

Lee G. Brockington

28 Nov 1991

Dear Ms Durden,

I am writing to express support for the designation of North Inlet / Mud Bay as a National Estuarine Research Reserve. I believe this is a unique opportunity to not only bring more research dollars and interest to North Inlet but also to increase the availability of educational programs for local youth. With wetland areas decreasing across the US, it is great to have a chance to set aside an area for research & study; without compromising its use for the public as a source of recreation. As I understand it, an advisory committee of local citizens will provide input to the types of research conducted in the reserve. Local participation is not only recreation but also research/education should demonstrate the value of this resource on many levels.

Thank you for your time

Susan Service
Chapel Creek SC
Pawleys Is SC 29585

M-35

Response to Susan Service

Comments noted: no response required.

12-2-91

Susan Durden
NOAA
Sanctuaries and Reserve Division
1825 Connecticut Ave., N.W, Suite 714
Washington, D.C. 20235

Ms. Durden,

I give my support to the designation of North Inlet, and most of Mud Bay (Winyah BAY), in South Carolina, as a National Estuarine Research Reserve (NERR).

M-36 There is a definite need for more research in this area.

Thank you.

Cindy Roberts
PO Box 57
Murrells Inlet, SC 29576

Response to Cindy Roberts

Comments noted: no response required.

Response to Abbie E. Johnson

Comments noted: no response required.

November 27, 1991

Ms. Susan Durden
NOAA
Sanctuaries and Reserve Division
1825 Connecticut Ave., NW, Suite 714
Washington, DC 2035

M-37

Dear Ms Durden,

I would like to express my support for the establishment of the Estuarine Reserve Program in North Inlet, South carolina. I frequently use North Inlet for fishing and recreation and I believe the reserve program can only serve to enhance and protect the existing resources for my generation and many to come. I feel my conern regarding public access to North Inlet is adequately addressed by existing state law.

Yours Sincerely,

Abbie E. Johnson

Route 4 Box 438
Georgetown, S.C. 29440

1 DEC. 1991
Rt. 4, Box 435
Georgetown, S.C.

Susan Dudden
NOAA
Sanctuaries and Reserve Division
1825 Connecticut Ave. NW, Suite 714
Washington, DC

Dear Ms. Dudden,

I am writing concerning the appointment of North Inlet as a member of the National Estuarine Research Reserve.

I realize the uniqueness of this area to the sportsmen and naturalists of Georgetown County and whole-heartedly support the designation.

The University of South Carolina and the Baruch Institute have been the primary guardians of this area for years, keeping a watchful eye for encroachment by development and missuse. I feel that no better stewards could be found to continue this job and ensure the good health of North Inlet and Winyah Bay for future generations.

Sincerely,
William V. Johnson

M-38

Response to William V. Johnson

Comments noted: no response required.

November 27, 1991

Ms. Susan Durden
NOAA
Sanctuaries and Reserve Division
1825 Connecticut Ave., NW, Suite 714
Washington, DC 2035

Dear Ms Durden,

I would like to express my support for the establishment of the Estuarine Reserve Program in North Inlet, South carolina. I frequently use North Inlet for fishing and recreation and I believe the reserve program can only serve to enhance and protect the existing resources for my generation and many to come. I feel my conern regarding public access to North Inlet is adequately addressed by existing state law.

Yours Sincerely,

Lois B. Hammon

M-39

Response to Lois B. Hammon

Comments noted: no response required.

Response to Pamelia S. Cromer

Comments noted: no response required.

Dr. Pamelia S. Cromer
Route 1, Box 481
Summerton, South Carolina 29148

December 2, 1991

To Whom It May Concern:

North Inlet and Winjah Bay are priceless treasures and need to be protected as part of our natural heritage. This is a special area and it needs to be set aside for research and to provide programs to educate children on the importance of estuaries to all life.

Sincerely,
Pamelia S. Cromer, Ed.D.

12-1-

Dear Mr. Durden,

I would like to voice my support of the proposal to designate North Inlet and Winyah Bay of Georgetown, S.C., as a National Estuarine Research Reserve.

I became keenly aware of the vast marine resources of the above noted area during the time my husband was a tug-boat Captain in Georgetown harbor. For the past thirteen years I have taught the value of our coastal area to my students. Presently, as a science teacher in Williamsburg county, I use the programs available through the Belle W. Baruch Institute for field trips and on-site studies. It would greatly enhance my curriculum to have a NERR site nearby.

Again, my full support is behind the NI/WB NERR proposal site.

Sincerely,
Cheryl Lane Watson

Response to Cheryl Lane Watson

Comments noted: no response required.

Response to C. Warren Irvin, Jr.

Comments noted: no response required.

C. WARREN IRVIN, JR., M.D.
1436 BERKELEY ROAD
COLUMBIA, SC 29205

Nov 21, 1991

Dear John.

The respect that I have for you and the entire Baruch Institute made it easy for me to accept the chair of the Board of the Baruch Institute. Your integrity, knowledge, skill and compassion for the environment is well known and appreciated throughout the community.

As a "second home" owner at your neighbor to the North, I am sure I speak for many many friends at DeBordieu to endorse and encourage the National Estuarine Research Reserve. It is comforting to us to know that your work will (and has) extend the enjoyment of all of us in the North Inlet and DeBordieu Creek.

Please give my regards to all your colleagues, but in this session especially to Dwayne and Wendy Allen who represent us so well in the Georgetown area.

Sincerely

Warren

Response to E.C. McGregor Boyle

Comments noted: no response required.

E.C. McGregor Boyle
516 Myrtle Avenue
Pawleys Island, SC 29585

November 30, 1991

Dr. F. John Vernberg
Baruch Institute
University of South Carolina
Columbia, S. C. 29208

Dear Dr. Vernberg;

This letter is written in support of the proposal on behalf of The Baruch Institute to conduct a joint study of the estuaries known as Murrels Inlet and North Inlet on the coast of South Carolina.

I have enjoyed and appreciated the recreational value of Murrels Inlet all of my life and have been concerned about the effects of increasing pressure on that habitat. The rising population, increased tourism and successful commercial development will put a strain on any environment.

In more recent years, I have become familiar with the uniqueness of North Inlet. The abundance of marine life there is a reflection of the relatively pristine conditions.

As a resident of Waccamaw Neck and a member of the Town Council of the Town of Pawleys Island, I have been encouraged by the quality of research conducted by The Baruch Institute. I feel that the expansion of this work to include Murrels Inlet and compare conditions and developments of the two areas could offer significant benefit to the entire region and beyond. Keep up the good work.

Sincerely,

E. C. McGregor Boyle

M-43

Response to Susan G. Robinson

Comments noted: no response required.

Nov. 29, 1971

Dear John -

I have read with interest of the proposed National Estuarine Research Reserve in North Inlet. What a wonderful thing that would be! You at the Belle Baruch Institute for Marine Biology & Coastal Research are doing such a fine job for there & this project seems to me to be a natural extension of your work with research, education & protection of our coastal waters.

M-44

I am interested in this project for many reasons as I love the Great Outdoors like to see everything done that can be done to protect and preserve it. Understanding it is probably the best way to developing ways to protect it.

I wish you many successful with this. It seems to be a great opportunity for good for all concerned.

Sincerely
Susan G. McElvain
(Mrs. Dorr W. McElvain
4030 Clarinda St.
Chevy Chase, D.C.
20015

STUART C HOPE
12 Lafayette Blvd West
DeBordieu Colony
Georgetown, SC 29440

Home 803-527-1023
Fax 803-527-1093

November 29, 1991

Ms. Susan Durden
NOAA
Sanctuaries and Reserve Division
1825 Connecticut Ave, NW, Suite 714
Washington, DC 20235

Re: North Inlet/Winyaw Bay NERR

Dear Ms. Durden,

I am on the committee that helped draft the management plan for the proposed NERR and represented the interests of DeBordieu Colony. This is my home and we, here at DeBordieu, were all very much interested in what effect the proposed NERR would have on our right of access and our traditional uses of the waters. One of the reasons I chose to live here was the access to North Inlet area.

