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Statement of Findings  
MAINTFNANCE DREDGING OF PORT ROYAL HARBOR

Beaufort County, South Carolina

OCT. 1976

1. I have reviewed and evaluated, in light of the overall public interest, the documents concerning the Port Royal Harbor Navigation Project, Beaufort County, South Carolina, as well as the stated views of other interested agencies and the concerned public, relative to the various practicable alternatives in accomplishing the maintenance of the harbor.

2. I have reviewed analyses of the alternatives to the proposed action. The possible consequences of these alternatives have been studied for environmental effects, social well-being and economic effects, including regional and national economic development, and engineering feasibility.

3. In evaluation of the selected and other viable alternatives, the following points were considered pertinent:

a. Environmental considerations. An average of 283,139 c.y./yr. of sandy material would be dredged from the harbor entrance and placed in nearby ocean disposal areas with similar bottoms. Approximately 55,000 c.y. of sandy material would be removed from the inner channel at intervals of about five years and deposited on an adjacent disposal site which would be diked for this purpose. The area proposed for diking is former marsh which has been built up by the previous deposition of dredged material. Diking of the proposed disposal area would require the further commitment of about four acres of marsh which has already been altered by earlier dredging operations. The diking and continued use of this site is considered to have fewer adverse environmental impacts than would the use of new sites in marsh, open water within the harbor, or upland areas. The proposed disposal area would, when diked, have sufficient capacity to receive inner harbor shoal material for over 50 years. Should the owner of the site exercise a 90-day cancellation option, new upland or approved offshore disposal areas would be acquired by the project sponsor, the South Carolina State Ports Authority. Short-term increases in turbidity and sedimentation would be small because of the high sand and shell content of the shoal material. Sediment analyses indicate that shoal material is relatively clean and dredging should not result in any degradation of water quality. Smothering of plant and animal communities would occur in the disposal areas; however, the proposed areas are neither densely populated nor highly productive. There would be a short-term reduction of the benthic organism population in the path of the dredge cutterhead.

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b. Social well-being considerations. The continued maintenance of project channels would have favorable implications for the socio-economic well-being of area residents. Ships serving the area would maintain the small commercial and industrial base which now exists. This would directly and indirectly have a beneficial effect on the local, state and to a lesser degree, the national economy.

c. Engineering considerations. The recommended plan of dredging is considered to be the most practical method of maintaining the project with available equipment and in consideration of the closeness of the proposed disposal areas.

d. Economic considerations. The recommended plan of dredging is considered to be less costly than other available methods of maintaining the navigation channels. The economic benefit to the area is sufficient to justify maintenance of the authorized project.

4. I find that the action proposed is based on thorough analysis and evaluation of various practical 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 congressionally specified purposes; that where the proposed action has an adverse effect, this effect is either ameliorated or substantially outweighed by other considerations of national policy; 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 recommendation.

6 Oct. '76  
Date



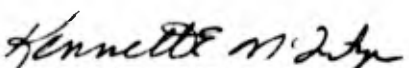
HARRY S. WILSON, JR.  
Colonel, Corps of Engineers  
District Engineer

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STATEMENT OF FINDINGS (Cont'd)  
Port Royal Harbor Project. Beaufort County, South Carolina

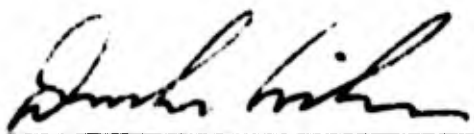
I have reviewed the Statement of Findings and concur with the recommendations of the District Engineer.

Date 22 Oct 76

  
KENNETH E. McINTYRE  
Brigadier General, USA  
Division Engineer

I concur with the preceding Statement of Findings.

Date 1 Nov 1976

  
DRAKE WILSON  
Brigadier General, USA  
Deputy Director of Civil Works

FINAL  
ENVIRONMENTAL STATEMENT

MAINTENANCE DREDGING OF PORT ROYAL HARBOR  
BEAUFORT COUNTY, SOUTH CAROLINA

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U. S. ARMY ENGINEER DISTRICT, CHARLESTON, SOUTH CAROLINA

October 1976



**SUMMARY**  
**MAINTENANCE DREDGING OF PORT ROYAL HARBOR**  
**BEAUFORT COUNTY, SOUTH CAROLINA**

( ) Draft

(X) Final Environmental Statement

Responsible Office: U. S. Army Engineer District, P. O. Box 919,  
Charleston, S. C. 29402  
Telephone: 803-577-4171 Ext. 229

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

2. Description of action: Maintenance of a channel 27 feet deep and 500 feet wide across the ocean bar and in Port Royal Sound; 24 feet deep and 300 feet wide in Beaufort River and Battery Creek; and a turning basin 27 feet deep by 600 feet wide opposite the State Ports Authority wharf.

3. a. Environmental impacts: Short-term increase in turbidity and sedimentation; smothering of plant and animal communities in disposal areas; short-term reduction of benthic organism population in path of cutterhead and in offshore disposal area; possible increase in local mosquito population; minor increase in air pollution during dredging operations; and stimulation of local, State, and national economy.

b. Adverse environmental effects: Temporary increase in turbidity and siltation in vicinity of the dredge and disposal areas; possible displacement of wildlife species; disruption of benthic invertebrates in path of cutterhead and in open water disposal area; alteration of existing vegetation in disposal area; and possible increase in local mosquito population.

4. Alternatives.

- a. Open water disposal of all material
- b. Upland disposal of all material
- c. No action

5. Comments received from:

U. S. Environmental Protection Agency  
U. S. Department of Commerce  
Federal Highway Administration, USDT  
U. S. Department of Health, Education, and Welfare  
Soil Conservation Service, USDA  
Forest Service, USDA  
U. S. Department of Interior  
S. C. Department of Archives and History  
S. C. Department of Health and Environmental Control  
Beaufort County Joint Planning Commission  
S. C. Water Resources Commission

6. Draft Statement to CEQ 2 April 1976 .  
Final Statement to CEQ 29 OCT 1976 .

FINAL  
ENVIRONMENTAL STATEMENT

MAINTENANCE DREDGING OF PORT ROYAL HARBOR  
BEAUFORT COUNTY, SOUTH CAROLINA

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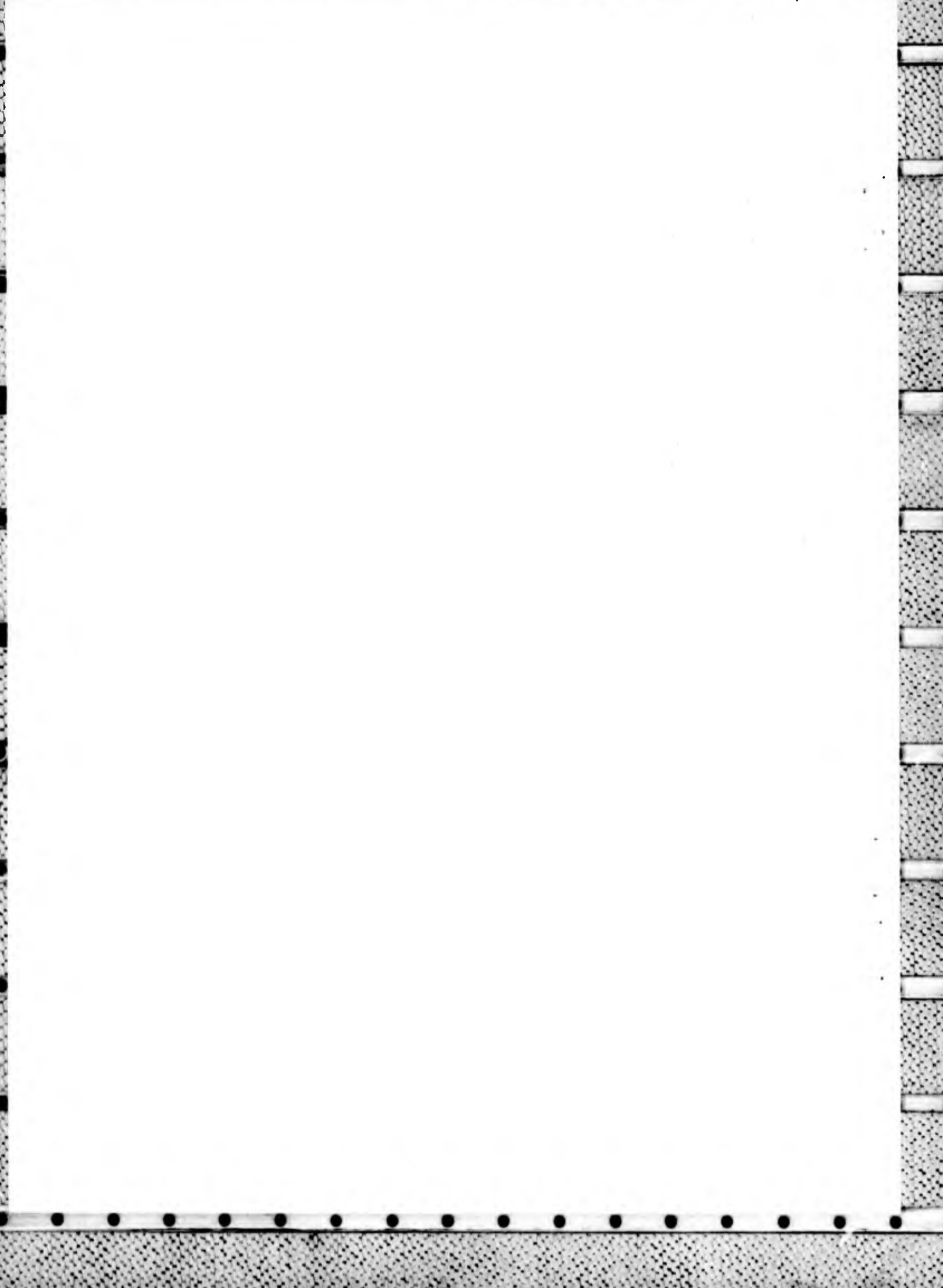
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1.0 Project description.

1.01 The Port Royal Harbor Project (Plate 1) provides for a channel 27 feet below mean low water (mlw) and 500 feet wide across the ocean bar and in Port Royal Sound for approximately 13.2 miles, thence -24 feet mlw and 300 feet wide in Beaufort River and Battery Creek for approximately 7.5 miles to a turning basin 27 feet deep and 600 feet wide opposite the wharf of the South Carolina State Ports Authority. The existing project was authorized by the River and Harbor Act approved September 3, 1954, in accordance with plans contained in H. Doc. 469, 81st Cong., 2nd Session.

1.02 The project was completed in June, 1959 but maintenance dredging continues to be performed on an annual basis in the entrance channel and at less frequent intervals in the inner channel. Dredging frequencies and quantities of materials removed since project completion are listed in the following text table.

Summary of Port Royal Maintenance Dredging

Fiscal Year	Entrance Channel (cu. yds.)	Inner Channel (cu. yds.)
1959	229,710	-
1960	-	-
1961	287,023	-
1962	-	-
1963	479,364	-
1964	448,372	58,196
1965	444,675	-
1966	430,929	-
1967	218,966	-
1968	305,550	-
1969	515,947	-
1970	274,902	53,578
1971	324,482	-
1972	291,005	-
1973	82,205	-
1974	103,860	-
1975	283,542	-

The average annual cost of maintenance for the period 1971-1975 has been \$225,540. As of 30 June 1975, the total cost of new work in the harbor is \$1,786,00 and the total cumulative maintenance cost is \$2,813,032.

1.03 Dredging of the entrance channel is accomplished by a hopper dredge and the dredged material is deposited in two off-shore disposal areas (Plate 1). One of these areas is located approximately seven miles offshore from Bay Point Island and contains approximately 413 acres. The other area is near the end of the authorized

project about 12 miles from Bay Point Island and contains approximately 918 acres.

1.04 As can be seen in the above table, dredging in the inner harbor channel has only been required on two occasions since project completion. Materials removed during both initial construction and previous maintenance have been disposed of in undiked disposal areas 100E and 101E shown on Plate 1. Disposal area 100E contains 227 acres under easement to Port Royal Port Authority for an indefinite period but is subject to 90-day cancellation notice. Disposal Area 101E contains 428 acres under perpetual easement to the State of South Carolina. Materials removed during the most recent dredging (FY-1970) were pumped into disposal area 101E.

1.05 Materials dredged from the inner harbor during future maintenance operations will be disposed of in the lower one-third of Disposal Area 100E in an area which was used during previous dredging operations. This proposed disposal area contains a boat launching ramp and access road; therefore, to avoid interfering with use of this facility, the disposal area will be divided into three separate diked areas of about 11, 16, and 7 acres respectively (see Plate 2). Assuming an average dredging rate of about 80,000 cubic yards of sandy-silt material every five years, the anticipated life of these disposal areas exceeds 50 years. The easement for disposal of material on Area 100E was obtained by the project sponsor, the S. C. State Ports Authority (SPA). This easement contains a 90-day cancellation clause which would allow the owner to prevent further use of the area at any time between dredging operations. Because the area is adjacent to deep water, the owner may well decide to exercise his option prior to the area being filled to capacity.

1.06 When this disposal area is used to capacity, or if the owner exercises his 90-day cancellation option, new areas will be selected by the S. C. State Ports Authority (SPA) on upland sites adjacent to the harbor. Prior to the approval of new disposal areas by the Corps and their acquisition by the SPA, the Environmental Protection Agency, U. S. Fish and Wildlife Service, S. C. Wildlife and Marine Resources Department, and other cognizant agencies will be consulted in an effort to minimize any adverse impact of the dredging operation.

## 2.0 Existing Environmental Setting

2.01 General. The Port Royal project area is located on the coast of Beaufort County, South Carolina in the area often referred to as the Sea Island Section of the Coastal Plain Province. Port Royal Sound is a drowned river embayment at the mouth of the Broad River. Of the several additional tributaries supplementing the general southeastern drainage pattern of the sound, the principle streams are the Beaufort River, the Chechessee River and the Colleton River. Port Royal is one of three South Carolina ports operated by the S. C. State Ports Authority. In addition to the ships docking at Port Royal, most of the inner harbor is used by traffic on the Atlantic Intracoastal Waterway.

2.01.1 Peripheral land within the boundaries of the project area includes parts of Bay Point Island, St. Helena Island, Cat Island, Parris Island, and Hilton Head Island. The only municipality located in the immediate project area is Port Royal with a 1970 population of 2,865. Beaufort, with a 1970 population of 9,434 is located about 4 miles north of Port Royal.

2.02 Hydrology. Port Royal Harbor is located in the protective waters of the Port Royal Sound estuarine system, specifically on Battery Creek, a tributary to the Beaufort River. The other major tributaries to Port Royal Sound are the Broad, Chechessee and Colleton Rivers.

2.02.1 Water quality. The waters of Beaufort River and Battery Creek are designated as Class SB or waters suitable for bathing and other usages except shellfishing for market purposes, and uses requiring water of lesser quality. The Broad River portion of Port Royal Sound is designated as Class SA, or waters suitable for shellfishing for market purposes and any other usages, and for uses requiring waters of lesser quality. However, the northern shore of Port Royal Sound from the S. C. Highway 170 bridge downstream to Bay Point is closed to shellfishing since it does not meet the Class SA standards.

2.02.1.1 Domestic sewage discharged into the Beaufort River and Battery Creek has resulted in coliform counts in excess of state standards causing the closure of the following areas to shellfishing for market purposes: Beaufort River, Brickyard Creek, Battery Creek, and all tributaries to the above named streams, and the northern shore of Port Royal Sound from Bay Point to the S. C. Highway 170 bridge.

2.02.1.2 While water quality in Port Royal Harbor is degraded because of fecal contamination to the extent that market shellfishing is not allowed, the chemical quality of the waters of Port Royal Sound is generally excellent and indicative of high water quality (Reference 10).

2.02.2 Ground water. Ground water is plentiful in the Beaufort area and is the only potable water supply which occurs naturally in the area. The principal water bearing zone is the upper part of the Eocene limestone. The top of this limestone ranges from 30 to 100 feet in depth in the Port Royal Sound area. In addition to the principal water bearing zone in the Eocene limestone, shallow zones less than 100 feet in depth provide small quantities of water. Additionally, some sands 2,700 to 2,900 feet deep produce small quantities of fresh water but use of this water is limited because of its relatively high dissolved solids (1140 mg/l) and fluoride (5.0 mg/l) content (Reference 9).

2.02.2.1 Duncan (Reference 10), in a seismic study of the Port Royal Sound area, found that the top of the principal artesian aquifer ranged from an elevation of 95 feet below mean sea level at the confluence of Beaufort River and Port Royal Sound up to 30 feet below mean sea level near the confluence of Beaufort River and Battery Creek.

2.02.3 Tides. Tidal fluctuations in the Port Royal estuary are the greatest of any area along the South Carolina coast. At Hilton Head, in Port Royal Sound, the mean tide range is 6.6 feet, and the spring range is 7.8 feet. In Whale Branch, the connecting waterway between Coosaw River and Broad River, the mean tide range is 7.9 feet and the spring range is 9.2 feet. At Beaufort, the corresponding ranges are 7.4 feet and 8.7 feet and at Port Royal, 7.2 feet and 8.5 feet (Reference 16).

