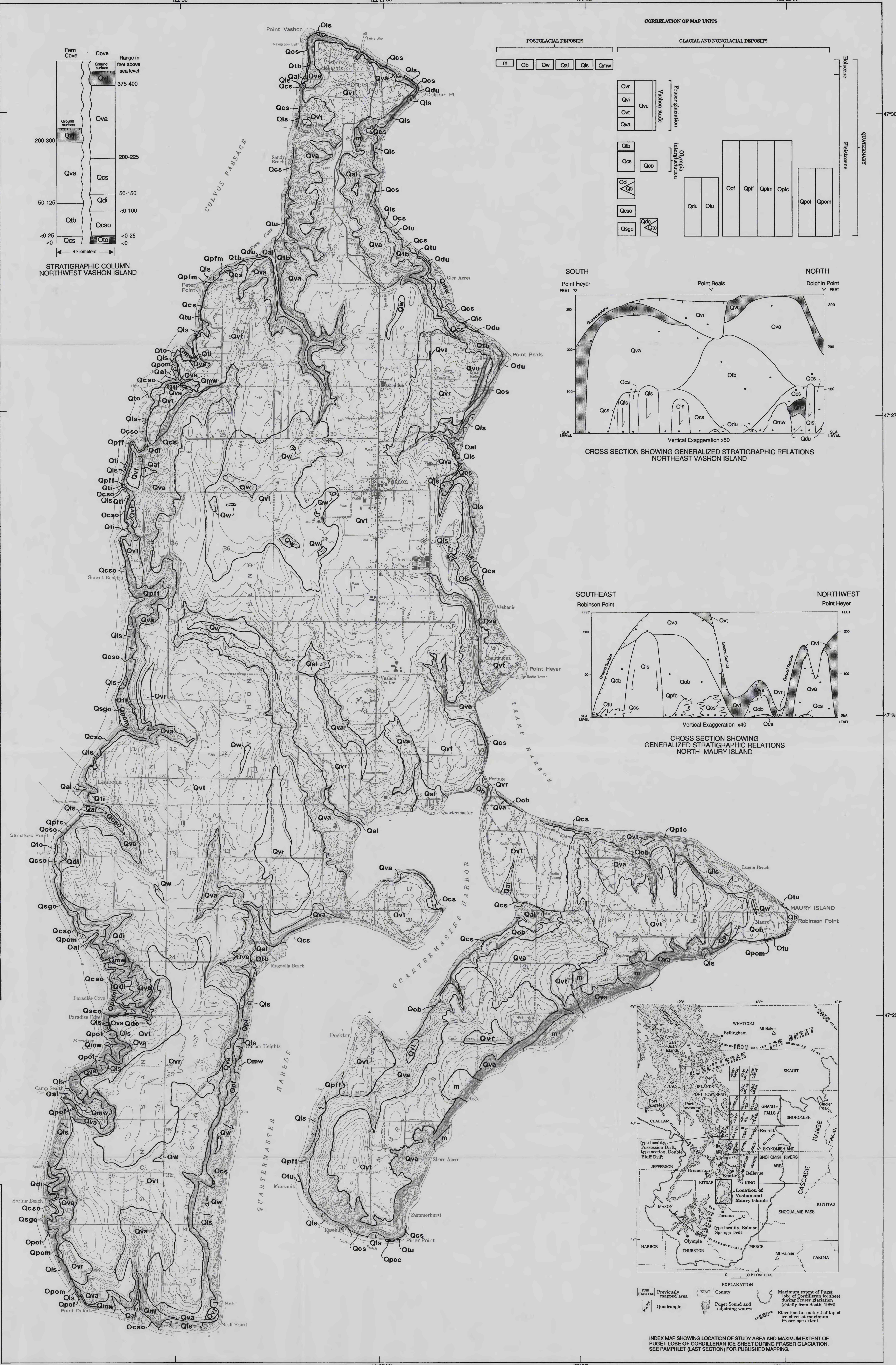


DESCRIPTION OF MAP UNITS

- POSTGLACIAL DEPOSITS**
- m Modified land (Holocene)—Sand and gravel fill or extensively graded natural deposits due to quarrying of unit Qva, southeast Maury Island and north Vashon Island.
  - Qb Beach deposits (Holocene)—Locally well sorted sand, pebbles, and shells deposited or reworked by wave action. Unit shown on map only at Robinson Point, on Maury Island, and at Portage, between Vashon and Maury Islands, where deposits are extensive and lie 12' to 20' above mean high tide. Elsewhere, equivalent sediment is unmappped but present as a continuous deposit around both islands. Grades at stream mouths into unit Qal.
  - Qw Wetland deposits (Holocene)—Peat and alluvium. Poorly drained and intermittently wet. Localities are compiled from King County (1963). Grades into unit Qal.
  - Qa1 Alluvium (Holocene)—Moderately sorted deposits of cobble gravel, pebbly sand, and sandy silt along rivers and streams. Also includes alluvial fans, common particularly where streams reach the coastline. Surfaces generally untruncated. Grades into units Qf, Qv, and Qb.
  - Qls Landslide deposits (Holocene)—Diamicts composed of broken to internally coherent surficial deposits derived from slopes. Arrows show downslope direction of movement. Includes both the transported material and any unstable scarp area.
  - Qmw Mass-wastage deposits (Holocene)—Colluvium, soil, or landslide debris with indistinct morphology, mapped where sufficiently continuous and thick enough to obscure all indications of the underlying material. Unit is gradational with units Qal and Qls.
- GLACIAL AND NONGLACIAL DEPOSITS**
- Deposits of Vashon stage of Fraser glaciation of Armstrong and others (1965) (Pleistocene)—Divided into:
- Qvr Recessional-outwash deposits—Stratified sand and gravel, moderately to well-sorted, with less common silty sand and rare silty clay. Mantles upland till surface; accumulated predominantly as outwash plains and valley trains.
  - Qvi Ice-contact deposits—Similar in texture to unit Qvr, but containing colluvial features and rare till lenses that suggest deposition near stagnant or active glacial ice.
  - Qvt Till—Mainly compact diamict with subangular to rounded clasts, glacially transported and deposited. Unit is typically at most a few tens of meters thick, deposited as an undulating layer with over 100 m of relief across the islands. Contact with unit Qvr is gradational where mantled by outwash.
  - Qva Advance-outwash deposits—Well-bedded sandy gravel to more common medium- and fine-grained sand, generally firm and unoxidized; deposited by proglacial streams. At map scale, tends to grade downward from gravely sand to uniform medium-fine sand; as such, unit includes, in part, the Colvos Sand of Garling and others (1965) and is correlative with the Esperance Sand Member of the Vashon Drift (Mullineaux and others, 1965). Base of unit is placed at either uppermost appearance of silt or clay or an abrupt transition to more oxidized clasts of typically nonglacial origin.
