



DESCRIPTIVE NOTES

INTRODUCTION

This map sheet depicts the bathymetry of inner Bonavista Bay, in particular Newnam Sound, Chandler Reach, and Cloche Sound. The principal purpose of multibeam surveys in this region was to support the Memorial University for multibeam sonar coverage in Newnam Sound (for habitat mapping). Subsequent discussions with Dr. John A. Stewart of Fisheries and Oceans Canada (FCO) regarding the importance of cod spawning in this region led to the decision to expand on the Newnam Sound coverage by mapping in outcropping areas where possible. The additional mapping was made possible by funding from the International Recovery Fund, in support of the Species at Risk Act.

MULTIBEAM BATHYMETRIC DATA COLLECTION AND PROCESSING

Data were collected in two phases. First, in Newnam Sound (2003) by the Canadian Hydrographic Service (CHS) with data collected from Memorial University. The CHS EM1000 system was used to collect data in the shallow areas at the head of the bay. Multibeam data were collected by the CHS using the CHS Bathymetric Interferometric Processing System (BIPS). Backscatter data were extracted by CHS at Memorial University. In the second phase, the CHS Matthew covered the deeper areas of Cloche Sound and Chandler Reach. The vessel was equipped with a Hachinson Survey 710. Two hydrographic launches were employed with dual 3000 metre swath depth sounders (SWATH) and a 1200 kHz Simrad EK60 echosounder. During the survey, and later at CHS St. John's, Newfoundland, using HIPS. Backscatter data were again extracted by CHS using the BIPS system.

The Differential Global Positioning System was used for navigation, providing positional accuracy of ± 1 m. Survey speeds for most routes averaged 10 knots. Data were collected for dual swaths using output from side scanners installed in the region. After HIPS processing, data were imported into the GRASS GIS system. Contours, fill maps, and colour bars were exported from GRASS to the ESRI Arc GIS system.

SURVEY	REMARKS
2003	Survey by the CHS Matthew of Newnam Sound using a Simrad EM1000 system.
2003	Survey by the CHS launches of Newnam Sound using a Simrad EK6000 system.
2008	Survey by the CHS Matthew of Bonavista Bay using a Simrad EM710 system.
2008	Survey by two CHS hydrographic launches of Bonavista Bay using a Simrad EK6000 system.

Table 1. Remarks on surveys carried out in the study area.

DATA DISPLAY

Artificial sun illumination from 90 degrees azimuth and 35 degrees inclination was applied in the GRASS GIS. Vertical exaggeration was 10. A colour display was used to represent depth. The colour palette (e.g., red) represents shallow water and cool colours (e.g., blue) represent deep water. Histogram equalization was applied to the depth values to enhance the detail. The depth values were binned such that equal areas are covered by each colour in the palette.

GEOMORPHOLOGY

Newnam Sound and Cloche Sound are fjords, with depths in excess of 300 m (Canadian Hydrographic Service Chart 4805). The fjord coverage east of the settlement of Sable Harbour extends to a maximum depth of 455 m. In comparison with other fjords in Newfoundland (Shaw et al., 1999), the outer parts of Newnam and Cloche Sounds are relatively deep, while the inner parts are very shallow. Exposure areas of rugged bedrock occur in relatively shallow water between Newnam Sound and Cloche Sound, northeast of Sable Bay, and to the east of the head of the bay.

For purposes of description we divide the region into four geomorphic regions:

Newnam Sound
A sill (A) at a depth of ~270 m separates the foot from the deeper waters just to the east. This sill is mostly bedrock but may also be composed of glacial till. The sill is probably a typical for, with steep banks, and a flat floor (B) that shows signs of being and having. Quaternary sediments are mostly mud-covered thick glaciolacustrine sediments. Between the southeast extremity of Sable Island and the narrow at Sable Point the seafloor is relatively flat, and the seafloor is marked by a series of depressions (C) up to 30 metres deep. This topography may reflect stagnation of ice in the fjord during deglaciation. South of Sable Point, the seafloor is relatively flat, and the seafloor is marked by a series of depressions (D). A shallow terrace (E) at the head of the bay is an early Holocene submerged delta. A local outlier of the connection between the geomorphic subunits of the sound and marine habitats is provided by Coppeland et al. (2004).

