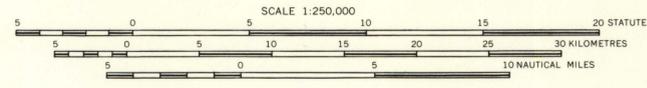
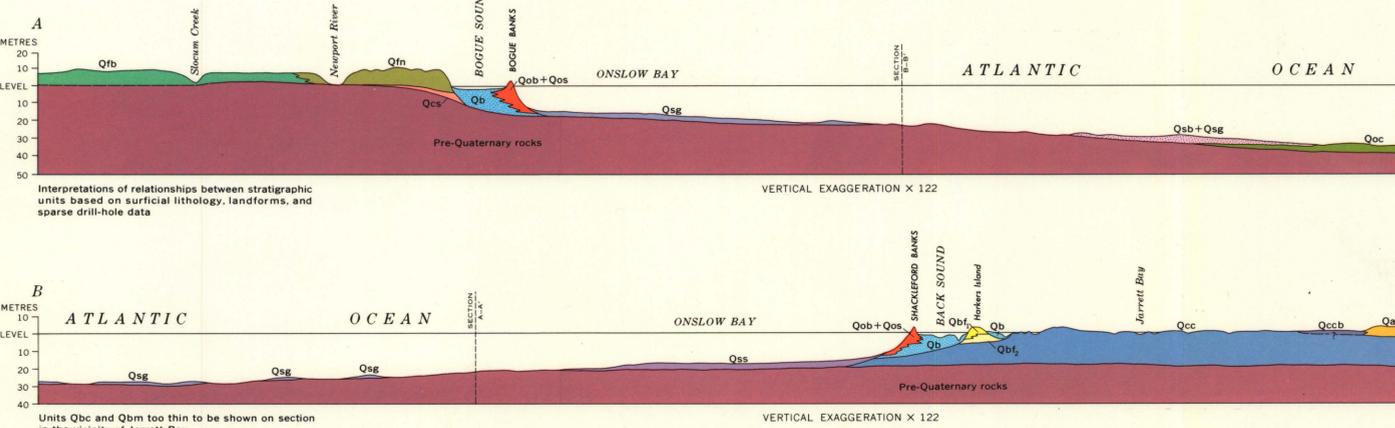


- DESCRIPTION OF MAP UNITS**
- Qm** FORAMINIFERAL MUD (HOLOCENE)—Sandy mud, various shades of brown, poorly sorted, median grain size ranges from silt to very fine sand; micaceous. Abundant Foraminifera; locally, Foraminifera content is high enough to classify sediment as a foraminiferal ooze for "salt-and-pepper" appearance. Shell material generally comprises less than 5 percent of sediment. Unit gradational with Qos.
 - Ql** CAPE LOOKOUT SAND (HOLOCENE)—Light-gray to light-yellowish-gray, fine- to medium, well-sorted, commonly micaceous. Black and brown sand-sized shell fragments and heavy minerals responsible for "salt-and-pepper" appearance. Shell material generally comprises less than 5 percent of sediment. Unit gradational with Qos.
 - Qob** OUTER BANKS SAND (HOLOCENE)—Quartz and shell sand, well-sorted, fine to coarse, pale-gray, yellowish-brown, and yellowish-green; includes very minor amounts of fine gravel. Shell fraction includes large angular to rounded fragments and whole valves of mollusks. Black heavy mineral locally abundant.
