Newfoundland Labrador
Natural Resources

LEGEND

An extended legend describing the characteristics of each of the map units is available with this open file map; the Open File number is the same.

POST-METAMORPHIC COVER

LATE DEVONIAN TO LATE MISSISSIPPIAN?
TAILINGS POND SEQUENCE
MD:T Variably indurated, terrestrial sedimentary strata

- MD:Tcm — Tailings Pond polymictic conglomerate

Plutonic rock units not included in the Robert's Arm volcanic belt
MID PALEOZOIC INTRUSIONS
UNMETAMORPHOSED INTRUSIVE ROCKS
SILURO-DEVONIAN?
TOPSAILS PLUTONIC SUITE
SD:SH and SD:TI Post-lower Springdale Group intrusive rocks

- SD:Tgbgd — Gull Brook granite

SILURIAN?
HODGES HILL INTRUSIVE SUITE
S:HI Post-metamorphic plutonic suite in the Robert's Arm volcanic belt

- S:Hrpg — Rocky Pond granite
- S:Hltgd — North Twin Lake granodiorite
- S:Hltgd — North Twin Lake quartz diorite

EARLY SILURIAN
HODGES HILL INTRUSIVE SUITE
eS:HI Post-metamorphic plutonic suite in the Robert's Arm volcanic belt

- eS:Hlgdr — Lower Gull Pond diorite
- eS:Hrpgd — Rocky Pond granodiorite
- eS:Hlggb — Long Pond hornblende gabbro
- eS:Hlgb — Long Pond pyroxene gabbro

EARLY SILURIAN
TOPSAILS PLUTONIC SUITE (CONTINUED)
eS:TI Post-metamorphic intrusive suite in the Robert's Arm volcanic belt

- eS:Tlsb — South Brook granodiorite

METAMORPHOSED INTRUSIVE ROCKS

LATE ORDOVICIAN–EARLY SILURIAN
Syn-metamorphic intrusions in schistose and gneissic rocks of the Robert's Arm volcanic belt

- eS:Tbggb — Dawes Pond metagabbro
- OS:BPog — Tower Hill felsic orthogneiss

Stratified rock units not included in the Robert's Arm volcanic belt
PRE-CARBONIFEROUS TERRESTRIAL OVERSTEP SEQUENCE
REGIONALLY METAMORPHOSED ROCKS (SILURIAN OR YOUNGER EVENT)
EARLY–MIDDLE SILURIAN
SPRINGDALE GROUP (lower part)
S:S Volcanosedimentary basin fill (Kings Brook sequence)

- S:SVf1 — Kings Brook rhyolite
- S:SVm1 — Kings Brook basalt
- S:SS — Kings Brook sandstone

PRE-MIDDLE SILURIAN MARINE OVERSTEP SEQUENCES
REGIONALLY METAMORPHOSED ROCKS (SYN-SILURIAN EVENT)
LATE ORDOVICIAN
SHOAL ARM FORMATION
IO:SA Transgressive high-stand sedimentary cover (post-arc)

- IO:SAg — Gummy Pond shale

ROCKS FORMED IN THE IAPETUS OCEAN
Stratified rock units from the Exploits Subzone of the Dunnage Zone
REGIONALLY METAMORPHOSED ROCKS (SYN-SILURIAN EVENT)
MIDDLE ORDOVICIAN
WILD BIGHT GROUP (upper part)
mO:WP Arc-related turbidites (younger Wild Bight sequence)
Pennys Brook Formation (middle and upper divisions)

- mO:WPu — Sops Arm Brook argillite

ROCKS OF THE ROBERT'S ARM VOLCANIC BELT
EARLY ORDOVICIAN–LATE ORDOVICIAN
Stratified rock units from the Mid-Iapetan realm of the Dunnage Zone
REGIONALLY METAMORPHOSED ROCKS (LATE ORDOVICIAN–EARLY SILURIAN AND YOUNGER EVENT)
MIDDLE AND LATE ORDOVICIAN
Robert's Arm volcanic belt (southeast part)

Late Ordovician–Early Silurian?
Burnt Pond structural tract (BPT)
IO-eS:SH Sops Head Complex (in part)

- IO-eS:SHm — Tommys Arm Bridge melange

Late Ordovician and older
Baker Brook structural tract (BBT)
IO:Brb Rocky Brook division

- IO:Brb3 — Rocky Brook argillite
- IO:Brb2 — Rocky Brook wacke
- IO:Brbu — unseparated Rocky Brook succession

Late Middle Ordovician
Baker Brook structural tract (BBT)
mO:Beb Eastern Baker Lake Brook division