The committee has been very responsive to the concerns voiced by all members charged with drafting the management plan and I am satisfied that the plan adequately addresses the initial concerns that several members had from different viewpoints. In my opinion, the language is clear and concise and does not take away from the access for traditional uses of this area.

Anyone who takes the time to read the management plan will reach the same conclusion.

This proposal certainly has my support.

With very best regards,

Stuart C. Hope

M-46

Response to Stuart C. Hope

Comments noted: no response required.

Response to Jane C. Richardson

Comments noted: no response required.

December 2, 1991

Susan Durden
NOAA
Sanctuaries and Reserve Division
1825 Connecticut Ave. N.W., Suite 714
Washington, DC 20235

Dear Mrs Durden,

I am a teacher at Kingstree Elementary School in Kingstree, SC. I teach science and I use the Belle Baruch Institute quite often. I have also helped developed a science unit which studies the Black River ecosystem. I am very much in favor of the North Inlet/Winyah Bay National Estuarine Reserve Research System. As an educator, I see the need to preserve and study these wetland areas for the benefit of future generations.

Sincerely,

Jane C. Richardson
5th grade Science
Kingstree Elementary School
500 Academy St.
Kingstree, SC 29556

M-47

Response to Charlotte Trotter

Comments noted: no response required.

December 2, 1991

Dr. F. John Vernberg
Baruch Marine Lab
P.O. Box 1630
Georgetown, S.C. 29442

Dear Dr. Vernberg,

As a resident of this area with property on DeBordieu Creek I am very much in favor of the North Inlet/Winyah Bay Area being designated as a National Estuarine Reserve.

The comparative studies of North Inlet as an undisturbed area and Winyah Bay as an area that has been disturbed are most necessary to the well being of the marine life in the coastal area and these would have a great impact on all tidal waters. In my opinion these studies are most necessary.

In addition to the scientific value of the work the Reserve would increase the availability of more educational programs and material that will provide citizens with information needed to assure a good future for this area and its resources. The Reserve would also create a means by which the public can participate in the collection and measurement of information about the special nature of the marine life in the area.

I have enjoyed many fine hours of fishing in the Creek and North Inlet as a result of a course taught by Mr. Dennis Allen at the Kimbell Center.

Sincerely,
Charlotte Trotter

November 27, 1991

Ms. Susan Durden
NOAA
Sanctuaries and Reserve Division
1825 Connecticut Ave., NW, Suite 714
Washington, DC 2035

Dear Ms Durden,

I would like to express my support for the establishment of the Estuarine Reserve Program in North Inlet, South carolina. I frequently use North Inlet for fishing and recreation and I believe the reserve program can only serve to enhance and protect the existing resources for my generation and many to come. I feel my conern regarding public access to North Inlet is adequately addressed by existing state law.

Yours Sincerely,

Joseph B Hanna Jr.

M-49

Response to Joseph B. Hanna

Comments noted: no response required.

Response to Richard H. Moore

Comments noted: no response required.

UNIVERSITY OF SOUTH CAROLINA
COASTAL CAROLINA COLLEGE
OFFICE OF GRANTS AND SPONSORED RESEARCH

P. O. Box 1954
Conway, SC 29526
Conway (803) 347-3161

P. O. Box 1954
Myrtle Beach, SC 29578
Myrtle Beach (803) 448-1481

FAX (803) 349-2990

December 2, 1991

Dr. F. John Vernberg
Belle W. Baruch Institute for Marine Biology and Coastal Research
Marine Field Lab
P. O. Box 1630
Georgetown SC 29440

Dear John,

I understand that the North Inlet - Winyah Bay system is being considered as a National Estuarine Research Reserve and would like to express my support for this proposal. As a member of the biology faculty at Coastal Carolina College I consider the North Inlet/ Winyah Bay system to be one of the finest educational and research resources in the southeast. I have often brought my classes to North Inlet or the contiguous upland areas since they provide an excellent concentration of diverse habitats within a relatively small area and can attest to the value of these experiences for my students. Although I have not conducted any research at North Inlet in the past few years, my earlier experiences there have convinced me of the importance of the system as a site for marine and estuarine research. Most recently I have been working in the upper parts of the bay including the tidal freshwaters of the Waccamaw, Black and Little Pee Dee Rivers. These habitats contain a diverse and interesting community that can provide answers to many interesting questions about the ecology, physiology and genetics of populations living at the freshwater - saltwater interface.

I have also been active in various environmental and educational groups in the community which have utilized the area for field trips and other educational activities. Our local Audubon Society has done a great deal of bird watching on and around North Inlet/ Winyah Bay. For example, the Litchfield-Pawleys Island Christmas Bird Count area, which was been censused annually for nearly 20 years, includes the upper reaches of Winyah Bay). I also know that many area teachers depend on access to North Inlet/ Winyah Bay and specially the facilities at Baruch, for environmental education experiences for school children of all grade levels.

I have also found that the waters of North Inlet and Winyah Bay provide excellent recreational, fishing and shellfish gathering opportunities and have always felt confident that such activities could coexist with research and educational activities.

I hope you are successful in having North Inlet - Winyah Bay named as a National Estuarine Research Reserve, as that designation will help preserve this beautiful and unique area for the enjoyment and benefit of all of the citizens of the region.

Sincerely,

Richard H. Moore
Professor of Biology

C:\CORRES\VERNBERG.L02

M-50

Ms. Susan E. Durden
Sanctuaries and Reserves Division
Office of Ocean & Coastal Resource Management
National Ocean Service/NOAA
1825 Connecticut Avenue, N.W.
Suite 714
Washington, DC 20235
Telephone (202)-606-4122

Ms. Durden:

I am writing to include my comments on the DEIS/DMP for the proposed North Inlet/Winyah Bay National Estuarine Research Reserve.

The Draft Management Plan, as submitted is flawed, in my opinion, in the area of public access. As worded on Page 37 of the Draft Management Plan and Page 29949 Sub Part A (921.1, c) of the Federal Register, I believe that Reserve Management will hamper, if not completely stop, free and unimpeded traditional use of this area in favor of research despite assurance to the contrary. Traditional use being not only sport hunting, fishing, and shell fishing, but other non consumptive uses as well. Having enjoyed free access to this area, I find this scenario intolerable. (1) (2)

In conclusion, I also believe that the State of South Carolina possesses the willpower and resources to protect the North Inlet/Winyah Bay Estuarine System without having to resort to Federal funding and resulting guidelines. Accordingly, I am asking that the proposed North Inlet/Winyah Bay Estuarine Research Reserve be withdrawn from consideration. (3)

Sincerely,

Russell B. Swail

cc: David Cottingham
Director
Ecology and Environmental
Conservation Office
Rm. 6814
U.S. Dept. of Commerce
Washington, D.C. 20235

M-61

Response to Russell B. Swail

1.1 The revised wording in the Draft Management Plan is: "Public access to the Reserve will follow existing practices in that the Public has access to the North Inlet and Winyah Bay portions of the Reserve by boat, including power boats. According to the law, no waterways can be restricted to public access. Since there is no evidence that the public's use of the proposed Reserve area threatens the site's ecological integrity, restrictions on access are not proposed or planned." In addition the wording of the sections on traditional uses has been clarified in response to public comments. For example, "Traditional public uses of the proposed site will not be altered. These uses include boating, fishing, observation of wildlife, swimming and recreational harvesting of oysters and clams as permitted by state laws. Traditional uses of Winyah Bay permitted by state and Federal agencies will continue, including those associated with existing shipping channels" (Executive Summary).

