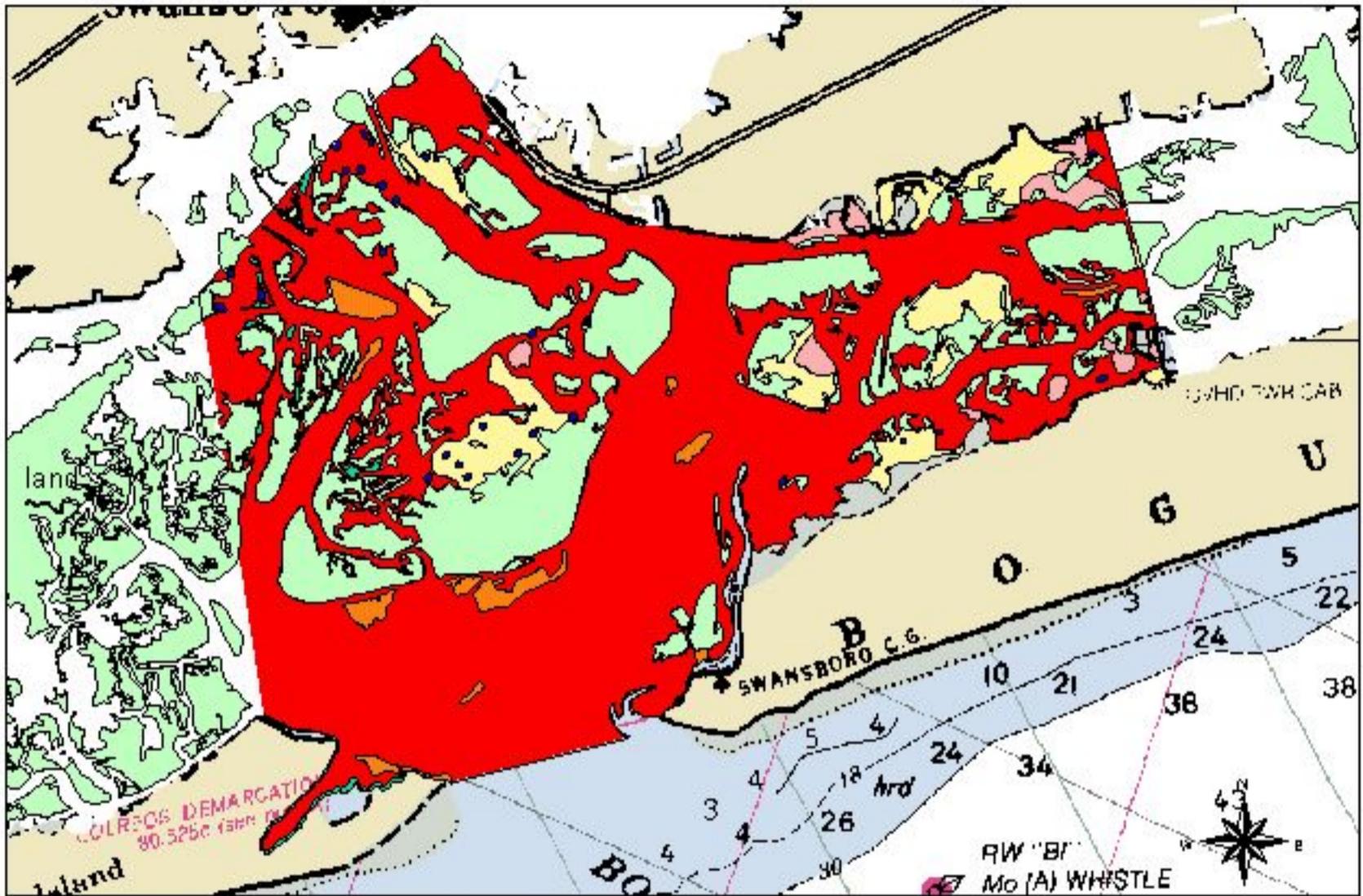


N.C. Division Of Marine Fisheries  
 Shellfish Mapping Program  
 C004

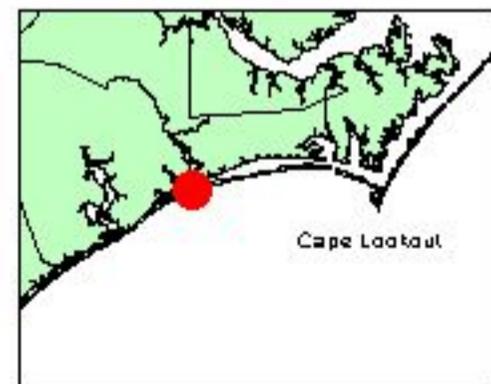


0.5 0 0.5 1 Miles



Strata	Shellfish per square meter
D	0.00
H	0.00
L	0.00
V	24.06
W	76.82
X	0.00

Strata Types	
	D - Subtidal Soft Non-vegetated w/o shell
	H - Subtidal Firm Non-vegetated w/o Shell
	L - Subtidal Hard Non-vegetated w/o Shell
	V - Intertidal Hard Vegetated w/o Shell
	W - Intertidal Hard Non-vegetated Shell
	X - Intertidal Hard Non-vegetated w/o Shell
	Land