- mO:Beb2 — Eastern Baker Lake Brook metawacke
- mO:Beb1 — Eastern Baker Lake Brook metarhyolite tuff

Late Middle Ordovician
Catamaran Brook structural tract (CBT)
mO:CB Joes Lake division

- mO:CBv2 — Joes Lake basaltic and rhyolitic tuff
- mO:CBv1 — Joes Lake basaltic andesite
- mO:CBv3 — Joes Lake pillowed tholeiite

Late Middle Ordovician?
Burnt Pond structural tract (BPT)
Sops Head Complex (in part)
mO:BHHC Burtons Harbour–Herring Cove division

- mO:BHHCr — Herring Cove basalt
- mO:BHHCs — Burtons Harbour siltstone

Middle Ordovician?
Burnt Pond structural tract (BPT)
mO:BP Jules Harbour division

- mO:BPgg — Jules Harbour migmatitic paragneiss
- mO:BPhs — Jules Harbour hornfelsic schist
- mO:BPs — Jules Harbour phyllitic metaturbidite

Stratified rock units from the Notre Dame Subzone of the Dunnage Zone
REGIONALLY METAMORPHOSED ROCKS (ORDOVICIAN AND SILURIAN EVENTS)
EARLY AND MIDDLE ORDOVICIAN
Robert's Arm volcanic belt (northwest part)

Late Middle Ordovician
Crescent Composite structural tract (CCT)
mO:CC Deer Pond division

- mO:CCfs — Deer Pond sandy wacke

Middle Ordovician?
South Brook structural tract (SBT)
mO:Rgl Black Gull Island division

- mO:Rgl — Black Gull Island pillowed tholeiite

Late Early Ordovician
Gullbridge structural tract (GT)
eO:R Robert's Arm units in the Dawes Pond–Great Gull Lake–Loon Pond area
eO:Rgb Powderhouse division

- eO:Rgbw — Powderhouse tuffaceous wacke

eO:Rgb Gull Brook Bridge division

- eO:Rgb3 — Gull Brook Bridge tuff and jasperite
- eO:Rgb2 — Gull Brook Bridge pumiceous wacke
- eO:Rgb1 — Gull Brook Bridge basaltic andesite

eO:Rdb Dawes Pond Brook division

- eO:Rdb3 — Dawes Pond Brook calc-alkalic pillow breccia
- eO:Rdb2 — Dawes Pond Brook rhyodacite and aquagene tuff
- eO:Rdbu — Dawes Pond Brook unseparated

eO:Rwb West Lake Brook division

- eO:Rwb3 — West Lake Brook basaltic andesite
- eO:Rwb2 — West Lake Brook arc tholeiite
- eO:Rwb1 — West Lake Brook high-alumina basalt

eO:Rsp Starkes Pond division

- eO:Rspr — Starkes Pond banded rhyolite
- eO:Rspb — Starkes Pond rhyolite breccia

Plutonic units coeval with rocks of the Robert's Arm volcanic belt
REGIONALLY METAMORPHOSED INTRUSIVE ROCKS (SYN-ORDOVICIAN AND LATER EVENTS)
LATE EARLY ORDOVICIAN?
eO:F Pre-tectonic intrusions in the northwest part of the Robert's Arm volcanic belt
eO:FF Firetower Hill intrusive suite

- eO:FFgp — Firetower Hill quartz–feldspar porphyry

ROCKS OF THE EASTERN OPHIOLITE BELT
Plutonic rock units older than the Robert's Arm volcanic belt
REGIONALLY METAMORPHOSED INTRUSIVE ROCKS (SYN-ORDOVICIAN AND LATER EVENTS)
EARLY ORDOVICIAN
eO:H Metamorphosed intrusions in rocks of the Eastern ophiolite belt
eO:HM Mansfield Cove Complex

- eO:HMg — granodiorite - tonalite

eO:HH Hall Hill Complex

- eO:HHg — banded metagabbro

SYMBOLS

- Mineral occurrence (metallic)
- Drill core sample site

Geochronology

- U-Pb (zircon, titanite) sample site
- Ar-Ar (biotite, hornblende) sample site

Geochemistry

- Lithogeochemistry (Whole rock) sample site

Sample Stations

- S. Swinden and P. Sacks (1986)
- B. O'Brien (1996)
- L. Dickson (1999)
- B. O'Brien (2002)
- B. O'Brien (2003)
- B. O'Brien (2005)
- B. O'Brien (2006)

