THE PROVENANCE OF TILLS OVERLYING THE EASTERN PART OF THE SOUTH MOUNTAIN BATHOLITH, NOVA SCOTIA

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Mapping of quarternary deposits on the South Mountain Batholith (SMB) has resulted in a four-fold subdivision of tills, divided primarily on the basis of clast lithology, texture, stratigraphic position and morphology.

Three tills have clast lithologies characterized by granites eroded from the South Mountain Batholith. The oldest granite till is a compact till of restricted distribution, mainly observed in drumlin cores. Two younger granite tills dominate the surficial deposits of portions of the SMB and have textural properties ascribed to melt-out tills. The fourth till represents a farther-travelled till with a variable clast provenance typified by pebbles derived from both the SMB and regions to the north. Clast dispersal evidence suggests that all tills were transported in a general southward direction.

Detailed clast examinations allow reliable conclusions concerning direction of ice flow and lithologic relationship between till and bedrock of the SMB. The SMB is an area of multiple glaciation where till prospecting cannot be successful unless the direction of till transport and source areas are established.

Un levé cartographique des dépôts quaternaires recouvrant le Batholite de South Mountain a permis de mettre en évidence quatre variétés de tills en fonction de la lithologie des clastes, la texture, la position stratigraphique et la morphologie.

Dans trois tills, les clastes montrent des lithologies caractérisées par des granites arrachés au Batholite de South Mountain (BSM). Le plus vieux till de granite est un till tassé, de faible étendue, observé surtout dans les noyaux de drumlins. Dans certaines portions du BSM, les dépôts de surface sont dominés par deux tills de granite plus récents qui possèdent des caractéristiques texturales rapportées aux tills d'ablation. Le quatrième till a parcouru une plus grande distance; la source de ses clastes est variable et comprend typiquement des galets provenant tant du BSM que des régions plus au nord. La dispersion des blocaux suggère un direction générale de transport des tills vers le sud.

Un examen approfondi des clastes permet de tirer de solides conclusions à propos de la direction de l'écoulement glaciaire et de la relation lithologique entre le till et le socle du BSM. Le BSM a subi de multiples glaciations et la prospection du till n'y est donc guère profitable à moins de déterminer la direction de transport et la source du till.

[Traduit par le journal]

INTRODUCTION

The glacial geology of the South Mountain Batholith has been influenced by four ice flow phases (Finck and Graves, 1987a). Each ice flow has formed (or modified pre-existing tills to form) a till with lithic and chemical properties related to the source rocks. It is essential that tills deposited by different ice flows be distinguished so that interpretations of geochemical and clast dispersal data from the different flows are not confused. Podolak and Shilts (1978) and Stea and O'Reilly (1982) have confirmed the importance of this concept by showing that till geochemistry is strongly controlled by clast geology and, hence, provenance.

This paper describes surficial deposits overlying the eastern part of the South Mountain Batholith (Fig. 1). Till classification and division is accomplished using directions of clast transport, clast lithology, stratigraphic position, color, texture and morphology. Emphasis will be placed on describing the directions of clast transport from till lithology and the spatial relationship between till and bedrock source. Physical properties of the tills such as color, texture and morphology will be presented so that these may be utilized during field mapping.

PREVIOUS WORK

In mainland Nova Scotia, the succession of glacial movements as interpreted from till deposition is well documented. A compact till of restricted occurrence, mapped at the base of drumlins, is the oldest till in the Meguma Zone. Stea and Fowler (1979) designated this till the Hartlen Till where it overlies Meguma Group rocks, and discovered the clasts to be dominated by Meguma Group lithologies. They concluded that the Hartlen Till is 90-95% locally derived with 5-10% foreign clasts. Grant (1963) had also described it as being locally derived with only minor dilution by exotic pebbles. It was termed a lodgment till by Nielsen (1976), deposited during an uninterrupted glacial sequence that occurred during Mid-Late Wisconsinan glaciation. The Hartlen Till is correlative with the McCarron Brook Till of Stea *et al.* (1985) and was formed by an east-southeastward ice flow (phase one of Stea and Finck, 1984).

The Hartlen Till is succeeded by the Lawrencetown Till (Grant, 1963; Grant, 1975) which was deposited

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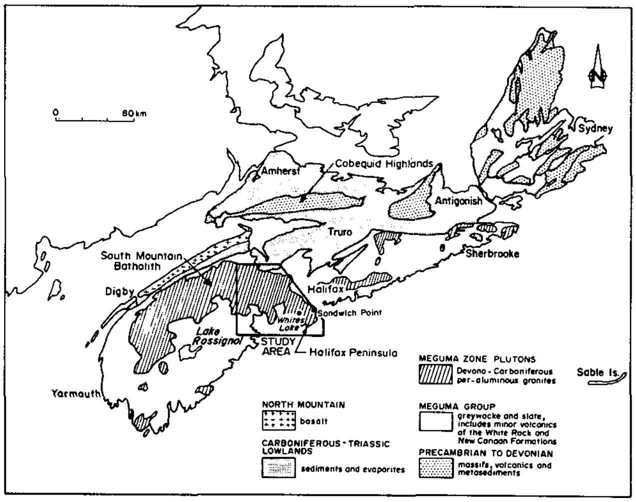

Fig. 1. Generalized geology map of Nova Scotia showing the study area.

by a southeastward to southward ice flow (phase two of Stea and Finck, 1984). The Lawrencetown Till was first mapped in detail by Grant (1963) who identified seven 'red clay' drumlin fields in Nova Scotia extending from Lunenburg County to Guysborough County. He noted increased levels of foreign lithologies associated with the drumlins and believed the far-travelled clasts were dispersed southward to southeastward from sources in North Mountain, Carboniferous lowlands and the Cobequid Highlands.

Tills having a clast composition controlled by bedrock lithologies originating within the South Mountain Batholith and the encompassing Meguma Group rocks have been described by Prest (1896), Grant (1963) and Stea and Fowler (1979). They observed the close relationship that granite, slate and greywacke tills of this region have with the underlying bedrock and concluded that tills dominated by a particular lithology overlie bedrock of that same lithology. These tills, formed during ice flow phases 3 and 4 of Stea and Finck (1984), have been related to radiating ice centers moving in diverse directions from upland areas in Nova Scotia.