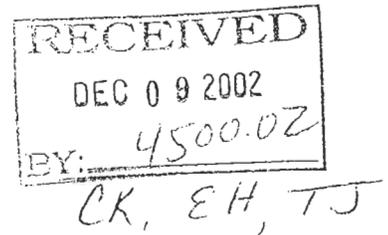


# United States Department of the Interior

## FISH AND WILDLIFE SERVICE

Raleigh Field Office  
Post Office Box 33726  
Raleigh, North Carolina 27636-3726

November 22, 2002



Colonel Charles R. Alexander  
District Engineer, Wilmington District  
U.S. Army Corps of Engineers  
Post Office Box 1890  
Wilmington, North Carolina 28402-1890

Attn: Mickey Sugg, Regulatory Division

Dear Colonel Alexander:

The U.S. Fish and Wildlife Service (Service) has reviewed Public Notice Action ID No. 200100632, dated October 21, 2002. The applicant, the Town of Emerald Isle, proposes to relocate the dominant ebb tidal channel within Bogue Inlet, in Carteret and Onslow Counties, North Carolina. The dredged material would be placed along approximately 4.0 miles of oceanfront beach in western Emerald Isle. The purpose of the project is to redirect the ebb tidal channel towards the center of the inlet, away from vulnerable infrastructure and development at The Pointe along the eastern shoulder of Bogue Inlet. These written comments supplement the Service's verbal comments given at a public scoping meeting held on October 29, 2002, in Cape Carteret, North Carolina, and a previous scoping letter, dated June 28, 2002, regarding the proposed project.

These comments are submitted pursuant to, and in accordance with, provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) and the Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.).

The Service appreciates the opportunity to provide the Town of Emerald Isle and their consultants technical assistance regarding fish and wildlife resources in the proposed project area while specific project features remain in development. In addition to the potential concerns described in our June 28, 2002, letter, we are concerned about the cumulative impacts to shorebird and colonial waterbird habitats resulting from this and other coastal projects. Consequently, we would like to provide the following recommendations for conducting a cumulative effects assessment as the National Environmental Policy Act (NEPA) process of environmental documentation moves forward.

First, the Environmental Impact Statement (EIS) should contain a cumulative effects assessment that follows the 11-step process outlined by the Council on Environmental Quality (CEQ) in their 1997 publication *Considering Cumulative Effects Under the National Environmental Policy Act*

(Table 1). This step-wise approach allows for a clearly defined assessment of the potential cumulative effects resulting from past, present and reasonably foreseeable future actions (RFFA). CEQ (1997) and Canter and Kamath (1995) recommend utilizing a resource-based approach to cumulative effects assessment. In other words, specific ecological resources (e.g., a fish or wildlife species, water or air quality parameters), ecosystems (e.g., sandy beach, marine hardbottom, submerged aquatic vegetation, brackish marsh) and human communities (e.g., the Town of Emerald Isle, Hammocks Beach State Park, commercial fishermen) should be used as the perspective(s) from which cumulative effects are assessed.

The CEQ (1997) approach allows for multiple resources, ecosystems and/or human communities to be assessed, with individual geographic and temporal scales for each. This is typically accomplished in a matrix format, with the relevant past, present and RFFA items listed along one axis and the resources, ecosystems and/or human communities of concern listed along the other axis (e.g., Table 3). The relative magnitude and significance for each action on each resource, ecosystem and/or human community is then ranked in the matrix.

A full cumulative effects assessment would include many different fish and wildlife resources (e.g., shorebirds and waterbirds, fishery resources, SAV, hardbottoms, marine mammals). Each project or action should be assessed for the magnitude of impact(s) relative to the other actions on each resource of concern. Impacts may be positive or negative and may be direct, indirect, incremental, additive or synergistic in origin (Canter and Kamath 1995). The assessment may rank impacts as low, medium or high magnitude if quantitative assessment methods or thresholds are not readily available. Some actions and resources may need more intensive analysis than others, and the temporal and spatial boundaries may differ for each resource. The relevant spatial boundaries for the human community, for example, may be the state of North Carolina as was utilized in the cumulative impacts analysis for the Mason Inlet Relocation Project.

The Service recommends that the project team proposed for the Bogue Inlet Relocation Project be utilized as a consensus-building approach to identify the magnitude and significance of each impact for each resource, ecosystem and human community identified in the analysis. We will refer to shorebirds and waterbirds as an example of a valuable ecological resource for analysis in this discussion.

The first four steps of the CEQ (1997) cumulative effects assessment process occur during the scoping process. Therefore, the Service would like to provide specific recommendations for each of these four initial steps. The first step is to identify the significant issues and define what the goals of the cumulative effects assessment will be. Due to Bogue Inlet's high use by breeding, migratory and overwintering shorebirds and waterbirds, the Service recommends incorporating these resources into the cumulative effects assessment (Table 2). The appropriate assessment, or management, goals for shorebird resources would be the conservation goals described in the *Southeastern Coastal Plains – Caribbean Regional Shorebird Plan* (Hunter 2001) and the *United States Shorebird Conservation Plan* (Brown et al. 2000). For waterbirds, the corresponding management goals would be those outlined in the *North America Waterbird Conservation Plan, Volume One: Seabirds and Colonial Waterbirds* (Kushlan and Steinkamp 2001).

The second step of the cumulative effects assessment is to determine the appropriate spatial boundaries for each resource, ecosystem and/or human community. For the shorebirds and waterbirds of particular interest to the Service, we recommend the spatial boundaries extend from Cape Henry, Virginia, to Cape Romain, South Carolina, because the coast between those two capes contain the overlapping breeding and overwintering ranges for several shorebirds and colonial waterbirds of very high or high management concern listed in Table 2. This spatial area also contains the northernmost range for nesting loggerhead sea turtles and the spawning area for several fishery resources, and therefore may be useful for other resources and ecosystems of concern. The capes provide geographic and oceanographic boundaries as well.

