

APPENDIX I
SECTION 404(B) EVALUATION

SECTION 404(b) EVALUATION
ENVIRONMENTAL IMPACT STATEMENT
ON
BOGUE INLET CHANNEL EROSION RESPONSE PROJECT
EMERALD ISLE, NORTH CAROLINA

I. Project Description

a. Location. Bogue Inlet is located on the border of Carteret and Onslow Counties in southeastern North Carolina and provides access to recreational and commercial vessels between the open waters of the Atlantic Ocean and the Intracoastal Waterway. Bogue Inlet is bordered to the east by Bogue Banks and is situated approximately twenty-five miles west of Beaufort Inlet. The Town of Emerald Isle comprises approximately the western twelve miles of the barrier island complex in Carteret County. West of Bogue Inlet is Bear Island, an undeveloped barrier island approximately three miles in length in eastern Onslow County.

The proposed work will be performed along the shoreline along the west end of the Town of Emerald Isle, North Carolina. The Bogue Inlet Channel Erosion Response Project involves the repositioning of the Bogue Inlet bar channel to a location centrally located between Bogue Banks and Bear Island and the restoration of the western 23,831 feet of Emerald Isle's shoreline. Refer to the location map (Figure 1) in the Environmental Impact Statement.

b. General Description. The Town of Emerald Isle, which covers approximately the western 12 miles of Bogue Banks, is suffering from the erosive effects of the eastward migration of the Bogue Inlet ocean bar channel. The bar channel began its eastward trek around 1984 and has moved steadily to the east at an average rate of 93 feet per year. The eastward migration of the inlet channel has been accompanied by erosion of the inlet shoreline that borders The Pointe subdivision located on the extreme west end of the Town of Emerald Isle. Inlet shoreline erosion rates averaged 75 feet per year since the mid 1980's.

The Town of Emerald Isle presently has permits to nourish 10 miles of its 12 mile shoreline using offshore borrow areas. The beach nourishment is part of an island-wide project sponsored by Carteret County. The County project covers approximately 16.8 miles of ocean shoreline along Bogue Banks and begins at the east town limits of Pine Knoll Shores and ends at a point 6,500 feet (1.25 miles) east of Bogue Inlet. The project involves three phases: Phase 1 (completed in April 2002) included the shorelines fronting the towns of Pine Knoll Shores and Indian Beach as well as the unincorporated shoreline fronting the village of Salter Path; Phase 2 (completed in March 2003) covers the eastern 31,100 feet of the Town of Emerald Isle's shoreline; and Phase 3 involves the western 23,831 feet of the Town's shoreline. The proposed Bogue Inlet Channel Erosion Response Project - Preferred Alternative includes using a

portion of the dredged material to close the existing ebb channel and the remaining material be used to nourish the beach along the west end of the town. This nourishment would cover the requirements of Phase 3 of the Carteret County Beach Nourishment Project and offshore borrow areas would not need to be utilized.

c. Authority and Purpose. Initial authorization for the Bogue Inlet navigation project came under Section 107 of the Rivers and Harbors Act of 1960 (P.L. 86-645), passed on September 7, 1983 and based on a Detailed Project Report dated May 1983. The authorized channel extends from the inlet gorge through the ocean bar and measures 150 feet wide at a depth of 8 feet mean low water. Under Section 107 (Continuing Authority), specific Congressional authorization is not required. The inlet channel connects with a 6-foot MLW x 90-foot wide channel that extends from the inlet gorge to the Intracoastal Waterway. This connecting channel was authorized on November 29, 1963 under Section 107 and was based on a Detailed Project Report dated April 1963.

Under the current project authority, the U.S. Army Corps of Engineers (USACE) Navigation Branch follows the deep water channel that exists at the time that maintenance dredging is performed. Accordingly, no attempt is made to maintain a fixed channel.

The purpose of the Bogue Inlet Channel Erosion Response Project is to address the severe erosion problem that is threatening development and town infrastructure located along The Pointe shoreline. Presently, seven homeowners and the Town of Emerald Isle have responded to the erosion threat by constructing temporary sandbag revetments to protect threatened homes and infrastructure. The existing sandbag revetment covers approximately 700 feet of the inlet shoreline and has been effective in protecting the threatened homes and roads albeit not without some maintenance. North Carolina coastal management rules and regulations will only allow the sandbag revetments to remain in place for two years, if they are protecting homes, and five years if it is protecting large structures or roads. The eventual removal of the existing sandbag revetments will result in the immediate loss of these seven threatened homes and a resumption of the inlet shoreline erosion. Accordingly, the Town of Emerald Isle is seeking a more permanent means of addressing the erosion threat.

d. General Description of Dredged or Fill Material.

