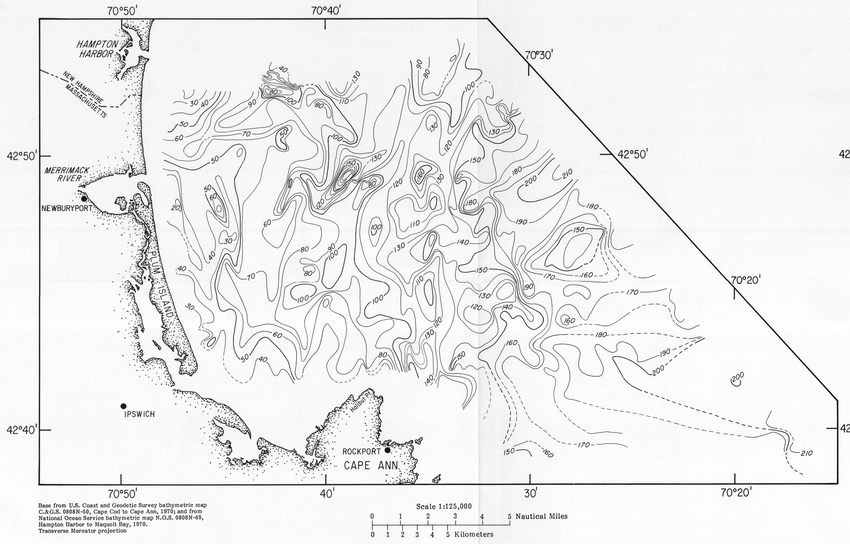
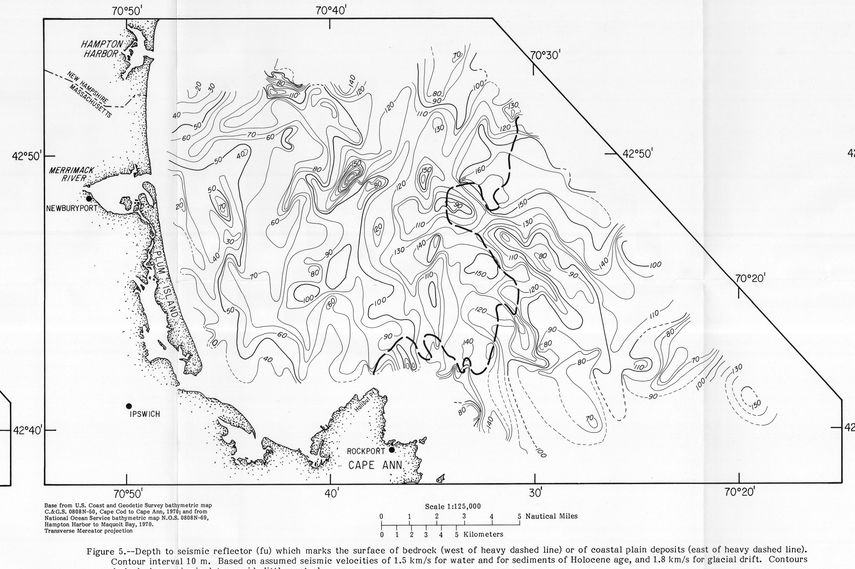


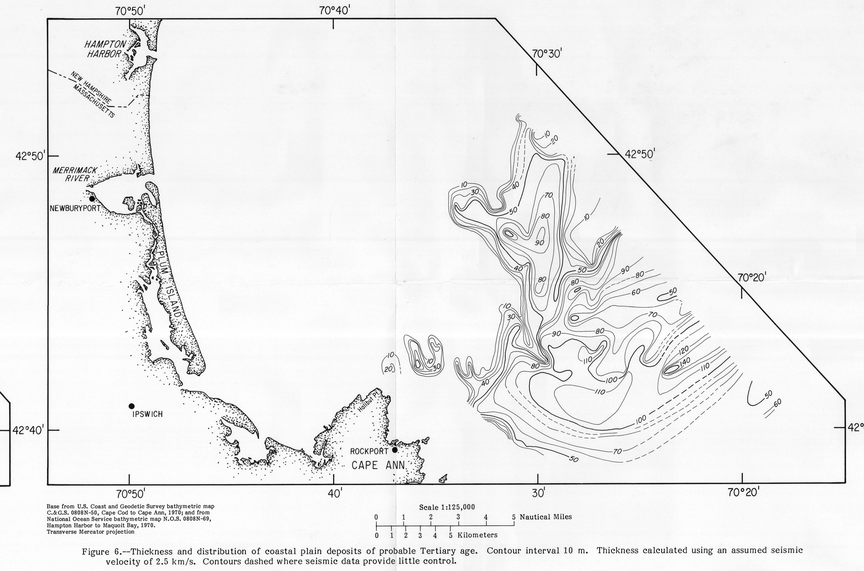
Base from U.S. Coast and Geodetic Survey bathymetric map C.&G.S. 8888N-59, Cape Cod to Cape Ann, 1976; and from National Ocean Service bathymetric map N.O.S. 8888N-69, Hampton Harbor to Maquoit Bay, 1976. Transverse Mercator projection