2.03 Geology. Port Royal lies within the geomorphologic division defined by Cooke (Reference 3) as the coastal terraces. Colquhoun (Reference 2) described the coastal plain terraces as: "... sediment complexes bounded above by terrestrial and marine landforms and below by terrestrial and marine unconformities...Thickness between these surfaces in stable areas depends on: the depth of river erosion prior to a rise in sea level (35-40 feet below sea level in unconsolidated sediments), and the thickness of the sediments deposited below and/or above sea level landward and seaward of the shoreline during transgression and regression."

2.03.1 The basal strata of limestones and sands have been strongly influenced by erosion during a period of tectonic activity when much of the South Carolina Coastal Plain was uplifted to form the southern part of the Great Carolina Arch, and as it subsided, the Beaufort County area was covered by the Okefenokee Embayment. Despite unconformities associated with past tectonics, the sedimentary deposits have been named in successively younger sequence: Tuscaloosa, Black Creek, Pee Dee, Black Mingo, and Warley Mill marl Formations; and Santee, Castle Hayne, and Ocala Limestones. All of these strata are obscured by unconsolidated sands and clays of the surface terraces which were deposited during fluctuations in sea level since the early Miocene (Reference 3).

2.03.2 Colquhoun (Reference 2) has identified two intergradational sequences within the terrace deposits. He noted a "... landward terrestrial sequence...consisting of bed-load and overbank, estuarine, palustrine and deltaic stages; and a seaward marine sequence.... consisting of littoral, sublittoral, bar, barrier island-lagoon, and barrier island-tidal marsh, and flat stages". It may be inferred that the geologic processes occurring in the past such as coastal subsidence, are also active at the present and affecting the landscape of the Port Royal area.

2.04 Soils. There are two major soil associations in the project area: Kiawah-Wando-Seabrook association and tidal marsh association (Reference 5). Descriptions of these associations are presented below.

2.04.1 Kiawah-Wando-Seabrook association. This association has nearly level, somewhat poorly to well drained soils with loamy fine sand surface soils and subsoils. Most of the soils found on the Carolina sea islands belong to this association. Kiawah soils which comprise 30 percent of the association, are found on ridges of intermediate elevations and are somewhat poorly drained sandy soils with dark gray loamy sand surfaces and dark brown to grayish-brown loamy fine sand subsoils. In addition, many reddish-brown iron concentrations are found throughout the soil profile. Wando soils comprise 25 percent, occupy the highest elevations, are somewhat excessively drained and have dark grayish-brown fine sand surfaces and strong brown fine sand subsoils. Seabrook soils comprise 20 percent of this association and are moderately well drained and have dark grayish-brown surfaces and brownish-yellow loamy sand subsoils. Minor soils, comprising one fourth of this association, are Rutlege, thick surface, Ona, and St. Johns.

2.04.2 Tidal marsh. Soil materials in this association are unclassified. Although they are highly variable, they consist primarily of marine sediments and are predominantly mineral soils with varying amounts of organic matter. Marsh soils are usually covered twice daily with tidal water.

2.05 Climate. Climatic data for the Port Royal Sound area are drawn from records compiled at Charleston, S. C. The region is characterized by a humid sub-tropical climate. Warm ocean currents dominate the weather patterns of the project area causing summers to be warm and humid (average July temperature 82°F), and winters to be relatively mild (average January temperature 50°F). Precipitation is fairly evenly distributed throughout the year; however, a peak of rainfall does occur in July (6.2 inches) and August (6.5 inches). Average annual temperature and mean annual precipitation are 66.1°F and 47.3 inches, respectively (Reference 6). The U. S. Department of Agriculture (Reference 15) gives additional climatic information for the region including the Port Royal project area: evapotranspiration potential is 33.66 to 44.88 inches, 11-15 damaging tropical storms occurred between 1901 and 1955, the freeze-free period lasts approximately 290 days, and only 2 severe glaze storms occurred between 1926 and 1953.

2.06 Biological resources. To facilitate a discussion of biological resources, the project area will be classified as follows: (1) Open water, (2) Beach and dune, (3) Marsh, (4) Woodlands, (5) Agricultural lands, and (6) Urbanized land.

2.06.1 Open water. Approximately half of the project area is included in the saline open water biotic community. In addition to

the estuarine waters of Port Royal Sound, the following tributaries are located partially within the boundaries of the project area; Beaufort River, Battery Creek, Archers Creek, Chowan Creek, Ballast Creek, and Station Creek. Plants in the open water community are restricted to phytoplankton and marine seaweeds which grow attached to various objects or may drift ashore with the tide. During winter storms, seaweeds in the littoral drift accumulate on the beaches or become entangled in the low marshes along with wrack material consisting primarily of smooth cordgrass. Frequently observed seaweeds are Enteromorpha, Ulva, Sargassum, Gracilaria, Dasya, Bryopsis, and other genera of red and brown algae.

2.06.1.1 The most important groups of animals in the open water communities are the planktonic organisms, benthic invertebrates, and fish. Food webs of this community demonstrate the basic interdependence of open water systems and surrounding terrestrial communities, particularly the marsh communities. For instance, many of the benthic organisms and fish at various stages of their life cycle depend directly on the marshes for food. Exchange of nutrients between aquatic, semi-aquatic, and terrestrial ecosystems, and distribution and diversity of species within them, are dependent on the energy provided by tidal action in estuaries.

2.06.1.2 Benthic invertebrates are detrital feeders and rely on the release of foods in the form of dead organic material (detritus) from marsh systems as their primary source of food. The population levels and species diversity of these forms are good indicators of the quality of estuarine ecosystems and, therefore, the presence (or absence) of pollution. Benthic invertebrate samples taken (April, July and October of 1970) during the Port Royal Sound Environmental Study (Reference 10) had relatively high species diversity and large numbers indicating a well-balanced, unpolluted estuary. Table 1 summarizes these data.

2.06.1.3 Further sampling undertaken during the Port Royal Sound Environmental Study revealed many estuarine dependent fish, including many important sport and commercial species were common in the estuary. Salt marsh creeks yielded 67 species of fishes and macro-invertebrates. The blue crab, an important commercial invertebrate, accounted for 70 percent of the invertebrate biomass harvested, and bay anchovy, Atlantic silverside, striped mullet, and silver perch accounted for 95 percent of the total fish catch. Species identified as using the salt marsh creeks as nursery areas were striped mullet, black drum, Atlantic thread herring, sheepshead, American eel, gray snapper, bluefish, crevalle jack, silver perch, spotted seatrout, weakfish, spot, Atlantic croaker, Atlantic spadefish, great barracuda, Spanish mackerel, and paralichthid flounders along with penaeid shrimp and blue crabs.

2.06.1.4 The adults of several predatory species are common in the area including lemon shark, southern stingray, sea catfish, pig-

fish, pinfish, Gulf flounder, southern flounder, summer flounder, silver perch, spotted seatrout, red drum, ladyfish, and blue crab. Open water and near-shore sampling during the above referenced study yielded 47 species of fish, many of which were common in the salt marsh creek samples.

2.06.1.5 The major commercial species in the area are blue crab, oysters and brown and white shrimp. Commercial fishery landings for the area as compiled by the Department of Commerce in cooperation with the S. C. Wildlife and Marine Resources Department are presented in Table 2. The main sport fishes taken from the inshore waters are sea-trout, red drum, black drum, sheepshead, spot, croaker, and flounder.

2.06.1.6 The bottle-nosed dolphin and the diamondback terrapin may be found in Port Royal Sound throughout the year. The logger-head turtle is most likely to be found in limited numbers in the harbor area during the spring and summer. There are a variety of birds frequently seen in the harbor area, including some that are also common to other environments. Species commonly observed are brown pelican, black skimmer, royal tern, red breasted merganser, herring gull, laughing gull, ringbill gull, osprey and double crested cormorant.

2.06.2 Beach and dune. Within the project area, the beach and dune biotic community is located north of the entrance to Port Royal Sound and on the east and south edges of Bay Point Island. The community may be defined on the basis of the presence or absence of vegetation. Characteristically, the beach and dunes facing the ocean are linearly arranged into zones of bare unvegetated sand sloping upward into a foredune zone of sea oats, sandspurs, seaside spurges, croton, and bitter panicum. Proceeding inland, a zone of undulating dunes occurs. These dunes are sparsely covered by foredune herbs, yucca, ground cherry, salt meadow cordgrass, golden aster, rabbit tobacco, catbriers, and occasional shrubs, such as yaupon and wax myrtle.

2.06.2.1 On the southern end of Bay Point Island, adjacent to the mouth of Port Royal Sound, the species composition occurring on the dunes is slightly different. The bare beach sands slope upward less sharply than they do on the ocean beach described previously. This habitat, because it is afforded greater protection from the erosive winds and waves, salt spray, and sand blasting has a more diverse assemblage of plants. Not only are the typical foredune species present, but also the salt tolerant coastal weeds, such as Russian thistle, seabeach orach, sea blite, sedge, pennywort, marsh elder, and sea rocket. A dune ridge of probable eolian origin separates the south beach and dunes from tidal marsh. Several woody species occur, including yaupon, seedlings of live oak, cabbage palm, buckthorn, red cedar, wax myrtle, silverling, catbriers and pepper-vine.

2.06.2.2 The beach and dune community, subject to changes in landform following major storms, provides limited habitat for mammals;

however, the beach mouse and house mouse are commonly found. Species such as the raccoon, opossum, and marsh rabbit, occasionally visit this community while foraging. Reptiles encountered might include the Atlantic loggerhead turtle, eastern glass lizard, or the rough green snake. Other inhabitants include ghost crabs, sand fleas, wedge shells, and a host of other invertebrates occupying the dunes and beaches. Invertebrates that inhabit this area provide the basic diet throughout the year for many shorebirds, such as sandpipers and plovers.

2.06.3 Marsh. The greatest expanses of intertidal marsh occur southeast of St. Helena Island along Station Creek downstream of the confluence of the Beaufort River and Port Royal Sound along the eastern and northern sides of Parris Island and along the banks of most of the tributaries to Port Royal Sound. The vegetation in these marshlands varies with elevation and salinity but is generally dominated by emergent, narrow-leaved rushes, sedges, and grasses. Soils are generally poorly drained peats and mucks and anaerobic conditions are usually present beneath the ground surface. The tidal marshes in the project area can generally be separated into low marsh and high marsh.

2.06.3.1 Low marsh is the lowest, topographically, and occurs from mean sea level to about mean high water. This region is regularly flooded by lunar tides and is vegetated primarily with smooth cordgrass throughout most of the project area. Occasionally, scattered individuals of high marsh species, such as glasswort, sea blite, or sea ox-eye will also be present in elevated islets in the low marsh community, but these never form extensive stands. Because of its tolerance to flooding and the high salinities of the waters and sediments, smooth cordgrass thrives in an environment which is relatively free of competition from other species. Only in areas where flooding is irregular and physiologically less limiting is smooth cordgrass replaced by other species.

2.06.3.2 High marshes are those marshes situated at elevations above the normal high tide level but within the area flooded by spring tides. In the project area this community occurs as a fringe community on the margins of the low marsh. Black needlerush is the principal plant found in the high marsh where it frequently occurs as pure stands. Other high marsh species are sea ox-eye, glasswort, sea blite, salt meadow cordgrass, marsh elder, dog fennel, salt marsh aster, salt marsh fimbriatylis, dropseed, salt grass, silverling, broomsedge, wax myrtle, and seedlings of live oak.

2.06.3.3 Estuarine marsh communities. These communities have been well documented in terms of productivity, animal diversity and importance to the marine system (and to man). The basis of the importance of these associated marsh communities involves the basic high productivity of the marsh itself, and its function of trapping nutrients from the upland communities. The detritus deposited each year when the

Spartina dies and decomposes provides a food base upon which the estuarine organisms thrive. The dense plant growth in the marsh provides excellent cover for many species of birds, aquatic and semi-aquatic mammals, reptiles and amphibians. Substrates in these communities are inhabited by a myriad of foraminiferans, nematodes, annelids, arthropods, and mollusks. The marsh community provides a nursery ground for the principal commercial marine organisms of the state; white and brown shrimp and blue crabs. These and the young of many other sport and commercial species move in and out with the tide to feed around the stems of the marsh grass.

2.06.3.3.1 Throughout these marsh communities numerous shorebirds, waterfowl, gulls, herons, and egrets will be found. Birds such as plovers, dowitchers and sandpipers thrive on the benthic invertebrate population around the shoreline and on open flats. In the open water bordering these communities, waterfowl will be found feeding on vegetation or small marine fishes and free swimming invertebrates. Another game bird to be found is the clapper rail, a permanent resident of the marshes that nests in the smooth cordgrass. The herons and egrets feed on fish, invertebrates, reptiles, amphibians, and small mammals in the marsh. Many gulls will be found the year round utilizing these communities for resting and scavenging. Other birds such as the red-winged blackbird, common and boat-tailed grackles, sparrows, and warblers will be found nesting and feeding on insects and grains. Birds of prey such as osprey, bald eagle, and marsh hawk will also be found utilizing these communities to some degree.

2.06.3.3.2 Mammals of the marshes typically include the raccoon, mink, otter, rice rat, opossum and marsh rabbit. The raccoon, opossum and mink are ubiquitous animals and opportunistic feeders. The otter thrives on crustaceans and fish while the rice rat and marsh rabbit are herbivores. On occasion, other mammals such as the bobcat and fox will visit these communities.

2.06.4 Woodlands. The woodlands of the Port Royal area are primarily mixtures of oak, pine, and cabbage palm and in much of the area the forest is dominated by live oak. The presence of pines in the canopy is usually dependent on the density of the oak trees, age of the stand, and factors such as soil texture and moisture. Three species of pine are found in the area, loblolly, longleaf and occasionally slash pine. The cabbage palm is generally found on the topographically low sites or in woodlands which have been repeatedly burned. Other species attaining canopy status are magnolia, sweet gum, hickories, water oak and laurel oak.

2.06.4.1 In general, the species of plants found in the understory varies with the overstory type. In the live oak dominated forest, the ground cover is sparse with scattered herbs such as partridge berry and the epiphytes Spanish moss and resurrection fern. Shrubs such as devil's walking stick, Chinese tallow tree, sassafras, wax myrtle and wild black cherry grow around the open margins of the

forest. The live oak-cabbage palm hammocks which occur as islands in the salt marsh have a shrub layer consisting of red cedar, yaupon, buckthorn, hackberry, winged sumac, red buckeye, Carolina laurel cherry, wild olive and occasionally saw palmetto, coral bean, and Spanish bayonet. The understory of the live oak-palm-palmetto woodlands, the most abundant forest type in the project area, contains persimmon, Chinese tallow tree, sparkleberry, wax myrtle, Hercules-club, American beauty berry, coral beans, sassafras, muscadine grape, and catbrier.

2.06.4.2           The oak-pine forest supports a variety of animal life. Some are restricted to particular habitats within the forest while others may range throughout the community. Game animals such as the white-tailed deer, feral hogs and wild turkey range throughout the area. Bobwhite and mourning dove use the more open areas. Gray squirrels inhabit the hardwood stands. The cotton rat is found in the palmetto and open grass areas while the woodrat and cotton mouse remain in the more heavily wooded areas. These rodents as well as birds, amphibians, and reptiles are a source of food for predators such as hawks, owls, foxes, snakes, and bobcat which range throughout this and adjacent communities.

2.06.4.3           Population estimates for several game species reported in 1972 as part of the Port Royal Environmental Study show white-tailed deer at one per 28 acres, 2.8 gray squirrels per acre in hardwood stands, and fair sized populations of turkeys. Although fox squirrels have been reported in the area, no population estimates are available. Small bird densities in the area were estimated at 13 birds per acre in pine stands, 19 per acre in pine-hardwood stands, and 29 birds per acre in hardwood stands.

2.06.5           Agricultural land. Agricultural lands include fields and pastures. Green beans, tomatoes, squash, cucumbers, Irish potatoes, corn, cabbage, peppers, and soybeans are produced in this area. With the planting season beginning about the last week in February, it is possible to grow more than one crop per season, although the greatest potential production is in the early spring. During the remainder of the year, after the vegetable and feed crops have been harvested, the fields are covered by a dense growth of weeds. Common species such as crabgrass, Bermuda grass, goose grass, boerhaavia, cocklebur, fumitory, peppergrass, and shepard's purse are extremely abundant. Less frequently found, but often occurring in large populations, are cleome, corydalis, water starwort, and morning glory. Many of the crop plants also persist for a time following harvest. Fields that are left fallow after harvest provide habitat for small mammals, birds, reptiles, and amphibians, and hunting grounds for birds of prey. The cotton rat, house mouse, and opossum, for instance, are permanent residents, while the common night-hawk and marsh hawk are temporary foragers.

2.06.6 Urbanized land. Urbanized land in the Port Royal area consists of man-influenced and man-dominated areas.

2.06.6.1 Man-influenced. Disturbance by man, evident in all terrestrial communities of the Port Royal project, has resulted in several successional communities that are unlike those occurring naturally. For example, a low marsh site (Disposal Area 100E) has been filled near the State Ports Authority docks and the resulting community exhibits some of the characteristics of a high marsh, an old field, and shrub thicket. Among the more abundant species are wax myrtle, dog fennel, salt meadow cordgrass, broomsedge, silverling, dewberry, goldenrod, sea ox-eye, sandspurs, and pennywort. Part of the fill is presently a paved parking facility near a boat landing and the remainder will be diked and used as a disposal area for materials dredged from the inner harbor.

