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DESCRIPTIVE NOTES

INTRODUCTION

This map is part of a four-map series of German Bank, located on the Scotian Shelf offshore southern Nova Scotia. It is the product of a 1997–2003 survey that used a multibeam-sonar system to map 1866 km^2 of the seafloor. Other surveys collected geological and biological data for scientific interpretation. This map shows the seafloor topography of German Bank in shaded-relief view with colour-coded surficial geological units at a scale of 1:50 000. Topographic contours generated from the multibeam data are shown (in white) on the surficial geology at a depth interval of 20 m. Bathymetric contours (in blue) outside the multibeam survey area, presented at a depth interval of 10 m, are from the Natural Resource Map series (Canadian Hydrographic Service, 1967, 1971a, b, 1972). Map 2107A (Todd, 2007b) shows colour-coded seafloor topography in shaded-relief view. Map 2106A (Todd, 2007a) shows coloured backscatter strength in shaded-relief view. Map 2109A (Todd et al., in press) shows seafloor topography in shaded-relief view with colour-coded benthic habitat zonation.

The complete German Bank map suite includes three adjoining map areas at a scale of 1:50 000 that comprise 5321 km^2 of seafloor surveyed with a multibeam-sonar system. In total, twelve maps constitute the German Bank map suite (three map sheets each on four themes: topography, backscatter strength, surficial geology, and benthic habitat).

GEOLOGICAL HISTORY

The Scotian Shelf is a formerly glaciated continental margin characterized by a topographically rugged inner shelf. The inner shelf area constituting German Bank is dominated by outcropping bedrock consisting of Cambro-Ordovician metasedimentary rocks (Meguma Group) intruded by Late Devonian-Carboniferous granitoid plutons (Drapeau and King, 1972; King and MacLean, 1976; Pe-Piper and Loncarevic, 1989; Pe-Piper and Jansa, 1999; McCall, 2002). Bedrock has been modified by glacial erosion and is separated from the discontinuous and thin overlying unconsolidated Quaternary sediments by a rugged erosional surface.

At the glacial maximum of the Late Wisconsinan substage of the Quaternary period, culminating in the Gulf of Maine region at approximately 20 000 BP (radiocarbon years before present, 20 ka), German Bank was covered by a regional ice sheet that terminated to the south on the Scotian Slope (Schnitker et al., 2001; Dyke et al., 2002; Hundert, 2003; Stea, 2004). The glacial maximum was followed by a multiphased retreat of the ice front and the incursion of marine waters into the Gulf of Maine and onto German Bank. Ice-front retreat and glaciomarine deposition began as early as 18 ka with grounded ice absent from the Gulf of Maine by approximately 14 ka (King and Fader, 1986; Schnitker et al., 2001).

The landforms and deposits of the German Bank seafloor provide evidence of the pattern of Late Wisconsinan glacial-dynamic events in the Gulf of Maine offshore southern Nova Scotia. Interpretation of the regional glaciation history of German Bank is primarily based on major glacial landforms (Todd et al., 2007). Glacial landforms occurring in the study area were formed below the ice sheet (drumlins and megaflutes) and at its margins (regional scale moraines >10 km long and De Geer moraines <10 km long).

GEOSCIENTIFIC DATA

In order to provide groundtruth for the multibeam data, and to complement the historical geoscientific information in the area, high-resolution geophysical profiles were collected over German Bank in 2000, 2002, and 2003 (Fig. 5; Todd et al. (2001a, b, 2003, 2004)). The systems deployed included a Huntec Deep Tow Seismic (DTS) boomer, a single-channel sleeve-gun seismic-reflection system, and a Simrad MS992 sidescan sonar (120 kHz and 330 kHz). The geophysical surveys investigated different seafloor types and features identified using the multibeam-bathymetric and backscatter data (Todd, 2007a, b). In total, 1208 km of geophysical profiles were used in the interpretation of the German Bank surficial geology.

