Parts of NTS 21 B/10,15

Deparment of Natural Resources
Lands, Minerals and Petroleum Division

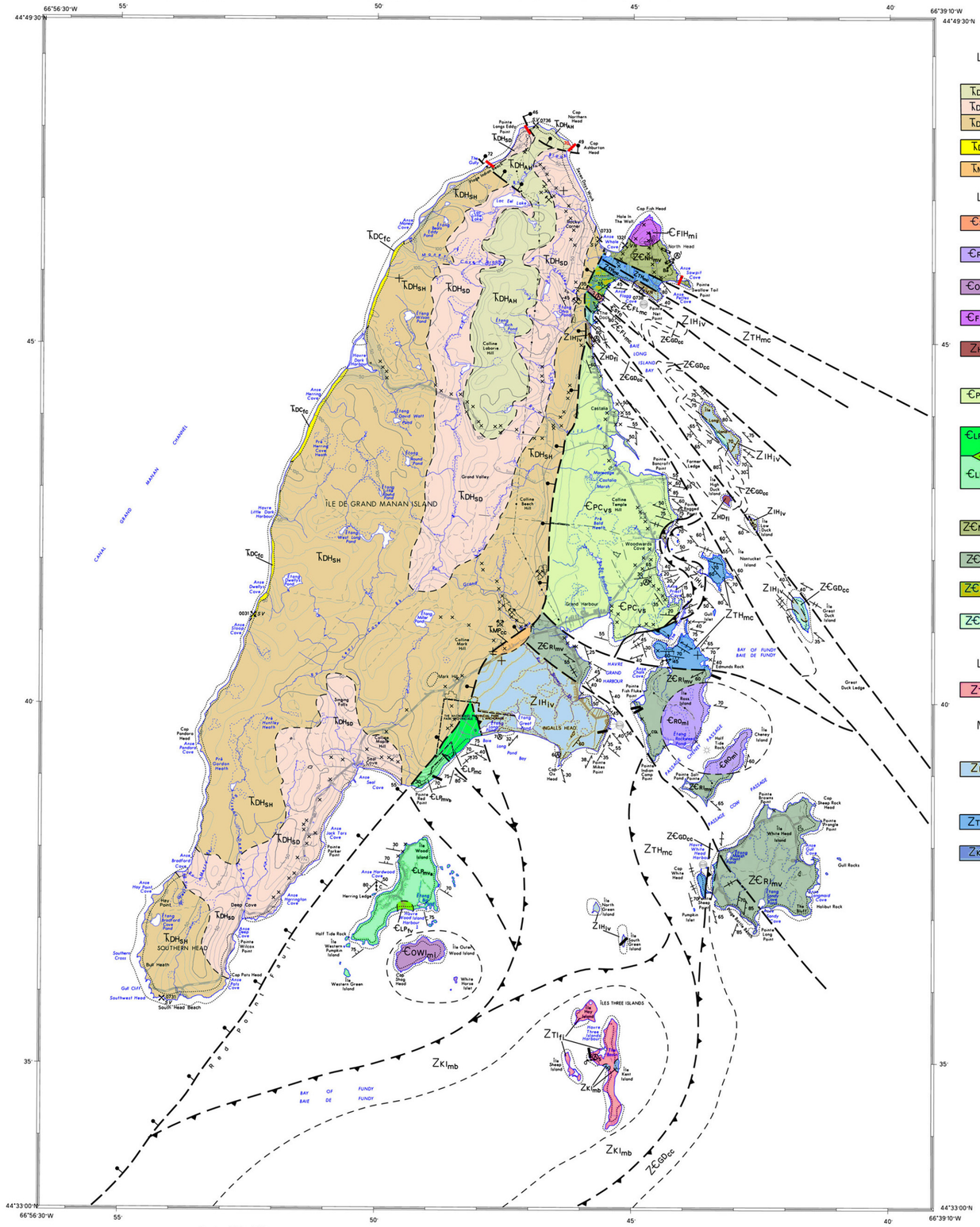
New Nouveau Brunswick

Ministère des Ressources naturelles
Division des terres, des minéraux et du pétrole

