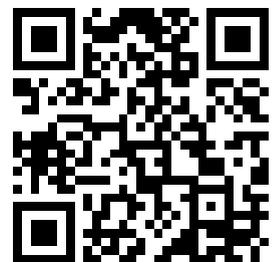


---

This is a reproduction of a library book that was digitized by Google as part of an ongoing effort to preserve the information in books and make it universally accessible.

Google™ books

<https://books.google.com>

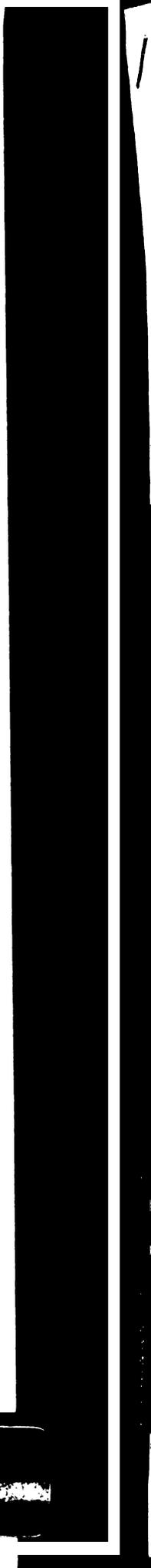


COE-NC-731203-D





3 5556 031 268519



**ENVIRONMENTAL PROTECTION AGENCY**

**REGION IV**

**1421 Peachtree Street, N. E.  
Atlanta, Georgia 30309**

**April 3, 1973**

**Colonel Albert C. Costanzo  
District Engineer  
Wilmington District, Corps of Engineers  
U. S. Department of the Army  
P. O. Box 1890  
Wilmington, North Carolina 28401**

*COE .  
0581-0*

**Dear Colonel Costanzo:**

**We have reviewed the Draft Environmental Impact Statement for the Field Research Facility of the Coastal Engineering Research Center at Duck, North Carolina, and concur that the project will have only temporary adverse effects on water quality during construction of the pier and on-shore facilities.**

**We would point out, however, that effects of the project will be short-term only if the wastewater generated at the Research Center, and boat wastes in the pier area, are adequately handled in accordance with State and Federal standards. It is, therefore, recommended that Chapter 3, "The Environmental Impact of the Proposed Action", include a statement to this effect. In addition, septic tank construction should be such that tile field drainage is above mean high water.**

**It is further suggested that precautions specified in our Agency's "Water Quality Considerations for Construction and Dredging Operations", (revised April-1971), be observed to prevent water quality problems associated with construction.**

**In another area of concern, the Statement should include a noise abatement plan for the construction phases of the project to minimize impact on the community. Also, all land clearing and construction activities should comply with municipal and State noise regulations.**

**Finally, it is suggested that the Statement include measures to comply with applicable State and local air quality standards, particularly regarding open burning and fugitive dust regulations. Further, the North Carolina State Department of Natural Resources should be consulted to ensure that all emission sources, such as incinerators, will meet State standards.**



Field Research Facility: Duck, North Carolina

(X) Draft                      ( ) Final Environmental Statement

Responsible Office: U. S. Army Engineer District, Wilmington, N. C.

1. Name of Action: (X) Administrative                      ( ) Legislative

2. Description of Action: Construction, operation, and maintenance of a field research facility to be located on a 175-acre site on the North Carolina Outer Banks approximately 1 mile north of Duck, North Carolina. The research facility will consist of an approximately 1,800-foot long ocean pier and associated on shore facilities.

3. a. Environmental Impacts: Land acquisition will remove 175 acres from the real estate market of which 9 acres will be used for on shore facilities and approximately 166 acres will be preserved in a natural state. Construction of the pier and on shore facilities would result in some increased ocean turbidity and some damage to the dunes. Aesthetics could be reduced by the presence of the facility. Pier pilings will allow attachment of marine life and serve as shelters and feeding areas for higher marine organisms. Data acquired at the research facility will enable a better understanding of shore processes.

b. Adverse Environmental Effects: During construction, there will be some destruction of the existing dunes and some disturbance of the dune line, increased turbidities that could result in temporarily decreased alga productivity and smothering of some marine organisms, and temporarily increased noise levels. Construction would cause an aesthetic degradation of the natural scenic shoreline. The pier would be a navigation obstruction to boats and, infrequently, to migrating birds and fish. There would be a permanent interruption to vehicular traffic on the beach.

4. Alternatives: Select a site other than in North Carolina; a site in North Carolina but not at Duck, N. C.; use of existing piers; a research facility of different design or different research capabilities; a research facility of smaller area; no action.

5. Comments Requested:

EPA, Region IV  
Office of Environmental Project  
Review, USDI  
Commander, Fifth Coast Guard  
District  
US Dept. of HEW, Region IV  
Region 3, Department of  
Transportation, FHA

Forest Service, USDA  
Office of Environmental Affairs,  
Atomic Energy Commission  
N. C. Clearinghouse and  
Information Center  
Greensboro Area Office, HUD  
Environmental Defense Fund, Inc.  
ECOS, Inc., Chapel Hill



Sierra Club, Joseph LeConte  
Chapter, Triangle Group  
Deputy Assistant Secretary for  
Environmental Affairs, USDC  
Conservation Council of N. C.  
National Audubon Society  
The Outer Banks Association, Inc.  
Environmental Resources Commission  
President's Air and Water  
Advisory Boards, EPA  
Duke University Marine Laboratory  
Dept. of Geology, Duke University  
Dept. of Soil Science, NC State  
University  
Cape Hatteras Anglers Club  
Research Laboratories of  
Anthropology, UNC  
Mayor, City of  
Kill Devil Hills  
Nags Head  
Manteo  
See also Responses to 13 Sep 72  
Letter, Appendix D  
Mr. Huntington Cairnes,  
Kitty Hawk, NC  
Neuse River Regional Planning  
and Development Council

Water Resources Research  
Institute, NC State University  
Wetlands and Estuaries for  
Tomorrow  
Izaak Walton League  
N. C. Wildlife Federation  
Institute of Marine Sciences,  
UNC  
The Soil Conservation Society  
of America, N. C. Chapter  
Dept. of Civil Engineering,  
Duke University  
Dept. of Civil Engineering,  
NC State University  
Project Environment  
Elizabeth City Surf Fishing Club  
Currituck Project  
Chairman, Board of Commissioners  
Dare County  
Currituck County  
Carteret County  
See also List of Attendees at  
12 Dec 72 Public Meeting,  
Appendix E  
N. C. Marine Science Council  
Mr. David Stick, Kitty Hawk, NC

6. Draft Statement to CEQ \_\_\_\_\_.  
Final Statement to CEQ \_\_\_\_\_.



**DRAFT**  
**ENVIRONMENTAL STATEMENT**

**FIELD RESEARCH FACILITY, DUCK, NORTH CAROLINA**

**Prepared by**  
**U. S. ARMY ENGINEER DISTRICT, WILMINGTON, NORTH CAROLINA**  
**8 February 1973**



TABLE OF CONTENTS

<u>Paragraph No.</u>	<u>Subject</u>	<u>Page No.</u>
1	<u>Project Description</u>	
	a. General - - - - -	1
	b. Location - - - - -	1
	c. U. S. Army Coastal Engineering Research Center (CERC) - - - - -	1
	d. Pier Specifications - - - - -	4
	e. On Shore Facilities - - - - -	5
	f. Instrumented Research Vehicle - - - - -	8
	g. On Shore Laboratory Building - - - - -	8
	h. Electrical Power - - - - -	8
	i. Communications - - - - -	9
	j. Construction Costs - - - - -	9
	k. Maintenance Requirements - - - - -	9
	l. Personnel Requirements - - - - -	9
	m. On Site Research - - - - -	9
	n. Other Activities Associated With Project - - - - -	12
	o. Project Life - - - - -	12
2	<u>Environmental Setting Without the Project</u>	
	a. North Carolina Outer Banks - - - - -	12
	b. Coastal Plain of North Carolina - - - - -	14
	c. Plant Communities - - - - -	15
	d. Animal Communities - - - - -	17
	e. Ecological Systems in Project Area - - - - -	20
	f. History of Project Area - - - - -	20
	g. Land Use - - - - -	22
3	<u>The Environmental Impact of the Proposed Action</u>	
	a. On Site Development - - - - -	23
	b. Access - - - - -	24
	c. Animal Life - - - - -	25
	d. Plant Life - - - - -	26
	e. Shoreline Processes - - - - -	26
	f. Aesthetic Quality - - - - -	27
4	<u>Any Adverse Environmental Effects Which Cannot Be Avoided Should the Proposal Be Implemented</u>	
	a. Visual - - - - -	28
	b. Traffic - - - - -	28
	c. Construction - - - - -	29
5	<u>Alternatives to the Proposed Action</u>	
	a. Alternative 1 - Select a Site Other Than the North Carolina Site - - - - -	30
	b. Alternative 2 - Select a Site in North Carolina Other Than Duck, N. C. - - - - -	35
	c. Alternative 3 - Use an Existing Pier - - - - -	37



TABLE OF CONTENTS--Continued

<u>Paragraph No.</u>	<u>Subject</u>	<u>Page No.</u>
5	<u>Alternative to the Proposed Action--Continued</u>	
	d. Alternative 4 - Use Temporary Offshore Platforms - - - - -	39
	e. Alternative 5 - Use Only a Small Portion of the 175-acre Duck, North Carolina Site -	40
	f. Alternative 6 - Take "No Action" - - - - -	41
6	<u>The Relationship Between Local Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity</u> - - - - -	44
7	<u>Any Irreversible or Irretrievable Commitment of Resources Which Would be Involved in the Proposed Action Should it be Implemented</u> - - -	44
8	<u>Coordination With Others</u>	
	a. Wilmington District Letter of 13 September 1972 - - - - -	44
	b. Public Meeting, Manteo, North Carolina, 12 December 1972 - - - - -	45
	<u>References</u> - - - - -	47

TABLE OF PLATES

		<u>Page No.</u>
PLATE I	Proposed Field Research Facility Location - - - - -	2
PLATE II	Proposed Field Research Facility Plan View - - - - -	6
PLATE III	Proposed Field Research Facility Artist's Conception - - - - -	7
PLATE IV	Aerial View of Field Research Facility - - - - -	13
PLATE V	Field Research Facility General Habitat Map - - - - -	18
PLATE VI	Proposed Field Research Facility Site Selection Studies - - - - -	33



TABLE OF CONTENTS--Continued

TABLE OF APPENDECIES

		<u>Page No.</u>
APPENDIX A	Statement of Findings - - - - -	A-1, A-2
APPENDIX B	CERC Organization and Function, ER 10-1-9 - -	B-1, B-2
APPENDIX C	Excerpts from "The Birds, Mammals, Reptiles, and Amphibians of Cape Hatteras National Seashore Recreational Area" by T. L. Quay - - - - -	C-1 - C-17
APPENDIX D	13 September 1972 Letter with Comments and Replies - - - - -	D-1 - D-37
APPENDIX E	12 December 1972 Public Meeting Exhibits - - - - -	A thru K



Draft

FIELD RESEARCH FACILITY, DUCK, N. C.

ENVIRONMENTAL STATEMENT

1. Project Description.

a. General. The project consists of construction, operation, and maintenance of a research pier and appurtenances for the U. S. Army Coastal Engineering Research Center (CERC) on 175 acres of Federal property in Dare County, North Carolina. Appendix A contains a Statement of Findings on this proposed action.

b. Location. The facility will be located on the barrier beach approximately 1 mile north of Duck, N. C. The 175 acre site is bordered by the Atlantic Ocean on the east (3300 feet) and Currituck Sound on the west (3300 feet). The lengths of the northern and southern boundaries are 2200 and 2600 feet, respectively. The land is currently owned by the United States Government and was formerly used as a practice bombing range by the United States Navy. The use of the property is currently being transferred to the United States Army Corps of Engineers. Plate I shows the general location of the project.

c. U. S. Army Coastal Engineering Research Center (CERC). The U. S. Army Coastal Engineering Research Center (CERC) was established by Congress in 1963 to replace the Beach Erosion Board which was originally established in 1930. The mission of CERC is to conduct research and development in the field of coastal engineering to provide a better understanding of coastal processes, winds, waves, tides, currents, and materials



as they apply to navigation, recreation, storm flood protection, erosion control, and shore and offshore structures. The responsibilities of CERC include conducting research on the effects of engineering activities on the ecology of the coastal zone, as well as collecting and publishing information and data concerning coastal phenomena and research projects which are useful to the U. S. Army Corps of Engineers and the public. (CERC Organization and Functions are set forth in Appendix B.)

The proposed field research facility for CERC will satisfy a pressing research need within the U. S. Army Corps of Engineers. Most of CERC's coastal engineering research has been laboratory experimentation and theoretical investigations backed by limited field work. The field work has been hampered by a lack of a dependable means of obtaining high-quality data on a continuing basis in the coastal zone. Increasing problems with beach erosion along much of the U. S. coastline (as described in the Corps' recent National Shoreline Study) have accentuated the existing requirement to establish a structure and a base of operations for the continuous collection of appropriate coastal engineering field data. These field data will be used, in conjunction with continuing laboratory and theoretical studies, to provide improved knowledge of the processes operating in the coastal zone for use in the planning, design, construction, and operation of coastal engineering projects. Since the information obtained will be published in the scientific literature and widely distributed, it will also be of significant value to other federal, state, and local agencies and educational institutions in their consideration of coastal matters.



Data obtained will be used to develop relationships between imposed wave energy and the response of the shore, and to define the hydrodynamics of wind waves in shallow water. In addition to the generalized and specific relationships derived, the facility will be used to determine exactly what, how, and over what time period field measurements should best be taken in and near the surf zone. This knowledge will make the task of acquiring the necessary data at other locations along the Atlantic, Pacific, Gulf, and Great Lakes coastlines simpler, less costly, and time consuming.

d. Pier Specifications. Specifications require a pier structure having a reinforced concrete deck supported on round concrete-filled steel shell piles. The pier will be approximately 16 feet wide and will extend approximately 1800 feet from the frontal dune line to a minimum water depth of 20 feet. This depth is required so that the pier structure will span the zone disturbed by surf in major storms.

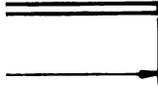
The elevation of the pier deck will be approximately 25 feet above mean low water (MLW) except for approximately 400 feet at the seaward end where the deck will be raised an additional two feet. No structural elements other than pilings extend below an elevation of 20 feet as measured from MLW.

The pier will be supported on pilings (pile bents) spaced 40 feet to 80 feet apart depending on final design. Piles placed in the water will vary from 18 to 30 inches in diameter depending on the water depth and method of construction. Those piles located on shore will be 12 inches in diameter.

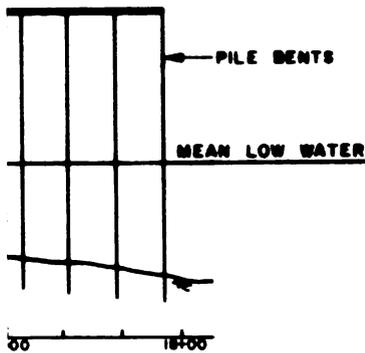


e. On Shore Facilities. Approximately 9 acres will be required for the onshore facilities. These facilities include a platform approximately 40 feet by 65 feet in size, a laboratory building of approximately 3000 square feet of floor space, a 200-foot long vehicular access ramp, approximately 1800 feet of unpaved access road 14 feet in width, a 65-foot by 50-foot unpaved parking area, and a pedestrian stairway. The research platform and laboratory building are landward of the frontal dune line. Because of the depth of the pier's decking, it will be necessary to cut permanently the frontal dune line to a maximum depth of 2 feet and a width of pier (approximately 16 feet). Dare County has an ordinance controlling dune modification. The appropriate local authorities have been consulted about the proposed change in dune profile. The access ramp, the access road, and parking area will be located at or near existing grade behind the frontal dunes. Other appurtenances include a 7-foot chain-link fence, crowned another foot with three strands of barbed wire, surrounding the on-shore facilities, a post barricade near the northern and southern property lines closing the beach to vehicular traffic, and navigation beacons at the seaward terminus of the pier. Two wooden access ramps over the frontal dunes in the vicinity of the north and south property lines will be constructed to provide a means for beach vehicles to detour around the CERC beach area by way of the existing state road across the property. Plate II shows plan and profile views of the facilities to be initially constructed at the site. Plate III shows an artist's conception of the facility.





DECK EL.=27.0(MLW)



COASTAL ENGINEERING RESEARCH CENTER  
DUCK, NORTH CAROLINA

# Proposed Field Research Facility

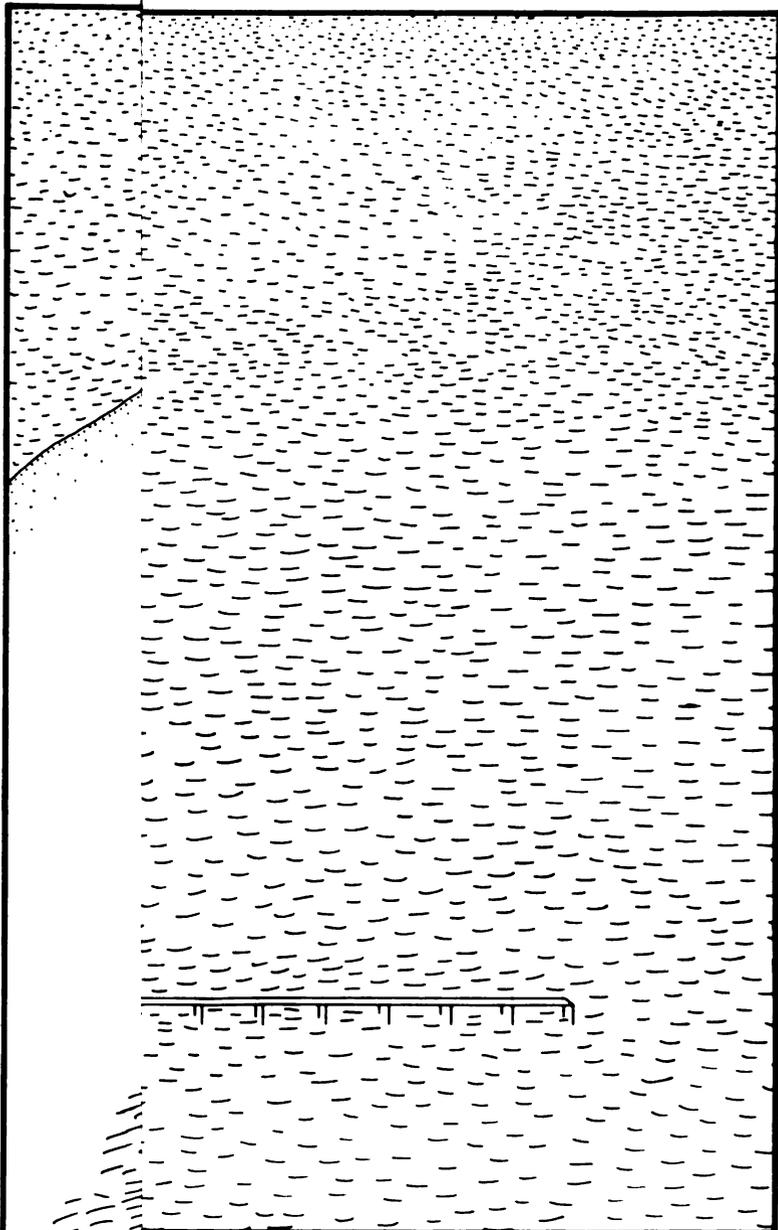
U.S. ARMY ENGINEER DISTRICT, WILMINGTON, N.C.

DRAWN BY DRW  
CHECKED BY CBF

File No.

PLATE II





COASTAL ENGINEERING RESEARCH CENTER  
DUCK, NORTH CAROLINA

# Proposed Field Research Facility

ARMY ENGINEER DISTRICT, WILMINGTON, N. C.

DESIGNED BY DRW  
CHECKED BY CBF

File No.



f. Instrumented Research Vehicle. The pier will support an instrumented research vehicle (carriage on rails) from which instruments and test equipment will be operated. The instrumented research vehicle will operate on the pier over its full width and length to obtain bottom soundings, suspended sediment samples, etc. Bottom-mounted gages to measure near shore processes will be installed in the immediate vicinity of the pier. The vehicle will be propelled by either a battery or a small gasoline engine.

g. On Shore Laboratory Building. On the platform at the shore end of the pier, a laboratory building will be constructed. This building will contain approximately 3,000 square feet of floor space and will house laboratory facilities, temporary living quarters for 6 to 10 research personnel, and a shelter for the instrumented research vehicle. The laboratory space will include a field data analysis room, computer room, coastal processes laboratory, instrumentation calibration and repair room, and a data acquisition room. The building will reach a height of 22 feet or less above the pier deck. A shallow well will be provided for water supply. Solid wastes will be collected and removed for approved disposal. Waste water will be processed by a septic tank with tile field.

h. Electrical Power. Electrical power will be utilized. Battery-operated power sources may also be used to operate the navigation aids and some research activities. The pier will not be lighted, except for the navigation beacons and occasional measurements at night. When night operations are required, lights will be used in the area of concern and these will normally be directed downward from the deck to the water.



i. Communications. Communications will be provided by telephone lines installed along the existing powerline and by other telecommunications links, such as radio or microwave transmissions.

j. Construction Costs. The construction cost of the project is estimated to be approximately 1.9 million dollars and it will take 12 - 18 months to complete. Construction of the project is scheduled to begin in late 1973 depending on the availability of Congressionally authorized funds.

k. Maintenance Requirements. Routine maintenance will be required occasionally on the access road, on the laboratory building (painting, plumbing, electricity and the like), and on the grounds. The pier should be relatively maintenance free.

l. Personnel Requirements. One or two personnel will be at the site on working days. Up to ten personnel may be at the site at any one time on a temporary basis.

m. On Site Research. On site research will include studies of the modification of waves in shallow water; turbulence, diffusion, and dispersion processes in the surf zone; storm surge water level rise; longshore current studies; correlation of longshore wave energy with sand transport; relationships between imposed wave energy and onshore and offshore movement of sand; wave run up measurements; and testing of wave gage and wave direction gage instrumentation as well as the development of other specialized instrumentation including that needed for measuring longshore current and orbital velocities in the surf zone.



Several theories have been developed to predict various aspects of the modification of waves in shallow water. Some of these theories have been tested in laboratory facilities but need to be investigated under actual sea conditions. These studies include the change in wave shape as the wave approaches the shore, especially to check the occurrence of secondary waves; study of breaker characteristics (including statistics) and the conditions under which waves of various heights and steepness break; study of relationship between wave characteristics, beach slope, and wave set-up at the beach; and study of the maximum height which wave crests reach under various wave, water level, wind, and beach conditions. In order to make the required measurements, a stable platform across the full width of the surf zone is needed. The pier is designed to fulfill this requirement.

Since it is important that measurements be made during storms, the pier should withstand any normal storm of record with only minor damage. This will enable CERC to collect data during most weather conditions and especially during storms.

To date, there has been little success in relating waves and longshore current velocities. Longshore current velocities and the incident wave characteristics will be measured to establish a relationship between the two. Continuous measurements will be made at the pier to determine amounts and rates of beach change caused by storms and the recovery from storm



effects. Information obtained in these studies will permit the prediction of the magnitude of shoreline recession during storms and the changes of the beach profile.

