

LAKE AMBROSE-NOEL PAUL'S BROOK AREA: SURFICIAL AND GLACIAL MAPPING

by D.G. Vanderveer and B.G. Sparkes

INTRODUCTION

Prior to the 1978 field season, the major aim of the surficial mapping program (see Figure 1) (Vanderveer and Sparkes, 1978) was to support the inventory of the aggregate resources of the province. During 1978 a project was funded to conduct a more detailed surficial and glacial investigation in the Lake Ambrose - Noel Paul's Brook area which would provide information as an aid to mineral exploration. This area was chosen because of the scattered occurrences of mineralized float, the thick and extensive cover of overburden (which has given rise to difficulties in geological mapping and in the interpretation of geochemical anomalies), and the recognized mineral potential of the area, with several companies active in exploration. The area has good access and a considerable number of till exposures; fresh bedrock exposures exhibiting striations and directional indicators are also present.

FIELD PROGRAM

Mapping started in mid-June and was completed by early September. Information was obtained along all existing roads in the area, most lake shorelines and some streams. A helicopter was used late in the summer to reach the more inaccessible areas. A backhoe was used to dig pits to obtain samples and to provide suitable exposures to do till fabrics. Thirty pits were dug and twenty-two fabrics obtained; the other pits either filled up with water or lacked enough stones to identify a fabric. During the course of field work 450 observation sites were noted and forty sets of striae recorded with directions and/or relative ages assigned to thirty of these. There were 325 samples taken, of which 200 were till, 5 sand, 25 gravel, 35 pebble, and 60 rock. Profile

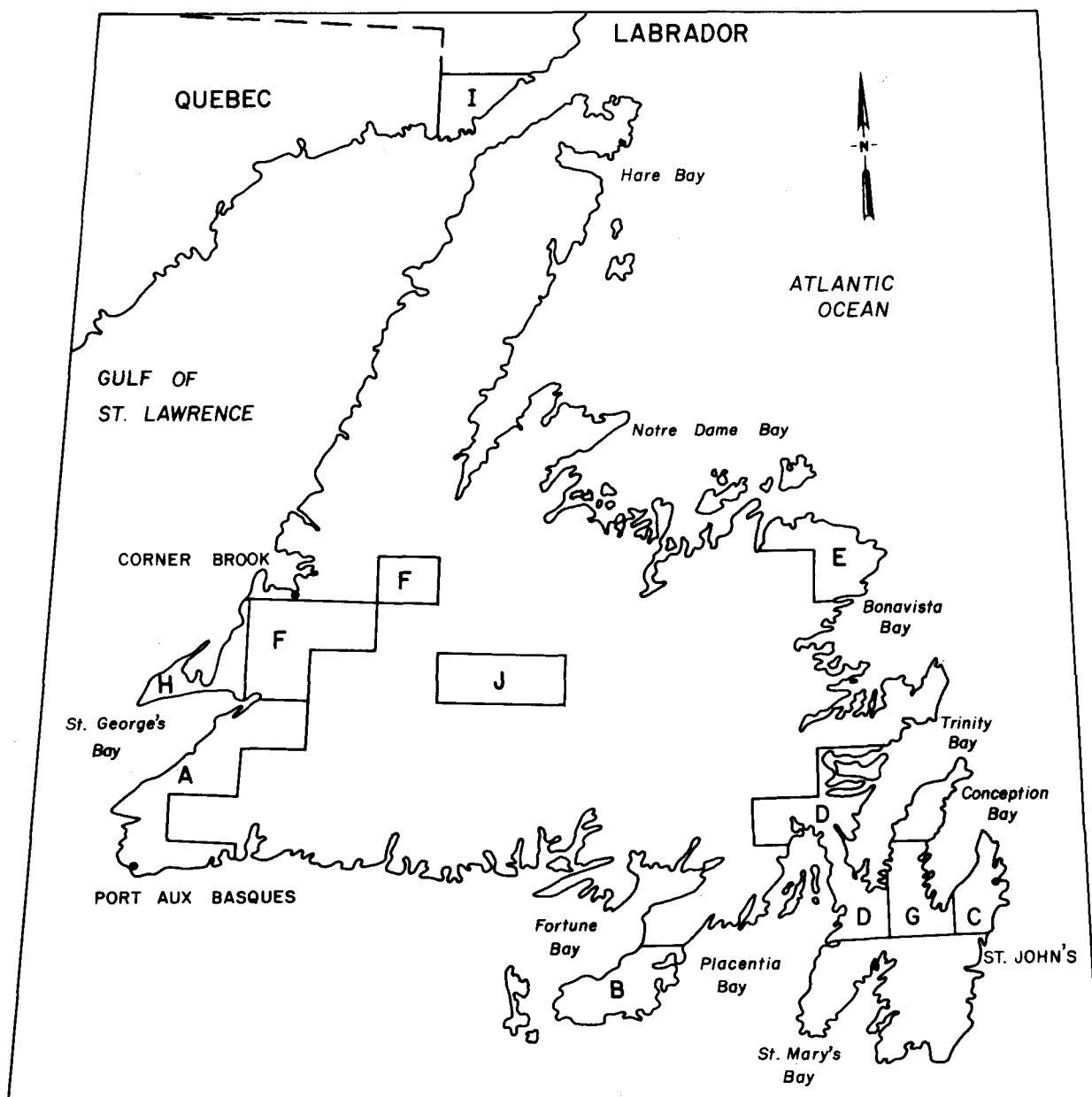
sampling was conducted in many of the backhoe dug pits.

