

**Bogue Inlet Channel Erosion Response Project
Draft Environmental Impact Statement**

**Table 10
Average Wave Heights by Direction and
Percent of Wave Energy from Each Direction
(WIS Station AU2045)**

Wave Direction	Onshore or Offshore	Average Wave Height (feet)	Percent of Wave Energy
0.0 deg - N	Offshore	3.9	1.51%
22.5 deg - NNE	Offshore	4.7	2.44%
45.0 deg - NNE	Offshore	5.4	5.78%
67.5 deg - ENE	Offshore	5.0	4.36%
90.0 deg - E	Onshore	3.3	11.78%
112.5 deg - ESE	Onshore	3.2	15.42%
135.0 deg - SE	Onshore	3.4	11.93%
157.5 deg - SSE	Onshore	4.9	9.41%
180.0 deg - S	Onshore	5.1	12.45%
202.5 deg - SSW	Onshore	4.4	7.32%
225.5 deg - SW	Onshore	4.7	6.02%
247.5 deg - WSW	Onshore	4.7	3.45%
270.0 deg - W	Offshore	4.8	3.07%
292.5 deg - WNW	Offshore	4.4	1.63%
315.0 deg - NW	Offshore	4.5	1.89%
337.5 deg - NNW	Offshore	4.1	1.54%

4.17.3 Littoral Transport

The wave information provided for WIS Station AU2045 was used to compute the average longshore sediment transport potential in the vicinity of Bogue Inlet for each month. Details of the sediment transport estimates are provided in Appendix B with average monthly and yearly littoral transport rates for the shorelines near Bogue Inlet summarized in Table 11.

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**Table 11
Average Monthly and Annual Transport Rates (cy/yr)
WIS Station AU2045
1976 to 1995**

Month	East	West	Gross	Net ^(a)
Jan	-28,654	58,247	86,901	29,594
Feb	-31,986	46,850	78,836	14,863
Mar	-48,688	52,963	101,651	4,275
Apr	-37,666	38,160	75,826	495
May	-28,277	31,526	59,803	3,249
Jun	-24,784	21,707	46,491	-3,077
Jul	-23,877	17,003	40,880	-6,874
Aug	-11,327	38,973	50,299	27,646
Sep	-8,089	89,299	97,389	81,210
Oct	-6,632	55,439	62,071	48,807
Nov	-18,922	63,412	82,335	44,490
Dec	-26,406	54,008	80,414	27,602
Total	-295,308	567,587	862,895	272,280

^(a) + = Net Transport to the West, - = Net Transport to the East.

The predominant direction of littoral transport in the vicinity of Bogue Inlet is to the west with the net transport averaging 272,300 cubic yards/year to the west. During the months of March to July, the average net sediment transport is nearly balanced with strong predominance to the west during the other months of the year. The gross rate of littoral transport is approximately 863,000 cubic yards/year. For the 20-year hindcast period, the gross rate of sediment transport ranged from a low of 667,000 cubic yards/year to a maximum of 1,138,000 cubic yards/year. Net transport was to the west for all 20 years; however, net westerly transport varied over a wide range from a minimum of 13,000 cubic yards/year (1994) to a maximum of 558,000 cubic yards/year (1980).

4.18 INFRASTRUCTURE

World War II had a tremendous impact on the migration of immigrants to the United States in the mid to late 1900's. North Carolina began to notice the effects of this migration as evidenced by the steady increase in infrastructure and development in the 1970's. (Carteret County, 1999) This increase in population and development was most noticeable along the North Carolina

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coastline. The Carteret County 1996 Land Use Plan found the highest increase in population growth along seven coastal counties during the years of 1970 to 1994 (Carteret County, 1999).

Military facilities such as: the U.S. Marine Corps Air Station base at Cherry point in Havelock; U.S. Marine Camp Lejeune base at Jacksonville and port at Morehead City; and U.S. Air Force Base Seymour Johnson in Goldsboro; have contributed significantly to population increases along the North Carolina coastline. However, the U.S. Marine Corps Air Station base at Cherry Point in Havelock has been identified as having the greatest population and infrastructure impact on the Crystal Coast. (Insiders Guide, 2003) Industrial decentralization also contributed to the increase in population along the Crystal Coast. However, the most significant influence was found to be due to the increase in recreational and retirement facilities. The recreational and retirement facilities have provided a resource for tourists during the seasonal or peak population months (May through August) in Carteret County.

Over the past 25 years, the recreational and retirement centers have shifted the permanent population and economic structure along coastal communities in North Carolina. The high seasonal population has changed the economic structure of these communities to service and retail oriented industry. (Carteret County, 1999)

The Pointe Subdivision is connected to other sections of Emerald Isle by Coast Guard Road. Other roads within The Pointe Subdivision, include Inlet Drive, Bogue Court, Inlet Court, and Channel Drive. Power lines, telephone service, storm sewers, and television cables generally follow the existing roads. There is no central sanitary sewer system as the individual homes are all served by septic tanks. There are over 100 lots located west of Coast Guard Road, most of which (95) are developed. The Swansboro Coast Guard Station is located on the sound side of the Pointe Subdivision and occupies approximately 4.5 acres.

