

QUATERNARY

**Q** Fluvial, deltaic, glacial, interglacial and raised beach deposits (mapped in Polar Bear Pass and wherever the underlying geology cannot be inferred with reasonable certainty).

FREEMANS COVE IGNEOUS SUITE

PALEOGENE

- EOCENE (Rb-Sr isochrons: 47 ± 4 Ma)**
- TnB** Nephelinitic, basaltic, black, microcrystalline ultramafic igneous rocks with phenocrysts of forsterite olivine, and variably acidic and variably aluminous. It includes a mineralogically diverse matrix of feldspathoids, aegirine, nepheline, plagioclase and glass. Basaltic contain matrix plagioclase, minor melilite nephelinitic, occurs as dykes, small plugs and dissected vesicular or amygdaloidal volcanic flows on southeastern Bathurst Island.
- Tg** Olivine gabbro (Tg) sill: dark grey to greenish grey, iron oxide stained igneous rocks with plagioclase phenocrysts, olivine phenocrysts, poikilitic brown augite and titaniferous magnetite, minor ilmenite and amphibole, columnar jointed. Microgabbro dykes, plugs (Tg) dark grey microcrystalline igneous rocks featuring olivine, augite, flow aligned plagioclase microcrysts in a matrix of variably devitrified glass, ilmenite and nepheline.
- TgP** Feldspathoid microcrystalline dikes and plugs (Tg): grey, green, and yellow green microcrystalline, splintery fractured, intrusive rocks with phenocrysts of nepheline and alkali feldspar in a sub-microscopic groundmass that includes zeolitized feldspathoids, alkali feldspars and ocellular green quartzite, variably calcic amphibole, amphibole microcrysts and matrix xenoliths. Phonolite (Tg) pale green, splintery fractured intrusive rocks featuring spherulitic textures, occurs as small, erosionally dissected, blade-shaped, volcanic flows.
- Tx** Intrusive breccia, agglomerate, circular, (7)diatreme-shaped, bodies containing xenoliths of limestone, sandstone, pumice and various basaltic-melilite-phonolite group volcanic and intrusive igneous rocks, megacrysts of olivine, black aluminous titanite and plagioclase.

SVERDRUP BASIN SUCCESSION

CRETACEOUS

**UPPER CRETACEOUS**

**Kk** KANGIK FORMATION: clay shale, soft, flat laminated, dark grey, coaly shale, brownish black and dark grey, fissile, siltstone; quartzite sandstone, white and poorly lithified, minor coal, unit is brecciated and homelined near gabbro sills and dykes, preserved in two fault bounded outcrops located north of Freemans Cove and west of Bass Point on southeastern Bathurst Island.

**Ki** ISACHSEN FORMATION (Barnemian and Aptian): sandstone, quartzite, white, poorly lithified or very selectively calcareous cemented; the calcareous cemented coal; minor grey shale, yellowish green siltstone near base of section with large ironstone concretions; preserved in three small outcrops of northern Bathurst Island, one located east of Purcell Bay near Humphys Hill and two in the valley of the Stuart River.

LOWER CRETACEOUS

**JA** AWINGAK FORMATION (Volgian): sandstone, quartzite, fine to coarse grained, cross-stratified, locally consolidated, hematite-cemented layers, argillaceous partings; argillaceous sandstone; exposures located only on northwestern Cameron Island.

**JR** RINGNES FORMATION (Ciferdian-Kimmeridgian): shale, black and brownish black, grades up into locally consolidated sandy shale and argillaceous sand, exposures located only on northwestern Cameron Island.

JURASSIC

**UPPER JURASSIC**

**JS** SANDY POINT FORMATION (Undivided, Aalenian): sandstone, quartzite and ferruginous; argillaceous sandstone, yellowish green; calcareous ironstone, scattered balmatite, ammonites, phosphatic nodules; chert pebbles may include poorly exposed beds of the base assignable to the Jameson Bay Formation (Barnian); exposures located only on northwestern Cameron Island.

LOWER AND MIDDLE JURASSIC

**TPB** PAT BAY FORMATION (Camrian): sandstone, quartzite and calcareous, pale yellow and pale yellowish green; lime granitoid, sandy with common bivalves; bivalve coquina; exposures located only on northwestern Cameron Island.

