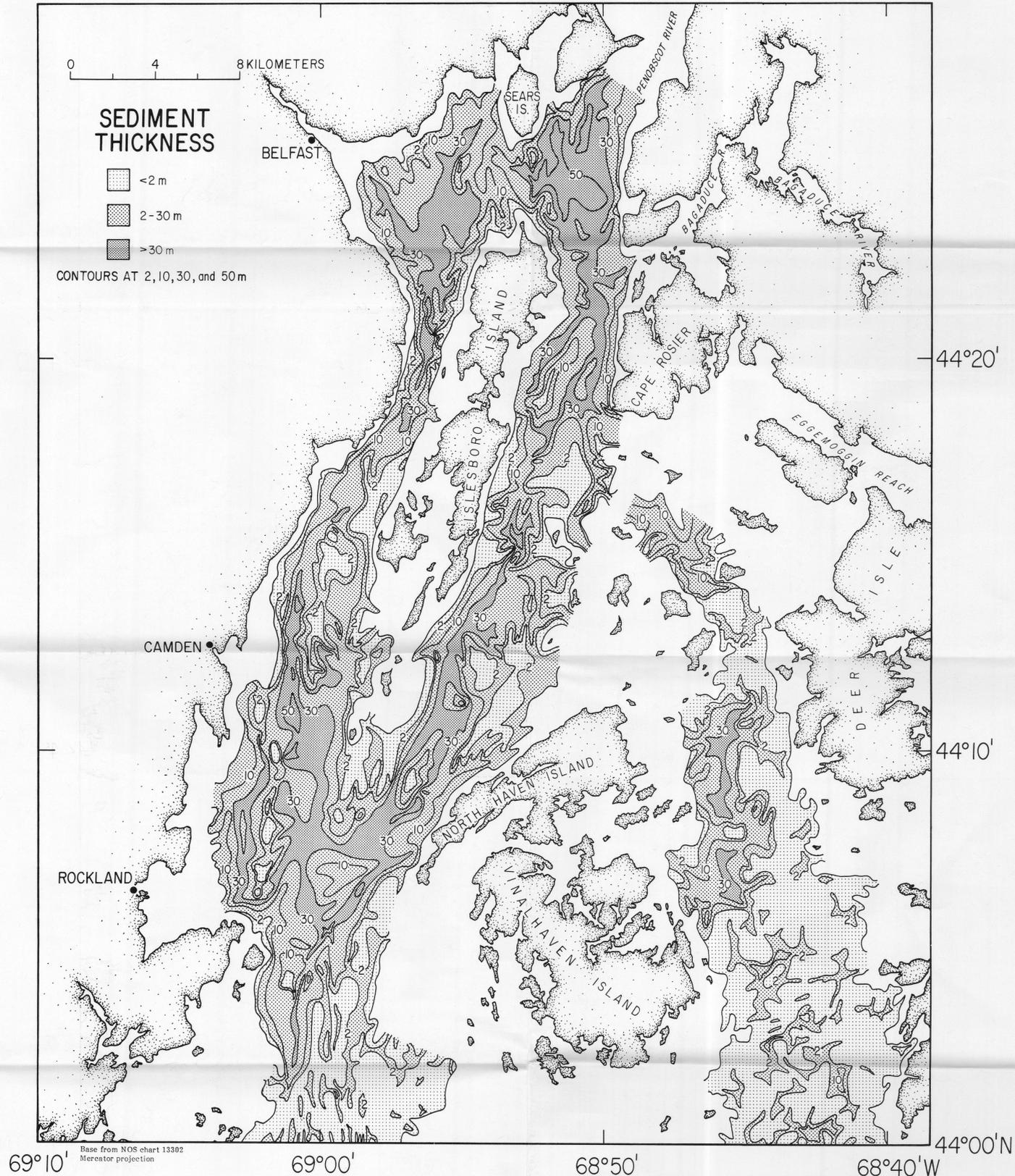


The deepest reflector observed in most profiles defines the bedrock surface beneath the bay (fig. 3). This reflector is strong, continuous, and highly irregular, and can be traced seaward from outcrops near the shore. Bedrock outcrops along most of the mainland shore consist of igneous, metamorphic, and metasedimentary rocks of early and middle Paleozoic age (Hussey, 1967). The depth to bedrock below sea level was determined from the profiles after they had been corrected for tidal-height variations (National Oceanic and Atmospheric Administration, 1992) and by using an assumed compressional-wave velocity of 1,500 m/s for water and sediments.

The bedrock surface forms the irregular bathymetric sill at the mouth of the bay and large troughs beneath the three main passages (figs. 3 and 4). The troughs, in particular, have rugged cross sections, discontinuous axial gradients, and widths of 1 to 5 km (at depths 40 m below sea level). Axial depths range from 50 to 182 m below sea level and are greatest in the lower reach of the bay near the confluence of Middle and West Passages. The bedrock troughs are buried by sediments except near the bay mouth.

FIGURE 4.—DEPTH TO BEDROCK



The thickness of sediments that overlies bedrock within the bay was also calculated from the subbottom profiles by using a compressional-wave velocity of 1,500 m/s for unconsolidated material. The sedimentary column consists of four units of late Wisconsinan and Holocene age that can be distinguished by characteristic acoustic returns (Knebel and Scanlon, in press). The sedimentary units are composed of glacial drift, glaciomarine detritus, fluvial deposits, and marine sediments (fig. 3).

Sediment thickness within the bay (fig. 5) largely parallels the configuration of the bedrock surface. The overall thickness ranges from 0 to more than 50 m. Locally, however, the distribution is complex, and

differences of several tens of meters in sediment thickness commonly are found within a fraction of a kilometer. The greatest sediment accumulations (~50 m) are located within a large bedrock depression at the head of the bay near the entrance to the Penobscot River, and in other small areas along the lengths of Middle and West Passages (fig. 5). East Passage generally lacks sediment deposits, having only two small areas where the thickness exceeds 30 m. Accumulations also are thin or absent along the shore and around the islands. Near the mouth of the bay, sediments are found only in thin isolated pockets atop the sill and within deep entrance channels.

FIGURE 5.—SEDIMENT THICKNESS.

MAPS SHOWING SEA-FLOOR TOPOGRAPHY, DEPTH TO BEDROCK, AND SEDIMENT THICKNESS, PENOBSCOT BAY, MAINE

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