PLATE 2011-14

BEDROCK GEOLOGY OF GRAND MANAN ISLAND

(PARTS OF NTS 21 B/10 AND B/15), NEW BRUNSWICK



Scale 1:50 000

Miles

Kilometres

REFERENCE

- Municipal Roads
- National, Arterial, Collector and Local Paved Roads
- Gravel and Other Local Roads (DOT)
- Non-DOT Resource Access Roads
- Lake, River, Stream
- Ferry Crossing
- Lighthouse
- Power Line
- Marsh or Swamp Outline
- Gravel Pit or Quarry Outline
- Microwave Tower

Base map derived from Service New Brunswick 1:10 000 base map
Reference System: North American Datum 1983 (CSRS)
Map Projection: New Brunswick Stereographic Double Projection

LATE TRIASSIC

FUNDY GROUP

TDH_{ah}, TDH_{sd}, TDH_{sh} — DARK HARBOUR BASALT: Ashburton Head Member (TDHAH) - Dark grey, medium-grained, tholeiitic massive to columnar lava flows. Seven Days Work Member (TDHSD) - Medium grey, medium-grained vesicular lava flows with dykes and small sills. Southwest Head Member (TDHSH) - Dark grey, medium- to coarse-grained, tholeiitic columnar lava flows, ponded within the Grand Manan Basin.

TDC_{fc} — DWELLYS COVE FORMATION: Light maroon to light grey siltstone and mudstone, grading downward into fine-grained red sandstone.

TMP_{cc} — MILLER POND ROAD FORMATION: Red, medium- to coarse-grained arkosic conglomeratic sandstone with clasts of Ingalls Head Formation near its base.

LATE NEOPROTEROZOIC TO EARLY CAMBRIAN

ϵSY_{fl} — STANLEY BROOK GRANITE: Light pink, foliated, medium-grained granite intermingled with dark green, medium-grained gabbro.

ϵRO_{mi} — ROCKWEED POND GABBRO: Dark grey, medium-grained gabbro, locally veined by greyish pink, medium-grained, foliated granite.

ϵOWI_{mi} — OUTER WOOD ISLAND GABBRO: Dark grey, medium-grained gabbro, locally veined by gabbroic pegmatite.

ϵFIH_{mi} — FISH HEAD GABBRO: Dark grey, medium-grained gabbro, locally veined by gabbroic pegmatite.

ZHD_{fi} — HIGH DUCK ISLAND GRANITE: Light greyish pink, fine-grained, sparsely porphyritic granite.

CASTALIA GROUP

ϵPC_{vs} — PRIEST COVE FORMATION: Dark grey to greyish green, medium-bedded mafic tuff interstratified with dark grey to greenish grey, medium-bedded volcaniclastic sandstone grading to laminated silty mudstone; minor light grey, bedded felsic tuff.

ϵLP_{mc}, ϵLP_{fv}, ϵLP_{mv} — LONG POND BAY FORMATION: $\epsilon LPmva$ - Dark grey, massive to feldspar-phyric, mafic volcanic rocks interstratified with red, thick-bedded arkosic grit and sandstone grading to red laminated mudstone; flow tops are coarsely amygdaloidal and stained red due to subaerial oxidation. $\epsilon LPmvb$ - Dark grey, hyaloclastic mafic volcanic flows and bedded tuffs interstratified with greyish green, thin-bedded, laminated siltstone and light grey, fine-grained sandstone. $\epsilon LPfv$ - Greenish pink, massive felsic volcanic rocks. $\epsilon LPmc$ - Medium grey, medium-bedded, feldspathic sandstone grading to light grey, laminated silty mudstone; light grey, thin-bedded, laminated siltstone interstratified with thick-bedded, light grey granule conglomerate containing angular clasts of laminated siltstone.

$Z\epsilon NH_{mv}$ — NORTH HEAD FORMATION: Dark grey, massive mafic volcanic flows and breccia.

$Z\epsilon RI_{mv}$ — ROSS ISLAND FORMATION: Dark grey, massive to pillowed mafic volcanic flows; minor dark grey mafic volcanic breccias, greyish green laminated siltstone, and light grey quartz- and granite-clast conglomerate (CGL).

$Z\epsilon FL_{mc}$ — FLAGG COVE FORMATION: Light grey to pinkish grey, thin- to medium-bedded quartzite interstratified with medium green and dark grey, laminated silty mudstone and shale.