1.2 The wording on Page 29949 Sub Part A (921.1, c) of the Federal Register is "National estuarine research reserves shall be open to the public to the extent permitted under State and Federal law. Multiple uses are allowed to the degree compatible with the research reserve's overall purpose as provided in the management plan (see 921.13) and consistent with paragraphs (a) and (b) of this section. Use levels are set by the individual state and analyzed in the management plan. The research reserve management plan shall describe the uses and establish priorities among these uses. The plan shall identify uses requiring a state permit, as well as areas where uses are encouraged or prohibited. Consistent with resource protection and research objectives, public access may be restricted to certain areas within a research reserve." The regulations in the Federal Register do not require reserve areas to be restricted and the Draft Management Plan does not propose to restrict public access to any waterways (see 1. above).

1.3 The Draft Management Plan describes protection of the site by existing laws. No new laws or restrictive regulations on access are proposed.

E. Scott Kennedy
3071 Wild Horse Circle
Conway, SC 29526
November 27, 1991

Susan Durden
NOAA
Sanctuaries and Reserve Division
1825 Connecticut Ave., NW, Suite 714
Washington, DC 20235

Dear Ms. Durden,

I am writing to express my support for the proposed National Esturine Research Reserve Site which would be located in the North Inlet-Winyah Bay area of Georgetown, South Carolina. The program would provide much needed funding for research and educational activities already in progress at the site as well as help to maintain the system in as natural a state as possible.

It has come to my attention that a number of misinformed people of the local community are expressing their opposition to the NERRS project. These people have been led to believe that the estuary would be closed for fishing and other recreational activities if the plan were to be implemented. These are the people who would benefit most from the program. 1

In making a decision based on public support of NERRS, please consider that most of the public in opposition are people who do not have the correct information concerning the purposes and goals of the plan.

Thankyou for your consideration.

Sincerely,

E. Scott Kennedy

M-60

Response to E. Scott Kennedy

As a result of meetings with concerned citizens, a better understanding of the NERRS program has resulted. In addition the wording of the Draft Management Plan has been revised to clarify that public access will not be restricted (also see Appendix N, a Resolution passed by the SC Coastal Council which affirms the rights of public access).

UNIVERSITY OF SOUTH CAROLINA
GEORGETOWN, S. C. 29442

BELLE W. BARUCH INSTITUTE FOR
MARINE BIOLOGY AND COASTAL RESEARCH

Marine Field Laboratory
P. O. Box 1630
(803) 546-3623

SCOTT E. CHAPAL
RESEARCH DATA MANAGER
LONG-TERM ECOLOGICAL RESEARCH PROJECT

Dear Ms. Durden,

In response to the recent local outcry against the establishment of North Inlet, SC as a National Estuarine Research Reserve (NERR), I feel compelled to write you to express my professional and private opinion. Some Georgetown sportsmen have concluded that the designation of North Inlet will result in restrictions on their rights to boat, fish, or hunt in the Inlet. The Draft Management Plan calls for no such restrictions and research can be carried out in this area without the imposition of such restrictions on local sportsmen. Research has been conducted in North Inlet since 1969 without the existence of those kinds of restrictions and research can be successfully continued at North Inlet without changes in law which exclude sporting or recreational use of the Inlet. After the designation as a NERR's site, people will continue to be able to fish, clam, oyster, hunt, and boat in North Inlet pursuant to the same state laws that apply everywhere else in South Carolina. No creeks, waterways, oyster reefs or marshes will be closed. This program will not impact the the existence of Georgetown industries nor the port itself.

The establishment of the reserve will greatly enhance the ability of the Baruch Institute to acquire federal money to conduct research concerning the estuarine resources of South Carolina. The NERR's designation would be provide synergistic collaborative potential with the ongoing Long Term Ecological Research Program through the University of South Carolina. It will also focus national attention on the pristine uniqueness which is the North Inlet Ecosystem by including it in the network of NERR's sites which have been previously established all over the Coastal U.S. These other sites have managed to integrate into local life-styles and economies successfully, lending proof to the notion that these reserves and local traditional uses can coexist. Educational opportunities will evolve from the establishment of North Inlet as a reserve for local children and students, South Carolina undergraduate and graduate students, and for the public at large.

In short, the reservations held by local people seem to be unfounded and short sighted. Indeed, the establishment of the reserve can improve the quality of life in and around Georgetown. The involvement of local people in reserve issues and the development of research ideas pertinent to the area could be achieved through the creation of a local citizens advisory committee.

We at the Baruch Marine Laboratory very much look forward to the day when North Inlet becomes a National Estuarine Research Reserve. It is our intent to convince the citizenry of Georgetown that the establishment of the reserve will not prevent any traditional uses of the Inlet and that, furthermore, the area and the state of South Carolina will benefit enormously from the designation of North Inlet as a NERR's site.

1

With respect,

Scott E. Chapal

Scott E. Chapal

M-59

Response to Scott E. Chapal

After reviewing written and oral comments from numerous individuals and meeting with various groups the wording in the Draft Management Plan has been strengthened to clarify that public access will not be denied (also see appendix N for copy of resolution passed by the SC Coastal Council which also supports public access.

C. Dean Cain, Jr.
Arundel Plantation
Star Rt. 1, Box 238
Georgetown, SC 29440

Ms. Susan Durden
NOAA
Sanctuaries and Reserves Division
1825 Connecticut Ave.
NW Suite 714
Washington, DC 20235

Dear Ms. Durden:

I am writing in support of the proposed NEER project in North Inlet near Georgetown, SC. As a member of the advisory committee I have seen the formation of the project from the past to the present and am satisfied of the intent of the project.

However, I realize that our committee has some work to be done concerning wording of the intent of the project and the legal interpretation thereof. I hope that in the next proposed meeting of the advisory board these miscommunications can be handled. 1

I understand the fear and impatience the general public has with government in any form in this day and time. I am a marine fisheries manager for the State of South Carolina and have been through many situations to where people have had "traditional" privileges altered or taken away completely. So, rather wrong or right, people don't like to see changes in the present scenerio.

I realize the necessity of research and would certainly like to see Baruch become part of NEER. I have worked with the Baruch Foundation for several years and know of their renowned research performed in scientific professionalism.

Again, I support the NEER project and intend to work hard for its inception.

Sincerely,

C. Dean Cain, Jr. 12-2-91

M-58

Response to C. Dean Cain, Jr.

After reviewing written and oral comments from numerous individuals and meeting with various groups the wording in the Draft Management Plan has been strengthened to clarify that public access will not be denied (also see appendix N for copy of resolution passed by the SC Coastal Council which also supports public access.

House of Representatives

State of South Carolina

R. Linwood Altman
District No. 108-Georgetown County
Box 164
Pawleys Island, S.C. 29585

434-C Blatt Building
Columbia, S.C. 29211

Tel. (803) 734-3064

Committees:
Education and Public Works,
1st Vice Chairman
Subcommittee on Highways, Chairman
Interstate Cooperation, 1st Vice Chairman
State Bidding Procedures, Vice Chairman
Highway Oversight Joint Committee
South Carolina Coastal Council, Member

November 29, 1991

Ms. Susan Durden
N.O.A.A.
Sanctuaries and Reserve Division
1825 Connecticut Ave. Suite 714
Washington, DC 20235

Dear Ms. Durden:

I am writing in support of the classification of North Inlet/Winyah Bay area under the National Estaurine Reserve Research System.

My strong support comes from an equally strong support of my constituency in Georgetown County. This proposal has been properly addressed in well publicized public hearings.

Your favorable recommendations will be appreciated by the people of Georgetown County.

With kindest regards.