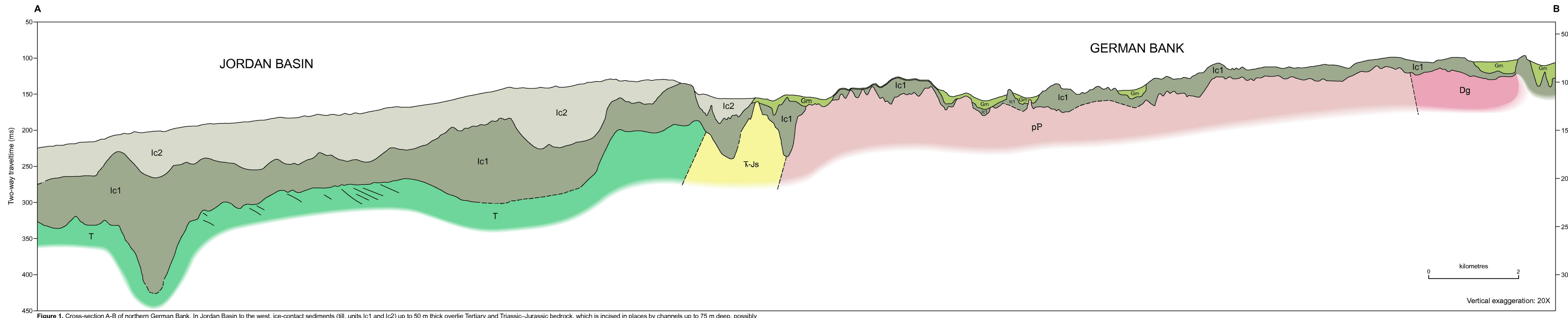
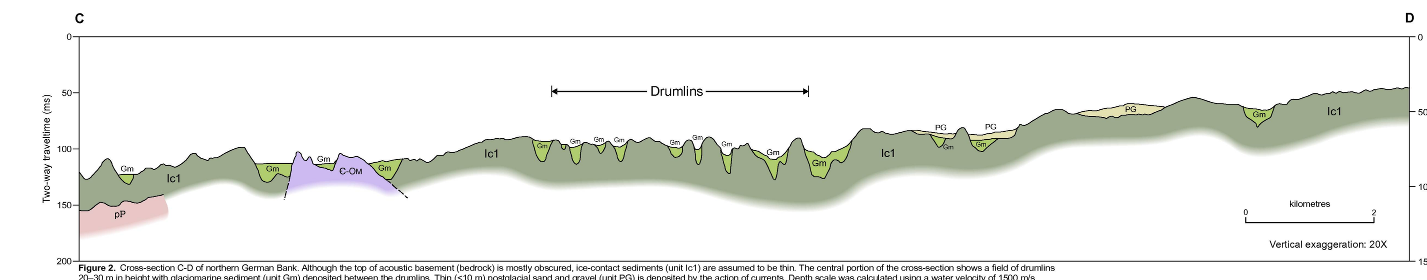
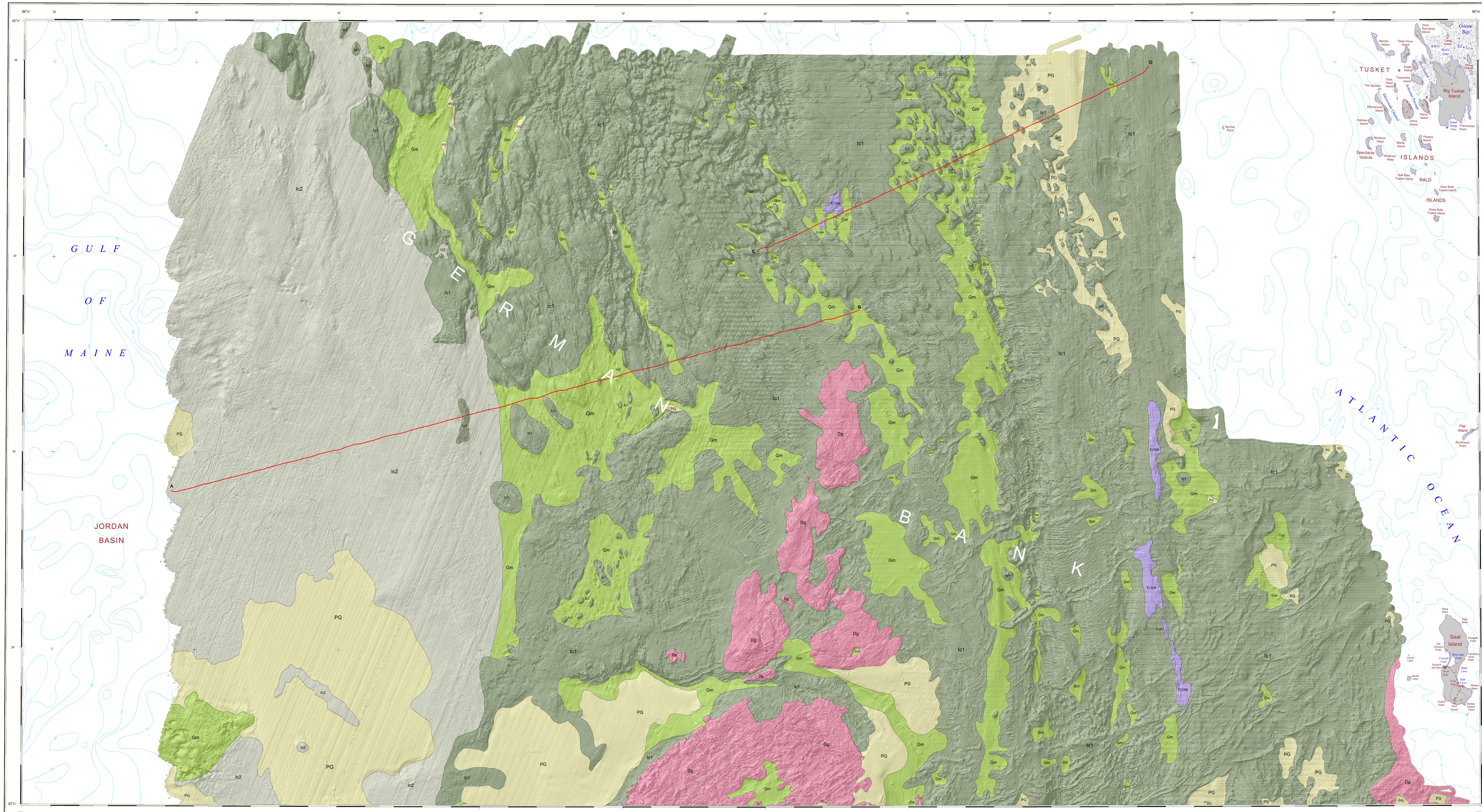
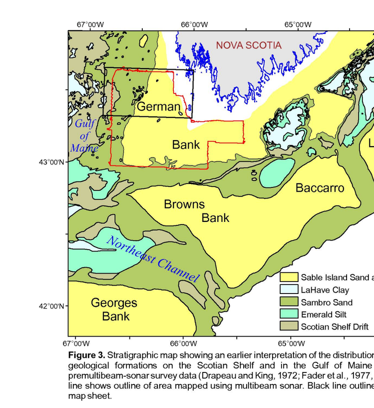
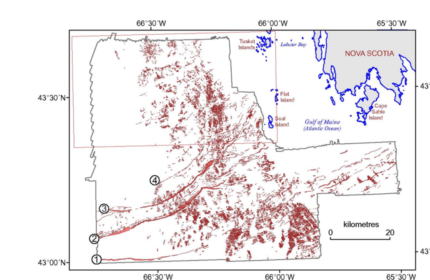