Over the past several years, CERC has intermittently made measurements of wave run-up on ocean beaches at various fishing piers. Additional measurements are needed with more dependable operation, especially under storm conditions. Work has been done on the correlation of longshore transport with imposed wave energy, both in the laboratory and in the field. Data will be obtained at the facility relating wave height, period, and direction at the pier to measurements of sand in suspension and sand available for longshore transport, to bed load movement, and to the longshore transport rate.

Other research will be conducted in the vicinity of the pier, both along the beach and on the sound west of the research site including the growth of wind waves, sedimentation, and storm tide development. The site will also be available for ecological studies. Wave, tide, wind and surge measurements may be made on the sound side of the island. These do not require the presence of the pier facilities and would probably be undertaken even in its absence. Limited tests and evaluations will be conducted in vegetation studies, especially in marsh and dune grass propagation, nourishment and stabilization, and on sand transport by wind. Off-site activities will also include studies of beach changes in response to wave conditions. These studies require measurement of beach profiles in the vicinity of the project and along the project area.



These programs will require the installation of a few temporary markers and monuments and a minimum of instrumentation and will be done only with the permission of the landowner.

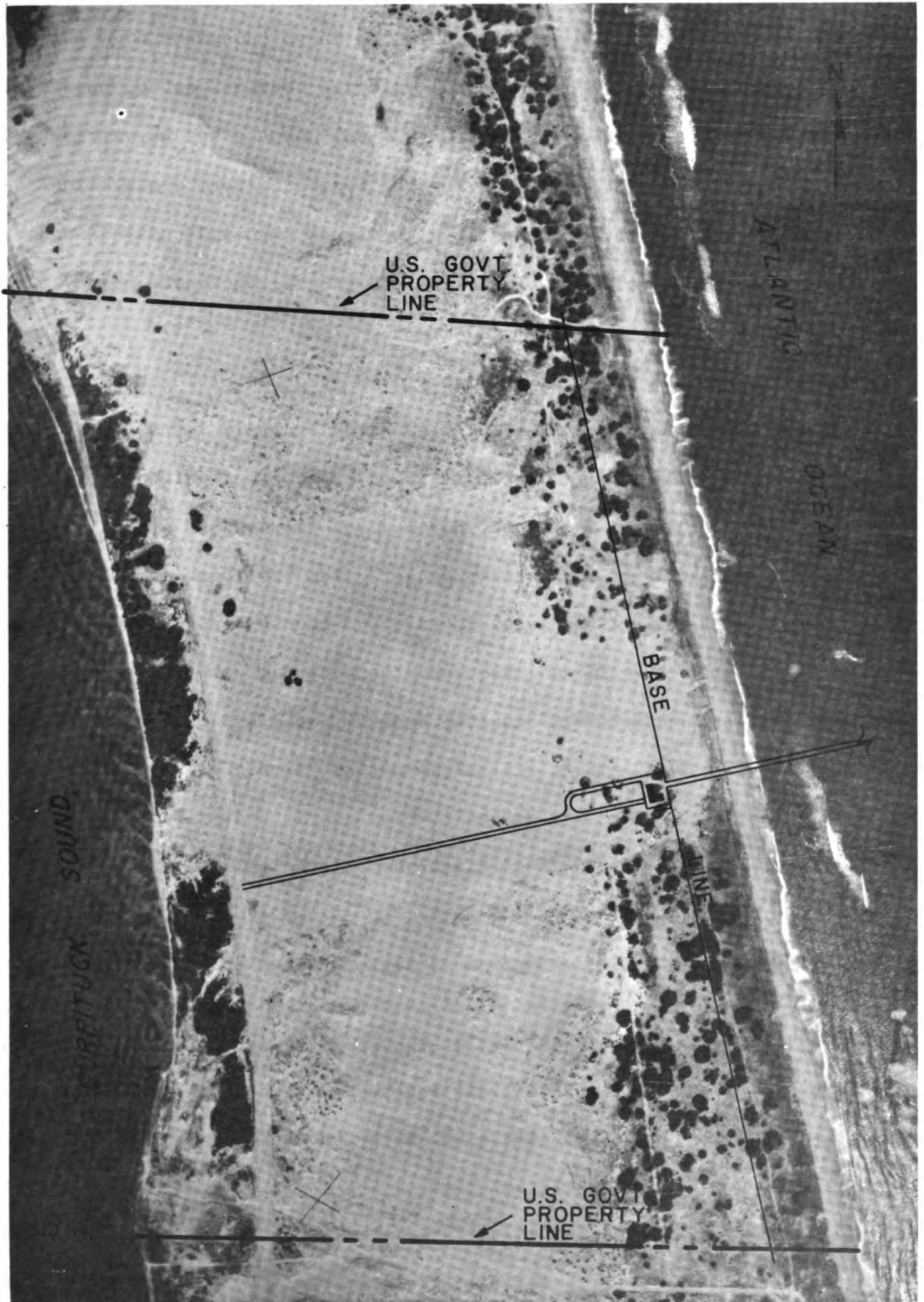
n. Other Activities Associated with Project. Personnel from other public agencies and universities involved in coastal research programs will be invited to visit and to use the facility. Recreational facilities could be implemented in conjunction with State and local agencies. Recreational uses are not compatible with most of the research activities to be conducted, and the pier will not be available for public use.

o. Project Life. The facility is designed for a project life of 40 years. Disposition of the pier and other facilities will be determined after the completion of the proposed research plans at the end of the project life.

## 2. Environmental Setting Without the Project.

a. North Carolina Outer Banks. Duck, N. C. is located on that part of the North Carolina Outer Banks extending from Virginia to Oregon Inlet, North Carolina (see Plate I & IV). The North Carolina State Line forms the boundary to the north, the Atlantic Ocean to the east, Oregon Inlet to the south, and Currituck Sound to the west. The Outer Banks to Cape Hatteras are characterized physically by sandy beaches terminating in a





**AERIAL VIEW OF FRF SITE PLATE IV**



dune line with scattered dunes and sand reaching to the westerly sounds. The shaping forces are wave activity on the ocean side, wind, and some wave activity on the sound side. The wind-generated ocean waves shape the beach while winds move the dunes and surface sands; however, sand and dune movement are restricted by overlying vegetation of varying density and type. Ponded waters of varying salinities also are found.

b. Coastal Plain of North Carolina. The research facility area is part of the Coastal Plain of North Carolina, a low and partially submerged area varying in width up to 125 miles and confined between the Piedmont Plateau on the west and the Continental Shelf on the east. A series of marine deposits, attesting to several cycles of uplift and submergence, were deposited upon the ancient rocks of the area. The source of these materials was probably adjacent portions of the Piedmont Plateau. The fluctuations in sea level in past geologic areas appear to be correlated with the Pleistocene glacial and interglacial stages, during which great quantities of water were alternately withdrawn and returned to the sea by the freezing and melting of the continental ice sheets.

The Coastal Plain area was submerged in early Pleistocene time. With each emergence and subsequent submergence, larger areas were left above the sea, and several well-defined terraces have been recognized in North Carolina. During the flooding as a result of the last interglacial stage, the seaward part of the Coastal Plain was covered by a thin mantle of the lowest of these terraces - the Pamlico. This layer, composed almost entirely of sand, was deposited by the waves and currents. When the sea finally receded during the last glacial stage (Wisconsin), the Pamlico terrace never emerged again to a level higher than its present one.



Along this emergent coast of North Carolina, with its gently sloping shore covered by the Pleistocene formations, barrier beaches have formed under wave and current action. From a geological viewpoint, this has occurred in comparatively recent times. These beaches are composed of marine deposits of sand and shells in varying mixtures. Information is not clear as to the source of this sand. At the present time, material is moving southward. One theory states that the extensive barrier beaches were formed in this manner. Another theory is that the barrier beaches developed where the slope of the former sea bottom was too gentle for shore processes to establish a profile of equilibrium on the existing slope and that nature remedied the situation by building up the sea bottom near the shore, thus increasing the bottom slope and creating a barrier beach simultaneously. (See Johnson (1965) for more detail on both theories.) The lagoons and sounds inland of the barrier beaches gradually accumulated sediment derived from erosion of the adjacent mainland and were converted to marshes. This trend is continuing at the present time.

c. Plant Communities. The Outer Banks is a distinct ecological area. Growth is difficult for most plant species due to the variable weather, windblown sand, salt spray, and unfertile, sandy soils (Burk, 1962). Some windward portions of the dune are sparsely overgrown with clumps of American beach grass Ammophila breviligulata and sea oats (Uniola paniculata). These clumps become more dense as one proceeds to the crest of the dune line and then leeward. Leeward of the dunes this grass community will eventually succeed into a thicket composed of wax myrtle (Myrica cerifera), Yaupon (Ilex vomitoria), willow (Salix sp.), and grapevines (Vitis sp.), and other species. This growth is strongly influenced by salt spray and wind-driven sand resulting in the stunted and sheared woody vegetation typical of



Along this emergent coast of North Carolina, with its gently sloping shore covered by the Pleistocene formations, barrier beaches have formed under wave and current action. From a geological viewpoint, this has occurred in comparatively recent times. These beaches are composed of marine deposits of sand and shells in varying mixtures. Information is not clear as to the source of this sand. At the present time, material is moving southward. One theory states that the extensive barrier beaches were formed in this manner. Another theory is that the barrier beaches developed where the slope of the former sea bottom was too gentle for shore processes to establish a profile of equilibrium on the existing slope and that nature remedied the situation by building up the sea bottom near the shore, thus increasing the bottom slope and creating a barrier beach simultaneously. (See Johnson (1965) for more detail on both theories.) The lagoons and sounds inland of the barrier beaches gradually accumulated sediment derived from erosion of the adjacent mainland and were converted to marshes. This trend is continuing at the present time.

c. Plant Communities. The Outer Banks is a distinct ecological area. Growth is difficult for most plant species due to the variable weather, windblown sand, salt spray, and unfertile, sandy soils (Burk, 1962). Some windward portions of the dune are sparsely overgrown with clumps of American beach grass Ammophila breviligulata and sea oats (Uniola paniculata). These clumps become more dense as one approaches to the crest of the dune line and then leeward. Leeward of the community will eventually succeed into a thicket composed of (Myrica cerifera), (Ilex vomitoria), willow (Salix) and other species. This growth is at the expense of the sand resulting in the



shrub-thicket plant community found throughout the North Carolina Outer Banks. Behind the outer protective shrub thicket, protected by both distance from the surf and a thick vegetative thicket, are found maritime forests, although such forests are not present at the site. These forests, where they occur, consist mainly of pines and live oaks with several other species, such as the forest at Buxton Woods on Cape Hatteras. (See Appendix C.)

Collier Cobb (1906) indicated that the Banks were previously more heavily vegetated with maritime forest. He wrote that at one time the Outer Banks was well forested and in some places the forest extended down to the water edge. He stated that the movement of sand (sand waves) on and from the banks, and particularly on Bodie and Hatteras Islands, was started just after the Civil War by deforesting or cutting of trees next to the shore for ship timbers. He further stated that the shore strip of the Outer Banks could be regained by reforestation and the dunes stabilized by planting native grasses.

The fact that the Outer Banks would support larger woody vegetation is indicated by the plant communities south of the research facility site at Duck, North Carolina, and perhaps a mile north of the site. Trees occur in relatively undisturbed areas with some protection from the wind and spray. Intermittent sand dunes and isolated shrubs are found in areas not covered by hardwood overgrowth. Since the wind and wind-blown sand are somewhat reduced or diverted as they proceed across the ground, thicker growth occurs near the sound side of the site.



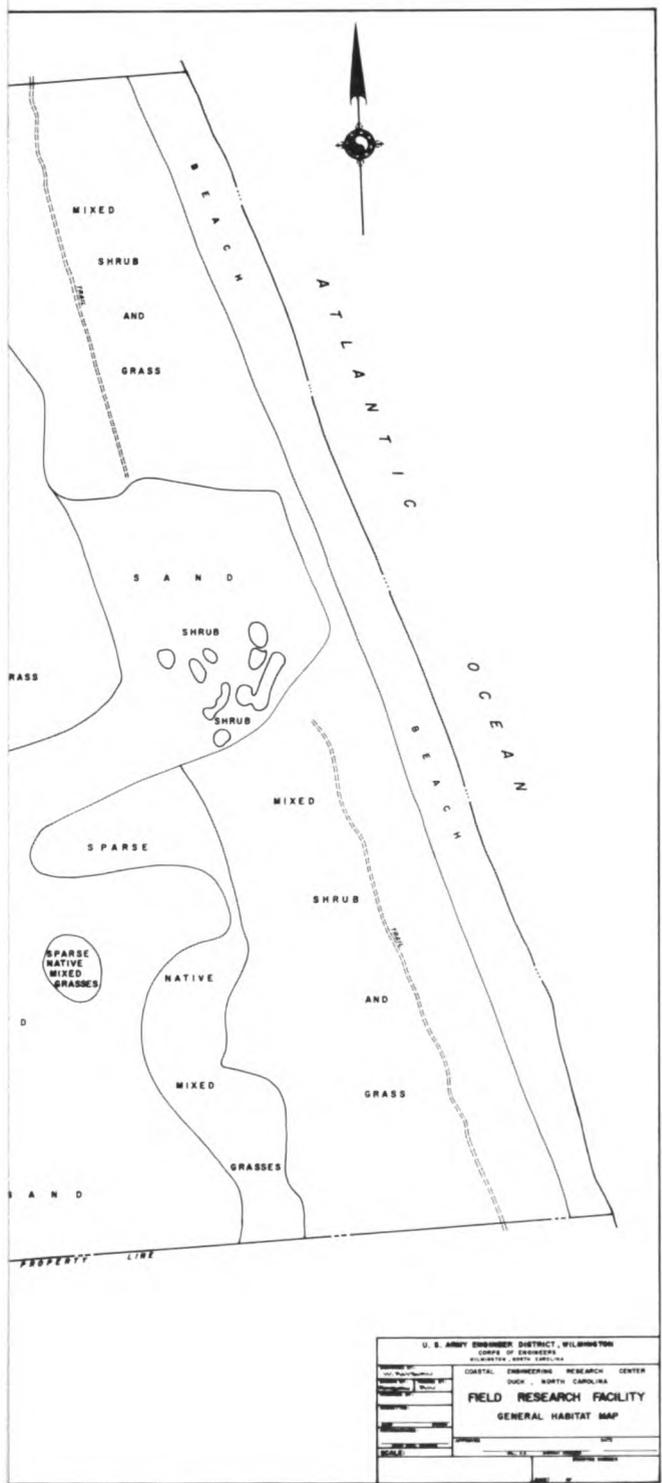
Because the Duck site has been subject to environmental disturbances, it is somewhat of an exception to the above description. There are some native shrubs and grasses behind the dunes and near the road. (See habitat map, Plate V.) The central portion of the site consists of areas of bare sand and areas of planted American beach grass. Dwarfed live oak (Quercus Virginiana) and wax myrtle (Myrica cerifera) occur on the ocean side of secondary dunes. On the more protected sound side, a thicket of red maple (Acer rubrum), choke cherry (Prunus sp.), wax myrtle, summac (Rhus sp.), green brier (Similax sp.), and blackberry (Rubus sp.) have developed. There is some evidence of pruning in this stand from effects of salt spray and wind-driven sand. The site is expected to become more vegetated with native plants and should revert to more typical dune and shrub-thicket habitat types since practice bombing has ceased.

Currituck Sound supports considerable aquatic growth, grading from freshwater flora on its northern end to brackish water flora near its connection with Albermarle Sound.

For a discussion of plant communities of the North Carolina Outer Banks, see Appendix C.

d. Animal Communities. Beach fauna must adapt to withstand the severe environmental stresses. This is particularly true in the surf zone. The predominant animals are able to withstand environmental stress by burrowing, migration, and elastic or rigid skeletal structures. The last attribute







is particularly marked in the crustaceans and molluscs which comprise the bulk of a sandy beach community (Dexter, 1969). These and other animals constitute the food base for larger predators such as shorebirds, small mammals, fish, and man. Some of the bottom feeding fish such as whiting, (Menticirrhus sp.), drums (Sciaenops sp., and Pagonias sp.), and flunders (Paralichthys spp.), are especially noteworthy because they feed on the native invertebrates in the surf zone.

Some fish migrate through the area in the Spring and Fall and are valuable to sport fishermen during those seasons, including such species as the channel bass (Sciaenops ocellata) and striped bass (Morone saxatilis). Other fish are either available as local residents or complete some portion of their life cycle in the nearshore or sound area.

Proceeding inland, insect and plant populations support a minor number of amphibians, reptiles, and mammals but a considerable number of birds. These birds are primarily migratory and often spend time in the local marsh ponds and Currituck Sound (See Quay (1959), for animals typical of the Cape Hatteras National Seashore and Brothers (1965) for reptiles and amphibians of Northeastern North Carolina). See also Appendix C.

It should be noted that the Outer Banks and especially the oligohaline waters of Currituck Sound are valuable to waterfowl, shorebirds, and other birds, as wintering and breeding grounds. Currituck Sound is relatively a fresh body of water. It supports large numbers of freshwater fish and other freshwater organisms at its upper end, where its sea connection has been lost, and more marine species at the lower and southern end where it connects to the more saline waters of Albermarle Sound. Such a set of environmental conditions results in an extremely diverse, native fauna.



For a more complete discussion of animal communities of the North Carolina Outer Banks, see Appendix C.

e. Ecological Systems in Project Area. Coastal ecological systems (after Copeland, 1970) located in the project area are: high energy beaches, benthic algal bottoms, marshes, grass flat, tide pools, oligohaline waters, and migrating stocks of fishes and other organisms. Upland areas include community types dominated by the dune vegetation and maritime shrub thicket. A habitat map is included as plate V.

Field reconnaissance of the project area did not include biological sampling. However, observations at the site indicated that some ecological damage would continue without the building of the research facility due to heavy unauthorized usage of the area by dune buggies and other human effects concomitant with land development on both sides of the site.

f. History of Project Area. The history of the area is summarized from Stick (1958) and Dunbar (1958). The first English colony was established in 1584 on Roanoke Island. The colony was resupplied several times but eventually abandoned for unknown reasons. The northern portion of the Outer Banks was used variously for a pirate's base and for raising livestock.

Hunting and fishing were performed initially for survival and later for commerce and sport. American Indians, as well as current hunters, have used the site. Stick (1958) "has found more than two dozen arrowheads and numerous potsherds in a small, now barren area near Duck."



It has been determined that no significant archeological damage will occur. This statement is made after consulting the National Register of Historic Places, the State of North Carolina's Department of Archives and History and the Research Laboratories of Anthropology at the University of North Carolina at Chapel Hill.

Duck, North Carolina, as a small fishing village, established a post office in 1909. The predominant fishery resources were eel and carp. This fishery was gradually phased out as the Chesapeake Bay region gained accessibility to the northern markets. However, Duck is one of the few villages in North Carolina that has retained a high occupational percentage of fishermen.

The area just north of Duck was used by the Navy as a bombing range from 1941-1965. The range proper is the site of the proposed research facility (see Plate IV). The location is approximately 1 mile north of Duck. Its borders are a 3300 foot easterly border on the Atlantic Ocean, a 2200 foot northerly border, a 3300 foot westerly border on Currituck Sound, and a 2600 foot southerly border. Decontamination was effected by April 1971 with ordnance removal completed by September 1971. Some inert, scrap bomb fragments remain on the site. Limited decontamination and removal was accomplished in both the Atlantic Ocean (to a distance of 500 yards, 20-foot deep) and Currituck Sound (to a distance of 200 yards). Ordnance removal required some destruction of the vegetation through the use of heavy machinery and modification of the internal topography. An attempt was made to stabilize the area by the planting of American beach grass over 23 acres, completed in April 1972. The area has been unused



since that time with access being limited through the use of posted signs, however, such signs have not been totally successful in prohibiting access to dune buggies. The area was last inspected by the U. S. Navy for the U. S. Army Corps of Engineers on 8 September 1972.

g. Land Use. The distance south of the old target site to the fishing pier at Kitty Hawk, North Carolina is approximately six miles; within this area, the Kitty Hawk Land Company has developed an area of approximately four miles known as Southern Shores, with the latest addition being Seacrest Village, also a part of Southern Shores. Southern Shores, including Seacrest Village, contains 310 ocean-front lots. Most of these lots have been sold; however, a few still remain in the name of Kitty Hawk Land Company. Within the remaining 9800 feet to the target site, there is one other subdivision known as Bay Berry Bluffs with 12 ocean-front lots along a 668 foot stretch of the beach. There is also an area adjacent to Duck, North Carolina leased to E. L. Sutherland and Roy Niel, Jr. for a tent-trailer park. This land fronts 328 feet on the ocean. The remaining 8800 feet to the site is divided among 51 owners, with the largest ocean-side tract being 564 feet long.

The land north of the target site for approximately one mile is individually owned except 1200 feet in the Sound Sea Village subdivision being developed by Mr. Walter Perry; the remaining 4000 feet are individually owned by 18 owners with the largest tract fronting 502 feet on the ocean.

All of the remaining land north of the approximately one mile mentioned is owned by Pine Island, Inc. and has for years been used primarily for hunting ducks.



The contemporary plans for the area are undecided. In the Currituck Plan (Envirotek, Inc. 1972), various potential development plans are proposed for the future of the Outer Banks in Currituck County. This document explores several types of development intensities which would maintain the area's natural attractiveness. Several of these plans involve the construction of a north-south road or highway that could be continued into Dare County and through the relatively undisturbed research facility site. All plans include some type of residential use for the general area.

3. The Environmental Impact of the Proposed Action. The project essentially consists of the following elements which will have an impact on the environment.

a. On Site Development. The site for the field research facility consists of 175 acres with 3300 feet of ocean shoreline. The facilities to be constructed on the site, however, will occupy only 9 acres and approximately 400 feet of ocean shoreline. This 9-acre area will be contained within a security fence 8-feet high with the remaining 166 acres serving as an undisturbed area for studies of beach vegetation, dune formation and movement by natural forces, and ecological phenomena that are significant in coastal engineering. Within the site, approximately 2 acres will be occupied by at-grade or near-grade structures such as the access road and ramp, parking area, and laboratory building platform. The existing plant community over these 2-acres will be replaced for the life of the project with these man-made facilities, including a section of the pier crossing the frontal dunes. This modification has been coordinated with the Shore Protection Officer of Dare County.



Of the other 166 acres, the dune community will not be significantly affected. The pier will extend over most of the frontal dune and all of the beach at sufficient elevation to preclude significant alteration of these systems and should produce no appreciable long-term ecological effects. There will be a disturbance of the natural dunes and vegetation during construction of the pier and support facilities. Repairs will be carried out to preserve most of the dune cross-section and natural drainage on the landside of the dune. Further restoration and stabilization of construction areas will be accomplished by judicious plantings and maintenance.