FIELD METHODS

Till cuts were examined along highways, secondary roads and the seacoast. Mapping was supplemented by till and clast sampling on a square 2 km grid pattern. This sample separation was used for the following reasons: (1) to sample the South Mountain Batholith (SMB) at the greatest possible density and obtain the maximum amount of lithologic and till information while meeting the time limitations of the project; (2) the clast data was intended for use by the bedrock mapping members of the survey to aid in determining bedrock type and delineating bedrock contacts where exposure is lacking. A significantly larger till/clast sampling grid may have had a coarser separation than the actual occurrence of bedrock outcrop, thereby decreasing the usefulness of the clast counting study; and (3) the sampling grid also served as a regional till geochemical survey. It was felt that a 2 km spacing had a reasonable chance of intersecting mineral dispersal trains based on previous knowledge of tin dispersal at East Kemptville (Stea and Grant, 1982) and tungsten dispersal at Ship Harbour (MacGillivray, 1983).

Clast identification was conducted on pebbles extracted from till in the field. Plastic sieves having 1.25 cm openings were used to separate clasts and till matrix. Clast data assists in identifying the magnitude and direction of till dispersal and to quantify the lithologic composition of the till. Pebbles were divided into three principal groups: granitoid, Meguma Group and foreign lithologies. The granitoids, derived from the SMB, were further sub-divided visually (after MacDonald *et al.*, 1987) into units using texture, grain size, alteration, color, and modal percentages of biotite, muscovite, quartz, and the feldspars. Meguma Group clasts were further sub-divided into greywacke and slate. The foreign category of pebble types includes volcanic rocks, mafic and intermediate intrusive rocks, sandstones, siltstones, metasedimentary rocks and quartz. This classification contains pebbles that commonly have unknown provenance and may include Meguma Group clasts of unusual colour and alteration that are difficult to discriminate from Cobequid Highland metasedimentary rocks.

A genetic classification after Dreimanis (1976) has been applied to some units. Lodgment tills (Granite Till A) on the SMB are characterized by high compaction, a clast content dominated by local lithologies and the development of fissility and sub-horizontal fault planes that may exhibit slickenslides. Melt-out tills have a loose texture and exhibit sorting structures as described in Shaw (1982). In this survey, ablation till (Granite Till C) was distinguished from ground moraine (Granite Till B) by hummocky morphology and an abundance of melt-water related structures such as planar-bedded sand and boulder scours. Clast types in the ablation till are generally more varied and are transported from a more distant and larger area than Granite Till B. The latter also lacks the irregular knobby morphology of the ablation till and is, instead, expressed as a low relief ground moraine resulting from deposition by active receding ice (Graves and Finck, 1988).

STRATIGRAPHY

The stratigraphic relationships between till units are, in general, poorly exposed in the study area; however, observations generally agree with the work of previous authors. Till sequences are best observed in drumlin sections exposed along the coast or in gravel pits. Mapping superimposed tills (Fig. 2) is vital to determine relative ages of ice advances. During the survey, exposed drumlins were examined to ascertain the sequence of glacial deposition and the nature of internal contacts. Till fabric analysis was performed on selected sections to aid the clast provenance studies and to determine ice flow directions.

A complete sequence of tills in superposition representing Wisconsinan glaciation in Nova Scotia has not been recognized on the SMB. Loose, sandy tills are commonly seen overlying Granite Till A and the Lawrencetown Till, but Lawrencetown Till has not been mapped overlying Granite Till A. Three of the most important sections studied by the

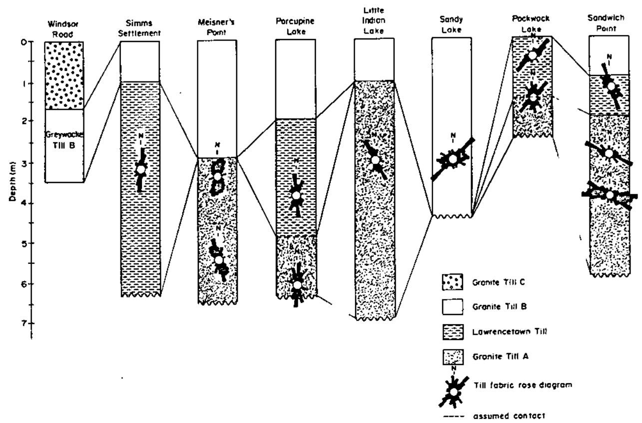

Fig. 2. Till stratigraphy on the eastern South Mountain Batholith. Rose diagrams show the fabric orientation within the till units.

authors are described below.

Sandwich Point Section

A wave-cut drumlin at Sandwich Point exhibits a nearly complete stratigraphic sequence. The uppermost portion of the section reveals Granite Till B, a very stony till in which the clasts are comprised entirely of angular boulders of Halifax Peninsula Leucomonzogranite (MacDonald *et al.*, 1987) derived from underlying bedrock. This till grades into a zone containing angular granite and subangular greywacke clasts, which in turn overlies a sandy washed greywacke-rich diamicton interpreted to have been derived from the underlying Lawrencetown Till. In a classic succession, Granite Till A would underlie the Lawrencetown Till, whereas at this locality the stratigraphic position is filled by a compact, Meguma-rich till resembling the Hartlen Till. This is unusual, as the Hartlen Till and Granite Till A are lateral equivalents and derived from the Meguma Group and South Mountain Batholith, respectively. This is the only location where Hartlen Till was observed overlying the SMB. The Meguma Group-granite contact is only two hundred metres to the east, suggesting a nearby source for the Hartlen Till. Underlying the Hartlen Till, at Sandwich Point, is residual granite believed to be of pre-Wisconsinan age, pre-dating all tills in the province.

Simms Settlement Section

An excavated drumlin at Simms Settlement reveals the stratigraphic relationship between Granite Till B and Lawrencetown Till. Bouldery Granite Till B overlies the Lawrencetown Till and continues laterally along the ground surface. Wedges of granite till are injected into the lower till. An attitude was not determined for these wedges; however, Nielsen (1976) noticed the same structures in a section at White's Lake, Halifax County. Nielsen observed that the till wedges dip 45° to the south-southeast, implying injection into the lower till by overriding ice flowing in the same direction.