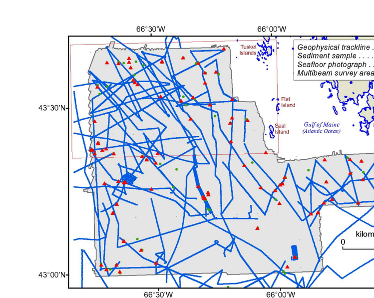
Figure 1. Cross-section A-B of northern German Bank. In Jordan Basin to the west, ice-contact sediments (till, units Ic1 and Ic2) up to 50 m thick overlie Tertiary and Triassic–Jurassic bedrock, which is incised in places by channels up to 75 m deep, possibly formed by subglacial erosion. To the east on German Bank, pre-Triassic bedrock is overlain by thin (<20 m) ice-contact sediments (unit Ic1). Basins are draped with glaciomarine silt (unit Gm). Depth scale was calculated using a water velocity of 1500 m/s.

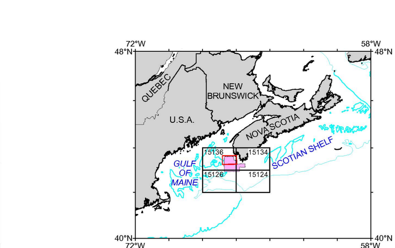












LEGEND

QUATERNARY

POSTGLACIAL SEDIMENTS

Postglacial sediments result from reworking by ocean processes of earlier glaciogenic sediments — principally till and glaciomarine silt — and from modern sediment transport and deposition. Postglacial sediments are commonly denoted as Sable Island Sand and Gravel.