Sincerely,

R. Linwood Altman

Special Note:

My support and constituency support is contingent on perpetual access to this area for recreational activities as presently exists. 71

R. Linwood Altman

M-57

Response to R. Linwood Altman

The wording in the Draft Management Plan has been strengthened to emphasize public access to North Inlet via the tidal waterways will not be restricted. In addition the SC Coastal Council has passed a resolution (Appendix N) ensuring public access.

The Belle W. Baruch Foundation
BELLEFIELD PLANTATION
P. O. BOX 578
GEORGETOWN, SOUTH CAROLINA 29442

25 November, 1991

Mrs. Susan Durden
Manager of Atlantic and Great Lakes Region Sanctuaries and Reserves Division
Office of Ocean and Coastal Resource Management
1825 Connecticut Avenue N.W.
Washington, DC 20235

Dear Mrs. Durden:

Subject: Proposed North Inlet/Winyah Bay National Estuarine Research Reserve

Portions of this proposed Estuarine Research Reserve involves privately owned property. Because of this fact, the following questions are in need of answers:

1. What are the responsibilities of private land owners in a National Estuarine Research Reserve relative to land use, access across private lands to estuarine areas, etc?

2. What are the responsibilities of the agencies involved in the development of the proposed estuarine research reserve to the private land owners involved?

Your reply to these questions will be helpful and appreciated.

Sincerely yours,

J. E. Halpin
Trustee

Please reply to:
J. E. Halpin
228 Holiday East
Clemson, SC 29631-1455

M-56

Response to J.E. Halpin

The responsibilities of the private land owner and the Federal/state agencies are described in the Management Plan. For example, public access is addressed in a number of sections and the policy is that access to the Reserve across private land is restricted and subject to existing policies (II A 2, II A 4 c (10), II A 4 e, II A 4 f 7, IV B 5 i). Typically policies were proposed by the Baruch Institute and subject to the approval of the Baruch Foundation. Land use of areas included in the Reserve will follow current policies which pre-date the Management Plan. The Management Plan reflects the cooperative efforts and responsibilities of agencies and the Baruch Foundation (i.e. Sections I and II).

November 27, 1991

Ms. Susan Durden
NOAA
Sanctuaries and Reserve Division
1825 Connecticut Ave., NW, Suite 714
Washington, DC 2035

Dear Ms Durden,

I would like to express my support for the establishment of the Estuarine Reserve Program in North Inlet, South carolina. I frequently use Norh Inlet for fishing and recreation and I believe the reserve program can only serve to enhance and protect the existing resources for my generation and many to come. I feel my conern regarding public access to North Inlet is adequately addressed by existing state law.

Yours Sincerely,

Maura H. Kenny

M-55

Response to Maura H. Kenny

Comments noted: no response required.

UNIVERSITY OF SOUTH CAROLINA
COASTAL CAROLINA COLLEGE
COASTAL CAROLINA COLLEGE
DEPARTMENT OF BIOLOGY

P. O. Box 1954
Conway, SC 29526
Conway (803) 347-3161

P. O. Box 1954
Myrtle Beach, SC 29578
Myrtle Beach (803) 448-1481

2 December 1991

Dr. F. John Vernberg
Belle W. Baruch Institute for Marine Biology and Coastal Research
P.O. Box 1630
Georgetown, SC 29440

Dear Dr. Vernberg:

I am writing to give my strong support to establishing the North Inlet/Winyah Bay National Estuarine Research Reserve. I have worked in this area for over seven years and recognize its uniqueness and value to the region.

North Inlet is a valuable resource for our program here at Coastal Carolina College. We use the area for a variety of classes including Marine Ecology, Wetlands Ecology and Ornithology, and non-traditional classes such as Continuing Education and Marine Science Junior Scholars. Several of the faculty also use North Inlet and the Baruch Marine Lab for our research program. I have been monitoring local littorine populations there for six years, and use the project to train students how to conduct field research.

During the past two years I have coordinated the S.C. Shorebird Survey, a state-wide monitoring program sponsored by the S.C. Sea Grant Consortium and S.C. Wildlife and Marine Resources Department. North Inlet is an important area for migratory sandpipers during fall migration, and has critical habitat for the Piping Plover (Charadrius melodus), a species protected by the Endangered Species Act. Therefore, the area deserves the recognition that it would receive by becoming part of the National Estuarine Research Reserve System.

In summary, I believe that establishment of the North Inlet/Winyah Bay National Estuarine Research Reserve would benefit the local region, as well as the scientific community in general.

Sincerely,

Christopher P. Marsh
Associate Professor

Response to Christopher P. Marsh

Comments noted: no response required.

Post Office Box 676
Murrells Inlet, S.C. 29576-0676
December 2, 1991

Dr. F. John Vernberg
P. O.Box 1630
Georgetown, South Carolina 29440

Dear Dr. Vernberg:

We wish to express our strong support for the establishment of North Inlet/Winyah Bay National Estuarine Research Reserve.

Past studies of this area show it's importance with respect to education and research programs. The establishment of the reserve will promote these activities without interfering with the traditional activities that have been carried on in the area.

We sincerely hope the reserve status is granted.

Very truly yours,
Margaret De Sousa G.W. De Sousa

Mr. snd Mrs. G. W. De Sousa

M-53

Response to Mr. and Mrs. G.W. De Sousa

Comments noted: no response required.

Response to Franklin H. Spivey

Comments noted: no response required.

7601 N. Ocean Blvd., Apt. 3-B
Myrtle Beach, SC 29572
Nov. 30, 1991

Dr. F. John Vernberg
Baruch Marine Lab
P. O. Box 1630
Georgetown, SC 29440

Dear Dr. Vernberg:

I support the designation of North Inlet/Winyah Bay as a National Estuarine Research Reserve.

It is my understanding the establishment of the North Inlet/Winyah Bay Reserve will provide additional research dollars for the area, increase the availability of more educational programs, bring National recognition to our unique coastal area and create a means by which the public can participate in collection and measurement of information about the special nature of the area.

The National Reserve would contribute greatly to our area.

Sincerely

Franklin H. Spivey

M-52

PO Box 1637
Conway, SC 29526
1 December 1991

Dr. F. John Vernberg
PO Box 1630
Georgetown, SC 29440

Dear Dr. Vernberg:

I support the establishment of the North Inlet/Winyah Bay National Estuarine Research Reserve. I believe that this will help create an unparalleled research and educational resource for our geographical region. I further understand that the traditional uses of North Inlet and Winyah Bay (such as fishing, oystering, and recreation) will be maintained after this designation.

Sincerely,

Stephen Thomas

Stephen Thomas

M-51

Response to Stephen Thomas

Comments noted: no response required.

Billy Ackerman
Hy 521 Box 43
Georgetown, SC 29442

Mark Anderson
P.O. Box 1538
Georgetown, SC 29442

Gerald L. Venton
4931 S 1st Street
Murrell's Inlet, SC 29576

Violet K. Benton
4931 S 1st Street
Murrell's Inlet, SC 29576

Herman Blake

Mildred T. Blake

Joseph L. Bulls
2316 South Bay St.
Georgetown, SC

Katherine L. Bull
2316 South Bay Street
Georgetown, SC

B.C. Campbell
4 Delbrook Road
Pawleys Island, SC 29585

Michael R. Carter, Sheriff
Georgetown County
P.O. Box 869
Georgetown, SC 29440

Charles C. Clark

James H. Cooper

D.B. Crayton

Steve Crews
2021 Ashbury St.
Georgetown, SC 29440

Arnie Cribb, Jr.
267 Rose Avenue
Georgetown, SC

Tony L. Davis
Rt. 2, Box 12C
Andrews, SC 29510

Calvin C. Dawson
Rt. 2, Box 157
Georgetown, SC 29440

Rowena J. Dawson
Rt. 2, Box 157
Georgetown, SC 29440

John B. Dawson
Rt. 2, Box 158
Georgetown, SC 29440

Helyn M. Dawson
Rt. 2, Box 158
Georgetown, SC 29440

Jimmy Dial
P.O. Box 2434
Pawleys, Island

Dwane P. Dore, Sr.
P.O. Box 414
Georgetown, SC 29442

Mr. and Mrs. C.S. Duelley
Box 8125 Maryville Station
Georgetown, SC 29440

W.D. Evans, Jr.