Figure 4.--Depth to bedrock surface. Contour interval 10 m. Based on assumed seismic velocities of 1.5 km/s for water and for sediments inferred to be of Holocene age, 1.8 km/s for inferred Pleistocene sediments, and 2.5 km/s for sediments inferred to be of Tertiary or Cretaceous age. Contours dashed where seismic data provide little control.



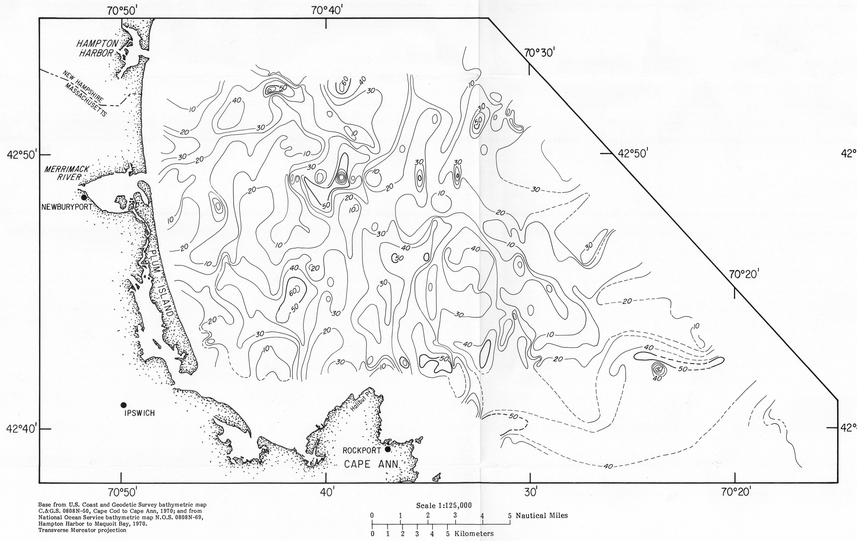
Base from U.S. Coast and Geodetic Survey bathymetric map C.&G.S. 8888N-59, Cape Cod to Cape Ann, 1976; and from National Ocean Service bathymetric map N.O.S. 8888N-69, Hampton Harbor to Maquoit Bay, 1976. Transverse Mercator projection

Figure 5.--Depth to seismic reflector (fu) which marks the surface of bedrock (west of heavy dashed line) or of coastal plain deposits (east of heavy dashed line). Contour interval 10 m. Based on assumed seismic velocities of 1.5 km/s for water and for sediments of Holocene age, and 1.8 km/s for glacial drift. Contours dashed where seismic data provide little control.



