PRELIMINARY RECONNAISSANCE STUDY OF THE NORTHERN GRENVILLE PROVINCE, NASKAUPI RIVER AREA, LABRADOR

by

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INTRODUCTION

The author did not undertake an extensive field program during 1979, being in the process of compiling the results of geological studies conducted in the Central Mineral Belt between 1974 and 1978. However, a helicopter-supported reconnaissance survey was carried out from Goose Bay for a five-day period during the last week of July to evaluate the feasibility of initiating a program along the northern margin of the Grenville Province in the Grand Lake - Naskaupi River area in 1980. The main reasons for the initial reconnaissance work were the possibility of finding unrecognized metavolcanic rocks of the Bruce River Group in the area south of Nipishish Lake (cf. Ryan and Harris, 1978), and the reported occurrence of Seal Lake Group rocks in the Mount Elizabeth area (Stevenson, 1967) near a regional uranium reconnaissance program (URP) anomaly detected in 1977.

The mapping carried out in 1979 was concentrated in the Crooked River - Naskaupi River - Grand Lake area, and included the southern halves of N.T.S. areas 13K/2 and 3, and all of N.T.S. areas 13F/14 and 15. Previous work had shown the northwest portion of the study area (13K/3) to be underlain by the Seal Lake Group in fault contact with foliated granites to the south (Fahrig, 1959) and the northeast portion (13K/2) to be underlain by granite and paragneiss (Williams, 1970). The other two map areas (13F/14 and 15) were shown on Stevenson's (1967) map as being underlain chiefly by "black and white gneisses and gneissic granite of probable sedimentary origin", with an east-west trending belt of metaquartzites in the vicinity of Mount Elizabeth and another ovoid area on the north side of the Red Wine River. The major finding of the study was the recognition of Williams' (1970) "paragneiss" and Stevenson's (1967) "metaquartzite" as aplite and microgranite similar to that of the Nipishish Lake area described by Ryan and Harris (1978). The presence of these fine grained rocks and their intrusive nature were documented earlier by Fahrig (1959), but the rocks were not differentiated from the coarser types on his map.

Figure 1 is a preliminary reconnaissance map and many of the rock type boundaries are uncertain. However, comparing Figure 1 with previous regional maps shows that there are major changes in lithological distribution within the area. The present study has shown that rocks previously mapped as gneisses are, in fact, variably foliated granites. Only rocks which exhibit a distinct compositional layering are designated "gneiss" on the present map. The granitoids commonly show one fabric which is, in places, very strongly developed. However, pretectonic pegmatite and aplite dikes and local *in situ* syntectonic granitic mobilizate occur in the more intensely deformed granites and, when parallel to the foliation, give the rock a gneissic appearance.