2.06.6.1.1 Man-influenced communities also occur on St. Helena Island, and in most cases, represent old fields which are burned over and planted infrequently, or have been abandoned and not yet reverted to forest. Species likely to be found in these sites are seedlings of loblolly pine, rabbit tobacco, broomsedge, golden aster, goldenrod, dog fennel, sandspur, beard grass, dwarf dandelion, and toad-flax.

2.06.6.1.2 The shrub areas provide cover for small rodents and birds, but the major portion of this community is field habitat capable of supporting rodents, lizards, amphibians, and some ground dwelling birds. The field provides good hunting grounds for owls and hawks, along with habitat for the more insective animals, including the big brown bat and evening bat, various birds, such as blue jays and American robins, and smaller vertebrates, like the green anole and southern toad.

2.06.6.2 Man-dominated. Man-dominated biotic communities are those which have been irrevocably changed and are constantly maintained by man's activities. Three main sites are found in the Port Royal project area: Parris Island Marine Base, the town of Port Royal, and a residential development at Fort Fremont. Most species of the natural communities which formerly occupied these sites have been obliterated by right-of-way, commercial development, and residential construction. Of those plants which remain, forest species such as live oak, cabbage palm, and pine are the most conspicuous. As a result of landscaping with ornamental plants, local residents have introduced many new species. Some of these species, such as tamarisk, English ivy, and Chinese tallow tree often escape to vacant lots and other disturbed habitats. Common roadside herbs include centipede grass, sneezeweed, sandspur, finger grass, waxweed, plantain, buttonweed, and false dandelion.

2.06.6.2.1 The man-dominated community provides habitat to those animals that easily adapt to man's habit and habitations. The gray squirrel, flying squirrel, opossum, and many birds easily adapt to

man's presence and the black rat, Norway rat, and house mouse live with man. Lizards and amphibians which are capable of using habitats with either natural and/or introduced vegetation are also found.

2.06.7 Community relationships. The biotic communities of the Port Royal project area, when viewed together, present a mosaic of ecosystems which are interrelated and highly dependent on each other. Because the environmental factors of these communities are particularly stringent (high salinities, frequent storms, shifting substrates, unchanging landforms, salt spray, sand blasting, broad atmospheric and soil temperature and moisture fluctuations, generally low nutrients, etc.) the ecotones between them are usually narrow, thus producing a marked zonation of communities. The reason for this situation involves the fact that small differences in various physical factors make for large differences in biotic composition within these coastal fringe communities. Plate 3 and 4 graphically illustrate some of these ideas. The beach and dune community shown in Plate 3A demonstrates the limited growth forms of plants which develop under exposure to the prevailing physical factors controlled by the ocean. A wide variety of biotic communities is shown on Plate 3B. Note the mosaic appearance of this distribution.

2.06.7.1 Biotic communities as depicted in Plate 4A may be the result of natural phenomena (note the clear zonation). This plate shows an oak-pine forest that has developed on an elevated place within a low marsh. On the other hand, man's activities produce changes in naturally occurring vegetation. Plate 4B illustrates this process, in that the elevated roadbed has produced conditions needed for high marsh species to invade embankments and forests species have become established on the left of the road.

2.06.8 Endangered species. Endangered species (Reference 17) can be defined as those species in danger of extinction throughout all or a significant portion of their range. Their peril may result from one or more causes--loss of habitat or change in habitat, over-exploitation, predation, competition or disease. Endangered species which occur or possibly occur in the project area are:

Fish

Shortnose sturgeon

Acipenser brevirostrum

Reptiles and Amphibians

American alligator

Alligator mississippiensis

Birds

Eastern brown pelican

Pelecanus occidentalis  
carolinensis

Southern bald eagle

Haliaeetus l. leucocephalus

Peregrine falcon  
Bachman's warbler  
Kirtland's warbler  
Eskimo curlew  
Red-cockaded woodpecker

Falco peregrinus  
Vermivora bachmanii  
Dendroica kirtlandii  
Numenius borealis  
Dendrocopus borealis

The shortnose sturgeon was a resident of Atlantic seaboard rivers from New Brunswick to Florida, however, most recent records are from the Hudson River. The alligator is commonly observed in freshwater rivers and lakes. The brown pelican is a commonly observed resident of coastal South Carolina and nests in many areas along the coast. The bald eagle, a permanent resident of the state, has been sighted near Victoria Bluff (Reference 10). The peregrine falcon, Kirtland's warbler and the Eskimo curlew are transient species. According to the U. S. Fish and Wildlife Service, Bachman's warbler, one of the rarest of our small birds, has been observed in the Lion Swamp near Charleston. The red-cockaded woodpecker is a resident of the old-age pine woodlands.

2.06.9                      Endangered and threatened plant species. There are no endangered plants in the project area. According to Radford, Ahles, and Bell (Reference 7), two plants found in Beaufort County are listed as threatened in the latest listing of endangered and threatened plant species (Reference 12). These are Sarracenia rubra which occurs in bogs and savannahs and Schisandra glabra a woody vine found in rich woods.

2.07                         Historical and archaeological sites. The latest edition of the National Register of Historic Places (February 4, 1975) lists 21 sites in Beaufort County. Three of these sites are located near Port Royal and include: Fort Frederick, the Hassell Point site, and Little Barnard Island. None of these sites are located within the area of project influence.

2.08                         Economic Development.

2.08.1                      Employment. The civilian labor force in Beaufort County in 1974 amounted to 17,230 persons, as compared with 12,050 in 1970 (Reference 8). The rate of unemployment in 1974 was 5.3 percent and the ratio of unemployment in 1974 was over one-half a percentage point lower than that for the State. The distribution of employment in the county in 1969 is shown in Table 3. Less than 7 percent of the non-agricultural employment in Beaufort County was in manufacturing, whereas more than 33 percent of the non-agricultural employment was in government.

2.08.2                      Income. It was estimated that total personal income in Beaufort County in 1970 from all sources was approximately \$132 million. Given that there were approximately 13,500 households in the county, average income per household was \$9,800. Per capita income for 1970 was estimated at \$2,500, which was 67 percent of the 1969 U. S. average of \$3,676. In 1969, per capita income in the state of South

Carolina was estimated at \$2,580, so that it can be concluded that average income per capita in Beaufort County was roughly equal to the State average.

2.08.2.1 Average income figures may be only partially meaningful, however, since they may reflect a population with both extremely high and extremely low incomes. The household survey revealed that 57 percent of the households had incomes below \$6,000. On the extreme, 6 percent of the households had incomes above \$21,000 for the year, and 12 percent had incomes below \$3,000 in 1970.

### 2.08.3 Major Components of the Economic Base.

2.08.3.1 Military Facilities. As shown in Table 4, military activity was one of the most important influences on the Beaufort County economy in 1970, accounting for nearly one-half of all sales in the county. The military sector of the county's economy is comprised of the Parris Island Marine Base and the Laurel Bay Marine Air Station. Direct military spending in the county is primarily directed into payrolls totaling almost \$83 million in 1970. In addition, more than \$1.5 million was spent by the military in the county in 1970 for construction activities. The payroll expenditures are distributed throughout the local economy in the form of payments for retail items and services, and its impact is felt in almost all sectors of the Beaufort economy.

2.08.3.2 Tourism and Recreation. With its subtropical climate and relatively unspoiled estuarine environment, Beaufort County has developed since 1960 a major tourism and recreation industry. The industry is now the second most important component of the county's economic base, accounting for about 6 percent of all gross sales in the county. There are three major sectors which are directly involved in tourism and recreation activities - hotels and lodging places, eating and drinking places and gasoline service stations. Yet tourism and recreation activities also have indirect impacts on many other sectors of the local economy, particularly households which supply labor and wholesale and retail trade establishments.

2.08.3.3 Agriculture, forestry and fisheries. Agriculture, forestry and fisheries activities constitute the traditional base of the Beaufort County economy. Yet all of the sectors have been in decline in recent years, and in 1970 they accounted for only about 5 percent of total sales in the county. The decline in agricultural employment and number of farms would appear to indicate that farm operations have become heavily mechanized, thus releasing human resources to seek other forms of employment. But even though the number of people engaged in farming operations has been decreasing, Beaufort County continues to have a viable agricultural economy, ranking 26th (among 46 counties) in the state in total cash receipts from farming and second in cash receipts from vegetable crops (Reference 19).

2.08.3.3.1 The fishing industry in Beaufort County is relatively small. In 1963, there were an estimated 223 full-time job equivalents in the industry, although probably many more than 223 persons were employed in these positions on a part-time basis. The principal types of fishing activities center on shrimp, crabs and oysters. Available studies indicate that there is little potential for substantial growth in the shrimp fisheries on the Carolina coast, but some prospects exist for expansion of crab and oyster operations.

2.08.3.4 Manufacturing. Table 3 shows that the direct and indirect effects of manufacturing currently account for only about 3 percent of all sales in Beaufort County. Current manufacturing operations in the county are geared largely to apparel, food processing and other light industry with traditionally low wages. Growth of manufacturing in the county has been relatively slow. The State of South Carolina gained 35,200 new manufacturing jobs from 1970 to 1974, while Beaufort County gained 420 jobs (Reference 8).

2.08.4 Port of Port Royal. In 1974, the port handled 180,646 tons of waterborne commerce. Statistics for the last five years show that 234,124 tons were handled in 1970; 114,524 tons in 1971; 151,394 in 1972; and 90,183 in 1973 for a five-year average of 154,174 tons. The principal commodities passing through the port are clay, oilseeds, shellfish, grain mill products, pulp, paper and paperboard, fabricated metal products, basic textile products, residual fuel oil, and distillate fuel oil. Clay, shellfish, and agricultural products are outbound shipments while petroleum products are inbound shipments. Commodities shipped in 1974 are given below in tons.

Oilseeds, Nec	3,463
Shellfish, except prepared	2,293
Clay	171,181
Grain mill products, Nec	1,085
Basic textiles products	275
Pulp	726
Paper and paperboard	618
Distillate fuel oil	175
Residual fuel oil	198
Fabricated metal products	632
Total	<u>180,646</u>

## 2.09 Land Use.

2.09.1 Of the approximately 575 square miles which make up Beaufort County, almost 100 square miles are made up of tidelands. These tidelands are the basis for most of the fisheries, both commercial and recreational, of the region since they act as nurseries and feeding areas for numerous species of vertebrates and invertebrates. These tidelands have started to diminish in the past few years as a result of encroachment by residential and recreational developments.

2.09.2                    Approximately 150 square miles of Beaufort County are classified as farmlands, but only about 30 square miles are utilized. Cattle grazing constitutes a major use of this land and the remainder is used for raising tomatoes, cucumbers and other crops on a commercial scale.

2.09.3                    Some 30 square miles are classified as urbanized land. These lands include the cities of Beaufort and Port Royal, the military centers at Parris Island and Laurel Bay Marine Air Station, and the resort-retirement developments on Hilton Head and Fripp Islands.

### 3.0                        Relationship of the Proposed Action to Land Use Plans.

3.01                      There are no existing or proposed Federal, State or local land use plans, policies or controls which would be affected by the continued maintenance of the Port Royal Harbor project.

### 4.0                        The Probable Impact of the Proposed Action on the Environment.

4.01                      General. Material dredged from the inner harbor during the last maintenance dredging (FY-1970) was deposited on undiked disposal areas located on former marsh (See Plate 1). The State of South Carolina is required to furnish disposal areas for this and other similar projects, and it has been the practice of the State to select and acquire disposal areas only as the need for new areas develops. Although the exact location of the disposal areas to be used in maintenance dredging of the inner harbor when the existing area is used to capacity is not now known, it appears certain that the high priority placed on marsh preservation in the interest of wildlife and estuarine productivity will prevent the further use of marsh for disposal of dredged material. Consequently, the discussion of impacts will be based on the assumption that material dredged from the inner harbor channels will be deposited in disposal area 100E, an undiked area which has been used in the past. When this area has been filled to capacity, new disposal areas will probably be located on upland areas adjacent to the harbor. Dredging of the entrance portion of the harbor will continue to be accomplished by a hopper dredge and the dredged material will be deposited in the currently used offshore disposal areas.

4.01.1                    A major impact of this maintenance dredging is related to effects on water quality and on the ecosystems within the harbor and disposal areas. Water quality is affected mainly by local short-term increases in turbidity and sedimentation of adjacent water areas because of the bottom disturbance by the dredge cutterhead and the suspended and dissolved material in the effluent from the disposal areas. The effects on disposal areas include the smothering of plant communities and displacement of animal communities.

## 4.02

### Open water.

4.02.1            General. It is characteristic of any hydraulic dredging project that water turbidity in the vicinity of the dredge will increase as a result of the mechanical action of the dredge cutterhead. Observations of maintenance dredging in the harbor indicate there will be a limited temporary increase in turbidity in the area of dredging and although visible at the surface only in the immediate vicinity of the cutterhead, the plume may extend several hundred feet either upstream or downstream as determined by tidal currents. Some temporary increase in turbidity can also be expected adjacent to the upland disposal areas and in the offshore disposal area. However, due to the small amounts of material involved and their sandy nature, the temporary and localized effects on resident biota of increased water turbidity are not considered to be of a magnitude to affect long-term productivity.

4.02.1.1            In addition to increased turbidities, the disturbance of bottom sediments by the dredge may resuspend chemical substances and possibly increase levels of nutrients, and B.O.D. Such effects would be most noticeable in the immediate vicinity of the dredge and would not extend any appreciable distance beyond the source. Sediment analyses indicate low levels of heavy metals, nutrients and organic pollutants. Standard elutriate tests and sediment analyses are included as Appendix B. Therefore, the disturbance of these sediments should not have any significant effect on water quality or the long-term productivity of the harbor ecosystem.

4.02.2            Phytoplankton. From research conducted in areas similar to Port Royal Harbor, it appears that the effect of dredging on the primary production of phytoplankton is initially inhibitory due to increased turbidity. Recovery, however, takes place downstream.

4.02.3            Zooplankton. Research conducted on the survival of zooplankton (Reference 1) indicates that water which comes from the disposal sites is more toxic than the water at the dredge site or downstream. It appears that zooplankton populations may be reduced during actual dredging operations, but the area affected is comparatively small and effects decrease rapidly with distance from the dredging operation.

4.02.4            Invertebrates. In most dredging projects, one of the most significant short-term impacts in the channel area is the physical disruption of benthic invertebrates by the dredge cutterhead. This gross effect has been well documented in many studies and field investigations conducted along both the Atlantic and Gulf coasts and can be expected to some extent during maintenance of Port Royal Harbor. In addition, some smothering of benthic organisms may occur in areas immediately adjacent to the channel. The greatest concentrations of benthic invertebrates in the Port Royal Sound estuary occur in the shallower portions in and around the salt marshes, not in the deeper areas through which the harbor channel is aligned. As a result, the

overall long-term impact on benthic invertebrates should be insignificant and repopulation of disturbed areas by recruitment from adjacent areas should begin shortly after dredging is completed.

4.02.4.1 Some benthic organisms inhabiting the offshore disposal area could possibly be smothered as dredged materials from the hopper dredge settle to the bottom in this area. However, recent studies by the S. C. Wildlife and Marine Resources Department (Reference 11) indicate that the effects of offshore dumping at Charleston Harbor, which involves a much larger dredging operation than is required at Port Royal Harbor, are not significant. Therefore, although the impacts of offshore disposal are difficult to quantify, it appears that this method of disposal has fewer adverse effects than other methods of disposal, such as marsh disposal.

4.02.5 Fish. The Port Royal Sound estuarine system supports a diverse array of fishes. Although many of these species are occasionally found in deeper channelized portions of the estuary, the majority are usually associated with salt marshes and shallower water areas which should not be significantly affected by the proposed project.

4.02.5.1 Available data indicate that fish populations, unlike benthic invertebrates which are relatively immobile and may undergo population reductions that may be locally severe, are less likely to be adversely affected by dredging operations. In some areas, dredging could even be considered to be beneficial to certain species of fish. As a dredge works its way along a channel, benthic animals which would normally be buried in the sediments are dislodged and become susceptible to predation. This sudden availability of food quite often results in higher than normal concentrations of fishes near the dredge. Ocean disposal could create a similar situation.

4.02.5.2 Although it would appear that fish are relatively unaffected by dredging, some concern has been expressed over the possible effects of increased turbidities and siltation associated with dredging. As a dredge moves along the channel, it invariably creates some type of turbidity plume, the size of which will vary considerably depending on the type of sediment being dredged, strength of currents and other factors. The magnitude of the impact of suspended particles on fishes will, in most cases, be dependent on the concentration, composition, absorbed minerals or toxins and the tolerance of particular species. In general, bottom-dwelling species are the most tolerant of suspended solids, filter feeders are most sensitive and juvenile forms are more sensitive than adults.

4.02.5.3 Under experimental conditions, fish subjected to extremely high concentrations of suspended soils have died from suffocation due to clogging of the gills and opercular cavities. However, under normal circumstances, fish avoid turbid waters and have the ability to clear gill membranes of accumulated silt upon entering undisturbed water. However, not all species are equally susceptible to

suspended solids and different suspended solids vary in their effect. As a general rule, it has been found that fish can tolerate high turbidities except when they are accompanied by low levels of dissolved oxygen, acids, alkalies, or other substances which interfere with respiration, injure gills, or prevent their normal function, and they are quite capable of leaving the immediate dredging area.

