

Identification_Information:

Citation:

Citation_Information:

Originator: R. W. Tabor

Originator: R. A. Haugerud

Originator: Wes Hildreth

Originator :E. H. Brown

Publication_Date: 2003 (paper copy); 2006 (digital database)

Title: Geologic Map of the Mount Baker 30- by 60-Minute Quadrangle, Washington

Edition: 1.0

Geospatial_Data_Presentation_Form: vector digital data

Series_Information:

Series_Name: U.S. Geological Survey Miscellaneous Investigation Series

Issue_Identification: I-2660

Publication_Information:

Publication_Place: Menlo Park, CA

Publisher: U.S. Geological Survey

Online_Linkage: <http://pubs.usgs.gov/imap/i2660/>

Description:

Abstract: Abstract: This digital map database has been prepared by R.W. Tabor from the published Geologic map of the Mount Baker 30- by 60 Minute Quadrangle, Washington. Together with the accompanying text files as PDF, it provides information on the geologic structure and stratigraphy of the area covered. The database delineates map units that are identified by general age and lithology following the stratigraphic nomenclature of the U.S. Geological Survey. The authors mapped most of the geology at 1:100,000. The Quaternary contacts and structural data have been much simplified for the 1:100,000-scale map and database. The spatial resolution (scale) of the database is 1:100,000 or smaller.

Purpose: This database depicts the distribution of geologic materials and structures at a regional (1:100,000) scale. The report is intended to provide geologic information for the regional study of materials properties, earthquake shaking, landslide potential, mineral hazards, seismic velocity, and earthquake faults. In addition, the report contains information and interpretations about the regional geologic history and framework. However, the regional scale of this report does not provide sufficient detail for site development purposes.

Supplemental_Information

DIGITAL COMPILATION- R. W. Tabor and R. A. Haugerud scanned, vectorized and edited the geologic map information from stable ink-on-mylar author compilation at 1:100,000 scale. ARC/INFO vectorized coverage of the geology was later edited by K. Nimtz with assistance from Susan Mayfield and Richard D. Koch.

The digital compilation was done in versions 7.1.1 through 8.2 of ARC/INFO with version 3.0 of the menu interface ALACARTE (Fitzgibbon and Wentworth, 1991, Fitzgibbon, 1991, Wentworth and Fitzgibbon, 1991).

BASE MAP-The geology of this dataset was mapped on dimensionally stable chronflex prints of the Mount Baker 1:100,000 scale topographic quadrangle. Although no base map material is included in this dataset, a vectorized version of the base can be downloaded from

<http://edcftp.cr.usgs.gov/pub/data/DLG/100K/M/>.

Time_Period_of_Content:

Time_Period_Information:

Single_Date/Time:
Calendar_Date: 2003 (paper); 2006 (digital database)
Currentness_Reference: 2003.
Status:
Progress: Complete
Maintenance_and_Update_Frequency: As needed
Spatial_Domain:
Bounding_Coordinates:
West_Bounding_Coordinate: -122.009828
East_Bounding_Coordinate: -120.979965
North_Bounding_Coordinate: 49.013477
South_Bounding_Coordinate: 48.486950
Keywords:
Theme:
Theme_Keyword_Thesaurus: none

Theme_Keyword: Alma Creek pluton
Theme_Keyword: alpine glaciation
Theme_Keyword: bedrock geology
Theme_Keyword: Bell Pass melange
Theme_Keyword: Cascade Magmatic Arc
Theme_Keyword: Cascade River Schist
Theme_Keyword: Cascade Pass dike
Theme_Keyword: Cascade Pass Family
Theme_Keyword: Chelan Mountains terrane
Theme_Keyword: Chilliwack Composite Batholith
Theme_Keyword: Chilliwack Group
Theme_Keyword: Chuckanut Formation
Theme_Keyword: Conglomerate of Bald Mountain
Theme_Keyword: Cordilleran Ice Sheet
Theme_Keyword: Cultus Formaion
Theme_Keyword: Darrington Phyllite
Theme_Keyword: drainage diversion
Theme_Keyword: Easton Metamorphic Suite
Theme_Keyword: Easton terrane
Theme_Keyword: Eldorado Orthogneiss
Theme_Keyword: Entiat Fault
Theme_Keyword: Excelsior nappe
Theme_Keyword: erosional landscape
Theme_Keyword: fault offset
Theme_Keyword: Fraser glaciation
Theme_Keyword: geologic history
Theme_Keyword: geologic structures
Theme_Keyword: geology
Theme_Keyword: glacial geology
Theme_Keyword: Glacier Extensional Fault
Theme_Keyword: Hannegan Volcanics
Theme_Keyword: Hidden Lake stock