Windsor Road Section

Ablation till of SMB provenance (Granite Till C) overlies a local, stony till (Greywacke Till B) derived from greywacke bedrock, at Windsor Road, Lunenburg County. It is a washed till with associated stratified drift and is considered the youngest till unit mapped. Granite Till C contains boulders of biotite monzogranite believed to have been eroded from Sandy Lake Monzogranite inliers 10 km to the northeast. This suggests that the till was formed by ice flowing to the southwest.

TILL UNITS

Granite Till A

Finck and Graves (1987a) mapped Granite Till A coring drumlins north of The Head of St. Margaret's Bay at Meiseners Point and at Little Indian Lake (Fig. 3). It is a compact, moderate brown till commonly displaying sub-horizontal fissility. In drumlin sections the till varies from 3-10 m thickness and is always overlain by 1-2 m of loose, granitic till.

Granite Till A, in a drumlin 700 m west of Little Indian Lake, contains a clast population representative of the immediate bedrock geology (Fig. 4b). The drumlin is situated near a bedrock contact between Sandy Lake Monzogranite (SLM) and Tantallon Leucomonzogranite (TL). The variation in granitic clast percentages within the till is minimal. For instance, the SLM content varies from 45-65% and the TL content varies from 20-30%. Meguma Group and foreign clasts constitute a significant proportion of the till, varying from 6% near the contact with the upper unit to 33% at 4 m depth. Granite Till A is also exposed in a road cut on Highway #103 3 km southwest of the Little Indian Lake section (Fig. 4a). It contains 40-55% clasts from the underlying TL, but also 15-30% clasts from the SLM which is located 4 km north of this section. As in the drumlin at Little Indian Lake, the lower till contains Meguma Group and foreign clasts. Granite Till A is consistently dominated by local granites while hosting farther travelled non-granitic clasts.

Peltoniemi (1985) described clast uptake in till using renewal distance which is the distance (measured in the down-ice direction from a bedrock contact) over which a down-ice rock type increases from 0-50% in the till. It is applied here to give a numerical value to the rate of incorporation of clasts into the till. Renewal distances are calculated after Salonen (1986) using clast count data collected in the field. In Granite Till A, the renewal distance varies from 1.7 km to 2.4 km.

The clast geology in Granite Till A at Little Indian Lake indicates southward dispersal and is consistent with southeastly till fabric data. The physical properties, clast lithology and stratigraphic level suggest Granite Till A was formed during ice flow phase 1 of Stea and Finck (1984).

Lawrencetown Till

The Lawrencetown Till is a reddish-brown muddy till (Plate 1) of partial exotic provenance that forms drumlins separated by a ground moraine (Fig. 8). The drumlins vary in thickness from 3-10 m and the ground moraine from 1-3 m. A variation in mud content modifies the texture from cohesive in the

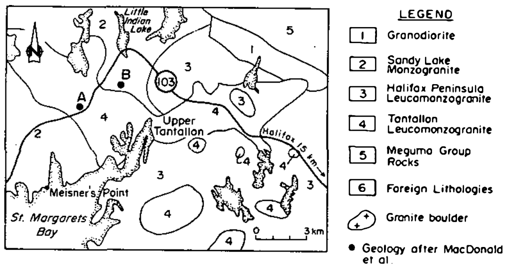

Fig. 3. Location of till sections A and B in relation to bedrock of the South Mountain Batholith.

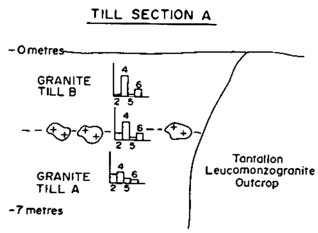

Fig. 4a. Till section A exposed along Highway #103. Histograms represent the clast types observed at pebble count sites. The bar numbers are keyed to the bedrock geology in Figure 3.

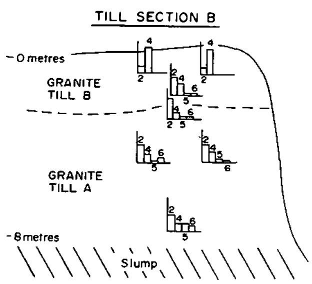

Fig. 4b. Till section B exposed west of Little Indian Lake.

drumlin till to a looser, sandier texture in the ground moraine. Lawrencetown Till drumlins contain 60-90% clasts from north of the SMB and the ground moraine contains 40-60% non-granitic pebbles. Lawrencetown Till lacks till hummocks and glaciofluvial deposits indicating basal deposition and only a slight influence on the till by glacial melt-water.

Detailed clast examinations by the authors indicate Lawrencetown Till was derived from a distant source. Mapping of the Lawrencetown Till on the South Mountain Batholith has shown that much of the clast and matrix of the Lawrencetown Till is derived from north and northwest of the drumlinized areas. Clasts in this till on the Halifax Peninsula are Meguma Group slates and greywackes, Carboniferous sedimentary rocks and Cobequid Highlands volcanic and intrusive rocks. The Lawrencetown Till must have crossed the Cobequid Highlands, Minas Sub-basin and Meguma Group bedrock to have entrained a pebble assemblage of this type with transport distances up to 90 km from the Cobequid Highlands (Finck and Graves, 1987a). Indicator clasts derived from the Cobequid Highlands are spherulitic rhyolite from the Fountain Lake Group and diorite from the Devono-Carboniferous plutons coring the Highlands (P.J. Wallace, personal communication).

South of Windsor, Hants County (Fig. 5a) the Lawrencetown Till has a far-travelled clast provenance that is distinct east of Leminster in comparison with the area to the west (Fig. 5b). East of Leminster, Lawrencetown Till contains 0-30% sedimentary rocks from the Minas Sub-basin and 0-10% basalt clasts of North Mountain provenance. Till in this area has clast renewal distances as large as 70 km. The Carboniferous sedimentary rock concentrations over the SMB decreases to <5% south and west of the western terminus of the Carboniferous Basin. Simultaneously, the basalt percentages increase quickly in this area of the