The temporal boundaries for the cumulative effects assessment, step 3 in the CEQ (1997) process, should range from the earliest construction dates of shoreline and inlet stabilization projects, through the present, to 50 years into the future (the typical planning life of a federal shore protection project). The earliest known dates of shoreline and inlet stabilization projects within the assessment area (Cape Henry to Cape Romain) are relevant since they reflect when the coastal habitats important to shorebirds and waterbirds began undergoing varying degrees of modification. Ideally, pristine conditions are the appropriate historical limit (CEQ 1997, Canter and Kamath 1995), but data for those conditions often do not exist. To our knowledge, the oldest shoreline or inlet stabilization efforts within the assessment area were the construction of the Georgetown Harbor jetties at Winyah Bay in 1890.

The fourth step in performing a cumulative effects analysis is to identify the past, present and RFFA relevant to the resources, ecosystems and/or human communities of concern. The Service has drafted an initial list of these actions that have affected shorebird and waterbird habitat (positively or negatively, to varying levels of significance) in Table 3. Actions listed in the table as RFFA are those that have been formally proposed, environmental documents have been prepared or are being prepared, or the relevant authorization and/or permits have been obtained but construction has not started. The assumption is also made that privately sponsored projects that have occurred in the recent past and/or present are likely to continue to occur in the future. Table 3 contains a preliminary list of these projects and actions for the purposes of scoping a cumulative effects assessment, and the list may be supplemented, edited or shortened as a full cumulative effects assessment proceeds.

The types of projects or actions included in Table 3 are those that have been implemented or proposed by private, local, regional, state or federal entities. Actions may include policies, plans, programs, projects or permitted events (CEQ 1997; Canter and Kamath 1995). Consequently, activities such as beach driving, waterfowl impoundments and bird exclosures are included as permitted events in individual counties, towns or national seashores, programs to enhance bird habitat, and projects to improve avian reproduction success respectively. Since bare ground areas are an important microhabitat for shorebirds and waterbirds, vegetation plantings and the artificial creation of dunes (via sand fencing or beach scraping) are included as they alter the distribution and abundance of the bare ground microhabitat. Hard stabilization projects such as seawalls, revetments, groins and jetties are included as they modify and sometimes eliminate ephemeral microhabitats (e.g., overwash fans, spits, and foredunes). Dredging projects are

included to the extent that they modify tidal shoals, inlet hydrology, and inlet shoulders; inlets are a preferred habitat for many bird species. Beach nourishment or storm damage reduction projects are incorporated in the preliminary list due to their modification of oceanfront beach microhabitats for avian foraging, nesting and loafing. Dredging and beach nourishment projects are also similar actions to the Bogue Inlet Relocation Project.

Bogue Inlet currently provides habitat of high value to fish and wildlife resources (a resource category 2 under the Service's Mitigation Policy (January 23, 1981, Federal Register v. 46, n. 15, pp. 7644-7663)). The cumulative loss and disturbance of inlet and beach habitats for migratory shorebirds and waterbirds is significant and one of the leading contributors to declining populations of several high priority species (Brown et al. 2000, Hunter 2001, Hunter et al. 2001, Kushlan and Steinkamp 2001). These cumulative effects should be thoroughly assessed, and we have provided recommendations to facilitate such an analysis. The Service is willing to provide technical assistance to the Corps and the applicant in conducting a cumulative effects assessment.

We appreciate the opportunity to comment on the proposed project and look forward to working with the project team as the project is developed. Please contact Tracy Rice of my staff at (919) 856-4520 extension 12 or electronically via [Tracy\\_Rice@fws.gov](mailto:Tracy_Rice@fws.gov) if you have any questions or comments.

Sincerely,



Garland B. Pardue, Ph.D.  
Ecological Services Supervisor

#### References

- Brown, S., C. Hickey and B. Harrington (eds). 2000. *United States Shorebird Conservation Plan*. Manomet, Massachusetts: Manomet Center for Conservation Sciences. Various paginations.
- Canter, L.W., and J. Kamath. 1995. Questionnaire Checklist for Cumulative Impacts. *Environmental Impact Assessment Review*: v. 15, pp. 311-339.
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LeGrand, H.E., Jr., and S.P. Hall. 1999. *Natural Heritage Program List of the Rare Animal Species of North Carolina*. Raleigh, NC: North Carolina Natural Heritage Program, Division of Parks and Recreation, Department of Environment and Natural Resources. 98 p.

cc: Ron Sechler, NMFS (Beaufort)  
Kathy Matthews, EPA (Athens, GA)  
Dave McHenry, NC WRC (Washington)  
David Allen, NC WRC (Trenton)  
Charles Jones, NC DCM (Morehead City)  
Preston Pate, NC DMF (Morehead City)  
Craig Kruempel, Coastal Planning & Engineering, Inc. (Boca Raton, FL)  
Frank Rush, Town Manager (Emerald Isle)