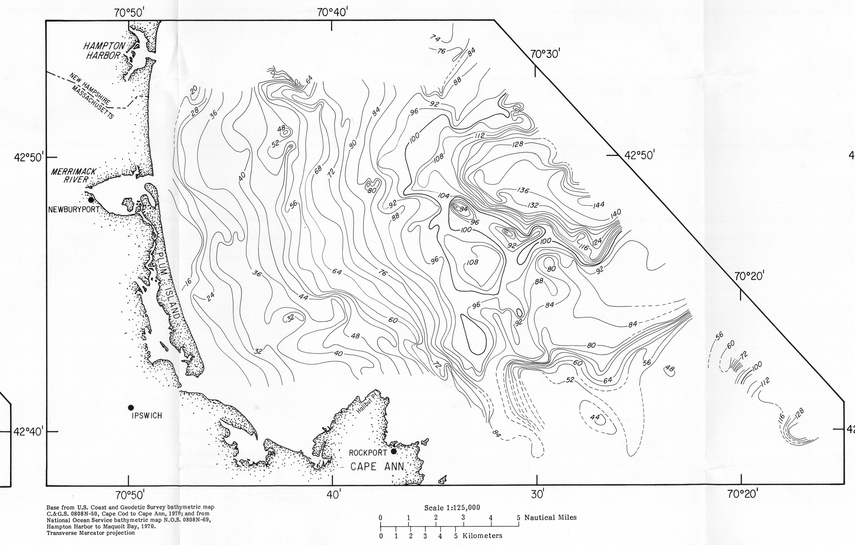
Base from U.S. Coast and Geodetic Survey bathymetric map C.&G.S. 8888N-59, Cape Cod to Cape Ann, 1976; and from National Ocean Service bathymetric map N.O.S. 8888N-69, Hampton Harbor to Maquoit Bay, 1976. Transverse Mercator projection

Figure 6.--Thickness and distribution of coastal plain deposits of probable Tertiary age. Contour interval 10 m. Thickness calculated using an assumed seismic velocity of 2.5 km/s. Contours dashed where seismic data provide little control.



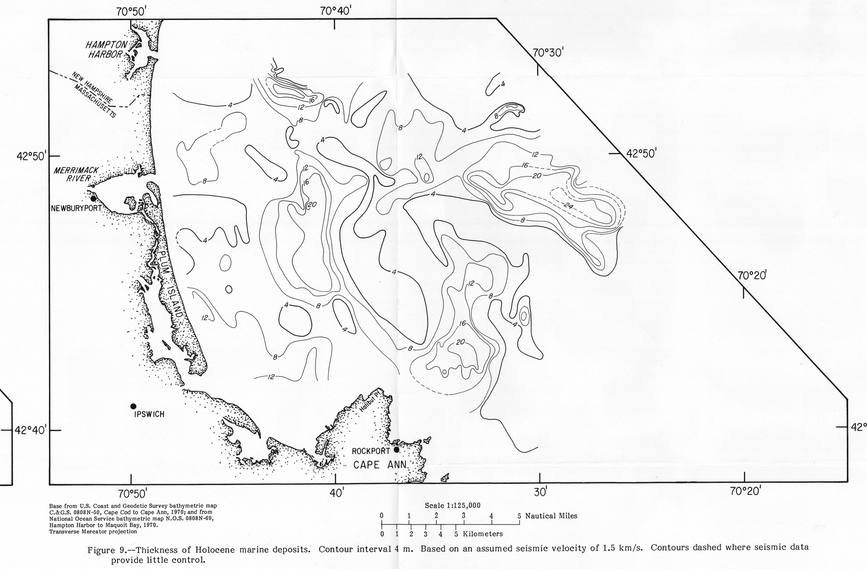
Base from U.S. Coast and Geodetic Survey bathymetric map C.&G.S. 8888N-59, Cape Cod to Cape Ann, 1976; and from National Ocean Service bathymetric map N.O.S. 8888N-69, Hampton Harbor to Maquoit Bay, 1976. Transverse Mercator projection

Figure 7.--Thickness of glacial drift. Includes coarse-grained submarine deposits (Qdt) and fine-grained glacial marine deposits (Qmd). Contour interval 10 m. Thickness calculated using an assumed seismic velocity of 1.8 km/s. Contours dashed where seismic data provide little control.



