Current Research (1990) Newfoundland Department of Mines and Energy, Geological Survey Branch, Report 90-1, pages 85-88

ICE FLOW IN NORTH-CENTRAL NEWFOUNDLAND

Lloyd St. Croix and David M. Taylor
Terrain Sciences Section

ABSTRACT

Reconnaissance level striation mapping in north-central Newfoundland covering NTS map sheets 2D/11, 2D/12, 2D/14 and 2D/15 suggests the existence of three separate ice-flow events. Of these, the earliest ice-flow direction was southeastward; the second was eastward and the third and most recent ice-flow identified had a north-northeastward trend. This recognition of the area's recent glacial history, in terms of ice-striae characteristics, will assist in the exploration efforts for gold and base metals in the area.

Exploration activity is generally hampered by the extensive, sediment overburden and lack of bedrock exposures. Studies such as this, which improve our understanding of the area's recent glacial history, enhances the efficiency and effectiveness of drift prospecting programs.

INTRODUCTION AND OBJECTIVE

The north-central part of Newfoundland is an area of considerable mineral exploration interest, especially for gold and base metals. A thorough understanding of the area's recent ice-flow and glacial history, could help to enhance the efficiency and effectiveness of drift exploration.

The object of the project was to compile reconnaissance level maps of glacial striae, at a 1:50,000 scale, of NTS map sheets 2D/11, 2D/12, 2D/14 and 2D/15 (Figure 1). Glacial striae are small grooves or scratches cut into surface bedrock by rock fragments carried in a glacier, and the orientation of these striations generally represent a record of the glaciers travel path. Mapping of these striations is an effective method of obtaining a broad understanding of the general ice-flow history in a region.

RESULTS

Approximately 325 single- and multiple-striation sites were observed and recorded during the field season. Ice-flow direction was determined from the morphology of the bedrock surface, using such features as stoss and lee, nailheads, chattermarks and crag and tails. Sites that indicate multiple ice-flow directions, commonly suggest separate flow events, but in some cases may represent a different ice-flow direction within one flow event. Relative temporal relationships between the flows are indicated by crosscutting characteristics and leeside preservation.

An analysis of the data collected indicates the existence of three separate ice-flow events over all or parts of north-central Newfoundland (Figure 2). Of the three ice-flow events, the earliest ice-flow direction trends southeastward and was found mainly west of Gander Lake; the second ice-flow direction is eastward and is identified at several sites

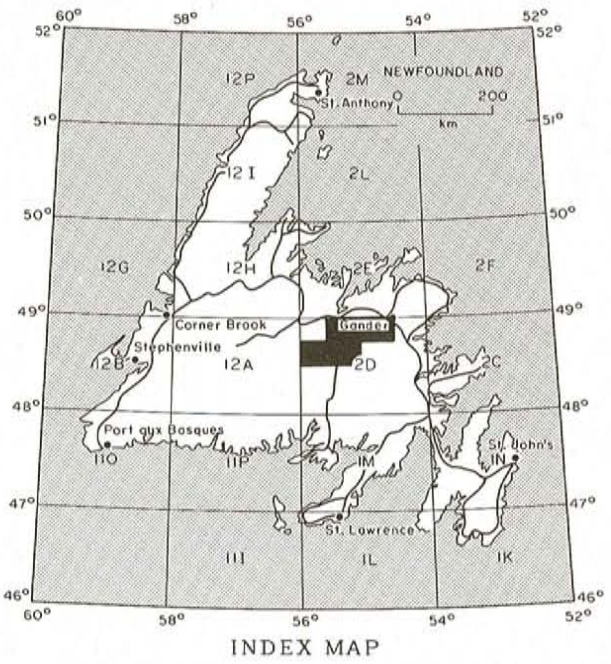

Figure 1. *Map showing the study area.*

throughout the region; and the most recent ice flow has a north-northeastward trend and is also widespread over the entire region. The absolute age of these ice-flow events is not known.

The southeastward ice-flow is, areally, the largest of the three glacial events observed (Figure 3). This flow can be traced to the south, in the Hermitage Bay–Fortune Bay area (Proudfoot *et al.*, 1988), and to the west in the Noel Paul's Brook–Meelpaeg Lake area (Vanderveer and Sparkes, 1982). The dispersal centre of the southeastward ice flow was interpreted by Rogerson (1982) to be north of Red Indian Lake.