4.02.5.4 Due to the sandy nature of the sediments dredged from Port Royal channels, turbidity plumes created by the proposed project are not expected to become excessive and will generally be restricted to the channel area. Fish species which would have the highest probability of being affected are the filter feeders (primarily menhaden, herring, and shad) and juvenile forms. Estimates of the relative abundance of these species in the channel area at any given time varies so that it is not practical to attempt a precise determination of impact on these species. Based on research which has been accomplished in other areas and available information on the effects of current dredging practices in the harbor, it is felt that any impact resulting from the proposed maintenance would be of a short-term, localized nature and should not significantly affect the fish stocks in the Port Royal estuarine system.

4.02.5.5 Principal commercial species marketed in the Port Royal area are shrimp, blue crabs, oysters, clams, alewives, American eels, flounder, whiting, black sea bass, and spot. A majority of these species are captured in offshore fisheries which will not be directly affected by maintenance dredging. Oysters and clams are found in shallower areas of the harbor and will not be affected by the project. Shrimp and blue crabs are found throughout the estuary and there is a possibility that some could be killed if they come in contact with the dredge cutterhead. Potential mortality should not be great enough to have any effect on recruitment to the offshore fishery. Many of the commercial fish species spend a portion of their life cycle in the estuary and these could be adversely affected by turbidities or could be picked up by the cutterhead. The impact on these fish is also expected to be temporary and insignificant.

4.02.6 Porpoises, turtles, and birds rely on the open water area only for feeding and resting. Since the proposed dredging is not expected to significantly affect invertebrate and fish populations, it should also not affect the value of the open water area as habitat for these animals.

4.03 Beach and dune. Within the Port Royal area there is a considerable amount of beach and dune community. However, since it is not practical from an engineering and economic viewpoint to build diked disposal areas that are totally confined to the beach and dune zone, this type of community will not be affected by future maintenance operations.

4.04 Marsh. Because of the high premium now placed on estuarine marshes, it is considered unlikely that new disposal areas in the marsh zone would be acquired when the existing area is depleted. Some marsh would, however, be destroyed during the diking of Disposal Area 100E since it is not practicable from an engineering standpoint to confine dikes to only the upland areas of this disposal area. As a result, approximately 4 acres of tidal marsh would be destroyed by dikes and subsequent disposal of dredged material. This includes about 2 acres of marsh in the area north of the access road, less than 2 acres south of the access road and less than one-half acre just east of the boat ramp (See Plate 2). In addition, a small stagnant borrow ditch on the east side of the boat ramp would likely be filled.

4.04.1 Marshes used as disposal areas become progressively altered until the ground elevation exceeds the height reached by spring tides. When the ground surface is no longer subject to tidal overflow as a result of the deposition of dredged material, the disposal area begins to take on the characteristics of an upland area. Plants such as smooth cordgrass, black needle rush, and big cordgrass are eventually replaced by other grasses, poke berry, silverling, marsh elder, and wax myrtle. This conversion to an upland environment represents a permanent loss of the marsh involved in the disposal operation.

4.04.2 The loss of marsh also represents a reduction in the habitat available to marine forms. Some species of fish such as the speckled trout may spend their entire lives in estuaries. Others, including white and brown shrimp, blue crabs, croakers, spot, and red drum spend part of their juvenile life in marshes and adjacent water areas. Consequently, the functional importance of marsh extends beyond its intrinsic potential biological productivity. While it is recognized that marshes play an important role as a nursery area in the life cycle of many species, this role has not been quantified to the extent that its effect can be described on a per acre basis. However, since most of the approximately 4 acres of tidal marsh in Area 100E which would be affected by the proposed diking and subsequent disposal has already been altered to some degree by previous disposal practices, it is doubtful that loss of this acreage would have any noticeable affect on the area's long-term productivity.

4.04.3 Bird species frequenting the marsh areas would be displaced as these areas are converted to an upland environment although many species would continue to forage in the area. Mammals such as the raccoon, opossum, marsh rabbit, and various rodents would continue to use the disposal area although its habitat value may be reduced. Due to the relatively infrequent dredging required in the inner channel, shrubs, grasses, and small trees would likely become established between dredgings. This vegetation would provide habitat for small birds such as sparrows, red-wing blackbirds, and grackles, and small rodents.

4.05 Woodlands. Woodlands now appear to be one of the two most likely areas to be selected for disposal of dredged material when the currently used disposal area is used to capacity, although new

disposal areas may not be needed for many years. Woodlands are one of the larger environmental types in the Port Royal Harbor area, and the rationale for preservation of individual tracts of marsh does not apply to these woodlands. Woodlands are also less expensive than urbanized areas and would therefore be more suitable from the project sponsor's viewpoint.

4.05.1 Prior to the use of any wooded tract of land, the owner would probably remove merchantable timber. In any event, dense stands would be removed to permit a more even distribution throughout the disposal area of the hydraulically dredged material. Any trees not removed and all understory plants would be killed when their roots become covered to a sufficient depth. Vegetative regrowth would probably consist of poke berry, and other herbs and shrubs such as silverling and wax myrtle, and trees of most of the same species growing prior to dredging.

4.05.2 Practically all significant animal life except for some small birds would be displaced during and shortly after the use of a wooded disposal area. Raccoons, opossums and some small rodents might continue to forage without interruption in the disposal area. As vegetative regrowth begins, foraging by other species that were displaced during the preparation and clearing and subsequent use of the area would increase. While periodic use of these areas continues, plant and animal life would probably fluctuate from a low during and shortly after deposition of dredged material to a high just before a dredging operation. When capacity has been reached, a reversion to a wooded state by sweetgum, pines, hackberry, oaks and other upland species would occur unless man's activities intervene through use of the area for residential or other development.

4.06 Agricultural land. Agricultural lands along with woodlands, appear to be one of the most likely areas to be selected for disposal of dredged material when the currently used disposal area is used to capacity. Agricultural lands are one of the smaller categories of land use but some of the basic restrictions operating against the selection of marsh and urbanized areas do not apply.

4.06.1 The dredged material is predominantly sand and shell. An area used for disposal of such material would no longer be valuable for crops, unless the material were removed for use as fill. Other impacts of using cultivated land for the disposal of dredged material depend on the length of time since the land may have been cultivated. Recently cultivated land usually has very little utility for wildlife because of the common practice of clean farming, and the use of such an area would have little impact on wildlife. Fields that are left fallow for some time provide habitat for a number of small animals. Most of these would be displaced during and shortly after the use of cultivated fields for the disposal of dredged material. Vegetative regrowth would begin shortly after the area dries. Poke berry, followed by other herbs and grasses would appear first. Shrubs such as silverling and wax

myrtle and trees such as sweetgum and sassafras would appear shortly afterwards. As vegetative regrowth progresses, foraging by animals displaced during dredging would increase. The extent of this foraging would also depend on the quality of adjacent habitat. If such a disposal area were bordered by woods, a greater diversity of animal life might forage in the disposal area than if it were bordered by cultivated fields. Plant and animal life would probably fluctuate from a low during and shortly after deposition of dredged material to a high just before a dredging operation. When capacity has been reached, a reversion to a wooded state by sweetgum, pines, hackberry, oaks, and other upland species would occur unless cultivation is resumed or the area is placed into residential or other development. The disposal material is suitable for many uses and removal from the disposal area for some of these purposes could further the life of the disposal area.

4.07                   Urbanized land. The use of urbanized areas does not appear practical because such use would be incompatible with human use of adjacent areas. The cost of urbanized property also would deter its use for this purpose.

4.08                   Endangered or threatened species. There are several endangered or threatened plant and animal species which occur or possibly occur in the harbor area. The project should not affect any of these species.

4.09                   Archaeological and Historical Sites. The continued maintenance of Port Royal Harbor should have no impact on archaeological or historical resources. Since the completion of the harbor project in 1959, annual maintenance of the entrance channel and dredging of the inner harbor at about five year intervals has continued and it is highly unlikely that continued maintenance would disturb anything of historic value. Coordination with the state historic officer has been accomplished and the National Register of Historic Places lists no Register properties which would be affected by the proposed project. In the event that the project is modified or new disposal areas are provided by the local sponsor, the new areas would be surveyed and the State Historic Preservation Officer will be contacted.

4.10                   Aesthetics. Aside from the physical presence of the dredges and floating pipelines that would be in the harbor during maintenance dredging, there should be little or no effect on aesthetics. The upland disposal sites may be aesthetically displeasing to users of adjacent land.

4.11                   Air quality. There may be a very minor increase in air pollution as a result of operation of the dredge; however, the effects should be temporary as well as insignificant and probably not measurable at existing air quality stations.

4.12                   Noise. In view of the large expanse of open water, noise levels from dredge operations should not be raised objectionably above present levels.

4.13 Mosquitoes. The use of diked disposal areas to avoid adverse effects on estuarine values has an adverse effect in that diking in the coastal zone creates ideal habitat for the salt marsh mosquito. Because of the present impracticality of natural control techniques in these disposal areas, mosquito control in typical diked disposal area requires frequent inspection and spraying. The most commonly used insecticide is Flit M.L.O., which dissipates quickly and has little adverse side effects, but the necessity of frequent treatment of disposal areas is expensive. The State of South Carolina as the sponsor of the Port Royal Harbor Navigation Project, has responsibility for mosquito control. Due to the sandy nature of most of the materials and the fact that the disposal area will only be used at about 5-year intervals, we do not expect mosquito control to be as much of a problem as it is in disposal areas which contain silty sediments and are used more frequently.

4.14 Economic Impact. The continued maintenance of Port Royal Harbor would have a favorable economic impact on the area. Ships serving the area now would help to maintain and possibly expand the economic base now being established in the Port Royal area. This would in turn directly and indirectly have a beneficial affect on the local, State and national economy.

4.14.1 The cessation of maintenance dredging would require that all freight be transported to and from Port Royal by means other than deepwater vessels. Assuming an average additional cost of \$3.00/ton if all freight were shipped by barge to or from nearby deepwater ports, the economic value of maintenance dredging of Port Royal Harbor would be \$541,938, based on 1974 traffic. The average annual cost of maintenance dredging for the period 1971-1975 was \$225,540. This rough estimate yields a B/C ratio of 2.40.

5.0 Any Probable Adverse Environmental Effects Which Cannot Be Avoided.

5.01 A detailed discussion of all environmental impacts expected to result from the project is contained in Section 4.0. Some of these impacts are considered unfavorable, but cannot be avoided by any practical means within the authority and scope of the proposed project.

5.02 The principal adverse impact would be related to temporary changes in water quality and its effects on the harbor ecosystem. These effects include: increased turbidities and siltation in the vicinity of the dredge and disposal areas; a possible temporary decrease in primary productivity resulting from turbid waters reducing the euphotic zone; and a possible reduction in dissolved oxygen levels as a result of the dredge disturbing organic materials undergoing anaerobic decomposition.

5.03 In addition, some benthic organisms may be destroyed by the dredge cutterhead and others may be covered in the offshore

disposal areas. Wildlife species inhabiting the disposal areas for the inner harbor would be displaced by the deposition of dredged materials. Although the grasses on the disposal areas may be relatively unaffected by the dredged material, some of the woody vegetation may be killed. Regrowth usually begins soon after dredging is completed. Diking in coastal areas also creates ideal mosquito habitat; however, the sandy nature of most of the dredged material and the fact that the upland disposal area will only be used at about 5-year intervals should keep this problem to a minimum.

## 6.0 Alternatives To The Proposed Action

### 6.01 Disposal alternatives

6.01.1 . Open water disposal of all material. One aspect of this alternative would involve the exclusive use of a hopper dredge to remove the shoal material from the inner harbor as well as from the entrance channel and transporting it to the ocean disposal areas. Although this method could be used, except in confined areas, the distance that the dredge would have to travel from the inner harbor to the ocean disposal areas (up to approximately 20 miles) would make this alternative impractical. The greater distance traveled would also require more fuel and much more time and these factors would make the associated costs prohibitive. Therefore, this alternative now appears impractical. Within the project life, methods may become available whereby dredged material with a low water content can be removed from the channel bottom and economically transported offshore by hopper barge. If the special equipment required for this method becomes available in the Charleston District, offshore disposal of all dredged materials could become a practical alternative to the use of diked disposal areas.

6.01.1.1 Another aspect of this alternative would involve the depositing of shoal materials in the open waters of the inner harbor either adjacent to the channel or in shallow water areas or deepwater areas of the estuary within 10,000 feet of the dredge. This remains a viable alternative and is under consideration for future operations. The impacts associated with this type of openwater disposal would be similar to those associated with the current dumping in the offshore disposal area although they would probably be of greater magnitude. This would be particularly true of disposal in productive shallow water areas. Implementation of this alternative would probably be contingent on a determination that the adverse environmental impacts would be less than would occur under the recommended plan. Prior to implementation of such a plan, it would be fully coordinated with appropriate Federal and state agencies.

6.01.2 Alternate upland disposal areas. This alternative would involve the use of upland areas adjacent to the harbor for disposal of dredged materials from the inner channel only since it would be both impractical and undesirable from an environmental viewpoint to consider such a proposal for the entrance channel. In the area around the

inner harbor shoals, the only upland areas within an economical pumping distance (10,000 feet or less) are located on the east side of the Beaufort River on Ladies and St. Helena Islands. Although this is a viable alternative, it would be less desirable than using Disposal Area 100E or open water disposal due to greater pumping distance and associated cost increases, land costs, and adverse environmental effects associated with utilizing upland for disposal of dredged materials as discussed in Sections 4.05 and 4.06.

6.01.3 Disposal Area 101E. This alternative would involve the use of Disposal Area 101E (Plate 2) for disposal of materials dredged from the inner channel only. This undiked disposal area is under perpetual easement to the S. C. State Ports Authority and contains 428 acres. Except for the three dredged material islands in this disposal area which were created during the 1969 maintenance dredging, the area under easement is marshland. Implementation of this alternative would require that a dike be constructed around these dredged material islands to create two diked areas totaling approximately 17 acres as shown in Plate 2. The anticipated life of these areas would be about 20 years.

6.01.3.1 Although this is a viable alternative, it would be less desirable than the proposed plan of disposal or the open water disposal alternative discussed in Section 6.01.1 due to the larger area of marsh which would be affected. For example, under this alternative, approximately 12 acres of vigorous salt marsh would be covered by the dike and dredged materials as compared to about four acres under the proposed plan. The impacts of this loss of marsh would be similar to those discussed in Section 4.04.

6.02 No action. This alternative would involve discontinuation of maintenance dredging of Port Royal Harbor. Shoals would continue to develop in the entrance channel and harbor until they would be too shallow to accommodate ships which now utilize the harbor. This alternative would forego the economic benefits derived from shipping and industrial development which are essential to local and regional growth and prosperity. All adverse effects of dredging would be prevented. This alternative was rejected because the project's benefits are believed to greatly outweigh the limited adverse environmental impacts that would result from continued maintenance of the project.

## 7.0 The Relationship Between Local Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity

7.01 The principal long-term benefit of continued maintenance of Port Royal Harbor relates to its stimulus of the local and regional economy. The continued maintenance would permit the continued use of the harbor by ships which otherwise would have to go to other ports and which supply the local and regional industries with goods and a means of transporting their products. The use of disposal area 100E will result in a long-term loss of four acres of previously altered marshland.

7.02 The principal short-term effect relates to the actual maintenance dredging of Port Royal Harbor by hydraulic dredge and the disposal of the dredged material in upland and offshore disposal areas. The action of the cutterhead would have temporary and localized effects on water quality and benthic organisms which are not considered to be of a magnitude to affect long-term productivity. The use of the upland disposal area would cause a temporary and localized change in water quality from the effluent coming from this area.

7.03 The disposal of the material in open water areas has little potential for affecting any long-term uses. The use of upland areas would result in long-term losses of natural areas and the utility these areas may have for wildlife. However, no areas that are unique or have outstanding value in any particular resource would be used for the disposal of dredged material.

#### 8.0 Any Irreversible and Irretrievable Commitments of Resources Which Would be Involved in the Proposed Action

8.01 The project should not cause any known significant curtailment of the diversity and range of beneficial uses of the local environment. Certain resource commitments would be required for the disposal of material dredged from the harbor and entrance channel. The disposal area would undergo a change from a partially vegetated condition to a non-vegetated state which would persist during and shortly after each use. When used to capacity, the disposal area would go through a vegetative succession beginning with grasses and herbs and ending with tree growth that would probably consist of pine and mixed hardwoods. There would be no permanent commitment of resources in the offshore disposal area. The proposed project would involve a total commitment of gasoline and oil required for dredge operations.

#### 9.0 Coordination and Comment and Response

9.01 A draft EIS was distributed for review on 12 April 1976. All letters of comment are attached to this EIS. A circled number follows each comment which requires a response. A corresponding number was assigned to the appropriate response. Responses to these letters of comment are contained in the following section.

#### 9.02 Government Agencies

##### U. S. Environmental Protection Agency

1. Although plans for the dikes and spillways have not been completed, the preferred engineering procedure is to follow natural drainage. The two recommended disposal areas within 100E and closest to Battery Creek (Plate 2) will likely spill into this creek. Drainage of the remaining recommended area farthest from the creek would require modifications in bordering elevated roads and possibly a change in natural drainage before spill from this area could be directed to Battery Creek.