1. General Characteristics of Material. The proposed inlet material will be used to fill the current ebb channel of Bogue Inlet and nourish 23,831 feet of the shoreline of the along the Town of Emerald Isle. This material is considered to be highly compatible with the native beach material. Results from the jet probe and vibracore analyses are indicative of fairly uniform, well-sorted sand deposits with minor layers of shell fragments and shell hash as well as minimal amounts of silt. The Inlet sediment contains material with a grain size of approximately 0.30 mm and the composite of silt content is on average 1.25%. For the most part, the percent of gravels and fines in Bogue Inlet compare favorably with the concentrations found in the unnourished portions of Bogue Banks.

2. Quantity of Material. Construction of the new channel would require the removal of 1,009,500 cubic yards of material which would then be used to construct a sand dike to close the existing ebb channel and nourish 23,831 feet of beach comprising Phase 3 of the Carteret County Beach Nourishment Project. Sand dike construction across the existing channel is estimated to require a volume of 200,000 cubic yards of material and thus, approximately 809,500 cubic yards of the remaining material will be used to complete the nourishment of 23,831 feet of beach shoreline along Emerald Isle under Phase 3.

3. Source of Material. The material used to close the existing ebb channel and nourish 23,831 feet of Emerald Isle shoreline will be obtained from material removed from the Inlet during the relocation of the ebb channel. This material is expected to be compatible with native beach material and compare favorably to the grain size and silt percentage of unnourished areas of Bogue Banks.

e. Description of the Proposed Discharge Site.

1. Location. Phase 3 of the Carteret County Beach Nourishment Project calls for the nourishment of 4.5 miles (23,831 feet) of western Emerald Isle. The proposed sand dike will be constructed in an area where the channel diverges into a predominant flood channel on the east side and an ebb channel on the west side.

2. Size. The Phase 3 nourishment area includes 4.5 miles (23,831 feet) of Emerald Isle's shoreline. Phase 3 consists of a 21,200 foot main fill section, a 531 foot taper on the east end to tie into the end of Phase 2, and a 2,000 foot taper on the west end.

The sand dike will have a maximum elevation of +4.5 feet National Geodetic Vertical Datum (NGVD), a top width of 50 feet and a maximum bottom width of approximately 700 feet extending approximately 1,700 feet across the channel from the existing middle ground shoals west of the existing channel to the Bogue Banks sand spit.

3. Type of Site. The Phase 3 nourishment area along Emerald Isle's shoreline is currently designated as a recreational beach comprised mostly of eroding sand. The area for sand dike construction is the existing ebb channel just west of the inlet shoreline of Emerald Isle. The east side of the sand dike will tie into the Bogue Bank's sand spit, while the west side will taper into the sand platform of the Bogue Inlet complex.

4. Type of Habitat. The disposal site for nourishment is a supratidal dry beach with a high energy intertidal environment. The disposal site for sand dike construction is a high energy subtidal environment.

5. Timing and Duration of Discharge. Project activities are expected to occur between November 16, 2004 and March 31, 2005. The exact timing of nourishment is not known at this time of compilation of the Environmental Impact Statement.

f. Description of Disposal Method. It is anticipated that the material will be obtained from the inlet using cutter-suction pipeline dredge with the material deposited directly on the ocean shoreline to construct the Phase 3 and in the existing channel to construct the sand dike. The rate of placement along the ocean shoreline, based on the total volume of material that would be removed from the inlet, would be 35.9 cubic yards/lineal foot of beach. The net in-place placement rate, using 15% losses between the borrow area and the beach, would be 31.2 cubic yards/lineal foot. This net placement rate is approximately 88.6% of the recommended net placement rate of 35.2 cubic yards/lineal foot. Once the material is pumped onto the beach, the newly deposited material will be graded to achieve the desired construction profile.

II. Factual Determination

a. Physical Substrate Determinations.

1. Substrate Elevation and Slope. Disposal of the material along the beach would directly cover the area from the toe of the existing dune seaward to a depth of approximately 10 feet below NGVD. The thickness of the fill would range from a maximum of about 6 feet near the existing 0-foot NGVD contour and decrease to 0 at the -10-foot NGVD contour.

2. Sediment Type. Sand from the Inlet is well-sorted, coarse grained quartz sand with minimal amounts of silt, pieces of shell and shell hash. The material from the Inlet is similar in size and shape, and is compatible with the native beach sand. See Appendix B.

