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## Geology of the Quatsino-Port McNeill Area, Northern Vancouver Island

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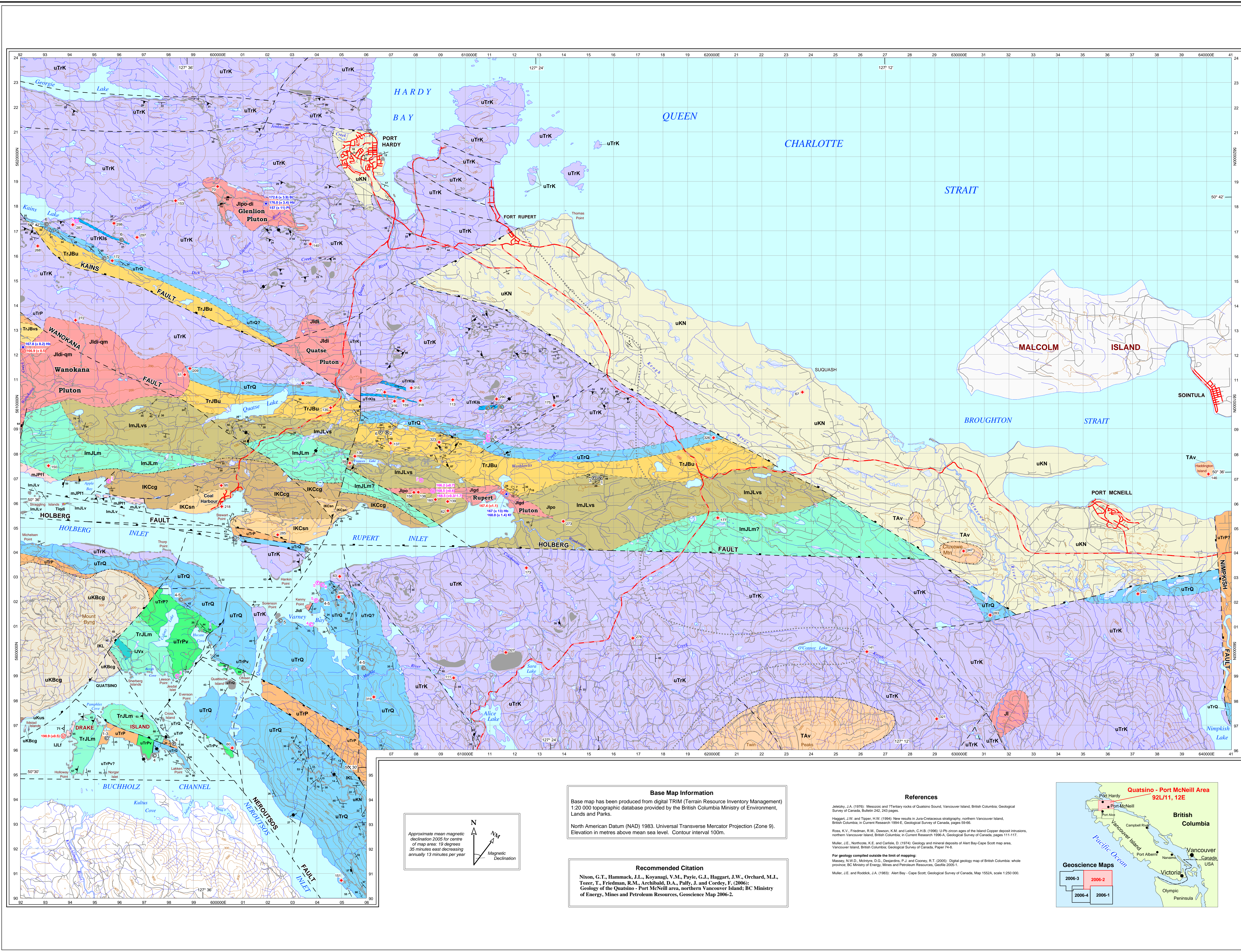
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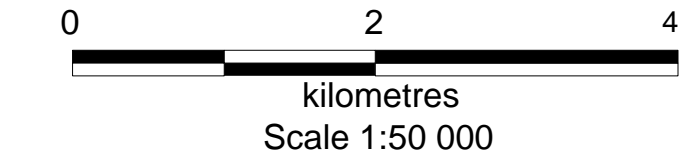
BC Geological Survey  
 GEOSCIENCE MAP 2006-2  
**Geology of the Quatsino-Port McNeill Area,  
 Northern Vancouver Island**