GLACIAL STRIAE

Throughout most of the study area (Figure 2) two major sets of glacial striae have been recorded. These are the "140 to 170" directional striae and a "040 to 060" (dominant "060") set of striae. On numerous outcrops both sets of striae have been recorded and occasionally a third or fourth set may also be present. In all cases where directions have been assigned, the striae trends have been given directions using one or more of the following indicators: (a) miniature crag and tail, (b) crescentic or lunate fractures or gouges, (c) nail head striae and (d) miniature stoss and lee forms. The age relations between successive glacial flow regimes have been assigned on the basis of stoss and lee, and in some cases the relationship of the various striae sets.

In all observed cases where the "170" set of striae and the "060" occur on the same outcrop, the "170" set is preserved on the northwest, north or northeast side in the lee of the later "060" movement. Where bevelled facets occur on the outcrop, the bevel will be located nearest the north or northeast side of the outcrop (or subcrop) with evidence of the "060" movement situated on the top and on southwest to south facing surfaces.

In the vicinity of Red Indian Lake, particularly in the northwest corner of the Lake Ambrose map area, near Harbour Round, there are directional striae that again indicate a early southward flow but also record a subsequent flow to the southwest. This later southwest flow is also indicated by the transport of boulder erratics southwest from the Tulk's Hill prospect (Jeff Thurlow, personal communication), located to the west of the map area.



Surficial and Glacial Mapping

- A. Southwest Newfoundland (O.F. Nfld. 959)
- B. Burin Peninsula (O.F. Nfld. 958)
- C. St. John's** (O.F. Nfld. 232)
- D. Avalon Isthmus (O.F. Nfld. 960)
- E. Wesleyville-Carmanville*

- F. Deer Lake-Harry's River*
- G. Holyrood-Harbour Grace***
- H. Stephenville-Port au Port***
- I. Southern Labrador***
- J. Lake Ambrose-Noel Paul's****

* Field work conducted in 1975.

** Field work conducted in 1976.

*** Field work conducted in 1977.

**** Field work conducted in 1978.

Striae at the Noel Paul's Brook dam indicate an early northward glacial flow of ice, an intermediate northeast flow and a late easterly flow.

Till fabrics throughout the study area record only the southwest to northeast movement of ice.