The construction plan will provide for the protection of land and water resources and fish and wildlife on the island during the course of construction and the preservation or restoration of all resources outside the limits of permanent work. It will preclude dredging or excavating borrow materials in the area.

b. Access. Access to the field research facility will be provided by the existing State road crossing the property on the Currituck Sound side and by means of a 1/2-mile new road to be constructed by the U. S. Government. This new 1/2-mile road will intersect the existing State road and will extend to a point just landward of the frontal dunes. The area through which this new road will be constructed is now a large quasi-stable dune area with traffic currently limited to oversand vehicles. (See Plate IV.)

The presence of the pier will interfere with the use of a stretch of the beach and dune area approximately 1600 feet each side of the pier. Chain link fence will enclose and delineate the 9-acre area for the onshore facility



and create an access barrier. However, because of its high porosity, as shown by field research, the chain link fence will not affect the topography of the site or dune and beach processes (Savage and Woodhouse, 1968). Post-type fences will extend from the water's edge to the dune front, and vehicular traffic across the beach front at the pier will be prohibited at all times. Access ramps to and from the beach to the road west of the facility are currently being designed. The post fences will not prohibit pedestrian traffic. This area of the seashore, including the beach, is presently open to oversand vehicles. There may be brief occasions during which the use of sensitive research instruments may require closing the beach to pedestrian traffic; however, the vehicle access ramps located at the north and south property lines can also be used by pedestrians during these periods.

c. Animal Life. Noise from the construction and subsequent research activities of the site will undoubtedly affect animal life in the immediate area of the pier. Conceivably, the pier could interrupt passage of low flying migratory birds, particularly shore-birds, and might produce mortalities through occasional bird strikes. Both the lighthouse at Chincoteague, Virginia, and the water tower at Ocean City, Maryland, have experienced bird strikes. However, visual observations at 35 ocean piers now existing along the North Carolina coast indicate local and apparently migrating flocks of birds readily avoid these structures. The significance of strikes by nocturnally flying animals is not known, but it is projected that the project should have little effect on shore bird passage and will be used as a roosting area for gulls and terns.



Nearly 2,000 tons of construction material are estimated to be delivered to the site by land. After examining all alternatives, it was decided to transport the construction material by road. The possible effect that the road will have on wildlife is negligible. Wildlife still flourishes on the island in spite of man's increasing presence.

d. Plant Life. The pier will have an effect on the biota in its immediate vicinity. The littoral and sublittoral zones in which the pier will be constructed are characterized by constant motion, without structures for permanent attachment of sessile biota. Pier pilings will afford such structures, be rapidly colonized, and serve as refuges and feeding areas for higher marine organisms. This will result in locally higher diversity and populations of marine life by providing new community types in the area.

e. Shoreline Processes. The pier should have no noticeable effect on the physical features of the shoreline in its immediate vicinity. Visual observations by CERC at 27 pier sites in the United States indicate that narrow piers did not appear to exert a noticeable influence on coastal topography, including the location of the dune line, the location of the water line, or the geometry of approaching wave crests. Narrow piers, in this instance, were classified according to their near constant width of 20 to 30 feet and the lack of buildings on the structure. Wide piers are three or four times as wide as the planned facility and their surface is usually occupied by buildings. These wide piers have been observed to influence the nearby beach. Because wide piers are built to carry considerable loads, they require greater numbers and size of supports, thereby contributing to their effectiveness as barriers to longshore transport. While narrow piers,



such as the proposed CERC pier, may influence bottom contours in the immediate vicinity of the structure, they have little or no short or long term effect on the geometry of the coast or the ability of littoral processes to move sediment parallel to the beach (Coastal Engineering Research Center, 1971).

Negligible localized scour will occur around the piles in the seaward zone. It will be of minor depth and will not extend beyond the immediate vicinity of the piles.

f. Aesthetic Quality. The proposed pier will have an impact on the present aesthetic quality of the ocean beach. Few structures now interrupt the vista along beach and an undeveloped quasi-natural aspect prevails. Erection of the CERC pier and security fence will alter this aspect during the life of the project.

The actual visual impact of the facility at the ocean beach will be dependent upon a number of factors. Generally, the pier itself will not be visible to persons inshore of the frontal dune although the building may be apparent up to fifteen miles away. Visual sightings of the pier structure from the beach and frontal dune will range from one to two miles for distinctive recognition, and for seven to fifteen miles as a contrasting image on the horizon which is typical for piers in the area. Under ideal visibility conditions, the shelter building will be visible as a structure from seven to fifteen miles. The presence of surf haze, frequently occurring along the shore, will reduce these distances considerably.



4. Any Adverse Environmental Effects Which Cannot Be Avoided Should the Proposal be Implemented.

a. Visual. The proposed pier will extend approximately 1800 feet across the dunes and out into the ocean and project upward to 27 feet above mean low water (MLW). A laboratory building will be constructed ashore extending the height of the facility at the platform an additional 22 feet and be enclosed by a fence 8-feet high. These facilities may be visible up to 15 miles under ideal visibility conditions and will be deemed an adverse aesthetic effect by some Outer Banks visitors. The presence of the facility in relatively undeveloped area of the island, with its long, straight, and unencumbered beach compounds the visual impact.

b. Traffic. The introduction of man, even in few numbers, in this area of the island will result in some change in the ecosystem. Migrating and nocturnal fauna may be disturbed. Increased traffic during construction will disturb wildlife. This, however, will be of a temporary nature depending on the length of construction (12 to 18 months) and the methods of construction employed.

A short section of the beach will be closed to oversand vehicles used by both surf fishermen and non-fishermen. At times the beach will also be closed to pedestrians. Access around the area will be provided by two ramps over the frontal dunes in the vicinity of the north and south property lines, thereby enabling beach vehicles to detour around the CERC beach area by way of the existing State road across the property.



Wildlife will be individually subject to physical harm through collisions with moving vehicles. This problem, however, exists with present vehicle operations over much of the island.

While the pier represents some possible inconvenience and, for irresponsible boaters, a hazard, there are no nearshore watercraft operations made in the ocean at Duck. Access between the ocean and inland waters occurs only at the entrance to Chesapeake Bay at Cape Henry, 55 miles north of Duck; and at Oregon Inlet, 30 miles south of Duck. Commercial fishing vessel operators are prohibited from fishing closer than one-half mile from the ocean shore.

c. Construction. Actual construction will destroy some dune and grass communities. Also small areas of the ocean bottom will be occupied by pilings supporting the pier.

5. Alternatives to the Proposed Action. These six alternatives were considered before selecting the Duck, N. C. site for the field research facility, and each alternative is discussed in the following paragraphs:

Select a site other than the North Carolina site.

Select a site in North Carolina other than Duck, N. C.

Use an existing pier.

Use temporary offshore platforms.

Use only a small portion of 175-acre site at Duck, N. C.

Take "no action".



a. Alternative 1 - Select a Site Other Than the North Carolina Site.

One alternative to the proposed plan would be to use a site other than the North Carolina site. Criteria used by CERC in site selection were the following:

Essential Criteria

- (1) Site must have a typical sand beach with sand to a sufficient depth over differing substrate to prevent exposure of the under-layer during the expected research life of the pier.
- (2) Site must have exposure to a wave climate, including storm occurrence and wave directions, in which the wave conditions are representative of U. S. coasts.
- (3) Site must be free of offshore bottom features which may lead to severe anomalies in the wave climate in the nearshore area.
- (4) Site must have a significant astronomical tide (i.e., range on the order of 1.5 to 6 feet).
- (5) Nearshore slope must be representative of sandy U. S. coastal areas, and such that the 20-foot depth contour is not appreciably more than 2,000 feet from the intersection of mean sea level with the beach profile.
- (6) Site must be located on a straight coastline outside the range of effects of any significant littoral barrier.



- (7) Site must be accessible by land vehicle.
- (8) CERC must have control of the use of the pier and adjacent beaches to ensure lack of interference with research programs.

Desirable Criteria

- (9) Site should be of size and location to serve as a base for local data collection programs including a sound or estuary area and appropriate sites for coastal vegetative studies.
- (10) Commercial power and communications facilities are desired at the site.
- (11) Site should usually be free of fog and cloud cover, permitting data acquisition by the most common remote sensing techniques, e.g., visible light photography.
- (12) Coastline at the site should be relatively stable (on a time scale of about 50 years).
- (13) Beach should have natural dunes.

Wave conditions are statistically different on the major coasts of the United States. An East Coast location (rather than West Coast or Gulf Coast) was selected because of the exposure to a variety of types of severe



storms including major hurricanes and because of the severity of coastal erosion problems. Plate VI shows the East Coast as it relates to the site selection studies. Of the site locations considered, the criteria narrowed the search to the area between New York, New York, and Cape Hatteras, North Carolina. However, areas both north and south of these two locations were investigated.

To the north, the coasts of Maine, New Hampshire, and Massachusetts are predominantly rock with small pocket beaches frequently located at the mouths of rivers. In addition, in the New Hampshire-Massachusetts area, the beaches tend to be sheltered from storms by Cape Cod, Georges Bank, and Nova Scotia. The outer face of Cape Cod is also sheltered by Nova Scotia and Georges Bank. The influence of Georges Bank makes the wave patterns reaching Cape Cod too complex to analyze and to associate with open ocean conditions. The south shore of Cape Cod and the south shore of Massachusetts are not exposed to waves from the northeast, or even the east, and are sheltered from the south by the Nantucket Shoals and the offshore islands. The Rhode Island shoreline is similarly affected.

Long Island shelters the Connecticut shore. The south shore of Long Island is not exposed to waves north or east, and only to a minor extent to those from the east which are in turn affected by Nantucket Shoals. The south shore is fully exposed to waves from the south and southeast, but the western portion of Long Island, at least, is affected by the Hudson submarine canyon.







The coast of New Jersey is sheltered geographically from waves from the northeast, and much of the shore is materially affected by manmade structures. In addition, there are numerous inlets along the shore further limiting the search for suitable sites.

The stretch from the Delaware Bay entrance to nearly Cape Hatteras is the most desirable area from an exposure standpoint along the East Coast.

The area south of Cape Hatteras to South Carolina is made up of a number of cusped embayments, all with significant shoals off the point of the cuspid, and all sheltered from waves from the northeast.

The Sea Islands off Georgia and part of South Carolina have inlet effects, have poor exposure to northeasterly waves, and have nearshore slopes so gentle that the 20-foot contour may be more than 1 to 2 miles offshore.

Coming south into Florida, exposure opens up to waves from the northeast, but the distance of the shore from the major storm fetch areas is so great that representative severe local wind wave systems are seldom developed, and major storms other than hurricanes would seldom be encountered. Further south along the Florida coast, the effect of the Gulf Stream becomes greater, and the coast is sheltered by the Bahama Islands.

Within the stretch from the Delaware Bay entrance to Cape Hatteras six areas were considered: Assateague, Maryland; Wallops Island, Virginia; Cedar Island, Virginia; Dam Neck, Virginia; Duck, North Carolina; and the



North End, Hatteras National Seashore, North Carolina. Using the criteria cited above, both Assateague, Maryland and Duck, North Carolina are the most acceptable sites. The Assateague site had the quality of being bordered by extensive public lands in each direction but was rejected to retain the pristine qualities of an undeveloped national park.

b. Alternative 2 - Select a Site in North Carolina Other Than Duck, N. C.

A second alternative would be to place the research facility elsewhere in North Carolina. Again the same site selection criteria were used.

Locations on Cape Hatteras National Seashore could not be found, which were either outside the protection of Diamond Shoals or outside the influence of these shoals on waves passing over them, without going so far north as to be within the influence of Oregon Inlet. Waves from the south-southeast octant are influenced by the shoal area, causing too complex a wave pattern for analysis.

In addition, although the Gulf Stream is not the factor here that it would be in some Florida locations, it is closer to shore near Cape Hatteras, and such effect as it might have would be greater at Hatteras than at the Duck, North Carolina project site. Since it is not known how great this effect might be, it was desirable not to have it magnified anymore than absolutely necessary.



This coupled with the facts that there is very limited access to points in North Carolina north of Corolla, N. C., and that the nearshore areas south of Kitty Hawk, N. C. are committed to land development or to the Cape Hatteras and Cape Lookout National Seashores, results in Duck, N. C., as being the most acceptable site in North Carolina and from preceding arguments on the east coast.

The U. S. Army Corps of Engineers Public Meeting for the field research facility held on 12 December 1972 at Manteo, North Carolina, brought forth several specific, suggested alternate sites on the Outer Banks. Subsequent investigations have shown these sites to be less desirable than the Duck site. The suggested alternate sites and the significant undesirable feature(s) of these sites are listed below:

(1) Bodie Island - Abandoned Radar Tracking Station. This site is less desirable because of the influence of Oregon Inlet (less than 5 miles away) on waves and currents and because of significant offshore shoaling with the Platt Shoals to the southeast causing anomalies in the wave climate from that direction.

(2) Pea Island - Coast Guard Station. This site is less desirable since it is located at the mouth of Oregon Inlet. The Platt Shoals are due east of this site (3 miles offshore) and cause severe anomalies in the nearshore wave climate.



(3) Hatteras Island -

(a) Abandoned Kinnakett Coast Guard Station. This site is less desirable because of the irregular nearshore bottom slope which produces a non-uniform wave climate. This site is also under the adverse influence of Cape Hatteras and Diamond Shoals (11 miles to south) and possibly by Wimble Shoals (8 miles to north).

(b) Naval Facility, Buxton. This site is less desirable because it is under the direct adverse influence of Cape Hatteras and Diamond Shoals.

(c) National Weather Service Complex, Buxton. This site, like the one at the Naval Facility, Buxton, is less desirable because it, too, is directly influenced adversely by Cape Hatteras and Diamond Shoals.

(4) Roanoke Island - North Carolina Marine Sciences Council Marine Center Site. A location on Roanoke Island is unacceptable for the field research facility since the pier would be located in a sheltered estuary rather than the unsheltered ocean as is needed for coastal engineering research.

c. Alternative 3 - Use an Existing Pier. A third alternative is the use of an existing pier. This would leave the Duck site in an undisturbed state that would eventually revert to a more or less natural state with time if left undeveloped.



This alternative would eliminate all project effects upon the natural environment of the Duck site. Existing piers are already committed to other uses, generally for recreation and fishing. The interaction between CERC research and private pier use would be detrimental to both uses and would materially interfere with the research. Of necessity, CERC has in the past used and is currently using facilities of this type on a limited, special-use basis.

Specific field measurements have been made from piers at Atlantic City, New Jersey (1948, 1957-1969), Virginia Beach, Virginia (1962, 1963-1965, 1966, 1967-1971), Nags Head, North Carolina (1962, 1963 to present), Daytona Beach, Florida (1954-1957, 1964 to present), Palm Beach, Florida (1954-1956, 1956-1962), and Mission Beach, California (1949-1950). Data have also been obtained at the Steel Pier at Atlantic City, New Jersey, particularly on wave gage testing and on pressure attenuation for waves. In addition, some data on wave forces have been obtained on a pier at Davenport, California, under contract to the University of California.

None of these piers have been satisfactory for year-around, continuous research use. They are available for exclusive use only at certain seasons and were not designed so that adequate measurements could be taken. In some cases, because of the closeness of pile spacing, the pier affected the observed wave conditions. Generally, instrumentation cannot be placed where required, and continuous measurements cannot be made through the surf zone on piers not designed for research work. Excessive tolerances on horizontal leveling, settlement, and motion are incompatible with accurate measurements.



Few piers have been designed and built for safe use during major storms. In the past, piers on which wave gages were installed have had portions of their seaward ends, including CERC equipment, destroyed during severe storms at Atlantic City, New Jersey, Virginia Beach, Virginia, repeatedly; Nags Head, North Carolina; and Daytona and Palm Beach, Florida. These piers generally are not designed to withstand severe storms, and damages are to be expected.

The research pier will be designed to continue functioning during most probable storms. Therefore, data should be obtained during storms when data, which are of great importance to the research program, cannot be collected from existing piers.

There are no known piers on the Atlantic Coast which extend to a water depth of 20 feet (mean low water), sufficient to span the entire surf zone as it develops during major storms, that are suitable for research use. The proximity of commercial and residential structures to most existing piers would prevent studies of dune formation and movement as well as related vegetation studies. Such studies are important in coastal engineering, and it is essential that they be carried out at the same location as the associated surf zone studies to gain an understanding of the sea-land interactions.

d. Alternative 4 - Use Temporary Offshore Platforms. A fourth alternative would be to use the general area at Duck, North Carolina, but limit the construction to land structures and substitute temporary offshore platforms for the pier. This would result in less degradation of



the aesthetics of the area looking from the beach. There would also be less physical damage to the environment, however, such facilities as access roads and a boat launching/docking structure would then be required.

But research of the nature needed cannot be conducted satisfactorily from the beach or in the water by the use of temporary offshore platforms or from anchored barges. Mobile platforms and barges cannot operate continuously and safely in the surf zone. Like existing piers, measurements or tests are most often interrupted during extreme storm conditions when they are needed most. The hazards posed to operating personnel, to equipment, and to the shoreline also prohibit the use of temporary offshore platforms for the purposes proposed. It is necessary to have a continuous platform across the beach and surf zone from which to suspend various instruments down into the water at various distances from the shore during all kinds of weather and surf conditions.

e. Alternative 5 - Use Only a Small Portion of the 175-acre Duck, North Carolina Site. A fifth alternative would be to use only a small portion of the 175-acre site at Duck, N. C. Since the planned research requires large areas of undisturbed environment both on and offshore, this would be unacceptable. One of the reasons that Assateague, Maryland initially received primary consideration was the fact that land development was improbable and there were no shore structures near the proposed pier. Without this natural state at a site, complexities develop in the



coastal parameters to be measured and research becomes futile. Because of the imminent land development on both sides of the Duck site, the entire 175 acres is needed to provide an undisturbed environment for meaningful research work.

f. Alternative 6 - Take "No Action." A sixth alternative is "no action." This would allow the land and water to remain in its undeveloped state and, if not later developed for other purposes, revert gradually from an ex-bombing range to a relatively undisturbed natural condition. The disadvantage to this alternative would be that future research in coastal engineering would continue to remain restricted to office and laboratory studies with only limited field work in the actual coastal environment.

The field research facility will provide CERC and others with an increased and needed field research capability and experience in the study of shore processes needed to resolve erosion and protection problems. On site field studies are necessary to verify and extend theoretical laboratory and office studies which have been carried on for over 20 years at CERC as part of their mission in coastal engineering.

Field data of primarily U. S. Army Corps of Engineers constructed coastal projects are currently being collected by CERC in approximately 21 locations, over half of which are on the East Coast. This data collection effort is mostly of a repetitive nature to determine long term changes and to evaluate the effects of implementing particular coastal projects. Similar data have been obtained at other projects in the past.



Some periodic data are also gathered by survey crews on waves and profile changes in the immediate beach area along the Eastern seaboard and on a much shorter term basis by volunteer individuals.

The field research facility will serve as a base of operations at which more extensive and complete data can be collected to verify, to understand, and to extend to generalized applications that data which have been collected in non-pier sites and in simplified laboratory studies.

The great need for further research and experience to improve techniques in the science and engineering of shore protection is stated in the June 1966, "Report of the Panel on Oceanography of the President's Science Advisory Committee", as follows:

"The Nation needs to improve the technology for constructing coastal zone structures, which will make the national expenditure on breakwaters, harbors, beach erosion, docks, etc., more effective. The panel was distressed to find a high failure rate of construction projects in the surf zone and on beaches, the destruction of beaches by breakwaters designed to extend the beaches, the silting of harbors and marinas as a result of construction designed to provide shelter, and the enhancement of wave action by the building of jetties supposed to lessen wave erosion are but a few examples of the inadequacy of our knowledge and practice in coastal construction. . ."



It is presumptive to quantify the benefits that accrue from scientific research; therefore, the effect of not building the research facility has not been estimated, nor has a benefit-cost ratio been calculated. However, because of the national scope of shoreline erosion problems, projects leading to improvement in coastal engineering technology have assumed a high magnitude of importance both from the environmental and economic viewpoints.

The U. S. Army Corps of Engineers' 1971 National Shoreline Study Report, authorized by Section 106 of the River and Harbor Act of 1968, reflected the nation's increased concern in shoreline erosion as a result of growing demand for shoreland, increasing erosion and shorefront damage, lack of progress under existing beach control law, and a national sensitivity to environmental problems.

The total cost of remedial measures to halt erosion on 2700 miles of U. S. shoreline was estimated by 1970 methods and prices to be about \$1.8 billion plus an average annual beach nourishment cost of \$73 million. It is not difficult to project what a five percent reduction in these costs would mean if remedial techniques could be improved and corrected.

Without the capability the field research facility offers to verify in the field those concepts generated under laboratory conditions, CERC's future ability to understand, to predict, and to ameliorate coastal erosion



problems will be greatly diminished. As a result, the coastal human environment, particularly in developed areas, may be jeopardized by inadequate or incorrect protective measures.

6. The Relationship Between Local Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity. The present use of the project area is for sports fishing, swimming, and sightseeing. There is also a limited amount of trespassing for vehicular travel to the beach and for hunting and shooting. There is current pressure to develop unused land on the Outer Banks, either residentially or commercially. The project would not affect the use of the beach by fishermen on foot, swimmers, or sightseers except during those times when pedestrian traffic is not allowed. It would decrease in the long run aesthetic values of the beach and improve the fishing by attracting fish. The facility would also supply data for shore and nearshore processes that could be used by scientists and engineers long after the life of the project. This would allow man to live with a more complete understanding of the dynamic, everchanging coastal areas.

7. Any Irreversible or Irretrievable Commitment of Resources Which Would be Involved in the Proposed Action Should it be Implemented.

There would be an irretrievable commitment of financial resources and labor associated with construction and maintenance.

8. Coordination With Others.

a. Wilmington District Letter of 13 September 1972. An introductory letter was sent by the District Engineer, Wilmington, N. C. on 13 September 1972 to elicit comments on the proposed project from



federal, state, and local agencies and from environmental groups and other interested individuals. The letter explained the project and asked for information to consider in preparing the environmental statement. There were 56 copies of the letter distributed and 30 replies were received. A summary of the areas of concern is as follows:

Modification of beach (including beach erosion)

Disposal of liquid wastes

Water Supply

Vehicular access to beach

Aesthetics

Public use of lands

Obstruction to navigation

Real estate development

Roadway from Virginia

A copy of the 13 September 1972 letter and the comments received with replies made by the Wilmington District to specific comments are at Appendix D.

b. Public Meeting, Manteo, North Carolina, 12 December 1972. A public meeting was held by the U. S. Army Corps of Engineers in Manteo, North Carolina on 12 December 1972 to explain the project and allow the public to express their views. There were 41 persons in attendance. Representatives from the Environmental Protection Agency, the State of North Carolina's Department of Natural and Economic Resources, and several



social groups presented opinions as did several interested individuals. The State of North Carolina strongly endorsed the project. A list of attendees and other pertinent data on the meeting is at Appendix E.

c. Responses to the letter and comments at the public meeting have been incorporated in the text of the Draft Environmental Statement. Comments on this statement will be incorporated in the Final Impact Statement.