3. Dredge/Fill Material Movement. The fill material will be subject to erosion by waves as well as peak flood and ebb flows along the Inlet. With the construction of the sand dike, tidal flow in the existing channel will be reduced and the location of the sand dike will ensure its stability while under construction. Movement of fill material will be toward Bogue Sound and toward the ocean during each tidal cycle phase. Material is expected to be contained to areas close to the Inlet and have short suspension time due to the medium-sized grains and low silt percentage (1.25%).

4. Physical Effects on Benthos. The placement of sand on the beach will result in the burial and subsequent loss of most of the beach infauna. Sandy beaches are generally populated by small, short-lived organisms with high reproductive potential. The benthic communities impacted by the fill should be fully recovered between one to three years. The benthic infaunal communities within the Inlet will be temporarily impacted from being transferred from an intertidal, wet habitat to dry upland area and from direct burial. Recolonization of the disturbed areas by benthic macroinfaunal

species will occur within one to three years after completion of dredging. No long-term (greater than three years) adverse impacts are expected.

b. Water circulation, Fluctuation and Salinity Determination.

1. Water Column Effects. Fill placement will not have long-term or significant impacts, if any, on salinity, temperature, water chemistry, clarity, color, odor, taste, dissolved gas levels, nutrients or eutrophication.

2. Current Patterns and Circulation. Circulation patterns within Bogue Inlet will change due to the re-routing of the main ebb channel. Currents in the project area influenced by both tidal and longshore drift effects. Net movement of water due to the longshore current is predominantly from east to west. Currents in the Inlet are strongly influenced by tidal effects and fresh water flow from the White Oak River. Tidal fluctuations in Bogue Inlet primarily move in a south and north direction during each tidal phase.

3. Normal Water Level Fluctuations and Salinity Gradients. Tides in the project area are semi-diurnal. The mean tide range in the Atlantic Ocean in the vicinity of Bogue Inlet is 3.7 feet while the average spring range is 4.3 feet. Elevations of mean high water and mean low water tidal datum in the vicinity of Bogue Inlet are +2.21 feet National Geodetic Vertical Datum (NGVD) and -1.5 feet NGVD.

c. Suspended Particulate/Turbidity Determinations.

1. Expected Changes in Suspended Particulates and Turbidity Levels in the Vicinity of the Disposal Site. There will be a temporary increase in turbidity levels in the project area during construction activities. Turbidity will be short-term and localized with no significant adverse impacts to natural resources expected. Turbidity levels during construction should not exceed the state standard beyond the vicinity of the pipe and sedimentation is not expected to persist for more than three days (maximum settling time for medium-sized sand grains) after construction.

2. Effects on the Chemical and Physical Properties of the Water Column.

a. Light Penetration. The placement of fill on the beach will increase turbidity in the nearshore zone during construction, but should not exceed the State standard beyond the vicinity of the pipe. The medium-sized grains, well-sorted sand, and low silt percentage (1.25%) should allow for a short suspension time and containment of sediment during and after construction. The estimated maximum settling time for medium-sized sand grains is expected to be three days and thus, light penetration is expected to return to normal within zero to three days post-construction. Therefore, limited adverse impacts on the nearshore and inlet environments are anticipated during construction activities.

b. Dissolved Oxygen. The tidal prism will not change due to the channel relocation efforts, therefore dissolved oxygen levels are not expected to be altered by this project.

c. Toxic Metals, Organics, and Pathogens. No toxic metals, organics, or pathogens will be released by the project.

d. Aesthetics. During project construction, aesthetic quality will be temporarily reduced when dredging equipment is present. After relocation of the channel and demobilization of the construction equipment, the quality of the aesthetic resources within the project area will be restored to pre-construction conditions. There will be an improvement in aesthetic quality of the area due to the increased beach area and restoration of the natural shoreline.

3. Effects on Biota.

a. Primary Productivity and Photosynthesis. A temporary increase in the level of suspended particles is expected in the surf zone and inlet during construction. Primary productivity is not recognized as a significant phenomenon in the surf zone and thus, there will be limited effects on nearshore productivity as a result of the proposed beach nourishment. Primary productivity in the Inlet should only be temporarily impacted as increases in turbidity levels and suspended particles are expected to be short-term.

b. Suspension/Filter Feeders. There is not expected to be long-term adverse impacts to suspension/filter feeders in or around the project area.

c. Sight Feeders. Fish species that depend upon sight to feed in the water column will be temporarily impacted during construction activities. However, no adverse long-term impacts to sight feeders are expected from project activities.

d. Contaminant Determinations. Deposited fill material is not predicted to introduce, relocate, or increase contaminants in or around the project area.

e. Aquatic Ecosystem and Organism Determinations. The use of sand from the inlet for beach nourishment will likely provide sediment that more closely matches that of the original beach sediment, and therefore, differences in sediment coloration, grain size, and composition are not likely to occur. Therefore, no sediment related impacts to the aquatic ecosystem or organisms are expected. The proposed fill material, taken from the Inlet itself, meets the exclusion criteria, and therefore, no additional chemical-biological testing will be required.