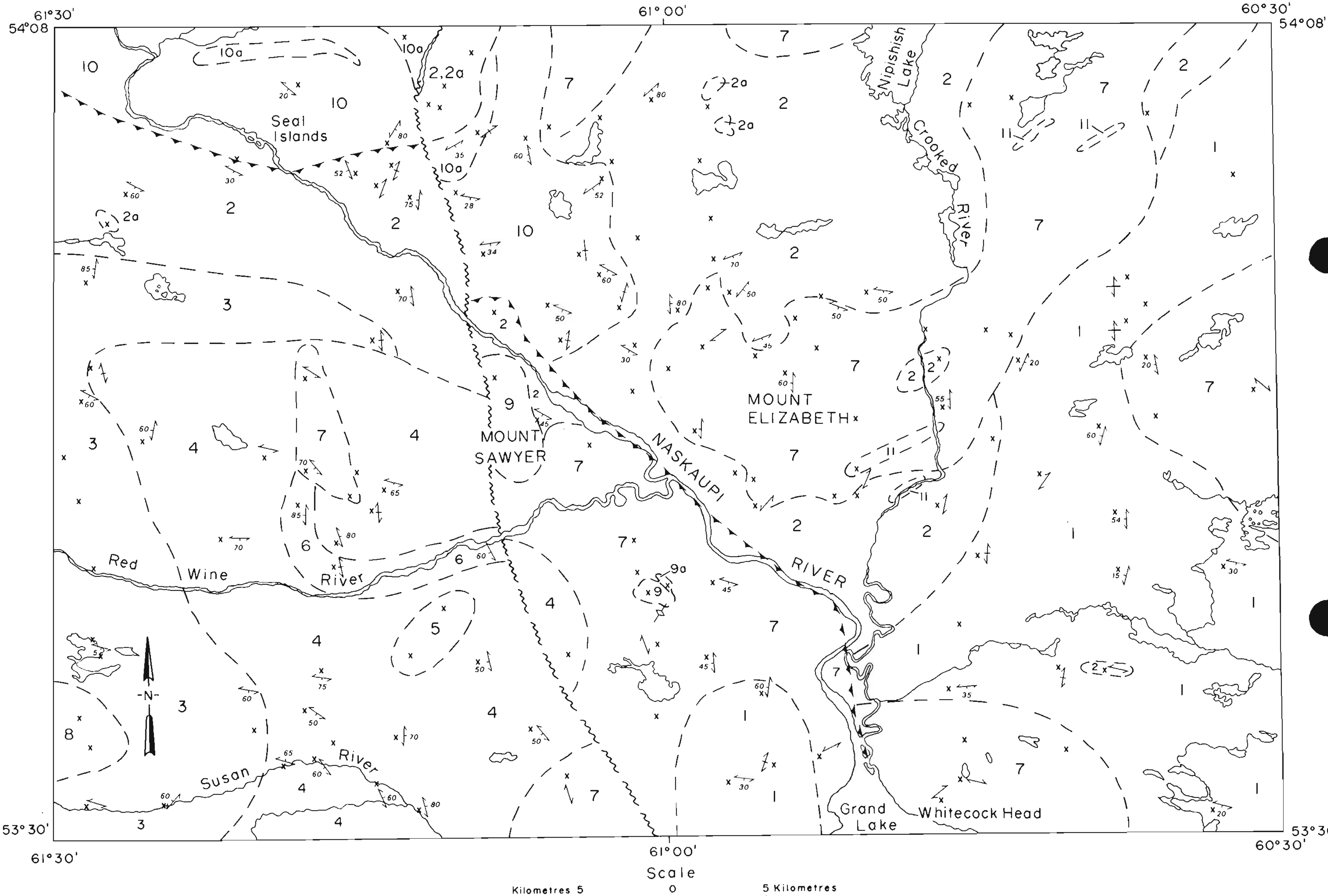
GENERAL GEOLOGY

Banded Gneiss (1)

Medium grained, well banded, white weathering biotite ± epidote gneiss with

LEGEND

11	Michael gabbro
10	Seal Lake Group: quartzite; 10a, metabasalt
9	Anorthosite; 9a, ultramafic rocks
8	Diorite
7	Medium grained biotite granite, microgranite, aplite
6	Garnetiferous leucodiorite
5	Pink granite
4	Biotite granite
3	Megacrystic granodiorite
2	Monzonite and granodiorite; 2a, diorite
1	Biotite gneiss and amphibolite


61°30'
54°08'
61° 00'
60°30'
54°08'
Seal
Islands
Nipishish
Lake
Crooked
River
MOUNT
SAWYER
MOUNT
ELIZABETH
NASKAUPI
RIVER
Red
Wine
River
Susan
River
Grand
Lake
Whitecock Head
-N-
53°30'
61°30'
61°00'
53°30'
60°30'
Scale
Kilometres 5
0
5 Kilometres

local granular garnetiferous amphibolite units occupies a north-trending lobe east of the Crooked River and west of Grand Lake. These rocks exhibit varying degrees of remobilization and migmatization manifested in the field as agmatitic, schlieric, dictyonitic and nebulose variations of the well banded character. Most of the mobilizate component in these rocks appears to be a result of *in situ* processes. Irregular, small quartzofeldspathic zones have biotite-rich selvedges and, characteristically, the subconcordant neosome granitic vein network contains stubby hornblende prisms. Locally, the gneissic layering is folded by open, gently south-plunging folds. Scintillometer (SCINTREX BGS-1, total count) values vary from 50 to 150 cps over this unit, with the average being in the order of 100-110 cps. A few rusty, pyritic seams were noted, but are of limited extent.

Granitic and Dioritic Rocks (2-8)

Most of the area is underlain by a variety of granitic rocks varying from very coarse megacrystic types to very fine, granular, microgranite and aplite. Minor amounts of diorite are also present locally. Relative ages of all these units could not be established from this survey, but the aplitic granites appear to be among the youngest (*cf.* Ryan and Harris, 1978).

Medium to coarse grained, white weathering monzonite and biotite ± hornblende granodiorite (2) belonging to the Otter Lake Granite (Ryan and Harris, 1978) outcrops south of Nipishish Lake and along the Naskaupi River. The monzonitic phase is intrusive into the granodioritic phase. This granite commonly displays a mottled, greenish aspect due to saussuritization of plagioclase and the development of epidote after biotite. Locally, it includes significant amounts of earlier gabbro and diorite (2a). The granite is inhomogeneously deformed, varying from massive to strongly schistose. Measured scintillometer values range between 80 and 150 cps, with most between 90 and 100 cps.