4.19 WATER COLUMN

Estuarine waters, marine waters, and creeks characterize subtidal areas in and around Bogue Inlet. Subtidal areas are found in areas east of the inlet, west of the inlet, and behind Dudley Island. Soft-bottom, subtidal habitats consist of various percentages of sand, silt, and clay, occurring in sheltered bays and estuaries. These habitats are influenced to a great extent by tides and thus have a variety of different salinities and water temperatures.

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Biological resources associated with subtidal environments include shrimp, crabs, clams, fish, and the pelagic and benthic communities that support them.

4.19.1 Marine

The nearshore environments and coastal waters in the Permit Area include the beach areas and surf zones of Bear Island and Emerald Isle. Species common in these habitats range from sharks and the snapper-grouper reef fish complex.

4.19.2 Estuarine

Estuarine waters in the State of North Carolina are defined by CAMA as "all the water of the Atlantic Ocean within the boundary of North Carolina and all the waters of the bays, sounds, rivers, and tributaries thereto seaward of the dividing line between coastal fishing waters and inland fishing waters, as set forth in the most recent official published agreement adopted by the Wildlife Resource Commission and the Department of Environment and Natural Resources" (NCDCM, 2003).

Bogue Sound is a shallow body of water characterized as having sand and mud bottoms and an estuarine environment. The sound is highly influenced by tides at the western end near Bogue Inlet and as a result, has high salinity variation. The area closest to Bogue Inlet contains various areas of sand shoals and SAV habitats (see maps in Appendix C), in addition to mud bottom habitat.

Some of the most productive and valuable wetlands are estuarine environments. Estuarine systems in the project area are located in the western end of Bogue Sound, Dudley Island, and the estuarine system north of Bear Island. These marshes are regularly and irregularly flooded lands where plants species such as salt marsh cordgrasses (*Spartina alterniflora* and *S. patens*), glasswort (*Salicornia* spp.), salt grass (*Distichlis spicata*), and sea lavender (*Limonium carolinanum*) can be found. These habitats are important for fish spawning and juvenile development. Acquisition of digital aerial imagery, along with the field investigations of the low and high marsh (September 2003), will provide definitive boundaries of the marsh environments of Bogue Inlet.

4.20 URBAN QUALITY

The location of the project area assessment is within an inlet environment and will therefore not involve urban quality issues.

4.21 SOLID WASTE

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The Solid Waste Management Act of 1989 regulates the safe disposal and management of solid wastes, more specifically the reduction of wastes in North Carolina. A Solid Waste Management Plan was adopted in 1991, however the North Carolina Department of Natural Resources is in the process of updating the plan with surveyed data. There are currently 39 operating lined Municipal Solid Waste Landfills (MSWLF) in the state of North Carolina. However, the challenge continues for the state as the volume of material needing to be disposed of increases, while the amount of available landfill space decreases. (NCDENR, 2000)

The Coastal Regional Solid Waste Management Authority (CRSWMA) was appointed by the Boards of County Commissioners from Carteret, Pamlico, and Craven Counties to operate and manage solid waste in the aforementioned counties. The CRSWMA operates and manages three solid waste facilities and one MSW line landfill site in the three counties.

The nearest MSWLF site available to the Town of Emerald Isle, in Carteret County, is located in Swansboro at the W.A. Page ACB Site on State Route 1114. A Construct and Demolition Landfill (CDLF) is also available for the disposal of landscaping and construction materials at the Styron facility located in Morehead City. (NCSWS, 2003)

4.22 DRINKING WATER

Similar to other rural areas, the primary public water supply source for both Carteret and Onslow Counties is fed by a groundwater source (USEPA, 2002). This groundwater source (aquifer) of the coastal plain region of North Carolina is available in the pore spaces of both consolidated and unconsolidated stratified materials such as clay, sand, gravel and shell. These aquifers are considered to be high yielding for the municipalities utilizing them. (GWPC, 2003)

The watershed system, called the Bogue-Core Sound Watershed (USGS Cataloging Unit 03020106), supplies groundwater to the surrounding cities, towns, and islands around Bogue Inlet. Bogue Banks Water Corporation supplies the water to the Town of Emerald Isle, while the City of Swansboro operates and maintains the water supply and distribution for the entire city.

4.24 NON-RELEVANT RESOURCE ISSUES

The following section describes resources that are considered to be insignificant due to the scope of the project alternatives.

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4.24.1 Hazardous, Toxic, and Radioactive Waste

No chemical analysis of the sediments within the proposed channel has been performed to date. It is unlikely that the project area sediments have accumulated hazardous, toxic, or radioactive substances regulated by CERCLA or RCRA. There are currently no hazardous, toxic, or radioactive waste producers adjacent to or known discharges of contaminants to Onslow Bay (CSE, 2001). The high energy nature of the project area with wave, tidal, and littoral currents make the retention or deposition of hazardous, toxic, and radioactive wastes within the project area unlikely. Studies have shown that contaminants usually do not adsorb to particles with grain size suitable for beach restoration (USACE, 1994) which is characteristic of the material found in Bogue Inlet.