<b>Table 1. Steps in cumulative effects analysis to be addressed in each component of the environmental impact assessment (CEQ 1997).</b>	
<b>Environmental Impact Assessment Components</b>	<b>Cumulative Effects Analysis Steps</b>
Scoping	1. Identify the significant cumulative effects issues associated with the proposed action and define the assessment goals.
	2. Establish the geographic scope for the analysis.
	3. Establish the time frame for the analysis.
	4. Identify other actions affecting the resources, ecosystems, and human communities of concern.
Describing the Affected Environment	5. Characterize the resources, ecosystems, and human communities identified in scoping in terms of their response to change and capacity to withstand stresses.
	6. Characterize the stresses affecting these resources, ecosystems, and human communities and their relation to regulatory thresholds.
	7. Define a baseline condition for the resources, ecosystems, and human communities.
Determining the Environmental Consequences	8. Identify the important cause-and-effect relationships between human activities and resources, ecosystems, and human communities.
	9. Determine the magnitude and significance of cumulative effects.
	10. Modify or add alternatives to avoid, minimize, or mitigate significant cumulative effects.
	11. Monitor the cumulative effects of the selected alternative and adapt management.

Table 2. Avian indicator species recommended for use as resources of concern within a cumulative effects assessment for the Bogue Inlet Relocation Project. The ecological niche within the project area, national, regional and/or state population status is listed for each species is listed.

Species	Ecological Niche	National Population Status	Regional or State Population Status
<p>American oystercatcher <i>Haematopus palliatus</i></p>	<p>Migratory shorebird Present year-round Nests on bare ground Aquatic gleaners/sweepers and probers/priors Found in estuaries, inlets, beachfront habitats Project area has notable concentration of wintering population Long parental care period (up to 1 yr) to teach young foraging techniques</p>	<p>Species of High Concern<sup>1</sup></p>	<p>Extremely High Priority<sup>4</sup> Region extremely important for breeding, very important to species for wintering<sup>4</sup></p>
<p>Piping plover <i>Charadrius melodus</i></p>	<p>Migratory shorebird Present year-round Nests on bare ground within walking distance of foraging habitat Terrestrial and aquatic gleaners/probers Found in inlets, beachfront habitats Project area has notable concentration of migratory population from all three breeding populations (Atlantic, Great Lakes and Great Plains); critical habitat for migratory and wintering populations</p>	<p>Highly Imperiled<sup>1</sup> Federally threatened and endangered (depending on the breeding population)</p>	<p>State threatened<sup>3</sup> Extremely High Priority<sup>4</sup> Region extremely important to species for wintering, very important for breeding and migration<sup>4</sup></p>
<p>Wilson's plover <i>Charadrius wilsonia</i></p>	<p>Migratory shorebird Present during spring, summer and fall Nests on sand beaches and tidal mud flats Loosely colonial with terns and oystercatchers Terrestrial and aquatic gleaners, a visual predator Found in estuaries, inlets and beachfront habitats</p>	<p>Species of High Concern<sup>1</sup></p>	<p>Significantly rare<sup>3</sup> High Priority<sup>4</sup> Region extremely important to species for breeding<sup>4</sup></p>

<p>Red knot <i>Calidris canutus</i></p>	<p>Migratory shorebird Present during spring and fall migrations, sporadic in winter Aquatic and terrestrial prober/gleaners Found in estuaries, inlets and beachfront habitats Forage in large flocks during winter Have large territories</p>	<p>Species of High Concern<sup>1</sup> (known to be in decline)</p>	<p>Extremely High Priority<sup>4</sup></p>
<p>Sanderling <i>Calidris alba</i></p>	<p>Migratory shorebird High concentration of wintering population Aquatic and terrestrial prober/gleaners Found in inlet and beachfront habitats Strong fidelity to wintering grounds, defends foraging territory</p>	<p>Species of High Concern<sup>1</sup> (known to be in decline)</p>	<p>Moderate Priority<sup>4</sup></p>
<p>Willet <i>Catoptrophorus semipalmatus</i></p>	<p>Migratory shorebird Present year-round Nests on bare ground Aquatic gleaner, visual predator, wader Found in salt marshes, tidal mud or sand flats Strong fidelity to foraging territory, defend winter territories</p>	<p>Species of Moderate Concern<sup>1</sup></p>	<p>Moderate Priority<sup>4</sup></p>
<p>Dunlin <i>Calidris alpina</i></p>	<p>Migratory shorebird Present during winter Aquatic and terrestrial prober/gleaners Found in beachfront, inlet and estuarine habitats Has large territories, breeding site fidelity Wintering populations may have sex separation with males concentrated more to the north of the wintering range</p>	<p>Species of Moderate Concern<sup>1</sup> (known to be in decline)</p>	<p>Moderate Priority<sup>4</sup></p>
<p>Short-billed dowitcher <i>Limnodromus griseus</i></p>	<p>Migratory shorebird High concentration during winter Aquatic and terrestrial prober/gleaner, wader Found in estuarine, inlet, and beachfront habitats Forage in large flocks with sandpipers and plovers during winter</p>	<p>Species of High Concern<sup>1</sup> (known to be in decline)</p>	<p>High Priority<sup>4</sup></p>