Very coarse grained megacrystic granodiorite (3) outcrops with an annular and lobate pattern along the western margin of the map area in the vicinity of the Susan and Red Wine Rivers; it corresponds to the "porphyritic veined augen gneiss" of Stevenson (1967). This granitic body is composed of pink, twinned, microcline(?) megacrysts up to several centimetres in maximum dimension in a medium grained matrix of quartz, feldspar and biotite. In several outcrops, hornblende was observed as a matrix phase accompanied by small red garnets. Lensoid basic inclusions occur locally. This granite varies from undeformed to augen textured to strongly schistose, the megacrysts changing from subhedral, to rounded and ovoid, and to lensoid streaks in response to the deformation. Such variations have been noted in single outcrops and reflect the inhomogeneity of deformation. Scintillometer values recorded from this unit ranged from 100-140 cps, with most around 100 cps.

A large area in the vicinity of the Susan and Red Wine Rivers is underlain by a gray to white weathering, medium to coarse grained, locally feldspar-porphyritic, biotite granite (4); hornblende and garnet may be present. Texturally, it varies from nearly undeformed to schistose to gneissic. It is well exposed along the Susan River, where some outcrops display a strongly gneissose character due to flattening of aplite and pegmatite dikes parallel to the foliation; other outcrops display a foliated character with *in situ* quartz-feldspar melt occupying dilation fractures slightly oblique to the foliation. In some outcrops, these melts have migrated along the foliation and coalesced to give the whole rock a remobilized, migmatitic appearance. Scintillometer values are erratic over this unit, with bimodal concentrations at 40-50 cps and 130-150 cps.

Two outcrops of pink, medium grained, equigranular, biotite granite (5) were examined in the central part of the unit 4 biotite granite south of the Red Wine River. It may be related to unit 4, but no contacts were seen. Scintillometer readings were between 150-180 cps at each locality.

Three outcrops of variably foliated gray to white weathering, medium grained garnetiferous leucodiorite (6) were observed in the vicinity of the Red Wine River. The rock consists of scattered porphyritic melanocratic inclusions several tens of centimetres in maximum size in a medium grained leucocratic matrix, both cut by very fine grained leucocratic dikes. The mineralogy in all three phases is plagioclase, hornblende and garnet. Only mineral proportions and grain size distinguish between the three varieties. One pervasive foliation is present in this lithology, which, when strongly developed, gives it a gneissic appearance as a result of the elongation of inclusions and flattening of the dike network parallel to the foliation.

Large parts of the area are underlain by medium to fine grained, white to pink weathering leucogranite, granodiorite and aplite (7). These are characteristically equigranular, sugary rocks which vary from nonfoliated to gneissic. Biotite is the main foliation-forming mineral, but muscovite is present locally, as are stubby hornblende grains and small red garnets. The fine grained saccharoidal character of these rocks in the Mount Elizabeth - Nipishish Lake area led Stevenson (1967) and Williams (1970) to interpret them as metasedimentary. However, no indications of a sedimentary origin were observed. The presence of inclusions of granite and gneiss like those described above indicates an intrusive origin, as documented by Fahrig (1959) and Ryan and Harris (1978).

Not all the rocks included within this group are identical. The microgranites in the vicinity of Crooked River and west of Nipishish Lake are generally medium to very fine grained pink saccharoidal rocks which are massive to gneissose. White quartz veins, sometimes having an *en echelon* pattern, are present locally; these may be up to 2 m thick and several tens of metres in strike length. Where the granite is deformed, these veins are mylonitic and weakly banded, possibly explaining why Stevenson interpreted them as metaquartzites and meta-arkoses. Background radioactivity values in this fine grained pink granite are consistently higher on the average than the surrounding rocks. Measured values ranged between 80 and 450 cps, with most above 130 cps. The 450 value was recorded from an area south of Mount Elizabeth corresponding to a uranium anomaly detected during the 1977 URP regional survey (McConnell, 1979).

Along the southwest shore of the Naskaupi River, the micrograni tes are brown to pink weathering, and locally garnetiferous and gneissose. One outcrop of coarser grained, granular, white weathering granite with stubby hornblende prisms was noted within this unit. Radioactivity registered 90-180 cps.

Whitecock Head and surrounding area is composed of medium grained, massive to schistose, sugary, biotite-bearing granodiorite. Rafts of banded amphibolite were noted in one exposure. Scintillometer readings of radioactivity measured at four localities in this unit ranged between 90 and 150 cps.