NTS 92L/11, 12E  
**G.T. Nixon, J.L. Hammack, V.M. Koyanagi, G.J. Payie, J.W. Haggart, M.J. Orchard,  
 T. Tozer, D.A. Archibald, R.M. Friedman, J. Palfy and F. Cordey**

**GEOLOGY**  
 by  
 G.T. NIXON, J.L. HAMMACK, V.M. KOYANAGI, G.J. PAYIE (BC Geological Survey)  
 J.W. HAGGART (Geological Survey of Canada)

**PALEONTOLOGY**  
 by  
 M.J. ORCHARD, T. TOZER (Geological Survey of Canada)  
 J. PALFY (Hungarian Natural History Museum)  
 F. CORDEY (University of Lyon)

**GEOCHRONOLOGY**  
 by  
 D.A. ARCHIBALD (Queen's University)  
 R.M. FRIEDMAN (The University of British Columbia)



- LAYERED ROCKS**
- TERTIARY**  
 Neogene  
**ALERT BAY VOLCANICS**  
 TAV Basaltic to rhyolitic, aphanitic to porphyritic flows, low domes and volcanic breccia; minor volcanic conglomerates, sandstone and debris-flow deposits.
- UPPER CRETACEOUS**  
**NANAIMO GROUP EQUIVALENTS (IN PART)**  
 Comparison to *Messinichian*  
 uKN Medium to coarse-grained arkosic to lithic wacke, pebble to cobble conglomerate, siltstone and minor coal; locally fossiliferous.
- QUEEN CHARLOTTE GROUP EQUIVALENTS (IN PART)**  
 Comparison to *Early Turonian to ?Santonian*  
**BLUMBERG FORMATION**  
 uKBsn Massive to thinly bedded lithic to arkosic wacke with minor pebble to cobble conglomerate.  
 uKBcg Massive conglomerate with minor lenses of coarse-grained lithic wacke.
- Campanian to ?Turonian*  
**SHALE UNIT**  
 uKus Dark grey, calcareous to non-calcareous siltstone and impure limestone interbedded with subordinate wacke and minor pebble conglomerate.
- LOWER CRETACEOUS**  
**COAL HARBOUR GROUP**  
*Albian*  
 IKCsn Upper sandstone facies; through cross-laminated lithic wacke intercalated with siltstone, minor pebble conglomerate and rare coal.  
 IKCcg Lower conglomerate facies; massive conglomerate with minor lenses of coarse-grained lithic wacke.
- Late Valanginian to Barremian*  
**LONGARM FORMATION EQUIVALENTS**  
 IKL Thinly bedded to massive sandstone, siltstone, mudstone, pebble conglomerate and minor coal; locally fossiliferous.
- UPPER TRIASSIC (CARNIAN) TO MIDDLE JURASSIC (MID-BAJOCIAN)**  
**BONANZA GROUP**  
*Rhaetian or Hettangian to mid-Bajocian (Quatsino - Port McNeill Area)*  
**LEMARE LAKE VOLCANICS (subdivided by lithotype)**  
 Age designations: ml, Middle Jurassic; ml?, Lower and/or Middle Jurassic;  
 ll, Lower Jurassic; Td, uppermost Triassic - lowermost Jurassic.
- L** Undifferentiated basaltic to rhyolitic, predominantly subaerial lavas and pyroclastic rocks including ash-flow tuffs and rare airfall tuffs and reworked equivalents; minor pillow lavas, breccia, hyaloclastite and pyroclastic surge deposits, locally intercalated with marine to non-marine, volcanic conglomerate, sandstone, siltstone, mudstone, impure limestone and localized debris-flow deposits.
- Lf** Mainly rhyolitic or dacitic to rhyolitic lavas and/or pyroclastic rocks, including flow and pyroclastic breccias, welded to non-welded crystal-lithic lapilli tuffs and rare airfall tuffs; may include thin interbedded sedimentary deposits.
