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ICE FLOW IN WEST-CENTRAL NEWFOUNDLAND

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ABSTRACT

Reconnaissance-level striation mapping in west-central Newfoundland covering map areas NTS 2D/13, 2E/4, 2E/5, 2E/12 and 12H/1 suggests the existence of four separate ice-flow events. Of these, the earliest ice-flow direction was northeastward, the second was northward and the third ice flow identified had a north-northeastward trend. The fourth and most recent ice flow had an eastward 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.

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

INTRODUCTION AND OBJECTIVE

West-central 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 exploration in drift-covered areas.

The project objective is to compile reconnaissance-level maps of glacial striae, at a 1:50 000 scale, of map areas NTS 2D/13, 2E/4, 2E/5, 2E/12 and 12H/1 (Figure 1).

During the 1991 field season, ice-flow data were collected from west-central Newfoundland; this data gathering and compilation is part of an on-going regional striation study. The purpose of this study is to improve our understanding of the deglacial history of Newfoundland. A tentative model of deglaciation for the Notre Dame Bay area was presented by St. Croix and Taylor (1991). The data collected during this past field season support the sequence of deglaciation proposed by the model and also extend the western margin of the model (see St. Croix and Taylor, 1991) to the eastern edge of the Topsails.

A complete listing of the striation sites recorded during the past summer can be obtained from the Striation Database (Taylor *et al.*, 1991). Efforts continue on the compilation and development of this database for the Island of Newfoundland. To date, approximately 5000 striations sites have been entered into the database. It is planned to extend this coverage over the coming year and to concentrate on specific problems and areas of less than adequate regional coverage.

RESULTS

Approximately 500 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, chattermarks and miniature crag and tails. Sites that indicate multiple ice-flow directions commonly indicate 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.

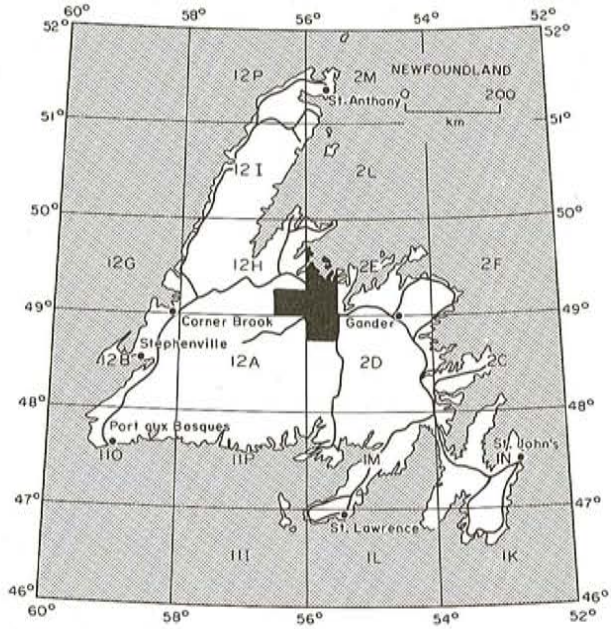

Figure 1. *Map showing the study area.*

The striation data collected suggests the existence of four separate ice-flow events over all or parts of west-central Newfoundland (Figure 2). Of these, the earliest ice-flow