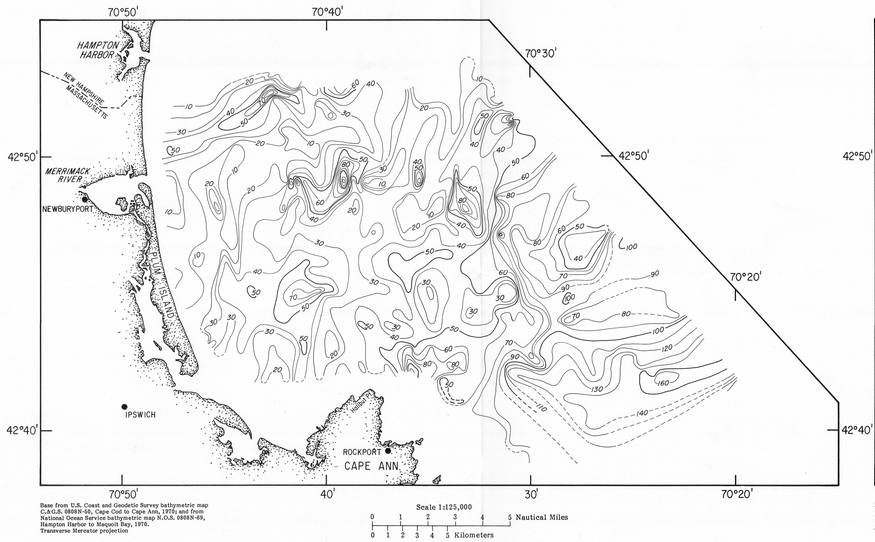
Base from U.S. Coast and Geodetic Survey bathymetric map C.&G.S. 8888N-59, Cape Cod to Cape Ann, 1976; and from National Ocean Service bathymetric map N.O.S. 8888N-69, Hampton Harbor to Maquoit Bay, 1976. Transverse Mercator projection

Figure 8.--Depth to the glacial drift surface (ru; see figure 3). Contour interval 4 m. Based on an assumed seismic velocity of 1.5 km/s for water and for sediments of Holocene age. Contours dashed where seismic data provide little control.



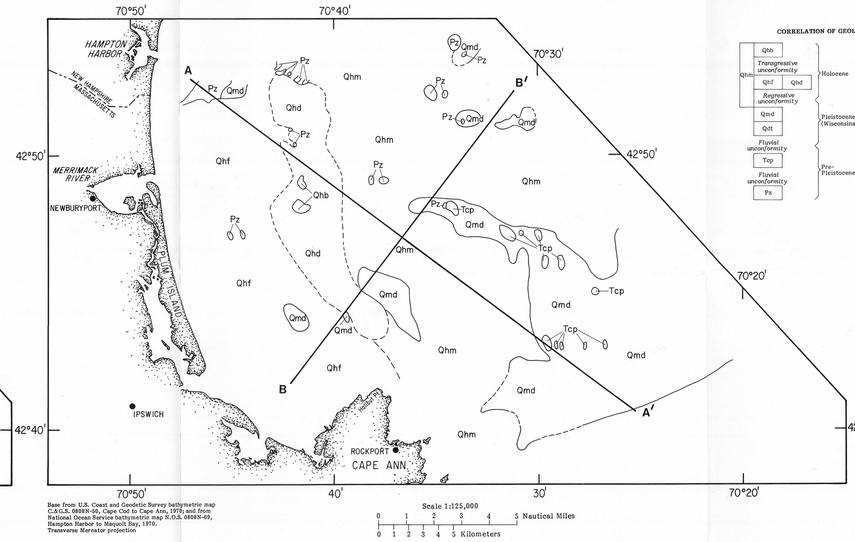
Base from U.S. Coast and Geodetic Survey bathymetric map C.&G.S. 8888N-59, Cape Cod to Cape Ann, 1976; and from National Ocean Service bathymetric map N.O.S. 8888N-69, Hampton Harbor to Maquoit Bay, 1976. Transverse Mercator projection

Figure 9.--Thickness of Holocene marine deposits. Contour interval 4 m. Based on an assumed seismic velocity of 1.5 km/s. Contours dashed where seismic data provide little control.



Base from U.S. Coast and Geodetic Survey bathymetric map C.&G.S. 8888N-59, Cape Cod to Cape Ann, 1976; and from National Ocean Service bathymetric map N.O.S. 8888N-69, Hampton Harbor to Maquoit Bay, 1976. Transverse Mercator projection

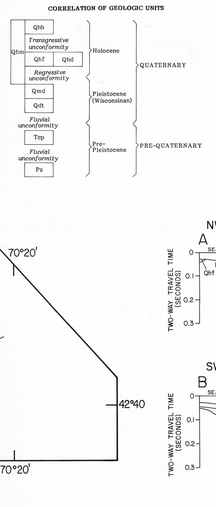
Figure 10.--Total sediment thickness above bedrock. Contour interval 10 m. Based on assumed seismic velocities of 2.5 km/s for coastal plain sediments, 1.8 km/s for glacial drift, and 1.5 km/s for marine sediments of Holocene age. Dashed where seismic data provide little control.



