

Nearshore and Offshore Marine Ecosystems

The marine environments found offshore North Carolina's barrier islands, including hardbottoms, have been previously described in USFWS (1999), USFWS (2000a), USFWS (2000b) and USFWS (2002a), which are incorporated by reference here. The Cape Lookout area is more diverse than most marine areas along the U.S. Atlantic coast due to the mixing of the Gulf Stream from the south with the Labrador Current from the north. As a result of this oceanographic mixing, the marine flora and fauna are a mixture of cold-water and warm-water species. Highly migratory aquatic species such as whales and recreationally important finfish are common. Seabirds from the Arctic and the tropics co-mingle, with the unique east-west orientation of Bogue and Shackleford Banks often providing the first or last landfall for north-south migrating birds.

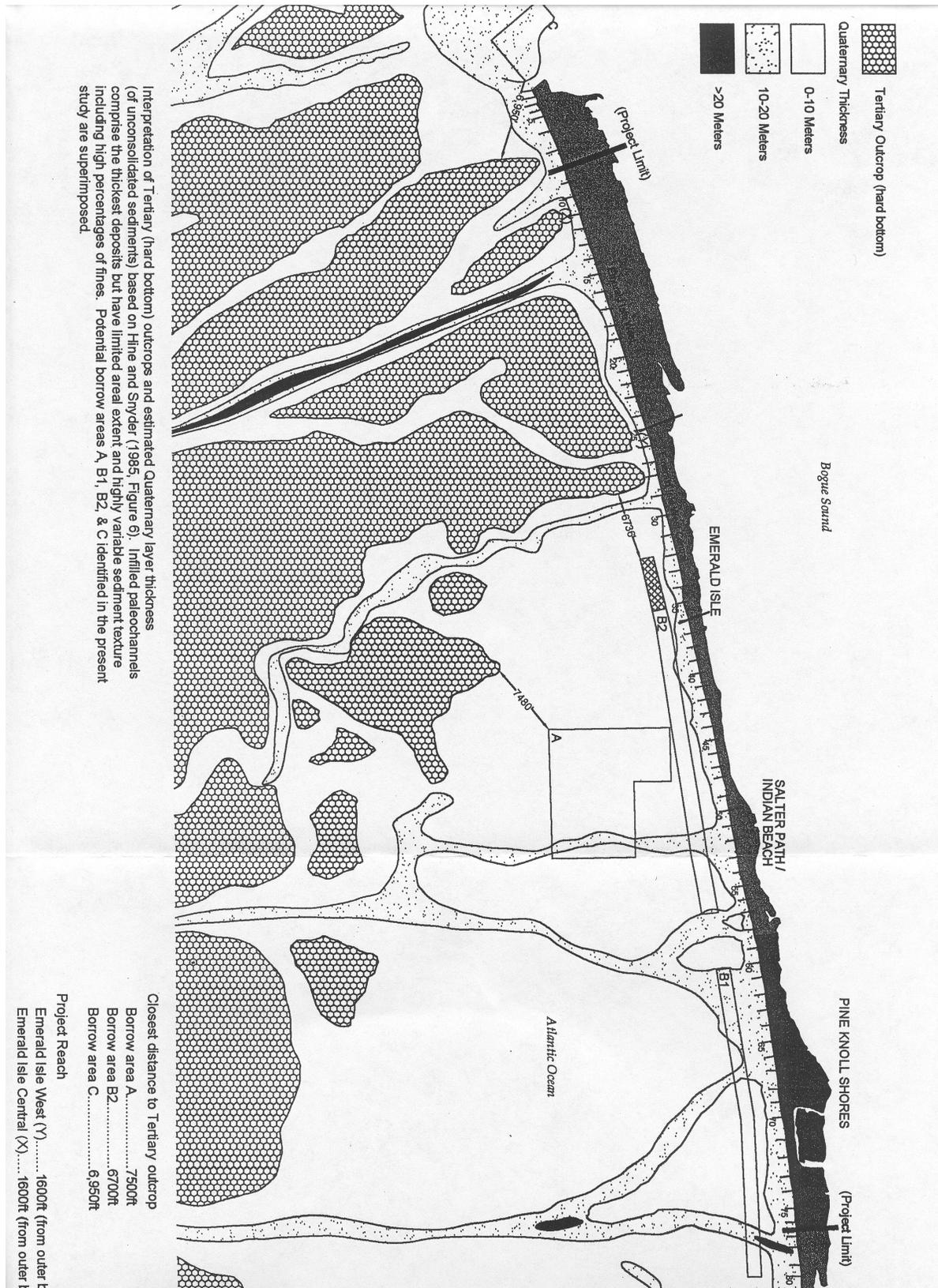
Bogue Banks serves as a transitional marine environment in another way as well – the seafloor offshore is dominated by hardbottoms to the west and softer sediment substrates to the east. Several studies have documented the hardbottom areas offshore (e.g., Hine and Snyder 1985; Mallette 1986; Steele 1986) and Figure 22 reproduces the distribution map of Hine and Snyder (1985) as included in CSE and Stroud (2000). The hardbottoms approach the beaches of Bogue Banks fairly closely, as evidenced by the fairly regular occurrence of coral and other encrusting organisms washing up on the beaches of the island (Figure 23).

