Current Research (1987) Newfoundland Department of Mines and Energy,
Mineral Development Division, Report 87-1, pages 39-43

QUATERNARY MAPPING IN THE GANDER RIVER AREA, NEWFOUNDLAND

D.G. Vanderveer and D.M. Taylor
Quaternary Geology Section

ABSTRACT

Exploration efforts for gold in the Gander River area are being affected by extensive overburden cover and a lack of bedrock exposures. Quaternary mapping of a 55-by-40-km area in the Gander River (2E/2) map area is being conducted to document the distribution of surficial landforms, and to develop a dispersal model to assist mineral exploration in the area.

A continuous mantle of till and extensive organic deposits cover most of the study area; bedrock is exposed only on hilltops, road cuts and along streams. Two regimes of glacial flow—an earlier flow toward the east (080 to 100°) and a later northward flow (000 to 030°) toward the coast—have been identified. The earlier flow is preserved on surfaces that are 'in the lee' of the later northward flow.

Detailed sampling of till matrix and clasts for analyses of texture, rock type and geochemical variation is planned for 1987 in the vicinity of diagnostic zones of gold mineralization or of distinct bedrock zones.

INTRODUCTION

The Gander River Ultrabasic Belt (GRUB line) has been the recent target of gold exploration, which has been spurred by the recent discovery of gold in the Cinq Cerf area on the southwest coast of Newfoundland. Exploration efforts in the Gander River area are being affected by the extensive overburden cover and a lack of bedrock exposures. Outcrops are scattered and generally restricted to stream exposures or hilltops.

The objectives of this study are to determine the direction(s) of glacial transport, to map the distribution of surficial landforms and to document glacial dispersal in order to develop a model for dispersal for use in mineral exploration programs in the Gander River area.

This study is a continuation of previous work (Butler *et al.*, 1984; Vanderveer, 1985) in the Weir's Pond (2E/1) and Gambo (2D/16) map areas.

Location and Access

The study area (Figure 1) covers a 55-by-40-km area extending from Gander Lake in the south to Gander and Loon bays in the north, and from Benton in the east to Glenwood in the west. Most of the field work in 1986 was centred in the Gander River (2E/2) map area.

Access to the area is via the Trans-Canada Highway (Route 1), the Gander Bay highway (Route 330) and Route 340 in the Loon Bay area. Numerous woods roads generally provide good access to much of the area's interior. Similarly, the Gander River transects the study area and may be travelled by either motor boat (e.g., Gander River boat) or canoe.

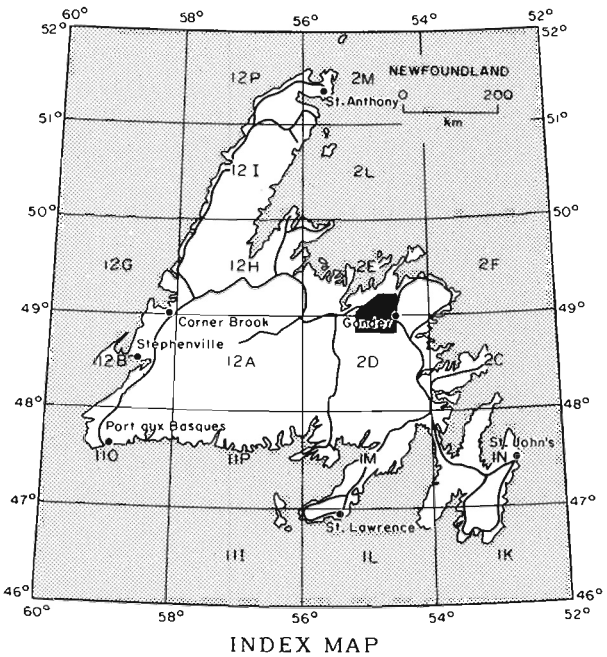

Figure 1: *Location of study area.*

General Geology

Gold exploration in the region is centred along the GRUB Line (Figure 2), which extends along the eastern margin of the Gander Zone. The GRUB line is composed of medium to coarse grained pyroxenite, serpentinite, magnesite and talc–tremolite schist, mafic flows, fine to medium grained