There were no bulk storages of hazardous materials, no toxic waste dump sites, and no disposal of toxic wastes found in Onslow County based on a Camp Lejeune Environmental Assessment (EA) (Camp Lejeune, 2002). Carteret County opposes the dumping of toxic substances within the county (Carteret County, 1999). In addition, there are no known radioactive waste sites near Bogue Inlet. Beaufort, at the U.S. Department of Commerce, is the closest site for radioactive waste based on its use as an on-site storage for decay of low-level radioactive waste (USEPA and FCPM, 1995). A closer source of hazardous materials could be Camp Lejeune Marine Base. In North Carolina, there are concerns with contaminants at military bases. Some military-related contaminants of concern include VOCs, PCBs, PAHs, heavy metals, pesticides, and solvents. In 1989, the NOAA Coastal Resource Coordination Program conducted a coastal hazardous material site review for Camp Lejeune which was contaminated with pesticides and PCBs (NOAA-Office of Response and Restoration, 2003). Camp Lejeune also routinely conducts Shore Fire Control Party Training. This entails firing onto the camp in a practice attack. During the attacks, there is repetitive artillery fire. According to the Environmental Assessment (July 2002), 99% of rounds fall within the Naval Gunfire Impact Area and the potential for rounds to fall short is less than 0.01%.

Direct concerns with contaminants in Bogue Inlet can come from local businesses. There are no large industries in the area, but small business, such as paint shops can put contaminants directly into the estuarine waters.

4.24.2 Noise

Levels of noise in the area are relatively low. However, "a noise impact on Emerald Isle's lifestyle is obvious," according to John Pike (Global Security). He states that there is a noise impact from the Marine Corps Auxiliary Bogue Landing Field (MCALF). MCALF serves as a training facility primarily for AV-8 Harriers from Cherry Point Marine Corps Air Station. In addition, MCALF

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Bogue is used for practice approaches by C-130 transports from Cherry Point, F-18 fighters from Beaufort, SC, and helicopters from New River MCAS. These aircrafts do have serious noise impacts on developed areas (NCDCM. 1996). Noise levels associated with dredging and construction are generally low and should not greatly affect the surrounding areas.

4.24.3 Energy Requirements and Energy Conservation

Energy requirements for this type of project assessment would be confined to fuel for operating machinery, labor transportation, and other construction type equipment.

The energy conservation potential assessment associated with the project would include such activities as the reuse of sand for beach nourishment and the relocation of existing structures.

No other energy requirements or conservation measures have been identified for this project assessment.

TABLE 9
ESSENTIAL FISH HABITAT SPECIES OF THE ATLANTIC WATERS
BOGUE INLET, NORTH CAROLINA

SAFMC - South Atlantic Fisheries Mangement Council; ASMFC - Atlantic States Marine Fisheries Council; MAFMC - Mid-Atlantic Fisheries Management Council; NCDMF - North Carolina Division of Marine Fisheries;
 NM - Nautical Mile; / = not likely to occur in area