Theme_Keyword: Hozomeen Group
 Theme_Keyword: Index Family
 Theme_Keyword: Kushan Caldera
 Theme_Keyword: landslide deposits
 Theme_Keyword: Marblemount pluton
 Theme_Keyword: Magic Mountain Gneiss
 Theme_Keyword: melange
 Theme_Keyword: metamorphism
 Theme_Keyword: Mount Baker volcanic center
 Theme_Keyword: Napeequa Schist
 Theme_Keyword: Nooksack Formation
 Theme_Keyword: North Cascades
 Theme_Keyword: Northwest Cascade System
 Theme_Keyword: orogenic deposits
 Theme_Keyword: orthogneiss
 Theme_Keyword: Orthogneiss of Haystack Creek
 Theme_Keyword: Orthogneiss of Marble Creek
 Theme_Keyword: Phyllite and schist of Little Jack Mountain
 Theme_Keyword: radiometric ages
 Theme_Keyword: rock samples
 Theme_Keyword: Ruby Creek Heterogeneous Plutonic Belt
 Theme_Keyword: Semischist and phyllite of Mount Josephine
 Theme_Keyword: Shuksan Greenschist
 Theme_Keyword: Shuksan Nappe
 Theme_Keyword: Skagit Gneiss
 Theme_Keyword: Skymo Complex
 Theme_Keyword: Slate of Rinker Ridge
 Theme_Keyword: Snoqualmie Family
 Theme_Keyword: Straight Creek Fault
 Theme_Keyword: stitching units
 Theme_Keyword: Sulphur Mountain pluton
 Theme_Keyword: surficial geology
 Theme_Keyword: terrane overlap units
 Theme_Keyword: Twin Sisters Dunite
 Theme_Keyword: transtensional deposits
 Theme_Keyword: ultramafic rocks
 Theme_Keyword: Vedder Complex
 Theme_Keyword: Vashon stage
 Theme_Keyword: Volcanic rocks of Big Bosom Buttes
 Theme_Keyword: Volcanic rocks of Mount Rahm
 Theme_Keyword: Wells Creek Volcanic Member
 Theme_Keyword: Yellow Aster Complex
 Theme_Keyword_Thesaurus: none

Place:

Place_Keyword_Thesaurus: none
 Place_Keyword: Pacific Northwest
 Place_Keyword: North Cascade Mountains
 Place_Keyword: Skagit River

Place_Keyword: Washington

Place:

Place_Keyword_Thesaurus: Augmented FIPS 10-4 and FIPS 6-4, version 1.0

Place_Keyword: Whatcom County

Place_Keyword: Skagit County

Access_Constraints: none.

Use_Constraints: SPATIAL RESOLUTION- Uses of this digital geologic map should not violate the spatial resolution of the data. Although the digital form of the data removes the constraint imposed by the scale of a paper map, the detail and accuracy inherent in map scale are also present in the digital data. The fact that this database was edited for a scale of 1:100,000 means that higher resolution information is not present in the dataset. Plotting at scales larger than 1:100,000 will not yield greater real detail, although it may reveal fine- scale irregularities below the intended resolution of the database. Similarly, where this database is used in combination with other data of higher resolution, the resolution of the combined output will be limited by the lower resolution of these data..

Native_Data_Set_Environment: Microsoft Windows 2000 Version 5.0 (Build 2195) Service Pack 4; ESRI ArcCatalog 9.0.0.535

Spatial_Data_Organization_Information: mbgeology is contact, fault, and polygon coverage; bmlines is fold axes, cross-section lines, river-cut terrace boundaries, and mineral isograds; mbisofoss is locations of samples analysed for isotope age and identified; mbsmoc is locations of small outcrops of ultramafic rocks, limestone, or marble; mbstruct is structural symbols: bedding: foliation, lineation, and fault balls (These symbols will not show on screen or plot without appropriate symbol sets available in Alacarte); mbrocksamp is a point coverage of rock samples archived at North Cascades National Park, Marblemount. For more information about the rock samples contact the curator at Marblemount, telephone 360 873 4500.

Direct_Spatial_Reference_Method: Vector

Point_and_Vector_Object_Information:

SDTS_Terms_Description:

SDTS_Point_and_Vector_Object_Type: Complete chain

Point_and_Vector_Object_Count: 8250

SDTS_Terms_Description:

SDTS_Point_and_Vector_Object_Type: Label point

Point_and_Vector_Object_Count: 2765

SDTS_Terms_Description:

SDTS_Point_and_Vector_Object_Type: GT-polygon composed of chains

Point_and_Vector_Object_Count: 2765

SDTS_Terms_Description:

SDTS_Point_and_Vector_Object_Type: Point

Point_and_Vector_Object_Count: 49

Spatial_Reference_Information:

Horizontal_Coordinate_System_Definition:

Planar:

Map_Projection:

Map_Projection_Name: Transverse Mercator

Transverse_Mercator:

Scale_Factor_at_Central_Meridian: 0.999600

Longitude_of_Central_Meridian: -123.000000

Latitude_of_Projection_Origin: 0.000000

False_Easting: 500000.000000
 False_Northing: 0.000000
 Planar_Coordinate_Information:
 Planar_Coordinate_Encoding_Method: coordinate pair
 Coordinate_Representation:
 Abscissa_Resolution: 0.000128
 Ordinate_Resolution: 0.000128
 Planar_Distance_Units: meters
 Geodetic_Model:
 Horizontal_Datum_Name: D_Clarke_1866
 Ellipsoid_Name: Clarke 1866
 Semi-major_Axis: 6378206.400000
 Denominator_of_Flattening_Ratio: 294.978698
 Entity_and_Attribute_Information:
 Detailed_Description: **mbgeology**
 Entity_Type:
 Entity_Type_Label: mbgeology.aat
 Attribute:
 Attribute_Label: FID
 Attribute_Definition: Internal feature number.
 Attribute_Definition_Source: ESRI
 Attribute_Domain_Values:
 Unrepresentable_Domain: Sequential unique whole numbers that are automatically generated.
 Attribute:
 Attribute_Label: Shape
 Attribute_Definition: Feature geometry.
 Attribute_Definition_Source: ESRI
 Attribute_Domain_Values:
 Unrepresentable_Domain: Coordinates defining the features.
 Attribute:
 Attribute_Label: FNODE#
 Attribute_Definition: Internal node number for the beginning of an arc (from-node).
 Attribute_Definition_Source: ESRI
 Attribute_Domain_Values:
 Unrepresentable_Domain: Whole numbers that are automatically generated.
 Attribute:
 Attribute_Label: TNODE#
 Attribute_Definition: Internal node number for the end of an arc (to-node).
 Attribute_Definition_Source: ESRI
 Attribute_Domain_Values:
 Unrepresentable_Domain: Whole numbers that are automatically generated.
 Attribute:
 Attribute_Label: LPOLY#
 Attribute_Definition: Internal node number for the left polygon.
 Attribute_Definition_Source: ESRI
 Attribute_Domain_Values:
 Unrepresentable_Domain: Whole numbers that are automatically generated.