TRIASSIC

**UPPER TRIASSIC**

**Tb** BURNE FORMATION: sandstone, quartzite, fine grained, locally consolidated, castellate weathering, selectively hematite cemented, pervasively stained with hematite and limonite; minor variegated mudrock; exposures located only on northern Helena Island.

LOWER TRIASSIC

**UPPER PERMIAN**

**PtF** TROLD FJORD FORMATION (Wacorian): sandstone, green and glauconitic, common brachiopods and colonial corals, local amygdaloidal quartz vugs; basal chert pebble conglomerate; minor ferruginous brachiopod coquina and argillaceous lime partings; exposures located only on southern Cameron Island.

LOWER PERMIAN

**PGB** GREAT BEAR CAPE FORMATION (Artinskian): lime packstone, common crinoids and foraminifera; exposures located only on northeastern Helena Island.

**PBC** BELCHER CHANNEL FORMATION (Asselian - Sakmarian): sandstone, quartzite and cherty, hematite stained; interbedded lime packstone, crinoid; exposures located only on northern Helena Island.

PERMIAN

**MIDDLE CARBONIFEROUS THROUGH (?) LOWER PERMIAN**

**CPC** CAMRON FJORD FORMATION (Bohemian? to Asselian): sandstone, quartzite and cherty, hematite stained; scattered chert pebbles; selective calcite cementation; mudsils; chert pebble conglomerate; minor crinoid packstone; exposures located on northeastern Bathurst Island, eastern Helena Island and on adjacent small islands.

CARBONIFEROUS AND (?) PERMIAN

**DEVONIAN CLASTIC WEDGE: MELVILLE ISLAND GROUP (Dcb-DeI)**

DEVONIAN

**UPPER DEVONIAN**

**DPi5** Sandstone, quartzite, fine and medium grained, white and grey weathering thick bedded; dolostone unit with shaly macrotabulae occurs at the base.

**DPi4** Sandstone, quartzite, fine and medium grained, yellowish orange weathering thick bedded.

**DPi3** Sandstone, quartzite and cherty, medium to coarse grained, yellowish orange and pale greyish green weathering, variably pebbly; minor siltstone, coarcted wood and plant fragments.

**DPi2** Sandstone, quartzite and cherty, fine grained, moderate greyish green weathering; siltstone/shale; common coarcted plant fragments; minor thin coal seams.

**DPi1** Sandstone, quartzite and cherty, medium to coarse grained, yellowish orange and pale greyish green weathering, variably pebbly; chert pebble conglomerate; minor siltstone; coarcted wood and plant fragments.

UPPER DEVONIAN

**BEVERLY INLET FORMATION (Frasnian) (Dbe-u, Dbe-l)**

**Dbe-u** Upper part: Sandstone, quartzite, fine grained, moderate greyish green and somewhat recessive weathering; siltstone, shale, common distal mica and coarcted plant fragments.

**Dbe-l** Lower part: Sandstone, quartzite, fine to medium grained, pale greyish green and resistant weathering; siltstone, minor shale and redbeds, common distal mica and coarcted plant fragments.

MIDDLE DEVONIAN

**HECLA BAY FORMATION (Givetian) (Dhb-u, Dhb-l)**

**Dhb-u** Upper part: sandstone, quartzite, fine grained, friable, locally castellate weathering, laterite(?) common kaolinitized mud rip-up clasts, cross-stratification.

**Dhb-l** Lower part: sandstone, quartzite, fine grained, sericite; common mud rip-up clasts, cross-stratification; minor very fine sandstone and siltstone.

**M:** marker horizon of very fine greyish green sandstone, siltstone and shale.

**DBi** BRD FJORD FORMATION (Eifelian and Givetian): sandstone, quartzite, calcareous, micaceous, intensely bioturbated, common brachiopods, trilobite fragments, corals, siltstone, shale; minor argillaceous limestone, striae arranged in numerous, thin, shoaling upward cycles.

**DCb** CAPE DE BRAY FORMATION (Eifelian): shale, micaceous, silty and calcareous; siltstone; minor very fine argillaceous sandstone; arranged in thick firing upward cycles; basin slope calciform foreste are readily identified on air photographs and on seismic profiles.

LOWER AND MIDDLE DEVONIAN

**BLUE FORD beds (Emisian and Eifelian) (Dbl-u, Dbl-l)**

**Dbl3** Upper part: limestone, including lime mudstone, wackestone, grainstone, and stromatopora lime ruststone; thick to massive bedded, bioturbated, pale brown weathering; unit grades into upper part of the 'Eids'.