Taxa	Common Name	NMFS (Highly Migratory Species)	SAFMC (3- 200NM)	MAFMC (3-200 NM)	Management Designation		Probable Life Stage in Project Area	Fish Habitat Ecology	Estuarine Emergent Wetlands	Submerged Aquatic SAV (SAV) and Seagrass Beds	Oyster Reefs and Shell Banks	Intertidal Flats	Estuarine, Marine Water Columns, and Creeks (Subtidal)	Shallow Sand and Muddy Bottoms	Feeding Habits	
					ASMFC (0- 3 NM)	NCDMF Stock Status (2002)										
<i>Seriola rivoliana</i>	Almaco jack		X			Concern	/	Pelagic; rarely near shoreline, 15 to 160 m (49 to 525 ft); Juv: around floating objects (<i>Sargassum</i>)								fish, invertebrates
<i>Anguilla rostrata</i>	American eel				X	Unknown	Juvenile/ Adult	Catadromous: ocean, estuaries, freshwater streams, rivers, brakishwater, Juv: estuaries, lakes, rivers, SAV, soft bottom	X	X		X	X	X		invertebrates and small fish
<i>Alosa sapidissima</i>	American shad				X	Concern	Juvenile/ Adult	Anadromous: ocean waters, move to rivers to spawn; Juv: rivers, sounds					X			plankton, mainly copepods and mysids, fish
<i>Micropogonias undulatus</i>	Atlantic croaker				X	Concern	Juvenile/ Adult	Inhabit mud and sand-bottom areas, coastal waters, estuaries; Juv: estuaries	X					X		crustaceans, worms, mollusks, detritus, fish
<i>Brevoortia tyrannus</i>	Atlantic menhaden				X	Viable	Juvenile/ Adult	Estuarine-dependent; along the coast; Juv: inlets and estuary	X			X	X			phytoplankton
<i>Chaetodipterus faber</i>	Atlantic spadefish		X			Concern	Juvenile/ Adult	Juv: estuarine, shallow water; Adult: sandy beaches, shallow coastal waters, artificial reefs; 3-35 m (10-115 ft)	X			X	X			invertebrates, plankton
<i>Acipenser oxyrinchus</i>	Atlantic sturgeon				X	Overfished	Juvenile/ Adult	Rivers, estuaries, shallow waters of continental shelf; Juv: brakish water, freshwater	X			X	X			molluscs, fish, worms, invertebrates, gastropods, shrimp
<i>Seriola zonata</i>	Banded rudderfish		X			Concern	Juvenile/ Adult	Coastal waters, inshore around structures, anywhere from surface to seafloor				X	X			fish, shrimps
<i>Centropristis ocyurus</i>	Bank sea bass		X			Concern	/	Hardbottom, shipwrecks to 55 m (180 ft), deep water								small fish, benthic invertebrates
<i>Argopecten irradians</i>	Bay Scallop					Concern	Juvenile/ Adult	Estuarine-dependent; SAV (eelgrass)	X	X	X					diatoms
<i>Thunnus obesus</i>	Bigeye tuna	X					/	Oceanic								fish, cephalopods, crustaceans
<i>Myceterperca bonaci</i>	Black grouper		X			Concern	Juvenile	Adult: offshore, over 18 m (60 ft); Juv: may occur inshore in shallow water				X				fish, cephalopods, crustaceans
<i>Anisotremus surinamensis</i>	Black margate		X			Concern	Juvenile/ Adult	Over rocky bottoms, ledges, wrecks, nearshore reefs, surf areas, around groins					X			crustaceans, urchins, molluscs, fish
<i>Centropristis striatus</i>	Black sea bass		X	X	X	Concern	Juvenile	Adult: Offshore over wrecks, rubble, reefs, rocky bottoms; Juv: estuaries and offshore	X							fish, crustaceans, shellfish
<i>Apsilus dentatus</i>	Black snapper		X			Concern	Juvenile/ Adult	Rocky bottoms; Shallow waters around reefs and SAV		X						fish, cephalopods, tunicates
<i>Lutjanus buccanella</i>	Blackfin snapper		X			Concern	/	Deeper waters over rocky bottoms, near drop-offs and ledges								fish
<i>Callinectes sapidus</i>	Blue crab					Concern	Juvenile/ Adult	Highly migratory; ocean waters, freshwater, sounds, rivers					X			plankton, invertebrates, fish, plants, mollusks, crustaceans, organic debris
<i>Makaira nigricans</i>	Blue marlin	X					/	Oceanic								fish, cephalopods
<i>Haemulon sciurus</i>	Blue stripe grunt		X			Concern	Juvenile	Juv: <i>Thalassia</i> beds; Adults: migrate to offshore reefs		X						crustaceans, bivalves, small fish
<i>Thunnus thynnus</i>	Bluefin tuna	X					Juvenile/ Adult	Oceanic, seasonally comes close to shore					X			small schooling fish, squids, red crabs
<i>Pomatomus saltatrix</i>	Bluefish			X	X	Recovering	Juvenile/ Adult	Juv: estuaries, bays, coastal waters Adult: open ocean, large embayments, estuaries	X				X			fish, crustaceans, polychaetes
<i>Caulolatilus microps</i>	Blueline tilefish		X			Concern	Juvenile/ Adult	Surf beaches, estuaries, brakish water, shallow coastal waters	X				X			benthic invertebrates, fish
<i>Ameiurus nebulosus</i>	Brown bullhead					Unknown	Juvenile/ Adult	Rivers, impoundments, rarely enters brakish waters					X			mollusks, insects, leeches, crayfish, plankton
<i>icialurus punctatus</i>	Channel catfish					Unknown	Juvenile/ Adult	Rivers, streams, reservoirs					X			fish, crustaceans, clams, snails, insects, sm. Mammals
<i>Ameiurus catus</i>	White catfish					Unknown	Juvenile/ Adult	Mud-bottom pools, open channels, rivers, impoundments					X			aquatic insects, crustaceans, worms, and smaller fish
<i>Ameiurus natalis</i>	Yellow bullhead					Unknown	Juvenile/ Adult	Sluggish current over soft substrate in creeks, large rivers, impoundments					X			aquatic SAV, crayfish, larvae, crustaceans