 - Qos** Beach and dune deposits
 - Qsb** Shoreface deposits gradational with beach facies of Qob; below water depth of approximately 6 metres contains considerable silt and clay
 - Qns** NORTH BAY SAND (HOLOCENE)—Well-sorted, pale-gray to yellowish-gray; forms a narrow estuarine barrier at the southern edge of Pamlico Sound and a beach and dune ridge west of Turtleneck Bay
 - Qns** Beach and dune deposits
 - Qbs** SHOREFACE DEPOSITS GRADATIONAL WITH Qns
 - Qbc** LAGOONAL AND ESTUARINE DEPOSITS (HOLOCENE)—Sand, light- to dark-gray or yellowish-brown, mainly very fine to fine; medium sand and coarser sediments concentrated in tidal channels and inlets. Calcium carbonate content ranges from 5 to 10 percent; dominant carbonate component is black-stained mollusk fragments. No iron-staining on quartz grains. Unit composes bottom sediment of most of Bogue, Core, and Pamlico Sounds and margins of Neuse estuary
 - Qbc** Sandy silt and clay, commonly contains fibrous organic matter. CaCO₃ content is low. Composes bottom sediment of deeper water areas of sounds and bays, upper reaches of small estuaries, and main channel of Neuse River estuary below the 13-foot (4-metre) bottom contour
 - Qbm** Soft silt and clay mud and peat, lesser amounts of clayey and silty sand. Salt-marsh grasses *Spartina alterniflora* and *Spartina patens* dominate flora
 - Qb** Backbarrier deposits, undifferentiated. Unit shown only in cross sections
 - Qsc** SANDY SHELF DEPOSITS (HOLOCENE AND PLEISTOCENE)—Quartz sand, medium-grained, shelly; calcium carbonate fraction is composed mostly of mollusk and barnacle fragments but includes abundant oolites and calcareous algae
 - Qsb** Grayish-brown to light-yellowish-brown; shell fragments, oolites, and algal material comprise up to 15 percent of sediment. Quartz grains and shell fragments stained brown by iron oxide
 - Qsg** Dark-gray, shell fragments and oolites comprise up to 80 percent of sediment. Black-stained shell material causes overall dark-gray sediment color or "salt-and-pepper" appearance
 - Qss** MUDDY SHELF DEPOSITS (HOLOCENE AND PLEISTOCENE)—Silty sand, grayish-brown to dark-gray, fine to medium, poorly sorted, commonly micaceous. Silt fraction generally about 10 percent of sediment. Calcareous material, largely sand-sized skeletal fragments, ranges from 10 to 50 percent. Gradational with Qsc and Qsg
 - Qsc** Clayey silt and very fine clayey sand, gray-green to dark-gray; calcium carbonate content less than 15 percent
 - Qc** COQUINA (HOLOCENE AND PLEISTOCENE)—Calcareite and calcarenite, light-brown to gray, consists largely of coarse sand- to pebbled-sized carbonate skeletal material (mostly pelecypoda) and lesser amounts of coarse quartz grains cemented by coarsely crystalline low-magnesium calcite. Shell fragments tend to be very well rounded and commonly retain original coloration. Molluscan fauna includes *Mulinia lateralis*, *Cardium* sp., *Nucula proxima*, *Donax roemeri proxima*, *Donax roemeri protracta*, *Turbo* sp., *Plicatula* sp., *Crasostrea virginica*, and *Mercenaria campechiensis*
 - Qa** ALGAL LIMESTONE AND CALCAREOUS SANDSTONE (PLEISTOCENE)—Algal limestone, brown, extensively bored and infilled; consists of encrusting algae and sand-sized skeletal grains in a sub-microcrystalline matrix; dominant mineral is high-magnesium calcite. Sandstone consists of fine to coarse calcareous skeletal fragments with 10 to 50 percent quartz and feldspar grains in a submicrocrystalline, high-magnesium calcite matrix
 - Qoc** OOLITIC CALCARENITE (PLEISTOCENE)—Light-brown to yellow-brown or gray; consists of unrecrystallized oolites and a few coarse carbonate skeletal grains in a chalky to dense microcrystalline calcareous matrix. Gross rock-carbonate mineralogy is 55 to 75 percent aragonite with high-magnesium calcite generally dominant over low-magnesium calcite