Attribute:

Attribute_Label: RPOLY#

Attribute_Definition: Internal node number for the right polygon.

Attribute_Definition_Source: ESRI

Attribute_Domain_Values:

Unrepresentable_Domain: Whole numbers that are automatically generated.

Attribute:

Attribute_Label: LENGTH

Attribute_Definition: Length of feature in internal units.

Attribute_Definition_Source: ESRI

Attribute_Domain_Values:

Unrepresentable_Domain: Positive real numbers that are automatically generated.

Attribute:

Attribute_Label: MBGEOLOGY#

Attribute_Definition: Internal feature number.

Attribute_Definition_Source: ESRI

Attribute_Domain_Values:

Unrepresentable_Domain: Sequential unique whole numbers that are automatically generated.

Attribute:

Attribute_Label: MBGEOLOGY-ID

Attribute_Definition: User-defined feature number.

Attribute_Definition_Source: ESRI

Attribute:

Attribute_Label: LTYPE

Detailed_Description:

Attribute_Definition: Geologic contact description

Attribute_Definition_Source: Author

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: contact, certain

Enumerated_Domain_Value_Definition: Boundary between geologic units established in reconnaissance mapping by authors or compiled from other workers

Enumerated_Domain:

Enumerated_Domain_Value: contact, concealed

Enumerated_Domain_Value_Definition: Boundary between geologic units that is concealed by a younger units

Enumerated_Domain:

Enumerated_Domain_Value: contact, inferred

Enumerated_Domain_Value_Definition: Boundary of uncertain location between geologic units; contact exists but location inferred from indirect evidence(Shown with short dash between units on published map)

Enumerated_Domain:

Enumerated_Domain_Value: contact, approx. located

Enumerated_Domain_Value_Definition: Boundary that is approximately located between geologic units (Shown with long dash between units on published map)

Enumerated_Domain:

Enumerated_Domain_Value: high-angle fault, certain

Enumerated_Domain_Value_Definition: Trace of fault established in reconnaissance mapping by authors or compiled from other workers

Enumerated_Domain:

Enumerated_Domain_Value: high-angle fault, inferred

Enumerated_Domain_Value_Definition: Uncertain location of fault; positional accuracy uncertain but but general location inferred from indirect evidence

Enumerated_Domain:

Enumerated_Domain_Value: high-angle fault, concealed

Enumerated_Domain_Value_Definition: Trace of fault concealed by younger unit; positional accuracy uncertain

Enumerated_Domain:

Enumerated_Domain_Value: high-angle fault, approx. located

Enumerated_Domain_Value_Definition: Very uncertain location of fault

Enumerated_Domain:

Enumerated_Domain_Value: thrust fault, certain

Enumerated_Domain_Value_Definition: Trace of fault established in reconnaissance mapping by authors or compiled from other workers

Enumerated_Domain:

Enumerated_Domain_Value: thrust fault, concealed

Enumerated_Domain_Value_Definition: Trace of thrust fault concealed by younger unit; positional accuracy uncertain

Enumerated_Domain_Value: thrust fault, inferred

Enumerated_Domain_Value_Definition: Uncertain location of fault; positional accuracy uncertain but but general location inferred from indirect evidence

Enumerated_Domain:

Enumerated_Domain_Value: map boundary

Enumerated_Domain_Value_Definition: map boundary of this 1:100,000 study

Enumerated_Domain:

Enumerated_Domain_Value: glacier boundary

Enumerated_Domain_Value_Definition: Boundary of glacier derived from Mount Baker 1:100,000 scale topographic map

Enumerated_Domain:

Enumerated_Domain_Value: scratch boundary

Enumerated_Domain_Value_Definition: Boundary that is indefinite, gradational or very approximately located (shown without a line between units on published map)

Enumerated_Domain:

Enumerated_Domain_Value: atten. fault, certain

Enumerated_Domain_Value_Definition: Extensional fault, location certain

Enumerated_Domain:

Enumerated_Domain_Value: atten. fault,, concealed

Enumerated_Domain_Value_Definition: Trace of extensional fault concealed by younger unit; positional accuracy uncertain

Enumerated_Domain_Value: atten. fault, inferred

Enumerated_Domain_Value_Definition: Uncertain location of extensional fault; positional accuracy uncertain but but general location inferred from indirect evidence

Enumerated_Domain:

Enumerated_Domain_Value: water boundary

Enumerated_Domain_Value_Definition: Boundary of open water derived from Mount Baker
1:100,000 scale topographic map

Enumerated_Domain:

Enumerated_Domain_Value: limebed

Enumerated_Domain_Value_Definition: Trace of limestone or marble bed

Entity_Type:

Entity_Type_Label: mbgeology.pat

Attribute:

Attribute_Label: FID

Attribute_Definition: Internal feature number.

Attribute_Definition_Source: ESRI

Attribute_Domain_Values:

Unrepresentable_Domain: Sequential unique whole numbers that are automatically generated.

Attribute:

Attribute_Label: Shape

Attribute_Definition: Feature geometry.