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Taxa	Common Name	NMFS (Highly Migratory Species)	SAFMC (3- 200NM)	MAFMC (3-200 NM)	Management Designation		Probable Life Stage in Project Area	Fish Habitat Ecology	Estuarine Emergent Wetlands	SAVs	Oyster Reefs and Shell Beds	Intertidal Flats	Estuarine, Marine Water Columns, and Creeks (Subtidal)	Shallow Sand and Muddy Bottoms	Feeding Habits
					ASMFC (0- 3 NM)	NCDMF Stock Status (2002)									
<i>Scomberomorus regalis</i>	Cero		X				Juvenile/ Adult	Over wrecks, along ledges at depths 1-20 m (3.3 - 66 ft); over coral reefs							crabs, fish, squid
<i>Rachycentron canadum</i>	Cobia		X				Juvenile/ Adult	Over mud, sand, and gravel bottoms, inshore and offshore, estuaries	X			X	X	X	crabs, fish, squid
<i>Epinephelus fulvus</i>	Coney		X			Concern	Juvenile/ Adult	Shallow and deep water, hides in caves or under ledges							small fish, crustaceans, shrimp
<i>Lutjanus cyanopterus</i>	Cubera snapper		X			Concern	Juvenile	Juv: inshore in SAV; adult: offshore or nearshore over wrecks, reefs, and ledges		X					fish, shrimps, crabs
<i>Lutjanus jocu</i>	Dog snapper		X			Concern	Juvenile	Juv: estuaries, rivers adult: offshore rocky reefs	X				X		fish, benthic invertebrates, gatropods, cephalopods
<i>Coryphaena hippurus</i>	Dolphin fish		X			Viable	Juvenile	Juvs: found near the coast, with floating <i>Sargassum</i> ; Pelagic, deep water, close to surface					X		fish, zooplankton, crustaceans, squid
<i>Crassostrea virginica</i>	Eastern oyster					Concern	Juvenile/ Adult	Intertidal, subtidal, estuarine	X		X	X	X		algae, plankton, and detritus
<i>Haemulon flavolineatum</i>	French grunt		X			Concern	Juvenile	Juv: nearshore SAV; Adults: rocky reefs, under ledges		X					small crustaceans
<i>Myceteroperca microlepis</i>	Gag grouper		X			Recovering	Juvenile/ Adult	Juv, larvae: estuaries and SAV; Adults: offshore on rocky bottom, inshore on rocky or SAV bottom	X	X					fish, crabs, shrimp, cephalopods
<i>Chaceon feneri</i>	Golden crab		X				Juvenile/ Adult	Deep ocean, waters over continental shelf, EFH areas							zooplankton
<i>Lopholatilus chamaeleonticeps</i>	Golden tilefish		X	X		Concern	Juvenile/ Adult	Over mud, rock, sand bottom; continental shelf, 80-540 m (262-1772 ft), ledges							shrimp, crabs, fish, squid, bivalves, holothurians
<i>Epinephelus itajara</i>	Goliath grouper		X			Concern	Juvenile/ Adult	Shallow, inshore areas, rock or mud bottoms, brackish estuaries; not common north of Florida							crustaceans, turtles, fish, stingrays
<i>Lutjanus griseus</i>	Gray snapper		X			Concern	Juvenile/ Adult	Coastal and offshore waters; rocky areas, estuaries, rivers (juv)	X				X		fish, shrimp, crabs, gastropods, cephalopods, plankton
<i>Balistes carolinensis</i>	Gray triggerfish		X			Concern	Juvenile/ Adult	Bays, harbors, lagoons, reefs; Juv: among <i>Sargassum</i>					X		benthic invertebrates; mollusks, crustaceans
<i>Epinephelus cruentatus</i>	Graysby		X			Concern	Juvenile/ Adult	Inhabits SAV (<i>Thalassia</i>) beds, coral reefs, rocky reef ledges		X					shrimp, fish
<i>Seriola dummerili</i>	Greater amberjack		X			Concern	Juvenile/ Adult	Deep water, will enter coastal bays					X		fish, invertebrates
<i>Menticirrhus littoralis</i>	Gulf kingfish					Unknown	Juvenile/ Adult	Sandy bottoms of surf zone, seasonal movement from estuarine and nearshore waters to offshore waters	X				X		worms, crustaceans
<i>Mercenaria mercenaria</i>	Hard clam					Unknown	Juvenile/ Adult	Estuarine-dependent; sandy bottoms, SAV bottoms	X	X	X			X	diatoms
<i>Alosa mediocris</i>	Hickory shad				X	Unknown	Juvenile/ Adult	Anadromous: ocean waters, move to rivers to spawn; Juv: estuaries, ocean waters	X				X		fish, squid, crustaceans, fish eggs
<i>Lachnolaimus maximus</i>	Hogfish		X			Concern	Juvenile/ Adult	Over open bottoms or coral reef areas; lagoons					X		molluscs, crabs, sea urchins
<i>Calamus bajonado</i>	Jolthead porgy		X			Concern	Juvenile/ Adult	Coastal waters, vegetated sand bottoms		X			X		sea urchins, crabs, molluscs
<i>Scomberomorus cavalla</i>	King mackerel		X				Juvenile/ Adult	Along beaches and near mouths of inlets and coastal rivers				X	X		fish, penaid shrimp, squid
<i>Calamus nodosus</i>	Knobbed porgy		X			Concern	Juvenile/ Adult	Over reefs, ledges, wrecks and other hard bottom areas							gastropods, crabs, sea urchins, bivalves, other invertebrates
<i>Lutjanus synagris</i>	Lane snapper		X			Concern	Juvenile/ Adult	Over all types of bottoms, but mainly coral reefs and SAV sandy areas		X				X	fish, crabs, shrimp, worms, gastropods, cephalopods
<i>Seriola fasciata</i>	Lesser amberjack		X			Concern	Juvenile/ Adult	Coastal pelagic or demersal							squid, fish
<i>Euthymnus alletteratus</i>	Little tunny		X				Juvenile/ Adult	Neritic waters close inshore					X		crustaceans, fish, squid, heteropods, tunicates