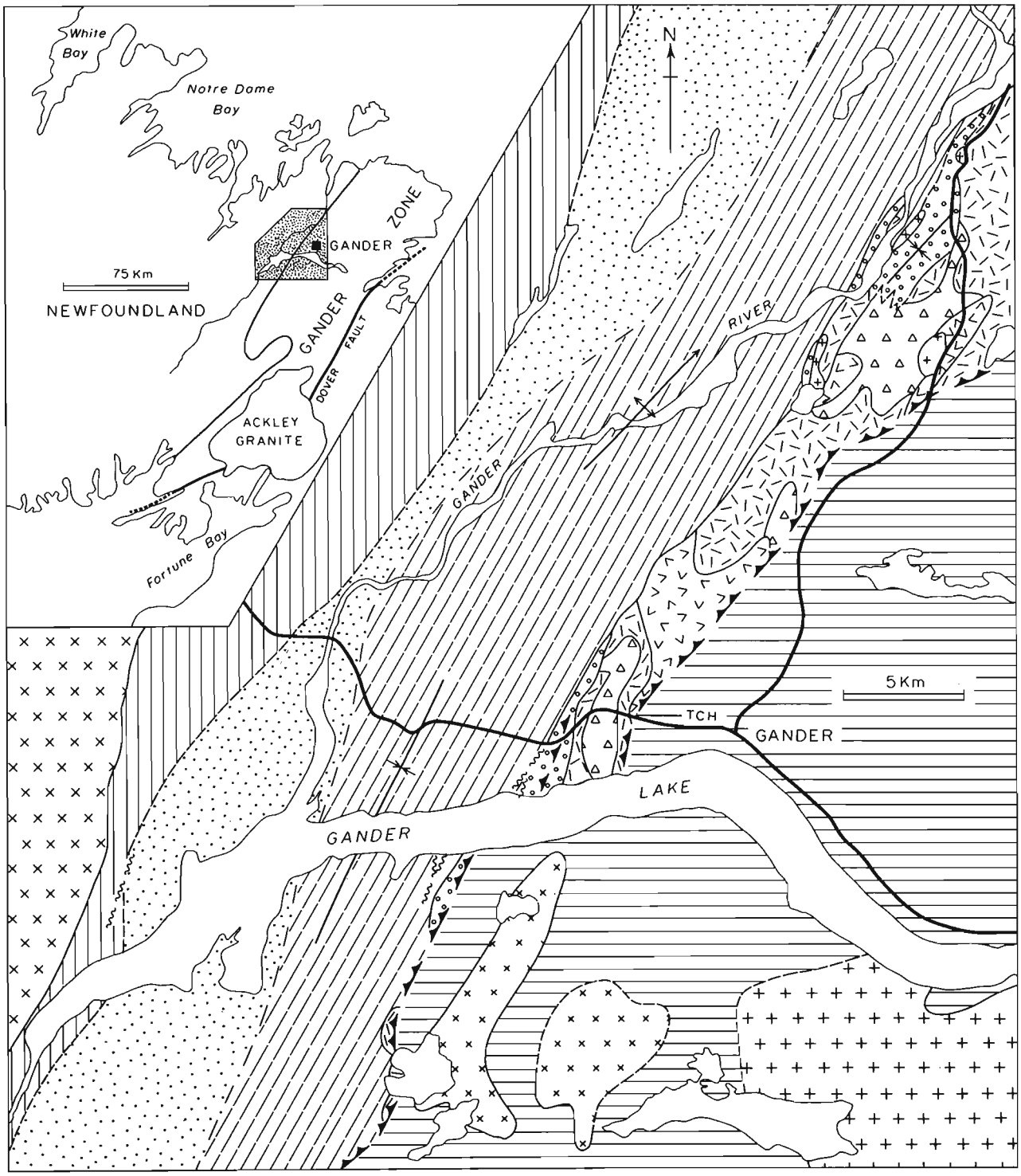

Figure 2. *Generalized geology, Gander River area (after Blackwood, 1982).*

LEGEND *(Figure 2)*

DEVONIAN(?)