Minor Structures

- Bedding (tops known, overturned; tick for dip direction, dot for facing direction)
- Bedding (tops unknown; tick for dip direction)
- M-fold axis (generation unknown)
- W-fold axis (generation unknown)
- S-fold axis (generation unknown, 2nd)
- Z-fold axis (generation unknown, 2nd)
- Fold axial surface (generation unknown)
- Metamorphic foliation (generation unknown, 1st, 2nd)
- Linear shape fabric (generation unknown)
- Joint (direction of dip indicated)
- Dyke (direction of dip indicated)
- Vein (direction of dip indicated)

Major Structures

Axial Trace of Early Formed Folds

- Late stage synform in klippe; upright or steeply inclined asymmetrical; plunge direction indicated by multiple arrows on axial trace
- Late stage antiform in fenster; upright or steeply inclined asymmetrical; plunge direction indicated by multiple arrows on axial trace
- Overturned syncline or synform; tick on axial trace indicates dip direction of axial surface; plunge direction indicated by single arrow
- Overturned anticline or antiform; tick on axial trace indicates dip direction of axial surface; plunge direction indicated by single arrow
- Upright syncline or synform; plunge direction indicated by single arrow on axial trace
- Upright anticline or antiform; plunge direction indicated by single arrow on axial trace

Axial Trace of Late Formed Folds

- Overturned syncline or synform; tick on axial trace indicates dip direction of axial surface; plunge direction indicated by single arrow (subhorizontal to reclined)
- Overturned anticline or antiform; tick on axial trace indicates dip direction of axial surface; plunge direction indicated by single arrow (subhorizontal to reclined)
- Upright syncline or synform; plunge direction indicated by single arrow on axial trace (variably plunging to vertical)
- Upright anticline or antiform; plunge direction indicated by single arrow on axial trace (variably plunging to vertical)
- Upright syncline affecting terrestrial overstep sequence strata (gentle plunge direction indicated on axial trace)
- Upright anticline affecting terrestrial overstep sequence strata (gentle plunge direction indicated on axial trace)

Trace of Early Formed Faults

- Folded thrust fault (barbs drawn on hangingwall plate; teeth indicate present direction of fault dip; approximate)
- Symmetamorphic reverse fault flanking fenster or klippe (transparent barbs drawn on hangingwall plate; teeth indicate original fault dip; approximate)

Trace of Late Formed Faults

- Symmetamorphic reverse fault associated with late formed folds (white barbs drawn on hangingwall plate; teeth indicate original fault dip; approximate)

Trace of Late Stage Faults

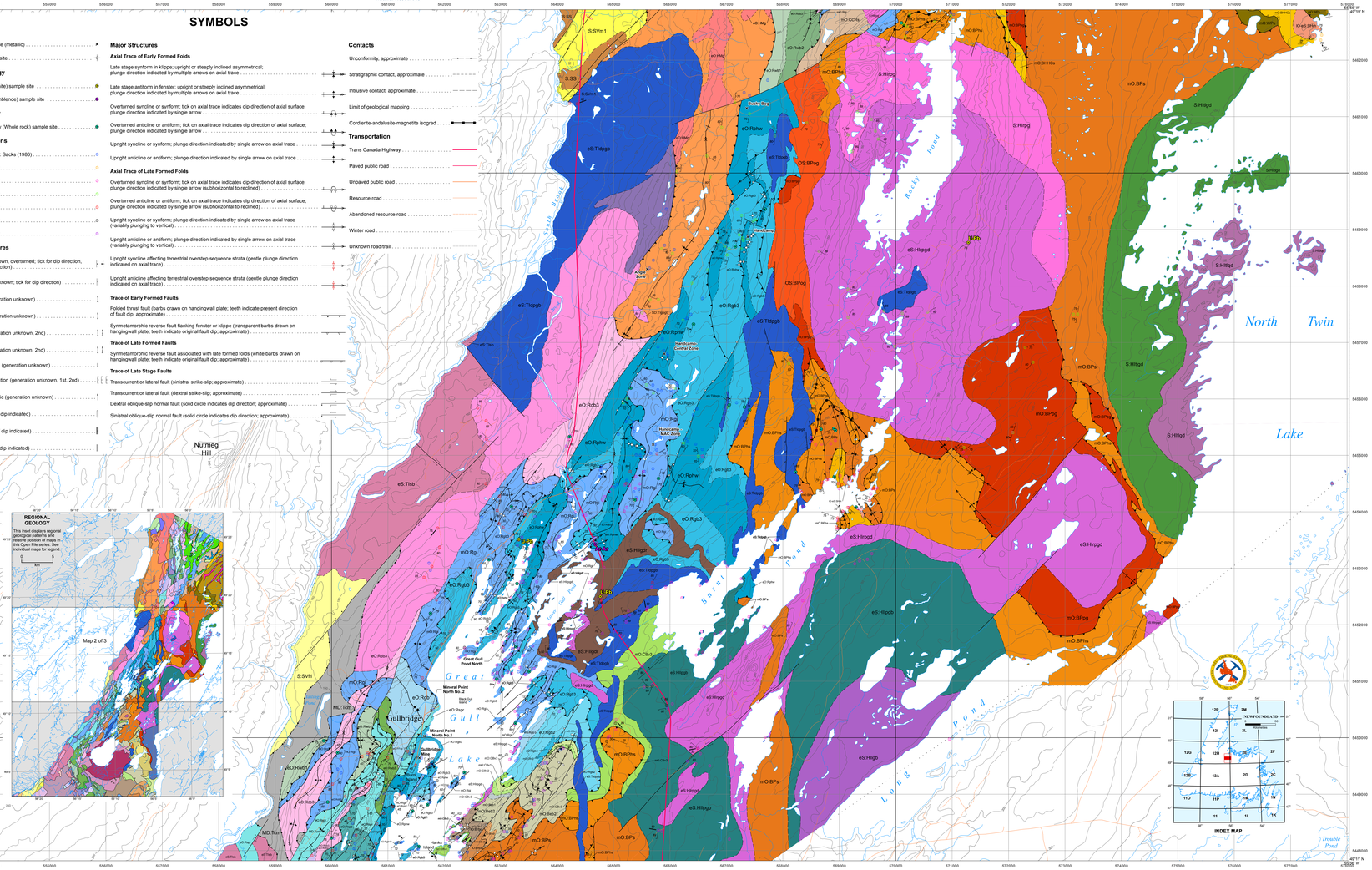
- Transcurrent or lateral fault (sinistral strike-slip; approximate)
- Transcurrent or lateral fault (dextral strike-slip; approximate)
- Dextral oblique-slip normal fault (solid circle indicates dip direction; approximate)
- Sinistral oblique-slip normal fault (solid circle indicates dip direction; approximate)