1. Effects on Plankton. No adverse long-term impacts to planktonic organisms are anticipated.

2. Effects on Benthos. No adverse long-term impacts to non-motile or motile benthic invertebrates are anticipated.

3. Effects on Nekton. No adverse long-term impacts to nektonic organisms are expected.

4. Effects on the Aquatic Food Web. No adverse long-term impacts to any trophic group in the food webs associated with the project area are expected.

5. Effects on Special Aquatic Sites.

a. Hardground and Coral Reef Communities. No hardground or coral reef communities occur in the project area and therefore, no adverse impacts are expected.

b. Sanctuaries and Refuges. Bogue Inlet contains several bird islands, as well as a sea turtle sanctuary along the ocean shoreline of the project area. No long-term negative impacts to these sanctuaries or refuges are anticipated. Beach nourishment may provide positive impacts to the sea turtle sanctuary by adding additional nesting habitat along Emerald Isle, as well as anticipated accretion along Bear Island, due to the channel realignment.

Effects to bird islands are anticipated regardless of the proposed work due to the migratory nature of the inlet. The project will involve relocating the habitats used by birds for foraging, resting, roosting, and nesting shorebirds, colonial waterbirds and other waterbirds that utilize the area.

c. Wetlands. Both high and low salt marsh environments are found around Bogue Inlet, however, negative cumulative impacts to either type of marsh is not expected. Turbidity is expected to temporarily increase during construction, but is expected to quickly settle after construction and nourishment is completed. Due to the medium-sized, well-sorted grains and the low silt percentage, sediments are projected to have a low suspension time and remain within close proximity to the dredge and fill activities. After construction and nourishment, a sand spit is expected to form and then merge with the constructed sand dike. The merging of the sand spit with the dike (approximately four years) would protect the inlet shoreline and prevent the breaching of Bogue Banks sand spit. Preventing the Bogue Banks sand spit from breaching would help avert the possible loss of the high salt marsh located on the sound side of the sand spit.

d. Mud Flats. Some of the fill material during construction may move from the beach into adjacent aquatic soft bottom habitats, which may temporarily alter the composition and population numbers of the micro and macrofauna due to burial. However, the use of inlet sediment, which closely approximates the composition of the natural sediment on Emerald Isle, should prevent any negative cumulative impacts to the nearshore soft bottom communities due to differences in sediment composition.

e. Vegetated Shallows. Submerged Aquatic Vegetation (SAV) resources are found in those areas upstream of the mouth of Bogue Inlet in areas that are protected from direct changes in water quality, such as turbidity. The design of the proposed channel dimensions were selected to maintain the same tidal exchange volumes through the inlet that presently exists. Therefore, cumulative adverse impacts to SAV are not expected.

6. Endangered and Threatened Species. The west end of Emerald Isle and the east end of Bear Island are designated as Critical Habitat for Wintering Piping Plover. No adverse long-term impacts to these areas are expected. However, construction noise and other activities associated with the dredging operation, including the movement of support vessels and crew, may stress piping plovers by causing them to spend more time being alert rather than foraging and resting. These impacts from construction activities are expected to be temporary and minimal. Completion of the sand dike construction and beach nourishment is expected to compensate for any lost Critical Habitat for Wintering Piping Plovers.

Project construction will occur between November 16, 2004 and March 31, 2005. The construction timeframe was selected based on when sea turtles, manatees, and other habiting species are not likely to be present. Impacts to SAV resources that manatees and sea turtles rely on as a food source, should not be affected during project construction and thus, no adverse impacts to either sea turtles or manatees are expected.

Beach nourishment has been shown to have positive impacts to seabeach amaranth plants as indicated by the 2002 and 2003 monitoring reports for Bogue Banks. Refer to Section 4.4.4 of the EIS. Findings presented by Coastal Science & Engineering reported a significant increase in plant populations post nourishment activities. Beach nourishment activities proposed for the Phase 3 project are expected to have similar results as they will provide additional habitat for seabeach growth and thus, positive impacts are expected.