2. Shoal material has been dredged only from the uppermost length of the inner channel in the past. One end appears to be roughly 10,000 to 12,000 feet from the nearest upland areas on Ladies and St. Helena Islands which might reasonably be expected to be available for disposal of dredged material. The other end, at the turning basin, is about 12,000 to 15,000 feet from these possible disposal sites. When pumping distances exceed 5,000 feet the cost for this transport increases substantially. In addition, the cost of high land adjacent to deep water would likely be high. Uplands are not regulated by EPA to the same degree as wetlands; however, it should be recognized that upland sites have environmental values which must be weighed when considering such sites for disposal areas. Even if the upland sites were available now, the higher costs were justified, and adverse effects on uplands were considered, the Corps cannot guarantee that these sites will be available over the 50-year project life. EPA will be consulted when new disposal areas are needed as described in Section 1.06. See also response to comment 3 by the South Carolina Department of Health and Environmental Control.

3. We concur that other disposal sites would be preferable to Site 101E. New sediment analyses and elutriate test results have been included in the Final EIS.

U. S. Department of Commerce

1. The impacts of oxygen demand, nutrients and resuspended chemical substances were discussed in Section 4.02.1.1 and mentioned in several other areas of the draft EIS. See also the addition to Section 4.02.1.1. Standard elutriate tests and sediment analyses were not available for the draft EIS but have been included in the Final EIS as Appendix B. The sediments are low in heavy metals, nutrients and organic pollutants; however, due to the low concentrations in water samples, certain nutrient levels from the elutriate tests exceeded the water levels by more than 1.5 times. This criterion for ocean dumping has, however, been deleted from the new EPA ocean dumping regulations.

2. EPA, S. C. Wildlife and Marine Resources Department and U. S. Fish and Wildlife Service were specifically mentioned because of the language in P.L.92-500 and P.L. 85-624. Other agencies having interest or jurisdiction which would be affected by any considered disposal area would also be routinely consulted.

Federal Highway Administration, USDT

No response required.

U. S. Department of Health, Education, and Welfare

No response required.

### Soil Conservation Service, USDA

1. As indicated in Section 1.05, the area most likely to receive dredged material is the presently used Area 100E, which is former marsh. Continued use of this area is the preferred disposal method based on environmental, engineering and economic concerns. If new disposal sites are required, agricultural lands and woodlands would be likely choices.
2. See addition to Section 4.06.1 and response 3 below.
3. Only material dredged from the inner channel would be deposited in presently used or alternate sites. As shown in Section 1.02, this would amount to roughly 55,000 C.Y. every five years, and would not require an area any larger than the presently used disposal Area 100E.

### Forest Service, USDA

As indicated in Section 1.06, agencies having interest or jurisdiction which would be affected by any considered disposal area would be consulted prior to approval of these areas for disposal of dredged material. The environmental impact associated with any contemplated disposal area would be considered prior to its approval.

### U. S. Department of Interior

1. Although the USDI has reviewed the draft EIS for the Port Royal Harbor Project, its comments indicate an apparent lack of appreciation of the present status of this project and the limitations thereby placed on the scope of the EIS. As is clearly stated in the draft EIS, the construction of the project was completed in 1959.

Construction was not preceded by an archeological survey so it is not known nor can it be determined if there were any archeological resources within the channel cross section dredged during construction. Whatever archeological resources that may have existed in the channel cross section were destroyed and/or removed during construction dredging. Since there has been no change in channel alignment, and none is anticipated, all material removed during maintenance dredging, past and future, would be recent sediments having no archeological or historical value.

The material dredged from the inner harbor during construction dredging and the two maintenance dredging operations was deposited in undiked disposal areas located in regularly flooded salt marsh (disposal areas 100E and 101E). These disposal areas were not surveyed for archeological resources prior to their use. Although it appears unlikely that these marshes contain significant archeological resources, it is now impractical to conduct an archeological survey

because of the accumulation of dredged materials. One of these areas (area 100E) is the disposal area proposed for continued use in the future maintenance dredging of the project.

Since all future work to be performed in the maintenance of this project would be performed in areas from which any possible archeological resources have either been removed during construction or covered with accumulations of dredged material during construction and maintenance dredging, there appears to be no need for archeological surveys of either the channel or the recommended disposal area (area 100E). However, should future maintenance be required in any channel segment not previously dredged or should it be necessary to use a new disposal area, archeological surveys would be conducted.

2. The USDI cites laws and regulations defining the Federal responsibility concerning archeological resources. Conspicuous by its absence from the Department's discussion is one of the more recent laws, Public Law 93-291, which was enacted by the Congress on 24 May 1974. This law was enacted after the regulations, executive order, and public laws cited by the USDI and contains mandatory provisions which appear to continue and expand the basic responsibility of the USDI for the survey and salvage of archeological resources.

The regulations, executive order, and public laws cited by the USDI state several broad goals, but do not provide specific steps for accomplishing all of these goals. The Advisory Council on Historic Preservation outlined steps by which a Federal agency might comply with the few specific requirements of these laws and regulations, and also accomplish the vaguer, broader goals. Many of these steps were not required by law, but were suggested by the Advisory Council to encourage Federal agencies to adopt uniform procedures for protecting cultural resources.

It is significant that the Department of the Interior comments cite a group of laws and regulations at the beginning of the letter, but fail to cite specific portions of laws when discussing the "three levels of treatment" which USDI claims are required by these laws. In fact, only the first of these levels, as described, is required by law. As described in USDI comments, levels two and three appear to be personal interpretations of the Advisory Council regulations. Various but differing interpretations have also been received from State agencies and citizen groups.

On 24 May 1974, four months after the 36 CFR 800 regulations were published, Congress passed Public Law 93-291. This law outlined in unusually clear and specific terms the steps to be followed to protect cultural resources. In agreement with earlier public laws and executive orders, but in contrast to the suggestions by the Advisory Council in 36 CFR 800, Public Law 93-291 clearly assigned the responsibilities to the Secretary of the Interior for initiating surveys (Section 4c) and coordinating actions among cognizant agencies and individuals (Section 5). In Sections 4 and 5, the law states

the responsibilities which "shall" be performed by the Secretary of the Interior. These include initiation of survey work and coordination efforts. The law does provide in Section 3a and 7a that Federal agencies constructing or licensing a project "may" assist the Secretary by assuming certain tasks related to cultural resources.

In response to the permissive provisions of Sections 3a and 7a, the Corps of Engineers has agreed to assume most of the responsibilities for cultural resources on civil works projects and general investigation studies which were delegated to the USDI by Public Law 93-291 and earlier legislation. This voluntary acceptance of responsibilities delegated to the USDI is in agreement with the broad sentiments expressed in the National Environmental Policy Act, Executive Order 11593, and the Historic Preservation Act of 1966, and is also responsive to suggestions of the Advisory Council pertaining to the adoption of internal procedures as outlined in 33 CFR 305.

As is stated previously, any mention of Public Law 93-291 in USDI's comments is conspicuously absent. The USDI's reliance on a suggested procedure by the Advisory Council and declination to acknowledge Public Law 93-291 is not a tenable position, especially when the latter is more recent, more specific and more authoritative. The USDI's expanded interpretation of 36 CFR 800 in the areas of "sites in the process of nomination to the National Register" and "unknown sites" as specific procedures whose performance is incumbent upon other agencies also appears unwarranted.

3. 33 CFR 305 required that the latest list of National Register sites be checked. This has been done for the Port Royal Harbor Project area.

4. 33 CFR 305 also required early consultation with the State Historic Preservation Officer, but like 36 CFR 800, this contact "at the earliest stages of the project" refers to new projects and project modifications. As the Port Royal Harbor Project was completed in 1959, laws and regulations adopted after this time clearly cannot be applied to the early stages. Neither 36 CFR 800 nor Executive Order 11593 grants special status to "sites in the process of nomination to the National Register"; however, procedures for handling sites "eligible for inclusion in the National Register" are outlined in 36 CFR 800 and 33 CFR 305.

5. Section 4 of Public Law 93-291 makes it incumbent upon the Secretary of the Interior to assure that surveys and studies are performed to identify unknown sites. In the Port Royal Harbor Project, the only inland area now being used for disposal or anticipated for use in the immediate future is former marsh which has already been covered with dredged material and four acres of marsh that will be included in the diking of this area. No archaeologists or historians will be hired or contracted by the Corps to study this disposal area or the

previously dredged portions of the channel. In the event that new disposal areas are needed, these areas will be investigated by the Corps for cultural resources, and the State Historic Preservation Officer will be contacted. The voluntary assumption of these duties from the Secretary of the Interior is in agreement with 33 CFR 305 and the earlier laws and regulations. See revision to Section 1.05.

6. See responses 2 and 5.

7. Surveys do not assure that no resources exist in an area, but indicate that reasonable steps were taken to identify such resources. Considering the location and previous use of the presently used disposal site as discussed in response number 1, no cultural resources can reasonably be expected in the site, and no surveys will be performed on this area. See responses 1 and 5 above regarding possible new disposal sites.

#### S. C. Department of Archives and History

1. At present only the Disposal Area 100E is being used for disposal of dredged material inside Port Royal Harbor. This site was formerly marsh and, as indicated in Plate 2, almost all of the site has been previously used for disposal. Procedures for identification of cultural resources prior to action by a Federal agency cannot be applied to this site which received dredged material prior to the adoption of cultural resource laws and regulations. The Charles Fort Monument would not be affected by continued use of this site. The likelihood that Stuart Town was located on regularly flooded marsh is sufficiently remote to preclude surveys in the presently used site.

2. Dredging in the inner harbor amounts to about 55,000 C.Y. at 5-year intervals. As indicated in Section 1.05 of the draft EIS, diking of Disposal Area 100E would provide sufficient capacity for the proposed project beyond 50 years. The easement for this area, which was obtained by the South Carolina State Ports Authority as local sponsor includes a 90-day cancellation clause. Should the owner elect to use the 90-day cancellation clause, the SPA would be responsible for acquiring a new disposal area. Prior to accepting an alternative disposal area, the Corps would consider the need for dredging and all environmental implications associated with use of the alternate disposal area. If warranted, the Corps would also contract for an archeological survey prior to accepting an alternate disposal area.

#### S. C. Department of Health and Environmental Control

1. It should be noted that not only did the 1972 S. C. Water Resources Commission study indicate that exposure of the aquifer in the project area was due primarily to natural geologic processes, but also that the main concern centered on channel deepening or

widening in areas where the aquifer might be further exposed (first paragraph page 99 and 104, Summary and Conclusions). Even if the initial dredging of the inner channel in 1964 was a contributing factor in exposing the aquifer, maintenance of the channel to the existing authorized depth should cause no disturbance of overlying "cap-rock" or further expose the aquifer, since the channel is maintained at depths shallower than the top of the aquifer.

2. Depending on specific circumstances, the open water disposal of dredged material can be economically practical and may have less adverse environmental impact than disposal on either wetlands or uplands. Both engineering practicality and the maintenance of environmental quality would be prominent in any possible future consideration of this alternative.

3. Although Disposal Areas 100E and 101E were formerly regularly flooded marshes, both areas have been altered substantially by their use as disposal areas. This is particularly true of the recommended disposal area (area 100E) which is described in Section 2.06.1. Diking this disposal area would involve the additional destruction of only about 4 acres of marsh which has already been altered substantially by changes in elevation, flushing capability, and species composition. This commitment of a small area of low quality marsh is considered preferable to the acquisition and use of a new disposal area.

4. The mention of water quality impacts in Section 7.02 due to effluent from upland disposal sites was a minor consideration which was included only for the sake of comparison of upland sites with other alternatives. Impacts due to effluent from upland sites would be no different than water quality impacts described for the presently used Area 100E. Because the dredged material is mostly sand and shell, turbidity is not a major problem. As shown in the Final EIS, the sediments are relatively clean. Some increase in dissolved nutrients might occur immediately adjacent to the spillway.

5. Transport of material onshore to beaches by the presently used hopper dredges is not feasible.

6. The estimated dredging requirement for dredging in the inner harbor is approximately 55,000 cubic yards at intervals of about 5 years. Since the shoal material is mostly sand and shell and is relatively clean, dredging should not have any significant adverse impacts on water quality. The SCDHEC will be provided advance notice of dredging operations.

7. The material dredged from the inner channel is sand and shell. This material does not form the deep cracks that clays and silts form upon drying. Further, the sandy materials drain rapidly and do not provide standing water as do clays and silts. Consequently, mosquitoes may not become a problem with disposal area 100E. However, if mosquitoes do breed in this disposal area, the S. C. State Ports Authority,

as sponsor of Federal harbor projects in South Carolina, can be expected to contribute to the local mosquito abatement program as it has done at other harbor projects.

8. See contradictory comment 2 by SCDHEC and response.

9. As indicated in response 7, no aggravation of local mosquito problems is anticipated. If written assurance from another State agency is required, it is suggested that this be obtained through State channels.

#### Beaufort County Joint Planning Commission

1. While it is noted that recreational or industrial benefits may accrue to the Port Royal area as a result of placement of dredged material, the Corps' primary interest in the disposal area 100E is its economic and engineering attractiveness due to its proximity to channel dredging, and the minimal impacts associated with placing material on a previously used site. Disposal sites near the shoaling areas but not in productive marsh areas are scarce and costly. Therefore, the Corps would like to fill disposal areas to capacity, rather than move to new sites when ground elevations make disposal sites attractive to other interests. After sites are filled to capacity, they will still have the same, perhaps greater, potential for recreation and other uses.

2. See response to S. C. Department of Health and Environmental Control comment 1.

3. See response to S. C. Department of Health and Environmental Control comment 7.

4. The possibility of using upland sites in general has been discussed in the EIS and also in response to EPA comment 2. Any use of inland swamp areas would have to be weighed against their value as woodlands and wildlife habitat and against the advantages of other alternatives. Natural sinks, however, if located reasonably close to dredged areas and isolated from fresh water aquifers, could possess economic and environmental advantages. The Corps is not aware of such sinks in the project area but would investigate their possible use as disposal sites if such sinks are located.

5. Wherever possible, the Corps seeks to turn the frequently adverse action of dredged material disposal into constructive uses. We, therefore, welcome input concerning local needs and coordination with local interests.

#### State of South Carolina Water Resources Commission

1. See response to comment 1 by the South Carolina Department of Health and Environmental Control.

2. Authorization for the present Port Royal Harbor channel was cited in Section 1.0 of the EIS. Alternatives which would enlarge the channel would require separate authorization, studies and a separate EIS. Such alternatives were, therefore, not included in the present EIS. The EIS discusses only the impacts of continued maintenance of the existing project. At present, most ships are light-loaded in Port Royal and moved to Savannah for filling due to the insufficient channel depths to fully utilize these ships in Port Royal. Reducing channel depths below 24 feet would, therefore, result in a further reduction in the harbor's capacity. This change must be considered a major alteration in the stated purpose of the channel as authorized, and is not an alternative for maintenance of the existing project as covered by this EIS.

3. The statement that "no action" would result in shoals and restrict ships now using the harbor is not an allegation but an observable fact; if this were not so, there would be no requirement for maintenance dredging. The draft EIS described the type of cargo and tonnage now being shipped through Port Royal Harbor in Section 2.08.4. This section has been expanded in the final EIS. Economic benefits were described in Section 2.08.4, 4.14, and 4.14.1 of the draft EIS. The existing project is a 24-foot channel, rather than a 27-foot channel, as this is the controlling depth in Beaufort River and Battery Creek. As with most coastal navigation projects, additional depth is provided in the ocean to allow for swells.

4. As explained in Section 1.06 of the draft EIS, new disposal areas, regardless of elevation, would be selected by the State Ports Authority.

5. See revisions to Plate 1 for the location of shoal areas. As indicated in Section 1.02 of the draft EIS, no part of this area has a high shoaling rate. The exact locations of the proposed disposal areas were shown in Plate 2 of the draft EIS. The life expectancies of the disposal areas were given in Sections 1.05 and 6.01.4 of the draft EIS.

6. The most readily applicable method for increasing the useful life of disposal areas in Port Royal Harbor is removal of the sand and shell for fill or construction. See also comments by the Beaufort County Joint Planning Commission.

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## GLOSSARY

algae - any of a group of chiefly marine or freshwater aquatic plants with no true leaves, stems, or roots ranging in size from microscopic single-cell organisms or colonies to large macroscopic seaweeds.

Amphipoda - large order of malacostracan Crustacea; includes the side-swimmers, sand hoppers, etc.; body compressed; first thoracic segment fused with head; no true carapace; mostly scavengers; most spp. marine, burrowing or moving about on the bottom and debris.

anaerobic - refers to life or processes that occur in the absence of oxygen.

Annelida - phylum consisting of elongated, segmented worms; includes earthworms, leeches, and many kinds of marine forms.

aquifer - an underground bed or stratum of earth, gravel or porous stone that contains water.

Arthropoda - largest phylum; characterized by a segmented body, segmented appendages, chitinous exoskeleton, and an extensive hemocoel; includes crustaceans, insects, spiders and their relatives, centipedes, millipedes, etc.; in all types of habitats.

association - in an ecological sense, a subunit of community organization identified by its major organisms.

benthic region - the bottom of a body of water. This region supports the benthos, a type of life that not only lives upon, but contributes to the character of the bottom.

benthos - the plant and animal life whose habitat is the bottom of a sea, lake, or river.

biota - all the species of plants and animals occurring within a certain area.

biotic - of/life.

bivalve - any member of the molluscan Class Pelecypoda. Having a shell of two parts which are joined by hinge, as in pelecypods.

bloom - to flower; of algae, to appear or occur suddenly or in large quantity or degree.