Attribute_Definition_Source: ESRI

Attribute_Domain_Values:

Unrepresentable_Domain: Coordinates defining the features.

Attribute:

Attribute_Label: AREA

Attribute_Definition: Area of feature in internal units squared.

Attribute_Definition_Source: ESRI

Attribute_Domain_Values:

Unrepresentable_Domain: Positive real numbers that are automatically generated.

Attribute:

Attribute_Label: PERIMETER

Attribute_Definition: Perimeter of feature in internal units.

Attribute_Definition_Source: ESRI

Attribute_Domain_Values:

Unrepresentable_Domain: Positive real numbers that are automatically generated.

Attribute:

Attribute_Label: MBGEOLOGY#

Attribute_Definition: Internal feature number.

Attribute_Definition_Source: ESRI

Attribute_Domain_Values:

Unrepresentable_Domain: Sequential unique whole numbers that are automatically generated.

Attribute:

Attribute_Label: MBGEOLOGY-ID

Attribute_Definition: User-defined feature number.

Attribute_Definition_Source: ESRI

Attribute:

Attribute_Label: PTYPE

Attribute_Definition: symbol of geologic unit

Attribute_Definition_Source: Author

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: Ql

Enumerated_Domain_Value_Definition: **SURFICIAL DEPOSITS:** Non-glacial deposits: **Landslide deposits (Holocene)**—Diamictons composed of angular clasts of bedrock and surficial deposits derived from upslope. Commonly shown on map without unit label; arrows denote downslope direction of movement. Includes both transported material and unstable scarp area if present.

Enumerated_Domain:

Enumerated_Domain_Value: Qlo

Enumerated_Domain_Value_Definition: **SURFICIAL DEPOSITS:** Non-glacial deposits: **Older landslide deposits (Holocene and Pleistocene)**—Similar to diamictons described above but with data to show age. Generally large and with somewhat subdued hilly topography. Church Mountain landslide in the North Fork of the Nooksack, the Bear Creek landslide, and landslides in the Skagit River valley south of Damnation Creek.

Enumerated_Domain:

Enumerated_Domain_Value: Qmw

Enumerated_Domain_Value_Definition: **SURFICIAL DEPOSITS:** Non-glacial deposits: **Mass-wastage deposits (Holocene and Pleistocene)**—Colluvium, soil, or landslide debris with indistinct morphology, mapped where sufficiently continuous and thick to obscure underlying material. Unit is gradational with units Qf and Ql.

Enumerated_Domain:

Enumerated_Domain_Value: Qt

Enumerated_Domain_Value_Definition: **SURFICIAL DEPOSITS:** Non-glacial deposits: **Talus deposits (Holocene)**—Non-sorted angular gravel to boulder diamicton. At lower elevations gradational with unit Qf. At higher elevations includes small rock-avalanche deposits as well as some Holocene moraines, rock glaciers, and protalus rampart deposits that lack characteristic morphology. Surfaces generally unvegetated. Mostly mapped from aerial photos in alpine valleys. Grades into unit Qf.

Enumerated_Domain:

Enumerated_Domain_Value: Qf

Enumerated_Domain_Value_Definition: **SURFICIAL DEPOSITS:** Non-glacial deposits: **Alluvial-fan deposits (Holocene)**—Poorly sorted cobble to boulder gravel, deposited either as a discrete lobe at the intersection of a steep stream with a valley floor of lower gradient or as a broad apron on steep sideslopes. Gradational with unit Qt, especially in granitic terrane where fans along major valleys commonly merge with talus. Mostly mapped from topography and aerial photos in alpine valleys.

Enumerated_Domain:

Enumerated_Domain_Value: Qyal

Enumerated_Domain_Value_Definition: Non-glacial deposits: **SURFICIAL DEPOSITS:** **Younger alluvium (Holocene)**—Moderately sorted deposits of cobble gravel to pebbly sand along rivers and streams. Generally unvegetated surfaces; gradational with both units Qf and Qb.

Enumerated_Domain:

Enumerated_Domain_Value: Qb

Enumerated_Domain_Value_Definition: Non-glacial deposits: **SURFICIAL DEPOSITS:** **Bog deposits (Holocene)**—Peat and alluvium. Poorly drained and intermittently wet. Grades into unit Qyal.

Enumerated_Domain:

Enumerated_Domain_Value: Qoal

Enumerated_Domain_Value_Definition: Non-glacial deposits: **SURFICIAL DEPOSITS: Older alluvium (Holocene and Pleistocene)**—Deposits similar to unit Qyal, but standing above modern-flood plain level and generally separated from it by a distinct topographic scarp. Age of deposits presumed younger than that of unit Qvr, but relations are ambiguous in some localities. In Middle Fork of the Nooksack River valley, may include lahar deposits from Mount Baker (Easterbrook and Kovanen, 1996).

Enumerated_Domain:

Enumerated_Domain_Value: Qam

Enumerated_Domain_Value_Definition: **SURFICIAL DEPOSITS:** Glacial deposits: **Alpine glacial moraine (Holocene)**—Boulder till; sparsely vegetated to unvegetated. Commonly shown with symbolized moraine crest on bedrock unit.

Enumerated_Domain:

Enumerated_Domain_Value: Qag

Enumerated_Domain_Value_Definition: **SURFICIAL DEPOSITS:** Glacial deposits: **Alpine glacial deposits (Holocene and Pleistocene)**—Deposits ranging from boulder till in uplands and upvalley to gravel or sand outwash on broad valley floors. On valley sides and uplands, includes areas veneered with drift but also includes subordinate areas of bedrock, alluvial fans, colluvium, or talus deposits. On valley floors also includes small fans, bogs, and modern stream alluvium. Areas of thin, sparse drift not distinguished from bedrock.