## REFERENCES

- Brothers, Donald R., 1965. An Annotated List of the Amphibians and Reptiles of Northeastern North Carolina. The Journal of the Elisha Mitchell Society, Vol. 81: 119-124.
- Burk, John C., 1962. The North Carolina Outer Banks, A Floristic Interpretation, The Journal of the Elisha Mitchell Society, Vol. 78: 21-28.
- Coastal Engineering Research Center, U. S. Army Corps of Engineers, 1971. Staff Studies. Unpublished M.S., Washington, D. C.
- Cobb, Collier, 1906. National Geographic Magazine, Vol. XVII.
- Copeland, B. J., 1970. Estuarine Classification and Responses to Disturbances. Trans. Amer. Fish. Society 99(4):826-836.
- Department of the Army, Corps of Engineers, 1971. Report on the National Shoreline Study. Washington, D. C.
- Dexter, Deborah M., 1969. Structure of an Intertidal Sandy Beach Community in North Carolina. Chesapeake Science 10(2):93-98.
- Dunbar, Gary S., 1958. Historical Geography of the North Carolina Outer Banks, Louisiana Press, Baton Rouge.
- Envirotek, Inc., 1972. The Currituck Plan-Outer Banks. Development Situation, Raleigh.
- Johnson, D. W., 1965. Shore Processes and Shoreline Development, Hafner Publishing Company, New York.
- President's Science Advisory Committee, 1966. Effective Use of the Sea, Report of the Panel on Oceanography, President's Science Advisory Committee, Washington, D. C.
- Savage, R. P. and W. W. Woodhouse, Jr., 1968. Creation and Stabilization of Coastal Barrier Dunes, Proc. of 11th Conference on Coastal Engineering. London, England. ASCE. 1969. 30p.
- Stick, David, 1958. The Outer Banks of North Carolina. The University of North Carolina Press, Chapel Hill.
- Quay, Thomas L., 1959. The Birds, Mammals, Reptiles, and Amphibians of Cape Hatteras National Seashore Recreational Area, Report to the National Park Service, Raleigh.



**LIST OF AGENCIES TO RECEIVE COPY OF ENVIRONMENTAL  
IMPACT STATEMENT**



LIST OF ADDRESSEES

Regional Director  
Environmental Protection Agency  
Region IV  
Suite 300, 1421 Peachtree Street, N.E.  
Atlanta, Georgia 30309

Assistant Secretary, Program Policy  
ATTN: Office of Environmental Project Review  
U. S. Department of the Interior  
Washington, D. C. 20240 (20 cys)

Director  
Office of Environmental Affairs  
Atomic Energy Commission Headquarters  
1717 H Street, N.W.  
Washington, D. C. 20402

Area Director, State and Private Forestry  
Forest Service, USDA  
Southeastern Area  
1720 Peachtree Road  
Atlanta, Georgia 30309

Commander  
Fifth Coast Guard District  
Federal Building  
431 Crawford Street  
Portsmouth, Virginia 23705

Director  
Clearinghouse and Information Center  
116 West Jones Street  
Raleigh, North Carolina 27603 (16 cys)

Regional Director  
Department of Health, Education,  
and Welfare  
Region IV, 50 Seventh Street, N.E.  
Atlanta, Georgia 30323

Assistant Director of Operations  
Planning and Relocation Branch  
Greensboro Area Office, HUD  
2309 N.W. Plaza, W. Cone Boulevard  
Greensboro, North Carolina 27408



Mr. T. J. Morawski, Division Engineer  
Region 3, Department of Transportation  
Federal Highway Administration  
P. O. Box 26806  
Raleigh, North Carolina 27611

Mrs. Joan Willey, Chairman  
Triangle Group Stream Channelization Subcommittee  
Joseph E. LeConte Chapter, Sierra Club  
2737 Rothgeb Drive  
Raleigh, North Carolina 27609

Environmental Defense Fund, Inc.  
P. O. Box 740  
Stoney Brook, New York 11790

Mr. David H. Howells, Director  
Water Resources Research Institute  
Riddick Hall, N. C. State University  
Raleigh, North Carolina 27611

Mr. Wallace Kaufman, President  
Conservation Council of North Carolina  
P. O. Box 1207  
Chapel Hill, North Carolina 27514

Mr. Watson Morris, Executive Secretary  
ECOS Incorporated  
Suite B, Union Building, UNC  
P. O. Box 1055  
Chapel Hill, North Carolina 27514

Mr. Guy O. Sapp  
Izaak Walton League  
Route 3  
Kernersville, North Carolina 27284

Dr. Sidney Galler  
Deputy Assistant Secretary for Environmental Affairs  
U. S. Department of Commerce  
Washington, D. C. 20235 (4 cys)

Cy furn: Mr. Randall P. Cheek, Area Supervisor  
Water Resources Division  
National Marine Fisheries Service  
Beaufort, North Carolina 28516

Mr. Philip J. Adler, President  
Wetlands and Estuaries for Tomorrow  
88 County Club Apartments  
Greenville, North Carolina 27834



Mr. Robert Manns  
National Audubon Society  
2795 Peachtree Road, N.E.  
Atlanta, Georgia 30303

Mr. Harold Nightlinger, Executive Secretary  
The Outer Banks Association, Inc.  
5718 North 9th Road  
Arlington, Virginia 22205

Dr. William W. Kirby-Smith  
Duke University Marine Laboratory  
Beaufort, North Carolina 28516

Director  
Institute of Marine Sciences  
University of North Carolina  
Morehead City, North Carolina 28557

President  
The Soil Conservation Society of  
America, N. C. Chapter  
P. O. Box AF  
Andrews, North Carolina 28901

Mr. James N. Willis, III, Chairman  
Environmental Resources Commission  
Atlantic Beach, North Carolina 28512

Mr. Alan Levin, Executive Secretary  
President's Air and Water Advisory Boards  
Environmental Protection Agency  
Washington, D. C. 20460 (10 cys)

Dr. Bruce Muga  
Department of Civil Engineering  
Duke University  
Durham, North Carolina 27706

Mr. Macy Hoyle, President  
N. C. Wildlife Federation  
Route 3, Box 47  
Smithfield, North Carolina 27577

Mr. Robert D. Barbee, Superintendent  
Cape Hatteras National Seashore  
P. O. Box 457  
Manteo, North Carolina 27954



Dr. Orrin Pilkey  
Department of Geology  
Duke University  
Durham, North Carolina 27708

Mr. W. W. Woodhouse, Jr.  
School of Agriculture and Life Sciences  
Department of Soil Science  
N. C. State University  
Raleigh, North Carolina 27607

Dr. Ralph W. Brauer  
Wrightsville Marine Bio-Medical Laboratory  
7205 Wrightsville Avenue  
Wilmington, North Carolina 28401

President  
North Carolina Beach Buggy Association  
P. O. Box 337  
Nags Head, North Carolina 27959

Professor Charles Smallwood, Jr.  
School of Engineering  
Department of Civil Engineering  
N. C. State University  
P. O. Box 5628  
Raleigh, North Carolina 27607

Mr. Karl Osborne  
The Saltwater Sportsman  
10 High Street  
Boston, Massachusetts 02110

Cape Hatteras Anglers Club  
Buxton  
North Carolina 27920

Dr. Bennie C. Keel  
Research Laboratories of Anthropology  
The University of North Carolina  
Chapel Hill, North Carolina 27514

Professor Daniel A. Okun  
The University of North Carolina at Chapel Hill  
Department of Environmental Sciences and Engineering  
Chapel Hill, North Carolina 27514



Drs. Robert Dolan and John S. Fisher  
Department of Environmental Sciences  
University of Virginia  
Charlottesville, Virginia 22903 (2 cys)

Mr. Walton Robertson  
Elizabeth City Surf Fishing Club  
Elizabeth City, North Carolina 27909

Mrs. J. R. Bryan, Jr.  
Project Environment  
1002 Bryan Avenue  
Wilmington, North Carolina 28401

Chairman, Dare County Board  
of Commissioners  
Manteo, North Carolina 27954

Mr. Thomas S. Bennett, Chairman  
Carteret County Board of Commissioners  
Morehead City, North Carolina 28557

Chairman, Currituck County Board  
of Commissioners  
Currituck, North Carolina 27929

Mayor  
City of Kill Devil Hills  
Kill Devil Hills, N. C. 27948

Mayor  
City of Nags Head  
Nags Head, N. C. 27959

Mayor  
City of Manteo  
Manteo, N. C. 27954

Mr. and Mrs. R. H. Cook  
Bayberry Bluffs Development  
Kitty Hawk, N. C. 27949

Dr. Wallace W. Harvey, Jr.  
Memorial Clinic  
Manteo, N. C. 27954



President  
Old Nags Head Cove Fish Tales  
Nags Head, N. C. 27959

Mr. R. B. "Bob" Preston  
Box 488  
Nags Head, N. C. 27959

Mr. Collins G. Gray  
P. O. Box 2585  
Avon, N. C. 27915

Mr. James T. Gray  
P. O. Box 6  
Avon, N. C. 27915

Mr. Oscar D. Gray  
Box 3  
Avon, N. C. 27915

Mr. R. W. Gray  
P. O. Box 2585  
Avon, N. C. 27915

Mr. T. C. Miller  
Avon, N. C. 27915

Mr. Bill Dillon  
Box 248  
Buxton, N. C. 27920

Mr. Grover Cook  
2500 E. Independence Blvd.  
Charlotte, N. C. 28205

Mr. Dan M. Connelly  
200 W. Church Street  
Edenton, N. C. 27932

Mr. Jasper W. Hassell  
P. O. Box 366  
Edenton, N. C. 27932

Mr. Frank W. Roberts  
Room 315, Kramer Building  
Elizabeth City, N. C. 27909

Mr. and Mrs. Wilton E. Robertson  
107 Pine Lake Drive  
Elizabeth City, N. C. 27909

Mr. and Mrs. William Small  
Route 1  
Elizabeth City, N. C. 27909

Ms. Claire D. Bullington  
P. O. Box 626  
Kill Devil Hills, N. C. 27948

Mr. George W. Jones  
Chart House  
Kill Devil Hills, N. C. 27948

Mr. David Stick  
Kitty Hawk, N. C. 27949

Mr. Huntington Cairnes  
Kitty Hawk, N. C. 27949

Ms. Gwen A. White  
Route 1, Box 170  
Kitty Hawk, N. C. 27949

Mr. W. M. Booker  
Box 442  
Manteo, N. C. 27954

Mr. Robert D. Chessman  
Route 1  
Manteo, N. C. 27954

Ms. Vera A. Evans  
Times Printing Company  
Manteo, N. C. 27954

Mr. Jerry W. Norris  
P. O. Box 278  
Manteo, N. C. 27954

Mr. R. Neil Thorne  
Route 1, Box 50  
Manteo, N. C. 27954

Mr. W. Ray White  
Box 398  
Manteo, N. C. 27954

Mr. Bob Simpson  
Box 643  
Morehead City, N. C. 28557



Mr. John F. Gaskill  
Route 1, Box 550  
Nags Head, N. C. 27959

Mr. Ben F. Anderson  
P. O. Box 1220  
Rocky Mount, N. C. 27801

Mr. Drayton D. Wade  
Planters National Bank  
Drawer 1220  
Rocky Mount, N. C. 27801

Mr. L. V. Gaskill  
Wanchese, N. C. 27981

Mr. Gage Williams  
Wanchese, N. C. 27981

Mr. Robert Segal  
1052 Clipper Drive  
Hampton, Va. 23369

Mr. and Mrs. Raymond M. Staley  
6001 Arlington Boulevard  
Apartment 917  
Falls Church, Virginia 22044

Col. Arthur V. Peterson (Ret.)  
129 G. Sea Crest Village  
Kitty Hawk, N. C. 27949

Mr. Lee Thornbury  
Currituck Project  
P. O. Box 5501  
State College Station  
Raleigh, N. C. 27607

Mrs. John Pelosi  
Route 1, Box 11AA  
Wake Forest, N. C. 27587

Neuse River Regional Planning and  
Development Council  
502 Pollock Street  
New Bern, North Carolina 28560

Mr. Addison Hewlett, Jr., Chairman  
Marine Science Council  
c/o Department of Administration  
P. O. Box 1351  
Raleigh, North Carolina 27602



**APPENDIX A**  
**STATEMENT OF FINDINGS**



APPENDIX A

STATEMENT OF FINDINGS  
FIELD RESEARCH FACILITY, DUCK, NORTH CAROLINA

We have reviewed and evaluated, in light of the overall public interest, the documents concerning the proposed action, as well as the stated views of other interested agencies and the concerned public, relative to the various practicable alternatives in accomplishing the development of a field research facility near Duck, North Carolina. The objective of the facility will be to establish a research station for the in-field collection of data pertaining to coastal processes. The most desirable plan is considered to be one which offers the best balancing of economic, environmental, social well-being, and engineering factors in view of the stated objective.

In evaluation, the following points were considered pertinent:

a. Due to the inadequacy of current data pertaining to coastal processes, the need for an improved, data acquisition laboratory is recognized. Since such a facility would study natural parameters, it would be required that its construction disturb as little and preserve as much of the existing environment at the chosen site as possible. The facility is so designed.

b. The research to be carried out requires the beach fronting the facility to be closed to vehicular traffic. This will be inconvenient for some. An adequate detour around the facility will be provided.

c. The pier and related buildings will be visible for a distance and might be considered to be esthetically displeasing to some.

d. Dedication of 175 acres of land to the project protects that land against any future real estate development; therefore, it represents a benefit to wildlife and to the natural habitat.

We find that the proposed action, as developed in the Draft Environmental Impact Statement, is based on thorough analysis and evaluation of various practicable alternative courses of action for achieving the stated objectives; that wherever adverse effects are found to be involved, they cannot be avoided by following reasonable alternative courses of action which would achieve the specified purposes; that where the proposed action has an adverse effect, this effect is either ameliorated or substantially outweighed by other considerations of national interest; that the recommended action is consonant with national policy, statutes, and administrative directives; and that on balance, the total public interest should best be served by the implementation of the proposal.



DON S. MCCOY  
Lieutenant Colonel, Corps of Engineers  
Commander and Director  
U. S. Army Coastal Engineering Research  
Center



ALBERT C. COSTANZO  
Colonel, Corps of Engineers  
District Engineer  
U. S. Army Engineer District, Wilmington

Date: \_\_\_\_\_

Date: \_\_\_\_\_



\_\_\_\_\_  
**Division Engineer**

**Date:** \_\_\_\_\_

\_\_\_\_\_  
**Chief of Engineers**

**Date:** \_\_\_\_\_



APPENDIX B

Organization and Functions -  
U. S. Army Coastal Engineering Research Center  
ER 10-1-9 dated 6 November, 1970



DEPARTMENT OF THE ARMY  
Office of the Chief of Engineers  
Washington, D. C. 20314

ENGECE-ME

Regulation  
No. 10-1-9

6 November 1970

ORGANIZATION AND FUNCTIONS  
U. S. Army Coastal Engineering Research Center

1. Purpose. This regulation establishes the organization of the U. S. Army Coastal Engineering Research Center (CERC) and defines its mission.
2. Establishment.
  - a. The U. S. Army Coastal Engineering Research Center was established by Public Law 172, 88th Congress, approved 7 November 1963, which abolished the Beach Erosion Board.
  - b. The approved organization is shown in Appendix A.
  - c. The U. S. Army Coastal Engineering Research Center is a Class II activity under the Chief of Engineers.
3. Mission. The U. S. Army Coastal Engineering Research Center, under the staff supervision of the Director of Civil Works:
  - a. Conceives, plans, and conducts research and development in the field of coastal engineering, in order to provide a better understanding of coastal processes, winds, waves, tides, currents, and materials as they apply to navigation, recreation, flood, and storm protection, shore and beach erosion control, shore structures, and offshore islands and structures.
  - b. Conceives, plans, and conducts research on the effects of the coastal activities of the Corps of Engineers on the ecology of the coastal zone.
  - c. Collects and publishes information and data concerning coastal phenomena and research projects which are useful to the Corps of Engineers and the public.
  - d. Assists in the planning and design of coastal works, including: determination of probable effects of such works on adjacent shores; establishment of hurricane protection criteria; and evaluation of the stability, durability, and effectiveness of proposed coastal navigation improvements and other coastal works.
  - e. Assists in the review, for technical adequacy, of studies, plans, and specifications for beach erosion control and other coastal engineering works.

---

This regulation supersedes ER 10-1-9, 26 Sep 69



6 Nov 70

f. Provides specialized consulting services to other elements of the Corps of Engineers and, as directed, to other Federal agencies.

g. Provides specialized training in coastal engineering to other public agencies.

h. Performs research in the field of Shore Processes to provide scientific and engineering information for the Corps of Engineers to utilize in selecting location and layout of harbors and jetties, forecasting and minimizing the adverse effects of such shoreline structures, forecasting and minimizing shoaling in harbor entrances and river channels, designing structures for shore protection, and maintaining and restoring beaches.

FOR THE CHIEF OF ENGINEERS:

1 Appendix  
Chart



RICHARD F. McADOO  
Colonel, Corps of Engineers  
Executive



APPENDIX C

Excerpts from: "The Birds, Mammals,  
Reptiles, and Amphibians of the Cape Hatteras  
National Seashore Recreational Area, by T. L. Quay



The following discussion of the major habitats of the Cape Hatteras area is taken from: Quay, T. L. 1959. The Birds, Mammals, Reptiles, and Amphibians of the Cape Hatteras National Seashore Recreational Area. Project completion report to the National Park Service. N. C. State University; Raleigh, North Carolina, p. 63-78. This material is included because of the similarities between the proposed Duck, North Carolina site and other upland areas of the Outer Banks of North Carolina. Discussions of similar habitats should be valuable in determining the environmental setting and predicting the effects of allowing the site to reestablish natural vegetation. This work should not be taken as a discussion of the Duck site, rather as an indication of similarity.

Part 5. entitled "Sound" has been deleted from Dr. Quay's discussion, and a separate part "Currituck Sound" has been added in its place. This change was necessary because Dr. Quay's work was done on the lower North Carolina banks, bordered on the west by medium salinity Pamlico Sound. The northern portion of the North Carolina Outer Banks is bordered on the west by Currituck Sound, an almost fresh body of water. Footnotes have been added to some sections where dissimilarities between Dr. Quay's original work and the Duck site occur.



## MAJOR HABITATS

The habitats of the Cape Hatteras National Seashore Park are classified in this report under sixteen major types. In this classification, and in the habitat designations of the Annotated Lists, the "Park" is considered to include all the land and water areas from Bodie Island on the north to Ocracoke Inlet on the south, and from the open ocean well offshore to the middle of Pamlico Sound.

The habitats extend in approximately parallel, usually narrow, and often continuous bands along the full length of the islands. A transect across the land from ocean to sound would pass through nearly all habitats at most places. This unusual situation creates very large edge effects and results in great local complexities of animal life.

The sixteen major habitats are briefly described below, including lists of the commoner species and groups typical of each. Many species are further limited, of course, to certain geographic sections, as indicated in the Annotated Lists, and to particular niches within a habitat. A few of the lists may appear to be somewhat repetitious, but each one is different from all others and complete within itself. This method allows each habitat to be examined separately as well as comparatively.

### 1. Inshore Ocean

The inshore ocean is the first one to five miles out from the surf, with water depths to 30-60 feet.

Loons, grebes, gannet, cormorant, scoters, red-breasted merganser, gulls, and terns are the commoner birds of the inshore ocean.



Smaller numbers of these extend farther out, but most of them can be seen from the beach. All of them at times are in the surf, especially the gulls and terns. The bottlenose porpoise is common; other marine mammals are casual. The marine turtles occur both inshore and offshore.

## 2. Offshore Ocean

The offshore ocean extends from the inshore ocean to the Gulf Stream and for all practical purposes on to the continental edge at the 200-meter line.

The separation between inshore and offshore oceans is necessarily somewhat arbitrary. Many of the inshore birds go varying distances into the more offshore waters, especially the gannet, loons, and scoters. More typical offshore birds are the shearwaters, petrels, golden plover, Hudsonian godwit, phalaropes, jaegers, kittiwake, and dovekie. Whales and porpoises are primarily offshore and open ocean forms, as are the marine turtles.

## 3. Surf

The surf is the region of the breaking waves, within a few hundred feet of the beach. It might be considered as the innermost zone of the inshore ocean.

Offshore ocean animals, and some of the inshore ones, occasionally get caught in the surf and become stranded on the beach. Marine turtles come ashore to lay their eggs in the sands of the beach, in May, June, and July. Many of the ocean birds approach the surf in stormy weather. Birds that feed regularly in the surf, either from the surface



or the air, are: horned grebe, brown pelican, gannet, cormorant, red-breasted merganser, gulls, terns, and black skimmer. All of these birds spend much time flying over the surf also when not actively feeding.

The narrow bands of surf and wave-washed beach become even more alive with birds during the spring and fall migrations, when fair to very large numbers of a wider variety of water birds move along this natural flyway where ocean and land meet. These include: loons, grebes, brown pelican, gannet, cormorant, ducks and geese of all kinds, the peregrine falcon and several other species of hawks, shorebirds, gulls, and terns.

#### 4. Inlets

The three inlets--Oregon, Hatteras, and Ocracoke--are rather large and natural connections between the ocean and the sound. Species from both habitats intermingle in the inlets. All migratory birds, including the small land birds, must cross or pass by the inlets twice each year. Offshore ocean birds enter the inlets more often than they approach the surf.



## 5. Currituck Sound

Currituck Sound, located in the most northern area of the coastal plain of North Carolina, separates the proposed CERC facility site on the Outer Banks, from the mainland. The sound is approximately 40 miles long,  $3\frac{1}{2}$  miles wide and approximately 7 feet deep. The mouth of Currituck Sound opens into Albemarle Sound to the south and Back Bay, Virginia to the north. The Atlantic Intracoastal Waterway extends through the sound, linking the Norfolk area to the open waters of the N. C. Sound Systems. This lagoonal sound drains the lowlands and swamp of the area. Because of the long distance of the sound from the ocean at Oregon Inlet (224 miles) the waters of the sound are almost fresh. Although there is a connection to Chesapeake Sound via the Albemarle and Chesapeake Canal, a guard lock prevents salt water from entering the Currituck site of the canal.

The waters of Currituck Sound are largely a freshwater system, with drainage entering from Back Bay, Northwest and North Landing Rivers, and from farmlands. Salinity in the sound is about 4‰ sea strength, and consequently these waters are important for fresh-water life. Fishes important in Currituck include the white perch, largemouth bass, sunfish, and anadromous fishes such as striped bass and alewives (Taylor, 1951). The sound has long been famous for waterfowl and shorebirds, because of the shallow depth and abundant supply of aquatic plants.

---

Taylor, Harden F. 1951, Survey of Marine Fisheries of North Carolina, The University of North Carolina Press, Chapel Hill, 1951



## 6. Tidal Flats

The tidal flats are the shores and shallow edges of the sound when exposed on low tide. They extend the full length of the Park and are especially well developed along Pea and Ocracoke islands and at the margins of the inlets.

These broad expanses of wet and bare sand and mud support a rich variety of invertebrate life. They abound in shorebirds of most species, especially during migrations. The commoner species are the semi-palmated plover, black-bellied plover, ruddy turnstone, greater yellowlegs, pectoral sandpiper, dunlin, short-billed dowitcher, and semi-palmated sandpiper. The terns, gulls, skimmer, pelican, and snow goose rest and preen on the flats. The peregrine falcon and pigeon hawk are attracted by the abundant prey. Other vertebrates do not inhabit the flats. [During those hours when the tide is high the flats are functionally a part of the inshore sound.]<sup>1</sup>

## 7. Ocean Beaches

The ocean beach is the narrow zone of bare sand from the surf to the base of the front dune. The lower or intratidal part is firm, wet, and sloping. The upper or supratidal part is soft, dry, and flat.