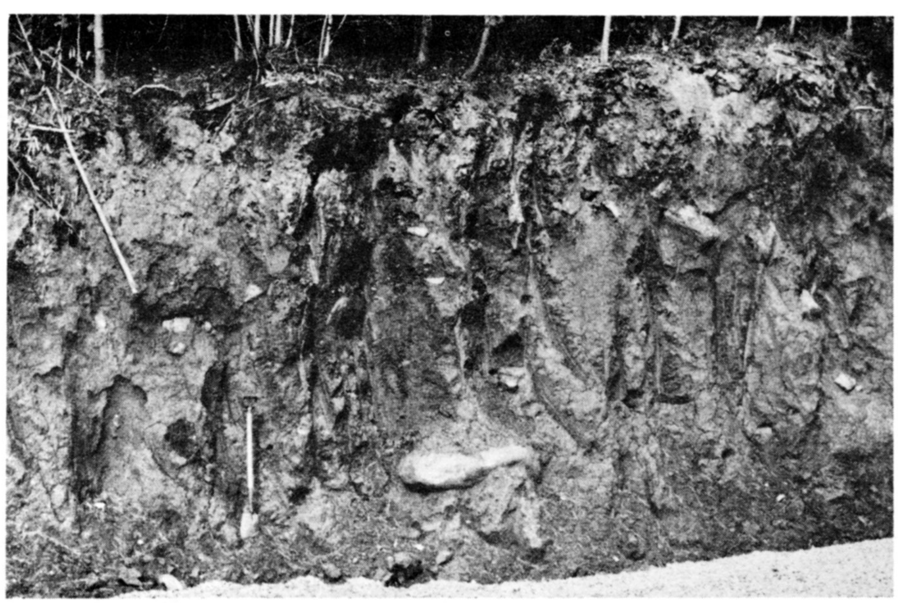

Plate 1. The Lawrencetown Till, a reddish-brown, muddy till containing clasts of local and distal provenance.

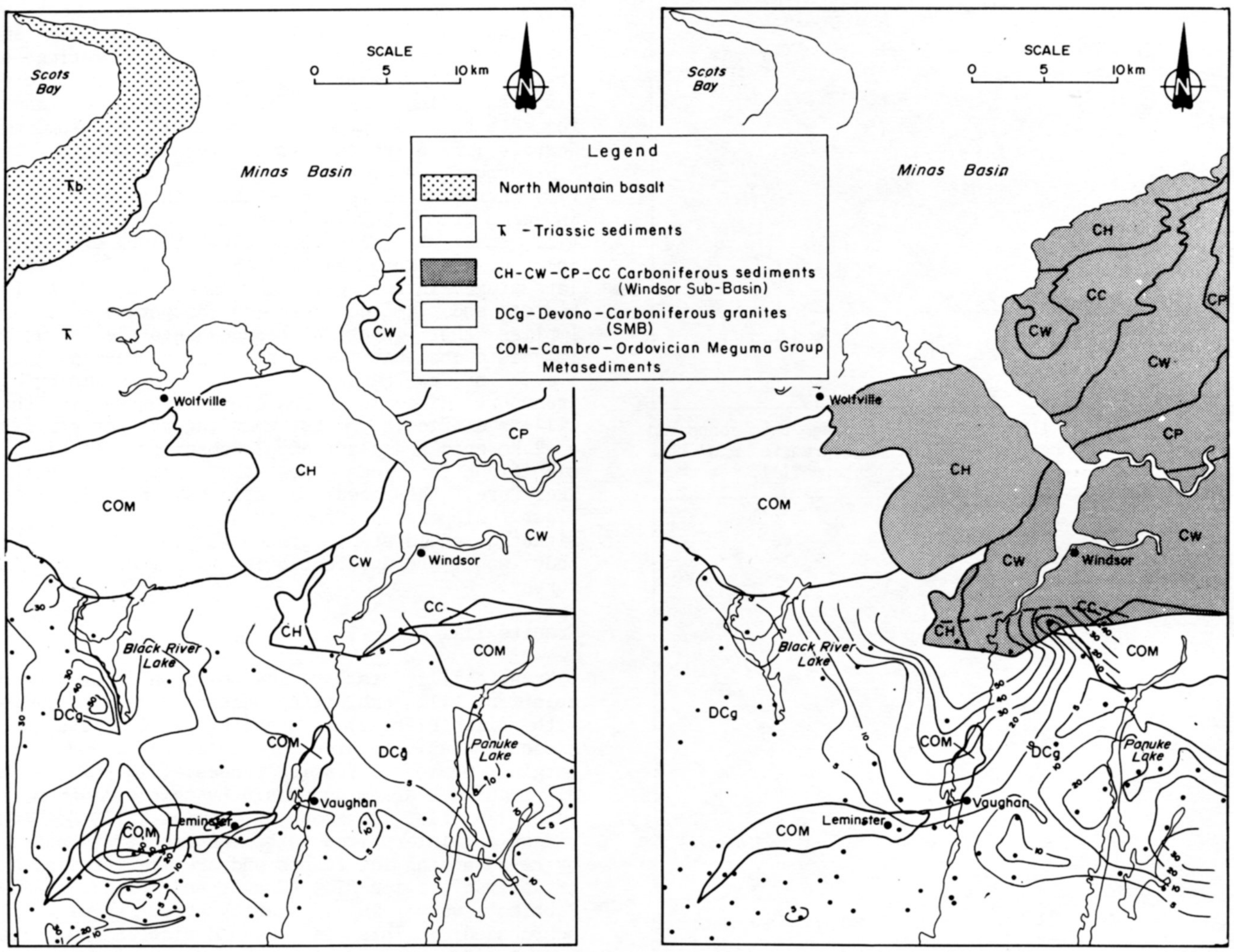

Fig. 5a. Clast lithology map showing the contoured percentages of North Mountain basalt clasts in Lawrencetown Till.

Fig. 5b. Clast lithology map showing the contoured percentages of Carboniferous sedimentary clasts in Lawrencetown Till.

SMB from 0-50%. The decrease in clastic rock types and the abrupt increase in basalt suggests that ice forming the Lawrencetown Till flowed south across this region.

Lawrencetown Till is usually described as far-travelled because of the high foreign clast content and its red muddy appearance. However, Lawrencetown Till also contains a significant local clast content. North of New Ross, the authors have observed New Ross Leucomonzogranite (NRLM) and Panuke Lake Leucomonzogranite (PLLM) clasts displaced from bedrock to the till surface within 500 metres (Figs. 5c, d). Though the uptake is abrupt, the granite till clasts do not achieve percentages greater than 56% in the till. Renewal distance for clasts in this area vary from 2.5 km to 5 km.