**Dbl2** Middle part: dolostone, fenestrate, flat or wavy laminated, pale grey weathering, variably calcareous, locally silty or argillaceous; birds eye and porpoise porosity; minor limestone, unit grades into the medial part of the 'Eids'.

**Dbl1** Lower part: dolostone, petrifoliate, thick bedded, moderate yellowish brown weathering, bioturbated, common vugs and biotopic porosity, corals, stromatopora, hemispherical stromatolites, and crinoids (including common Gasterocoema); spar calcite and bitumen vug fill; minor limestone; unit grades into the lower part of the 'Eids'.

EIDS beds (Emisian and Eifelian) (De-u, De-l, De-s)

**De-u** Upper part: lime mudstone, variably argillaceous; calcareous shale and mudrock; minor siltstone, pale bluish grey to yellowish grey weathering; thin bedded to fissile; arranged in coarsening upward hemicycles; common regional scale basin slope calciform foreste.

**De-s** DE-s (locally mapped facies) Sandstone, quartzite and fine grained, variably calcareous, medium bedded; unit is identified west and south of Polar Bear Pass, only.

**De-l** Lower part (central and northern Bathurst Island): Calcareous shale, mudrock and lime mudstone, thin bedded to fissile, petrifoliate, moderate yellowish brown to bluish grey weathering; minor thin carbonate oolite/limestone beds.

LOWER DEVONIAN

**DISAPPOINTMENT BAY FORMATION (Emisian) (Ddb)** dolostone, fenestrate, medium to thick bedded, light grey weathering; unit passes laterally into the upper part of the 'Stuart Bay'.

**Du** Unnamed formation (Progan and Emisian): cherty dolostone, chert grains range from sand to granule and pebble grade; pale grey weathering; medium to thick bedded; minor limestone, sandstone and conglomerate; unit passes laterally into the medial part of the 'Stuart Bay'.

PRINCE ALFRED FORMATION (Progan)

**DPA** Mapped facies: DPA-c: conglomerate, clast to boulder grade of chert, limestone, dolostone; chert pebble conglomerate; DPA-l: redbeds, dolostone, variably silty, light grey and pink-weathering; minor red-weathering shale; DPA-s: quartz sandstone.

The Prince Alfred Formation passes laterally into the lower part of the 'Stuart Bay'.

**DG** GOOSE FJORD FORMATION (Lochkovian and Progan): dolostone, micarbitic-fish, thin to medium bedded, light grey weathering, locally mudcracked; may prove to contain upper Silurian strata in the lower part; unit passes laterally into an olistostrome-rich facies of the upper 'Bathurst Island'.

SILURIAN AND DEVONIAN

**UPPER SILURIAN AND LOWER DEVONIAN**

**BATHURST ISLAND: beds and STUART BAY beds (undivided)**

**DBA-s** Mapped facies (not necessarily arranged in stratigraphic order): DBA-c: very fine sandstone; siltstone, minor shale, argillaceous limestone, chert pebble conglomerate; medium and thin bedded; resistant weathering; common Monograptus yulkenensis, plant fragments, verticillate fossils; DBA-l: chert pebble conglomerate, siltstone, very fine sandstone; argillaceous lime mudstone.

**DBA-o** DBA-c: lime mudstone; lime wackestone; sedimentary breccia (carbonate debris flow); siltstone; SDBA-c: carbonate olistostome; sedimentary breccia; siltstone; very fine sandstone; shale; scattered oistoliths.

**DBA-l** SDBA-c: Dba-c: siltstone, very fine sandstone, shale; thin bedded, recessive weathering.

DEVON ISLAND FORMATION

**SDi, SDDi** Shale and mudrock, calcareous, silty and dolomitic, recessive, moderate to dark grey weathering; common iron oxide stained carbonate concretions and graptolites, especially Bohemograptus bohemicus in the lower part of the formation.

ORDOVICIAN AND SILURIAN

**UPPER ORDOVICIAN TO UPPER SILURIAN**

**OSCP** CAPE PHILIPS FORMATION (Ashgill to Ludlow): shale and mudrock, calcareous and dolomitic, thin bedded to fissile, dark grey to brownish black weathering; lime mudstone; common monograptus and orthograptus; trilobite fragments in the lower part of the formation; wedge forming massive bedded dolostone marker at the base.