Shorebirds are characteristic inhabitants of the intratidal beach. The most typical species, which run along and feed actively in the washline of the breakers, are the black-bellied plover, ruddy turnstone, whimbrel, willet, knot, semi-palmated sandpiper, and sanderling--a somewhat different assemblage from that of the tidal flats.

---

<sup>1</sup>This sentence should be deleted when comparing to the Duck site.



Gulls and terns are equally common and typical of the ocean beaches, feeding in and flying over the surf and lower beach and resting on the upper beach. The commoner species, present in the surf and on the ocean beaches in aggregations of thousands of birds at a time, are: black-backed, herring, and ring-billed gulls in winter; laughing gull, and common, least, and royal terns in summer; and the Bonaparte's gull and Forster's tern in migrations.

Additional species and groups of water and land birds fly over and occasionally rest on the ocean beach during migrations, as listed in the description of the surf. Most any marine mammal, turtle, or bird may become stranded on the beach.

#### 8. Open Beaches and Dunes

The open beaches and dunes are the bare (unvegetated) and usually dry sand flats and dunes above the high-tide mark other than the upper ocean beach. These are scattered throughout the Park in varying size up to a mile or more long or wide. Their main locations are between the highway and the ocean dunes, amid wide stretches of blow-out dunes, on dredge lumps and sand bars in the sound, and on the outer lips of the inlets. They are occasionally flooded by extra-high tides, as is the upper zone of the ocean beach.

Congested sections of open beach and dune, like the tent camp on the north shore of Oregon Inlet, are devoid of vertebrate life. Narrow and shifting sections, like across the highway from ocean to sound at Sandy Bay just northeast of Hatteras village, are likewise devoid of life. Remote and relatively undisturbed sections on the main island,



like the long peninsula (The Plains) between the village of Ocracoke and the Inlet, have some nesting colonies of the least, common, and gull-billed terns and the black skimmer, in summer, and flocks of resting gulls, terns, and shorebirds at other seasons.

Dredge lumps, sand bars, and sandy parts of small islands in the sound are the principal locations of the many and large nesting colonies of royal, common, least, sandwich, and gull-billed terns, and the black skimmer. The American oystercatcher and the Wilson's plover nest in the vicinity of the terns. Sometimes these nesting sites have a very sparse and short herbaceous vegetation. The bald eagle often sits at the water-side of these lumps and bars of sand and shell, as do the pelican, cormorant, gulls, terns, skimmer, and shorebirds.

#### 9. Herbaceous Beaches and Dunes

This habitat includes all the sandy beaches, dunes, and flats above high tide with a partial to complete cover of herbaceous plants. This type is far more extensive and widespread but in the same general locations as the open beaches and dunes. They vary from high and dry (regular dunes) to low and temporarily wet. The dominant plants are: Uniola paniculata (sea oats), Spartina patens (saltmeadow cordgrass), Strophostyles helvola (wild bean or pea), Fimbristylis castanea (sand rush), Andropogon virginicus (broom-sedge), and Solidago sempervirens (seaside goldenrod). Many other species are common, and some scattered low shrubbery is present.

The Canada goose feeds regularly in the herbaceous dunes on the wild bean (Strophostyles), mainly at Pea Island. The marsh hawk, peregrine falcon, pigeon hawk, sparrow hawk, and barn owl forage here. The



ring-necked pheasant feeds in herbaceous areas near denser cover. Small land birds occurring in or over herbaceous beaches and dunes are: mourning dove, swallows, fish crow, starling, meadowlark, redwinged blackbird, boat-tailed grackle, savannah sparrow, and song sparrow.

Mammals ranging or living in the herbaceous areas are the opossum, cottontail, gray fox, raccoon, house cat, least shrew, mole, meadow vole, and house mouse. Distinctive species among the cold-blooded groups are the racerunner, glass lizard, hognose snake, black racer, Fowler's toad, green treefrog, squirrel treefrog, and leopard frog.

#### 10. Herb-Shrub Habitats

The herb-shrub mixture is possibly the most extensive of the vegetated habitats in the Park. It is intermixed with the herbaceous beaches and dunes, shrub thickets, thicket woodlands, and fresh marshes. Its general position is between the dunes on the ocean side and the salt marshes on the sound side. Most of the villages are located in herb shrub habitat, though this was not always so. Avon, Hatteras, and Ocracoke have some thicket woodland remaining. Buxton and parts of Frisco are still in the woods, but changing rapidly. The herb-shrub habitats vary from dry to periodically wet, from sparse to dense, and from fresh to brackish (the permanent fresh and tidal marshes are essentially herbaceous). The herbs are much the same as in the herbaceous beaches and dunes, but with greater variety. The dominant shrubby plants are Myrica cerifera (wax-myrtle), Baccharis halimifolia (groundsel-tree), Ilex vomitoria (yaupon), Iva frutescens (marsh elder), and Quercus virginians (live oak).



The greater complexity, extent, and continuity of the herb-shrub areas, as compared with the herbaceous beaches and dunes, provide for corresponding increases in species and numbers of animals. Characteristic birds are the several species of open-country hawks, barn and short-eared owls, pheasant, common snipe, dove, flicker, kingbird, swallows, purple martin, fish crow, Carolina and short-billed marsh wrens, mockingbird, robin, waxwing, starling, myrtle and prairie warblers, yellowthroat, house sparrow, meadowlark, redwinged blackbird, boat-tailed grackle, towhee, and savannah and song sparrows. Characteristic mammals, reptiles, and amphibians are: opossum, gray fox, least shrew, mole, cottontail, rice rat, meadow vole, Norway rat, house mouse, raccoon, and house cat; racerunner, and glass lizard; brown, ribbon, hog-nose, black, rough green, and yellow rat snakes, and kingsnake; Fowler's toad, green and squirrel treefrogs, narrow-mouthed toad, and leopard frog.

#### 11. Shrub Thickets

Shrub thickets are relatively pure and thick stands of shrubby species. They are usually small in area and scattered among the herb-shrub and woodland growths. They possibly should be classified with related types. As small units they provide important escape cover, perches, and breeding sites for a number of species from associated habitats. As large units they are rather barren, because of low food supply and dense physical matrix.



## 12. Thicket Woodlands

Thicket woodlands are mixtures primarily of high shrubs and low to intermediate trees, with scattered tall trees in places and considerable herbaceous growth. Some are dry and some are moist to swampy, some rather open and others quite dense. Most examples are on higher ground near the sound. The larger stands are: at the Cedar Point and lighthouse areas, on Bodie Island; in and near Avon, Little Kinnekeet, and Hatteras village, and at the fringes of Buxton woods, on Hatteras Island; and at Ocracoke village and several spots in the middle of Ocracoke Island. The dominant plants are: Myrica cerifera (wax-myrtle), Ilex vomitoria (yaupon), Baccharis halimifolia (groundsel-tree), Juniperus virginiana (red cedar), Persea borbonia (red bay), Xanthoxylum clava-herculis (hercules club), Iva frutescens (marsh elder), Quercus virginiana (live oak), Pinus taeda (loblolly pine), Smilax spp. (green-brier), and Vitis spp. (grape).

The mammals, reptiles, and amphibians of the thicket woodlands are much the same as in the herb-shrub habitats. The birds are sufficiently different to warrant a new list, as follows: green heron; nesting colonies of the little blue, Louisiana, and black-crowned night herons, common and snowy egrets, and glossy ibis; sharp-shinned, Cooper's, and red-shouldered hawks; pheasant; common snipe, dove, yellow-billed cuckoo, flicker; kingbird, crested flycatcher; common and fish crows; Carolina and short-billed marsh wrens; mockingbird, catbird, brown thrasher, robin, waxwing, starling; white-eyed and red-eyed vireos; yellow, myrtle, and prairie warblers; yellowthroat; boat-tailed and common grackles; cardinal, indigo bunting, and towhee.



### 13. Woods<sup>1</sup>

The Buxton woods is the only real woods in the Park. All other areas with trees are remnant woods now controlled by shrub and thicket species and classified as thicket woodlands. The Buxton woods covers about ten square miles, being seven miles long and one to three miles wide. Physiographically the region is a series of wooded dunes with fresh-water ponds and marshes in the swales between the ridges. Only a small part of the woods, at the Cape Hatteras face, is in the Park. The entire woods stands as a single ecological unit, however, and has been so considered in this investigation. Buxton woods is unique on the outer banks and should be studied intensively in all aspects in the near future.

The dominant trees are: Quercus virginiana (live oak), Pinus taeda (loblolly pine), Carpinus caroliniana (ironwood), and Ilex opaca (American holly). Many other tall trees, understory trees, shrubs, and vines are common, the more important being: Quercus nigra (water oak), Juniperus virginiana (red cedar), Osmanthus americanus (wild olive), Persea borbonia (red bay), Cornus florida (flowering dogwood), Xanthoxylum (hercules club), Salix (willow), Myrica (wax-myrtle), Ilex vomitoria (yaupon), Baccharis (groundsel-tree), Callicarpa (French mulberry), Vitis (grape), Smilax (greenbrier), and Gelsemium (evening trumpet flower). The shrub and understory layers are usually dense. The herbaceous and procumbent plants are well developed. The litter and duff layers are thick.

Many species of tetrapod vertebrates are found only in and near the Buxton woods, as noted in the Annotated Lists. Other species

---

<sup>1</sup>There are no woods at the Duck site.



are found there more than elsewhere. The aquatic species stay mainly in the ponds and marshes, but many of them appear in surrounding habitats at times for various reasons. The commoner and more distinctive animals are grouped below under each class, including both land and water forms.

Birds. Pied-billed grebe; all the herons and egrets, either as nesting birds or transients; surface-feeding ducks in small numbers, wood duck, ring-necked duck, bufflehead, hooded merganser; turkey vulture; sharp-shinned, Cooper's, and red-shouldered hawks; osprey; pheasant; king rail, common gallinule, coot; woodcock, snipe, spotted sandpiper; dove, cuckoo, screech owl, kingfisher, flicker; crested flycatcher, both crows, Carolina wren, catbird, brown thrasher, robin, hermit thrush, waxwing; white-eyed and red-eyed vireos; prothonotary, myrtle, pine, and prairie warblers, and yellow-throat; cardinal, and towhee. Twenty-four species are recorded so far only in the Buxton woods region.

Mammals. Mole, cottontail, gray squirrel, white-footed mouse, cotton mouse, muskrat, Norway rat, house mouse, nutria, raccoon, mink, otter, house cat, and white-tailed deer. The squirrel, white-footed and cotton mice, and deer are found only in the Buxton woods area.

Reptiles. Snapping, mud, spotted, and yellow-bellied turtles; ground and five-lined skinks; brown water, brown, ribbon, black, rough green, and yellow rat snakes; kingsnake, cottonmouth, and canebrake and diamondback rattlesnakes. Seven of these are found only in the Buxton woods.

Amphibians. All seven species, four of them only at Buxton woods-Cape Hatteras.



#### 14. Fresh-Water Ponds and Marshes

Permanent fresh-water ponds and marshes are concentrated in only a few places. Shallow marshes and small ponds traverse the mid-line of Bodie Island, along the highway, the full six miles from causeway to lighthouse pond. The pond at the lighthouse and its marshy shores and edges cover about 300 acres. The two fresh-water impoundments at Pea Island comprise about 1500 acres of open water and marsh. The third and last major set of fresh-water ponds and marshes is in the Buxton woods-Cape Hatteras region, encompassing possibly as much as three square miles in all. These prime centers support a diversity of exclusively fresh-water plants and animals, many of which otherwise would be lacking in the Cape Hatteras National Seashore.

Wide stretches of open beach and dune, herbaceous beach and dune, herb-shrub, and thicket woodland habitats often have several inches of surface water for days and weeks at a time. This condition is of major significance to the herbaceous and woody plants but of no long-range importance to aquatic animals. The problems of permanency and occasional brackishness are discussed in the Annotated List of Amphibians.

The more open ponds and marshes have abundant growths of submerged and floating aquatic plants, as Najas (water nymph), Potamogeton (pondweed), Eleocharis (spike-rush), Ruppia (widgeongrass), Bacopa (water-hyssop), Ludwigia (false loosestrife), and Characeae (musk grass)--all good waterfowl foods. The dominant emergent plants in the marshes and pond edges are: Typha spp. (cat-tail), Scirpus americanus (three square), Eleocharis spp. (spike-rush), Cladium (Buxton woods)(saw-grass),



Spartina patens (saltmeadow cordgrass), and Salix (willow). Many other typical genera and species are common and important.

The commoner and more characteristic animals of the fresh ponds and marshes are listed below. Many other species come to the wet edges.

Birds. Pied-billed grebe; great blue, green, little blue, Louisiana, and black-crowned night herons; common and snowy egrets; least and American bitterns; glossy ibis; whistling swan, Canada goose, snow goose; mallard, black duck, gadwall, pintail, green- and blue-winged teal, widgeon, shoveler; ring-necked duck, scaup, bufflehead, ruddy duck; marsh hawk, osprey, peregrine falcon, pigeon hawk; pheasant; king rail, common gallinule, coot; all species of shorebirds, some more often and in larger numbers than others, on shores and flats and in depths to their bellies, especially the whimbrel, spotted sandpiper, willet, greater and lesser yellowlegs, pectoral sandpiper, least sandpiper, dowitcher, semi-palmated sandpiper, avocet, and stilt; black-backed, herring, ring-billed, and laughing gulls; common, least, royal, and black terns; barn and short-eared owls; kingfisher; eastern kingbird, swallows, fish crow, short-billed marsh wren, yellowthroat, redwinged blackbird, boat-tailed grackle; savannah, seaside, swamp, and song sparrows.

Mammals. Cottontail, rice rat, muskrat, Norway rat, nutria, raccoon, mink, and otter. Deer use the ponds, marshes, and swampy thickets in the Buxton woods.

Reptiles. Snapping, mud, and yellow-bellied turtles; ribbon snake, black racer, rough green snake, cottonmouth, and canebrake rattlesnake.

Amphibians. Fowler's toad, green treefrog, squirrel treefrog, narrow-mouthed toad, and leopard frog.



## 15. Tidal Marshes<sup>1</sup>

Tidal marshes form irregular lines of varying widths along the shores and edges of all three islands. Tidal sloughs, creeks, and embayments penetrate higher ground deeply at many points, increasing the already-complex edge effects with the upland, fresh marsh, tidal flat, and inshore sound habitats. Drift accumulates heavily at the mean high water mark. Spartina alterniflora (saltwater cordgrass) is the dominant and usually only emergent plant of the intratidal zone, below the drift line. In the supratidal zone, washed with salt or brackish water regularly on the higher tides (moon and wind), the vegetation is dominated by the typical salt marsh species--Spartina patens (saltmeadow cordgrass), Distichlis spicata (spike-grass), Juncus roemerianus (black rush), Borrichia frutescens (sea-ox-eye), Iva frutescens (marsh elder), Baccharis halimifolia (groundsel-tree), Fimbristylis castanea (sand-rush), and Salicornia (saltwort). The tidal marsh vegetation grades almost imperceptibly on the landward side into fresh marsh, herbaceous beach, herb-shrub, and shrub thicket types.

The tetrapod vertebrates of the salt and brackish ponds and marshes are fewer in groups and species than those of fresh-water habitats. This is because of tidal movements, fluctuating water levels, salinity, and fewer food plants.

When the water is in, the animals of the open salt marshes (low or sparse vegetation and shallow water) are mainly the same species of herons, egrets, geese, ducks, shorebirds, gulls, and terns as occur in the fresh ponds and marshes. When the water is out the open salt

---

<sup>1</sup>The only true tidal salt marshes are found at the southern end of Currituck Sound.



marsh areas are "dry", and become temporarily inhabited with a number of vertebrates from bordering habitats.

The birds of the more typical or true tidal marshes (dense and tall stands of primarily herbaceous vegetation, dissected by narrow and soft-bottomed creeks and sloughs) are the least bittern, black duck, marsh hawk, clapper rail, short-eared owl, fish crow, long-billed marsh wren, redwinged blackbird, boat-tailed grackle, and seaside sparrow. Other vertebrates are: muskrat, nutria, mink, otter, diamondback terrapin, and banded water snake.

#### 16. Edificarian Habitats

The environs of the villages are essentially herb-shrub habitats, as are the sites of isolated buildings, bridges, and other man-made structures. Additional habitats are close to all the villages, however, and nearly all habitats are represented at one village or another. The plants and animals of each edificarian place are largely of herb-shrub origin, with various additions from whatever habitats are nearby. To illustrate: the gray fox hunts by the Park Headquarters on Bodie Island, otter swim in the drainage canal at Avon, nutria feed in the gardens at Hatteras, and cottonmouths crawl in the yards at Buxton.

A few common species are particularly associated with habitations. These are: chimney swift, barn swallow, purple martin, starling, house sparrow, black rat, Norway rat, house mouse, and house cat.



**APPENDIX D**

**REPLIES TO 13 SEPTEMBER 1972 LETTER**



<u>Description</u>	<u>Date</u>
Wilmington District Letter	13 Sep 72
Letter from Col. George E. Pickett, Office of Water and Air Resources, NC Dept of Natural & Economic Res.	21 Sep 72
Letter from Huntington Cairns, Kitty Hawk, N.C.	24 Sep 72
Letter from Arthur G. Linton, Chief, Federal Activities Office, Region IV, EPA	26 Sep 72
Letter from Robert J. Catlin, Director, Division of Environmental Affairs, Atomic Energy Commission	28 Sep 72
Letter from H. J. Green, Assistant State Forester, Office of Forest Resources, NC Dept of Natural & Economic Res.	28 Sep 72
Letter from William B. Farris, Northeastern Field Office, NC Dept of Natural & Economic Res.	3 Oct 72
Letter from Mrs. Carol W. Pelosi, Wake Forest, N.C.	4 Oct 72
Letter from Prof. Robert Dolan and John S. Fisher, Dept of Environmental Sciences, Univ. of Virginia	5 Oct 72
Letter from Karl Osborne, The Salt Water Sportsman	10 Oct 72
Letter from Ralph C. Heath, District Chief, Geological Survey	11 Oct 72
Letter from Frank J. Groschelle, Regional Director, Region IV, Dept of HEW	17 Oct 72
Letter from Robert D. Barbee, Supt., National Park Service	19 Oct 72
Letter from Dr. Wallace W. Harvey, Manteo, N.C.	19 Oct 72
Letter from Arthur V. Peterson, Kitty Hawk, N.C.	1 Nov 72
Letter from Arthur W. Cooper, Asst. Sec. for Resource Management, NC Dept of Natural & Economic Res.	1 Nov 72
Letter from Mr. & Mrs. Raymond M. Staley, Falls Church, Va.	7 Nov 72
Letter from Dr. Ralph W. Brauer, Dept. of Marine Bio-Medical Research, UNC at Wilmington	8 Nov 72
Letter from Bruce MacDougal, NC Dept of Archives & History	8 Nov 72
Letter from Harold J. Nightlinger, Executive Secretary, The Outer Banks Association, Inc.	8 Nov 72
Letter from Prof. C. C. Tung, Dept. of Civil Engineering, N. C. State University	10 Nov 72
Letter from Col. Costanzo to Dr. Wallace W. Harvey	13 Nov 72
Letter from Maj. Callahan to Harold Nightlinger	16 Nov 72



<u>Description</u>	<u>Date</u>
Letter from Alan Levin, Executive Secretary, President's Air and Water Advisory Board, EPA	22 Nov 72
Letter from Dr. Joffre L. Coe, Director, Research Laboratories of Anthropology, UNC at Chapel Hill	28 Nov 72
Letter from Col. Costanzo to Mr. Alan Levin	29 Nov 72
Letter from Prof. Daniel A. Okun, Dept of Environmental Sciences & Engineering, UNC at Chapel Hill	6 Dec 72





DEPARTMENT OF THE ARMY  
WILMINGTON DISTRICT, CORPS OF ENGINEERS  
P. O. BOX 1890  
WILMINGTON, NORTH CAROLINA 28401

SAWEE

13 September 1972

Dear

I am furnishing this letter and attached information for your use in coordinating planning efforts and evaluating a new research facility proposed by the Coastal Engineering Research Center (CERC) 5201 Little Falls Road, N.W., Washington, D. C. 20016.

The site for the facility is about one mile north of Duck, North Carolina, (see inclosed map) and was chosen by CERC after a multi-variate analysis of different criteria. Specific site investigations were made to determine site suitability for the study of coastal processes, using 13 criteria.

The Duck, N. C., site is currently owned by the Navy and transfer of the area to the Corps is being negotiated. It has an ocean frontage of about 3,300 feet and includes all the land across the barrier beach to Currituck Sound. The maximum elevation of the area is 25 feet, with frontal dunes 50 to 75 feet wide, 10 to 15 feet high. The beach width is 100 feet on a relatively straight coastline.

The Navy used the 175 acres for a bombing range between 1941 and 1965. The area is littered with metal fragments. Decontamination of the highway right-of-way was effected in April 1971 and the rest of the site was decontaminated in September 1971. Ordnance removal was accomplished in the waters of both the Atlantic Ocean and Currituck Sound at the site. The Navy considers the site as clean as possible although acknowledging the occasional appearance of ordnance as sand shifts and wave movements occur. Planting of 23 acres of the area with beach grass was done in April 1972.

The CERC research facility will consist of a pier, laboratory facilities, maintenance equipment and facilities, a parking lot, and an access road to the pier. Pedestrian access along the beach should not be impeded, although access to the pier will be restricted.



13 September 1972

The pier would extend 1,760 feet seaward, have a width of 16 feet, and a height of 25 feet above mean low water at the surf zone and 27 feet above mean low water at the seaward end. It would have a reinforced concrete deck and pile caps and steel pipe piles, concrete filled. The pier would conform with U. S. Coast Guard regulations.

Onshore construction would provide for access to the pier and laboratory space for, at most, 12 scientists. Some housing would need to be provided for one maintenance person who would remain on the site.

This research facility will be used to monitor physical processes occurring in the beach zone. Although there have been many studies concerning coastal processes (e.g. beach formation and erosion, wave phenomena, etc.), these studies have been largely laboratory oriented. This new research facility will afford researchers the opportunity to study these coastal processes, with sophisticated equipment, over a long period of time. The information obtained by this facility is critically needed for the development of sound shore management and protection guidelines. This need is evidenced by Corps of Engineers National Shoreline Studies which conclude that erosion along the shoreline of the Atlantic Ocean is a serious problem.

The pier would be used to monitor wave and wind parameters, current velocities (to and from the shore and along shore), and manifestations of beach processes. Other studies include observations of marsh grasses and stabilization of dunes by grass plantings. The area would become a natural laboratory of the near-shore, shore, dune, and sound environments. The research facility and attendant land area will also be available for use by other researchers if their projects do not interfere with the primary purpose of the facility.

Two representatives of the Wilmington District Environmental Resources Branch made a field investigation of the Duck site on 26 July 1972. The initial evaluation of this site was favorable. Preliminary coordination efforts with several Federal and State agencies produced favorable responses concerning the location of the pier on this site.