	State Threatened	Species of Low Concern <sup>2</sup>	Species of High Concern <sup>2</sup> (apparent population decline)	Species of Concern <sup>3</sup> Removed from Endangered Species list in 1985
<p>Gull-billed tern <i>Sterna nilotica</i></p>	<p>Colonial waterbird Present spring, summer and fall Nests on bare ground in colonies with other terns and black skimmers Forages by hovering and pouncing on prey Found in salt marshes, inlets and estuarine habitats</p>	<p>Colonial waterbird Present spring, summer and fall Nests on bare ground in colonies with other terns and black skimmers Courtship feeding ritual Forages by high-diving for fish Defend foraging territories during breeding season Found in estuaries, inlets, beachfront, and nearshore habitats</p>	<p>Colonial waterbird Present spring, summer and fall Nests on bare ground and rooftops in colonies with other terns and black skimmers Courtship feeding ritual Forages by plunge diving for prey Found in freshwater, marine, and estuarine waters, oceanfront beaches, sand flats and open dunes Nesting vulnerable to degradation</p>	<p>Species of Moderate Concern<sup>2</sup> (apparent stable population)</p>
<p>Common tern <i>Sterna hirundo</i></p>	<p>Colonial waterbird Present spring, summer and fall Nests on bare ground in colonies with other terns and black skimmers Courtship feeding ritual Forages by high-diving for fish Defend foraging territories during breeding season Found in estuaries, inlets, beachfront, and nearshore habitats</p>	<p>Colonial waterbird Present spring, summer and fall Nests on bare ground and rooftops in colonies with other terns and black skimmers Courtship feeding ritual Forages by plunge diving for prey Found in freshwater, marine, and estuarine waters, oceanfront beaches, sand flats and open dunes Nesting vulnerable to degradation</p>	<p>Colonial waterbird Present spring, summer and fall Nests on bare ground and rooftops in colonies with other terns and black skimmers Courtship feeding ritual Forages by plunge diving for prey Found in freshwater, marine, and estuarine waters, oceanfront beaches, sand flats and open dunes Nesting vulnerable to degradation</p>	<p>Significantly Rare<sup>3</sup></p>
<p>Least tern <i>Sterna antillarum</i></p>	<p>Colonial waterbird Present spring, summer and fall Nests on bare ground and rooftops in colonies with other terns and black skimmers Courtship feeding ritual Forages by plunge diving for prey Found in freshwater, marine, and estuarine waters, oceanfront beaches, sand flats and open dunes Nesting vulnerable to degradation</p>	<p>Colonial waterbird Present spring, summer and fall Nests on bare ground and rooftops in colonies with other terns and black skimmers Courtship feeding ritual Forages by plunge diving for prey Found in freshwater, marine, and estuarine waters, oceanfront beaches, sand flats and open dunes Nesting vulnerable to degradation</p>	<p>Colonial waterbird Present year-round Nests in trees, shrubs or on the ground Forages by high-diving for fish Found in estuaries, inlets and nearshore habitats Long-lived (25-30 yrs)</p>	<p>Significantly Rare<sup>3</sup> Species of Concern<sup>3</sup></p>
<p>Brown pelican <i>Pelecanus occidentalis</i></p>	<p>Colonial waterbird Present year-round Nests in trees, shrubs or on the ground Forages by high-diving for fish Found in estuaries, inlets and nearshore habitats Long-lived (25-30 yrs)</p>	<p>Species of Moderate Concern<sup>2</sup> (apparently stable population) Remains listed on Gulf Coast</p>	<p>Species of Moderate Concern<sup>2</sup> (apparently stable population) Remains listed on Gulf Coast</p>	<p>Species of Concern<sup>3</sup> Removed from Endangered Species list in 1985</p>

<p>Black skimmer <i>Rynchops niger</i></p>	<p>Colonial waterbird Present year-round Nests on bare ground in colonies with terns Forages by skimming water for prey (tactile hunter) Found in estuaries, inlets and beachfront habitats Sensitive to any human disturbance of colony Roosts in flocks on sandbars, shoals and beaches</p>	<p>Species of High Concern<sup>2</sup> (apparently population decline)</p>	<p>Species of Concern<sup>3</sup></p>
<p>Snowy egret <i>Egretta thula</i></p>	<p>Colonial wading bird Present year-round Nests in colonies in shrubs and deciduous trees Diverse foraging techniques for aquatic and terrestrial fauna, usually wading with active pursuit of prey (stalk and strike) Found in estuaries and inlet habitats Communal roosts at night</p>	<p>Species of High Concern<sup>2</sup> (apparent population decline)</p>	<p>Species of Concern<sup>3</sup></p>
<p>Little blue heron <i>Egretta caerulea</i></p>	<p>Colonial wading bird May be present year-round Nests in colonies in shrubs and deciduous trees; Diverse foraging techniques, usually stalk and strike prey Found in estuaries and inland habitats</p>	<p>Species of High Concern<sup>2</sup> (apparent population decline)</p>	<p>Species of Concern<sup>3</sup></p>
<p>Red phalarope <i>Phalaropus fulicarius</i></p>	<p>Migratory shorebird Present during spring and fall migrations, sporadic in winter Aquatic gleaner for marine invertebrates, larvae, plankton Found in nearshore and offshore marine habitats</p>	<p>Species of Moderate Concern<sup>1</sup> (thought to be in decline)</p>	<p>Species of High Concentration<sup>4</sup></p>
<p>Cory's shearwater <i>Puffinus diomedea</i></p>	<p>Migratory seabird Regionally high concentration in NC waters Present April to late November, peak mid-July to early August Forages by skimming, scavenging and diving for fish, squid, crustaceans, seaweed, and refuse May flock in rafts in nearshore and offshore areas Usually flies just above ocean surface</p>	<p>Species of Moderate to Low Concern<sup>2</sup> (apparently stable population)</p>	