The marine seafloor also supports numerous artificial reefs in varying states of stability (i.e., Artificial Reefs 315, 320, 330, 340, 342, and 345). Roughly two decades ago the state used discarded tires to construct some of these reefs. The metal chain fastening the tires together has subsequently corroded and the tires have washed up on the beaches of Bogue Banks following recent hurricanes. The local beach fill project also uncovered over 4000 of the tires in the three offshore dredge sites. Countless shipwrecks are found offshore Bogue and Shackleford Banks, ranging from World War II military vessels to 19th and early 20th century passenger transport and Colonial vessels.

The dredges for the recent local beach fill project also encountered five federally-protected sea turtles in their offshore dredge sites, killing four and injuring one. The turtles were encountered during December and April, indicating the high productivity of the marine area offshore Bogue Banks when waters exceed approximately 58 degrees Fahrenheit.

Recreational and commercial fishing is a multimillion dollar industry in the offshore project area. Several fishing tournaments are held each year targeting specific species such as blue marlin (*Makaira nigricans*), yellowfin tuna (*Thunnus albacares*), wahoo (*Acanthocybium solanderi*), dolphin (*Corypaena hippurus*) and king mackerel (*Scomberomorus cavalla*). Table 11 lists the annual catch and value of commercial fisheries landed in Carteret County that were harvested within 3 miles of shore from Cape Hatteras south to the South Carolina boundary. Table 12 lists the same data for catches from federal waters (those greater than 3 miles offshore). Over 140 different fishery resources are harvested from the nearshore and offshore waters. Fishery landings made in Carteret County are presumed to require travel through the proposed project area.

Figure 22. Extensive areas of hardbottom occur offshore Bogue Banks, as reproduced from Hine and Snyder (1985) from CSE and Stroud (2000). Figure 22a shows the hardbottom areas off of the western portion of the island and Figure 22b the eastern portion of the island.





Closest distance to Tertiary outcrop

Borrow area A7500ft
Borrow area B26700ft
Borrow area C6,950ft

Project Reach

Emerald Isle West (Y)1600ft (from outer bar)
Emerald Isle Central (X)1600ft (from outer bar)

Estimated Quaternary layer thickness
 Snyder (1985, Figure 6). Infilled paleochannels
 at extent and highly variable sediment texture
 ow areas A, B1, B2, & C identified in the present

Table 11. Commercial fisheries landings made in Carteret County from the nearshore and offshore marine area south of Cape Hatteras to the South Carolina border and within 3 miles of shore, 1994 to 2001. Data are provided by the North Carolina Division of Marine Fisheries and represented in state fiscal years (July 1 through June 30).

Year	Landings (lbs)	Estimated Value
1994	77,035,013.63	\$ 4,164,463.69
1995	63,799,951.89	\$ 5,446,336.66
1996	62,658,021.46	\$ 7,929,216.92
1997	109,609,244.82	\$ 11,411,581.18
1998	64,110,110.50	\$ 6,591,962.75
1999	42,211,465.60	\$ 4,591,076.12
2000	55,081,596.57	\$ 4,749,465.24
2001	54,680,854.74	\$ 5,239,279.55
1994-2001 Average	66,148,282.40	\$ 6,265,422.76

Table 12. Commercial fisheries landings made in Carteret County from the nearshore and offshore marine area south of Cape Hatteras to the South Carolina border and greater than 3 miles from shore, 1994 to 2001. Data are provided by the North Carolina Division of Marine Fisheries and represented in state fiscal years (July 1 through June 30).

