

LEGEND

- MESOZOIC**
- 25 QUACO FORMATION: sandstone, conglomerate
  - 24 LANCASTER FORMATION: shale, sandstone, conglomerate
  - 23 WEST BEACH FORMATION: volcanic, sedimentary, and undifferentiated acidic intrusive rocks
  - 22 BALLS LAKE FORMATION: sandstone, conglomerate
  - 21 Red conglomerate, sandstone, shale
- PRE-CARBONIFEROUS**
- 14 FAIRVILLE GRANITE
  - 15 ROCKWOOD PARK GRANITE: granite, granodiorite, quartz diorite
  - 16 Quartz diorite
  - 13 Gabbro, hornblende schist
- DEVONIAN**
- 18 Syenite
  - 19 Granite
  - 20 Granophyre
  - 17 Gabbro, diabase
  - 11 JONES CREEK FORMATION: shale, slate, argillite, hornfels
- SILURIAN**
- 12 MARGARENE GROUP (7, 11, 12) LONG REACH FORMATION: basic to intermediate lavas and related intrusions; volcanic breccias and tuffs; minor acidic flows; minor sedimentary rocks
- ORDOVICIAN OR EARLIER**
- 9, 10 CHARLOTTE GROUP (9, 10) DARK ARGILLITE DIVISION: and tuffs, chloritic schist
  - 10 Argillite, quartzite, hornfels
- CAMBRIAN AND ORDOVICIAN**
- 8 Red conglomerate, breccias, sandstone and shale; grey shale and sandstone; limestone
  - 7 GOLDBROOK GROUP: Acidic to basic lavas, breccias, and tuffs; minor sedimentary rocks; basic sills, and dykes; minor aplitic intrusions
  - 4 MILKISH HEAD GRANITE: granite, granodiorite, gneiss
  - 5, 6 Mainly metamorphosed volcanic and sedimentary rocks
  - 6 Rhyolite porphyry (intrusive), granitic gneiss, aplite, chloritic schist
  - 3 Biotite gneiss (perhaps in part altered Green Head sedimentary rocks); granite-gneiss; granite, granodiorite, gabbro
- PRECAMBRIAN**
- 1, 2 GREEN HEAD GROUP (1, 2) Hornfels; metamorphosed lavas, breccias, tuffs, conglomerates, and other sedimentary rocks
  - 2 Crystalline limestone, dolomite, argillite, quartzite, schist, gneiss; 2a, mainly argillite and quartzite

DESCRIPTIVE NOTES

Much of the rock of map-units 5 and 6 represent successive stages in the granitization of the sedimentary and volcanic rocks of map-unit 1. In the adjoining map-area to the south these units may contain rocks of Silurian age. The granitic gneiss of map-unit 6 is lithologically similar to that of the Milkish Head granite (4), and both are probably pre-Coldbrook in age though relationships are obscure due to faulting or lack of outcrops at contacts. Felsitic and diabasic dykes intruding both the Milkish Head granite and the rocks of map-unit 6 are considered to be related to Coldbrook volcanism. Similar dykes are lacking in the Devonian granites.

Small masses of aplitic granite intrude the Coldbrook group in the central part of the peninsula between the Long Reach and Kennebecas Bay, and may be Devonian in age. Sedimentary rocks classed with the Coldbrook group are exposed in the most westerly part of this peninsula.

The beds of the Saint John group (8) exposed along the Long Reach and to the northwest are mostly red to purplish conglomerate and breccia and red arkosic sandstone. Grey sandstone and shale containing a few fossils appear on Catons Island and the nearby mainland.

The sedimentary and volcanic rocks of the Long Reach formation (12) are less metamorphosed and less steeply dipping than those of the Coldbrook group to the south. The Long Reach flows are regarded as having risen in part along the fault-contact with the Coldbrook group. Relatively massive porphyritic basalts or andesites underlying the marked ridge between Williams Lake and the Long Reach probably represent one of the vents or feeders. Similar rocks are intrusive into Cambrian beds on the northwest shore of the Long Reach, and in places display a concordant relationship with the intruded rocks. The remnant of Cambrian sedimentary rocks on the northeast shore of Milkish Head Peninsula is also cut by intrusions resembling those on the Long Reach. The most prominent of the hills within the area underlain by the Long Reach formation west of Nerepis appears to mark another volcanic neck of late Silurian age.