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					ASMFC (0- 3 NM)	NCDMF Stock Status (2002)									
<i>Lutjanus mahogoni</i>	Mahogany snapper		X			Concern	Juvenile/ Adult	Shallow waters over rocky bottoms, sandy or SAV areas		X		X		X	fish, shrimps, crabs, cephalopods
<i>Haemulon album</i>	Margate		X			Concern	Juvenile/ Adult	SAV, sand flats, wrecks		X		X		X	benthic and subsurface invertebrates
<i>Epinephelus mystacinus</i>	Misty grouper		X			Concern	Juvenile/ Adult	Deep water, 100-400 m (328-1312 ft); juv: sometimes 30m (98 ft)							fish, crustaceans, squid
<i>Lophius americanus</i>	Monkfish			X		Overfished	Juvenile/ Adult	Inshore out to depths greater than 800 m (2625 ft); most common in depths 70 to 100 m (230-328 ft)					X		fish, sharks, sea birds
<i>Lutjanus analis</i>	Mutton snapper		X			Concern	Juvenile	Continental Shelf; Adults: among rocks; Juv: over sandy, SAV bottoms		X				X	fish, shrimp, crabs, cephalopods, gastropods
<i>Epinephelus striatus</i>	Nassau grouper		X			Concern	Juvenile/ Adult	From shoreline to at least 90 m (295 ft) depth, close to caves; Juv: SAV		X			X		fish, crabs, crustaceans, molluscs
<i>Menticirrhus saxatilis</i>	Northern kingfish					Unknown	Juvenile/ Adult	Mud or sand-mud bottom types; seasonal movement from estuarine and nearshore waters to offshore waters	X				X	X	worms, crustaceans
<i>Canthidermis sufflamen</i>	Ocean triggerfish		X			Concern	Juvenile/ Adult	Over rocky reefs, sand and SAV areas		X				X	benthic invertebrates
<i>Penaeus setiferus</i>	White shrimp		X			Viable	Juvenile/ Adult	Estuarine, palustrine, intertidal marshes and flats, subtidal flats, SAV	X	X		X	X		algae, worms, fish, crabs, other shrimp
<i>Penaeus aztecus</i>	Brown shrimp		X			Viable	Juvenile/ Adult	Estuarine, palustrine, intertidal marshes and flats, subtidal flats, SAV	X	X		X	X		algae, worms, fish, crabs, other shrimp
<i>Penaeus duorarum</i>	Pink shrimp		X			Viable	Juvenile/ Adult	Estuarine, palustrine, intertidal marshes and flats, subtidal flats, SAV	X	X		X	X		algae, worms, fish, crabs, other shrimp
<i>Etelis oculatus</i>	Queen snapper		X			Concern	Juvenile/ Adult	Offshore over rocky bottoms of continental shelf to 137 m (450 ft)							small fish, squid
<i>Balistes vetula</i>	Queen triggerfish		X			Concern	Juvenile/ Adult	Rocky or coral areas, sand and SAV areas		X				X	benthic invertebrates
<i>Sciaenops ocellatus</i>	Red drum		X	X	X	Overfished	Juvenile/ Adult	Sand and sandy mud bottoms in coastal waters and estuaries; surf zone; oyster reefs and shell banks	X		X		X	X	crustaceans, molluscs, fish
<i>Epinephelus morio</i>	Red grouper		X			Concern	Juvenile/ Adult	Rocky and muddy bottoms; juv: shallow water						X	fish, invertebrates
<i>Epinephelus guttatus</i>	Red hind		X			Concern	Juvenile/ Adult	Shallow reefs and rocky bottoms; wrecks and ledges; 18 to 110 m (59-361 ft); rare north of Florida							crustaceans, fish, and octopods
<i>Pagrus pagrus</i>	Red porgy		X			Concern	Juvenile/ Adult	Rock, rubble, or sand bottoms; Juv: SAV		X				X	crustaceans, fish, molluscs
<i>Lutjanus campechanus</i>	Red snapper		X			Concern	Juvenile	Rocky bottoms; Juv: shallow waters, over sand or muddy bottoms						X	fish, shrimp, crabs, worms, cephalopods, plankton
<i>Epinephelus adscensionis</i>	Rock hind		X			Concern	Juvenile/ Adult	Rocky inshore areas or deep reef bottoms, to depths of 76.2 m (250 ft); wrecks, ledges; rare north of Florida							crabs, fish
<i>Centropristis philadelphicus</i>	Rock sea bass		X			Concern	Juvenile/ Adult	Offshore sandy and muddy bottoms; hardbottom, rocks, jetties, and ledges							invertebrates, fish, squid, plankton, crustaceans
<i>Sicyonia brevirostris</i>	Rock shrimp		X				Juvenile/ Adult	Sand bottom habitats; 18 -182 m (59-597 ft) in depth							algae, worms, fish, crabs, other shrimp
<i>Istiophorus platypterus</i>	Sailfish	X					Juvenile/ Adult	Oceanic epipelagic; waters close to coasts					X		fish, crustaceans, cephalopods
<i>Calamus calamus</i>	Saucereye porgy		X			Concern	Juvenile	Juv: SAV (<i>Thalassia</i>) sandy bottoms; Adults: coral areas		X				X	molluscs, benthic invertebrates, crustaceans
<i>Mycteroperca phenax</i>	Scamp		X			Concern	Juvenile	Adults: deeper waters; inshore and offshore reefs, ledges, <i>Oculina</i> coral reefs, depths of 30 to 100m (98-328 ft) in N. Carolina; Shallow, clear water over coral reef, near corals / gorgonians; Juv: sand bottoms with or without SAV, muddy bottoms of lagoons,	X				X		fish, squid, crustaceans
<i>Lutjanus apodus</i>	Schoolmaster		X			Concern	Juvenile	Intertidal and subtidal habitats, over sand, silty-sand, shell, mud, mussel beds and eelgrass, wrecks, artificial reefs, on or near	X	X			X	X	crustaceans, fish, invertebrates
<i>Stenotomus chrysops</i>	Scup		X	X	X	Overfished	Juvenile/ Adult	Intertidal and subtidal habitats, over sand, silty-sand, shell, mud, mussel beds and eelgrass, wrecks, artificial reefs, on or near		X	X	X	X	X	crustaceans, benthic invertebrates, squid, zooplankton, fish