Northern gannet <i>Morus bassanus</i>	Migratory seabird Present during spring and fall migrations and winter Forages by high diving (often from > 90 ft) for fish and squid Found in nearshore areas, often visible from shore	Species Not at Risk <sup>2</sup> (biologically significant population increase)	
Black rail <i>Laterallus jamaicensis</i>	Migratory waterfowl Present year-round Nest in marsh grasses that are irregularly flooded Aquatic gleaner Found in fresh, brackish and salt marsh habitats (more common in extensive marshes) Beaufort and Cedar Island areas are two of few known resident areas Secretive	Federal Species of Concern	Significantly Rare <sup>3</sup> High Priority <sup>5</sup>
Common loon <i>Gavia immer</i>	Migratory waterfowl Present year-round with highest abundance during spring and fall migrations and winter Piscivorous, forages by surface diving Found in estuaries Raft at night		Moderate Priority <sup>5</sup>
Red-breasted merganser <i>Mergus serrator</i>	Migratory waterfowl or sea duck Present during spring and fall migrations and winter Piscivorous, forages by surface diving Found in estuaries and inlet areas	Unknown, may be increasing population	
Canvasback <i>Aythya valisineria</i>	Migratory waterfowl, diving duck Present during spring and fall migrations and winter Forages on SAV Found in estuarine and inlet areas	Steady, but below long- term average	Moderate Priority <sup>5</sup>

<sup>1</sup> Population status as designated in the U.S. Shorebird Conservation Plan (Brown et al. 2000). <sup>2</sup> Population status as designated in the North American Waterbird Conservation Plan (Kushlan and Steinkamp 2001). <sup>3</sup> Status as designated by the North Carolina Natural Heritage Program (LeGrand and Hall 1999). <sup>4</sup> Status as designated by the Southeastern Coastal Plains - Caribbean Regional Shorebird Plan (Hunter 2001). <sup>5</sup> Status as designated by the Partners in Flight Bird Conservation Plan for the South Atlantic Coastal Plain (Hunter et al. 2001).

**Table 3.** A preliminary list of past, present and reasonably-foreseeable future actions (RFFA) that may affect the coastal habitats of shorebirds and waterbirds. The list is presented from north to south and spans the area between Cape Henry, Virginia, and Cape Romain, South Carolina, which bracket the breeding, migratory stopover, and overwintering ranges of several shorebirds and waterbirds of concern (e.g., indicator species in Table 2). Past events cover those of approximately the last century (the period when dredging and shoreline/inlet stabilization began), and future events include those reasonably foreseeable to occur within the next 50 years (the typical planning life of a federal shore protection project). The time period of occurrence (past, present or RFFA) is marked for each project or action, while the magnitude of the impact(s) to avifauna need to be assessed by a consensus of a resource agencies and partners.

Project	Past	Present	RFFA	Magnitude
Fort Story Geotubes	X	X		
Fort Story Revetment	X	X	X	
Virginia Beach Beach Nourishment	X	X	X	
Rudee Inlet Jetties & Dredging	X	X	X	
Dam Neck Naval Base Rock Revetment/Dune	X	X		
Dam Neck Naval Base Beach Nourishment	X			
Sandbridge Seawalls	X	X		
Sandbridge Beach Nourishment	X	X	X	
Currituck County CCC Dune Ridge	X	X		
Currituck County Beach Driving	X	X	X	
Dare County Beaches North Beach Nourishment			X	
Nags Head/Kitty Hawk Dredge Disposal		X		
Cape Hatteras National Seashore Bird Exlosures	X	X		
Bodie Island Beach Driving	X	X	X	
Oregon Inlet Dredging & Disposal	X	X	X	
Oregon Inlet Terminal Groin	X	X		
Oregon Inlet Jetties			X	
Pea Island Waterfowl Impoundments	X	X		
NC 12 Dune Maintenance - Hatteras Island	X	X	X	
Rodanthe Dredge Disposal	X			
Albemarle-Pamlico-Core Sounds Dredge Disposal Islands	X	X	X	
Avon Dredge Disposal	X			
Buxton Inlet Closure	X			
US Navy Groins	X	X		
Cape Hatteras Lighthouse Sandbags	X			
Hatteras Island Beach Driving	X	X		
Hatteras Dredge Disposal	X			
Hatteras Inlet Dredging	X	X		
NC 12 Dune Maintenance - Ocracoke Island	X	X	X	
Ocracoke Island Dredge Disposal	X		X	
Cape Lookout National Seashore Beach Driving	X	X	X	
Drum Inlet Opening & Dredging	X			
Core Banks Dredge Disposal	X			
Cape Lookout National Seashore Dune Building	X	X	X	
Vegetation Plantings on Outer Banks	X	X	X	
Barden Inlet Dredging	X			
Cape Lookout Jetty	X	X		