INTERPRETATION OF THE GLACIATION OF THE STUDY AREA

The glacial history of the study area as based on the recorded striae and till fabrics *etc.*, is interpreted as follows:

1) Southward flowing ice invaded and crossed most of the study area and had a frontal position that lay somewhere to the south and southeast of the map area. Whether or not this ice mass retreated completely before the advance of later ice flows has not been determined. There is no conclusive evidence (*i.e.* older oxidized till units or differences of oxidation on striated outcrop surfaces) indicating that the "170" movement is older than late Wisconsin in age, although the presence of weathered rocks typical of the Buchans Group southeast of Red Indian Lake on some of the higher summits and the degree of weathering of rocks on these surfaces could each be used to reach the tenuous conclusion that the south flow of ice is related to an earlier glacial phase.

2) Northeast flowing ice was concentrated in the area southeast of Red Indian Lake and northwest of the "Granite Terrain" (*i.e.* northwest of Noel Paul's Brook) during the second stage of glaciation. It seems that this northeast flow of ice did not cover all the summits, since some summits are well weathered and retain erratics derived from the north or northwest.

3) Evidence of southwest flowing ice in the vicinity of Harbour Round, Red Indian Lake could indicate that the early south flowing ice mass with a center north and northwest of Red Indian Lake had a frontal position near the south shore of Red Indian Lake at a time when the northeast flow was at its maximum, and that the striae indicating southwest movement result from mutual interference of ice along the ridge of volcanics which stretches northeastward from Tulk's Hill, between the divergent southwest and northeast ice flows. A more plausible explanation might be that either the northeast-moving ice did not cross this ridge and did not flow into Red Indian Lake (*i.e.* was confined to the trough area between Harbour Round Pond and Noel Paul's Brook area) or that any flow into Red Indian Lake was extremely light (*i.e.* near the edge of the ice mass). The striae indicating movement to the southwest would then be a record of a divergence of the earlier south flowing ice mass.

4) Rib moraine and lineated morainal deposits in the southeastern corner of the Noel Paul's Brook map

area as well as striae at the Noel Paul's Brook Dam indicate that northerly flowing ice, from a center located to the south of Noel Paul's Brook on the granite terrain, reached at least the area of the dam but that northeast flowing ice (*i.e.* confined to Noel Paul's Brook valley) later dominated the area north of the granite terrain (*i.e.* Noel Paul's Brook - Sandy Lake area). An esker located adjacent to Noel Paul's Brook could indicate that this northerly flow of ice remained active during the north-easterly flow and was proximal to it.

CONCLUSIONS

The Lake Ambrose-Noel Paul's Brook map area is dominated by glacial transport in two directions, an early southward movement and a later northeast movement. Glacial transport to the southwest and the northeast is only evident locally, in the Harbour Round area and in the southeast part of the map area, respectively.

The backhoe was found to be an effective means of obtaining samples or exposures on which to conduct till fabric analyses in areas of extensive overburden where few other ice flow features are recorded. A backhoe mounted on a small muskeg type tractor would be necessary in any area lacking adequate road access.