Lawrencetown Till contains clasts from multiple SMB bedrock sources. This is illustrated 6 km north of New Ross where Salmontail Monzogranite is in intrusive contact with a Meguma Group greywacke inlier (Fig. 6). The maximum down-ice displacement of these granite clasts cannot be determined, however, Salmontail Monzogranite decreases to approximately 15% of the clast content 4 km down-ice of this contact. These clasts were eroded and deposited in a basal-ice position in the Lawrencetown Till where the rate of comminution is high. This contrasts with the long dispersal distance of foreign lithologies which are transported in an englacial position prior to deposition. The influx of foreign material also serves to dilute the local component.

Granite Till B

Granite Till B is a yellowish-brown, bouldery and immature till (Plate 2). The till forms a flat to undulating ground moraine (Fig. 7) that varies in thickness from 1-6 m. It exhibits limited clast dispersal and, therefore, can be divided into lithological facies that correlate with underlying bedrock.

The close spatial relationship between granite clasts in Granite Till B and the corresponding granite bedrock geology is seen on Figures 8, 9a, 9b and 9c. The lithology maps are contoured plots of the major granite clast types found in the till and the bedrock geology is after Corey (1988). Granite clasts are divided into three categories and contoured with a 25% interval. Comparison of the contoured plots with bedrock geology indicates

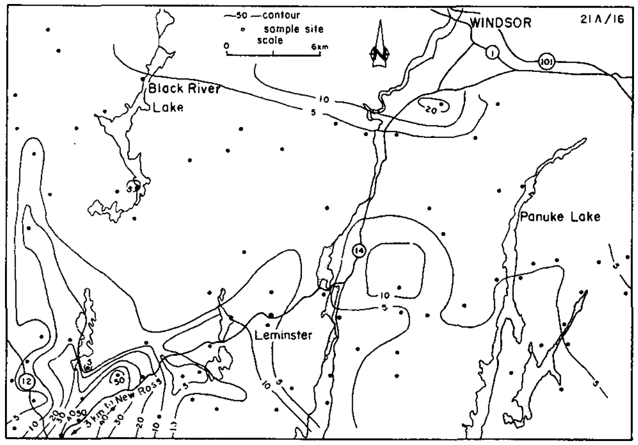

Fig. 5c. Clast lithology map showing the contoured percentages of Panuke Lake Leucomonzogranite and Lake Lewis Leucogranite clasts in Lawrencetown Till.

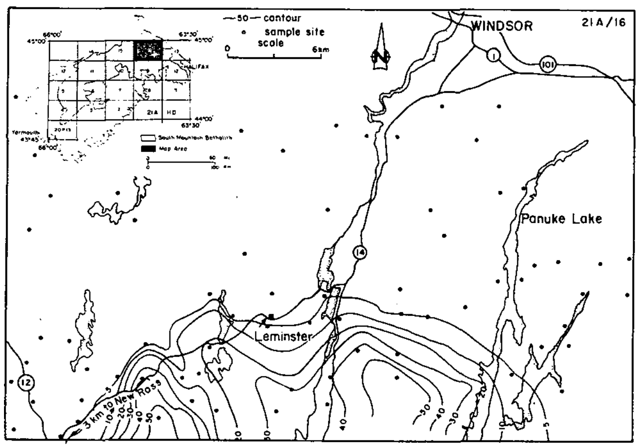

Fig. 5d. Clast lithology map showing the contoured percentages of New Ross Leucomonzogranite clasts in Lawrencetown Till.

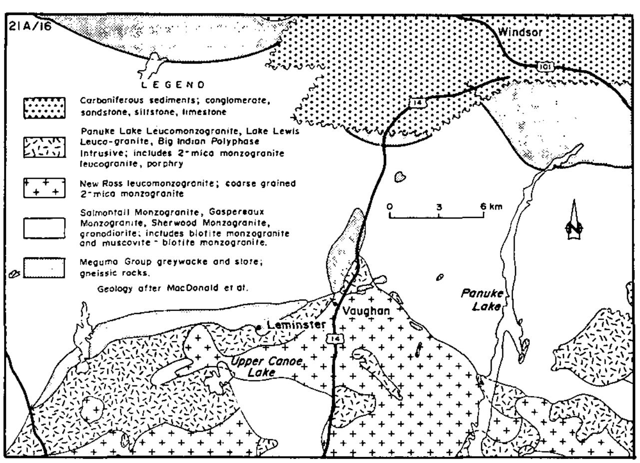

Fig. 6. Bedrock geology of the Windsor mapsheet.

little overlap of granites southward across adjacent rock types in quantities of clasts greater than 25%. For example, east of Spondo Lake and northeast of Chester large areas of Sandy Lake Monzogranite (SLM) are overlain by till dominated (75-100%) by SLM clasts (Fig. 9b). There appears to be little evidence of dilution by rock types found up-ice, i.e., to the north. West of Connaught Lake, two small inliers of SLM 1 km^2 and 6 km^2 are overlain by Granite Till B consisting of 75-100% SLM clasts confirming the restricted dispersal within the till sheet. Renewal distances for clasts, as determined by field mapping, in Granite Till B are tens to hundreds of metres.

Numerous bodies of Tantallon Leucomonzogranite (TL) intruded the SLM and NRLM. These plugs vary in area from 1 km^2 to 50 km^2 and have an overlying till sheet generally comprising 75-100% of clasts incorporated into the till (Fig. 9c) from these late-stage intrusions. The small size of the bodies and limited down-ice dispersal (<1 km) implies that input of bedrock into the till is immediate and that the transport distance is short, i.e., a few hundred metres. Determining a transport direction using clast dispersal in this till is difficult. Clast sampling was performed on a 2 km grid and clast displacement in this till is significantly less than the sample spacing. Therefore, the sampling grid may not intersect clast dispersion from a small granitic body situated equidistant between sample sites and this body would be undetected in the clast sampling survey.

Granite Till C

Granite Till C is a yellowish-brown, loose, sandy ablation till exhibiting bedded sands intermixed with till (Plate 3). Granite Till C exists as a discontinuous moraine of isolated mounds and merging hummocks forming ridges (Fig. 7) which distinguishes areas underlain by this till from the generally flat landscape of Granite Till B. The ridges are interpreted to be the result of pushing by re-advancing ice fronts and are ice marginal and transverse to ice flow (Graves and Finck, 1988). Pebbles vary in angularity from angular to subrounded. This till is dominated by clast lithologies derived from the SMB. In examined exposures, it contains pebbles from underlying bedrock in proportions ranging from 0-70%. Further travelled clasts include Meguma Group rocks from 5-20 km distance and other SMB granitoid lithologies.