Pink granite

Megacrystic granite

Two-mica leucogranite

SILURIAN

BOTWOOD GROUP

Red and gray sandstone and shale; minor limestone

MIDDLE ORDOVICIAN

DAVIDSVILLE GROUP

Thickly bedded graywacke and interbedded siltstone

Thinly bedded siltstone and shale

Polymictic conglomerate and sandstone

LOWER ORDOVICIAN OR EARLIER

GANDER GROUP

Psammite, semipelite and feldspathic quartzite

GANDER RIVER ULTRABASIC BELT (GRUB)

Trondhjemite and quartz porphyry

Pillowed basalt and volcaniclastic rocks

Gabbro

Pyroxenite, serpentinite and magnesite

volcaniclastic rocks, porphyritic mafic flows, fine to coarse grained trondhjemite and quartz and/or feldspar porphyry (Blackwood, 1982). The GRUB line is bounded to the west by conglomerate, sandstone, siltstone, gray to black slate and minor red slate of the Davidsville Group; to the east it is bounded by semipelite, pelite and psammite of the Gander Group (includes minor mafic tuff and amphibolite bands). In the northwest part of the study area, the Davidsville Group is bounded by the polymictic Goldson conglomerate (not shown on geology map), which is in turn in fault contact along its western margin with the Exploits Group and an unnamed argillite unit. The Exploits Group comprises alternating mafic pillow lava units and submarine volcaniclastic–sedimentary units.

QUATERNARY GEOLOGY

Surficial Deposits

The study area occurs in the 'Outer Drift Zone' of Jenness (1960). Landforms are normally of low relief, and glacial-deposition features are limited to either a few scattered occurrences of lineated (fluted) till forms that are subparallel to the latest observed direction of glacial transport, or to ribbed-moraine till deposits that are transverse to the latest flow direction.

The distribution of surficial-terrain types (Figure 3) has been summarized from a previous airphoto interpretation, which was conducted in support of Aggregate Resource Inventories (Kirby *et al.*, 1983).

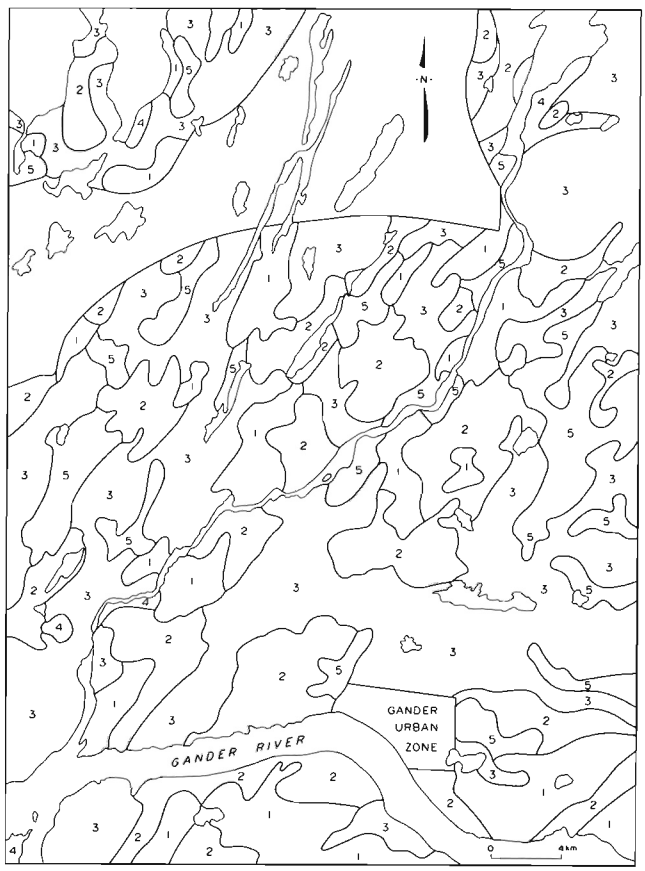

Figure 3: *Distribution of Quaternary sediments, Gander River area. Unit 1–bedrock; minor till cover may be present. Unit 2–till, 1 to 3 m thick, forming a continuous mantle; bedrock may be present. Unit 3–till commonly 3 to 10 m thick. Unit 4–glaciofluvial sediments (sand and gravel). Unit 5–organic sediments (peat and bog).*