Bryozoa - ectoprocta; phylum which includes the "moss animalcules"; small tufted or branched marine and freshwater organisms a few mm. high; attached to substrates.

canopy - topmost layer of leaves, twigs, and branches of forest trees, or other woody plants.

## GLOSSARY (Cont'd)

- carnivore** - a flesh eater. The highest trohic level(s) at the top of most food chains.
- coliform organism** - any of a number of organisms common to the intestinal tract of man and animals whose presence in waste water is an indicator of pollution and of potentially dangerous bacterial contamination.
- colonize** - to establish a colony in or on.
- community** - collectively, all of the organisms inhabiting a common environment and interacting with each other.
- detritus** - in the ecological sense, any fine particulate debris of organic or inorganic origin.
- diatom** - a unicellular form of algae with walls impregnated with silica.
- dissolved oxygen** - the oxygen dissolved in water or sewage. Adequate dissolved oxygen is necessary for the life of fish and other aquatic organisms and for the prevention of offensive odors. Low dissolved oxygen concentrations generally are due to discharge of excessive organic solids having high BOD, the result of inadequate waste treatment.
- diurnal** - activity by daylight; opposite of nocturnal. Occuring every day.
- diversity** - refers to the number of different kinds of species in an area.
- dominant** - a species or group of species which largely control the energy flow and strongly affect the environment within a community or association.
- ecotone** - transition or interdigitated area between two adjacent communities, as the merging zone or adjacent forest and grassland.
- environment** - sum of all physical, chemical, and biological factors to which an organism is subjected. One of the major habitat types, such as: marine, terrestrial, rain forest, desert, lake, etc.
- epifauna** - that fauna growing on or attached to the bottom of standing or flowing water
- erosion** - the process of wearing away by the action of water, wind, or glacial ice.
- estuary** - area where the fresh water meets salt water. For example, bays, mouths of rivers, salt marshes and lagoons. Estuaries are delicate ecosystems; they serve as nurseries, spawning and feeding grounds for a large group of marine life and provide shelter and food for birds and wildlife.

## GLOSSARY (Cont'd)

fauna - collectively, the animal life of any particular area or of any particular past time. A list of animal species and descriptions for a particular area or time.

filter feeder - any animal that obtains its food (usually small particles) by filtering it from water; e. g. Daphnia, clams, and tunicates.

flora - the plants peculiar to a country, area, specified environment, or period.

Foraminifera - one of the orders of the Class Sarcodina; main bulk of the cell is enclosed within a simple or chambered and/or coiled shell or test composed of secreted calcium carbonate (usually), silicon dioxide, or bits of foreign material cemented together with an organic secretion.

formation - any sedimentary bed or consecutive series of beds sufficiently homogeneous or distinctive to be a unit.

fossiliferous - containing fossils.

habitat - the specific place where a particular plant or animal lives; usually used in a much more restricted sense than environment, and refers to a smaller area; e. g. spring brook, treetop, weedy pond, and sandy beach.

halocline - boundary between water layers of differing salinities.

hyroperiod - rainy season.

in situ - in place.

infauna - fauna consisting of burrowers in the bottom deposits.

intertidal zone - that portion of the sea bottom between high and low tide lines; depending on tidal amplitude and slope of the bottom, the intertidal zone may be narrow or very wide.

invertebrate - collectively, all animals without a vertebral column.

Isopoda - order of malacostracan Crustacea; includes pill bugs, sow bugs, and wood lice; body depressed; first thoracic segment fused with head; abdomen short, some or all segments fused; 3100 spp.; in bottom debris of slat and fresh waters.

larva - general term for any independent, active, immature stage of an animal which is morphologically quite unlike the adult; by a complicated metamorphosis in most cases.

littoral - that shallow portion of the bottom extending from the shoreline to a depth of 200 m.; the term is also used to include both the bottom and the water above the bottom at the depths indicated.

## GLOSSARY (Cont'd)

- microscopic - Indistinguishable without the use of a microscope.
- Mollusca - Mollusk; any member of the Phylum Mollusca; including soft-bodied animals usually partly or wholly enclosed within a calcium carbonate shell and having a muscular "foot" for locomotion.
- nekton - collectively, the macroscopic animals suspended in the water of ponds, lakes, rivers, and seas; they move about independently of currents and include such forms as fishes and whales.
- Nematoda - Phylum which includes all the true roundworms; body slender, cylindrical, often tapered near ends, and covered with a cuticle; 100 microns to 1 m. long; marine, freshwater, terrestrial, and parasites of plants and animals.
- nursery area - an area where animals congregate for giving birth or where the early life history stages develop. e. g. estuaries for shrimp.
- pelagic - of or pertaining to the open waters of the sea and lakes, especially where the water is more than 20 m. deep.
- photic zone - the region of aquatic environments in which the intensity of light is sufficient for photosynthesis.
- photosynthesis - synthesis of carbohydrates from carbon dioxide and water with chlorophyll as a mediator using light as energy with oxygen as a by-product.
- physiography - a description of nature or natural phenomena in general.
- phytoplankton - small, mostly microscopic, plants floating in the water column.
- pioneer - any early occupant of an open or disturbed area of ground.
- plankton - collectively, all those organisms suspended in the water of an aquatic habitat which are not independent of currents and other water movements; most such organisms are microscopic and commonly include bacteria, algae, protozoans, rotifers, larvae, and small crustaceans.
- population - a group of organisms of the same species.
- producer - any organisms able to synthesize organic compounds from simple inorganic substances, e. g. green plants.
- productivity - the rate at which energy is stored by anabolic processes in organisms.
- Protista - acellular organisms having a nucleus, chromosomes and mitotic cell division (e.g., protozoans, most algae, slime molds and fungi).

## GLOSSARY (Cont'd)

rhizome - a thick horizontal stem partly along and partly under ground, sending out shoots above and roots below.

sedentary - sessile; permanently attached to a substrate, such as a barnacle or sponge.

sere - series of communities which follow one another in slow but definite sequence, ending in a climax typical of a particular climate and geographic area; such series may be completed in a hundred years or up to thousands of years.

sessile - attached to a substrate; not motile. Without a stalk.

substratum - the ground or any other solid object to which an animal may be attached, on which it moves about, or with which it is otherwise associated.

succession - the replacement of one community by another; the definition includes the (controversial or hypothetical) possibility of "retrograde" succession.

terrace - a raised embankment with the top leveled. A level ordinarily narrow plain usually with steep front bordering a river, lake, or sea.

Tunicata - subphylum in the Phylum Chordata; includes the tunicates, ascidians, salps, and sea squirts; highly modified marine chordates having a more or less cylindrical or globular shape; body wall covered with a secreted cuticular tunic; sessile, free-swimming, or suspended at surface; solitary or colonial.

turbidity - condition of water resulting from suspended matter; water is turbid when its load of suspended material is conspicuous.

vascular - consisting of or containing vessels adapted for transmission or circulation of fluid.

wrack - marine vegetation, dried seaweeds.

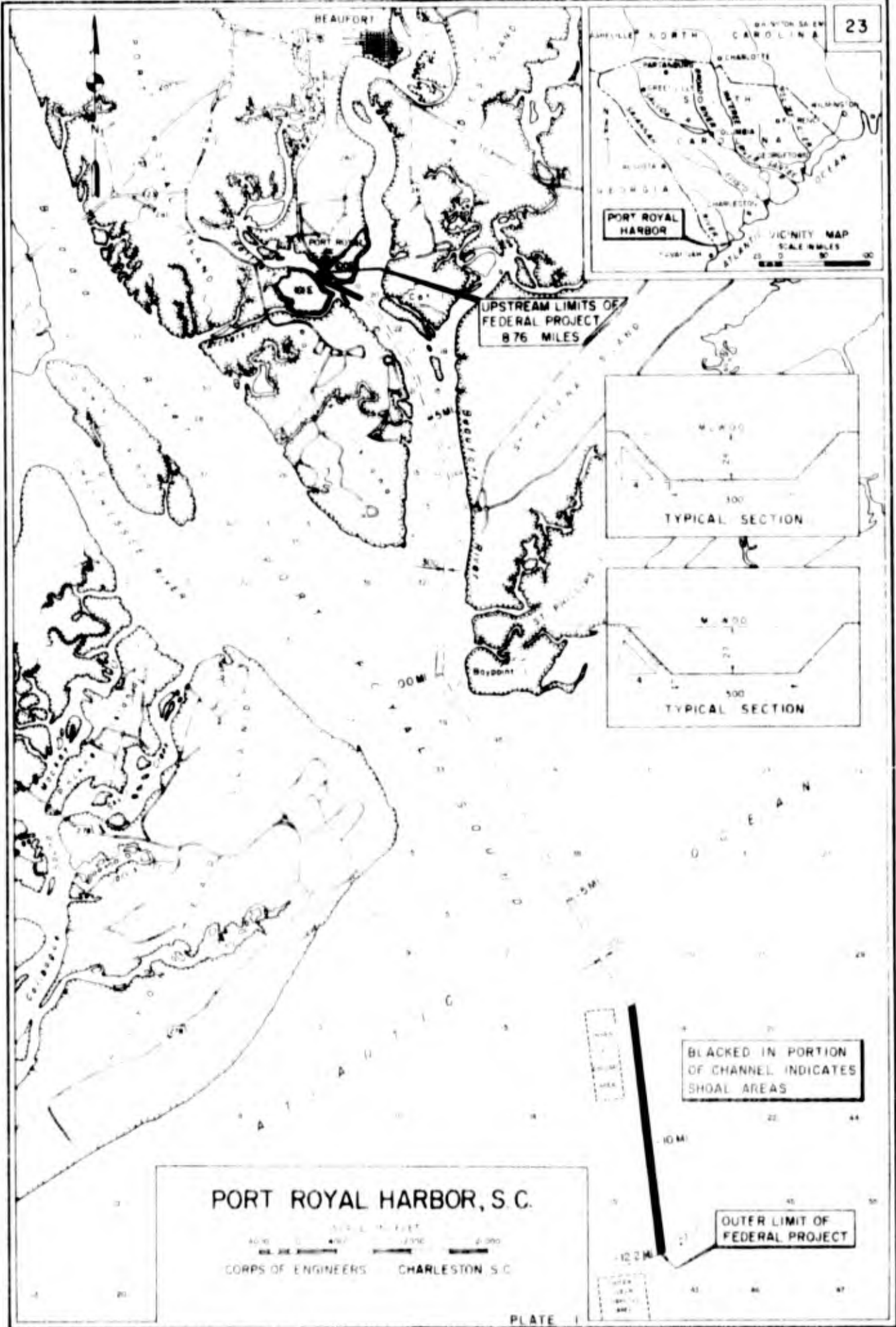




Plate 3A



A typical beach and dune community in the Port Royal project area

Plate 3B



A view of the tidal creek and low marsh in the foreground, a salt flat to the left, a high marsh at the right, and an oak-pine forest in the background

Plate 4A



A high marsh community in the foreground, low marsh in the center, and oak-pine forest in the background

Plate 4B



A low marsh is shown on the left, a high marsh along road embankments, and salt flat, high marsh, and oak-pine forest on the right.

TABLE 1. - The number of species of benthic invertebrates collected from several bottom types (Port Royal Sound Environmental Study 1972).

Organisms	Silt, Clay Sand	Coarse Sand	Medium to Fine Sand	Sand and Shell	Sand, Shell and Silt or Clay	Clay with Silt, Sand and Detritus	Clay and Shell	Silt and Sand
<b>MOLLUSCA</b>								
Pelecypoda	12	5	2	5	5	3	5	8
Gastropoda	10	5	2	5	6	5	8	12
<b>ARTHROPODA</b>								
Amphipoda	7	6	4	7	5	5	4	7
Caprelliidea	1	1	-	1	1	1	-	1
Stomatopoda	1	-	-	-	-	-	-	-
Mysidacea	-	-	1	-	-	-	-	-
Cumacea	2	1	-	1	1	1	-	1
Thoracica	-	-	-	1	-	-	-	-
Decapoda	5	6	1	4	6	1	1	10
Isopoda	2	1	-	3	1	1	2	1
Pycnogonida	1	-	-	-	-	-	-	-
<b>COELENTERATA</b>								
Anthozoa	2	1	-	1	1	1	-	2
<b>ECHINODERMATA</b>								
Ophiuroidea	4	2	-	2	2	2	1	2
<b>PLATYHELMINTHES</b>								
<b>NEMERTEA and ANNELIDA</b>								
Nemertea	1	1	-	1	1	1	1	1
<b>POLYCHAETA</b>								
Polychaeta	1	1	1	1	1	1	1	1
Sipunculoidea	-	-	-	-	1	-	-	1
<b>Total</b>	<b>49</b>	<b>30</b>	<b>13</b>	<b>32</b>	<b>31</b>	<b>22</b>	<b>26</b>	<b>47</b>

TABLE 2  
COMMERCIAL FISHERY LANDINGS, SOUTHERN DISTRICT, 1/ SOUTH CAROLINA

SPECIES	1974		1973		1972		1971		1970	
	Pounds	Dollars	Pounds	Dollars	Pounds	Dollars	Pounds	Dollars	Pounds	Dollars
Finfish										
Croaker, unclassified	525	59	550	75	-	264	450	45	-	68
Drum, Red (Redfish)	100	25	620	155	840	264	150	30	400	472
Flounders, unclassified	7,813	1,935	21,711	4,890	12,789	2,644	11,667	2,016	2,975	-
Groupers	500	250	-	-	-	-	650	94	-	-
Mickory shad	-	-	-	-	213	53	-	-	-	-
King whiting or "kingfish"	22,926	3,908	55,858	9,257	43,217	5,717	39,335	4,060	12,300	1,411
Mullet	-	-	-	-	84	16	200	16	-	-
Pompano	-	-	396	148	200	42	175	400	-	-
Sea bass, unclassified	-	-	1,107	552	5,240	2,578	23,155	6,245	1,933	371
Seatrout, gray	-	-	50	10	-	-	-	-	265	32
Seatrout, spotted	300	105	1,813	678	4,564	1,478	1,725	498	640	137
Shad	-	-	-	-	18,410	4,075	-	-	-	-
Sharks	-	-	515	68	-	-	-	-	-	-
Sheepshead, saltwater	100	125	350	53	460	76	490	45	-	-
Spanish mackerel	-	-	300	55	1,885	254	400	58	350	58
Snapper, Red	1,500	650	-	-	-	-	-	-	-	-
Spot	2,587	303	9,460	1,190	5,271	563	4,200	408	250	25
Total Finfish	37,058	8,371	92,730	17,131	93,173	17,760	82,597	13,563	19,113	2,574
Shellfish										
Crabs, Blue, hard	5,949,324	751,758	5,451,400	710,563	5,895,720	608,547	6,278,767	509,176	6,007,379	390,767
Shrimp, saltwater (heads-on)	2,255,034	1,653,107	2,846,792	3,073,750	2,628,371	1,891,466	3,927,655	2,502,616	1,632,704	942,782
Clams, Hard (meats)	7,695	6,285	48,089	23,426	17,010	7,562	144,518	65,378	11,462	5,275
Oysters (meats)	665,626	398,414	577,433	344,749	590,972	343,328	678,085	395,642	556,646	334,087
Squid	956	147	741	87	-	-	-	-	-	-
Total Shellfish	8,878,639	2,809,711	8,924,455	4,152,575	9,132,073	2,850,903	11,029,025	3,472,812	8,208,191	1,672,911
Grand Total	8,315,697	2,818,082	9,017,185	4,169,706	9,225,246	2,868,663	11,111,622	3,486,375	8,227,304	1,675,485

1/ Beaufort and Colleton County

Table 3. Work Force Estimates, Beaufort County, South Carolina, 1974

Item	
Civilian work force	17,230
Unemployment	920
Percent of work force	5.3
Employment	16,310
Manufacturing	1,250
Contract construction	1,590
Transportation, communication and utilities	490
Wholesale and retail trade	2,190
Finance, insurance, real estate	• 2,070
Service	2,550
Government	3,640
Other non-manufacturing	90

Source: South Carolina Employment Security Commission, South Carolina's Manpower in Industry, Research and Statistics Section, Columbia, July 1975.