Anthony L. Fegin
P.O. Box 2227
Georgetown, SC 29442-2227

Harris G. Fletcha III
P.O. Box 711
Pawleys Island, SC 29585

George S. Fogel

Dale Gordon
P.O. Box 1008
Pawleys Island, SC 29585

Jemings O. Guerry
408 Wayne Street
Georgetown, SC 29440

Glemmie Haimes

David L. Hamilton, Jr.
P.O. Box 1166
Pawleys Island, SC 29585

M.G. Hammen
420 Lorii Street
Georgetown, SC 29440

Bruce Henderson
29 Husey Drive
Pawleys Island, SC 29585

Billy Hendrick

Scott Hinds
Rt. 3, Box 104
Georgetown, SC

Hugh J. Huggins, Jr.
179 Wm. Screven Rd.
Georgetown, SC 29440

Andrew Jordan
Georgetown, SC

Ronald Jordan

T.H. Lauretam
P.O. Box 477
Pawleys Island, SC 29585

Neil Lewis
P.O. Box 1679
Pawleys Island, SC 29585

John Liles
P.O. Box 239
Georgetown, SC 29440

Robert L. Lumpkin, Jr.
McNair Law Firm, PA
P.O. Drawer 418
Georgetown, SC 29442

John Madison

Kent A. McAllen
P.O. Box 1585
Pawleys Island, SC

Robert O. McCarter
P.O. Box 1305 S Causeway
Pawleys Island, SC 29585

T. McCaskill
10 Collins Street
Pawleys Island, SC 29585

Donna M. Miller

Francis K. Miller

Rhonda Morris

Louise D. Murrell
Rt. 2, Box 159
Georgetown, SC 29440

Carolyn Norris
424 Wayne Street
Georgetown, SC

Rev. Gene A. Norris

Andy K. Owens
P.O. 1, Box 702A
Georgetown, SC 29440

Carolyn A. Owens

This identical letter was received from 82 individuals.

Ms. Susan E. Durden
Sanctuaries and Reserves Division
Office of Ocean & Coastal Resource Management
National Ocean Service/NOAA
1825 Connecticut Avenue, N.W.
Suite 714
Washington, DC 20235
Telephone (202)-606-4122

Ms. Durden:

I am writing to include my comments on the DEIS/DMP for the proposed North Inlet/Winyah Bay National Estuarine Research Reserve.

The Draft Management Plan, as submitted is flawed, in my opinion, in the area of public access. As worded on Page 37 of the Draft Management Plan and Page 29949 Sub Part A (921.1, c) of the Federal Register, I believe that Reserve Management will hamper, if not completely stop, free and unimpeded traditional use of this area in favor of research despite assurance to the contrary. Traditional use being not only sport hunting, fishing, and shell fishing, but other non consumptive uses as well. Having enjoyed free access to this area, I find this scenario intolerable.

In conclusion, I also believe that the State of South Carolina possesses the willpower and resources to protect the North Inlet/Winyah Bay Estuarine System without having to resort to Federal funding and resulting guidelines. Accordingly, I am asking that the proposed North Inlet/Winyah Bay Estuarine Research Reserve be withdrawn from consideration.

Sincerely,

Neil Lewis
PO Box 1079
Pawleys Island, S.C.
29585

M-64

cc: David Cottingham
Director
Ecology and Environmental
Conservation Office
Rm. 6814
U.S. Dept. of Commerce
Washington, D.C. 20235

Response to form letter

1.1 The revised wording in the Draft Management Plan is: "Public access to the Reserve will follow existing practices in that the Public has access to the North Inlet and Winyah Bay portions of the Reserve by boat, including power boats. According to the law, no waterways can be restricted to public access. Since there is no evidence that the public's use of the proposed Reserve area threatens the site's ecological integrity, restrictions on access are not proposed or planned." In addition the wording of the sections on traditional uses has been clarified in response to public comments. For example, "Traditional public uses of the proposed site will not be altered. These uses include boating, fishing, observation of wildlife, swimming and recreational harvesting of oysters and clams as permitted by state laws. Traditional uses of Winyah Bay permitted by state and Federal agencies will continue, including those associated with existing shipping channels" (Executive Summary).

1.2 The wording on Page 29949 Sub Part A (921.1, c) of the Federal Register is "National estuarine research reserves shall be open to the public to the extent permitted under State and Federal law. Multiple uses are allowed to the degree compatible with the research reserve's overall purpose as provided in the management plan (see 921.13) and consistent with paragraphs (a) and (b) of this section. Use levels are set by the individual state and analyzed in the management plan. The research reserve management plan shall describe the uses and establish priorities among these uses. The plan shall identify uses requiring a state permit, as well as areas where uses are encouraged or prohibited. Consistent with resource protection and research objectives, public access may be restricted to certain areas within a research reserve." The regulations in the Federal Register do not require reserve areas to be restricted and the Draft Management Plan does not propose to restrict public access to any waterways (see 1. above).

1.3 The Draft Management Plan describes protection of the site by existing laws. No new laws or restrictive regulations on access are proposed.

Ms. Susan E. Durden
Sanctuaries and Reserves Division
Office of Ocean & Coastal Resource Management
National Ocean Service/NOAA
1825 Connecticut Avenue, N.W.
Suite 714
Washington, DC 20235
Telephone (202)-606-4122

Ms. Durden:

I am writing to include my comments on the DEIS/DMP for the proposed North Inlet/Winyah Bay National Estuarine Research Reserve.

The Draft Management Plan, as submitted is flawed, in my opinion, in the area of public access. As worded on Page 37 of the Draft Management Plan and Page 29949 Sub Part A (921.1, c) of the Federal Register, I believe that Reserve Management will hamper, if not completely stop, free and unimpeded traditional use of this area in favor of research despite assurance to the contrary. Traditional use being not only sport hunting, fishing, and shell fishing, but other non consumptive uses as well. Having enjoyed free access to this area, I find this scenario intolerable.

In conclusion, I also believe that the State of South Carolina possesses the willpower and resources to protect the North Inlet/Winyah Bay Estuarine System without having to resort to Federal funding and resulting guidelines. Accordingly, I am asking that the proposed North Inlet/Winyah Bay Estuarine Research Reserve be withdrawn from consideration.

Sincerely,

Jay Sims

Please See
Attached Letter

cc: David Cottingham
Director
Ecology and Environmental
Conservation Office
Rm. 6814
U.S. Dept. of Commerce
Washington, D.C. 20235

M-67

Letter from Jay Sims. In addition to sending the above letter, Jay Sims submitted the following comments:

1. The Management Plan has too many loopholes that would allow the public to be barred from creeks and waterways. This area is open to the public now and should remain open unless a natural disaster should occur. (i.e. Hugo).

2. If this area is made into a reserve it will condense public pressure into areas already overused.

3. Retail sales of fishing tackle and supplies of local merchants would be affected hurting the local economy.

4. This project has basically been hidden from the public eye for the last several years Many residents did not know about the research reserve, until the November meeting. I would like to know if the Debordieu Colony Club members knew of this reserve since they would be the reserve's neighbor to the north?

5. If this is such a great plan then why isn't the highlands of Baruch which has many Carolina bays included in the Reserve's boundaries.

