

BEDROCK GEOLOGY OF GRAND MANAN ISLAND

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

MODIFIED BY J. G. MCHONE

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

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

ROCKWEED POND GABBRO: Dark grey, medium-grained gabbro, locally veined by greyish pink, medium-grained, foliated granite.

OUTER WOOD ISLAND GABBRO: Dark grey, medium-grained gabbro, locally

FISH HEAD GABBRO: Dark grey, medium-grained gabbro, locally veined by

HIGH DUCK ISLAND GRANITE: Light greyish pink, fine-grained, sparsely porphyritic

PRIEST COVE FORMATION: Dark grey to greyish green, medium-bedded mafic tuff interstratified with dark grey to greenish grey.

and sandstone grading to red laminated mudstone; flow tops are coarsely amygdaloidal and stained red due to subaerial oxidation. £LPmvb - Dark grey, hyaloclastic mafic volcanic flows and bedded tuffs interstratified with greyish green, thin-bedded, laminated siltstone and light grey. rocks. ELPmc - 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

NORTH HEAD FORMATION: Dark grey, massive mafic volcanic flows and

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).

FLAGG COVE FORMATION: Light grey to pinkish grey, thin- to medium-bedded quartzite interstratified with medium green and dark grey.

GREAT DUCK ISLAND FORMATION: Light grey. thick-bedded. volcanicand quartz- cobble and pebble conglomerate interstratified with medium-bedded.

THREE ISLANDS GRANITE: Dark pinkish red, medium-grained, equigranular

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

THE THOROUGHFARE FORMATION: White, medium- to very thickbedded quartzite interstratified with black carbonaceous shale.

KENT ISLAND FORMATION: White to buff marble with narrow zones of steely

× Outcrop, area of outcrop

 $/_{60}$ $/_{85}$ + Bedding, tops known (inclined, overturned, horizontal)

 \swarrow_{70} \swarrow Bedding, tops unknown (inclined, vertical)

Cleavage, first generation (inclined, vertical)

/ - - / Geological contact

Fault (thrust, undefined)

Triassic mafic dyke, with dip direction and angle

Dykes (felsic, mafic) and veins (quartz, carbonate, barite)

Radiometric age (with reference number)

Quarry

0731 X 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

NAME / COMMODITIES

SLOOP COVE - Cu SOUTHWEST HEAD - Cu WHALE COVE - Cu

NORTHERN HEAD - Cu FLAGG COVE - Pb. Cu 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

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. v. 47, p. 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.

WADE, J.A., BROWN, D.E., TRAVERSE, A., and FENSOME, R.A. 1996. The Triassic-Jurassic Fundy Basin, eastern Canada: regional setting, stratigraphy, and hydrocarbon potential: Atlantic Geology, v. 32, p. 189-231.