Unlike Granite Till B, this till has appreciable clast transport and as such a direction of flow can be determined using clast dispersal evidence. Deposits of Granite Till C are primarily concentrated at Gold River, Dauphinees Mill Lake, and north and east of Chester (Fig. 8). The ablation till at Dauphinees Mill Lake is a mixture of SLM, TL and Meguma Group rocks. Dispersal of the Meguma Group clasts, source of which is believed to be 20 km northeast of Dauphinees Mill Lake, is based on the southwestward-trending till fabric evidence at Sandy Lake and Pockwock Lake (Finck and Graves, 1987a, b), southwest-northeast oriented striations (Finck and Graves, 1987a, b) and Pleistocene mapping by other workers. A late Wisconsinan westward flow was mapped by Stea (1982) and Prest *et al.* (1972) in the Minas Sub-basin. Southwestward-trending erosional and depositional indicators of ice flow on the SMB may be a deviation of this westward advance to the southwest and onto the SMB. This southwestward flow formed Granite Till C in this area while dispersing Meguma Group clasts 20 km from the source.

Northwest of Chester, the dispersal of Spectacle

Plate 2. Granite Till B exposed at Simms Settlement. The clasts in this till are derived entirely from Sandy Lake Monzogranite which is the bedrock geology of the area. The stoniness of Granite Till B and the angular clasts attest to the immature nature of the till.

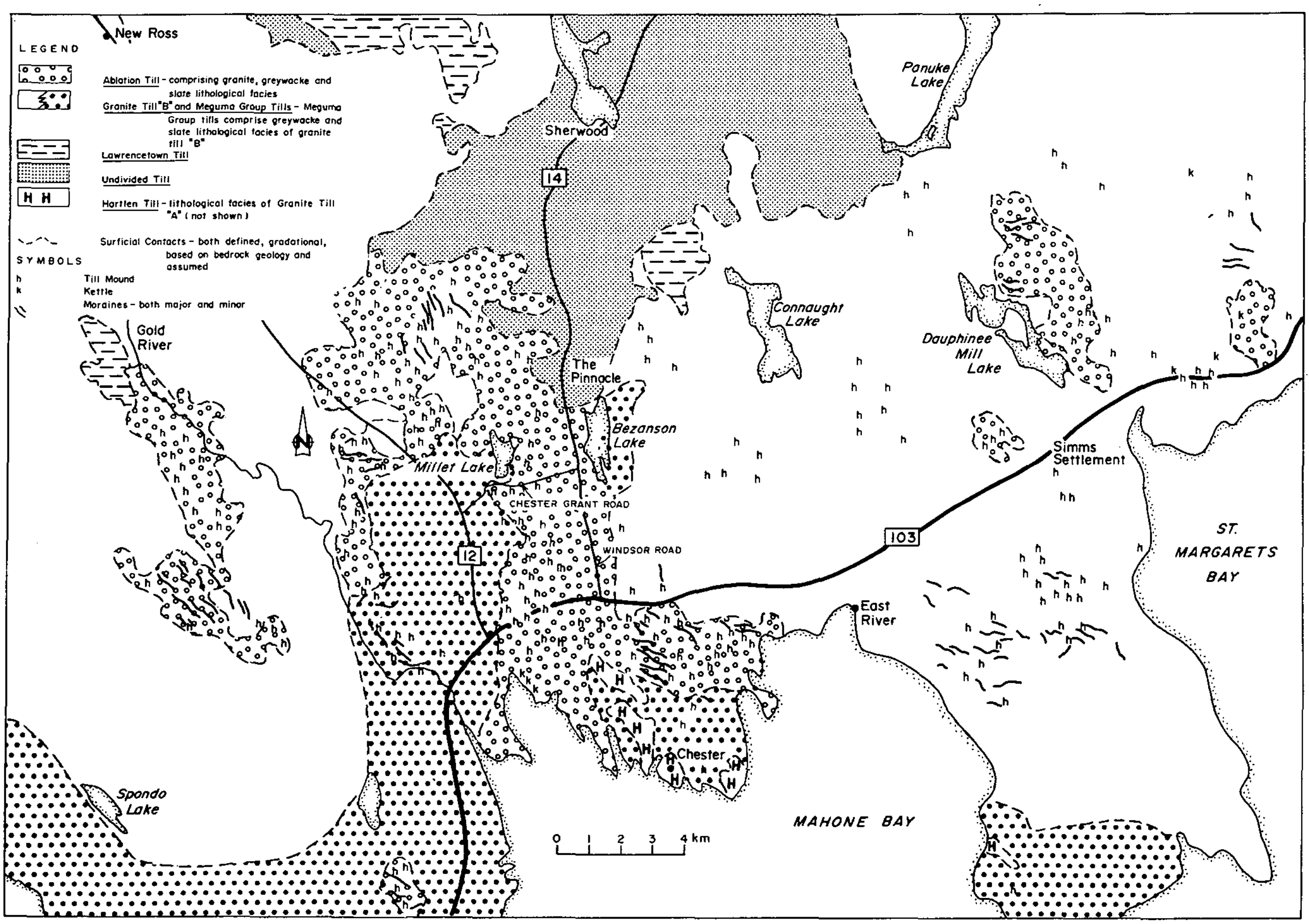

Fig. 7. Surficial geology of the Chester mapsheet.