$Z\epsilon GD_{cc}$ — GREAT DUCK ISLAND FORMATION: Light grey, thick-bedded, volcanic- and quartz- cobble and pebble conglomerate interstratified with medium-bedded, light grey, medium green, and maroon arkosic sandstone and mudstone.

LATE NEOPROTEROZOIC

ZTI_{fl} — THREE ISLANDS GRANITE: Dark pinkish red, medium-grained, equigranular granite, locally sheared and veined by quartz.

MESOPROTEROZOIC (?) TO LATE NEOPROTEROZOIC

GRAND MANAN GROUP

ZIH_{iv} — INGALLS HEAD FORMATION: Greyish green to maroon, andesitic to dacitic crystal tuff and volcanic breccia interstratified with thin beds and lenses of laminated maroon mudstone, red jasper and iron formation; minor dark grey to greyish purple, feldspar-phyric mafic volcanic flows, light grey, bedded felsic crystal tuffs and dark pink, spherulitic felsic volcanic flows, and greyish orange, sideritic sandstone and shale.

ZTH_{mc} — THE THOROUGHFARE FORMATION: White, medium- to very thick-bedded quartzite interstratified with black carbonaceous shale.

ZKI_{mb} — KENT ISLAND FORMATION: White to buff marble with narrow zones of steely grey magnetite skarn along contacts with the Three Island Granite.

LITHOLOGIC ABBREVIATIONS:

cc = coarse-grained clastic sedimentary rocks
fc = fine-grained clastic sedimentary rocks
fi = felsic intrusive rocks
fv = felsic volcanic rocks
iv = intermediate volcanic rocks
mb = marble
mc = medium-grained clastic sedimentary rocks
mi = mafic intrusive rocks
mv = mafic volcanic rocks
vs = volcaniclastic rocks

LOCATION MAP

SYMBOLS

- Outcrop, area of outcrop
- Bedding, tops known (inclined, overturned, horizontal)
- Bedding, tops unknown (inclined, vertical)
- Cleavage, first generation (inclined, vertical)
- Geological contact
- Fault (thrust, undefined)
- Strike-slip fault
- Brittle fault (with dip direction and angle where known)
- Fold axis (plunging)
- Triassic mafic dyke, with dip direction and angle
- Dykes (felsic, mafic) and veins (quartz, carbonate, barite)
- Radiometric age (with reference number)
- Quarry
- Mineral occurrence (with Unique Record Number): SV = stratabound deposits associated with subaerial volcanism; VN = vein deposits

This map should be referenced in the following manner:

FYFFE, L.R., GRANT, R.H., and MCHONE, J.G. 2011. Bedrock geology of Grand Manan Island (parts of NTS 21 B/10 and B/15), New Brunswick. New Brunswick Department of Natural Resources, Lands, Minerals and Petroleum Division, Plate 2011-14.

MINERAL OCCURRENCES

URN	NAME / COMMODITIES
0031	SLOOP COVE - Cu
0731	SOUTHWEST HEAD - Cu
0733	WHALE COVE - Cu
0736	NORTHERN HEAD - Cu
0738	FLAGG COVE - Pb, Cu
1321	AIRFIELD COPPER - Cu, Pb

RADIOMETRIC DATES

1. DEVONIAN FELSIC DYKES: 396+3/-2 Ma (U-Pb)

MCLEOD, M.J., JOHNSON, S.C., and KROGH, T.E. Archived U-Pb (zircon) dates from southern New Brunswick. Atlantic Geology, 39, pp. 209-225.

2. STANLEY BROOK GRANITE: 535+/-2 Ma (U-Pb)

FYFFE, L.R., VAN STAAL, C.R., VALVERDE-VAQUERO, P., and MCNICOLL, V.J. 2011. U-Pb Age of the Stanley Brook Granite, Grand Manan Island, New Brunswick, Canada. Atlantic Geology, 47, pp. 1-8.