The gabbro and diabase intrusions of Devonian age (17) are rudely sill-like in form, though their intrusion appears to post-date the major folding of that period. The Devonian granite (19) in the western part of the map-area is mainly a reddish, very coarse-grained biotite granite. To judge by the attitude of the Silurian beds to the north and south, the syenite (18), granite (19), and granophyre (20) complex in the north-central part of the map-area has a sill-like or wedge-shaped form, and was perhaps intruded along a south-dipping thrust plane. Hornblende is the main dark mineral in the granite, and augite in the syenite. The latter rock, with increasing quartz content, grades into the granite, and the granite in turn into the granophyre. The mineralogy, attitude, and succession of the facies suggest the possibility of differentiation in place.

Aplites and pegmatites associated with the Devonian granite are generally lacking in the invaded rocks. A few small dykes of these rocks occur in a porphyritic facies of the granite south and west of Welsford, where, also, small quartz-green veins containing some topaz, wolframite, molybdenite, and other metallic sulphides were observed.

The shales of the Jones Creek formation (11) are metamorphosed to a fine-grained hornfels for as much as half a mile north of the contact with the Devonian granite and syenite, but slight evidence of thermal metamorphism is observable at the south contact with the granophyre.

Faults truncate the folds of the Silurian and older formations, and in places cross the Devonian granite. The occurrence of northeasterly trending faults of the Long Reach and the associated lavas and near-surface intrusions on the Long Reach and to a lesser extent on the Kennebecas. Later movements occurred in part along the same zones. The fault at the contact of the Jones Creek formation (11) and the rocks of map-unit 6 dips southward, and is probably a thrust fault. Northeasterly trending longitudinal faults on which the late movements at least are known, from relationships northeast of the map-area, to have been post-early Mississippian, are chiefly responsible for the linear nature and fault-line scars of the Long Reach and the Kennebecas. A probably related set of transverse, steeply dipping faults, with a northeasterly trend, is also evident. One such fault follows McKee Lake, northeast of Mount Champlain, across the area of Devonian intrusions. Other parallel faults are suggested by the topography to the west and southwest. Strong joints or fractures parallel with the northeasterly and northeasterly trending faults and probably related to them in origin are also present. These are notably conspicuous in the valley of Nerepis River, where the stream crosses the Devonian granitic rocks, steep cliffs occur, defined by the joints of both sets, and probably formed originally by the Pleistocene glaciers moving southeastward down the valley.

The area is generally mantled with glacial moraine which is especially thick southward from the Nerepis Hills. The higher hills in the granite area are bare and display granular disintegration. Extensive terraces of outwash sands and gravels border Nerepis River below the constriction of the valley caused by the Devonian granite and occur at intervals along Saint John River and around Loch Ailva. Glacial or post-glacial lacustrine clays occur in lower Nerepis Valley and probably underlie much of Saint John River.

The Green Head group is a potential source of limestone and dolomite. The Devonian granite has been quarried at Welsford and could be worked elsewhere; joints are generally widely spaced. The granophyre has in places a deep red colour. The syenite (18) is pink, buff, and light-green, with a pleasing lustre. The Devonian gabbro and diabase are a possible source of 'black' granite.

Base metal sulphide mineralization is associated with the post-Devonian northeasterly and northeasterly trending faults. A vein with local heavy concentrations of galena and sphalerite and containing silver has been followed for 1500 feet along the transverse fault northwest of McKee Lake. Smaller occurrences of lead, zinc, and copper minerals have been reported along the Long Reach and may be related to the latest faulting; joints are generally widely spaced. The granophyre has in places a deep red colour. The syenite (18) is pink, buff, and light-green, with a pleasing lustre. The Devonian gabbro and diabase are a possible source of 'black' granite.