TABLE 9
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BOGUE INLET, NORTH CAROLINA

SAFMC - South Atlantic Fisheries Management Council; ASMFC - Atlantic States Marine Fisheries Council; MAFMC - Mid-Atlantic Fisheries Management Council; NCDMF - North Carolina Division of Marine Fisheries;
 NM - Nautical Mile; / = not likely to occur in area

Taxa	Common Name	NMFS (Highly Migratory Species)	SAFMC (3- 200NM)	MAFMC (3-200 NM)	Management Designation		Probable Life Stage in Project Area	Fish Habitat Ecology	Estuarine Emergent Wetlands	SAVs	Oyster Reefs and Shell Beds	Intertidal Flats	Estuarine, Marine Water Columns, and Creeks (Subtidal)	Shallow Sand and Muddy Bottoms	Feeding Habits
					ASMFC (0- 3 NM)	NCDMF Stock Status (2002)									
<i>Carcharhinus obscurus</i>	Dusky shark	X				Overfished	Juvenile/ Adult	Surf zone to well offshore; surface to 400 m (1312 ft) depths					X		bony fish, sharks
<i>Carcharhinus brevipinna</i>	Spinner shark	X				Overfished	Juvenile/ Adult	Nearshore to offshore, over continental shelf					X		fish, octopods, squids, cuttlefish, small sharks
<i>Galeocerdo cuvier</i>	Tiger shark	X				Overfished	Juvenile/ Adult	Near surface to depths of 140 m (459 ft), on or adjacent to continental shelves, river estuaries, lagoons	X				X		fish, sharks, rays, marine mammals, sea turtles, seabirds, more
<i>Carcharias taurus</i>	Sand tiger shark	X				Overfished	Juvenile/ Adult	Nearshore from the surf zone, shallow bays to at least 191 m (627 ft) on the outer continental shelves					X		fish, small sharks, rays, squids, crabs, and lobsters
<i>Carcharhinus plumbeus</i>	Sandbar Shark	X	X			Overfished	Juvenile/ Adult	Inshore and offshore, bays, river mouths, harbors					X		bony fish, sharks, cephalopods, shrimp
<i>Rhizoprionodon terraenovae</i>	Atlantic sharpnose	X				Overfished	Juvenile/ Adult	Continental shelves, from the intertidal to deeper waters, surf zone off sandy beaches, estuaries, bays, river mouths	X			X	X		fishes, shrimps, crabs, segmented worms and molluscs
<i>Squalus acanthias</i>	Spiny dogfish			X	In development	Overfished	Juvenile/ Adult	Inshore and offshore, enclosed bays and estuaries, can enter freshwater					X		fish, mollusks, crustaceans, other invertebrates
<i>Archosargus probatocephalus</i>	Sheepshead		X			Concern	Juvenile/ Adult	Bays and Estuaries, brackish water, freshwater, around pilings, jetties	X				X		molluscs, crustaceans
<i>Lutjanus vivanus</i>	Silk snapper		X			Concern	Juvenile/ Adult	Near edge of continental shelf, deeper waters, below 200 m (656 ft), shallow water at night							fish, crustaceans, gastropods, cephalopods, urochordates
<i>Epinephelus niveatus</i>	Snowy grouper		X			Concern	Juvenile	Adults: well offshore on rocky bottoms, deep as 244 m (800 feet); Juv: can be found inshore							fish, gastropods, cephalopods, brachyuran crustaceans
<i>Paralichthys lethostigma</i>	Southern flounder					Overfished	Juvenile/ Adult	Estuarine dependent, nearshore waters; Juv: inlets, muddy bottoms, estuaries	X			X	X	X	fish, crabs, shrimp
<i>Menticirrhus americanus</i>	Southern kingfish					Unknown	Juvenile/ Adult	Mud or sand-mud bottom types; seasonal movement from estuarine and nearshore waters to offshore waters	X				X	X	fish, shrimp, invertebrates
<i>Scomberomorus maculatus</i>	Spanish mackerel		X		X		Juvenile/ Adult	Inshore, nearshore, and offshore, especially over SAV beds and reefs		X				X	fish, shrimp, cephalopods
<i>Epinephelus drummondhayi</i>	Speckled hind		X			Concern	Juvenile/ Adult	Offshore rocky bottoms, common between 60 and 120 m (197 and 394 ft)							fish, crabs, shrimp, molluscs
<i>Panulirus argus</i>	Spiny lobster		X				Juvenile/ Adult	Oceanic, shallow subtidal, seagrass, unconsolidated bottom, <i>Laurencia</i> algal communities, coral live hardbottom		X				X	benthic scavengers
<i>Leiostomus xanthurus</i>	Spot				X	Viable	Juvenile/ Adult	Estuarine-dependent; estuarine and coastal waters; Juv: inlets, estuary	X			X	X		worms, crustaceans, organic detritus
<i>Cynoscion nebulosus</i>	Spotted sea trout				X	Viable	Juvenile/ Adult	Estuarine-dependent; Juv: SAV, Adult: river estuaries, coastal marine water sand bottoms, SAV, salt marshes	X	X				X	crustaceans and fish
<i>Morone saxatilis</i>	Striped bass				In development	Concern	Juvenile/ Adult	Inhabits coastal waters, bays, rivers						X	crustaceans, worms, fish, other invertebrates
<i>Mugil cephalus</i>	Striped mullet					Concern	Juvenile/ Adult	Wide variety of habitats; freshwater, estuarine, marine; near inlets to offshore areas	X			X	X		microorganisms, microalgae, decaying plant matter
<i>Paralichthys dentatus</i>	Summer flounder			X	X	Recovering	Juvenile/ Adult	Estuarine dependent, coastal waters; Juv: inlets, sandy bottoms in higher-salinity areas of estuaries	X			X	X	X	fish and shrimp
<i>Xiphias gladius</i>	Swordfish	X					Juvenile/ Adult	Oceanic but sometimes found in coastal waters					X		fish, crustaceans, squid
<i>Tautoga onitis</i>	Tautog				X	Overfished	Juvenile/ Adult	Adult: offshore and inshore hard-structure, shellfish beds; Juv: shallow, estuarine, SAV	X	X	X				gastropods, other mollusks, crustaceans
<i>Mycteroperca tigris</i>	Tiger grouper		X			Concern	Juvenile/ Adult	Coral reefs and rocky areas							fish, crustaceans
<i>Haemulon aurolineatum</i>	Tomtate		X			Concern	Juvenile/ Adult	SAV, sand flats, and patch reefs		X		X		X	crustaceans, molluscs and other invertebrates, plankton, algae
<i>Rhomboplites aurorubens</i>	Vermilion snapper		X			Concern	Juvenile/ Adult	Moderately deep waters, over rock, gravel or sand bottoms near edge of cont. shelf; Juv: shallower depths below 25 m (82 ft)							fish, shrimp, crabs, benthic invert, cephalopods, plankton
<i>Acanthocybium Solanderi</i>	Wahoo		X			Viable	Juvenile/ Adult	Oceanic, epipelagic, coastal					X		fish, squid
<i>Epinephelus nigritus</i>	Warsaw grouper		X			Concern	Juvenile/ Adult	Rocky bottoms; Juv: jetties, shallow reefs							crabs, shrimp, lobster, fish