 - Qcl** CEDAR ISLAND SAND (HOLOCENE AND PLEISTOCENE)—Well-sorted quartz sand, forms northwest trending beach ridges. Numerous round to elliptical depressions, some with low sand rims and organic fill, are aligned parallel to beach ridges. Average surface elevation is 5 to 10 feet above sea level; range is mean sea level (MSL) to 12 feet in elevation
 - Qcl** Silty and clayey sand of Pleistocene age overlain by a thin veneer of Holocene salt-marsh peat, mud, and sand. Forms flats covered in large part by high tides. Maximum elevations about 2 feet above MSL
 - Qt** NEUSE RIVER TERRACE DEPOSITS (PLEISTOCENE)—Sand, silt, and clay comprising channel and overbank deposits of an abandoned Neuse River flood plain; elevation of dissected surface ranges from sea level to 14 feet above sea level. To the north, adjacent to map area, terrace surface is modified by Carolina Bays
 - Qbf** BEAUFORT SAND (PLEISTOCENE)—Quartz sand, well-sorted, generally nonfossiliferous; forms broad discontinuous ridge in the vicinity of Morehead City and eastward, no beach ridge topography preserved
 - Qbf** Quartz sand, clayey and silty, commonly highly fossiliferous. Unit shown only in section B-B'
 - Qas** ATLANTIC SAND (PLEISTOCENE)—Quartz sand, well-sorted; in northeast and central parts of outcrop area, forms northwest-trending beach ridges, average surface elevation is 10 to 15 feet, ranging upward to 20 feet. Southwest part of outcrop area is characterized by lower relief and arcuate, northeast-trending sand ridges; arcs are convex northwestward. Slightly to strongly elliptical northwest-oriented depressions, some with well-developed sand rims and organic fill, truncate beach and dune-ridge topography
 - Qcc** CORE CREEK SAND (PLEISTOCENE)—Quartz sand, silty and clayey, bluish-gray, fossiliferous, commonly interbedded with thin clays. Uppermost 5 to 10 feet of unit, below the soil zone, commonly consists of moderately well-sorted sand with clay laminae as cross beds. Very abundant *Donax roemeri protracta* along with some *Spisula solidissima* in spoil piles along Adams Creek Canal and at USGS locality 10892 indicate that much of the fossiliferous sands in this area were deposited nearshore in shallow water of normal salinity. West and southwest of Atlantic barrier complex, uppermost part of map unit probably includes finer grained backbarrier sediments (tentatively differentiated as Qccb on section B-B') correlative with the Atlantic sand. Thickness ranges from about 25 feet or less near Grantsboro scarp to 50 or 60 feet near Core Sound. Unit appears to overlie directly upper Miocene and Pliocene marine beds (Yorktown Formation, including James City Formation of Du Bar and Soliday 1963). Surface is undulating and slightly dissected but slopes generally east-northeastward from elevations of 17 to 18 feet along western margin of plain (top of Grantsboro scarp, see fig. 5) to merge with 4- to 8-foot lowland west of Atlantic sand-ridge complex
 - Qms** MINNESOTT SAND (PLEISTOCENE)—Quartz sand, fine to coarse, well-sorted; underlies a broad ridge west and parallel to the Grantsboro scarp. Unit is 15 feet or more thick in eastern part of outcrop; it thins westward to a featheredge. Probably comprises beach and dune deposits correlative in part with the Atlantic sand
 - Qbg** BOGUE SAND (PLEISTOCENE)—Very poorly exposed, forms a highly dissected plain ranging in elevation from sea level to 25 feet