Brenda Payne
P.O. Box 1608
Pawleys Island, SC 29585

Larry L. Parker

Keith Parker and Family

Robert F. Roberts
Rt. 2, Box 159
Georgetown, SC 29440

Mary L. Roberts
Rt. 2, Box 159
Georgetown, SC 29440

Cecil Rogerson
Rt. 2, Box 147
Andrews, SC 29510

J. Sale

Joe Shroer
411 Front St.
Georgetown, SC 29440

Eloise Smith

John A. Smith

Verna H. Smith

Dale Stanley
215 Lilly
Conway, SC 29526

William Tanner

Chip Taylor
1032 Front St.
Georgetown, SC 29440

Edward W. Tuttle

Craig F. Young

12 Names are illegible

BAY ORTHOPAEDIC ASSOCIATES
GENERAL AND PEDIATRIC ORTHOPAEDICS
SPORTS MEDICINE
1001 N. FRASER STREET
P.O. BOX 1777
GEORGETOWN, SOUTH CAROLINA 29442

A. MASON AHEARN, M.D., FACS
WRIGHT S. SKINNER, III, M.D.
DIPLOMATES AMERICAN BOARD OF ORTHOPAEDIC SURGERY
FELLOWS AMERICAN ACADEMY OF ORTHOPAEDIC SURGEONS

GEORGETOWN OFFICE
(803) 527-4447
MURRELLS INLET OFFICE
(803) 357-1004
FAX
(803) 527-2701

December 2, 1991

Ms. Susan E. Durden
Sanctuaries and Reserves Division
Office of Ocean and Coastal Resource Management
National Ocean Service/NOAA
1825 Connecticut Avenue NW, Suite 714
Washington, DC 20235

Dear Ms. Durden:

This letter is in regards to the DEIS/DMP for the proposed North Inlet Winyah Bay National Estuarine Research Reserve.

The draft management plan as submitted concerns me greatly in the area of public access. As noted on page 37 of the draft management plan and also, page 299 49 sub-part A (921.1,C) of the Federal Registrar the reserve management will definitely impede if not bring to a complete halt the use of this natural estuarine area for sport hunting, fishing, and shell fish gathering. (1) (2)

After what has happened in Georgetown County as far as the development of the present sanctuary regions, I am very skeptical in the fact that North Inlet will remain open to the public use if the draft management plan is accepted. I am asking that the proposed North Inlet/Winyah Bay Estuarine Research Reserve be withdrawn from consideration because of the potential for the complete loss of control of the area for public use.

Thank you for considering my request.

Sincerely,

Wright S. Skinner, III, M.D.

WSS:dm

cc: Carol Campbell, Governor of the State of South Carolina
Robin Tallon, Representative

M-69

Response to letter from W.S. Skinner

3.1 See response to letter 1.1.

3.2 See response to letter 1.2.

Response to comments from Jay Sims

2.1 The law clearly states that no waterways can be restricted to public access.

2.2 No changes in usage patterns are expected.

2.3 No evidence presented to support this contention.

2.4 Three public meetings have been held. Each was advertised in two local newspapers and each public hearing received newspaper coverage. Those individuals who attended a public hearing who wanted to be informed of the next meeting requested and received notification by mail. There is no way to know if all the residents of DeBordieu colony knew about this project, however, Mr. Hope served on the Advisory Committee as a representative of the DeBordieu Home Owners Association. In addition, some Debordieu homeowners have written letters of support.

2.5 This program pertains to estuarine research reserves. The few small freshwater upland ponds are not considered an essential portion of the North Inlet or Winyah Bay estuarine ecosystems.

CONTINUED...

THE NOVEMBER PUBLIC MEETING IN GEORGETOWN SHOULD HAVE SHOWN YOU THAT THE ONLY LOCALS IN FAVOR OF THE PLAN WERE MOSTLY THOSE EMPLOYED BY THE BARUCH INSTITUTE. EVEN THE WOMAN THAT SAID SHE REPRESENTED THE LEAGUE OF WOMEN VOTERS USE TO WORK WITH THE BARUCH INSTITUTE. THE REST OF THE PEOPLE PRESENT (BY THE SHOW OF RAISED HANDS) WHICH MADE UP THE MAJORITY, OPPOSED TO THE PLAN. ACCORDINGLY, I AM ASKING THAT THE PROPOSED NORTH INLET/ WINYAH BAY ESTUARINE RESEARCH RESERVE BE WITHDRAWN FROM CONSIDERATION.

3

SINCERELY,
MALCOLM AND SANDRA FORE
Malcolm B. Fore Jr.
Sandra Fore

C.C. DAVID COTTINGHAM
DIRECTOR
ECOLOGY AND ENVIRONMENTAL
CONSERVATION OFFICE
RM. 6814
U.S. DEPT. OF COMMERCE
WASHINGTON, D.C. 20235

M-73

MALCOLM B. FORE JR.
2222 VIOLET ST.
GEORGETOWN S.C. 29440
TELEPHONE (803)-546-9059

MS. SUSAN E. DURDEN
SANCTUARIES AND RESEARCH DIVISION
OFFICE OF OCEAN & COASTAL RESOURCE MANAGEMENT
NATIONAL OCEAN SERVICE / NOAA
1825 CONNECTICUT AVENUE, N.W.
SUITE 714
WASHINGTON D.C. 20235

SUBJECT: DRAFT MANAGEMENT PLAN FOR THE PROPOSED NORTH INLET/WINYAH BAY NATIONAL ESTUARINE RESEARCH RESERVE.

MS. DURDEN

FROM A LOCAL LEVEL HERE IN GEORGETOWN, IT APPEARS THAT THE BARUCH INSTITUTE IS PLOTTING TO USE FEDERAL MANAGEMENT POLICIES TO FURTHER THEIR AMBITIONS OF RESTRICTING PUBLIC ACCESS TO THE NORTH INLET AREA. FOR THE PAST TWENTY FIVE YEARS THE BARUCH MANAGEMENT HAS NOT BEEN FAVORABLE TO PUBLIC ACCESS IN THE NORTH INLET AREA, AND HAS CAUSED A RIGHTFUL FEELING OF MISTRUST IN MANY OF US. I FEEL THAT ONCE THE BARUCH INSTITUTE HAS AN OPTION, IN THE FUTURE, NORTH INLET WILL BE RESTRICTED FROM PUBLIC USE. 1

THE NORTH INLET AREA IS NOT IN ANY DANGER OF BEING COMMERCIALY DEVELOPED, AND THE STATE OF SOUTH CAROLINA HAS SUFFICIENT MEANS TO PROTECT ITS RESOURCES, AND THE BARUCH INSTITUTE HAS BEEN DOING WELL WITHOUT BEING ON THE FEDERAL PAYROLL. WHILE I AM ON THAT SUBJECT, THE ECONOMEY IS IN TROUBLE NOW BECAUSE OF OVERSPENDING. SHOULD THE FEDERAL OFFICES BE LOOKING FOR MORE LIABILITIES, AND PAYING SALERIES AND BENIFITS FOR JOBS THAT ALREADY EXIST WITHIN THE BARUCH INSTITUTE. 2

M-72

Response to letter from Mr. & Mrs. Fore

1. As stated in the Draft Management Plan, public access cannot and will not be restricted from the tidal waterways.

2. The protected nature of North Inlet was one of the features which make this such an appealing area for a NERR. However, another important function of a NERR is to provide a site for research and teaching. Hence having a NI/WB NERR accomplishes a number of goals.

3. Although some of the attendees at the public hearing held on November 20, 1991, expressed opposition to the establishment of the NI/WB NERR, many others wanted more information about the program since most of the attendees did not read the draft management plan or did not attend previous public hearings. Concern was expressed about access to the Reserve. Since the public hearing, the wording concerning access has been modified in the draft management plan to clarify that access to tidal waters is not prohibited. In addition, the Resolution passed by the SC Coastal Council, which is included in the present version of the Draft Management Plan (Appendix N), further supports the accessibility of these waters.

that it is the public who is being asked to surrender this area to outside control.