CORNWALLIS GROUP (Ocb-Oci)

**ORDOVICIAN**

**UPPER ORDOVICIAN**

**Oci** IRENE BAY FORMATION (Ashgill): lime mudstone, skeletal lime wackestone, calcareous shale, thin to medium bedded, recessive, pale greenish grey and moderate yellowish brown weathering; intensely bioturbated, common trilobite fragments, corals, and other megafossils.

MIDDLE AND UPPER ORDOVICIAN

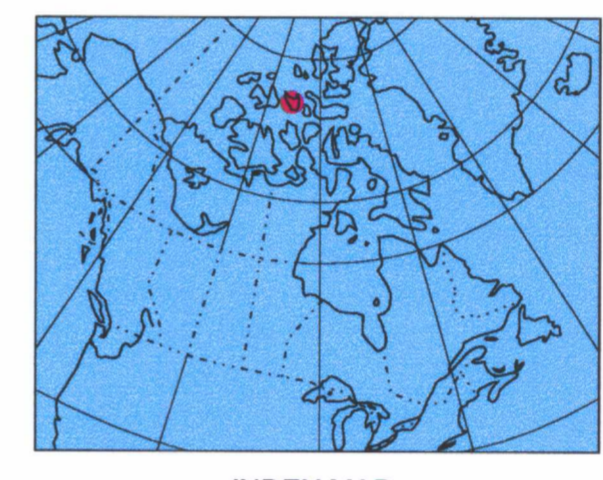
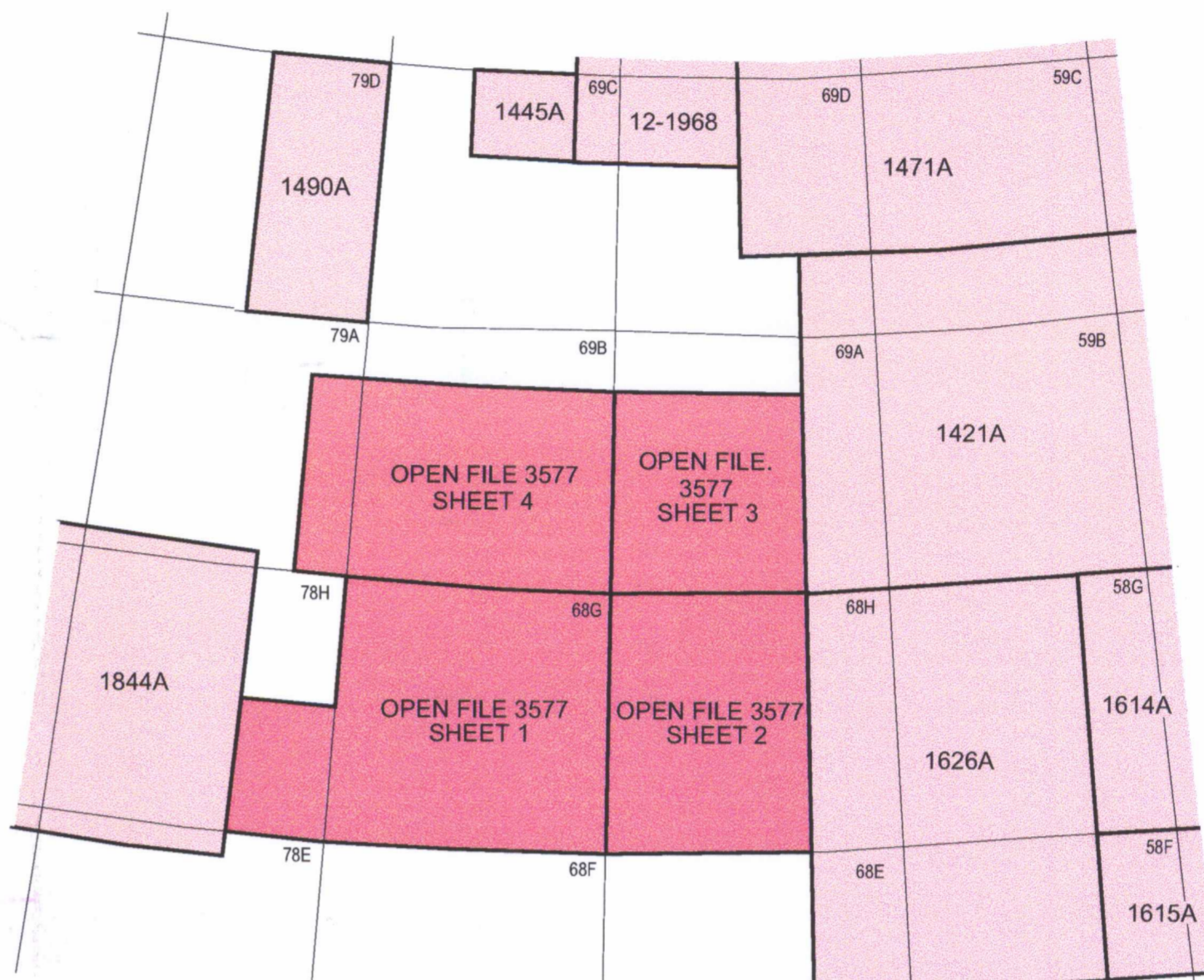
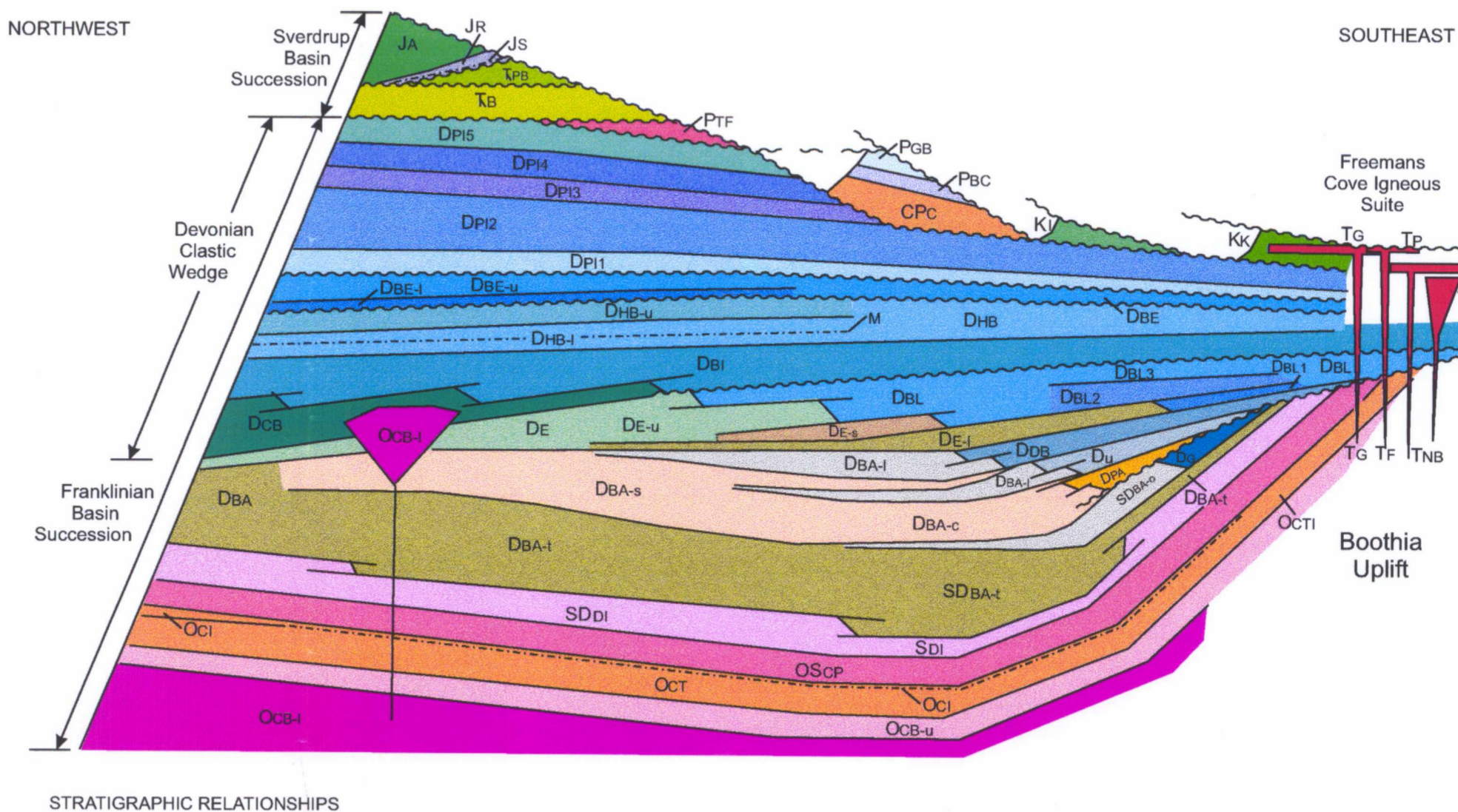
**OCTI** THUMB MOUNTAIN AND IRENE BAY FORMATIONS (undivided)