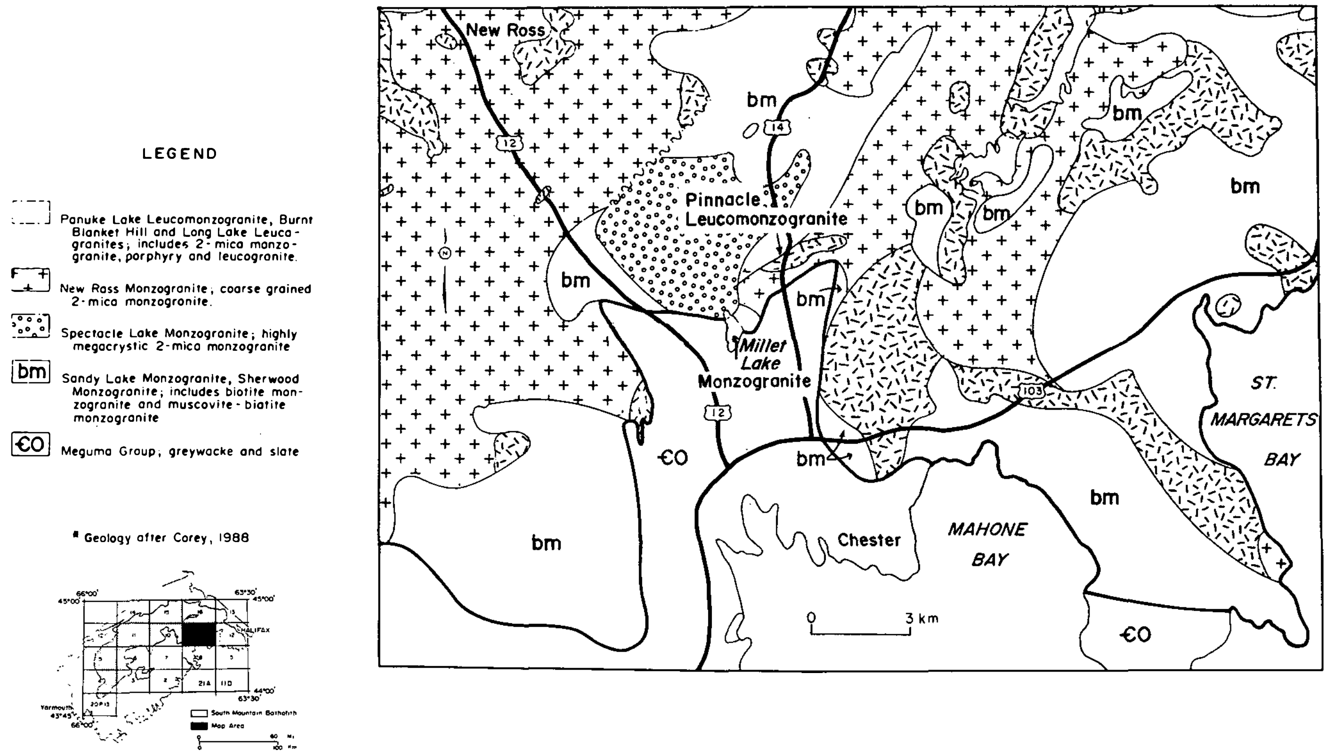

Fig. 8. Bedrock geology of the Chester mapsheet.

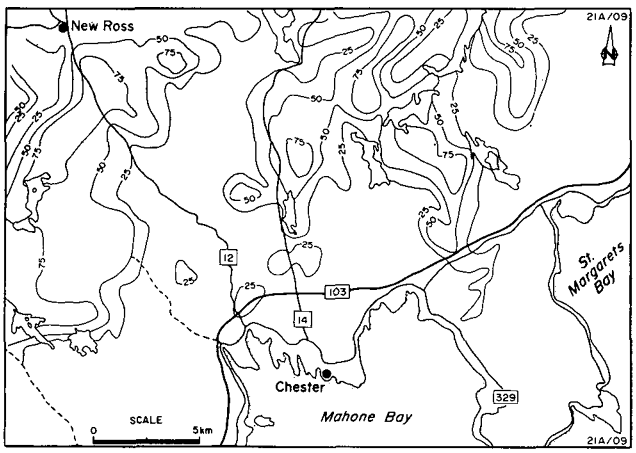

Fig. 9a. Clast lithology map showing the contoured percentages of New Ross Leucomonzogranite clasts in Granite Till B and Granite Till C. The area shown is the Chester mapsheet.

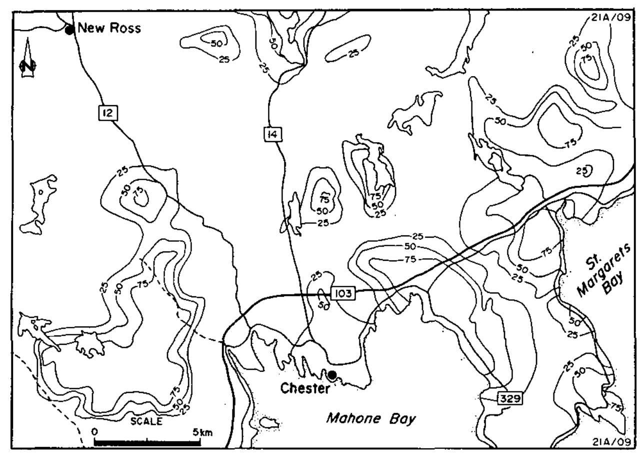

Fig. 9b. Clast lithology map showing the contoured percentages of Sandy Lake Monzogranite clasts in Granite Till B and Granite Till C.

Lake Leucomonzogranite clasts in Granite Till C indicates a different flow direction towards the south-southeast (Fig. 10). The onlap of these granite clasts onto greywacke bedrock is at least 5 km and renewal distances vary from approximately 300 m to 6 km. Within this dispersal fan, other distinctive rock types are also displaced southward. Two km south of Millet Lake, an excavated till hummock contains 60-80% of the Millet Lake Monzogranite. The intrusive plug is small (approximately 1 km^2) and provides a precise location for determining source and flow direction. Clasts from the Pinnacle Leucomonzogranite show a similar dispersal fan. On the Chester Grant road, stratified till contains 50% fine- to medium-grained leucomonzogranite clasts derived from a small intrusive body at The Pinnacle and 50% pyritic slate from the Halifax Formation. The location of this till cut is over greywacke bedrock and is 2 km south of the western contact of the Pinnacle Leucomonzogranite with New Ross Leucomonzogranite.