- Lm** Mainly basaltic to andesitic lava flows with minor intercalated volcanoclastic and sedimentary lithologies similar to Lvs; locally includes minor pillow lava and breccia.
- Lv** Mainly basaltic to andesitic volcanic breccia of epiclastic and pyroclastic origin, and variably reworked lithic-crystal tuff; locally fine-grained sedimentary interbeds.
- Lvs** Interbedded volcanoclastic and sedimentary strata, includes lithic and crystal-lithic lapilli tuffs and reworked equivalents, pyroclastic and epiclastic volcanic breccias, sandstone, siltstone, mudstone, impure limestone, and minor debris-flow and phreatomagmatic deposits; may include rare lava flows.
- Middle Jurassic (mid-Bajocian)**  
 Pemberton Hills Rhyolite  
 mlPH Rhyolitic lavas and ash-flow tuffs with minor intercalated epiclastic deposits (subunit 1).
- Hettangian (or possibly Rhaetian to Sinemurian) (Quatsino - Port McNeill Area)**  
 Victoria Lake Megacrystic Basalt  
 LVx Plagioclase-megacrystic basaltic to andesitic lavas locally intercalated with, and laterally equivalent to, aphanitic and plagioclase-phyric flows near the base of the Lemare Lake Volcanics.
- Rhaetian to Hettangian or ?Sinemurian (Quatsino - Port McNeill Area)*  
**VOLCANIC-LITHIC-SEDIMENTARY UNIT**  
 TrJBvs Interbedded volcanoclastic and lesser sedimentary strata (predominantly submarine); buff to grey-green, thin to very thick bedded, calcareous to non-calcareous, volcanic breccia, lithic and feldspathic wacke, siltstone and impure limestone; lithic-crystal tuff, lapilli tuff and reworked equivalents; and minor vitric tuff, pebbly sandstone, shale and volcanoclastic debris-flow breccia.
- Early Norian to Hettangian or Sinemurian (Quatsino - Port McNeill Area)**  
 TrJBU Undivided strata of the Parson Bay Formation and overlying volcanoclastic-sedimentary lithologies in the basal part of the Bonanza Group in areas of sparse outcrop north of Holberg Inlet and outside the limit of mapping.
- (late) Early Norian to Rhaetian or ?Hettangian (Quatsino - Port McNeill Area)**  
**PARSON BAY FORMATION**  
 uTP Medium grey to black, laminated to medium bedded impure limestone, calcareous to non-calcareous mudstone, siltstone, and shale, locally intercalated with minor grey-green lithic wacke, feldspathic wacke, lithic, crystal and vitric tuff and reworked equivalents and volcanoclastic breccia; and rare pebbly sandstone, conglomerate and debris-flow deposits; calcareous facies locally contain colonial coral horizons; organic-rich facies comprise carbonaceous to graphitic shales, mudstone and limestone; locally abundant fossils.
- uTPV** Volcanoclastic and volcanic lithologies; predominantly basaltic to andesitic epiclastic waterlain breccias and tuffs, includes lithic lapilli tuff and tuff-breccia of phreatomagmatic origin; minor pillow lava and hyaloclastite; locally interbedded fine-grained volcanoclastic and sedimentary rocks.