Year	Landings (lbs)	Estimated Value
1994	3,441,498.14	\$ 4,017,915.52
1995	4,878,202.04	\$ 6,343,473.36
1996	3,215,636.19	\$ 4,011,477.72
1997	5,938,877.00	\$ 4,219,268.25
1998	4,498,620.20	\$ 4,336,147.01
1999	4,359,971.35	\$ 3,839,928.59
2000	4,686,378.69	\$ 4,471,756.95
2001	3,061,194.26	\$ 3,761,611.99
1994-2001 Average	4,260,047.23	\$ 4,375,197.42

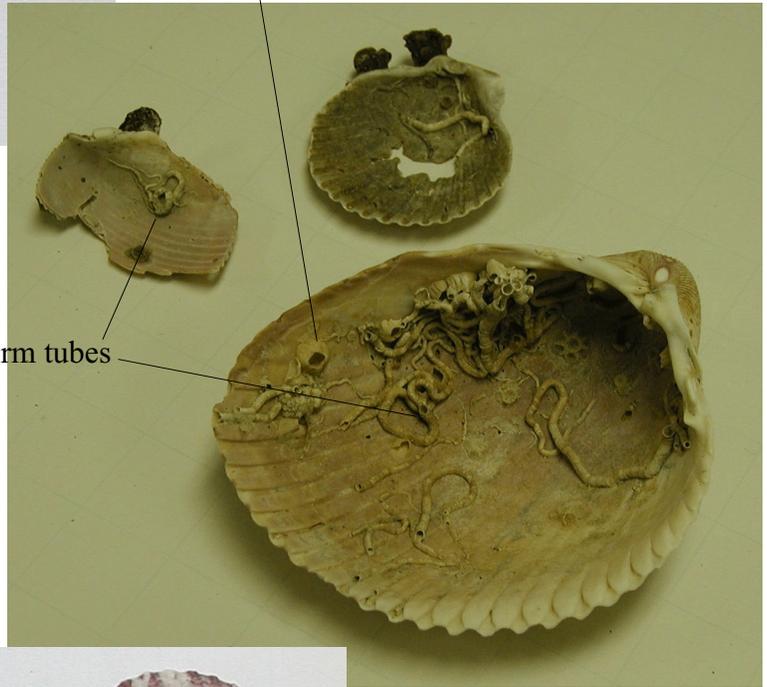
Figure 23. Coral, encrusting and boring (endolithic) fauna are often found along the beaches of Bogue Banks, indicating the presence of hardbottoms in the nearshore and offshore. Hardbottoms are the preferred habitat for creatures requiring rock outcrops or similar hard substrates to attach to, grow over or bore into. These fauna also may attach to exposed shells, as shown below. The presence of encrusted shells indicates the presence of these fauna in the nearshore and offshore waters of the project area. The pale blue lines in each photo are one inch apart for scale.



Coral encrusting an auger shell

Barnacles

Coral growing on shell fragments



Encrusting worm tubes



Tunicates

Encrusting bryozoa

Numerous captains offer half and full day recreational charters offshore to catch various species of fish, watch seabirds or marine mammals, dive shipwrecks or reefs, or experience “mystery tours” revolving around the human history offshore Bogue and Shackleford Banks. Half-day charters for deep sea fishing range from \$ 40 - 50 per adult. Full-day charters range from \$ 60 - 65 per adult. Private charters of 49 to 80 adults cost \$ 3000 - 5000 depending on the season and day of the week. Smaller private charter boats (6 adults or less) cost \$ 650 - 1350 for full-day and \$ 300 - 500 for half-day deep water cruises. Boat rentals for nearshore and sound cruises are also available for \$ 250 to 400 per day.

Dolphin watching cruises extolling “beautiful views of salt marsh, wildlife and beautiful homes” are advertised for \$250 for 1.5 to 2 hours. Others advertise birding, sightseeing, nature photography and shell collecting for \$400 a day.

Some local dive companies advertise that “North Carolina is without a doubt the premier dive destination on the entire East Coast.” The marine waters offshore Bogue and Shackleford Banks are described as “warm, clear waters ... with visibility of up to 200 feet”, implying their dependence on the water quality of the offshore marine area for their business. Snorkeling and scuba trips, including instruction, cost \$175 per person. Trips list tropical fish, soft corals, moray eels, lobsters, sea turtles, large game fish and sharks as attractions.

Besides the extensive hardbottoms in the offshore marine area, there are two known sand bodies. The offshore project area contains the Offshore Dredged Material Disposal Site (ODMDS) for dredge spoils from maintenance dredging of navigational channels and the experimental nearshore disposal site offshore eastern Atlantic Beach. Biological resources in these two areas is are not readily known. A third area with almost unlimited supplies of sand are the Cape Lookout shoals. These natural shoals have been designated as an HAPC by the SAFMC for their very high aquatic resource value.