The most prevalent terrain elements are Unit 2, consisting of a continuous mantle of till 1 to 3 m thick, and Unit 3, consisting of deposits of till 3 to 10 m thick. Organic sediments (Unit 5) of peat and bog are the next dominant terrain unit, and are most extensive in the east-central and west-central part of the study area. Smaller bogs also occur in most other terrain units but are unmappable at this scale. Glaciofluvial sediments (Unit 4) comprising sand and gravel are of limited extent and are generally restricted to areas adjacent to major river valleys. Exposed bedrock or bedrock concealed by forest cover (Unit 1) is of limited extent, occurring generally on

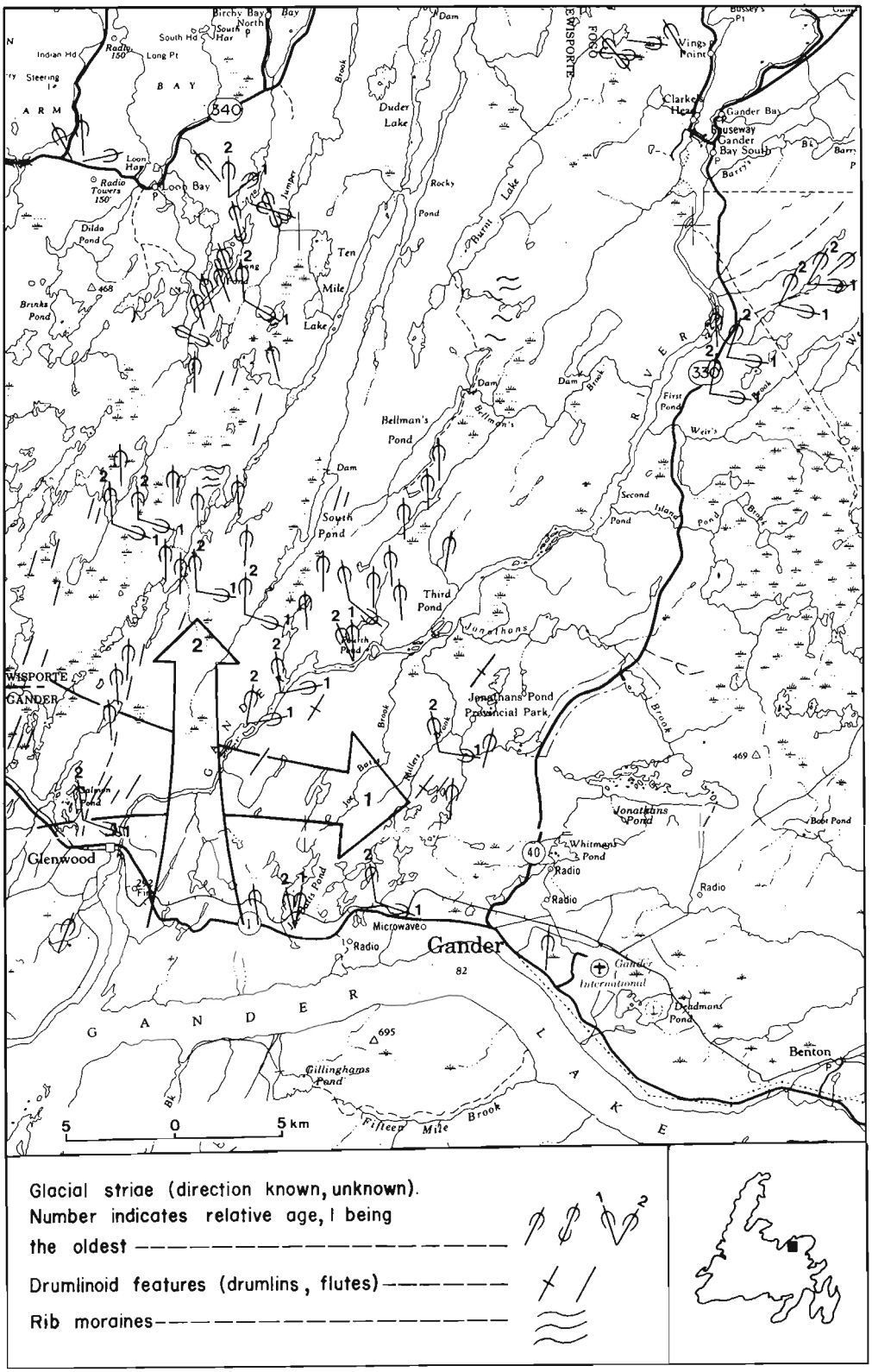

Figure 4. *Directions of glacial flow, Gander River area.*

hilltops, in road cuts and along stream sections. Unit 1 may locally include a thin (less than 1 m) discontinuous veneer of till.