Enumerated_Domain:

Enumerated_Domain_Value: Qgu

Enumerated_Domain_Value_Definition: **SURFICIAL DEPOSITS:** Glacial deposits: **Glacial deposits, undivided (Holocene and Pleistocene)**—Mostly morainal deposits or vegetated talus deposits similar to unit Qag or Qt, but includes outwash. May include considerable debris deposited from the Cordilleran ice sheet, especially in the North Fork of the Nooksack River and along Ross Lake. As mapped, includes deposits in part belonging to units Qyal, Qf, and Qmw.

Enumerated_Domain:

Enumerated_Domain_Value: Qvr

Enumerated_Domain_Value_Definition: **SURFICIAL DEPOSITS:** Glacial deposits: **Deposits of the Vashon stade of the Fraser glaciation of Armstrong and others (1965) (Pleistocene): Recessional outwash deposits**—Stratified sand and gravel, moderately sorted to well-sorted, and well-bedded silty sand to silty clay. This deposit formed predominantly in outwash plain and valley train environments in the lowland areas.

Enumerated_Domain:

Enumerated_Domain_Value: Qvt

Enumerated_Domain_Value_Definition: **SURFICIAL DEPOSITS:** Glacial deposits: **Deposits of the Vashon stade of the Fraser glaciation of Armstrong and others (1965) (Pleistocene): Till**—Mainly compact diamicton with subangular to rounded clasts, glacially transported and deposited. In ice-marginal areas or where covered by a thin layer of recessional outwash, contact with unit Qvr is gradational. As mapped, also includes deposits of units Qf, Qmw, and Qyal too poorly exposed or too small to show at map scale.

Enumerated_Domain:

Enumerated_Domain_Value: Qva

Enumerated_Domain_Value_Definition: **SURFICIAL DEPOSITS:** Glacial deposits: **Deposits of the Vashon stade of the Fraser glaciation of Armstrong and others (1965) (Pleistocene): Advance outwash deposits**—Well-bedded gravelly sand, fine-grained sand, and bedded silt, generally firm and unoxidized; deposited by proglacial streams and in proglacial lakes.

Enumerated_Domain:

Enumerated_Domain_Value: Qpf

Enumerated_Domain_Value_Definition: Non-glacial and glacial deposits: **Non-glacial and glacial sedimentary deposits older than Fraser Glaciation (Pleistocene)**—Moderately to deeply weathered, moderately sorted sand with volcanic clasts. Exposed only in the western part of the quadrangle along the south boundary.

Enumerated_Domain:

Enumerated_Domain_Value: Qbsc

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC: **Rocks of the Mount Baker volcanic center (Holocene and Pleistocene): Basalt of Sulphur Creek (Holocene)** — Plagioclase-rich olivine-pyroxene basalt to andesite lava flows and scoria cone produced by a monogenetic eruption near the head of Sulphur Creek in the early Holocene. Lava complex dominantly basaltic but consists of basaltic andesite medially and andesite proximally, zoned 51-59% SiO₂. Lavas flowed 12 km eastward to Baker River, where a remnant survives on the east shore of Baker Lake.

Enumerated_Domain:

Enumerated_Domain_Value: Qbscc

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC: **Rocks of the Mount Baker volcanic center (Holocene and Pleistocene): Basalt of Sulphur Creek (Holocene)** — Scoria cone of Qbsc (shown with pattern on published map)

Enumerated_Domain:

Enumerated_Domain_Value: Qbv

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC: **Rocks of the Mount Baker volcanic center (Holocene and Pleistocene): Andesite of present-day Mount Baker stratovolcano (Holocene and late Pleistocene)** — Plagioclase-rich pyroxene andesite (56-63% SiO₂; mostly olivine-bearing) lava flows and flow breccia with subordinate agglutinate, scoria, and pyroclastic-flow deposits — all erupted from the central vent of the modern stratovolcano. Consists dominantly of about 200 lava flows, nearly all emplaced radially and sector-confined. About 25 flows exposed between elevations of 2,500 m and 3,200 m make up the steep ridge west of the summit of Mount Baker. Debris flows derived from the cone have moved far down Park, Boulder, Sandy, Sulphur, Rocky, Bar, and Glacier Creeks and the Middle Fork of the Nooksack River, but deposits have largely been reworked as alluvium or till. Unit includes andesite lava remnants along Kulshan, Heliotrope, and Glacier Creeks.

Enumerated_Domain:

Enumerated_Domain_Value: Qbm

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC: **Rocks of the Mount Baker volcanic center (Holocene and Pleistocene): Miscellaneous lava-flow remnants (Pleistocene)** — Isolated andesite and dacite lava flows largely removed by erosion; source vents unknown but presumed to have erupted in the Kulshan caldera-Mount Baker area in postcaldera time. Includes: (1) reversely magnetized, olivine-pyroxene andesite lava-flow (55.5% SiO₂) remnant in upper Thompson Creek, K-Ar dated at 878 ± 18 ka; (2) reversely magnetized, undated, olivine-bearing pyroxene andesite lava-flow (60% SiO₂) remnant on southwest slope of Lookout Mountain, K-Ar dated at 859 ± 14 ka; (3) undated, hornblende-pyroxene-plagioclase andesite (59% SiO₂) lava-flow remnant on lower north slope of Slate Mountain, 400 m east of Anderson Creek, about 370 m above the modern valley floor; and (4) undated plagioclase-rich hornblende-pyroxene andesite (57.5% SiO₂) dike cutting south slope of

Mount Herman (at 1,525 m elevation; but too small to show at map scale); and (5) rhyodacite lava-flow remnant on distal nose of Boulder Ridge, north of Boulder Creek, K-Ar dated at 199 ± 5 ka.