Table 4. Estimated Magnitude of Major Components of the Economic Base of Beaufort County, South Carolina, 1970 (Reference 10)

Direct Expenditures Activity	(External Sales)	Total Sales	% of Estimated Gross Sales
Military	\$84,661,000	\$187,700,000	46
Tourism and Recreation	11,950,000	25,844,000	6
Agriculture, Forestry and Fisheries	7,333,000	19,467,000	5
Manufacturing	5,345,000	12,961,000	3
Totals	109,289,000	245,972,000	60

APPENDIX A  
LIST OF COMMON AND SCIENTIFIC  
NAMES OF PLANTS AND ANIMALS  
MENTIONED IN THIS STATEMENT

PLANTS

Common Name

Scientific Name

Smooth cordgrass	<i>Spartina alterniflora</i>
Sea oats	<i>Uniola paniculata</i>
Sandspurs	<i>Cenchrus longispinus</i>
Seaside spurge	<i>Euphorbia</i> spp.
Croton	<i>Croton punctatus</i>
Bitter panic grass	<i>Panicum amarum</i>
Yucca	<i>Yucca</i> spp.
Ground cherry	<i>Physalis viscosa</i>
Salt meadow cordgrass	<i>Spartina patens</i>
Golden aster	<i>Heterotheca graminifolia</i>
Rabbit tobacco	<i>Gnaphalium obtusifolium</i>
Catbriers	<i>Smilax</i> spp.
Yaupon	<i>Ilex vomitoria</i>
Russian thistle	<i>Salsola Kali</i>
Wax myrtle	<i>Myrica cerifera</i>
Seabeach orach	<i>Atriplex arenaria</i>
Sea blite	<i>Suaeda linearis</i>
Sedge	<i>Cyperus</i> spp.
Pennywort	<i>Hydrocotyle</i> spp.
Marsh elder	<i>Iva frutescens</i>
Sea rocket	<i>Cakile harperi</i>
Live oak	<i>Quercus virginiana</i>
Cabbage palm	<i>Sabal palmetto</i>
Buckthorn	<i>Bumelia tenax</i>
Red cedar	<i>Juniperus virginiana</i>
Silverling	<i>Baccharis halimifolia</i>
Pepper-vine	<i>Ampelopsis arborea</i>
Glasswort	<i>Salicornia</i> spp.
Black needlerush	<i>Juncus roemarianus</i>
Sea ox-eye	<i>Borrchia frutescens</i>
Dog fennel	<i>Eupatorium capillifolium</i>
Salt marsh aster	<i>Astor tenuifolius</i>
Dropseed	<i>Sporobolus virginicus</i>
Salt marsh fimbristylis	<i>Fimbristylis spadicea</i>
Salt grass	<i>Distichlis spicata</i>
Broomsedge	<i>Andropogon virginicus</i>
Loblolly pine	<i>Pinus taeda</i>
Longleaf pine	<i>Pinus palustris</i>
Slash pine	<i>Pinus elliotii</i>
Partridge berry	<i>Mitchella repens</i>
Spanish moss	<i>Tillandsia useneoides</i>
Resurrection fern	<i>Polypodium polypodioides</i>

PLANTS (Cont'd)Common NameScientific Name

Devil's walking stick	Aralia spinosa
Chinese tallow tree	Sapium sebiferum
Sassafras	Sassafras albidum
Wild blackberry	Prunus serotina
Hackberry	Celtis laevigata
Winged sumac	Rhus copallina
Red buckeye	Aesculus pavia
Carolina laurel cherry	Prunus caroliniana
Wild olive	Osmanthus americana
Coral bean	Erythrina herbacea
Spanish bayonet	Yucca aloifolia
Magnolia	Magnolia grandiflora
Water oak	Quercus nigra
Laurel oak	Quercus laurifolia
Sweetgum	Liquidambar styraciflua
Persimmon	Diospyros virginiana
Sparkleberry	Vaccinium arboreum
American beauty berry	Callicarpa americana
Muscadine grape	Vitis rotundifolia
Crabgrass	Digitaria spp.
Bermuda grass	Cynodon dactylon
Goosegrass	Eleusine indica
Boerhaavia	Boerhaavia erecta
Cocklebur	Xanthium strumarium
Fumitory	Fumaria officinalis
Peppergrass	Lepidium spp.
Shepherd's purse	Capsella bursa-pastoris
Cleome	Cleome gynandra
Corydalis	Corydalis micrantha
Water starwort	Callitriche peploides
Morning glory	Ipomoea quamoclit
Dewberry	Rubus spp.
Goldenrod	Salidago spp.
Beardgrass	Erianthus spp.
Dwarf dandelion	Krigia spp.
Toad flax	Linaria canadensis
Tamarisk	Tamarix gallica
Centepede grass	Eremochloa opiuroides
Sneezeweed	Helenium amarum
Fingergrass	Chloris petraea
Waxweed	Cuphea carthagensis
Plantain	Plantago lanceolata
False dandelion	Pyrrhopappus carolinianus
Buttonweed	Diodia teres
Hercules'-club	Zanthoxylum clava-herculis

## MAMMALS

### Common Name

Opossum  
Big brown bat  
Evening bat  
Mink  
Raccoon  
River otter  
Bobcat  
Gray squirrel  
Atlantic bottlenosed  
dolphin  
Flying squirrel  
Beach mouse  
Cotton mouse  
Woodrat  
Rice rat  
Norway rat  
Black rat  
House mouse  
Cotton rat  
Marsh rabbit  
White-tailed deer  
Feral hog

### Scientific Name

*Didelphis virginiana*  
*Eptesicus fuscus*  
*Nyctceius humeralis*  
*Mustela vison*  
*Procyon lotor*  
*Lutra canadensis*  
*Lynx rufus*  
*Sciurus carolinensis*  
  
*Tursiops truncatus*  
*Glaucomys volans*  
*Peromyscus polionotus*  
*Peromyscus gossypinus*  
*Neotoma floridana*  
*Oryzomys palustris*  
*Rattus norvegicum*  
*Rattus rattus*  
*Mus musculus*  
*Sigmodon hispidus*  
*Sylvilagus palustris*  
*Odocoileus virginianus*  
*Sus scrofa*

## BIRDS

Brown pelican  
Double-crested cormorant  
Red-breasted merganser  
Marsh hawk  
Southern bald eagle  
Osprey  
Peregrine falcon  
Wild turkey  
Wood ibis  
Eastern pigeon hawk  
Clapper rail  
Common nighthawk  
Red-cockaded woodpecker  
Blue jay  
Red-winged blackbird  
Common grackle  
Boat-tailed grackle  
Bachman's warbler  
Kirtland's warbler  
Eskimo curlew  
Herring gull  
Laughing gull  
Ring-billed gull  
Black skimmer  
Robin

*Pelecanus occidentalis*  
*Phalacrocorax auritus*  
*Mergus serrator*  
*Circus cyaneus*  
*Haliaeetus leucocephalus*  
*Pandion haliaetus*  
*Falco peregrinus*  
*Meleagris gallopavo*  
*Mycteris americana*  
*Falco c. columbarius*  
*Rallus longirostris*  
*Chordeiles minor*  
*Dendrocopus borealis*  
*Cyanocitta cristata*  
*Agelaius phoeniceus*  
*Quiscalus quisqualis*  
*Cassidix mexicanus*  
*Vermivora bachmanii*  
*Dendroica kirtlandii*  
*Numenius borealis*  
*Larus argentatus*  
*Larus atricilla*  
*Larus delawarensis*  
*Rynchops nigra*  
*Turdus migratorius*

## REPTILES AND AMPHIBIANS

### Common Name

Alligator  
Green turtle  
Loggerhead turtle  
Diamondback terrapin  
Green anole  
Eastern glass lizard  
Rough green snake  
Southern toad

### Scientific Name

*Alligator mississippiensis*  
*Chelonia mydas*  
*Caretta caretta*  
*Malaclemys terrapin*  
*Anolis carolinensis*  
*Ophisaurus ventralis*  
*Opheodrays aestivus*  
*Bufo terrestris*

## FISH

Lemon shark  
Shortnose sturgeon  
Ladyfish  
Southern stingray  
American eel  
Atlantic thread herring  
Bay anchovy  
Sea catfish  
Atlantic silverside  
Bluefish  
Crevalle jack  
Gray snapper  
Pigfish  
Sheepshead  
Pinfish  
Silver perch  
Spotted seatrout  
Weakfish  
Spot  
Atlantic croaker  
Black drum  
Red drum  
Atlantic spadefish  
Striped mullet  
Great barracuda  
Spanish mackerel  
Gulf flounder  
Southern flounder  
Summer flounder

*Negaprion brevirostris*  
*Acipenser brevirostrum*  
*Elops saurus*  
*Dasyatis americana*  
*Anguilla rostrata*  
*Opisthonema oglinum*  
*Anchoa mitchilli*  
*Arius felis*  
*Menidia menidia*  
*Pomatomus saltatrix*  
*Caranx hippos*  
*Lutjanus griseus*  
*Orthopristis chrysoptera*  
*Archosargus probatocephalus*  
*Lagodon rhomboides*  
*Bairdiella chrysura*  
*Cynoscion nebulosus*  
*Cynoscion regalis*  
*Leiostomus xanthurus*  
*Micropogon undulatus*  
*Pogonias cromis*  
*Sciaenops ocellata*  
*Chaetodipterus faber*  
*Mugil cephalus*  
*Sphyraena barracuda*  
*Scomberomorus maculatus*  
*Paralichthys albigutta*  
*Paralichthys lethostigma*  
*Paralichthys dentatus*

## INVERTEBRATES

Blue crab  
Brown shrimp  
White shrimp  
Ghost crab  
Sand flea  
Wedge shell  
Oyster

*Callinectes sapidus*  
*Penaeus aztecus*  
*Penaeus setiferus*  
*Ocypode quadratus*  
*Emerita talpoida*  
*Donax spp.*  
*Crassostrea virginica*

**APPENDIX B**  
**Standard Elutriate Tests**  
**and Sediment Analysis**

U. S. ARMY ENGINEER DIVISION LABORATORY, SOUTH ATLANTIC CORPS OF ENGINEERS MARIETTA, GEORGIA	DISTRICT	
	Charleston	
	PROJECT	
	Port Royal Harbor	
	CONTRACT NO.	
	--	
GENERAL TEST REPORT ( STANDARD ELUTRIATE TEST )	DATE REPORTED	
	30 March 1976	
	WORK ORDER NO.	
	9717	
DESCRIPTION	REQN. NO.	
Sediment and Water	SACEC-76-34	
SOURCE	BASE UNIT COST	
Port Royal Harbor	--	
FOR USE AS:	DATE SAMPLE RECEIVED	
	3-4-76	
TESTED FOR:	LAB NO.	
Chemical Analysis (see below)	See below	
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <input style="width: 30px; height: 20px; margin: 0 5px;" type="checkbox"/> <b>MEETS</b>  <b>SPECIFICATIONS</b> </div> <div style="text-align: center;"> <input style="width: 30px; height: 20px; margin: 0 5px;" type="checkbox"/> <b>FAILS</b>  <b>SPECIFICATIONS (See below)</b> </div> </div>		
Lab. No. Field Sample No. Total Organic Carbon mg/l Nitrogen, Ammonia     " Nitrogen, Kjeldahl    " Oil and Grease         " Total Phosphorus as P  " Ortho Phosphorus as P  " Lead                    ug/l Zinc                    " Mercury                 " Iron                    " Cadmium                " Arsenic                 " Chromium               " Nickel                  " Copper                  " Beryllium               " Selenium                "	3E-440  17 0.08 0.26 2.6 0.040 0.031 6.5 46 < 0.5 12.5 2.0 < 5.0 < 6.0 7.0 3.2 < 0.2 < 5.0	3E-441  PRE-1  15 0.52* 2.20* 3.2 0.079* 0.031 5.0 45 < 0.5 27.5 * 1.0 < 5.0 < 6.0 3.5 3.7 < 0.2 < 5.0
REMARKS: <div style="text-align: center; margin-top: 10px;">           * Exceeds the receiving water value by more than 1.5 times.         </div>		
REPORTED BY: <input type="checkbox"/> PHONE <input type="checkbox"/> WIRE  DATE _____	TESTED BY <div style="text-align: center;">JL, JN</div>	CHECKED BY <div style="text-align: center;">DW</div>
SAMPLED BY _____		

U. S. ARMY ENGINEER DIVISION LABORATORY, SOUTH ATLANTIC CORPS OF ENGINEERS MARIETTA, GEORGIA	DISTRICT Charleston
	PROJECT Port Royal Harbor
	CONTRACT NO. ---

GENERAL TEST REPORT ( SEDIMENT )	DATE REPORTED 30 March 1976
	WORK ORDER NO. 9717

DESCRIPTION Sediment Samples	REQM. NO. SACEC-76-34
---------------------------------	--------------------------

SOURCE Shoal near Bouy #42	BASE UNIT COST --
-------------------------------	----------------------

FOR USE AS:	DATE SAMPLE RECEIVED 3-4-76
-------------	--------------------------------

TESTED FOR: Chemical Analysis (see below)	LAB NO. 3S-441
--	-------------------

MEETS SPECIFICATIONS
  FAILS SPECIFICATIONS (See below)

Percent by Weight (Dry Basis)

Field Sample No.	PRE-1
Volatile Solids (Max 6.0)	3.51
T.V.S. Formula EC	3.74
Total Organic Carbon	0.92
C.O.D., (Max 5.0)	2.47
Nitrogen, Kjeldahl (Max 0.10)	0.093
Oil and Grease (Max 0.15)	0.09
Lead (Max 0.005)	0.0010
Zinc (Max 0.005)	0.0016
Mercury (Max 0.0001)	< 0.00002
Total Phosphorus as PO <sub>4</sub>	0.271
Iron	0.10
Cadmium	0.00022
Arsenic	0.00010
Chromium	0.0068
Nickel	0.0013
Copper	0.00052
Beryllium	0.00008
Selenium	< 0.00001
Vanadium	0.0022

REMARKS:  
The maximum requirements, shown in parentheses above, were specified in EC 1165-2-116, 14 August 1972. It is our understanding this EC expired 31 December 1972 and was not renewed.

REPORTED BY: <input type="checkbox"/> PHONE <input type="checkbox"/> WIRE	TESTED BY JL, JN	CHECKED BY DW
DATE _____	SAMPLED BY _____	

APPENDIX C  
Letters of Comment

APPENDIX C

Letters of Comment

Page No.

Government Agencies

U. S. Environmental Protection Agency	C-1
U. S. Department of Commerce	C-2
Federal Highway Administration, USDT	C-4
U. S. Department of Health, Education, and Welfare	C-5
Soil Conservation Service, USDA	C-6
Forest Service, USDA	C-7
U. S. Department of Interior	C-8
S. C. Department of Archives and History	C-11
S. C. Department of Health and Environmental Control	C-12
Beaufort County Joint Planning Commission	C-15
S. C. Water Resources Commission	C-17



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION IV

1421 PEACHTREE ST., N. E.  
ATLANTA, GEORGIA 30309

May 26, 1976

Colonel Harry S. Wilson, Jr., USA  
District Engineer  
Charleston District, Corps of Engineers  
P. O. Box 919  
Charleston, South Carolina 29402

Dear Colonel Wilson:

We have reviewed the Draft Environmental Impact Statement for maintenance dredging of Port Royal Harbor in Beaufort County, South Carolina, and believe a few additions could be made to clarify some points.

Although it is stated that disposal will be made to Site 100E, which will be divided into three diked areas, the locations of the effluent outfalls are not indicated. We believe they should either be located on Battery Creek or the Beaufort River to present siltation of the adjacent marsh areas. ①

Some upland areas exist within 10,000 feet of the shoals on the east side of the Beaufort River on Ladies and St. Helena Islands and they should probably be used when the present Site 100E has been completely filled. We, therefore, recommend that the effluent outfalls be shown, and that upland sites on Ladies and St. Helena Islands be used when present Site 100E is exhausted. ②

We are not in favor of disposal on Site 101E because considerable valuable marsh would be destroyed by this proposal. In addition, no chemical data are presented on the dredged material to be placed in the proposed offshore disposal sites. Such sites should not be used for material which does not meet the elutriate guidelines. ③

We, therefore, have rated LO (lack of objection) to the proposed action and 2 (insufficient information) to the Impact Statement.

Please supply us with five copies of the final statement, and if we can be of further assistance in any way, please let us know.

Sincerely yours,

*John E. Hagan III*  
John E. Hagan, III  
Chief, EIS Branch



**UNITED STATES DEPARTMENT OF COMMERCE**  
**The Assistant Secretary for Science and Technology**  
Washington, D.C. 20230

June 1, 1976

Colonel Harry S. Wilson, Jr.  
Charleston District, Corps of Engineers  
Department of the Army  
Post Office Box 919  
Charleston, South Carolina 29402

Dear Colonel Wilson:

The draft environmental impact statement for "Maintenance Dredging of Port Royal Harbor, Beaufort County, South Carolina," which accompanied your letter of April 12, 1976, has been received by the Department of Commerce for review and comment. The statement has been reviewed and the following comments are offered for your consideration.

General Comment

The draft environmental impact statement does not address the possible effects of dredging on chemical parameters such as Chemical Oxygen Demand (C.O.D.), Total Kjeldahl Nitrogen (T.K.N.), volatile solids, oil and grease, and concentrations of mercury, lead, cadmium, arsenic and other heavy metals in the water and bottom sediments. It would be helpful if the final environmental impact statement includes results of chemical analyses of water and bottom surface samples. ①

Specific Comments

1.0 Project Description

Page 2, paragraph 1.06 - The National Marine Fisheries Service should be included specifically as one of the agencies with which the selection of new disposal areas should be coordinated. ②



2.

Thank you for giving us an opportunity to provide these comments which we hope will be of assistance to you. We would appreciate receiving eight copies of the final statement. We also request one copy of the final statement be sent to Area Supervisor, Environmental Assessment Division, National Marine Fisheries Service Center, Post Office Box 570, Beaufort, North Carolina 28516.