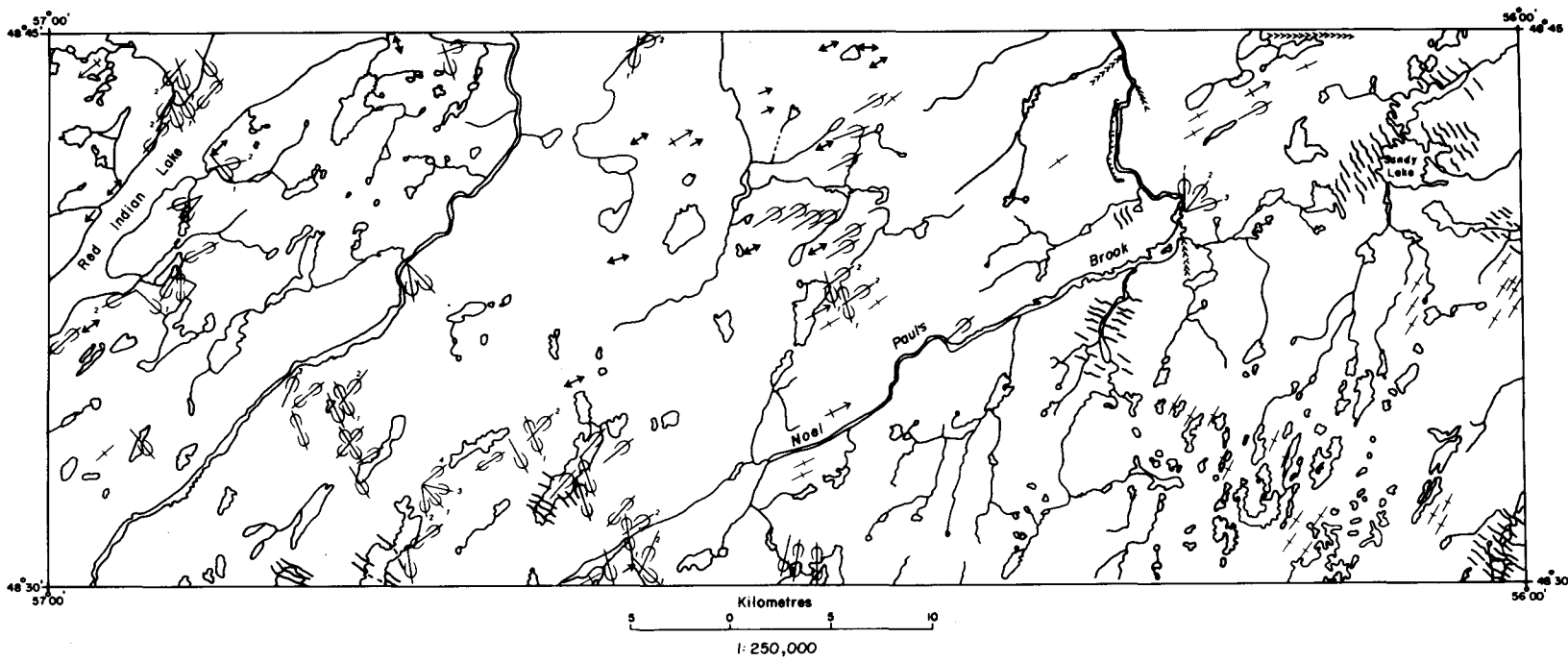
Further surficial and glacial mapping are required in the adjoining map areas to compliment this season's research and to further elucidate the complex glacial history of the Central Mobile Belt area.

FUTURE PLANS

Plans include: (a) lithologic studies of pebble samples to determine transport distances for various glacial ice regimes, (b) further analyses of the till fabric data, *i.e.* stereogram plots and contouring to further define the fabrics, (c) particle size analyses of till and aggregate samples to determine the variation of the till masses throughout the study area, and (d) geochemical analyses of the till samples and selected analyses for heavy mineral assemblages.

Depending upon a favorable response to the 1978 field program, it is hoped in 1979 to continue this research in the Central Mobile Belt area in areas adjacent to this present study.

Acknowledgements: *The authors wish to thank Jeff Steiner (senior field assistant) for his diligent work during the program and also Norman Mercer, Baxter Kean, and Neil Jayasinghe, for their invaluable discussions of the local geology in the map area.*



SYMBOLS

Glacial striae (direction of ice movement known, unknown)



Number indicates relative age, 1 being the oldest



Till fabrics (ice direction known, unknown)



Esker (direction of flow known, unknown)



Minor moraines, rib moraines, washboard moraines, annual moraines, till ridges transverse to ice flow (irregular, straight)



Drumlins and drumlinoid ridges



Crag and tail hills and ramps



Roche moutonnée



Glaciofluvial terrace



REFERENCES

Vanderveer, D.G., and Sparkes, B.G.

1978: Surficial and glacial mapping. *In* Report of

Activities for 1977. *Edited by* R.V. Gibbons. Newfoundland Department of Mines and Energy, Mineral Development Division, Report 78-1, pages 179-182.