Enumerated_Domain:

Enumerated_Domain_Value: Qbsw

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC: **Rocks of the Mount Baker volcanic center (Holocene and Pleistocene): Andesite of Swift Creek (late Pleistocene)**— Plagioclase-rich olivine-pyroxene basaltic andesite (54-56% SiO₂); isolated eroded remnants of lava flows along the floor of Swift Creek or banked against its east wall as high as 110 m above the floor. Vent unknown, probably farther north within Swift Creek drainage. Yields K-Ar determined age of 48 ± 18 ka. Lava flows were emplaced after downcutting of Swift Creek gorge to approximately its present depth.

Enumerated_Domain:

Enumerated_Domain_Value: Qbtp

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC: **Rocks of the Mount Baker volcanic center (Holocene and Pleistocene): Andesite of The Portals (late Pleistocene)** — Pyroxene andesite lava flows (57-62% SiO₂) distinguished by abundant small (<1 mm) plagioclase, erupted from a glacially eroded vent exposed on east face of Landes Cleaver (east of Mazama Glacier). A few thick flows form a proximal stack still more than 500 m thick and an intracanyon tongue more than 200 m thick that caps the divide between Sholes and Bar Creeks. Most exposures are glassy and polygonally jointed, owing to ice-contact emplacement. Different flows yield K-Ar ages of 76 ± 7 ka and 40 ± 7 ka

Enumerated_Domain:

Enumerated_Domain_Value: Qbls

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC: **Rocks of the Mount Baker volcanic center (Holocene and Pleistocene): Basalt of Lake Shannon (late Pleistocene)** — Plagioclase-olivine basalt (51-52% SiO₂), hyaloclastite tuff and thin lava flows, making up two glaciated knobs and a roadcut remnant 1-2 km west of upper Lake Shannon. Poorly sorted and poorly stratified deposit, as thick as 150 m. Vesicular fragments 1-15 cm make up only 5-10% of glassy deposit dominated by sand-and silt-sized particles, which are locally palagonitized and indurated. Intercalated lava tongues, probably spatter-fed, are 1-3 m thick; one gave an age of 94 ± 21 ka.

Enumerated_Domain:

Enumerated_Domain_Value: Qbcd

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC: **Rocks of the Mount Baker volcanic center (Holocene and Pleistocene): Andesite of Cougar Divide (middle Pleistocene)** — Plagioclase-rich pyroxene andesite and olivine-pyroxene andesite lava flows (56-63% SiO₂) capping the northern part of Cougar Divide and forming smaller remnants near upper Dobbs Creek.

Enumerated_Domain:

Enumerated_Domain_Value: Qbpc

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC: **Rocks of the Mount Baker volcanic center (Holocene and Pleistocene): Andesite of Park Creek (late Pleistocene)** — Stack of five pyroxene andesite lava flows (57-61% SiO₂) on south wall of Park Creek. Source vent concealed beneath modern Mount Baker. Middle flow gives K-Ar age of 140 ± 55 ka

Enumerated_Domain:

Enumerated_Domain_Value: Qbpl

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC: **Rocks of the Mount Baker volcanic center (Holocene and Pleistocene): Andesite of Pinus Lake (middle Pleistocene)** — Plagioclase-rich pyroxene andesite (59-62% SiO₂; sparse

olivine) intracanyon lava flow, surviving only as a 1-km² remnant 100 m thick, 1-2 km east of the confluence of Wells Creek with the North Fork of the Nooksack River. Base of flow 120 m above present-day river. Not distinguished separately on map is a second intracanyon flow remnant of glassy hornblende dacite (65% SiO₂) that supports a 60-m cliff below the northwest face of the andesite. Another remnant of yet a third intracanyon flow is present 1.5 km farther west; consisting of olivine-pyroxene andesite (59% SiO₂), its base is 225 m above the river junction.

Enumerated_Domain:

Enumerated_Domain_Value: Qbbb

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC: **Rocks of the Mount Baker volcanic center (Holocene and Pleistocene): Andesite of Black Buttes (middle Pleistocene)** — Olivine-pyroxene andesite (mostly 55-59% SiO₂) lava flows, flow breccia, and near-vent fragmental deposits (pattern) of Black Buttes stratovolcano. Plagioclase small and sparse in the dominant mafic lavas and ejecta but abundant in thicker flows of silicic andesite. Unit also includes sparse thin flows of olivine-plagioclase basalt (52% SiO₂). A fragmental vent complex interfingers radially with thick stacks of thin (1-15 m) proximal flows and flow-breccia. The fragmental core, extensively altered by fumarolic-hydrothermal fluids, has been glacially gutted to provide the west cirque of Deming Glacier. A few much thicker lava flows of pyroxene andesite (59-64% SiO₂) extend outward from the edifice, today supporting several high divides. Separate vents active during Black Buttes time include Forest Divide (Unit Qbfd), lava Divide (unit Qbid), and Lasiocarpa Ridge (unit Qbir).

Enumerated_Domain:

Enumerated_Domain_Value: Qbcp

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC: **Rocks of the Mount Baker volcanic center (Holocene and Pleistocene): Andesite of Coleman Pinnacle (middle Pleistocene)** — Hornblende-plagioclase andesite (59-63% SiO₂; pyroxene sparse to absent) lava flows and dikes, capping much of Ptarmigan Ridge. Erupted from dike-fed fissure system that extends more than 2 km northeasterly along Ptarmigan Ridge. Glacially sculptured remnants are as thick as 200 m.