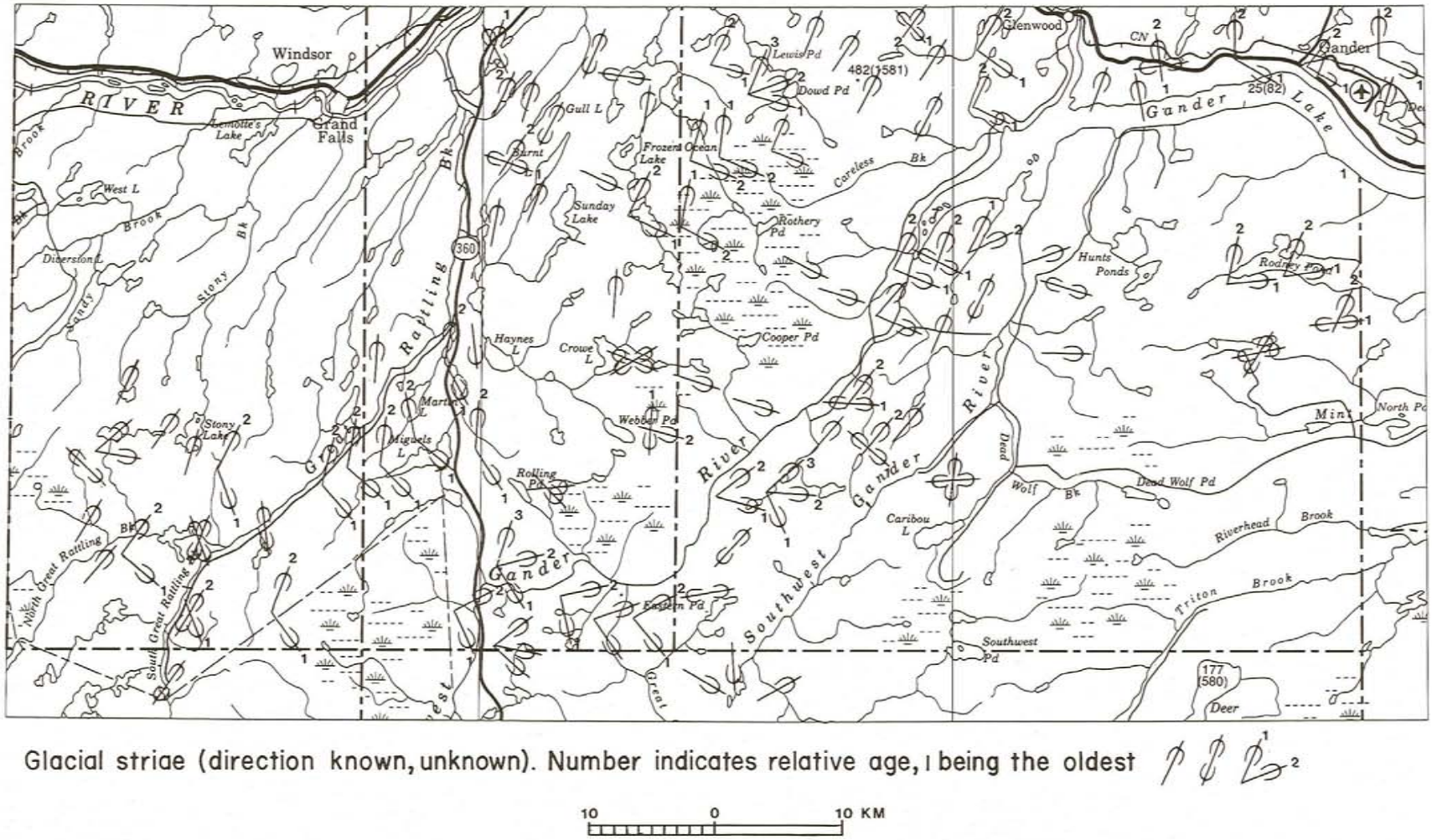

Figure 2. *Ice-flow in north-central Newfoundland.*

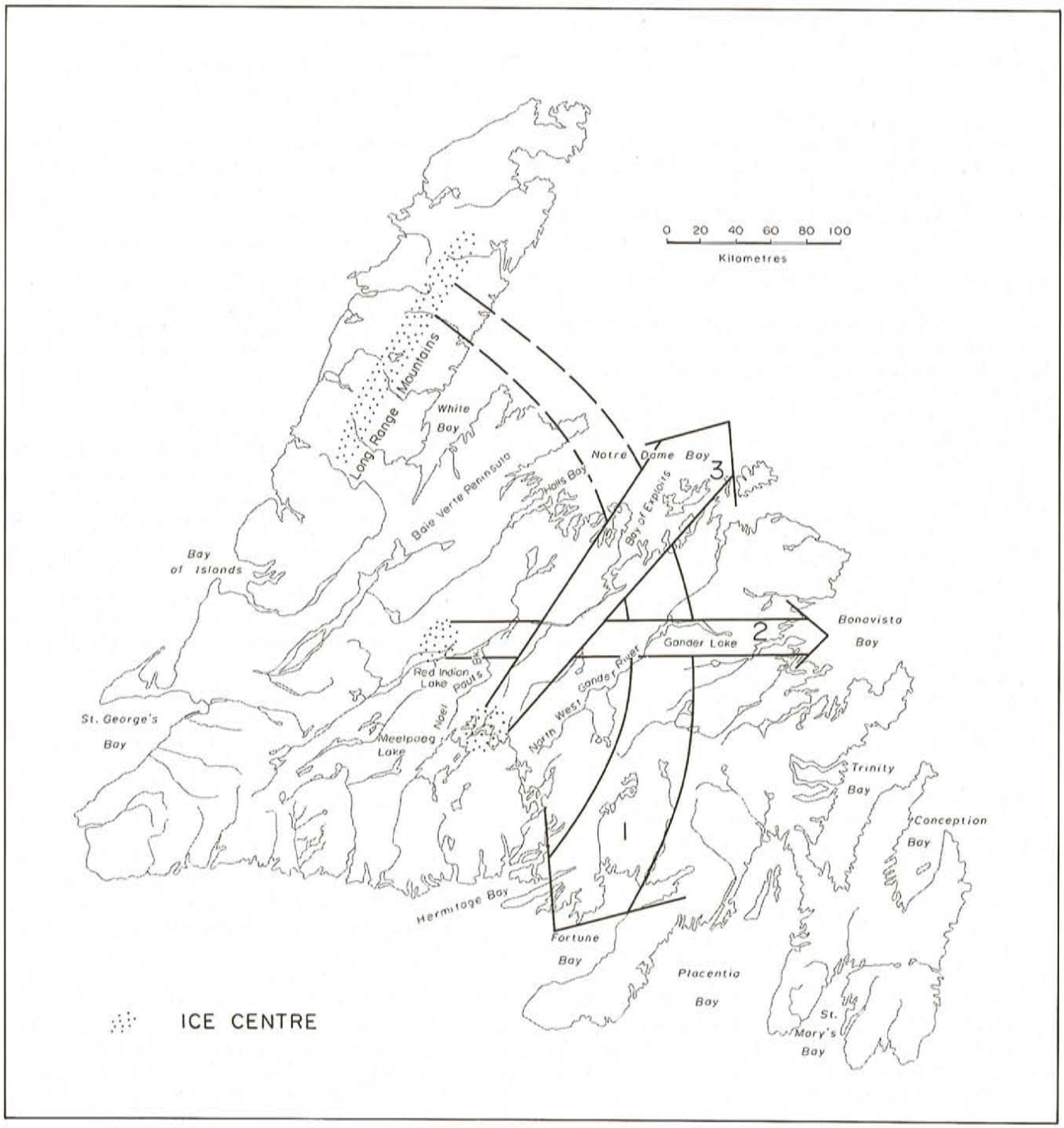

Figure 3. *Possible dispersal centres (after Rogerson, 1982) and major ice-flows for central Newfoundland.*

Striae recorded in the Great Rattling Brook area (Taylor and St. Croix, 1989), the New Bay Pond area north of Bishop Falls (Hornbrook *et al.*, 1975), and in the Baie Verte Peninsula—Notre Dame Bay area (Liverman and Scott, *this volume*) suggests that the ice flow is related to an ice dispersal centre in the Long Range Mountains. Further work is required in the interim area between Bay of Exploits and Halls Bay, to establish if these striae sites are related to the same southeastward flow. If so, then the scope and extent of the Long Range ice cap would be much greater then previously considered.