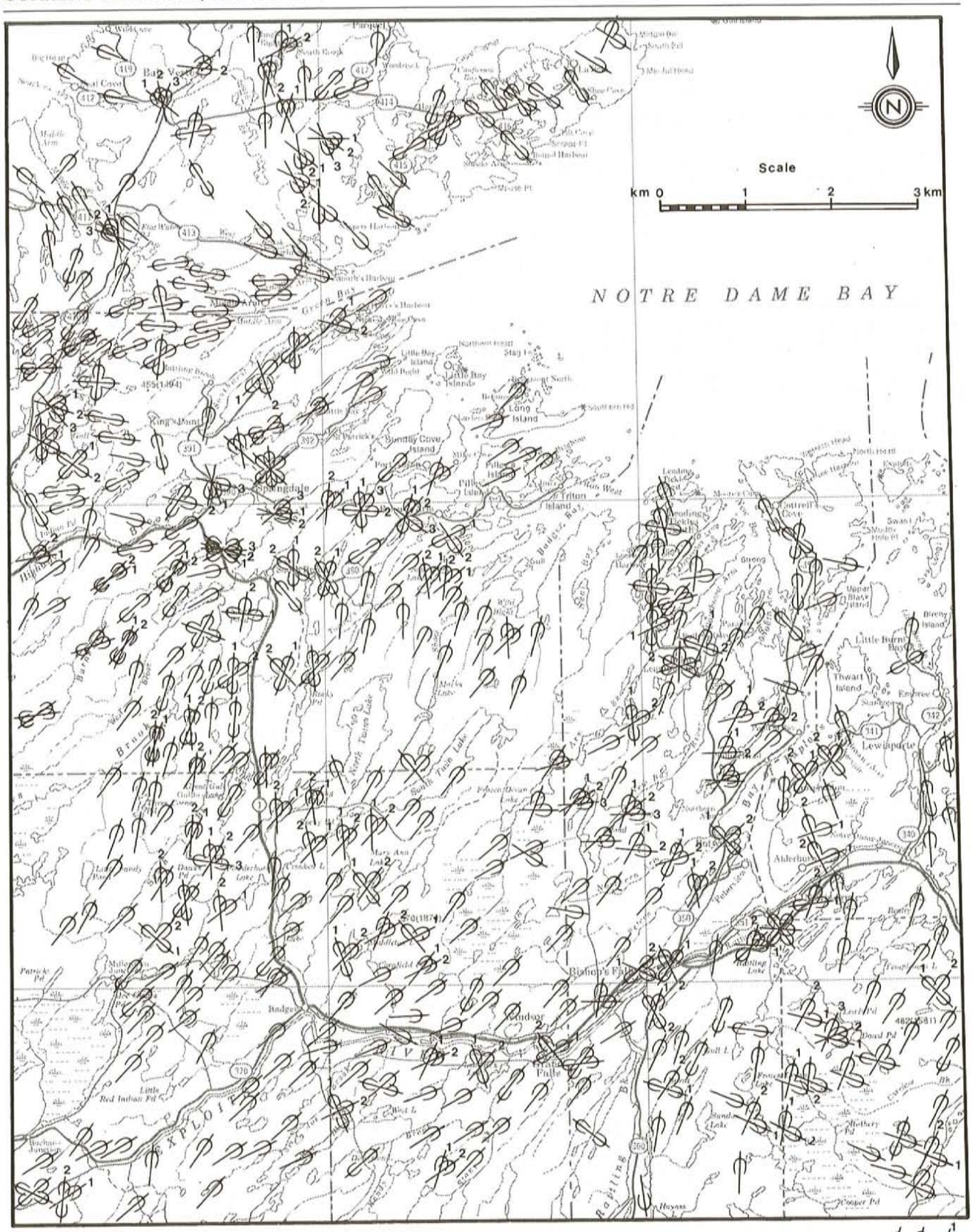

Figure 2. *Ice-flow in west-central Newfoundland. Figure includes data from: Liverman and St. Croix (1989a), Liverman and Scott (1990), Liverman* et al. *(1991), Sparkes (1984), Taylor and St. Croix (1989, 1990) and Vanderveer and Sparkes (1980).*

direction trends northeastward and was found mainly in the southern half of the field area; the second ice-flow direction is northward and is identified at several sites throughout the region; the third ice-flow has a north-northeastward trend and is also widespread over the entire region. The fourth and most recent ice-flow direction has a eastward trend and is found in the central portion of the field area in the vicinity of New Bay Pond. The absolute age of these ice-flow events is not known.

A northeastward ice flow is the earliest of the four glacial events recorded. Ice-flow indicators that pertain to this ice-flow event have consistently been preserved on the leeside surfaces of outcrops that show one or more subsequent ice-flow events. This flow is believed to have originated from an ice centre in the Red Indian Lake area, and can be found across most of north-central Newfoundland (St. Croix and Taylor, 1991).

The second glacial event, a northward ice flow, is found at various localities throughout the study area. The broad coverage and consistency of this ice-flow event indicate a possible ice divide, directly south of the study area (St. Croix and Taylor, 1991), with northward flow into Halls Bay, Badger Bay and Seal Bay.

The third ice flow, north-northeastward, is again widespread over the whole area. This ice flow consistently crosscuts the earlier (second) northward flow where observed on the same outcrops. This ice flow is generally interpreted to be the last regional ice-flow event in the area, and is commonly the only ice flow represented on many of the outcrops observed.

The most recent ice flow in the region was a relatively local, late-glacial event. This eastward ice flow was identified in the New Bay Pond area and may be related to a remnant ice centre in the Twin Ponds area north of Grand Falls as described by Grant (1974). This final ice-flow event may be related to a cooling episode following initial deglaciation identified in north-central Newfoundland by Eyles (1977), Macpherson and Anderson (1985) and Liverman and St. Croix (1989b).

IMPLICATIONS FOR DRIFT PROSPECTING

Explorationists working in drift-covered areas such as west-central Newfoundland must consider multiple ice-flow events when collecting and interpreting data. A geochemical or sediment dispersal pattern in till is commonly 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 may also have dispersed sediment along their respective flow paths, which may have been reincorporated by later ice-flow events.

In areas of multiple ice-flow events, preservation of multiple till units is also possible. Each till unit show sediment-dispersal patterns related to the ice flow that deposited it. Thus, an ability to differentiate between till units is essential in sampling and interpreting results. Multiple till units have not 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.

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