  - Qvu Drift, undivided
  - Qtb Transitional beds (Pleistocene)—Silt, with and without interbeds of very fine sand, inferred to mark an interval of lowland ponding just prior to arrival of ice sheet of Vashon stage (of Fraser glaciation) (Minard, 1983; Minard and Booth, 1988). Contact with overlying unit Qva is commonly gradational; contact with underlying unit Qcs is nowhere observed directly but also is likely gradational.
  - Qpf Deposits of pre-Fraser glaciation age, undivided (Pleistocene)—Massive to laminated silt and clay, and bedded sand and gravel with variable oxidation. May also include deposits of units Qcs, Qob, or any deposits predating the Olympic glaciation where exposures are inadequate to identify adequately at map scale. Where exposures are adequate, locally includes:
    - Qpfc Coarse-grained facies—Predominantly sand and gravel, fluvially deposited
    - Qpfd Fine-grained facies—Predominantly silt and clay, deposited in lakes or marine environments
    - Qpfm Mixed facies—Mixture of units Qpfc and Qpfd, too variable to show at map scale
  - Qcs Clay and silt (Pleistocene)—Massive to thinly laminated gray clayey silt, lying stratigraphically above all drift deposits pre-dating Fraser glaciation. Deposit appears in places to be closely associated with unit Qob and may be widespread facies of (informal) Olympia beds of Minard and Booth (1988). Elsewhere this deposit directly underlies sand of unit Qva or silt of unit Qb, suggesting that it reflects ponding by advancing ice sheet of Vashon stage (of Fraser glaciation) and is thus correlative with the Lawson Clay Member of the Vashon Drift (Mullineaux and others, 1965). It typically lacks definitive characteristics of proglacial origin, however, such as the presence of dropstones. Deposit is distinguished from other fine-grained sediments of presumed older age (unit Qcs) by stratigraphic position and absence of oxidation or manganese staining on joint planes.
  - Qob Olympia beds of Minard and Booth (1988) (Pleistocene)—Predominantly thinly interbedded sand and silt, with local layers of gravel, massive silt, and clayey silt, deposited by lowland streams during nonglacial interval preceding Fraser glaciation. Gravels lithologies are almost exclusively volcanic, suggesting a local origin. Oxidation is typically light and variable. This informally named unit correlates at least in part with the transitional beds (Qb) and the (informal) Olympia gravel of Minard (1983) mapped in Edmonds East and part of Edmonds West 7.5 quadrangles and the (informal) Olympia beds of Minard and Booth (1988) mapped in Redmond 7.5 quadrangle farther north. This unit may locally include deposits, such as the Whitby Formation (Esterbrook and others, 1967), formed during earlier nonglacial intervals, but the extent and timing of glacial advances pre-dating the Fraser glaciation that would help subdivide this mapping unit are unknown at this time.