No significant impacts to any threatened or endangered species or to designated Critical Habitat are anticipated from the proposed project.

7. Other Wildlife. Short-term temporary impacts may occur to shorebirds, colonial waterbirds or other waterbirds due to stressors from the presence of construction equipment and noise. However, no adverse impacts from these activities to small foraging mammals, reptiles, waterbirds, or wildlife in general are expected.

8. Actions to Minimize Impacts. All practicable safeguards will be taken during construction to preserve and enhance environmental, aesthetic, recreational, and economic values in the project area.

1. Proposed Disposal Site Determinations.

1. Mixing Zone Determination. The fill material and the realignment of the channel will not cause unacceptable changes in the mixing zone as will be specified in the Water Quality Certification in relation to: depth, current velocity, direction and variability, degree of turbulence, stratification, or ambient concentrations of constituents.

2. Determination of Compliance with Applicable Water Quality. Due to the coarse, medium-sized grains, and low silt percentage (1.25%) of the Inlet material, "Turbidity levels are not expected to exceed the state standard beyond the vicinity of the pipe; changes in salinity are not expected to result in the removal of the functions of a Primary Nursery Area (PNA); temperature is not projected to be altered during the course of the project; dissolved oxygen levels are not expected to decrease below 5.0 mg/l; and pH levels should remain between 6.8 and 8.5, which is normal for waters in the area". (NCDENR, 2003)

3. Potential Effects on Human Use Characteristics.

a. Municipal and Private Water Supplies. No municipal or private water supplies will be impacted by the implementation of the project.

b. Recreational and Commercial Fisheries. Loss of infaunal prey for finfish may result due to negative impacts resulting from the transfer of sand from the inlet onto land areas. However, impacts are expected to be temporary and minimal during project construction with infaunal community loss restricted to the immediate construction area. In addition, the recovery time for food stocks should be relatively quick (approximately one to three years) due to the high degree of compatibility associated with utilizing inlet material for beach nourishment. Turbidity impacts are predicted to be minimal because of the low silt/clay percentage and low suspension time of the sediment.

c. Water Related Recreation. The inlet material used to nourish Phase 3 of the Bogue Banks Beach Nourishment Project will create a much wider and improved recreational beach. Public access could be restored to the inlet shoreline restoring the opportunity for the public to enjoy the resources in and around Bogue Inlet.

d. Aesthetics. The stabilization of an eroding beach will improve aesthetics of the beach. Therefore, long term increases in aesthetic quality of the beach once the work is completed is expected.

e. Parks, National and Historic Monuments, National Seashores, Wilderness Areas, Research Sites, and Similar Preserves. Bear Island is part of the Hammocks Beach State Park system, which contains various resources such as maritime forests, beach and dune habitat, and many species of wildlife. Beach fill and sand dike construction will occur along Emerald Isle, not Bear Island and thus, no direct impacts to Bear Island from dredging or beach nourishment is anticipated. Positive effects from the realignment of the channel and beach nourishment may result due to

projected accretion along the oceanfront shoreline of Bear Island. However, the inlet shoreline of Bear Island is expected to erode due to the relocation of the channel to its mid-1970's location.

Extensive areas within Bogue Inlet and Bogue Sound are delineated as bird islands, as well as, Hawkins Island to the Northwest and Jones Island and Cedar Point Marshes in White Oak River, north of the inlet. Habitat Areas of Particular Concern (HAPC) for Red drum (*Sciaenops ocellatus*), penaid shrimp, and snapper –grouper complex exist in the tidal inlet, designated by the South Atlantic Fishery Management Council (SAFMC) (USFWS, 2002). Construction and nourishment activities are located along eastern Bogue Inlet and Western Emerald Isle, away from most of the bird islands and other areas of concern. Any impacts, if any, to these areas are expected to be temporary and minimal due to construction activities.

f. Determination of Cumulative Effects on the Aquatic Ecosystem.

Cumulative Effects of the resources of Bogue Inlet from the project are discussed in a Cumulative Effects Assessment and can be found in Appendix F of the EIS.

g. Determination of Secondary Effects on the Aquatic Ecosystem.

No adverse effects of the placement of fill material are anticipated. Bird, salt marsh and infaunal monitoring will document potential secondary impacts of turbidity and sedimentation upon the aquatic environment during and post-construction.

III. Findings of Compliance or Non-compliance with the Restrictions on Discharge.

To be determined.