Project	Past	Present	RFFA	Magnitude
Shackleford Banks Jetty	X			
Beaufort Inlet Dredging	X	X	X	
Beaufort Inlet Nearshore & Offshore Disposal Sites	X	X	X	
Fort Macon Jetty & Groins	X	X		
Atlantic Beach Dredge Disposal	X	X	X	
Pine Knoll Shores Dredge Disposal	X	X	X	
Carteret Co. Bogue Banks Beach Restoration Project		X	X	
Emerald Isle Dredge Disposal	X	X	X	
Bogue Banks Beach Scraping	X	X		
Vegetation Planting in Onslow Bay	X	X	X	
Onslow Bay Dredge Disposal Islands	X	X	X	
Bogue Inlet Dredging	X	X	X	
Bogue Inlet Relocation			X	
Camp Lejeune Target Ranges	X	X	X	
Camp Lejeune Beach Nourishment			X	
Onslow Beach Dredge Disposal	X	X	X	
New River Inlet Dredging	X	X	X	
North Topsail Beach Dredge Disposal	X	X	X	
Topsail Island Dune Maintenance	X	X	X	
Topsail Island Sand Bags	X	X	X	
Topsail Island Beach Scraping	X	X	X	
Topsail Island Beach Nourishment			X	
Topsail Beach/West Onslow Beach Nourishment & Terminal Groin			X	
New Topsail Inlet Dredging	X	X	X	
Topsail Beach Dredge Disposal	X	X	X	
Rich Inlet Dredging	X	X	X	
Figure 8 Island Sandbags	X	X	X	
Figure 8 Island Beach Scraping	X	X	X	
Figure 8 Island Beach Nourishment	X	X	X	
Mason Inlet Relocation		X	X	
Mason Inlet Sandbag Revetment	X	X		
Wrightsville Beach Beach Nourishment	X	X	X	
Moore Inlet Closure	X			
Masonboro Inlet Jetties & Dredging	X	X		
Masonboro Inlet Channel Closure	X			
Masonboro Island Dredge Disposal	X	X	X	
Carolina Beach Inlet Opening	X			
Carolina Beach Inlet Dredging	X	X	X	
Carolina Beach Revetment	X	X		
Carolina Beach Driving	X	X		
Carolina Beach Beach Nourishment	X	X	X	
Kure Beach Beach Nourishment	X	X	X	
Fort Fisher Revetment	X	X		
Fort Fisher Driving	X	X	X	
Bald Head Island Geotubes	X			
Bald Head Island Beach Scraping	X			
Bald Head Island Dredge Disposal		X	X	
Bald Head Island Beach Nourishment	X			
Cape Fear River (Wilmington Harbor) Dredging	X	X	X	
Caswell Beach-Oak Island Scraping	X			

Project	Past	Present	RFFA	Magnitude
Caswell Beach-Oak Island Sandbags	X	X		
Caswell Beach Dredge Disposal		X	X	
Caswell Beach-Oak Island Vegetation planting	X	X	X	
Long Beach Sea Turtle Habitat Restoration Project		X		
Oak Island Beach Nourishment			X	
Oak Island Dredge Disposal	X	X	X	
Lockwood's Folly Inlet Dredging			X	
Holden Beach Sandbags	X	X		
Holden Beach Beach Scraping	X			
Holden Beach Dredge Disposal	X	X		
Holden Beach Beach Nourishment		X	X	
Long Bay Dredge Disposal Islands	X	X	X	
Shallotte Inlet Dredging	X	X	X	
Ocean Isle Dredge Disposal	X	X		
Ocean Isle Beach Nourishment		X	X	
Ocean Isle Beach Scraping	X			
Ocean Isle Sandbags	X	X		
Tubbs Inlet Dredging			X	
Tubbs Inlet Relocation	X			
Sunset Beach Scraping	X			
Little River Inlet Jetties	X	X		
Cherry Grove Revetment	X	X		
Hog Inlet Dredging	X	X		
North Myrtle Beach Beach Nourishment/Dredge Disposal	X	X	X	
Myrtle Beach Beach Nourishment	X	X	X	
Myrtle Beach Seawalls & Revetments	X	X		
Surfside Dredge Disposal	X	X		
Garden City Beach Nourishment	X	X	X	
Murrells Inlet Jetties	X	X		
Murrells Inlet Dredging	X	X		
Huntington Beach State Park Beach Nourishment	X			
Midway Inlet Groins	X	X		
Pawley's Inlet Dredging ?				
Pawley's Island Beach Nourishment	X			
DeBordieu Island Beach Nourishment	X			
DeBordieu Island Seawall	X	X		
Winyah Bay Mouth Dredging	X	X		
Winyah Bay Mouth (Georgetown Harbor) Jetties	X	X		
Santee River Diversion ?	X			



# United States Department of the Interior

## FISH AND WILDLIFE SERVICE

Raleigh Field Office  
Post Office Box 33726  
Raleigh, North Carolina 27636-3726

December 3, 2002

Mr. Ken Jolly, Chief  
Regulatory Division, Wilmington District  
U.S. Army Corps of Engineers  
Post Office Box 1890  
Wilmington, North Carolina 28402-1890

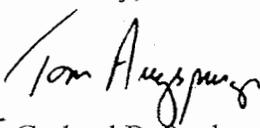
Attention: Mickey Sugg

Dear Mr. Jolly:

The U. S. Fish and Wildlife Service (Service) has enclosed an electronic version of our Draft Fish and Wildlife Coordination Act (FWCA) Report for the Bogue Banks Shore Protection Project, in Carteret and Onslow Counties, North Carolina. A hard copy of the report has been submitted to Mr. Hugh Heine of the U.S. Army Corps of Engineers. This report discusses a potential beach nourishment project under study by the Wilmington District of the U.S. Army Corps of Engineers for the Bogue Banks barrier island. The report identifies fish and wildlife resources in the project area and their value, describes the various federal alternatives considered, and provides our assessment of potential project impacts on these resources. This draft provides our recommendations for avoiding or minimizing the potential adverse environmental impacts of the project. This report does not constitute the Service's final report in accordance with Section 2(b) of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 - 667d) for the federal shore protection project nor any permits under review by the Regulatory Division.