- Deposits predating Olympic interglaciation of Armstrong and others (1965) (Pleistocene)—Divided into:
- Qpof Fine-grained deposits—Massive to laminated silt and clay, containing mixed sand and gravel. May include deposits mapped elsewhere as unit Qcs if clearly underlying other deposits of, or those predating, Olympia interglaciation. On southwest shore of Vashon Island, peat layers are exposed and suggest correlation with the Whitby Formation (Esterbrook and others, 1967) (radiocarbon sample USGS 2693; >53,000 B.P.).
  - Qpom Mixed deposits—Mixture of components of unit Qpof with some interbedded sand and gravel of units Qpfc, Qfd, and Qdo, either at too fine a scale to represent on map or too poorly exposed to reliably discriminate.
  - Qdi Intermediate drift (Pleistocene)—Lightly to heavily oxidized sand and gravel, and fresh to lightly oxidized diamict, both containing a few percent of exotic clast lithologies. Mapped where it underlies deposits of Fraser glaciation and where it overlies either till of unit Qto or oxidized lacustrine deposits of unit Qcs. Maximum observed thickness about 20 m. Texture, lithology, and degree of weathering equivalent to much thicker deposits of sand and gravel exposed below about altitude 75 m in northeast Tacoma, 8 km southeast of Vashon Island. Locally, includes:
    - Qdi Till (Pleistocene)—Fresh to lightly oxidized diamict, showing a mixture of lithologic types and rare striated stones that suggest glacial origin. Commonly exposed in close association with oxidized sand and gravel mapped within unit Qdi. Best exposed between about 15 and 30 m (50-100 ft) altitude in valley cuts above the northwest coast of Vashon Island. Observed thicknesses are between 5 and 10 m.
  - Qdu Drift, undivided (Pleistocene)—Deposits predating Fraser glaciation of Armstrong and others (1965), inferred to have been derived from ice-sheet glaciation. Locally, includes:
    - Qdt Till
- Description continued below



Base from U.S. Geological Survey, Downer and Head, Vashon, 1986; DeWolfe, 1972; Egli, Vashon, Clalls, Tacoma North, 1981.

Scale: 1:24,000

Vertical Exaggeration: x20, x40, x50

Vertical Datum: NATIONAL GEODETIC VERTICAL DATUM OF 1955

Contour Interval: 20 FEET

Area of Map: WASHINGTON

Geology mapped 1987-1988  
Edited by Carol O'Steen; prepared by Lori Moore  
Manuscript approved for publication February 5, 1991

**GEOLOGIC MAP OF VASHON AND MAURY ISLANDS, KING COUNTY, WASHINGTON**  
By  
**Derek B. Booth**  
1991