Contacts

- Unconformity, approximate
- Stratigraphic contact, approximate
- Intrusive contact, approximate
- Limit of geological mapping
- Cordierite-andalusite-magnetite isograd

Transportation

- Trans Canada Highway
- Paved public road
- Unpaved public road
- Resource road
- Abandoned resource road
- Winter road
- Unknown road/trail



Geology by B.H. O'Brien, P.Geo.
Preliminary GIS/digital cartography by M. Clarke (2013) and P. Desveaux (2014).
Final GIS/digital cartography by N.A. Stapleton.
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Lithogeochemical support studies by K. Sanzolo (2007) and D. Walsh (2008).

Base map in digital format published at Geomatics Canada, Earth Sciences Sector, Natural Resources Canada, Ottawa.

Elevations in metres above mean sea level. Contour Interval for NTS 12H/01 and NTS 12H/08 is 10 metres. Contour Interval for NTS 02E/04 and NTS 02E/05 is 15 metres.

Universal Transverse Mercator projection (UTM) Zone 21.

North American Datum (NAD) 1927.

Approximate magnetic declination (2015) at centre of map 19° 29' west, changing by 0° 11' east per year.

Open File NFLD/3268

Copies of this map may be obtained from the Geoscience Publication and Information Section, Geological Survey, Department of Natural Resources, Government of Newfoundland and Labrador, P.O. Box 8700, St. John's, NL, Canada A1B 4J6 (pub@gov.nl.ca).

Departmental website: http://www.nr.gov.nl.ca/nr/
Geological Survey website: http://www.nr.gov.nl.ca/nr/mines/geoscience/sports_maps

This map is subject to revision and modification. Symbols for bedding and selected minor structures are not plotted directly at the exposure location.

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Accompanying geological notes, reference list, and the complete legend of the map units comprising the Robert's Arm volcanic belt and adjacent rocks are available with this open file map.

Note

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REGIONAL GEOLOGY
This inset displays regional geological patterns and relative position of maps in this Open File series. See individual maps for legend.

MAP 2016-02
OPEN FILE NFLD/3268

GEOLOGY OF THE GREAT GULL LAKE – NORTH TWIN LAKE AREA (PARTS OF NTS 12H/01, NTS 12H/08, NTS 02E/04 AND NTS 02E/05), CENTRAL NEWFOUNDLAND; ROBERT'S ARM VOLCANIC BELT AND ADJACENT ROCKS: MAP 2 OF 3

Scale 1:25 000

0 — 2 — 4 — 6
km