I hope to award a construction contract prior to 30 June 1973. In order to do this, I will have to file a fully coordinated Environmental Impact Statement (EIS) with the Council on Environmental Quality by 15 April 1973. To meet that schedule, I plan to circulate a draft EIS prior to January 1973. Therefore, I would appreciate any comments that you have for consideration in preparing the draft EIS by 1 November 1972. I would also like your comments on whether or not you think that I should hold a public meeting on the environmental impact of this plan.



13 September 1972

If I can provide any further information to you in this matter, please do not hesitate to contact me. I will look forward to hearing from you in this matter.

Sincerely yours,



ALBERT C. COSTANZO  
Colonel, Corps of Engineers  
District Engineer

2 Incl

- 1. Map - Duck Research Facility Site
- 2. List of Addressees

If you desire to call my office, the following persons are available to discuss this project with you:

Colonel Albert C. Costanzo                      919-763-9971                      Ext. 466  
District Engineer

Major Joel T. Callahan  
Deputy District Engineer & Public Affairs Officer                      Ext. 467

Mr. E. G. Long, Jr.  
Chief, Engineering Division                      Ext. 455

Mr. Richard M. Jackson  
Chief, Environmental Resources Branch                      Ext. 592

Mr. John B. Woolwine  
Chief, Structural Section, Design Branch  
Project Coordinator                      Ext. 530



STATE OF NORTH CAROLINA  
DEPARTMENT OF NATURAL AND ECONOMIC RESOURCES

Raleigh 27611



ROBERT W. SCOTT  
GOVERNOR

187

S. W. BRADSHAW, JR.  
SECRETARY

Office of Water and Air Resources

GEORGE E. PICKETT, DIRECTOR  
TELEPHONE 829-3003

September 21, 1972

WS 72 HEM

Colonel Albert C. Costanzo  
District Engineer  
U. S. Army Engineer District  
Wilmington, Corps of Engineers  
P. O. Box 1890  
Wilmington, North Carolina 28401

Dear Colonel Costanzo:

Our Office has reviewed your plans for a new research facility proposed for the Duck area of North Carolina. We look forward to having such a facility established in North Carolina and hope that it will provide a great deal of information to better help us in understanding natural processes along the North Carolina coast.

Enclosed is a copy of the North Carolina Dune Protection Law. Dare County has enacted a local ordinance under this act, and you will have to obtain a sand dune permit from the County Shore Protection Officer before doing any work in the dune area. We would request that any proposed construction would minimize the amount of vegetation disturbed and would not substantially weaken the front-line dunes. We do not feel that the proposed work would require a public meeting on the environmental impact of the plan.

We look forward to having a CERC Research Center established in North Carolina.

Sincerely,

  
George E. Pickett

Enclosure



HUNTINGTON CAIRNS  
KITTY HAWK  
NORTH CAROLINA 27949

September 24, 1972

Dear Colonel Costanzo,

Thank you for your letter of September 13, 1972, with respect to the construction of a research facility about one mile north of Duck, N. C. The purpose for which the facility would be used seems to me eminently desirable. As a long time reader of Nature and Science, and of books and pamphlets in the field, I am under the impression that there is a distressing paucity of knowledge of the processes the scientists associated with the facility will investigate.

You ask if I think that you should hold a public meeting on the environmental impact of the proposed plan. Although I am informed that the holding of such a public meeting is required by law in cases of this kind, I gather from your question that this information is erroneous. However, I do think that the people of Dare County and of Currituck County should be informed of the proposed plan. I suggest that a news release containing ~~containing~~ the appropriate information be sent to The Coastland Times, Manteo, N. C. and to The Daily Advance, Elizabeth City, N. C. and perhaps to the News and Observer, Raleigh, N. C., and to The Virginian Pilot, Norfolk, Virginia. The response to the publication of that release should be of help in determining whether or not a public meeting should be held.



From my own point of view, my chief interest is the effect of the construction of the pier upon the width of the beach north and south of the pier. So far as I can ascertain there is a general impression among the Dare public that the construction of the Kitty Hawk Fishing Pier resulted in the erosion of the beach for a considerable distance south. On the other hand, the owner of a large acreage north of your proposed pier is of the view that the pier will widen the beach to the north. I have come upon nothing in the literature on the subject which indicates any certain knowledge in the field. My own beach, except for its elevation, seems to be in about the same condition it was in in 1947.

The Assateague project, which I understand has been abandoned, does not seem to me relevant to your proposed construction. I understand that the Assateague plan was opposed purely on aesthetic grounds, a situation which does not now exist north of Duck. I am also told that in the opinion of experts the pier or platform which had been proposed for Assateague would have produced no erosive effects on beach property.

Sincerely yours,



Colonel Albert C. Costanzo



# ENVIRONMENTAL PROTECTION AGENCY

## REGION IV

1421 Peachtree St., N.E., Atlanta, Georgia 30309

September 26, 1972

District Engineer  
U. S. Army, Corps of Engineers  
P. O. Box 1890  
Wilmington, North Carolina 28401

Subject: Research Facility for Monitoring Physical processes occurring in  
the Beach Zone

Dear Sir:

This is in response to your letter of September 13, 1972 requesting our comments with regard to items for inclusion in an Environmental Impact Statement covering the subject project.

We see no objection to the research facility provided proper measures are taken to dispose of all pollutants in accordance with State and Federal standards. The Environmental Impact Statement should include the measures which will be taken to dispose of solid wastes, air pollutants and waste water. Provision should be made for handling boat wastes at the pier and transferring them to the treatment system.

Since the adjacent waters are used for contact recreation, a high degree of treatment will be required for all waste water. Secondary treatment in an extended aeration plant, filtration and subsurface soil disposal is recommended in lieu of secondary treatment, chlorination and a long ocean outfall. If the quantity of waste water generated is under 10,000 g.p.d. a septic tank and tile field might be satisfactory if soil conditions and water table are suitable.

The Environmental Protection Agency is also interested in better methods of beach protection and erosion control since the dredging associated with the beach nourishment projects frequently disrupts the ecological cycles of both the borrow and fill areas. We believe that the data derived from such a project will be valuable to all agencies dealing with shore projects.

If we can be of further service, kindly advise.

Sincerely yours,

  
Arthur G. Linton, Chief  
Federal Activities Office





UNITED STATES  
ATOMIC ENERGY COMMISSION  
WASHINGTON, D.C. 20545

SEP 28 1972

Col. Albert C. Costanzo  
Corps of Engineers  
Wilmington District  
P. O. Box 1890  
Wilmington, North Carolina 28401

Dear Colonel Costanzo:

This is in reply to your letter of September 13, 1972, transmitting information concerning your Duck, N. C. research facility. In reviewing the information it has been determined that the Commission has no programmatic interests affected by the project nor any special expertise for evaluating the environmental impact of the facility. Therefore we have no comments to offer regarding the facility and suggest that the AEC not be included on the list of those requested to review the draft environmental impact statement.

Sincerely,

A handwritten signature in cursive script, appearing to read "R. J. Catlin".

Robert J. Catlin, Director  
Division of Environmental Affairs



STATE OF NORTH CAROLINA  
DEPARTMENT OF NATURAL AND ECONOMIC RESOURCES

Raleigh 27611



ROBERT W. SCOTT  
GOVERNOR

H. BRADSHAW, JR.  
SECRETARY

Office of Forest Resources

RALPH C. WINKWORTH, DIRECTOR  
TELEPHONE 629-4141

September 28, 1972

Colonel Albert C. Costanzo  
Corps of Engineers  
Wilmington District  
P. O. Box 1890  
Wilmington, N. C. 28401

Dear Col. Costanzo:

We see no environmental implications from a forestry standpoint concerning the proposed new research facility at Duck, N. C.

Possibly some of the research carried on here later will be of value for stabilizing beach sands with trees or shrubs.

Sincerely,

A handwritten signature in cursive script, appearing to read "H. J. Green".

H. J. Green  
Assistant State Forester

HJG/es

cc: Art Cooper



STATE OF NORTH CAROLINA  
DEPARTMENT OF NATURAL AND ECONOMIC RESOURCES

1129  
ROBERT W. BRADSHAW, JR.  
SECRETARY

Washington 27889  
35



ROBERT W. SCOTT  
GOVERNOR

Northeastern Field Office  
October 3, 1972

Colonel Albert C. Costanzo  
U. S. Army Corps of Engineers  
P. O. Box 1890  
Wilmington, North Carolina 28401

Dear Colonel Costanzo:

The Northeastern Field Office of the North Carolina Division of Community Services, in cooperation with the Dare Beaches Water and Sewer Authority, is currently preparing a land development plan for the Dare Beaches area of Dare County. The Dare Beaches area is considered to be that portion of Dare County extending from Oregon Inlet north to the Currituck County line, including the site of the proposed Coastal Engineering Research Center facility. Although only preliminary draft copies of the Dare Beaches Land Development Plan have been produced and no public hearings or formal actions have been taken on the plan, the "old Navy bombing range," which is already in public ownership, has been designated as public open space for the recreational use of the residents and visitors of the Dare Beaches. It should be noted that a similar recommendation was made in the Dare County Development Plan, published in 1964.

The lack of public beach areas is prominently mentioned as an existing problem in the northern portion of the Dare Beaches area. As the area becomes more fully developed, the problem will increase in magnitude. The provision of public open space by local governments is impossible in most cases, owing to the extremely high property values in the Dare Beaches area. Thus, it does not seem advisable to make any use of the Navy bombing range which will limit its maximum utilization by the public for recreation.

It must be assumed from your letter describing the proposed CERC facility that no future recreational use of the 175 acre site has been planned, and on the basis of this assumption, the facility would probably be detrimental to the future development of the Dare Beaches area. If the facility were developed with creative multiple-use in mind, however, it could be a real asset to the Dare Beaches area and its recreation industry. Public beach facilities and a "nature museum" interpreting the natural processes of the barrier islands are two obvious uses which are compatible with the proposed CERC research. Perhaps more could be identified with additional study.



Colonel Costanzo  
Page 2  
October 3, 1972

At any rate, it is felt that a public meeting should be held to discuss the impact of this project since it is so important to the future of the Dare Beaches area.

We would appreciate having the list of criteria used in the multi-variate analysis of sites for reference. Please contact this office if you have any questions concerning these comments.

Sincerely,



William B. Farris  
Community Planner  
Division of Community Services

WBF:ma

CC: Harold Strong, Administrator, Div. of Community Services  
George F. Reynolds, Chairman  
Dare Beaches Water and Sewer Authority



Route #1 Box 11 AA  
Lake Forest, N. C. 27587

October 4, 1972

Major Joel T. Callahan  
Department of the Army  
Ft. Belvoir District, Corps of Engineers  
P. O. Box 1590  
Ft. Belvoir, N. C. 28401

Dear Major Callahan,

Our family has only been in North Carolina two years and we had not seen the Outer Banks until this fall. I am sure we all remember and treasure different things but for all of us it was a thrilling experience to find white sand, endless beaches, beauty and solitude - all better than its billing.

It was a shock to read in the paper the following week that the Corps plans to build a huge pier near Duck,

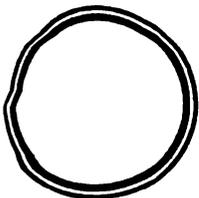


one of the last unspoiled parts of the  
Banks. Although it surely would yield  
scientific data, such an installation  
would also change the currents, the  
sand distribution on both sides for  
miles, and would mean more in-  
tervention of man into an environment  
shaped by wind and sea. Surely some  
part of that environment could be  
left for my grandchildren to at least  
glimpse.

I hope that this installation can  
be reconsidered.

Sincerely,  
Carol A. Pelosi  
(Mrs. John)





# DEPARTMENT OF ENVIRONMENTAL SCIENCES

BROOKS MUSEUM . UNIVERSITY OF VIRGINIA . CHARLOTTESVILLE . VIRGINIA . 22908

October 5, 1972

Colonel Albert C. Costanzo  
District Engineer  
Wilmington District, Corps of Engineers  
Wilmington, North Carolina 28401

Dear Colonel Costanzo:

Thank you for your letter of 13 September 1972 with regard to the new CERC research facility. The pier and related buildings are a much needed tool for systematic analysis of coastal processes.

It would appear from your description of the program of site evaluation that a rigorous determination of the suitability of this particular location has been made. The application of a multi-variate analysis to this decision process is of considerable interest to us, and we would appreciate a definition of the 13 criteria included in this analysis.

The statement of the impact of this facility on the coastal environment must, of course, attempt to isolate all possible consequences of both the structures as well as whatever research activities which might stress the natural physical and biological system. In this regard it is important to recognize the natural changes in this system, and thus build accordingly. As you know, the Outer Banks reach is one of the most dynamic along the mid-Atlantic. Any long-term plan will surely take into account most of the design problems characteristic of the North Carolina coast.

Recent increases of public interest in our natural environment, and their protection are, in our opinion, a healthy trend and should be encouraged. This form of communication can serve to further define public concern, as well as provide a format for greater explanation of the care and consideration which is included in development activities such as this research facility. Thus, we think a public hearing should be given careful consideration in your plans.

We are pleased to offer our services in your continued deliberation.

Sincerely,

Robert Dolan  
Associate Professor of

John S. Fisher  
Assistant Professor



THE **Salt Water**  
**SPORTSMAN**

THE VOICE OF THE COASTAL SPORT FISHERMAN

10 HIGH ST. • BOSTON • MASS. • 02110 TEL. (617)-426-4074  
Reply to  
Karl Osborne, P.O. Box 422, Vero Beach, Florida 32960  
Telephone: (305) 567-2583

10 October 1972

U.S. Corps of Engineers  
Wilmington District  
Wilmington, N.C.

Attn: Colonel Costanzo, District Engineer

Dear Colonel Costanzo:

As South Atlantic Representative for SALT WATER SPORTSMAN magazine I am deeply involved with coastal marine sport-fishing along the shores of North Carolina and consequently am often asked to act as spokesman for sportfishing interests.

Commenting on the proposed CERC project near Duck, N.C. I would like to point out that there is considerable beach buggy traffic on these particular beaches from early November through late January as fall runs of striped bass and bluefish attract numbers of both sports and commercial fishermen.

I respectfully submit that some provision for beach vehicles to bypass the construction area should be included in the project plans, along with pedestrian access. Blockage of north-south beach traffic could work a serious hardship on surf fishermen, many of whom are visitors from outside the state who are invaluable to the local economy.

I would very much appreciate your favorable consideration on this matter.

Sincerely,



Karl Osborne

cc: William Wade, Executive Director, Outer Banks Chamber of Commerce.  
Hal Lyman, Publisher SALT WATER SPORTSMAN





# United States Department of the Interior

## GEOLOGICAL SURVEY

P. O. Box 2857  
Raleigh, North Carolina 27602

October 11, 1972

Col. Albert C. Costanzo  
District Engineer  
Corps of Engineers  
P. O. Box 1890  
Wilmington, North Carolina 28401

Dear Col. Costanzo:

I have read your letter of September 13 relating to the proposed coastal-research facility at Duck, North Carolina. I am pleased to learn of your plans and believe the facility will meet an important need.

I do not have any comments at this time relative to your proposed environmental impact statement. I might note that we may be able to help you with the development of a water supply for the facility at the appropriate time.

Very truly yours,

Ralph C. Heath  
District Chief

RCH:rr





DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE  
REGION IV  
50 7TH STREET N.E.  
ATLANTA, GEORGIA 30323

October 17, 1972

OFFICE OF THE  
REGIONAL DIRECTOR

Colonel Albert C. Costanzo  
Department of the Army  
Wilmington District, Corps of Engineers  
P.O. Box 1890  
Wilmington, North Carolina 28401

Dear Colonel Costanzo:

Your letter of intent with regard to the proposed new research facility at Duck, North Carolina dated September 13, 1972, has been reviewed with emphasis on the health aspects of the project.

In view of the nature of this area, care should be taken in obtaining water supply. From our knowledge of the beach area, a shallow stratum of fresh water is available in limited quantities, but experiences at Nags Head years ago indicated eventual pollution of the ground water table from septic tanks saturating just under the surface area. Mr. Westbrook, of my staff, discussed this with Major Callahan by phone on October 17. We understand that these problems are under consideration by your staff.

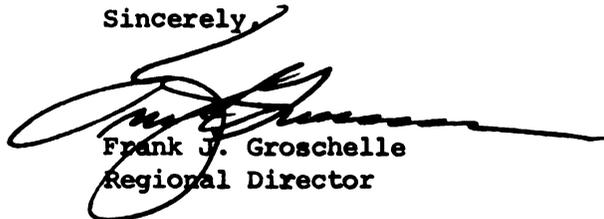
Mr. Sid Usry of the North Carolina State Board of Health, Raleigh, has indicated that his department will be glad to work with you on problems of solid wastes collection from the facilities.

We do not see any problems of a health nature from the construction of the pier, laboratory and other facilities.

From your list of addressees it is apparent that your intentions have been well publicized and that a public meeting is not warranted at this time.

We look forward to seeing the draft Environmental Impact Statement when it is available.

Sincerely,



Frank J. Groschelle  
Regional Director





# United States Department of the Interior

## NATIONAL PARK SERVICE

Cape Hatteras National Seashore  
P. O. Box 457  
Manteo, North Carolina 27954

IN REPLY REFER TO:

D18

October 19, 1972

Mr. Albert C. Costanzo  
Colonel, Corps of Engineers  
District Engineer - Wilmington Dist.  
P. O. Box 1890  
Wilmington, North Carolina 28401

Dear Col. Costanzo:

My staff and myself reviewed your letter regarding the proposed research facility at Duck, North Carolina, and are pleased with the prospect of a research center to monitor coastal processes in this area. As you have pointed out, the information and data compiled by such an installation is vital for the preparation of a comprehensive, up to date, coastal management plan which is so desperately needed on the barrier islands and coastlines of the eastern seaboard.

We do not believe that the construction would cause any significant environmental problems. It is possible that the pier pilings might create some minor disturbances in the long shore currents, resulting in a slight variation in sand deposition, but this would probably be very unconsequential.

In regard to holding public meetings on the environmental impact of this plan, I believe the principal value would be in establishing communications with coastal residents; providing an opportunity to explain the purpose and function of the facility and hopefully, create an atmosphere of rapport and mutual cooperation in the surrounding communities.



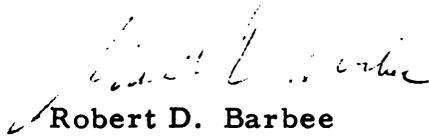
National Parks Centennial 1872-1972

D-15



If I can be of any assistance to you in preparing the EIS, please do not hesitate to contact me.

Sincerely,



Robert D. Barbee  
Superintendent



**WALLACE W. HARVEY, JR., M. D.**  
MEMORIAL CLINIC  
MANTEO, NORTH CAROLINA 27954  
—  
TELEPHONE 478-2070

October 19, 1972

Colonel Albert Costanzo  
District Engineer  
Corps of Engineers  
Wilmington District  
Wilmington, North Carolina

Dear Colonel Costanzo,

Thank you very much for sending me your letter of the proposals for a coastal research station development in the Duck area in Dare County.

Indeed, this is a most exciting development and I sincerely feel will be of great benefit to Dare County as well as the rest of the nation and other coastal areas which have problems similar to ours.

You are well aware of the aquatic growth in the upper sounds associated with pollution causing high bacterial counts of coliform, strep-fecalis, and botulism.

Other than these extremely hazardous health situations, the entire upper sounds are for any practical purpose lost for navigation for small crafts and it is impossible to navigate any large craft in the area that are overrun with aquatic growth.

I beg you and others associated with this project to seriously consider the development of a storm spillway approximately one quarter to one half mile wide with flood control gates, running from sea to sound and sound to sea so many of the problems that exist may be alleviated relative to obnoxious aquatic growth and the sterility of the sounds as a fishery nursery, due to pollution, except for a few isolated species.

This spillway would serve many very valuable purposes, number one would be to introduce sea water into the sounds to help control proliferation of obnoxious aquatic growth, to disspell the frightful situation that is existing relative to pollution by increasing the salinity, Ph, and decreasing the turbidity which would be associated with the introduction of sea water. The introduction of sea water could be controlled so that those who are concerned with other fisheries species would not be alarmed and those species that are intolerable of sea water could survive in a controlled atmosphere. Additionally, it would permit the regrowth of natural grasses such as widgeon, sagoweeK, and the various nut grasses which provide food for migratory water fowl. Another benefit would be a possible aid in increasing the circulation time within the sounds by permitting water to flow from sea to sound in time of unusual storm tides and alos permit the sound waters to be flushed by sound water flowing from sound to sea when the sounds become overloaded on unusual wind tides. Secondly, the benefits of the sea water in controlling obnoxious aquatic growth would aid the mariner in permitting an increase in traffic by boaters for recreational as well as commercial use by clearing the waterways for navigation.



**WALLACE W. HARVEY, JR., M. D.**  
MEMORIAL CLINIC  
MANTEO, NORTH CAROLINA 27954  
—  
TELEPHONE 473-2070

Thirdly, such a spillway would actually be a safty valve at the time of a hurri-  
can from any southerly quadrant to permit sound water to spill into the ocean without  
possibly breaking through in populated areas where life and property would be endangered  
until the existing man made dunes were breached.

We in Dare County are thinking in terms of asking the appropriate agencies of the  
state, such as the Department of Air and Water Resourses, and from the federal govern-  
ment, the Department of Interior and the Corps of Engineers to aid in the development  
of a spillway in the north end of Dare County and a spillway in the south end of Dare  
County as safty factors.

As you realize the only unpopulated and undeveloped property that exists in our  
area is that owned by the federal government and it appears that these are the most  
feasible sources for the development of spillways.

We also realize that the Department of Transportation and State Highway Commission  
may become involved by the necessity of building low level bridges over these spillways.

We are now convienced, in as much as seven or more outlets use to exist on the  
Outer Banks; these must be recreated to reestablish nature's way of flushing and in-  
creasing the circulation time of the sounds to keep them in their non-polluted productiv  
state. Diking of the Outer Banks and the sounds of North Carolina has proven quite detri-  
mental over the past years that these programs have been in effect.

Technical studies have now revealed that certain types of artificial dune stabili-  
zation with the closing of ocena overwashes lead to deterioration of the buffer banks  
and greater erosion than occurs without man's tampering.

The diking situation by these dunes has caused a fall in the clam fishery and had  
a serious effect on the oyster fishery as well as a decrease in the effeciency of the  
sound as a finfish nursery.