The second glacial event, the eastward ice flow is found mainly around Gander Lake and was mapped by Jenness (1960) to continue eastward into the Bonavista Bay area. Proudfoot *et al.* (1988) mapped eastward ice flow in the Northwest Gander River area and Vanderveer and Sparkes (1982) recorded eastward ice flow south of Red Indian Lake

in the Lake Ambrose area (Figure 3). The source of this ice flow is believed to be north of Red Indian Lake (Vanderveer and Sparkes, 1982).

The third ice flow, north-northeastward, is widespread over the whole area and was recorded to the south by Proudfoot *et al.* (1988). It has a possible dispersal centre, east of Meelpeag Lake (Figure 3). This ice flow is generally preceeded by ice dispersed from north of Red Indian Lake (Rogerson, 1982).

IMPLICATIONS FOR DRIFT PROSPECTING

Drift prospectors working in areas such as north-central Newfoundland, where multiple ice-flow events have been identified, should be careful when collecting and interpreting data for several reasons. Generally, a geochemical or sediment dispersal pattern in till is directly related to the most recent ice-flow event. However, in areas where multiple ice flows have been identified, the earlier ice flows should be taken into consideration because they must have also dispersed sediment along their respective flow direction. In the study area, the earlier ice flows to the east and southeast, may have initially dispersed sediment, before it was affected by the later north-northeast flow.

A second consideration, especially in areas of multiple ice-flow events, is the preservation of multiple tills. Each till sheet will show sediment dispersal patterns related to the ice flow that deposited it. Thus, an ability to differentiate between till sheets is essential in sampling and when interpreting results.

Multiple till units have not as yet been identified in the study area, but the complex ice-flow history, and the generally thick drift cover, suggest that they are likely to be found with more detailed mapping.

SUMMARY

This ice-flow data from north-central Newfoundland when combined with existing data to the north, (Hornbrook *et al.*, 1975; Vanderveer and Taylor, 1987), the west (Vanderveer and Sparkes, 1980) and to the south (Proudfoot *et al.*, 1988) will give a corridor of coverage from the Bay of Exploits–Gander Bay to Bay D'Espoir. It is planned to extend this coverage over the coming years.

REFERENCES

Hornbrook, E.H.W., Davenport, P.H. and Grant, D.R.
1975: Regional and detailed geochemical exploration studies in glaciated terrain in Newfoundland. Newfoundland Department of Mines and Energy, Mineral Development Division, Report 75-2, 116 pages.

Jenness, S.E.
1960: Late Pleistocene glaciation of eastern Newfoundland. Geological Society of America, Bulletin, Volume 71, pages, 161-180.

Liverman, D. and Scott, S.
This volume: Quaternary geology of the King's Point map sheet (NTS 12H/9).

Proudfoot, D.N., Scott, S., St. Croix, L., Taylor, D.M. and Vanderveer, D.G.
1988: Glacial striations in southeast-central Newfoundland. 1:250,000 scale. Newfoundland Department of Mines and Energy, Mineral Development Division, Open File (NFLD 1725). Map number 88-102.

Rogerson, R.J.
1982: The glaciation of Newfoundland and Labrador. *In* Prospecting in Areas of Glaciated Terrain. *Edited by* P.H. Davenport. Canadian Institute of Mining, Geology Division Publication, pages 37-56.

Taylor, D.M. and St. Croix, L.
1989: Glacial striations in north-central Newfoundland. Newfoundland Department of Mines and Energy, Geological Survey Branch, Map 89-108, Open File Nfld (1875).

Vanderveer, D.G. and Sparkes, B.G.
1980: Glacial-flow features–Red Indian Lake to Grand Falls. Newfoundland Department of Mines and Energy, Mineral Development Division, Open File (NFLD 93). Map number 80-20.

1982: Regional Quaternary mapping–an aid to mineral exploration. *In* Prospecting in Areas of Glaciated Terrain. *Edited by* P.H. Davenport. Canadian Institute of Mining, Geology Division Publication, pages 284-299.

Vanderveer, D.G. and Taylor, D.M.
1987: Quaternary mapping in the Gander River area, Newfoundland. *In* Current Research. Newfoundland Department of Mines and Energy, Mineral Development Division, Report 87-1, pages 39-43.