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					ASMFC (0- 3 NM)	NCDMF Stock Status (2002)									
<i>Cynoscion regalis</i>	Weakfish				X	Viable	Juvenile/ Adult	Shallow water over sand, sandy mud bottoms; in summer move to river estuaries	X			X	X	X	crustaceans, fish
<i>Haemulon plumieri</i>	White grunt		X			Concern	Juvenile/ Adult	Adults: patch reefs, coral heads, sandy bottoms; Juv: SAV (<i>Thalassia</i>)		X				X	crustaceans, fish, molluscs
<i>Tetrapturus albidus</i>	White marlin	X						Deep water, over 100 m (328 ft)							fish, squid
<i>Morone americana</i>	White perch					Concern	Juvenile/ Adult	Rivers, sounds					X		crabs, shrimp, and small fishes
<i>Calamus leucosteus</i>	Whitebone porgy		X			Concern		Fairly deep water, 10-100 m (33-328 ft), over rocks, reefs or patchy bottom							crustaceans, molluscs
<i>Polyprion americanus</i>	Wreckfish		X			Concern		Inhabit caves and shipwrecks; Juv: congregate below floating objects							crustaceans, cephalopods and benthic fishes
<i>Persca flavescens</i>	Yellow perch					Concern	Juvenile/ Adult	Rivers, estuaries	X				X		fish, insect larvae, plankton, and worms
<i>Mycteroperca venenosa</i>	Yellowfin grouper		X			Concern	Juvenile/ Adult	Juv: shallow SAV (<i>Thalassia</i>) beds; Adults: rocky and coral reefs, mud bottoms, 2 to 137 m (6.6-450 ft)		X					fish, squid
<i>Thunnus albacares</i>	Yellowfin tuna	X						Oceanic							fish, crustaceans, squid
<i>Mycteroperca interstitialis</i>	Yellowmouth grouper		X			Concern	Juv/Sm Adult	Rocky or coral bottoms from shoreline to at least 55 m (509 ft) depth; smaller fish: lagoons					X		fish
<i>Ocyrus chrysurus</i>	Yellowtail snapper		X			Concern	Juvenile/ Adult	Coastal water, coral reefs; Juv: SAV		X			X		plankton, fish, crustaceans, worms, gastropods, cephalopods