Looking forward to the pleasure of meeting with you, I remain

Very Sincerely Yours,  
  
W. W. Harvey, Jr. M. D.

WWH/bjs



**WALLACE W. HARVEY, JR., M. D.**  
**MEMORIAL CLINIC**  
**MANTEO, NORTH CAROLINA 27954**  
**TELEPHONE 473-2070**

cc; Colonel Page  
Department of Air and Water Resources  
Raleigh, North Carolina  
Mr. Ernest Brown  
Department of Conservation and Development  
Raleigh, North Carolina  
Mr. Pete Whitley  
North Carolina Board of Air and Water Resources  
Murfreesboro, North Carolina  
Dr. Jacob Kocman, M. D.  
State Health Director  
State Board of Health  
Raleigh, North Carolina  
Dr. Tom Linton, Director  
Bureau of Sports and Commercial Fisheries  
Raleigh, North Carolina  
Mr. Orville Woodhouse  
Chairman, Wildlife Commission  
State of North Carolina  
Grandy, North Carolina  
Mr. Penell Tillett  
Acting Chairman  
Dare County Board of Commissioners  
Manteo, North Carolina  
Editor, Coastland Times  
Manteo, North Carolina



ARTHUR V. PETERSON ASSOCIATES

November 1, 1972

Colonel Albert c. Co~~x~~stanzo, District Engineer  
Wilmington District, Corps of Engineers  
P. O. Box 1890  
Wilmington, N. C. 28401

Dear Colonel Co~~x~~stanzo:

With regard to your letter of September 13, 1972, I do not feel that the location of a CERC research facility at Duck, N. C. would have a disadvantageous impact on the local environment. The land itself, however, has been looked upon by various public bodies in the past few years as, among other things;

a possible site for future unused green space,

a public recreational and beach area,

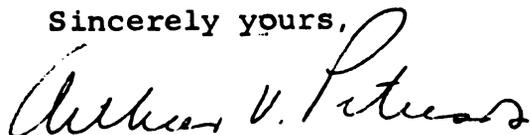
a possible county solid waste disposal site, convertible eventually to a park or green space, and

a location for a spillway connecting the ocean with Currituck Sound.

I believe it would be wise to seek out, through hearings or otherwise through direct contacts here, the feelings of the governmental bodies and of the residents in the area. It is possible that your program could be worked out in harmony with needed and desirable programs in the region.

If I could be of any assistance to you, please do not hesitate to call me.

Sincerely yours,



Arthur V. Peterson  
Colonel CE RET



STATE OF NORTH CAROLINA  
DEPARTMENT OF NATURAL AND ECONOMIC RESOURCES

Raleigh 27611



ROBERT W. SCOTT  
GOVERNOR

ES W. BRADSHAW, JR.  
SECRETARY  
TELEPHONE  
CODE 919-829-4177

November 1, 1972

Colonel Albert C. Costanzo  
District Engineer, Wilmington District  
U. S. Army Corps of Engineers  
P. O. Box 1890  
Wilmington, North Carolina 28401

Dear Al:

This letter will respond to your request of September 23 for comments on the research facility proposed by CERC for the Duck Bombing Range, Dare County. You have received several comments separately. Mine will summarize our Department's views.

Our Department is enthusiastic about this project and hopes very much that it will come to pass. We look forward to having this facility in North Carolina and to cooperating in research ventures that will be of benefit to our programs of shoreline management. Our agencies have made several specific comments and I shall attempt to summarize them.

The Office of Water and Air Resources has pointed out that a permit for dune modification will be required from Dare County prior to construction work. Commercial Fisheries has pointed out the possibility that construction of this facility may, in the end, result in the need for erosion control measures. It would be our hope that construction of this facility will be consistent with the most up-to-date information on shoreline erosion.

Substantial questions have been raised concerning public use of the beach and lands that will be associated with this facility. Commercial Fisheries has pointed out that both commercial fishing operations and sport fishing activities occur along the strand. These involve vehicles operating along



Colonel Albert C. Costanzo  
Page Two  
November 1, 1972

the beach both north and south of the proposed facility site. It is their opinion that provisions should be made for vehicles to pass through the site in some way, if not along the beach then near the sound. Other comments have been raised about the extent of public use of the beach that will be permitted. We are aware that certain restrictions will be necessary around a research facility. However, to the extent possible, we encourage planning for this facility to allow public use of the beach. Inasmuch as several state agencies had projected a recreational use of the Duck property once it passed out of federal use, and inasmuch as public beach areas are in short supply on that part of the Outer Banks (north of the Cape Hatteras Seashore), it would be very important for the impact statement to speak to this point.

We shall be pleased to review the impact statement for this project when it is prepared.

Sincerely yours,



Arthur W. Cooper  
Assistant Secretary for Resource Management

AWC/mrl



6001 Arlington Blvd., Apt. 917  
Falls Church, Virginia 22044  
November 7, 1972

Col. Albert Costanzo  
District Engineer  
U. S. Army District Engineer-Wilmington  
P. O. Box 1890  
Wilmington, N. C. 28401

Dear Sir,

We are writing to advise you of our support for the establishment of a Coastal Engineering Research Center facility at the old Naval bombing range near Duck, North Carolina. In our view, such a facility on the Outer Banks is essential to support the development of this major national resource. So much is unknown about the effects of mans activity on the total ecosystem which, of course, includes the coastline.

Dr. Wallace W. Harvey Jr. has proposed to you a spillway plan which would provide for water exchange between sea and sound. While we personally believe this must come if the inland sounds are to survive, we would like to see the approach tested under controlled conditions. Currituck Sound, as the most threatened sound, is an ideal location for these tests and the proposed facility would be ideal for this purpose.

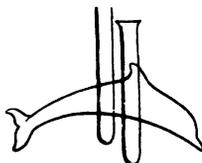
We are sure you are aware of the work of Dr. Paul J. Godfrey on Oceanic Overwash and its Ecological Implications on the Outer Banks of North Carolina. Dr. Robert Dolan of the University of Virginia has also studied the area. Dr. Ted Sudia, Office of Natural Science, National Park Service, U. S. Department of Interior has been the leader in these studies. They all show convincingly the need for such experiments.

We are not scientists, we are interested citizens of the State of North Carolina. Our goal is to discover a reasonable balance between man and nature that will permit orderly economic and cultural development while preserving the essential natural resources on which mans existance, in the long run, depend. The proposed research facility would help to realize that goal.

Sincerely

  
for Raymond M. Staley  
Shirley W. Staley





**UNIVERSITY of NORTH CAROLINA AT WILMINGTON**

**DEPARTMENT OF MARINE BIO-MEDICAL RESEARCH**

**WRIGHTSVILLE MARINE  
BIO-MEDICAL LABORATORY**

**7205 WRIGHTSVILLE AVENUE  
WILMINGTON, N. C. 28401  
PHONE (919) 256-3721**

November 8, 1972

Colonel Albert C. Costanzo  
Corps of Engineers, District Engineer  
Department of the Army, Wilmington District  
P. O. Box 1890  
Wilmington, North Carolina 28401

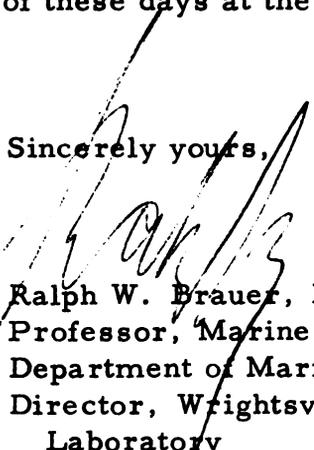
Dear Al:

Thanks so much for sending me the material on the Duck, N. C., facility. I am talking around a bit to try to see what input we might make into this, and if something comes up, we shall certainly be in touch with you again.

Hope to see you again one of these days at the Propeller Club!

With kind regards, I am,

Sincerely yours,



Ralph W. Brauer, Ph. D.  
Professor, Marine Physiology and Head,  
Department of Marine Bio-Medical Research,  
Director, Wrightsville Marine Bio-Medical  
Laboratory

RWB:aw



State of North Carolina  
Department of Archives and History

Raleigh 27602



8 November 1972

DIVISION ADMINISTRATORS:

C. F. W. COKER  
Archives and Records

MRS. JOYE E. JORDAN  
Historic Sites and Museums

MRS. MEMORY F. MITCHELL  
Publications

Colonel Albert C. Costanzo  
Corps of Engineers  
P. O. Box 1890  
Wilmington, North Carolina 28401

Dear Colonel Costanzo:

Thank you for sending us the letter and map regarding the proposed research facility near Duck in Dare County. We have reviewed the project and would like to report that no properties on the National Register of Historic Places or properties currently under consideration for the National Register will be affected by the project.

If you have any questions regarding this reply, please contact me at 829-7862.

Sincerely yours,

Bruce MacDougal  
Survey Supervisor



# The Outer Banks Association, Inc.

5718 NORTH 9TH ROAD  
ARLINGTON, VA. 22205  
703-524-4725

HAROLD NIGHTLINGER  
EXECUTIVE SECRETARY

November 8, 1972

Colonel Albert C. Costanzo  
District Engineer  
Wilmington District, Corps of Engineers  
Department of the Army  
P.O. Box 1890  
Wilmington, North Carolina 28401

Dear Colonel Costanzo:

Subject: Proposed CERC Research Facility near Duck, North Carolina

First, on behalf of the members of this Association let me express our appreciation at your asking for our opinions on this facility.

Enclosed is a copy of our Newsletter No. 6 mailed to our 470 members. In it we tried to present a complete picture as you had supplied it to us. As part of the Newsletter we also reproduced a portion of the map designating the site of the facility. We tried to present a variety of choices on a Ballot form to be completed by those interested members.

I made a tabulation of these returns primarily for our use. A copy is enclosed for your information and possible interest although such detail is probably not pertinent to your task.

The primary conclusion is: The members of this Association support the CERC Research Facility as proposed. 98 returns were received of which 77 favored the facility as stated. Only 7 flatly opposed it. The concentration against (5) were property owners from or in Southern Shores and north. One member near the site was vehemently opposed but was offset by another member 500' north who positively favored it.

Secondly, it is of interest that twenty-six (26) members favored the establishment by the Corps of another facility of this type along the coast in order, they believe, to provide even more research data.

Thirdly, the local suggestion of turning this land over to Dare County to be used as refuse-land-fill area was opposed by an equal number - 26.

Last. Although not technically part of the facility, this Association would be absolutely opposed to it if it in any way would support the argument for a highway being constructed down from the Virginia line. The written in remarks on this subject under Item 7 were almost vehement.



Again our appreciation for the opportunity to present our opinions.

From the written remarks accompanying the Ballot there is great concern by property owners over the future of the coastline of the Outer Banks.

If there should ever be any way in which this Association might be of service to you, please do not hesitate to call upon us.

Sincerely,



Harold J. Nightlinger  
Executive Secretary

Enclosures: Newsletter No. 6  
Tabulation of Ballot returns

Cc: Dr. Arthur Cooper  
Congressman Walter B. Jones



# The Outer Banks Association, Inc.

5718 NORTH 9TH ROAD  
ARLINGTON, VA. 22208  
703-524-4728

HAROLD NIGHTLINGER  
EXECUTIVE SECRETARY

October, 1972

## B A L L O T

on

### Proposed Corps of Engineers Research Facility Above Duck

1. \_\_\_ I am in favor of the Research Facility as proposed.
2. I am in favor of the Research Facility with the following changes:
  - \_\_\_ a. Specific location...should be located at \_\_\_\_\_
  - \_\_\_ b. Length of pier....should be \_\_\_\_\_
  - \_\_\_ c. Amount of land to be used...should be \_\_\_\_\_
  - \_\_\_ d. Restricted access...should be opened under certain conditions to public.
  - \_\_\_ e. Other changes: \_\_\_\_\_
3. \_\_\_ I am opposed to the Research Facility being located on the Outer Banks.
4. \_\_\_ I am in favor of the proposed site being transferred to Dare County to be used as a land-fill area.
5. \_\_\_ I am opposed to the proposed site being transferred to Dare County to be used as a land-fill area.
6. \_\_\_ I am in favor of the Corps of Engineers establishing several research facilities of a similar type and purpose spaced out along the Outer Banks.
7. Remarks and observations bearing on the specific proposal and the problem in general. \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

\_\_\_\_\_  
(Name - please print)

\_\_\_\_\_  
(Address)

\_\_\_\_\_  
(Property location on Outer Banks)

\_\_\_\_\_  
(Date)







Outer Banks Association, Inc.

Tabulation of Ballot returns on Proposed Corps of Engineers  
Research Facility Above Duck.

Area	Total Return	<u>1</u>	ITEM					<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>
			a	b	c	d	e				
thern Shores, uck, Corolla	35	26	4				5	2*	9	9	
ty Hawk	6	6			3				4	3	
ington Harbour	3	2	1								
l Devil Hills	11	9			2			2*	3	5	
s Head	10	7	1		1		1	*	3	3	
th Nags Head	13	12			1		1	1	2	2	
anthe	1	1									
es	1	1									
ro	3	2	1		1			1	1	1	
j	4	3	1		2						
on	3				2				1	1	
sco	7	7			1				2	2	
terras	<u>1</u>	<u>1</u>						*			
Totals	98	77	8		13		7	7*5	26	26	

uggested using the proposed site for both the research facility and the remainder,  
soundside portion as a land-fill area.



**ORTH CAROLINA STATE UNIVERSITY | AT RALEIGH**

**SCHOOL OF ENGINEERING**

**November 10, 1972**

**DEPARTMENT OF CIVIL ENGINEERING  
5995 ZIP 27607**

**Col. Albert C. Costanzo  
Department of the Army  
Wilmington District, Corps of Engineers  
P. O. Box 1890  
Wilmington, North Carolina 28401**

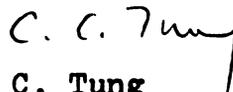
**Dear Col. Costanzo:**

**I want to thank you for the information you sent me regarding the research facility at Duck, North Carolina.**

**Other than the fact that we might want to inquire into the possibility of making use of the research facilities for our research later on, I wish also to know if you will be able to furnish me with the structural details of the pier for use in my study of reliability of coastal structures. If such information can be released and if you deem it agreeable to have a reliability analysis performed for the structure, please advise me of the procedure I should follow to secure the information.**

**It was a pleasure to know you at the Sea Grant site visit and I look forward to hearing from you regarding the matter.**

**Yours sincerely,**



**C. C. Tung  
Associate Professor  
of Civil Engineering**

**CCT/pb**



DEPARTMENT OF THE ARMY  
WILMINGTON DISTRICT, CORPS OF ENGINEERS  
P. O. BOX 1890  
WILMINGTON, NORTH CAROLINA 28401

15 November 1972

Wallace W. Harvey, Jr., M. D.  
Memorial Clinic  
Wantee, North Carolina 27954

Dear Dr. Harvey:

Thank you for your letter of 19 October 1972 and the favorable comments relating to the research pier proposed near Duck, North Carolina.

Your concern for the conditions now existing in Currituck Sound and the impact of these conditions on navigation, flooding, and the marine environment is also appreciated. However, serious consideration of all the factors mentioned in your letter would require a comprehensive study and/or a model study on the scale of the studies being conducted in the Chesapeake Bay area in Virginia. As you suggest, many agencies would necessarily be involved in a study of this scope.

The first step leading to a comprehensive study of the Currituck Sound estuarine area would be a request from the State of North Carolina for the Corps of Engineers to conduct the study. The second step would be the preparation of a resolution by the State seeking Congressional authority and funding for the study. You may be assured that I am anxious to cooperate with Dare County and the State of North Carolina in any request they may make.

I look forward to meeting you at the public meeting planned for early December 1972 in connection with the proposed ocean pier near Duck, North Carolina.

Sincerely yours,

ALBERT C. COSTANZO  
Colonel, Corps of Engineers  
District Engineer



DEPARTMENT OF THE ARMY  
WILMINGTON DISTRICT, CORPS OF ENGINEERS  
P. O. BOX 1890  
WILMINGTON, NORTH CAROLINA 28401

SAWEE

16 November 1972

Mr. Harold Nightlinger, Executive Secretary  
The Outer Banks Association, Inc.  
5718 North 9th Road  
Arlington, Virginia 22205

Dear Mr. Nightlinger:

Your letter of 8 November 1972 is a fine example of constructive local cooperation. It is very difficult for us to contact all of the people that should be contacted pertaining to any project. An organization such as yours that can bring a large number of opinions to our attention allows us to evaluate more correctly the merits and deficiencies of a project. Better information unquestionably leads to better conclusions.

Your questionnaire and responses are an invaluable aid in evaluating the desire for, and opposition to the proposed field research facility near Duck, North Carolina. The responses will be reflected in the environmental impact statement. Thank you for your letter, and we look forward to working with you and your organization in the future.

Sincerely yours,

JOEL T. CALLAHAN  
Major, Corps of Engineers  
Deputy District Engineer



ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460

OFFICE OF THE  
ADMINISTRATOR

November 22, 1972

Colonel Albert Costanzo  
U. S. Army Corps of Engineers  
District Engineers, Wilmington District  
Wilmington, North Carolina 28401

Dear Colonel Costanzo:

At the suggestion of Dr. Wallace W. Harvey, Jr., Manteo, North Carolina, a former member of the President's Water Pollution Control Advisory Board, I am writing to request ten copies of the proposed Coastal Research Project to be developed at Duck, North Carolina at the old naval bombing range. I feel this project would be of interest to other members of the President's Water Pollution Control Advisory Board in as much as it will affect a large body of sea water on the East Coast.

Thank you for your cooperation.

Sincerely yours,



Alan Levin, Executive Secretary  
President's Air and Water Advisory  
Boards



RESEARCH LABORATORIES OF ANTHROPOLOGY  
THE UNIVERSITY OF NORTH CAROLINA  
AT  
CHAPEL HILL  
27514

**MEMORANDUM TO:** Col. Albert C. Costanzo  
District Engineer, C.O.E.  
Wilmington District  
P.O. Box 1890  
Wilmington, North Carolina 28401

**FROM:** Dr. Joffre L. Coe, Director  
Research Laboratories of Anthropology  
University of North Carolina  
Chapel Hill, North Carolina 27514

**SUBJECT:** Proposed Coastal Research Facility, Duck,  
Dare County, North Carolina

**DATE;** November 28, 1972

It is unlikely that any significant archaeological remains are present in meaningful contexts at the site proposed for this facility.



December 6, 1972

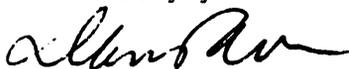
Colonel Albert C. Costanzo  
District Engineer  
Corps of Engineers  
Wilmington District  
P. O. Box 1890  
Wilmington, N. C. 28401

Dear Colonel Costanzo:

With regard to the proposed field research facility at Duck, North Carolina, Professor E. J. Kuenzler, Professor of Environmental Biology in the Department of Environmental Sciences and Engineering and Director of the Marine Science Curriculum at the University, has indicated that, from a research standpoint, the project is sound. He indicates that the instability of our sandy beaches coupled with their attractiveness to developers argues for a much better understanding of wind, wave, and current forces and transport processes than we now have. He hopes, and I concur, that the Corps of Engineers will encourage participation of university researchers in the use of these facilities and in the study of these problems.

It is hoped that the construction will be aesthetically sound and that the construction will not result in any deleterious impact to the integrity of the dunes.

Sincerely yours



Daniel A. Okun  
Professor of Environmental Engineering  
Head

DAO:p

cc: Dr. E. J. Kuenzler



**APPENDIX E**

**12 December 1972 Public Meeting**



EXHIBIT

DESCRIPTION

- A List of Attendees at Public Meeting
- B Telegram from Senator Jesse Helms
- C Statement of the Secretary, Department of Natural and Economic Resources
- D Statement of R. B. Preston
- E Letter from President, Old Nags Head Cove Fish Tales
- F Statement by Dr. W. W. Harvey, Jr.
- G Letter from President, North Carolina Beach Buggy Association
- H Letter from Mr. R. H. Cook, Bayberry Bluffs Development
- I Letter from Chairman, Plant Resources Committee, Soil Conservation Society of America
- J Letter from Mr. Paul F. Oswald
- K Letter with Statement from Mr. Raymond M. Staley and Mrs. Shirley W. Staley



LIST OF ATTENDEES AT PUBLIC MEETING

Mr. Collins G. Gray, Avon, N. C.  
Mr. James T. Gray, Avon, N. C.  
Mr. Oscar D. Gray, Avon, N. C.  
Mr. R. W. Gray, Avon, N. C.  
Mr. T. C. Miller, Avon, N. C.  
Mr. Bill Dillon, Buxton, N. C.  
Mr. Grover Cook, US EPA, Region IV  
Mr. Dan M. Connelly, Edenton, N. C.  
Mr. Jasper W. Hassell, Edenton, N. C.  
Mr. Frank W. Roberts, Elizabeth City, N. C.  
Virginia L. Robertson, Elizabeth City, N. C.  
Wilton E. Robertson, Elizabeth City, N. C.  
Margaret R. Small, Elizabeth City, N. C.  
Mr. William Small, Elizabeth City, N. C.  
Claire D. Bullington, Kill Devil Hills, N. C.  
Mr. George W. Jones, Kill Devil Hills, N. C.  
Mr. Rudolph H. Cook, Kitty Hawk, N. C.  
Mrs. R. H. Cook, Kitty Hawk, N. C.  
Mr. Pennel A. Tillett, Chairman, County Commissioners  
Gwen A. White, Kitty Hawk, N. C.  
Mr. W. M. Booker, Manteo, N. C.  
Mr. Robert D. Chessman, Manteo, N. C.  
Vera A. Evans (Coastland Times), Manteo, N. C.  
Dr. Wallace W. Harvey, Jr., Manteo, N. C.  
Mr. Jerry W. Norris (VEPCO), Manteo, N. C.  
Mr. R. Neil Thorne, Manteo, N. C.  
Mr. W. Ray White, Manteo, N. C.  
Mr. Bob Simpson, Morehead City, N. C.  
Mr. William L. Simpson, Morehead City, N. C.  
Mr. Steve B. Stevenson (Rep. for Governor Holshouser)  
Mr. Ted Mew (NC Dept of Nat. & Econ. Resources)  
Mr. John F. Gaskill, Nags Head, N. C.  
Karen Griffin, Nags Head, N. C.  
Mr. Robert B. Preston (Raleigh News & Observer)  
Mr. Ben F. Anderson, Rocky Mount, N. C.  
Mr. Drayton D. Wade, Rocky Mount, N. C.  
Mr. William B. Farris (NC Dept. of Nat. & Econ. Res., Div. of  
Community Services)  
Mr. L. V. Gaskill, Wanchese, N. C.  
Mr. Gage Williams, Wanchese, N. C.  
Mr. Robert Segal, Hampton, Va.  
Mrs. Rudolph P. Savage, Potomac, Md. (wife of RP Savage from CERC)

EXHIBIT A



REC'D Corps of Engineers  
Wilmington, N. C.

12<sup>05</sup> AM 11 DEC 1972

IPMWERAWIN

1-007135C346004 12/11/72

ICS IPMRGRB RAL

02095 RALEIGH NCAR 136 12-11 1008A EST

RMS COLONEL ALBERT C COSTANZO, DLR ONLY

DIST ENG WILMINGTON DIST US ARMY CORPS OF ENGINEERS

WILMINGTON NCAR

DEAR COLONEL COSTANZO:

I REGRET THAT I SHALL BE UNABLE TO ATTEND THE PUBLIC HEARING  
ON A PROPOSED FIELD RESEARCH FACILITY TO BE ESTABLISHED ON THE  
OUTER BANKS TO BE HELD ON 12 DECEMBER AT MANTEO NC

I AM ESPECIALLY INTERESTED IN THE PROCEEDINGS AND WOULD DEEPLY  
APPRECIATE A COPY OF THE REPORT OF THE MEETING FROM YOUR OFFICE.