Base from U.S. Coast and Geodetic Survey bathymetric map C.&G.S. 8888N-59, Cape Cod to Cape Ann, 1976; and from National Ocean Service bathymetric map N.O.S. 8888N-69, Hampton Harbor to Maquoit Bay, 1976. Transverse Mercator projection

Figure 11.--Map and cross sections showing distribution and stratigraphy of the geologic units. Units shown crop out at the sea floor or are overlain by younger sediments too thin to resolve in the seismic data. Seismic velocities assumed for the geologic units are 2.5 km/s for coastal plain sediments, 1.8 km/s for glacial drift, and 1.5 km/s for marine sediments of Holocene age. In cross sections, apparent-dip scale and vertical exaggeration are based on a seismic velocity of 1.5 km/s. Vertical exaggeration is abbreviated vert. exag.

CORRELATION OF GEOLOGIC UNITS



DESCRIPTION OF GEOLOGIC UNITS

Qtb **Bar deposits (Holocene)**—Mostly sand; may include some gravel. Unit generally less than 4 m thick. Forms sand waves and ridges atop the transgressive unconformity (tu; see figure 3, profiles C, E, F, and G)

Qhf **Fluvial deposits (Holocene)**—Mostly sand; may include some gravel, silt, and clay. Unit generally 8-12 m thick. Overlies the regressive unconformity (ru; see figure 3, profiles A-H). Considered to be subaerial stream and marine estuarine-deposits formed during the late Wisconsinan to early Holocene lowstand of sea level. Grades offshore into deltaic deposits

Qhd **Deltaic deposits (Holocene)**—Mostly sand; includes silt and probably some gravel and clay. Unit up to 20 m thick. Underlain by drift. Makes up a drowned delta of the Merrimack River. Grades offshore into deep-water marine deposits

Qhm **Marine deposits (Holocene)**—Mostly silt and clay; includes sand and possibly gravel. Unit up to 24 m thick. Occurs offshore in deep water. Conformably overlies glacial marine silt and clay in most places

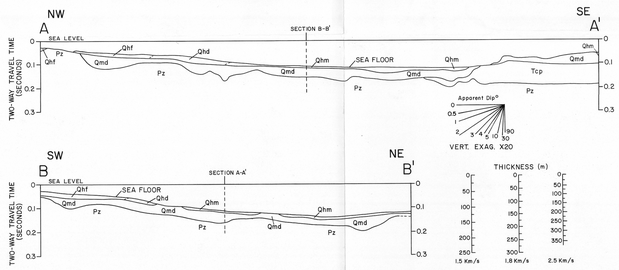
Qmd **Glacial marine deposits (Pleistocene)**—Mostly silt and clay with minor sand; may become sandier adjacent to bathymetric highs. Unit averages 40 m thick but is as much as 90 m thick in glacially scoured valleys. Overlies ice-contact drift and outwash; unconformably overlies coastal plain deposits and bedrock

Qdt **Coarse submarine glacial drift (Pleistocene)**—Ice-contact and outwash deposits of sand and gravel, and till. Thin and discontinuous drift below glacial marine deposits (Qmd). Unit may include older drift, possibly drumlin till of early to pre-Wisconsinan age. Unconformably overlies bedrock and coastal plain deposits. Shown on interpreted seismic profiles (fig. 3) only

Tcp **Coastal plain deposits (Tertiary)**—Inferred to be unconsolidated to consolidated gravel to clay similar to coastal plain and continental shelf sediments on Tippecanoe Ledge in the Gulf of Maine and in the subsurface of Martha's Vineyard and Nantucket (Schlee and Cheetham, 1967; Folger and others, 1978). Unit unconformably overlies bedrock

Pz **Bedrock (Mesozoic or older)**—Igneous, metamorphic, and sedimentary rock similar to that exposed on land adjacent to the map area

Contact—Dashed where approximately located or where inferred



MAPS AND SEISMIC PROFILES SHOWING GEOLOGY OF THE INNER CONTINENTAL SHELF, CAPE ANN, MASSACHUSETTS TO NEW HAMPSHIRE

By
Robert N. Oldale and Lynne E. Wommack

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