3. PRIEST COVE FORMATION: ca. 539+/-3 Ma (U-Pb)

BLACK, R.S., BARR, S.M., FYFFE, L.R., and MILLER, B.V. 2004. Pre-Mesozoic rocks of Grand Manan Island, New Brunswick: field relationships, new U-Pb ages, and petrochemistry. New Brunswick Department of Natural Resources: Minerals, Policy and Planning Division, Mineral Resource Report 2004-4, pp. 21-40.

4. HIGH DUCK ISLAND FORMATION: 547+/-1 Ma (U-Pb)

BLACK, R.S., BARR, S.M., FYFFE, L.R., and MILLER, B.V. 2004. Pre-Mesozoic rocks of Grand Manan Island, New Brunswick: field relationships, new U-Pb ages, and petrochemistry. New Brunswick Department of Natural Resources: Minerals, Policy and Planning Division, Mineral Resource Report 2004-4, pp. 21-40.

5. THREE ISLANDS GRANITE: 611+/-2 Ma (U-Pb)

BARR, S.M., MILLER, B.V., FYFFE, L.R., and WHITE, C.E. 2003. New U-Pb ages from Grand Manan and the Wolves Islands, Southern New Brunswick. In Current Research 2002. Edited by B.M.W. Carroll. New Brunswick Department of Natural Resources and Energy, Minerals and Energy Division, Mineral Resource Report 2003-4, pp. 13-22.

6. INGALLS HEAD FORMATION: 618+/-3 Ma (U-Pb)

BARR, S.M., MILLER, B.V., FYFFE, L.R., and WHITE, C.E. 2003. New U-Pb ages from Grand Manan and the Wolves Islands, Southern New Brunswick. In Current Research 2002. Edited by B.M.W. Carroll. New Brunswick Department of Natural Resources and Energy, Minerals and Energy Division, Mineral Resource Report 2003-4, pp. 13-22.

7. INGALLS HEAD FORMATION: 618+/-3 Ma (U-Pb)

MILLER, B.V., BARR, S.M., and BLACK, R.S. 2007. Neoproterozoic and Cambrian U-Pb (zircon) ages from Grand Manan Island, New Brunswick: implications for stratigraphy and northern Appalachian terrane correlations. Canadian Journal of Earth Sciences, 44, pp. 911-923.

MAIN SOURCES OF INFORMATION

ALCOCK, F.J. 1948. Grand Manan, New Brunswick. Geological Survey of Canada, Map 965A (with marginal notes).

FYFFE, L.R. and GRANT, R.H. 2000. Geology of Grand Manan Island (parts of NTS 21 B/10 and B/15), New Brunswick. New Brunswick Department of Natural Resources and Energy, Minerals and Energy Division, Plate 2000-29 (revised 2003).

HEWITT, M.D. 1993. Geochemical constraints on the source of sedimentary and volcanic sequences, Grand Manan Island, New Brunswick. Unpublished B.Sc. thesis, Department of Geology, Hartwick College, Oneonta, New York, U.S.A., 21 p.

HILYARD, M. 1992. The geologic significance of Grand Manan Island, New Brunswick. Unpublished B.Sc. thesis, Department of Geology, Hartwick College, Oneonta, New York, U.S.A., 26 p.

HODGINS, M.L. 1994. Trace elements, REE and Nd isotopic variations in metavolcanic and metasedimentary sequences, Grand Manan Island, New Brunswick. Unpublished B.Sc. thesis, Department of Geology, Hartwick, Oneonta, New York, U.S.A., 41 p.

MCHONE, J.G. 2011. Triassic Basin Stratigraphy at Grand Manan, New Brunswick, Canada. Atlantic Geology, 47, pp. 125 - 137.

STRINGER, P. and PAJARI, G.E. 1981. Deformation of pre-Triassic rocks of Grand Manan, New Brunswick. In Current Research, Part C. Geological Survey of Canada, Paper 81-1C, pp. 9-15.

TREMBATH, L.T. 1973. Zeolite mineral assemblage, Grand Manan Island, New Brunswick. In Geology of New Brunswick, Field Guide to Excursion. New England Intercollegiate Geological Conference, Trip A-1, pp. 1-3.

WADE, J.A. and JANSA, L.F. 1994. Preliminary interpretation of sub-North Mountain Basalt strata, Dark Harbour, Grand Manan Island, New Brunswick. In Current Research 1994E, Geological Survey of Canada, pp. 227-231.