PG — ***Postglacial sand and gravel:*** *well sorted sand, grading to rounded and subrounded gravel, with characteristic parallel to subparallel, low-amplitude reflections. Sand bodies have a mounded form and reach up to 20 m thick.*

GLACIAL SEDIMENTS

Ice-distal glaciomarine sediments result from fallout of sediment from glacial meltwater plumes and ice-rafted debris. On the Scotian Shelf these fine-grained sediments mainly occur in basins as draped deposits outcropping at the seabed, but occur on some banks as well. Glaciomarine sediments are commonly denoted as Emerald Silt.

Ice-contact sediments were deposited directly by and underneath the ice sheet primarily resulting in till that has an acoustically incoherent signature on seismic-reflection profiles. Ice-contact sediments are ascribed to the Scotian Shelf Drift. This till was deposited directly by ice on bedrock during the Wisconsinan stage of the Pleistocene Epoch.

Gm — ***Ice-distal glaciomarine silt:*** *poorly sorted clayey and sandy silt with some gravel. This unit exhibits a characteristic parallel to subparallel seismic-reflection configuration; the reflectors conformably drape the irregular top of the underlying ice-contact sediment (unit Ic1) and bedrock. In places it is interbedded with the underlying ice-contact sediment (unit Ic1).*

Ic2 — ***Ice-contact sediments (till):*** *unsorted, unstratified, and unconsolidated drift with characteristic transparent seismic-reflection configuration, consisting of a heterogeneous mixture of clay, sand, gravel, and boulders varying in size and shape. The till occurs on the eastern flank of Jordan Basin, reaching 60 m in thickness. The till is absent from the eastern portion of the map area. A surficial gravel lag commonly overlies these sediments.*

Ic1 — ***Ice-contact sediments (till):*** *unsorted, unconsolidated drift with characteristic chaotic seismic-reflection configuration, with evidence of internal reflections suggesting stacked tills, probably consisting of a heterogeneous mixture of clay, sand, gravel, and boulders varying in size and shape. The till occurs across the map region and is thickest on the eastern flank of Jordan Basin where it is commonly 20 m to 40 m thick, buried beneath unstratified ice-contact sediment (unit Ic2). Elsewhere, the outcropping till typically displays an array of glacial landforms including moraines, drumlins, and megaflutes.*

PRE-QUATERNARY

Bedrock is exposed on much of German Bank and mainly consists of Cambro-Ordovician metasedimentary rocks (Meguma Group) intruded by Late Devonian granitoid plutons. Bedrock is separated from overlying unconsolidated Quaternary sediments by a rugged erosional surface.

TERTIARY AND LATE CRETACEOUS
PALEOGENE AND NEOGENE; excluding Pleistocene

T — *BANQUEREAU FORMATION (cross-section only): shale, sandstone, siltstone, and limestone.*

TRIASSIC
MIDDLE TRIASSIC-EARLY JURASSIC
FUNDY GROUP

Ꞩ-Js — *Undifferentiated (cross-section only): acoustic basement; sandstone, siltstone, conglomerate, and shale.*

DEVONIAN
SOUTH MOUNTAIN BATHOLITH AND MEGUMA TERRANE PLUTONS

Dg — *Acoustic basement: undifferentiated Late Devonian granitoid suites cutting the Cambro-Ordovician Meguma Group.*

CAMBRO-ORDOVICIAN
MEGUMA GROUP

Ꞓ-OM — *Acoustic basement: metasedimentary rocks, Cambrian quartzite, greywacke, and slate.*

PRECAMBRIAN TO MISSISSIPPIAN

pP — *Undifferentiated (cross-section only): acoustic basement; comprises instrusive, volcanic, and metasedimentary rocks. Unit determined as pre-Pennsylvanian by King and MacLean (1976).*

Geological contact (map unit boundaries are interpreted from multibeam sonar bathymetry and geophysical seismic-profile data and are inferred contacts that may be gradational or conceptual in nature)

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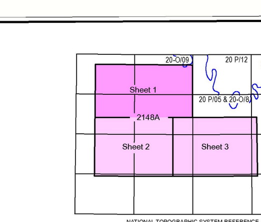

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Digital cartography by P. O'Regan, Data Dissemination Division (DDD) and S. Hayward, GSC (Atlantic)

Any revisions or additional information known to the user would be welcomed by the Geological Survey of Canada

MAP 2148A

SURFICIAL GEOLOGY AND SUN-ILLUMINATED SEAFLOOR TOPOGRAPHY

GERMAN BANK

SCOTIAN SHELF
OFFSHORE NOVA SCOTIA

Scale 1:50 000/Échelle 1/50 000

Universal Transverse Mercator Projection	Projection transverse universelle de Mercator
North American Datum 1983	Système de référence géodésique nord-américain, 1983
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