- LAYERED ROCKS (Cont'd)**
- UPPER TRIASSIC**  
**VANCOUVER GROUP**  
*Carnian to (late) Early Norian (Quatsino - Port McNeill Area)*  
**QUATSINO FORMATION**  
 utQ Medium to pale grey, thinly bedded to massive micritic limestone and locally bioclastic limestone; minor silica replacements and chert nodules; rare laminated interbeds, oolitic layers and siltal mats; locally fossiliferous.
- Carnian*  
**KARMTUSEN FORMATION**  
 uTK Aphanitic to plagioclase-phyric and locally plagioclase-megacrystic basaltic lava flows, commonly amygdaloid; predominantly subaerial flows in the upper part of the succession; may include minor pillow lava, breccia and hyaloclastite.
- uTKis** Trend of thin grey limestone beds and lenses intercalated with basalt near the top of the succession.
- INTRUSIVE ROCKS**
- TERTIARY (?Neogene)**  
 Tgd Medium grained quartz diorite possibly equivalent to Alert Bay Volcanics (known only on Staggings Islands in Holberg Inlet).
- EARLY TO MIDDLE JURASSIC**  
**ISLAND PLUTONIC SUITE**  
 JI Medium to coarse-grained, equigranular granitoid rocks and porphyry; includes hornblende +/- biotite-bearing diorite (di), plagioclase +/- hornblende porphyry (po), quartz monzonite/monzonite (qm) and granodiorite (gd).
- MAP SYMBOLS**
- Geological contact, defined
  - Geological contact, approximate
  - Geological contact, inferred
  - High-angle fault, defined (block on downthrow side if known)
  - High-angle fault, approximate
  - High-angle fault, inferred
  - Unconformity, approximate
  - Unconformity, inferred
  - Limit of mapping
  - Bedding, inclined
  - Primary flow lamination in volcanic rocks, inclined
  - Welding, inclined
  - Cleavage, fault-related, inclined
  - Lineation (slickenfibre on fault plane)
  - Lineation (slickenfibre on fault plane), horizontal
  - Plunge of minor fold axis
  - Minor fold with dip of axial plane
  - Dike, inclined, vertical
  - Macrofossil locality (with indicated age)
    - 1 Early Cretaceous
    - 2 Middle Jurassic (Aalenian)
    - 3 Early Jurassic (Sinemurian)
    - 4 Late Triassic (Late Norian)
    - 5 Late Triassic (Early Norian)
    - 6 Late Triassic
  - GSC macrofossil locality (ages as above)
  - Conodont locality (with indicated age)
    - 1 Late Triassic (Rhaetian)
    - 2 Late Triassic (Late Norian)
    - 3 Late Triassic (Middle Norian)
    - 4 Late Triassic (Early Norian)
    - 5 Late Triassic (Carnian - Late Carnian)
    - 6 Late Triassic
  - GSC conodont locality (ages as above)
  - Radialaria locality (with indicated age)
    - 1 Early Jurassic (Sinemurian - Pliensbachian)
    - 2 Late Triassic (Late Carnian - Middle Norian)
  - A40/Ar35 mineral date (Ma, 2 sigma error);
    - 167 (+/- 1.0)
    - 167 (+/- 1.0)
    - 200 (+/- 2)
  - U-Pb zircon date (Ma, 2 sigma error);
    - 10
    - 10
  - MINFILE locality (92L 10)
  - Outcrop examined
  - Outcrop too small to show at map scale
  - Roads, paved
  - Roads, dirt

**Base Map Information**  
 Base map has been produced from digital TRIM (Terrain Resource Inventory Management) 1:20,000 topographic database provided by the British Columbia Ministry of Environment, Lands and Parks.  
 North American Datum (NAD) 1983, Universal Transverse Mercator Projection (Zone 9).  
 Elevation in metres above mean sea level. Contour interval 100m.