Enumerated_Domain:

Enumerated_Domain_Value: Qbtm

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC: **Rocks of the Mount Baker volcanic center (Holocene and Pleistocene): Andesite of Table Mountain (middle Pleistocene)** — Plagioclase-rich pyroxene andesite lava flows (59-62.5% SiO₂) that form stacks as thick as 150 m at Table Mountain [17] and 250 m at nearby Kulshan Ridge. Glacially scoured remnants, mostly glassy and polygonally jointed, make up much of the surface in the Heather Meadows ski area.

Enumerated_Domain:

Enumerated_Domain_Value: Qbld

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC: **Rocks of the Mount Baker volcanic center (Holocene and Pleistocene): Andesite of Lava Divide (middle Pleistocene)** — Plagioclase-rich pyroxene andesite (58-63% SiO₂) lava flows, chaotic and stratified breccias, and vent-filling intrusion. Some flows olivine bearing. Vent plug is conical peak, fumarolically altered and laced with sulfides, forming western prow of cleaver

between Park and Rainbow Glaciers. Most lavas bracketed between 460 and 296 ka, but a basal flow on Park Creek gives 743 ± 72 ka.

Enumerated_Domain:

Enumerated_Domain_Value: Qbbr

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC: **Rocks of the Mount Baker volcanic center (Holocene and Pleistocene): Andesite of Bastille Ridge (middle Pleistocene)** — Plagioclase-rich pyroxene andesite (59-63% SiO_2) lavas that form a 200-m stack of about 10 west-dipping flows that cap Bastille Ridge. Remnant of a single 60-m-thick flow about 1 km northwest (on north side of Smith Creek) is similar, probably related.

Enumerated_Domain:

Enumerated_Domain_Value: Qbfd

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC: **Rocks of the Mount Baker volcanic center (Holocene and Pleistocene): Andesite of Forest Divide (middle Pleistocene)**—Olivine-bearing pyroxene andesite (58-61% SiO_2). Stack of about 10 lava flows capping Forest Divide. Vent buried by Mount Baker. Basal and top flows yield K-Ar ages of 455 ± 9 ka and 366 ± 10 ka.

Enumerated_Domain:

Enumerated_Domain_Value: Qblr

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC: **Rocks of the Mount Baker volcanic center (Holocene and Pleistocene): Andesite of Lasiocarpa Ridge (middle Pleistocene)** — Plagioclase-rich olivine-pyroxene andesite (58-62% SiO_2) lava flows and thick flow breccia. K-Ar dated at 515 ± 8 ka.

Enumerated_Domain:

Enumerated_Domain_Value: Qbpb

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC: **Rocks of the Mount Baker volcanic center (Holocene and Pleistocene): Basalt of Park Butte (and associated rocks) (middle Pleistocene)** —Plagioclase-olivine basalt (50% SiO_2) lava flow capping east ridge of Park Butte; yields K-Ar age of 716 ± 45 ka. Nearby remnants of basaltic andesite lavas (52.5-56% SiO_2 ; mapped as Qbm) containing clinopyroxene as well as olivine and plagioclase, cap Cathedral Crag, the ridge north of Baker Pass, and the small plateau just east of Park Butte. These yield K-Ar ages between 333 and 203 Ka and have no recognizable source vent.

Enumerated_Domain:

Enumerated_Domain_Value: Qkrl

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC: **Rocks of Kulshan caldera (early Pleistocene): Rhyodacite lava flows, domes, dikes and shallow intrusions** — At least seven separate eruptive units of biotite-hypersthene-hornblende-plagioclase rhyodacite (69-72% SiO_2) intrude and overlie intracaldera ignimbrite or sedimentary deposits. Five more intrude and overlie unit **KJna** on Cougar Divide (where three are shown on the geologic map), and at least one dike (30 m thick, but not shown on the map) of similar rhyodacite cuts unit **Pcmv** on the divide between Swift and Rainbow Creeks just south of the caldera.

Compositionally, the lavas and dikes are similar to the dominant pumice in the ignimbrite or slightly less evolved. Phenocryst contents range widely, from 5 to 25%. Like the ignimbrite, the lavas and dikes contain plagioclase, hypersthene, hornblende, biotite, FeTi oxides, apatite, and zircon, although one or more of these may be missing in some flows; sanidine is lacking, and

clinopyroxene and quartz are absent or very rare. Lithologically, the lavas and dikes are massive or flow-banded felsite; glacial erosion has stripped all but sparse remnants of glassy external zones, which tend to be altered where they survive. The felsite is pale to medium grey where fresh but is largely tan to orange-brown owing to pervasive oxidation and ferruginous films on joints and vugs. In areas of hydrothermal alteration, especially where brecciated, the lavas are pale green, cream, or white, commonly stained and streaked ochre to rusty brown due to decomposition of disseminated pyrite.

Enumerated_Domain:

Enumerated_Domain_Value: unit Qkls

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC: **Rocks of Kulshan caldera (early Pleistocene): Caldera-lake sedimentary deposits** — Laminated to thin-bedded ashy mudstone, ash-dominated debris-flow deposits, and intercalated sheets of rockfall breccia. Ashy sediments that originally consisted predominantly of vitric shards are mostly well-lithified and rich in calcite, clays, and pyrite. Colors range from pale grey or tan to black, or, where altered, ochre to rusty brown. Debris-flow deposits are diamictic massive or graded beds 0.1-7 m thick, containing pumice, caldera-wall lithics, and mudstone intraclasts in an ashy matrix. Sheets of lithic breccia, poor in ash, 0.1-5 m thick, largely made up of angular clasts of argillite, sandstone, and conglomerate, alternate with ash-rich laminated mudstone. Unit has been widely stripped by erosion. Surviving sections dip gently toward middle of caldera or are locally disrupted by intrusive rhyodacite and andesite.