Cloche Sound and Chandler Reach
Like Newnam Sound, the fjord trough is composed of several sections with differing morphology. The outer part of the fjord is a 270 m deep deep sill (F) just north of Chandler Harbour. The sill is a mixture of bedrock and glacial till. The seafloor is marked by a series of depressions (G) up to 30 metres deep, with steep banks and a smooth deep floor (H), marked only by sedimentary lenses, evidence of glaciolacustrine deposits. South of the sill, the seafloor is relatively flat, and the seafloor is marked by a series of depressions (I) up to 30 metres deep. Inland of the infurcation - in Cloche Bay and Cloche Sound - the floor is considerably shallower. It also has the characteristics of inner Newnam Sound, namely a series of irregular depressions (J) interspersed in a flat seafloor (K). Backscatter data show that the flatting areas have high backscatter, and are probably floored by fine gravel, whereas the depressed areas contain pockets of poignatorial mud. We provisionally interpret this highly unusual pattern as resulting from the presence of glacial till that occupied the fjord during deglaciation, c. 14,000 years ago, perhaps analogous to the formation of terraces inland. In the water section of the fjord the narrow part just east of Sable Point, the irregular terrain still present, but is mostly masked by thick and extensive deposits of poignatorial mud (K).

Sable Tickle
Sable Tickle is a shallow area south of Sable Island. In the west it connects with Newnam Sound via several narrow channels at the 270 m sill. The seafloor is mostly bedrock with steep banks, and a deep trough. The deepest water in the tickle is about 120 m. Sable Tickle is flanked by north-trending bedrock ridges (L) that show signs of being and having. Quaternary sediments occur only in the deeper areas (e.g., M), where the smooth seafloor probably consists of mud or sandy mud. The seafloor is marked by a series of depressions (N) up to 30 metres deep. Sable Tickle is a classic fjord (O) (Coppeland et al., 2004). It is interpreted as an early Holocene submerged delta formed under the influence of glacial ice recently retreated. Examination of an elevation model created from CHS Bathymetric Interferometric Processing System (BIPS) data shows high backscatter beneath a glacier to the west, but not in the immediate vicinity. The ridge is interpreted as several lobes, and indicates ice retreats that occurred over the fjord. The ridge is marked by several lobes, and indicates ice retreats that occurred over the fjord. The ridge is marked by several lobes, and indicates ice retreats that occurred over the fjord. The ridge is marked by several lobes, and indicates ice retreats that occurred over the fjord.

The outer fjord and Bonavista Bay
This outer fjord is composed of several geomorphic sub-unions, primarily distinguished on the basis of depth. The north-south trough is mostly deeper than 450 m and attains a maximum depth of 400 m at the north (O). Beyond the shallow waters and shallows into a broad nearly flat bottomed all depths of 300 m. The trough is floored by thick poignatorial mud, marked by sedimentary lenses and lower flat escape structures, and likely covering thick glaciolacustrine mud deposits. Several of the trough the seafloor is relatively smooth, and consists of poignatorial mud (P). The mud overlies terraces that are mostly marked by north-trending irregularities. In places these glacial terraces are in the form of elongated features, that is, terraces that form in the form of bedrock outcrops (Q). Exposed areas of rugged bedrock occur in the shallows (R) and Sable floor the shallow water on the east side of the trough (R) and also to the southwest (S).

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SHADED SEAFLOOR RELIEF

BONAVISTA BAY

NEWFOUNDLAND AND LABRADOR

Scale 1:70 000/Echelle 1/70 000

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This open file was produced by Natural Resources Canada in co-operation with Fisheries and Oceans Canada

Multibeam bathymetric data collected by Canadian Hydrographic Service and Natural Resources Canada, 2008

Multibeam bathymetric data compiled by J. Shaw and E. Patton, 2008

Digital cartography by P.A. Milburn, Data Dissemination Division (DDC)

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

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North American Datum 1983
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This map is not to be used for navigational purposes

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Depth in metres below mean sea level

Depth in metres below mean sea level

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