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- Area of thick overburden ..... [stippled pattern]
- Observed rock outcrop ..... [dotted pattern]
- Observed occurrence and attitude of diabase dyke ..... [diagonal lines]
- Bedding (inclined, vertical) ..... [horizontal lines]
- Cleavage or schistosity (inclined, vertical) ..... [diagonal lines]
- Fault (defined, approximate) ..... [dashed line]
- Synclinal axis (approximate) ..... [curved line]
- Glacial striae ..... [short parallel lines]
- Fossil locality ..... [circle with dot]
- Gravel pit ..... [square with X]
- Mineral occurrence ..... [X]

SYMBOLS FOR METALS

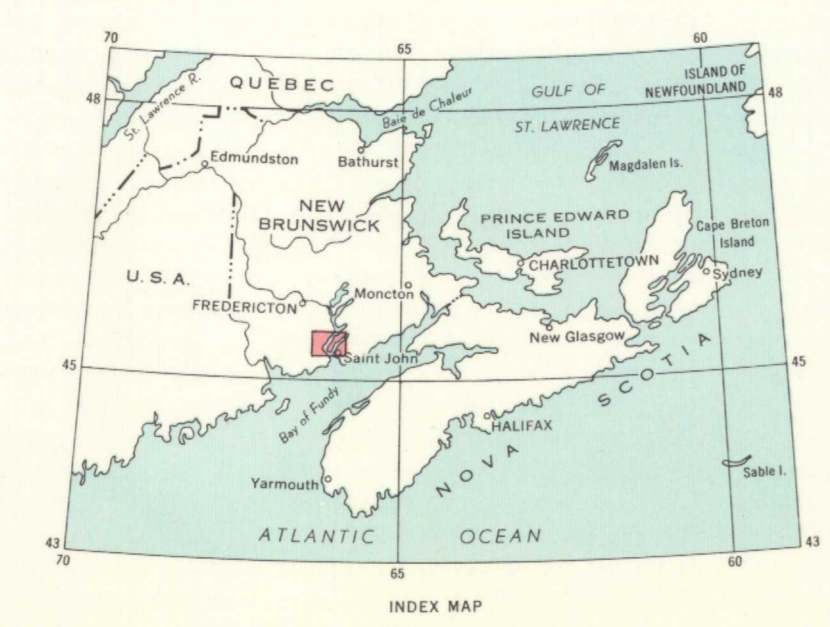
- Lead ..... Pb
- Silver ..... Ag
- Tungsten ..... W
- Zinc ..... Zn

Geology by G. S. MacKenzie, 1940, 1947

The geology of that part of the area south of latitude 45° 25' and east of longitude 66° 10' is from Map 407A, Saint John, by F. J. Alcock, 1935. Within this part of the map-area no outcrops are shown.

Base-map compiled and drawn by the Army Survey Establishment, R. C. E.

Approximate magnetic declination 2° 43' West



MAP 113A  
GEOLOGY  
SAINT JOHN  
NEW BRUNSWICK

Scale: One Inch to One Mile = 1/63,360

1 1/2 2 3

COPIES OF THIS MAP MAY BE OBTAINED FROM THE DIRECTOR, GEOLOGICAL SURVEY OF CANADA, OTTAWA

- REFERENCE
- Main highway ..... [thick line]
  - Road and buildings ..... [thin line]
  - Cart track, trail ..... [dotted line]
  - Bridge ..... [line with arch]
  - Power line ..... [line with cross-ticks]
  - Telephone line ..... [line with dots]
  - Church ..... [cross symbol]
  - Post Office ..... [circle with 'P']
  - Cemetery ..... [circle with 'C']
  - Quarry ..... [circle with 'Q']
  - Lighthouse ..... [tower symbol]
  - Wharf or pier ..... [line with T]
  - Foreshore flats ..... [line with wavy dashes]
  - Bench mark ..... [circle with 'BM']
  - Horizontal control point ..... [circle with 'CP']
  - Reserve boundary ..... [dashed line]
  - Parish boundary ..... [line with dots]
  - County boundary ..... [line with long dashes]
  - School ..... [circle with 'S']
  - Marsh ..... [line with wavy dashes]
  - Intermittent stream ..... [line with wavy dashes]
  - Sand or gravel ..... [line with dots]
  - Contours (interval 50 feet) ..... [line with wavy dashes]
  - Height in feet above mean sea-level ..... [circle with number]

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JUL 16 1964

5.1.4 Saint John, N.B.  
A, Geol. scale - 1 mi. to 1" Map 113 A  
1964