We would appreciate any comments that you wish to make on this report. All comments received will be considered in drafting our Final FWCA Report. In order to adequately evaluate all comments, we request that they be received by April 1, 2003. Technical questions should be directed to the attention of Tracy Rice at this office. She may be reached at 919-856-4520, extension 12.

Sincerely,

  
For  Garland B. Pardue, Ph.D.  
Ecological Services Supervisor

Enclosure

cc (with enclosure):

— Craig Kruempel, Coastal Planning & Engineering, Inc. (Boca Raton, FL)  
Frank Rush, Town Manager (Emerald Isle)



Michael F. Easley  
Governor

William G. Ross, Jr., Secretary  
Department of Environment and Natural Resources

Alan Kilmek, Director  
Division of Water Quality

Mickey Suggs  
US Army Corps of Engineers  
P.O. Box 1890  
Wilmington, NC 27402-1890

1/29/03

**RECEIVED**

FEB 04 2003

**REGULATORY  
WILMINGTON FIELD OFFICE**

Mr. Suggs:

RE Comments on Bogue Inlet Monitoring Proposal

Though you have already received most of these comments by email, here is a more official format for these comments

1. How do you plan to document marsh edge erosion? I believe at Mason's Inlet, surveying equipment was used.
2. Some method more quantitative than 'direct observation and indirect evidence' should be used to document invertebrates and wildlife in the marshes. Perhaps by using quadrats, between year observations would be more comparable.
3. On the topic of marsh invertebrate sampling, it was unclear why samples were to be collected from 150 ft into the marsh. It would seem that it would be more likely to pick up changes in the community due to the project if sampling occurred closer to the water. If this is not the case, please provide some supporting information.
4. A reference site for the infaunal samples is needed. One of the figures showed 4 sites beside the proposed new channel. One of the interior channel sites could be moved to an intertidal location South of Island #2 and ESE of your Bear Island Marsh Reference site. That way you could have a reference site without any additional costs. Also, all of the new channel sites are on the west side of the proposed channel. Either the northern or southern station should probably be moved to the east side of the proposed channel so someone can't come back and say there was deliberate avoidance on the east side.
5. The plan needs to specify what kind of sampling gear is being used. Ms Haight said a petite ponar would be used, however the plan suggested a PVC core would be the sampling device. While the petite ponar is not a bad choice for the intertidal area at less than slack tide, it is not appropriate in the middle of the marsh, where the Spartina stems and roots will probably keep the jaws from closing completely. Also, a petite ponar will



North Carolina Division of Water Quality; Wetlands/401 Unit  
1650 Mail Service Center; Raleigh, NC 27699-1650  
2321 Crabtree Blvd., Raleigh, NC 27604-2260  
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<http://h2o.enr.state.nc.us/ncwetlands>

not bite 10 cm deep in either hard sand or root strewn marsh, so if a sample is to be taken to 10 cm depth, as the plan said, something besides a ponar will be needed. If using a core, please note the diameter of the core and the depth to which you will be collecting.

6. It is important when working in sloping areas, such as the three sites along the existing channel, that sampling occurs at the same relative depth (height above MLW) each time. Sampling a foot or two deeper occasionally will make the data significantly less comparable, with the subtidal community naturally more diverse than the intertidal. If the plan is to show before and after similarity, throwing in questions of intertidal variability will confuse the issue. There may need to be a way to mark sites in addition to GPS to reduce this potential problem.

7. Why is one of the 4 replicates at each site essentially being thrown away by sieving it only for Donax and Emerita? It might as well be sent for complete invertebrate analysis, which would include these taxa. Besides, these animals are large enough that you will probably get 1 or 2 per ponar at most. To get a less inaccurate estimate of their density, more than just one core or a larger sampler than a petite ponar will be needed.

8. Currently, the monitoring plan calls for 1 year pre construction sampling and 2 years post construction. Please consider adding a third year post construction. DWQ currently requires 3 years post construction for their freshwater stream restoration monitoring, and the logic there - more chances to demonstrate success in a highly variable situation - applies here too.

9. Please consider in-field sample preservation as is proposed in the plan. When I talked with Ms. Haight, she indicated that the current plan was to bag the samples then transport them to Dr. Posey on ice, where he would preserve them. This is not a bad strategy in winter, but it becomes much more problematic in summer when ice could melt, a bag could leak or several other things could happen. Even if they didn't, you are leaving yourself open to someone saying later that your infaunal abundance values are not believable because there could have been some predation or decomposition in the bags.

10. Please consider epifaunal sampling at a few sites for a more complete description of the community, especially the crustaceans. I have sent Ms Haight a paper describing these methods under separate cover. Five minute intertidal sweeps at the flat edge, flat center and flat background would be adequate to characterize the epifauna near the proposed new channel, while two, 10-minute subtidal sweeps at the Marsh Main Channel and Marsh Background sites would be appropriate to look for shifts in the subtidal community. These would only need to be done about once per year (unless you really wanted to do them more frequently). The easiest way to collect these would be for me to go out with you on your Spring or Summer sampling (which ever season you want) and teach you the technique and collect these for you the first time.

11. You have many numeric methods to measure species diversity, evenness etc. without apparent reasoning why so many measures of approximately the same thing were