**MIDDLE ORDOVICIAN**

**BRV FJORD FORMATION (Ocb-u, Ocb-l)**

**Ocb-u** Upper part: dolostone, fenestrate, flat and wavy laminated, dolomitic lime mudstone, variably skeletal (crinoids and brachiopods) and dolomitic skeletal lime wackestone, minor petrifoliate dolostone, calcareous and dolomitic shale; unit varies from thin to medium bedded, and is moderately brownish grey, greenish grey and yellowish brown weathering, often brecciated near bodies of lower Bay Fjord evaporite, relic thrombolite and microbial textures.

**Ocb-l** Lower part: orthograptus, graptus, flat laminated, nodular, also massive and recrystallized; interbeds of dolomitic mudstone that are commonly boudinaged and brecciated; unit is intensely oolite/mud with well developed oolite; calcareous, pale greenish grey and yellowish brown weathering, often brecciated; orthograptus and coarse selenite spar; occurs as small fault bounded bodies and intrusive masses on northern Bathurst Island (base not exposed).



FRANKLINIAN BASIN SUCCESSION

**DEVONIAN CLASTIC WEDGE: MELVILLE ISLAND GROUP (Dcb-DeI)**

**UPPER DEVONIAN**

**PARRY ISLANDS FORMATION (Undivided) (Dpi)**

**BEVERLY INLET FORMATION (Undivided) (Dbe)**

**MIDDLE DEVONIAN**

**HECLA BAY FORMATION (Undivided) (Dhb)**

**LOWER AND MIDDLE DEVONIAN**

**BLUE FORD beds (Undivided) (Dbl)**

**EIDS beds (Undivided) (De)**

**LOWER DEVONIAN**

**DISAPPOINTMENT BAY FORMATION (Undivided) (Ddb)**

**PRINCE ALFRED FORMATION (Undivided) (Dpa)**

**SILURIAN AND DEVONIAN**

**BATHURST ISLAND beds and STUART BAY beds (Undivided) (DBA, SDBA)**

**DEVON ISLAND FORMATION (Undivided) (SDi, SDDi)**

**ORDOVICIAN AND SILURIAN**

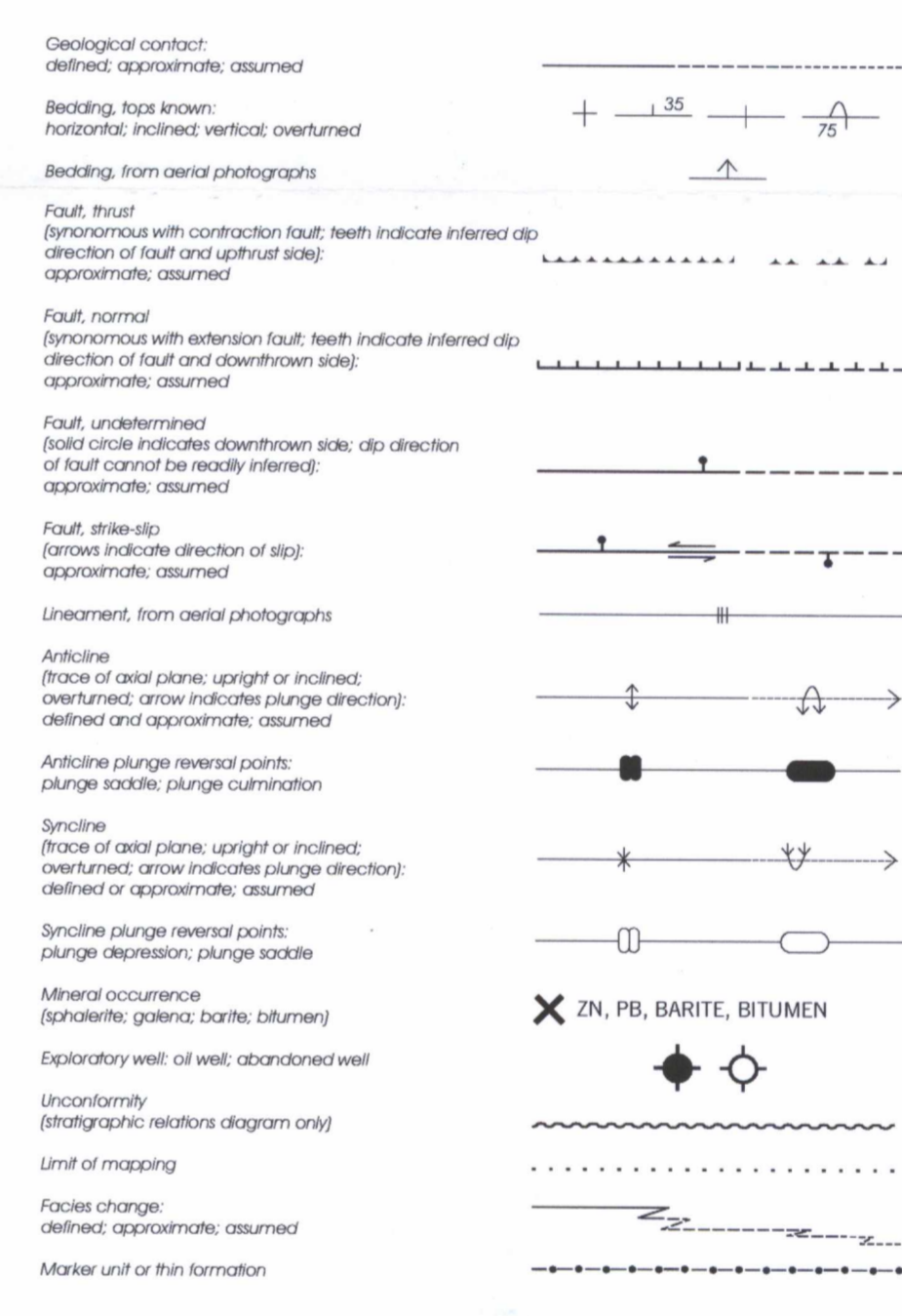