CONCLUSIONS

An extensive lithologic study of clast abundances and types in the tills of the SMB have allowed the authors to produce till clast lithology maps which portray valuable information regarding till provenance and till dispersal. The authors have

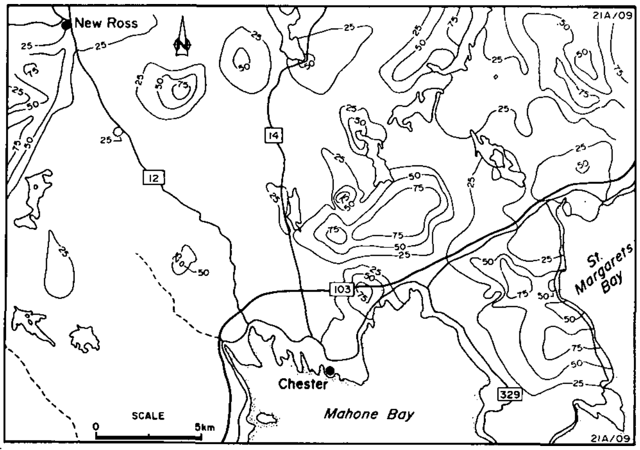

Fig. 9c. Clast lithology map showing the contoured percentages of Panuke Lake Leucomonzogranite and Long Lake Leucogranite clasts in Granite Till B and Granite Till C.

determined that the surficial geology of the study area hosts four tills; Granite Till A, Lawrencetown Till, Granite Till B and Granite Till C. Lawrencetown Till, Granite Till B and Granite Till C are the predominant till units with only sporadic occurrences of Granite Till A. Glaciation resulted in these tills having similar directions of transport but differing clast provenance.

The dominant direction of glacier flow is to the south-southeast. Clast dispersal has shown that glaciers flowing in this direction have formed Granite Till A, Lawrencetown Till and Granite Till C. Granite Till B and Granite Till C are in part formed by the same ice flow event suggesting southeast dispersal in Granite Till B. A late southwestward ice flow is believed to have formed ablation tills west of Dauphinees Mill Lake indicating both southeastward and southwestward transport in Granite Till C.

The following generalizations can be made with regard to the distribution of the above mentioned tills and their clast provenance.

Granite Till A has a restricted occurrence and is usually found coring drumlins. It is overlain by younger till and is not normally collected during till sampling surveys. The clast composition has renewal distances varying from 1.7 to 2.4 km and is characterized by SMB granites indicating that Granite Till A is useful for inferring granite bedrock located within the renewal distance.

The Lawrencetown Till is a widespread surface till in some areas of the SMB and is commonly encountered during till sampling and mapping surveys. The high non-granitic clast content of 40-90% makes this till less desirable than the granite tills for use in mineral exploration on the SMB. It exhibits a large variation in renewal distance from 2.5 to 70 km and as a result contains highly variable contents of SMB clasts.

The lithologic content of Granite Till B reflects the bedrock from which it was derived; changes in granite bedrock type are virtually mirrored in this till. Renewal distances in Granite Till B are short and vary from tens to hundreds of metres. Clasts in Granite Till B are reliable as aids in predicting the type of granite bedrock in areas of blanket till cover.

Granite Till C is derived predominately from the SMB, but compared to Granite Till B has incorporated clasts from a larger area. The renewal distances vary from 300 m to 6 km and consequently clast percentages vary correspondingly. Granite Till C with short renewal distances may be oligomictic whereas with longer renewal distances the clast content is multi-lithologic.

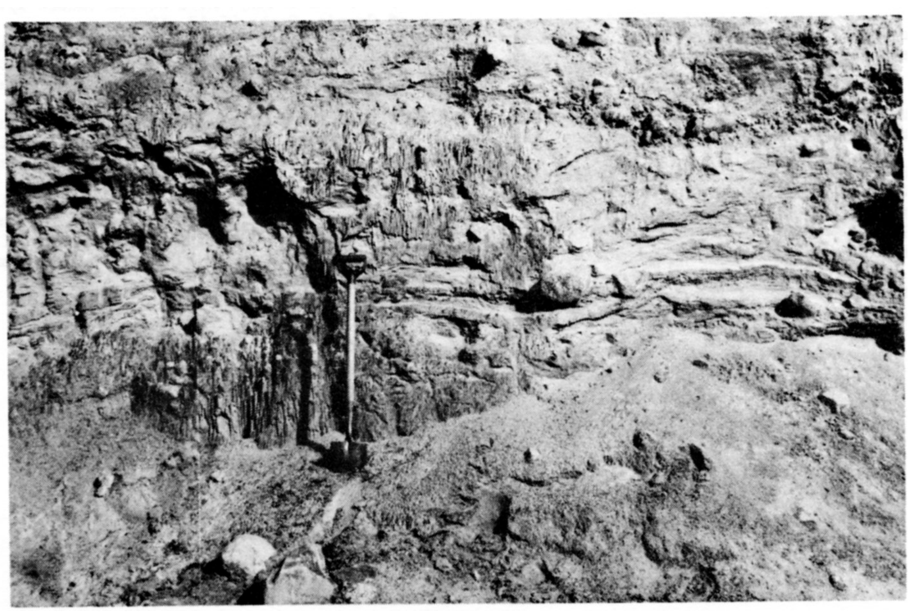

Plate 3. Granite Till C exposed 3 km north of Chester. The horizontal gravel/sand beds indicate re-working by glacial meltwater during till deposition.

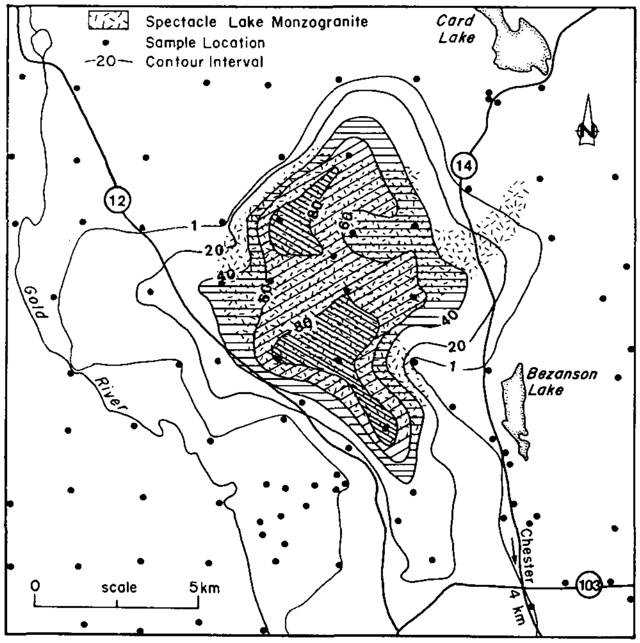

Fig. 10. Clast lithology map showing the dispersal of Spectacle Lake Leucomonzogranite clasts in Granite Till C.

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