Sincerely,

*( Sidney R. Galler*  
Sidney R. Galler  
Deputy Assistant Secretary  
for Environmental Affairs



**U.S. DEPARTMENT OF TRANSPORTATION  
FEDERAL HIGHWAY ADMINISTRATION  
2001 Assembly Street, Suite 203  
Columbia, South Carolina 29201**

April 16, 1976

Department of the Army  
Charleston District, Corps  
of Engineers  
Post Office Box 919  
Charleston, South Carolina 29402

Dear Sir:

Reference is made to your letter dated April 12, 1976 transmitting two copies of the draft environmental impact statement for maintenance dredging of Port Royal Harbor, Beaufort County, South Carolina.

We have reviewed the statement, and no conflicts within FHWA mission areas were noted.

Sincerely yours,

*W. H. Rice, Jr.*

W. H. Rice, Jr.  
District Engineer

For B. G. Cloyd  
Division Administrator



DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE  
REGION IV  
50 7TH STREET N.E.  
ATLANTA, GEORGIA 30323  
May 18, 1976

OFFICE OF THE  
REGIONAL DIRECTOR

HEW-654-4-76

Harry S. Wilson, Jr.  
Colonel, Corps of Engineers  
District Engineer  
Department of the Army  
Charleston District Corps of Engineers  
P.O. Box 919  
Charleston, South Carolina 29402

Subject: Maintenance Dredging of Port Royal Harbor  
Beaufort County, South Carolina

Dear Mr. Wilson:

We have reviewed the subject draft Environmental Impact Statement. Based upon the data contained in the draft, it is our opinion that the proposed action will have only a minor impact upon the human environment within the scope of this Department's review. The impact statement has been adequately addressed for our comments.

Sincerely yours,

Philip P. Sayre  
Regional Environmental Officer  
DHEW - Region IV

**UNITED STATES DEPARTMENT OF AGRICULTURE**

**SOIL CONSERVATION SERVICE**

---

240 Stoneridge Drive, Columbia, South Carolina 29210

May 12, 1976

Colonel Harry S. Wilson, Jr.  
District Engineer  
Corps of Engineers  
P. O. Box 919  
Charleston, South Carolina 29402

Dear Colonel Wilson:

Appropriate members of my staff have reviewed the draft environmental statement for the maintenance dredging of Port Royal Harbor, Beaufort County, South Carolina, and have the following comments.

In paragraph 4.06 the statement indicates the most likely area for spoil placement is agricultural land. ① Paragraph 4.06.1 indicates that agricultural land used as a disposal area will have little impact on wildlife. We agree, however, no mention is made of the impact on agriculture. This appears to be an adverse impact. ② Also, we suggest the cropland which will be changed to this use be quantified. ③

We appreciate the opportunity to review this statement.

Sincerely,

*G. E. Huey*  
G. E. Huey  
State Conservationist



UNITED STATES DEPARTMENT OF AGRICULTURE  
FOREST SERVICE

1720 Peachtree Road, N. W.  
Atlanta, Georgia 30309

8400  
May 12, 1976

Colonel Harry S. Wilson, Jr.  
District Engineer  
Charleston District  
Corps of Engineers  
P. O. Box 919  
Charleston, SC 29402



Dear Colonel Wilson:

Here are United States Forest Service, State and Private Forestry comments on the draft environmental statement covering, "Maintenance Dredging of Port Royal Harbor, Beaufort County, South Carolina".

Anticipated impacts on forest lands and resources resulting from the disposal of inner harbor dredged materials on previously used upland disposal area "100 E" are acceptable. However, all new woodland sites proposed for future disposal should be accompanied by site-specific environmental impact assessments. ①

Thank you for the opportunity to review and comment on this draft EIS.

Sincerely,

A handwritten signature in cursive script, appearing to read 'Robert K. Dodson'.

ROBERT K. DODSON  
Area Environmental Coordinator

Copy: State Forester, SC



# United States Department of the Interior

## OFFICE OF THE SECRETARY

Southeast Region / 148 Cain St., N.E. / Atlanta, Ga. 30303

ER-76/381

JUN 4 1976

District Engineer  
U.S. Army Corps of Engineers  
P.O. Box 919  
Charleston, South Carolina 29402

Dear Sir:

As requested in your April 12, 1976, letter to the Assistant Secretary, Program Policy, we have reviewed the draft environmental impact statement for the proposed Maintenance Dredging of Port Royal Harbor, Beaufort County, South Carolina, project for effects on outdoor recreation, geology, hydrology, fish and wildlife resources, and national parks, landmarks and historic areas.

We offer the following comments for your consideration:

### General Comments

The statement as written has addressed fish and wildlife and outdoor recreation aspects; however, it does not adequately identify cultural resources nor does it adequately assess the project's potential environmental impacts on these resources. ①

Federal agency responsibilities for identification, evaluation, and preservation of cultural (historic, archeological, architectural) resources are based on a series of Federal laws, Executive Orders, and regulations.

Compliance procedures required by Section 106 of the Historic Preservation Act of 1966, Executive Order 11593 "Protection and Enhancement of the Cultural Environment" (May 13, 1971), and the Advisory Council on Historic Preservation's "Procedures for the Protection of Historic and Cultural Properties" (36 CFR 800) are separate from the procedures of the National Environmental Policy Act. However, Section 101(b)(4) of NEPA specifically declares that one objective

of the National Environmental Policy is to "preserve important historic, cultural and natural aspects of our national heritage. . . ." In order to meet this objective, the Advisory Council instructs Federal agencies to coordinate NEPA compliance with the separate responsibilities of the National Historic Preservation Act and Executive Order 11593 to insure that historic and cultural resources are given proper consideration in the preparation of environmental impact statements. Agency obligations pursuant to the National Historic Preservation Act and Executive Order 11593 are independent from NEPA and must be complied with even when an environmental impact statement is not required. ②

The consideration of cultural resources requires three levels of treatment. The first requires the agency to check for sites which may be listed on the National Register of Historic Places within the vicinity of the project. ③

The second level as specified in 36 CFR 800, as supplemented by Executive Order 11593, requires the agency to contact the State Historic Preservation Officer at the earliest stages of the project to determine whether there are any sites in the process of nomination to the National Register. A copy of his comments should be incorporated in the draft statement. This treatment has apparently been omitted. These two steps then constitute the treatment of known historic and cultural resources. ④

Thirdly, it is incumbent upon the agency to make appropriate field studies to determine whether there are any unknown sites that have not yet been recognized and have not been nominated to the National Register of Historic Places. This may be done in one of two ways. If the State Historic Preservation Officer or your agency can ascertain and document that there have been recent historical and archeological field studies to determine the presence of cultural values within the area then it need only document these studies in the statement.

However, this probably has not occurred. In that case, it is incumbent upon the Federal agency to hire professional archeologists and historians to make the proper studies required by 36 CFR 800. These studies must be documented in the statement and the effects of the various alternatives on the values found must be incorporated in the appropriate sections discussing impacts, mitigating measures, and adverse effects. We can find no indication in the statement that such studies were made. ⑤

Specific Comments

2.07 Historical and Archeological Sites, page 13

We are pleased to note review of the National Register of Historic Places for the presence of known significant resources. The latest edition of the National Register is February 10, 1976.

This section should be expanded to discuss steps taken by the Federal agency in compliance with established cultural resource preservation procedures to determine the presence or absence of cultural resources on the disposal sites. Any resources located on or in the area of the proposed project's potential environmental impacts should be described. (6)

4.09 Archeological and Historical Sites, page 22

The second sentence "The continued maintenance of Port Royal Harbor should have no impact on archeological or historic resources" is indicative that the Federal agency cannot assure that cultural resources will not be disturbed. Adequate field surveys of the disposal sites and immediate vicinity will provide the Federal agency with data upon which to base impact predictions. (7)

Sincerely yours,

  
(Miss) June Whelan  
Special Assistant to the Secretary  
Southeast Region



South Carolina Department of Archives and History  
1430 Senate Street  
Columbia, S. C.

P. O. Box 11,669  
Capitol Station 29211  
803 — 758-5816  
April 2, 1975

Colonel Harry S. Wilson, Jr.  
Corps of Engineers, Charleston District  
Department of the Army  
Post Office Box 919  
Charleston, South Carolina 29402

Re: P/N 74-44-326 - Maintenance  
dredging in Port Royal Harbor,  
Beaufort County, South Carolina

Dear Colonel Wilson:

With reference to the above project, we are concerned that two very important historic sites, possibly eligible for the National Register, may be affected by depositing dredged materials on or near these sites. Listed in the Lowcountry Region Preservation Plan and Survey, these sites are as follows:

16. Charles Fort Monument (Ribault Monument), located on Parris Island Marine Corps Recruit Depot. Near site of a fort established by the French in 1563, and a later Spanish fort, established in 1566.
114. Site of Stuart Town, located on Port Royal Island. The site of a 1684 Scottish colony destroyed by the Spanish. Exact location undetermined. ①

We would like the opportunity for all parties concerned to check further into the exact locations of these historic sites, and to determine what effects, if any, depositing dredged materials on the shore might have on these sites. The procedures under Section 106 of the National Historic Preservation Act of 1966, outlined in 36 CFR 800, may be applicable here. ②

Sincerely,

  
Charles E. Lee  
State Historic Preservation Officer

CEL:sa  
CC: Ms. Cindy Cole  
Lowcountry Regional Planning Council

Dr. Robert Stephenson, Director  
USC Institute of Archeology and Anthropology



BOARD MEMBERS

Lachlan L. Hyatt, Chairman  
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Leonard W. Douglas, M.D.  
J. Lorin Mason, Jr., M.D.  
William C. Moore, Jr., D.M.D.

# SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL

E. KENNETH AYCOCK, M.D., M.P.H., COMMISSIONER  
J. MARION SIMS BUILDING — 2600 BULL STREET  
COLUMBIA, SOUTH CAROLINA 29201

May 4, 1976

District Engineer  
Attn.: Colonel H.S. Wilson  
U.S. Army Corps of Engineers  
P.O. Box 919  
Charleston, South Carolina 29402

Dear Colonel Wilson:

This office has reviewed The Draft Environmental Impact Statement regarding maintenance dredging of Port Royal Harbor (Beaufort County, South Carolina) and offers the following comments/recommendations for your consideration:

1) the potential impact(s) of dredging activities upon ground water resources should be discussed. Studies by the S.C. Water Resources Commission (Port Royal Sound Environmental Study, 1972) indicate that the principal artesian aquifer in the project area is exposed on the bottom of the Beaufort River and Battery Creek in the vicinity of Port Royal. Although this exposure is primarily due to natural geologic processes, dredging in these waterways may further strip away the upper confining unit, thereby enhancing saltwater intrusion into the aquifer. ①

2) open water disposal of dredged materials in the inner harbor area is not a viable alternative. Materials disposed of in such a manner may slough back into the navigation channel (thereby necessitating more frequent maintenance dredging) and/or destroy indigenous shellfish resources. ②

3) it is recommended that the utilization of marsh areas (i.e. 100 E and 101 E) for disposal purposes be ceased and that alternative disposal sites (i.e. upland and/or deepwater areas) be used. Piecemeal encroachments on state marshlands, for this and other purposes, are rapidly eliminating a valuable natural resource. ③

4) Section 7.02 of the document indicates that the effluent from upland spoil deposition sites would adversely affect the quality of receiving waters. This adverse impact should be more fully characterized. ④

5) consideration should be given to utilizing sediments dredged from the entrance channel for beach nourishment purposes on nearby Hilton Head Island. ⑤

Attn.: Colonel H.S. Wilson

Page 2

May 4, 1976

6) although most dredging activities will be centered in offshore areas and closed shellfishing waters, the temporary closure of some productive shellfish areas will be necessitated. As such, this agency should be given adequate notice prior to project implementation. ⑥

We appreciate the opportunity to have commented on the subject matter. If we can be of any further assistance, please don't hesitate to contact us.

Sincerely yours,

*C. Barry Shedrow*

C. Barry Shedrow  
Environmental Analysis Section  
Programs Development Division  
Bureau of Wastewater and Stream  
Quality Control

CBS/bc



BOARD MEMBERS

Lachlan L. Hyatt, Chairman  
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J. Lorin Mason, Jr., M.D.  
William C. Moore, Jr., D.M.D.

**SOUTH CAROLINA DEPARTMENT OF HEALTH AND ENVIRONMENTAL CONTROL**

April 16, 1976

E. KENNETH AYCOCK, M.D., M.P.H., COMMISSIONER  
J. MARION SIMS BUILDING — 2600 BULL STREET  
COLUMBIA, SOUTH CAROLINA 29201

Colonel Harry S. Wilson, District Engineer  
Charleston District, Corps of Engineers  
P. O. Box 919  
Charleston, S.C. 29402

Dear Colonel Wilson:

We have received and reviewed the draft EIS for the maintenance dredging of Port Royal Harbor, Beaufort County, South Carolina.

We note that Disposal Area 100E is to be diked to receive spoil from the project. As you are aware, the dikes prevent the controlling influence exerted by the tides on mosquitoes in spoil areas. For this reason, alternative 6-01-1-1, deposit of dredged materials in open waters of the inner harbor is the most attractive alternative except for open water disposal which the EIS denotes as impractical.

The responsibility for mosquito control must be assumed by either the Corps of Engineers or the South Carolina State Ports Authority, in writing, to alleviate the substance of our objection.

Thank you for the opportunity to comment on this project.

Yours truly,

L. A. Williams, Jr.,  
Director  
Division of Vector Control

LAW/ks

cc: Ralph Hoffman



2 June 1976

Colonel Harry S. Wilson, Jr.  
Charleston District  
Army Corps of Engineers  
Post Office Box 919  
Charleston, South Carolina 29402

Dear Colonel Wilson:

The Beaufort County Joint Planning Commission has reviewed the draft environmental impact statement for the maintenance dredging of Port Royal Harbor and wishes to make the following comments:

1. Area community development plans point out the recreation potential and marginal industrial potential of disposal area 100E near the southern tip of Port Royal Island. While some future use of this area for dredging disposal would increase this potential, its use as a disposal site for the next 50 years should be evaluated in light of local desire to develop this potential in the near future. ①
2. Extreme caution should be exercised in inner-channel dredging to avoid any further damage to the limestone layer protecting the main fresh water from salt water intrusion. This potential danger was pointed out in a State geologist report some time ago. ②
3. Because of the urban development nearby disposal areas 100E and 101E, extra attention to necessary mosquito control is requested and encouraged. ③
4. The possibility of utilizing inland swamp areas and natural sinks as future disposal areas should be explored. Such use might make these currently unusable areas productive either for economic or recreation development. ④

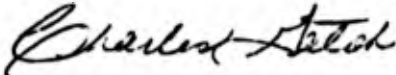
C-15

2 June 1976  
Page Two

5. The possibility exists for coordination of this and intercoastal waterway dredging with other planned or possible economic or recreation development projects where dredged materials could be used to improve a given site. We would like to study this possibility and report any findings to you and hopefully effect future coordination.

Thank you for the opportunity to comment and we look forward to further coordination with you and your agency.

With kindest personal regards,



Charles Gatch  
Executive Director

CG/dm

cc: Beaufort County Council and Chairman  
City Council of Beaufort and Mayor  
Town Council of Port Royal and Mayor

State of South Carolina  
Water Resources Commission



Clair P. Guess, Jr.  
Executive Director

July 13, 1976

Elmer C. Whitten, Jr.  
A-95 Coordinator  
Division of Administration  
1205 Pendleton Street  
Columbia, S.C. 29201

Dear Elmer:

The staff at the Water Resources Commission has received and reviewed the Draft Environmental Impact Statement on the Maintenance Dredging of Port Royal Harbor in Beaufort County, South Carolina.

The Water Resources Commission, in cooperation with the U.S. Geological Survey, has been conducting a capacity use investigation in the low country area. Therefore, much detailed geohydrologic data have been obtained on the tertiary limestone aquifer and other geohydrologic units. One of the major problems we have been studying is the effect that future dredging and other engineering practices will have on the tertiary artesian aquifer. These studies are incomplete at this time but the basic data are available to the Corps at our field office located in Yemassee, South Carolina. ①

To address the environmental impact statement, we have these specific comments or suggestions.

1. 6.0 "Alternative to the Proposed Action" is inadequate. Alternatives discussed are limited to use of alternate disposal sites or abandonment of entire project.

Such alternatives should include discussion of maintaining a shallower channel (something less than the authorized 27' mlw by 500' at the Sound and 24' mlw by 300' in Beaufort River). ②

6.02 alleges that no action would permit shoals so that the channel and harbor ... "would be too shallow to accommodate ships which now utilize the harbor. This alternative would forego the economic benefits derived from shipping....".

- a. What ships now utilize the harbor?
- b. What economic benefits are derived from continued maintenance of a 27' channel? ③

July 13, 1976

Page # 2

Mr. Elmer C. Whitten, Jr.  
A-95 Coordinator

2. Any new (additional) disposal areas or any previously undiked or unused disposal areas should be coordinated with the Port Authority and the Budget and Control Board if such areas occur below mhw on a case by case basis. (A)
3. Specific high shoaling areas and corresponding specific spoil area use should be given. More attention should be placed on the expected life or each spoil area contemplated for use. (S)
4. What methods does the Corps suggest to increase the useful life of each spoil area? (C)

The staff at the Water Resources Commission appreciates the opportunity to comment on this important matter and reserves the right to comment on the next environmental impact statement.

Sincerely yours,

Clair P. Guess, Jr.  
Executive Director

CPGJr:rhv

cc: Mr. John Caruthers