Rather than just opposing the PLAN without giving any input to the committee, I have chosen to make some suggestions which may make the PLAN more acceptable to the people of Georgetown. I have included the pages of the MANAGEMENT PLAN on which I have found the most troubling statements. I have marked these in RED with my comments beside them. I feel that most of the compromise SHOULD come from the Scientific and Research community, since the public already has full and unlimited use of this AREA, and many will feel that they have nothing to lose by totally opposing the Project.

Ms Durden, I would be grateful if you would send me a copy the transcript of the NOV 20 meeting, and a copy of the new MANAGEMENT PLAN when it comes out in early 1992.

Sincerely,
Danny L Shore

M-71

Danny Stone
Rt 6 Box 894
Georgetown SC
29440

Ms. Susan Buroch
Sanctuaries and Reserves Division
National Ocean Service / NOAA
1825 Connecticut Ave, N.W.
Suite 714
Washington DC 20235

Ms Buroch,

I enjoyed meeting you and Ms. Washington last Wednesday night, Nov 20, in Georgetown. I was very impressed with the fact that you were there and were interested in our views concerning this project.

First off, Let me state that I am against this plan in its present form. I find its' Access policy to have too many clauses, which in later years might be used to close off areas of North Inlet/Winyah Bay under the guise of Research and/or protectionism. I realize that there may be times when the resource may be so sensitive that the area needs to be closed, but I feel that these areas need to be as small as possible and for a short of a period as possible. I also would like to say to the Advisory Committee that this project is to provide an area for long-term Research AND to be an area that all sorts of recreational activities can take place, both Consumptive and Non-Consumptive. It is not to be construed as another Sanctuary as Baruch Lands and South Island are now. We have enough of these in Georgetown County and South Carolina already. I urge the committee to remember

M-70

Response to letter from Danny Stone

5.1 Comments noted. Statements in the Draft Management Plan have been reworded to clarify the points raised by Mr. Stone.

Provide for traditional multiple uses that are consistent with Reserve research in order to ensure the continuation of existing traditional uses described elsewhere in this document. (page 24)

The following additions were made to the Advisory Committee: representatives from SC Waterfowl Association and two representatives from general public. (page 28)

Public access to the Reserve will follow existing practices in that the Public has access to the North Inlet and Winyah Bay portions of the Reserve by boat, including power boats. According to the law, no waterways can be restricted to public access. Since there is no evidence that the public's use of the proposed Reserve area threatens the site's ecological integrity, restrictions on access are not proposed or planned. (page 35-36)

Research is one of the primary goals of the Reserve, and it is given highest priority in the management plan. Sometimes the success of a research project depends on the study site remaining undisturbed. To prevent trampling or other unnatural physical disturbances, the researcher may request that signs requesting avoidance of the study area be posted. The request would be made to the Reserve Manager and reviewed by the Advisory Committee. Typically, study plots are small and located in infrequently visited or remote areas so that public travel or access patterns would not be disturbed. An information program will be initiated to inform the public about the importance of the research sites. (page 41)

Traditional public uses of the proposed site will not be altered. These uses include boating, fishing, wildlife observation, swimming and recreational harvesting of oysters and clams as permitted by state laws. Seasonal hunting for waterfowl and rails in the tidal waterways of the Reserve is a legal activity. Traditional uses of Winyah Bay permitted by state and Federal agencies will continue, including existing shipping channels.

Public recreational activities are not allowed on the upland areas of the Hobcaw Barony. Since Hobcaw Barony is a designated wildlife refuge, no hunting or trapping is allowed on the upland portions of the property. However, the waterways are open under state and Federal jurisdiction and used by the public for boating, fishing, swimming and recreational harvesting of oysters and clams. However, seasonal hunting for waterfowl and rails in the tidal waterways of the Reserve is a legal activity. (page 74)

Access to the Reserve by land will be monitored and controlled and current access policies and regulations will be enforced. As noted previously (see Section III B) access to the Reserve's waterways by boat is a traditional use and this practice will not be altered. (page 84)

COMMENTS AND RESPONSES
PUBLIC HEARING

Comments expressed at the Public Hearing have been summarized for the sake of brevity and a complete copy of the transcript of the meeting is available upon request from the SC Coastal Council.

Mr. Stockly, Georgetown Sportfishing Association	Response to Mr. Stockly
For the record, Mr. Stockly submitted his comments in writing and these comments are included in the previous section with appropriate responses.	Comment noted; responded to in written comments section.
Mr. Dean Cain, S.C. Wildlife and Marine Resources Department	Response to Mr. Dean Cain
I am a regional marine biologist with SCWMR Department in Georgetown and a member of the NI/WB NERRS Advisory Committee. I am involved in District 9 law enforcement liaison. We have looked at laws concerning this proposal and I am convinced that Baruch neither has the authority nor the privilege to look at limiting our access in the North Inlet based on this plan. I believe that some of the changes referred to by Mr. Stockly have already been made in the plan.	Comment noted; no response necessary
Mr. Bunch	Response to Mr. Bunch
I have been working with wetlands for the past year. The Army Corps of Engineers has been working on new definitions of wetlands and new regulations are supposed to come out in January. How will these affect the NI/WB NERRS?	Any new regulations for tidally influenced wetlands will not be changed. The Army Corp's new regulations pertain to freshwater wetlands.
Mr. Chasdie, resident of Georgetown	Response to Mr. Chasdie
When I was a little boy my dad carried me to North Inlet. You was allowed to go anywhere, any time, any	No land will be taken by the federal or state government. Access to the Reserve is addressed in the Draft Management

place, out there. All I am concerned is in the future time. We, the people, are the federal government, we pay taxes for it so why should we give our lands up when we support it. I think we should still be able to come out there as we please.	Plan.
Mr. Huggins, resident of Georgetown	Response to Mr. Huggins
Expressed concern about access to Reserve.	Comment noted; revised wording concerning access has taken place as noted in previous section on written comments.
Mr. Danny Stone, Georgetown resident	Response to Mr. Danny Stone
For the record, Mr. Stone submitted his comments in writing and these comments are included in the previous section with appropriate responses.	Comments noted; responded to Mr. Stone in written comment section.
Mr. Len Fore, Georgetown resident	Response to Mr. Len Fore
Suggested everyone at public hearing read the DEIS/DMP and write a letter to somebody, call some elected officials and tell them how you feel. He was not in favor of proposal.	Comments noted. We have met with the respondent and have made several changes in the draft management plant to help address his concerns. In addition see the Resolution of the SC Coastal Council dealing with public access (Appendix N).
Mr. Malcolm Fore, Georgetown resident	Response to Mr. Malcolm Fore
The public notice of this meeting was hard to find in the newspaper. As far as I know, it was only in one newspaper. How many people here actually read this notice in the Georgetown Times? He voiced his opposition to plan for reasons expressed by Danny Stone. He urged people to contact the Governor at his home (number provided).	Comments noted. The public notice was published in the Georgetown Times and in the Coastal Observer, two local papers. We have met with the respondent and have made several changes in the draft management plant to help address his concerns. In addition see the Resolution of the SC Coastal Council dealing with public access (Appendix N).
Mr. Andy Jordan, Commercial fisherman.	Response to Mr. Andy Jordan
Concerned about access to North Inlet. "And I believe it's going to be taken away from us because if the federal	Comments noted; access issue addressed earlier. Role of federal government discussed in draft management plan.

government gets involved with it and if we are doing any harm whatsoever --- and it's up to them, they decide what kind of harm we are doing."

Mr. Paul Kenny, security officer with Baruch Foundation and research technician with USC.

Response to Mr. Paul Kenny

One of my jobs is to patrol North Inlet - I have never arrested anyone or asked one person to leave North Inlet. There is no legal basis to stop access to North Inlet by water. The management plan was created by an Advisory Committee consisting of Georgetown citizens and not by the Federal government.