 - Qfn** FLANNER BEACH FORMATION (PLEISTOCENE)—NEWPORT SAND MEMBER—Quartz sand, fine to coarse, well-sorted, locally contains fine to very fine quartz and chert pebbles. Thickness ranges from about 10 to 40 feet. Forms a set of about 40 beach ridges, trending northeast and flaring to east-northeast in an oceanward direction; ridges are truncated by depressions with sand rims ranging from small rounded mounds to larger elliptical oriented northwest. Surface elevation ranges from 25 to 42 feet above sea level
 - Qfa** ARAPAHO SAND MEMBER—Quartz sand, fine to coarse, moderately to well-sorted, commonly crossbedded; western part includes more poorly sorted, siltier sands. Unit is 25 feet or more thick, but thins westward and overlaps or interfingers with clayey and silty sands and silt of the Beard Creek member of the Flanner Beach Formation. Unit is difficult to distinguish from overlying Minnesott sand and locally includes this unit
 - Qfb** BEARD CREEK MEMBER—Sand, clayey and silty, blue-gray, highly fossiliferous, commonly interbedded with clay and silty clay beds up to 4 or 5 feet thick; locally, uppermost part of unit is well-sorted sand. Maximum thicknesses (40 to 50 feet or more) occur along an inferred Neuse River paleochannel (fig. 4). Surface of unit is a flat, poorly drained, generally featureless plain with swamps and shallow lakes, dissected near borders; elevations range from 30 to 40 feet above sea level over much of area, but are 20 to 30 feet along ancestral Neuse River estuary. Abundant mollusks (see table 1, locs. HL-1 and UB-1A) and an ostracode assemblage dominated by "Haploecytheridea" *setispunctata* and *H. bradyi*—in conjunction with the absence of *Donax* and *Spisula*—suggest deposition in a brackish water environment similar to the outer parts of the present Pamlico Sound
 - Qcs** CLAYEY SAND (PLEISTOCENE)—Clayey and silty sand, bluish-gray, interbedded with clays up to 8 inches thick. Molluscan fauna (see table 1, loc. SP-1) is dominated by *Mulinia* but includes species such as *Donax roemeri protracta* and *Spisula solidissima* which are characteristic of nearshore normal marine environments. Unit shown only on section A-A'
 - Ty** YORKTOWN FORMATION (LOWER PLEISTOCENE AND UPPER MIOCENE)—Clayey and silty sand and clay, gray to bluish-gray or greenish-gray, commonly very fossiliferous; sand-sized fraction mainly quartz with minor amounts of feldspar, glauconite, phosphorite, and pyrite. Outcrops in Onslow Bay are calcareous quartz sandstone, light- to medium-gray, extensively bored; borings commonly filled with limbed material derived from unconsolidated sediment cover. Thickness ranges from a few feet to over 100 feet in the eastern part of the map area. Outcrop areas along Neuse and Newport Rivers and tributaries exaggerated
- Legend:**
 — Contact
 ——— Toe of scarp, ticks toward higher topography
 - - - - - Inferred shoreline
 • Sample localities
 □ Box dredge
 × Rock dredge
 ⊗ Fossil locality
 ⊙ HL-1 Outcrop, auger hole, or spoil pile (designation refers to table 1)
 ⊙ Well used for cross section control (see plate 2)

Onshore base from U.S. Geological Survey, 1:250,000, Beaufort, 1964, and Rocky Mount, 1963; shoreline and bathymetry from National Oceanic and Atmospheric Administration, 1:250,000, N.O.S. 0806N-23, 1972
 10-foot onshore contours generalized from U.S. Geological Survey 7 1/2-minute quadrangles
 Offshore contour interval 2 metres to the 200 metre depth, 10 metres to maximum depth



Geology of emerged Coastal Plain by Robert B. Nixon, 1971. Geology of submerged Coastal Plain by Orrin H. Pilkey, 1971



Interpretations of relationships between stratigraphic units based on surficial lithology, landforms, and sparse drill-hole data

Units Qbc and Qbm too thin to be shown on section in the vicinity of Jarrett Bay

GEOLOGIC MAP AND CROSS SECTIONS OF THE SUBMERGED AND EMERGED COASTAL PLAIN PROVINCE, CAPE LOOKOUT AREA, NORTH CAROLINA