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**References**

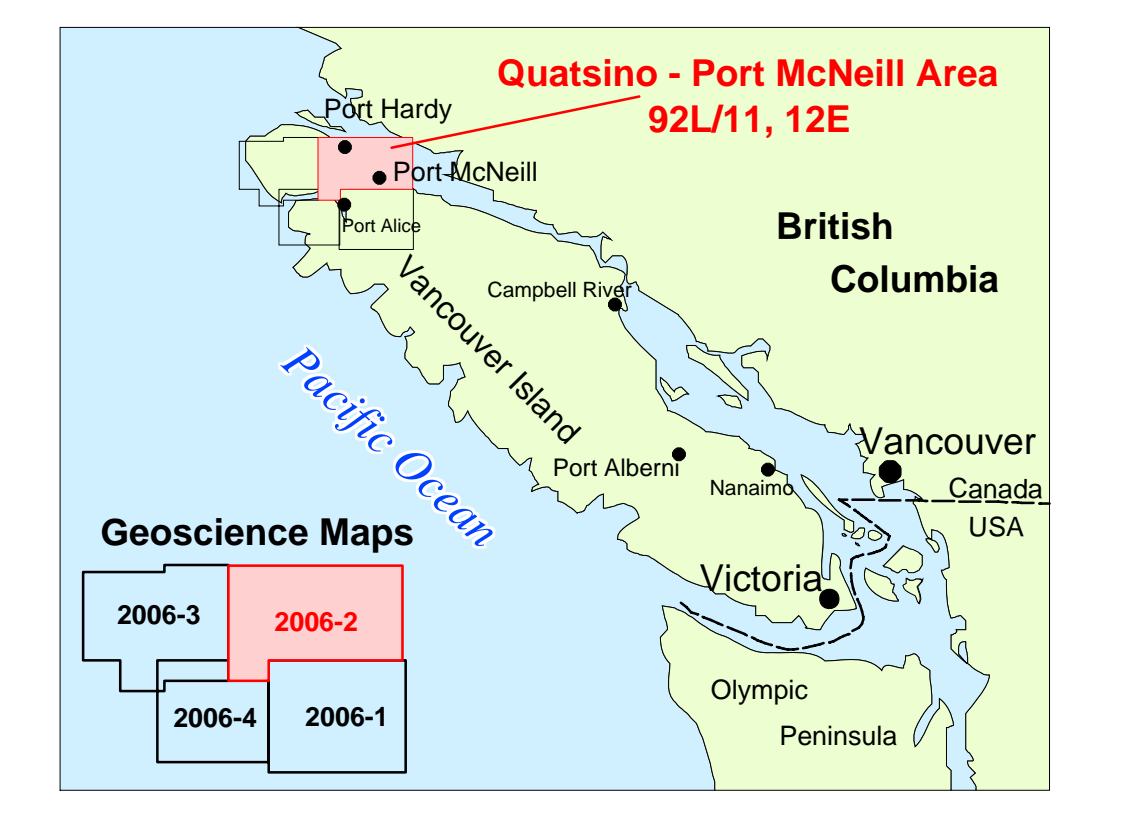
Johdy, J.A. (1976). Mesozoic and Tertiary rocks of Quatsino Sound, Vancouver Island, British Columbia. Geological Survey of Canada, Bulletin 242, 243 pages.

Haggart, J.W. and Tozer, T.W. (1994). New results in late Cretaceous stratigraphy, northern Vancouver Island, British Columbia. In Current Research 1994-5. Geological Survey of Canada, pages 59-66.

Ross, K.V., Friedman, R.M., Dawson, K.M. and LeBlond, C.H.B. (1996). U-Pb zircon ages of the Island Copper deposit intrusions, northern Vancouver Island, British Columbia. In Current Research 1996-4. Geological Survey of Canada, pages 111-117.

Muller, J.E., Neuhaus, K.E. and Cordey, F. (1974). Geology and mineral deposits of Alert Bay-Cape Scott map area, Vancouver Island, British Columbia. Geological Survey of Canada, Paper 74-4.

For geology compiled outside the limit of mapping:  
 Murray, N.W.D., Murray, D.G., Desjardins, P.J. and Cordey, F.T. (2005). Digital geology map of British Columbia: whole province. BC Ministry of Energy, Mines and Petroleum Resources, Geoscience Map 1552A, scale 1:250,000.  
 Miller, J.E. and Rossok, J.A. (1983). Alert Bay - Cape Scott. Geological Survey of Canada, Map 1552A, scale 1:250,000.



**Data Compilation**  
 G.T. Nixon, K.A. Johnston and M.C. Kelman

**Digital Cartography:** K.A. Johnston