I AM ANXIOUS TO LEARN OF THE DESIRES AND WISHES OF THE PEOPLE OF  
EASTERN NORTH CAROLINA IN THE AREA OF FLOOD CONTROL, STORM AND  
HURRICANE DISASTER THAT MIGHT OCCUR IN AREAS WHERE THE ARMY CORPS  
OF ENGINEERS COULD BE HELPFUL

I ALSO RECOGNIZE THE OVERGROWTH OF CERTAIN AQUATIC PLANTS THAT  
ARE CURRENTLY HINDERING NAVIGATION AND CAUSING ALARMING PROBLEMS  
IN THE AREA OF THE UPPER SOUND

THANK YOU SO MUCH FOR YOUR ASSISTANCE IN THIS MATTER

SINCERELY

JESSE HELMS

1137 EST

IPMWERAWIN

EXHIBIT B



STATEMENT OF THE SECRETARY, DEPARTMENT OF NATURAL AND ECONOMIC RESOURCES  
at a public meeting on the construction of a CERC research  
facility proposed for the Duck area of Dare County, North  
Carolina in Manteo, North Carolina at 2:30 p.m. on December  
12, 1972.

My name is Ted Mew, and I am here to present a statement on behalf of the Secretary of the North Carolina Department of Natural and Economic Resources. This statement represents the coordinated views of our Department, which is responsible for the prudent and productive use of the State's coastal areas.

The Department favors the project and appreciates the Corps efforts to bring this research facility to North Carolina. The facility will be used to monitor physical processes in the beach zone. This information will be used in the development of shore management and protection guidelines. It is the State's position that coastal management must work with nature and respect natural processes. We feel the research undertaken at the facility could generate information which would greatly benefit our management efforts as well as those of other coastal states. Currently the State is considering land use controls for beach areas to preserve natural processes, and would welcome relevant research findings.

The facility would also undertake research in the dune and marsh areas. The State has laws protecting each of these resources, and appropriate research would aid in the administration of these laws. Also, we would appreciate consideration being given to making some part of the area available for cooperative work by State agencies in studying various floral species.

The area has great recreation value, and if the facility were developed with creative multiple use in mind it could be a real asset to Dare County



and its recreation industry. Toward this end, it is requested that planning of the facility be coordinated with the Dare Beaches Land Development Plan, which is now in the preliminary draft stage. Commercial fishing, and sport fishing are important activities in the area, and both involve the use of vehicles on the beaches. But as planned some research at the facility will be undertaken along the beach, and it will be necessary to restrict vehicles in this area. The State of North Carolina supports this type of research and believes it will contribute to our understanding of beach processes. However, the State is also sensitive to the desires of the fishermen, many of whose livelihood is dependent upon the sea.

If vehicular access between the north and south boundary of the research facility is to be provided, then in order to accommodate both the research and fishing interests, the State requests the Corps of Engineers construct an adequate passageway from the beach, around the facility, and back to the beach. This passageway should be constructed in such a manner that long-term use will not damage the dunes. Also the vehicular access area to the beach at the south of the facility should be accessible from the main road coming from Duck.

The State fully supports the proposal, but asks for careful consideration on three points. First, it is our conviction that we must work with natural processes. Our experience has shown that any artificial structures placed in the beach area can interfere with these processes and produce erosive effects which may require artificial stabilizing of the beach. Therefore, we ask that the facility be carefully planned and located sufficiently distant from the shore to avoid creating the need for any beach protection measures now or in the future.



Second, State law prohibits damaging the dunes or the vegetation on them along the North Carolina coast. This law is administered in Dare County under a county ordinance requiring the issuance of a permit by the County. It is requested that the State law and the ordinance be fully observed in the planning and construction of the research facility.

Finally, our Department has received requests for construction of an ocean overwash on the Currituck Banks to raise the salinity of Currituck Sound and hopefully reduce the unwanted aquatic weeds. The Board of Water and Air Resources is undertaking a continuing review of this situation and the Department is preparing a position statement on overwashes. We request the Corps to defer any decisions on oceanic overwashes into Currituck Sound to the Department of Natural and Economic Resources.

The State looks forward to receiving benefits from the operation of the facility, and perhaps to making some contributions to the results it produces. The research proposed is badly needed, and its being done in North Carolina should enhance our efforts to manage our coastline wisely.

The opportunity to be heard is appreciated.



STATEMENT OF R.B. PRESTON BEFORE PUBLIC HEARING CONDUCTED BY THE U.S. CORPS OF ENGINEERS  
AT WASHINGTON, NORTH CAROLINA, DECEMBER 12, 1972, RE: PROPOSED USE OF DUCK BOMBING RANGE.

STATEMENT:

My name is R.B. "BOB" Preston and I am a resident of Dare County, N.C.

While I hold membership in many sportsmen's and conservation clubs ( see attached ) I arise this afternoon as a private citizen, to make certain statements and to ask a few questions regarding the proposal by the U.S. Corps of Engineers to establish a laboratory type facility on the site of the old Duck-Navy Bombing Range.

First I would state that I do not feel that the wording of the 1st paragraph of announcement of this hearing was of enough clarity to inform anyone, much less myself, as to what was being proposed by the Corps, so that we could be properly prepared to offer approval or objections. However, I assume that the proposed laboratory and the necessary pier would be practically the same as that rejected by conservationists on Assateague Island, Va.

Therefore, I must at the outset, state that until I have learned all of the facts, which I assume will be forthcoming at this meeting, maybe prior to my arising, then I will reserve judgement as to the feasibility and desirability of such a project. However, one fact was made abundantly clear in the original notice and that was the intent of the Corps of Engineers to construct post and cable fences transversely across the beach line so as to prohibit vehicular travel through the 3,300 feet of the property. I state, herewith that I am unalterably opposed to such restrictions.

If the proposed facility is to be constructed in the same manner as proposed for Assateague, then I fail to see why such restrictions are necessary, for the original proposal called for the decking of the pier to be some twenty-odd feet above mean high water. This elevation would allow any beach traveling vehicle to pass under and if the pile bents were to be of reinforced concrete I doubt seriously if a vehicle could do them much damage. Therefore; Why is it necessary to close the strand? If intrusion upon the laboratory is feared then why not construct a barrier fence parallel to the strand at the top of the dune?



2

2. What is contemplated by the Corps as to restrictions upon Currituck Sound to the West of the site? How far would your jurisdiction extend into State waters?

These waters are used by both sports as well as commercial fishermen, under the jurisdiction of the N.C. Wildlife Resources Commission, as well as waterfowl hunters, for years have had blinds established within the boundaries of the old bombing range (1. to 5.) and the records will show that when the range was active the Navy ceased bombing operations during the waterfowl season. What about these people? I hasten to add that I am not one of them, worse luck.

As to some of the objections raised by many as to the site at Assateague, i.e.; intrusion upon the esthetic aspect of a National Refuge and Seashore, I can find no valid reason to raise the same objection at the proposed site, for we already have many piers, though not as long as that proposed. However, I believe that the maximum width of the proposed structure is to be twenty-four feet, a far cry from the 3,300 feet of strand within the present property lines that will be restricted to us users.

There is not a person present, or otherwise, concerned with our continuing battle against beach erosion, the study of Littoral drift, wave and surge action of the surf and related programs that would not welcome the establishment of a well staffed study facility, but, I, as a citizen want more details as to what is proposed. I think I have mentioned them this afternoon.

As to this 175 acres being, and I quote, "Prime real estate and would probably be developed if some form of protection does not occur" end quote, <sup>as considered in the Environmental Impact Statement</sup> / I hold this no more than a sham to scare the general public, for as each of us know this land is being held at present by General Services Administration as surplus and I doubt, seriously that it will be offered for public auction in the foreseeable future.

So, Gentlemen, I conclude my statement in this manner: I would welcome a laboratory study provided, no restrictions are placed upon beach travel and we would be assured of continued use of adjacent waters of Currituck Sound.

Thank You.



CLUB AND ASSOCIATION AFFILIATIONS OF

R. B. "BOB" PRESTON

ORGANIZATION

TYPE OF MEMBERSHIP

TH CAROLINA BEACH BUGGY ASSO.	ACTIVE - FOUNDER AND PAST PRESIDENT
S HEAD SUP FISHING CLUB	ACTIVE * PAST PRESIDENT
BEACH BUGGY ASSO.	ACTIVE - MBR. OF ED. OF DIR.
JERSEY BEACH BUGGY ASSO.	ACTIVE - N.C. COURTESY PATROL
. WILDLIFE FEDERATION	ACTIVE
GINIA WILDLIFE FEDERATION	ACTIVE
IONAL WILDLIFE FEDERATION	ASSOCIATE MEMBER
RIA CLUB	PARTICIPATING MEMBER
DERNESS SOCIETY	PARTICIPATING MEMBER
. OUTDOOR PRESS ASSOCIATION	ACTIVE
DOOR WRITERS OF AMERICA	ACTIVE
ERNED CITIZENS FOR CONSERVATION(VA)	ACTIVE
IC WALTON LEAGUE	ASSOCIATE
TER SHORE OF VA. ANGLERS CLUB	LIFE MEMBER



OLD NAGS HEAD COVE FISH TALES  
NAGS HEAD, NORTH CAROLINA

December 12, 1972

Colonel Albert C. Costanzo  
Corps of Engineers  
Department of the Army  
Wilmington District  
P. O. Box 1890  
Wilmington, North Carolina 28401

Dear Colonel Costanzo:

Old Nags Head Cove Fish Tales, a women's fishing club with local and out of town membership, wishes to go on record in the matter of the proposed CERC research facility at Duck, North Carolina.

Our club supports the concept of a research facility in the area since we feel that beneficial work can be accomplished in such a facility. We would encourage any efforts to obtain constructive answers to problems such as erosion of our coastline and any other environmental problems which may be studied .

We do feel concern in the matter of use of the area by vehicular traffic since it seems to us that no provisions have been made to enable such traffic to detour the research laboratory.

Under North Carolina laws vehicular traffic is prohibited from crossing the dunes in areas other than those which have designated ramps. No such ramps presently exist in the areas bounding the proposed laboratory. Another factor to be considered is that the areas bounding the laboratory are privately owned and anyone attempting to cross the dunes in those areas would be trespassing.

We would suggest that the U. S. government provide access and egress ramps at the northern and southern boundaries of the laboratory and access roads to the existing state road. Beach vehicles could then legally cross the dunes and detour the laboratory as indicated in your November 20, 1972 proposal.

An alternate solution might be to shorten the fenced area to the mean highwater mark only allowing vehicles to continue on the beach rather than detour the laboratory.

Surely the U. S. government does not wish to deny the use of the beach to the many nature lovers, sports and commercial fishermen ... and women ... hunters, shell collectors and others who simply enjoy the unspoiled Outer Banks. Access to the area should be maintained in such a manner as not to interfere with the orderly workings of the proposed research laboratory.



Colonel Albert C. Costanzo  
December 12, 1972  
Page 2

We ask that serious consideration be given to our suggestions before any final approval for the planned laboratory is given.

Sincerely,

A handwritten signature in cursive script that reads "Karen Griffin". The signature is written in dark ink and is positioned to the right of the typed name.

Karen Griffin  
President



STATEMENT BY W. W. HARVEY, JR. B.S. M.D. AT PUBLIC MEETING ON  
PROPOSED FIELD RESEARCH FACILITY, DUCK, NORTH CAROLINA, HELD  
BY THE CORPS OF ENGINEERS IN MANTEO, NORTH CAROLINA ON 12 DECEMBER  
1972

Colonel Costanzo; Thank you very much for the opportunity of appearing at this public meeting relative to the establishment of a coastal field research facility at Duck, North Carolina.

Dare County has three basic industries the tourist industry, the sports and commercial fishing industry and the timber industry on the mainland. All are definitely concerned with matters in Northeastern North Carolina relative to the ocean, sounds and river basins. A field research facility of the Corps of Engineers would be most welcome in as much as it would provide an expertise and background which will be of definite benefit for a future orderly development of Northeast North Carolina and the beaches.

Of the total three hundred and twenty miles of ocean shoreline which has a sandy beach seventy two miles of this lies within Dare County and is supervised by the Cape Hatteras National Seashore. Cape Lookout National Seashore extends from Ocracoke Inlet to Beaufort Inlet a distance of fifty five miles which makes a total continuous of one hundred and twenty seven miles stretch of ocean shoreline of North Carolina which is federally owned. With the immense federal holdings in Dare County, the county is left with only approximately thirty three miles of ocean shoreline for county guided development and revenue.

\* Dare County is at present overwhelmed with federal and state agencies.

The Corps of Engineers should seriously consider the abandonment of construction of a facility at Duck relinquishing this three thousand three hundred feet of ocean shoreline to Dare County for county purposes and development by Dare County.

In as much as NOAA and the Department of Commerce, the National Park Service, the Federal Fish and Wildlife are all involved in research and studies along the northern North Carolina coastline, it appears it would be of immense technical benefit and tremendous federal economic savings of monies to join forces with one of the already existing federal units and establish their coastal research station within the confines of one of these groups; this should include the Naval facility at Buxton.

For example alternate sites could be established at;

1. Bodie Island

1. Abandoned Radar Tracking Station adjacent to the residence area of the National Park Service and their service garage.

2. Pea Island

1. The Pea Island Coast Guard Station site could be utilized in conjunction with the Wildlife headquarters, across the highway, where the Federal Wildlife research and programs are administered.



July

**3. Hatteras Island**

- 1. The abandoned Kenneket Coast Guard Station which is already available with intact facilities that can be occupied immediately.**
- 2. Portions of the Naval facility at Buxton which maintain a research station.**
- 3. The Weather Bureau complex at Hatteras for joint utilization of facilities, equipment and technical know how.**

**4. Roanoke Island**

- 1. A possible joint venture between the Corps research facility with the North Carolina Marine Science Council which will be established on the Roanoke Island site adjacent to the Manteo Airport.**

It is indeed difficult to some times pull together the sequestered agencies working even within a small area such as Dare County, Again in the face of repetition it would be of greater benefit to Dare County, the State of North Carolina and the United States Government if the proposed research facility in Dare County, North Carolina be established in conjunction with one of the already existing federal facilities.

The interchange of the technical knowledge would be of an immense and profitable benefit to all.

The joint utilization of facilities would be of tremendous monetary savings to the Federal government.



NORTH CAROLINA BEACH BUGGY ASSOCIATION  
P. O. BOX 337  
NAGS HEAD, NORTH CAROLINA 27959

December 12, 1972

Colonel Albert C. Costanzo  
Corps of Engineers  
Department of the Army  
Wilmington District  
P. O. Box 1890  
Wilmington, North Carolina 28401

Dear Colonel Costanzo:

The North Carolina Beach Buggy Association, headquartered at Nags Head, North Carolina and comprising 300 members, wishes to go on record in the matter of the proposed CERC research facility at Duck, North Carolina.

We wholeheartedly support any research facility which may contribute answers to problems such as erosion of the coastline or any other matters of ecological and/or environmental importance.

Our major concern in relation to the current proposal is the apparent lack of facilities enabling vehicular traffic to detour the research laboratory.

Since North Carolina state laws prohibit crossing the dune line in areas other than designated ramp areas, it would appear that vehicles would be in violation of the state regulation under the present proposal. In addition, the areas bounding the facility are privately owned and anyone crossing in these areas could be accused of trespass.

We feel that a simple and equitable solution would be for the U. S. government to provide access and egress ramps at the northern and southern boundaries of the facility and access roads to the existing state road. If these ramps and access roads could be installed beach vehicles would be legally able to detour as indicated in the proposal of 20 November 1972.

As an alternate suggestion, we believe that it might also be feasible to allow vehicular traffic to continue on the beach rather than detour merely by shortening the fenced area to the mean high water mark only.

We would like to call your attention to the fact that beach vehicles are used by sports and commercial fishing interests, hunters, tourists and nature lovers who come to the unspoiled Outer Banks to enjoy the uniquely unrestricted stretches of our beaches. We do not believe that the United States government wishes to abrogate the rights of citizens by prohibiting the use of any area such as the one under discussion.

EXHIBIT G



December 12, 1972  
Page 2

We respectfully request consideration of our alternate proposals prior to finalization of any plans for the CERC research laboratory.

Sincerely,

  
Claire D. Bullington  
President



(Located One-Quarter Mile North of Duck)  
RFD, KITTY HAWK, NORTH CAROLINA 27949

December 11, 1972

TELEPHONE  
(919) 441-5870

COOK  
mer

Col. Albert C. Costanzo  
Corps of Engineers  
Department of the Army  
Wilmington District, Corps of Engineers  
P. O. Box 1890  
Wilmington, N. C. 28401

Dear Sir:

With reference to the meeting December 12th in Manteo on a proposed field research facility at Duck, N. C., I wish to state, not only on behalf of myself but also a number of property owners to the north and south of us, that we are very enthusiastic with the idea and trust that it will become a reality. We represent property, which when developed and it is in the process of being developed, will involve two or three million dollars.

Most of the lot owners in this subdivision whom we have been able to contact, feel that this proposed facility at Duck will enhance the value of their property.

Very truly yours,

R. H. Cook



RHC:HGC

EXHIBIT H





SOIL  
CONSERVATION  
SOCIETY  
OF AMERICA

Address reply to:

P. O. Box 27307  
Raleigh, N. C. 27611

December 4, 1972

Col. Albert C. Costanzo  
U. S. Army Corps of Engineers  
P. O. Box 1890  
Raleigh, North Carolina 28401

Dear Col. Costanzo:

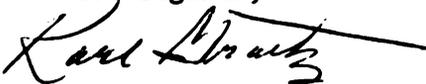
Your announcement of a public meeting on the proposed Field Research Facility, Raleigh, North Carolina, has been referred to my committee by President-Elect T. J. Wiggins. Mr. Wiggins and the Society appreciate your invitation to attend this meeting and to express views we might have concerning the proposed project.

The Society's basic objective is to advance the science and art of good land use and use. Our program includes land use, water resource management, natural vegetation, and recreation as they relate to the problems of erosion, sediment, flooding, and pollution. The proposed Field Research Facility is certainly of interest to our members.

In view of the information you furnished in the announcement, the Committee's understanding and perception of the impact the project can exert is very vague. To fully assess the proposed project, we need information regarding: 1. how much land area is to be utilized in the structures and complementing facilities; 2. will natural vegetation be retained on areas except those needed for the structures; 3. what measures will be included to insure stabilization of the site; 4. will waste disposal be a problem; and 5. what is the purpose of the facility and what research functions are to be conducted.

We feel sure that the project proposed will be of benefit to many groups, agencies, and individuals. The additional information requested should help us in confirming our comments.

With best regards,



Karl E. Graetz, Chairman  
Plant Resources Committee

cc: T. J. Wiggins

EXHIBIT I



6724 Caneel Court  
Springfield, Va. 22152  
December 6, 1972

Colonel Albert C. Costanzo  
Corps of Engineers  
Wilmington, N. C. 28401

Dear Colonel Costanzo:

I am writing this letter in response to the recent announcement of a public meeting to be held on December 12, 1972, at 2:30 P.M. at the Manteo Community Building. The purpose of the meeting is to hear plans on a proposed research facility to be located on the former bombing range at Duck. Unfortunately, I shall not be able to attend the meeting but would like to have this letter made a part of the record of the hearing.

First of all, I am very definitely in favor of the research facility. Not only is it urgently needed, but it is also a better use of the land than intensive development would be.

Secondly, development appears to be accelerating at a geometric rate and actions need to be taken immediately to determine the impact of the development in order to formulate essential controls.

Thirdly, natural and man-made ecological and environmental deterioration is taking place which needs study and counter-measures.

Fourthly, an agency needs to be established in this area which can assemble the facts, analyze them, and come up with practical solutions. Only the Federal Government has the necessary capability and resources to handle the job that needs to be done. The Army Corps of Engineers should be the Agency to handle the task.

Finally, I support the concepts outlined in the article printed in the Coastland Times on November 23, 1972, concerning this proposed facility. The Corps needs a field research facility but the Outer Banks needs the output of such a facility even more. In fact, the viability of this area is dependent upon early resolution of problems coming to light with increasing frequency. As they are often irreversible, research and corrective and preventive actions are urgently needed.

Please let me know if there is anything further I can do to support the establishment of the proposed facility.

Sincerely,

*Paul P. Oswald*  
Paul P. Oswald

EXHIBIT J

*I am a property owner at Southern Shores and am planning to move there in the near future when my retirement from U.S. Government Service becomes effective. My home there is located on the beach on Duck Road - No. 63A. I also own other property in Southern Shores. P.O.*



6001 Arlington Blvd., Apt. 917  
Falls Church, Va. 22044  
November 24, 1972

Col. Albert Costanzo  
District Engineer  
U. S. Army District Engineer- Wilmington  
P. O. Box 1890  
Wilmington, N. C. 28401

Dear Col. Costanzo,

Attached is a statement we wish to submit in support of the establishment of the proposed Coastal Engineering Research Center facility at Duck, North Carolina. Unfortunately, we will not be able to attend the public meeting on December 12, 1972. Therefore, we are submitting our statement in duplicate, as directed, for inclusion in the record.

Sincerely



Raymond M. Staley



Shirley W. Staley

EXHIBIT K



Announcement Date  
20 November 1972

STATEMENT  
In Response To  
ANNOUNCEMENT OF PUBLIC MEETING  
ON PROPOSED FIELD RESEARCH FACILITY,  
DUCK, NORTH CAROLINA  
12 DECEMBER 1972

The undersigned residents of Colington Island, Atlantic Township, Dare County, North Carolina wish to go on record in support of the establishment of the proposed Coastal Engineering Research Center facility at Duck, North Carolina.

We concur with the statement in the announcement regarding the "lack of field research pertaining to coastal processes and the resultant inadequacy in appropriate data for planning controls when such processes cause human hardship". Under the leadership of Dr. Ted Sudia, Office of Natural Science Studies, National Park Service, Dr. Paul J. Godfrey, University of Massachusetts and Dr. Robert Dolan, University of Virginia have been conducting limited study on this problem for some time. Their work, though important and enlightening, is not a substitute for continuing on-site monitoring. We presume the proposed research facility would utilize their research and permit them to participate in the continuing efforts.

The Atlantic Ocean is rising at a rate of around 25 cm./century. Most of the Outer Banks are geologically young and closely tied to sea level. Changes of 0.5 m. in 200 years can have profound effects on land that is never more than 1 or 2 m. above sea level. What are these effects and how can man best accommodate to them?

In the 1930s dune stabilization was thought to be an acceptable solution to erosion. This "solution" has reduced or eliminated overwash and interfered with the general tendency of the barrier islands to retreat before the ocean. Where the natural retreat has been stopped by high dune lines, the berm must absorb the force of the ocean and beach erosion has developed. In some areas the beach is washing away at a rate of 10 ft. a year. How can this problem be accommodated? Certainly not by temporary measures such as pumping sand back on the beach.

The condition of the interior sounds is deteriorating. A contributing factor is the development of shoals and inlet closure which both lowers the saline levels and reduces the flushing action. The work of the City of Virginia Beach in the Back Bay area is noteworthy on this problem. What is the best long term solution for the whole estuarine area?

These problems, among others, cry out for solutions that can only be developed in a dedicated research facility such as that proposed. The solutions will benefit all estuarine areas, not just the Outer Banks. But the Outer Banks provide a unique location for study on Federal land now available at no cost to the Government.

  
Raymond M. Staley

  
Shirley W. Staley