Hammer seismic surveys at ten different localities along the Gander Bay highway (Route 330) and near Weir's Pond indicate that most of the till cover is 3 to 5 m thick, although greater thicknesses occur locally.

Glacial Transport

Mapping of glacial erosional features (Figure 4), such as grooves and striae, and the identification of directional indicators (e.g., miniature crag and tail features) have established that two regimes of glacial flow affected the study area. There was an earlier flow directed toward the east (080 to 100°) and a later northward flow (000 to 030°) toward the coast (Gander and Loon bays). This relationship was mapped on at least 16 striated bedrock surfaces and is generally best preserved on larger outcrop surfaces that form small hills or knolls. Many of the striated surfaces have distinct faceted and/or polished, bevelled edges as a result of successive glacial events. For example, the north-, south- and west-facing surfaces were eroded by the earlier (eastward) glacial flow, and the east-, west- and south-facing slopes were subsequently eroded by flow to the north. Evidence of the earlier flow (eastwards) is now preserved on surfaces that are in the lee (i.e., north facing) of the latest northward flow.

Till and Lithological Studies

One of the objectives of this study is to document glacial dispersion. Identifiable, diagnostic zones of gold mineralization or discrete unique bedrock units that would provide adequate targets (tracers) for a more detailed sampling program were not located. However, bedrock mapping in the Weir's Pond (2E/1) map area (O'Neill, *this volume)* has led to the identification of some unique rock units that may be useful as tracers. Field work in 1987 will concentrate on detailed till sampling of both matrix and clasts (pebbles). The study of textures, clast rock types and the geochemical characteristics of the till matrix will permit the definition of glacial-dispersal patterns.

CONCLUSIONS

The Gander River area has been subjected to two regimes of glacial flow, the first toward the east and the second toward the north. The areas of recent gold exploration in the Gander region are commonly mantled by till of varying thicknesses. The effects of two glacial flows on the dispersal of gold in till remain largely unknown.

Glacial-dispersal studies in the vicinity of known gold showings or down-ice of distinctive bedrock units of limited areal extent are required to define the pattern(s) of glacial dispersal. These orientation studies will be carried out in 1987. Dispersal studies of this type provide useful models to assist mineral exploration in till-covered areas.

ACKNOWLEDGEMENTS

The authors wish to thank Paul Caraccio for his assistance with the field work, and Martin Batterson and Dave Proudfoot for their critical review of the manuscript.

REFERENCES

Blackwood, R.F.
1982: Geology of Gander Lake (2D/15) and Gander River (2E/2) areas, Newfoundland. Newfoundland Department of Mines and Energy, Mineral Development Division, Report 82-4, 56 pages.

Butler, A.J., Miller, H.G. and Vanderveer, D.G.
1984: Geoscience studies in the Weir's Pond area, northeast of Gander, Newfoundland. *In* Current Research. Newfoundland Department of Mines and Energy, Mineral Development Division, Report 84-1, pages 271-278.

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

Kirby, F.T., Ricketts, R.J. and Vanderveer, D.G.
1983: Inventory of aggregate resources in Newfoundland and Labrador. Newfoundland Department of Mines and Energy, Mineral Development Division, Report 83-2, 36 pages, and Open Files NFLD 1287 and LAB 602 (consisting of 29 colored 1:250,000 scale maps).

O'Neill, P.
This volume: Geology of the west half of the Weir's Pond (2E/1) map area.

Vanderveer, D.G.
1985: Quaternary mapping Moran heights, Labrador, and Gander–Gambo area, Newfoundland. *In* Current Research. Newfoundland Department of Mines and Energy, Mineral Development Division, Report 85-1, pages 55-58.