**UPPER ORDOVICIAN TO UPPER SILURIAN (OSCP)**

**CORNWALLIS GROUP (Ocb-Oci)**

**UPPER ORDOVICIAN (Oci)**

**MIDDLE AND UPPER ORDOVICIAN (OCTI)**

**MIDDLE ORDOVICIAN (Ocb-u, Ocb-l)**



Geological cartography by Medina Deuling and Peter Neulands, Geological Survey of Canada, Calgary, January, 1998.

Geology in 1992 by J.C. Harrison, T. de Freitas and R. Thorshester, and in 1995 and 1996 by J.C. Harrison and T. de Freitas. Description and dating of igneous rocks in the Freemans Cove area was adapted from R.W. Mitchell and R.G. Platt (Canadian Journal of Earth Sciences, vol. 21, p. 428-436, 1984). Mapping of the Devonian clastic wedge unit was facilitated by A.F. Embury and J.E. Moore (Bulletin of Canadian Petroleum Geology, v.24, p.481-495, 1976). Additional observations were acquired from Geological Survey of Canada Memoir 320 (Geological Survey of Canada, 318 Expedition, Bathurst Island). Thanks are extended to the Polar Continental Shelf Project for logistical support in the field. Funding was provided by the Department of Indian and Northern Development, Yellowknife, N.W.T. and the Geological Survey of Canada.

Any revisions or additional geological information known to the user would be welcomed by the Geological Survey of Canada.

Base map was assembled from digital topographic maps published of the same scale by the Canada Centre for Mapping (Ottawa), Natural Resources, Canada, 1997.

Copies of the topographic maps covering the area may be obtained from the Canada Map Office, Natural Resources Canada, Ottawa, K1A 0P9.

Magnetic declination in 1995 varied from approximately 20° easterly near Byron Martin Island to about 60° westerly on northeastern Bathurst Island. Compass use was found to be unreliable.