Two outcrops of undeformed, fine to medium grained, pale green weathering, leucodiorite (8) were observed at the southwest margin of the area.

Anorthosite (9)

Coarse grained anorthosite and leucogabbro were briefly examined in the vicinity of Mount Sawyer. These rocks are gray weathering, with plagioclase laths up to several centimetres long.

Pyroxene and ilmenite (?) are the main intercumulus phases. A prominent hill south of the confluence of the Red Wine and Naskaupi Rivers is composed of anorthosite and ultramafic cumulates (9a). A border zone of well layered (cm to m scale), chromite-bearing, rusty to gray weathering, ultramafic and anorthositic rocks is particularly well exposed along the northeast side of the hill; Stevenson (1967) called these banded rocks meta-andesites. The layering in the ultramafics is persistent along strike for tens of metres, and is folded into megascopic folds at the southeast end of the small ridge on which these rocks outcrop. The anorthositic rocks are intrusive into the ultramafic portion, a discordant relationship between banding in the ultramafics and a sill of anorthosite being observed at the top of the hill.

The relationship of the anorthositic rocks to the surrounding granitoids was not established, but Stevenson (1967) noted an intrusive contact at which the basic rock "apparently intrudes the gneisses". Radioactivity is low, values of 40-60 cps having been recorded.

Seal Lake Group (10)

Regional geological maps by Fahrig (1959) and Stevenson (1967) show Seal Lake Group sediments extending south of the Naskaupi River almost to the Red Wine River and, thence, eastwards through Mount Elizabeth and the Crooked River. This survey has shown that there is no basis for the outcrop distribution of Seal Lake Group "metaquartzites" shown on Stevenson's (1967) map, and that some of the rocks adjacent to the Naskaupi River shown as Seal Lake Group on Fahrig's (1959) map are strongly schistose granite, locally having an augen texture and misinterpreted by Cote (1970) as conglomerate.

The southern part of the Seal Lake Group in the study area is composed of white and gray, sugary and sericitic, metaquartzite, grit, and quartz pebble conglomerate units (10) with intercalated schistose chloritic metabasic volcanics (10a), all belonging to the Bessie Lake Formation of Brummer and Mann (1961). No facing directions could be obtained from outcrops of sediments visited. Background radioactivity of the sediments is low, averaging 80 cps, but observed values range between 40 to 100 cps.

Michael Gabbro(11)

Dikes of black, medium grained, Michael Gabbro (Fahrig and Larochelle, 1972) outcrop in the vicinity of Crooked River. These dikes are part of an extensive podiform series which continues eastwards to the Labrador coast (see Gower, this volume).

DISCUSSION

A brief reconnaissance survey of part of the Grenville Province north of Grand Lake has indicated that the area is dominated by a gneiss-granite-anorthosite assemblage which apparently predates the Seal Lake Group. An unconformity is postulated to be present along the eastern margin of the group, but along the southern boundary the contact is tectonic, with the older granites thrust northwards over the basal Seal Lake Group sediments. This thrust appears to continue southeastwards along the valley of the Naskaupi River.

The above considerations indicate that much of the area now considered to be underlain by Grenvillian gneisses is, in fact, composed of rocks of pre-Neohelikian age which may range in age from Archean to late Paleohelikian. The effects of Grenvillian deformation have not been satisfactorily determined. For instance, the generally north-trending attitude of the foliation in the pre-Seal Lake Group rocks seems to be a pre-Grenvillian feature although similar trends were locally encountered within the Seal Lake Group. Foliations with an east to southeast trend are related to Grenvillian thrusts and shears in the rocks along the Naskaupi River. Subhorizontal foliation measured in the gneissic terrain east of Crooked River may be an early feature in these rocks or it may reflect unrecognized thrusts or nappes of Grenvillian age in the area.

The major thrust which juxtaposes granites and Seal Lake Group quartzites near the Seal Islands is offset along a fault which is assumed to occur west of Mount Sawyer. This fault is the southerly extension of the Pocketknife Lake Fault zone, the reactivated boundary between the Nain and Churchill Structural Provinces.

In summary, there seems little chance of finding metamorphosed Seal Lake Group lithologies in the region south of Nipishish Lake and Naskaupi River, the rocks there being apparently of pre-Seal Lake Group age. No metavolcanic rocks of Bruce River Group type were observed anywhere in the study area.

Economically, the microgranite of the Mount Elizabeth area may be worthwhile for further uranium exploration.

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