Comments noted; no response necessary.

Mr. Shrower, Georgetown resident.

Response to Mr. Shrower

I am concerned about access to the Reserve. However, the other side of the coin is we have to start worrying about protecting the habitat. We have to start worrying about making sure there is fish there to fish. I would like to see that there is a way where the protection and the research that these people want to do can be done and at the same time where we can fish and where we can be insured that we are not going to get limited on our access.

Comments noted; wording on access has been changed to reflect his concerns.

Mr. Jim Ralston, Georgetown resident.

Response to Mr. Jim Ralston

I agree with the theme just heard. We need to be concerned about the future of the resources so we need research. We need to be concerned also with access to North Inlet.

What are approval procedures from this point on with this project.

1. Comments noted; research and access addressed in revised management plan.
2. Written comments can be received up to December 2nd. Comments will be addressed and a Final Environmental Impact Statement and a revised Draft Management Plan will be published before another public hearing will be held in Georgetown.

Mr. Renny Marsh, Georgetown resident.	Response to Mr. Renny Marsh
I think right now we are smothered with sanctuaries and state sanctuaries and federal sanctuaries in our area now that we are limited to certain areas that we can even go fishing and hunting anymore. And I know that this is probably a good proposal and a good thing that you are trying to do and all, but I am very concerned because I think this is just one foot in the door to smother us clean out of North Inlet, the public, and it's just one step up the ladder that's going to eventually take all our rights away from over there.	Comments noted; access and ownership discussed in revised management plan.
Ms. Betsy Haskins, Georgetown resident.	Response to Ms. Betsy Haskins
I served on the Advisory Committee as a representative from the League of Women Voters. She spoke in favor of proposal and indicated there are some misconceptions. One concerns the waters of North Inlet. They are public waters and can't be closed to the public. The League of Women Voters supports things like this because we think the public resources, what we have which belongs to all of us, should be maintained for all of us and should be enhanced. And that is the basic aim of this program.	Comments noted; no response is required.
Mr. Ed Russ, Georgetown resident.	Response to Mr. Ed Russ
Expressed concern over access.	Comments noted; access and ownership discussed in revised management plan.
Mr. Louis Cameron, Georgetown resident.	Response to Mr. Louis Cameron
I too agree that management is needed, however, we do not need the federal government ruining North Inlet. That's the bottom line.	Comment noted; management plan describes cooperative relationship between local citizens, the Baruch Foundation, the Baruch Institute, USC, and state and federal agencies.

PUBLIC HEARING - NOVEMBER 20, 1991
Georgetown, South Carolina

Place: Georgetown County Library
Georgetown, South Carolina

Time: 7:00 P.M.

Hearing held by:

F. John Vernberg, Director
Baruch Institute
University of South Carolina

H. Stephen Snyder
South Carolina Coastal Council

Mrs. Dolores Washington
Program Specialist
Sanctuaries and Reserves Division, NOAA

Hearing attended by:

1. Johny Huggins
2. Jay Sims
3. Malcolm Fore
4. Lin Fore
5. Michael Chastie
6. Calvin Richardson
7. Michael W. Flegel, Sr.
8. Brenda J. Flegel
9. Michael H. McDonald
10. Wade Wilder
11. Roger D. Jolly
12. William Conner
13. Paul Kenny
14. Bob Glenn
15. Andy Jordan
16. Levain Altman
17. Melvin Haimes
18. Charles E. Foxworth
19. Wendell Hinson
20. Benjamin L. Blake, Jr.
21. Benjamin L. Blake, Sr.
22. C. Edward Russ
23. Gene Leigh
24. Robert Yates
25. Jamie Elliott
26. R. Gary Pope
27. Terrell Mitchum
28. Rothie Altman
29. C.E. Luquire
30. Junior Cooper
31. Waitus Altman
32. Donald Kelly
33. Levon Miller
34. David Gallup
35. Keith Parker
36. S.E. Miller
37. Dean Cain
38. Ingell H. Doyle
39. Harold Zobel
40. R.H. Williams
41. Danny Norbutt
42. Richard L. Lambert
43. Edwin Jayroe
44. William M. Cribb, Jr.
45. Renee Marsh
46. Larry Holladay
47. Danny L. Stone
48. Thad Holley
49. Ray Mahaffy, Jr.
50. Keith Lunsford
51. Carl Hanson
52. Thomas L. Smith

53. Tommy Watt
54. Wayne Altman
55. Jim Ralston
56. Derek O. Nesbit
57. Vernon W. Smith
58. Vernie C. Barnhill
59. Mark Schroer
60. Betsy High
61. Bill Nauss
62. Donald Arck
63. Terry Miller
64. Judy Phelan
65. Richard Parker
66. Meg Phelan
67. Frankie S. Lambert
68. Robert D. Smith
69. Robert Lambert
70. Louie E. Cameron
71. Glenn A. Morris

Appendix N

South Carolina Coastal Council Resolution
Concerning Public Access to Waters of North Inlet and Winyah Bay.

SOUTH CAROLINA COASTAL COUNCIL

RESOLUTION

Whereas, the South Carolina Coastal Council is appointed by the General Assembly and Governor of South Carolina as the designated State agency to implement and manage the State's federally approved coastal zone management program and to coordinate the program with the National Oceanic and Atmospheric Administration (NOAA); and

Whereas, the National Estuarine Research Reserve (NERR) Program administered by NOAA is designed to select and protect representative coastal biogeographical regions throughout the nation for the purposes of research and education; and

Whereas, the Governor of South Carolina has directed the South Carolina Coastal Council, through a site-selection committee, to select for his nomination one or more sites for inclusion in the NERR System; and

Whereas, the South Carolina Coastal Council, by and through its committee, selected the North Inlet/Winyah Bay site in Georgetown County as one of the two NERR sites selected in South Carolina; and

Whereas, public comments were received in the development of a management plan for the North Inlet/Winyah Bay NERR in which citizens of Georgetown County expressed their concerns in ensuring that the tidal waters of North Inlet and Winyah Bay within the NERR boundary remain open to the public for access and recreational use.

Be it, therefore, Resolved, that when the North Inlet/Winyah Bay site is designated a National Estuarine Research Reserve (NERR) by NOAA, the following conditions shall govern use of the tidal waters:

1) All tidal waters of the State of South Carolina located within the Reserve must remain open to the public for access and recreational use, subject to rules and regulations of the State; and

2) If public access is limited by actions of any party or any governing body, then the South Carolina Coastal Council is authorized to intervene on behalf of the public by initiating appropriate legal action to restore and maintain access or by initiating procedures to remove the site from the NERR System.

Appendix O

Consistency Certification by South Carolina Coastal Council

SOUTH CAROLINA COASTAL COUNCIL

Ashley Corporate Center
4130 Faber Place
Suite 300
Charleston, S.C. 29405
(803) 744-5838
FAX 744-5847

William W. Jones, Jr.
Chairman

H. Wayne Beam, Ph.D.
Executive Director

February 24, 1992

Ms. Delores Washington
Sanctuaries and Reserves Division
NOAA/OCRM
1825 Connecticut Ave., NW, Rm. 714
Washington, DC 20235

Dear Ms. Washington:

The South Carolina Coastal Council has reviewed the Draft Environmental Impact Statement and the Draft Management Plan for the North Inlet/Winyah Bay National Estuarine Research Reserve and find the plan consistent with the S. C. Coastal Zone Management Program.

The Coastal Council looks forward to working with NOAA, the Belle W. Baruch Institute and the S. C. Wildlife and Marine Resources Department in implementing and managing South Carolina's components to the National Estuarine Research Reserve System.

Sincerely,

H. Stephen Snyder
Director of Planning
and Certification

cc: Mr. William W. Jones, Jr.
Dr. H. Wayne Beam
Mr. Christopher L. Brooks
Dr. John Vernberg