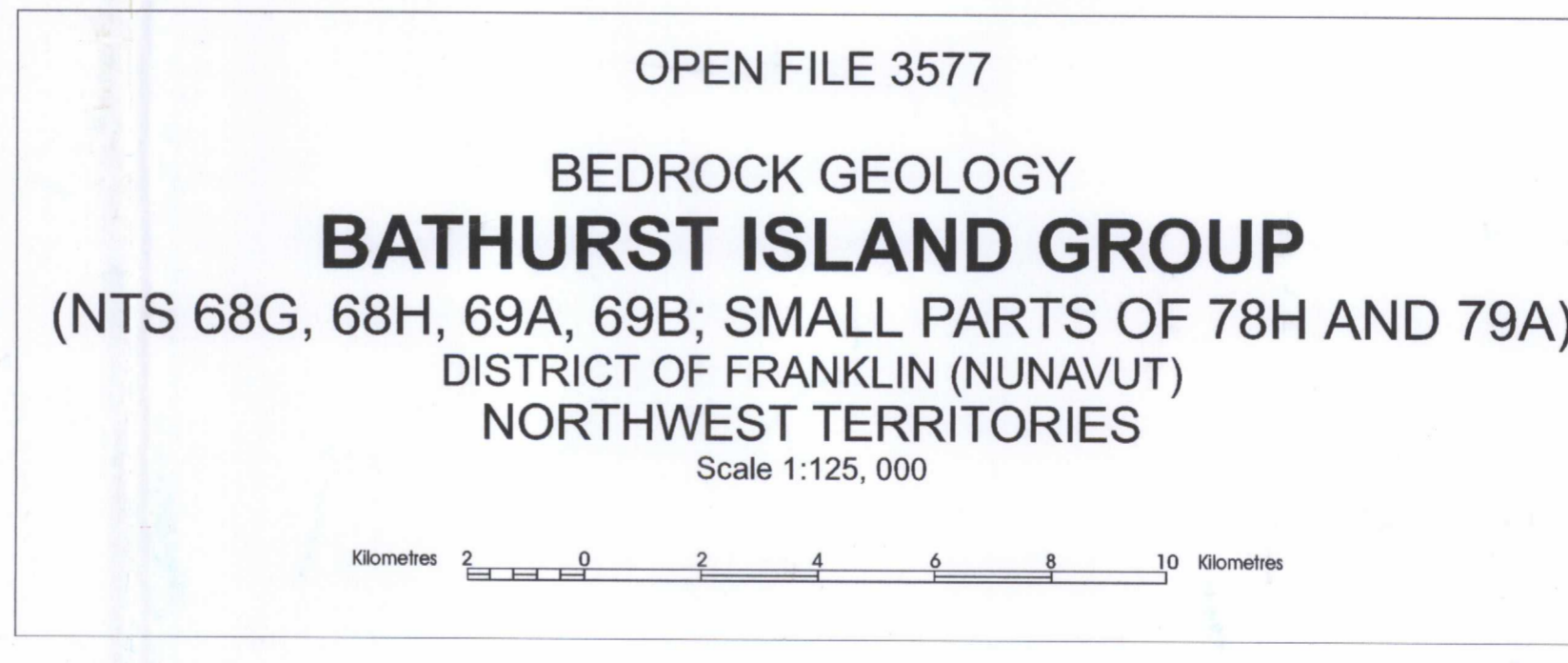
Elevation contours are drawn in feet above mean sea level.

Note: Offshore geological contacts are based on a reasonable inference of features from nearby onshore bedrock exposures. Marine seismic profiles have not been examined for this compilation.

Copies of this legend and the accompanying map may be obtained from the Geological Survey of Canada, 3303-33rd St. N.W., Calgary, Alberta T2C 2A7. Tel: (403) 292-7000; FAX: (403) 296-3542; E-mail: gsc\_calgary@nrcan.gc.ca

**NOTE:**

Although every effort has been made to ensure accuracy, these Open File maps have not been edited for conformity with Geological Survey of Canada standards.



Recommended citation:  
Harrison, J.C. and de Freitas, T.  
1998. Legend to accompany bedrock geology, Bathurst Island Group (NTS 68G, 68H, 69A, 69B; small parts of 78H and 79A), District of Franklin, Northwest Territories (Nunavut), Geological Survey of Canada, Open File 3577, scale 1:125,000 (sheet 5 of 5).