Enumerated_Domain:

Enumerated_Domain_Value:Qkig

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC: **Rocks of Kulshan caldera (early Pleistocene): Ignimbrite of Swift Creek** — Intracaldera rhyodacite ignimbrite (ash-flow tuff) filling Kulshan caldera. Mostly massive, but crudely stratified in top 100 m and near walls where myriad sheets of wall-collapse breccia are intercalated. Largely nonwelded but firmly indurated by groundwater and hydrothermal fluids. White to pale grey except where hydrothermally altered ochre to orange-brown. Pumice clasts are rarely larger than 10 cm and mostly smaller than 2 cm; nearly all are rhyodacite (72% SiO₂) containing 10-15 wt % phenocrysts (plagioclase >> hypersthene ≥ hornblende > biotite > FeTi oxides > rounded quartz > apatite _zircon). Andesitic pumice is also present but very sparse. Ignimbrite matrix is crystal-enriched (relative to pumice) and is poor in lithic fragments except near walls, where they are abundant. In addition to feeders for the postcaldera rhyodacite lavas (unit **Qkrl**), the ignimbrite is cut by at least 60 andesitic dikes and irregular intrusions, none of which are known to extend out of the caldera into surrounding wall rocks.

Enumerated_Domain:

Enumerated_Domain_Value: Qkmba

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC: **Rocks of Kulshan caldera (early Pleistocene): Caldera-collapse megablocks** — Partly shattered and sheared but quasi-coherent 0.1-to-1-km slide blocks of caldera-wall rock (unit **Tcla**) surrounded by intracaldera ignimbrite. Examples shown on printed map are labeled QKmb.

Enumerated_Domain:

Enumerated_Domain_Value: Qkmbn

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC: **Rocks of Kulshan caldera (early Pleistocene): Caldera-collapse megablocks** — Partly shattered and sheared but quasi-coherent 0.1-to-1-km slide blocks of caldera-wall rock (unit **KJna**) surrounded by intracaldera ignimbrite. Examples shown on printed map are labeled QKmb.

Enumerated_Domain:

Enumerated_Domain_Value: Thb

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC:

Hannegan Volcanics (Pliocene): Volcanic breccia—Mostly clinopyroxene-hornblende andesite clasts along with many clasts of older rocks in andesite tuff matrix. Many andesite dikes, sills and (or) flows.

Enumerated_Domain:

Enumerated_Domain_Value: Thmb

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC:

Hannegan Volcanics (Pliocene): Monolithologic breccia—Angular debris of older rocks, probably talus, and (or) debris-flow deposits. Mapped on north side of Ruth Mountain and above Sulphide Creek. The latter occurrence includes volcanic breccia, is outside the caldera, and may be of different origin.

Enumerated_Domain:

Enumerated_Domain_Value: Tht

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC:

Hannegan Volcanics (Pliocene): Tuff—White to light-brown dacite tuff and welded tuff, some rhyolite tuff, and rare andesite tuff and flow rocks, commonly highly altered. Bedding obscure.

Enumerated_Domain:

Enumerated_Domain_Value: Tvr

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC: Other volcanic rocks: **Volcanic rocks of Mount Rahm (Oligocene)**—Dacitic to less commonly andesitic breccias, tuffs, and flows with some feldspathic sandstone and conglomerate interbeds. Welded dacite tuff common.

Enumerated_Domain:

Enumerated_Domain_Value: Tvbb

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC: Other volcanic rocks: **Volcanic rocks of Big Bosom Buttes (Oligocene):**

Breccia—Predominantly dacite breccia; minor tuff beds. Forms massive cliffs. Scattered clasts of older rocks, including light-colored granitic rocks.

Enumerated_Domain:

Enumerated_Domain_Value: Tvbd

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC: Other volcanic rocks: **Volcanic rocks of Big Bosom Buttes (Oligocene): Dacite tuff**—Biotite dacite tuff, commonly ash-flow tuff and bedded fine-grained tuff. Also includes dacite on Middle Peak.

Enumerated_Domain:

Enumerated_Domain_Value: Tvbm

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC: Other volcanic rocks: **Volcanic rocks of Big Bosom Buttes (Oligocene): Monolithologic granite breccia**—Angular blocks of biotite granite from a few cm to several meters across in a granitic sand matrix. Scattered volcanic fragments. Derived from granite of Pocket Peak phase (unit Tcp).

Enumerated_Domain:

Enumerated_Domain_Value: Tvpd

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC:
Volcanic rocks of Pioneer Ridge (Oligocene): Dacite flows—Plagioclase- and quartz-phyric dacite. Mafic minerals altered to smectites.

Enumerated_Domain:

Enumerated_Domain_Value: Tvpb

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC:

Volcanic rocks of Pioneer Ridge (Oligocene): Mudflow breccia—Clasts of dacitic volcanic rocks and abundant clasts of underlying metamorphic rocks. Also includes volcanic-lithic sandstone. Locally strongly thermally metamorphosed.

Enumerated_Domain:

Enumerated_Domain_Value: Tdt

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC:

INTRUSIVE ROCKS OF THE CASCADE PASS FAMILY: **Tonalite of Cascade Pass dike (Miocene)**—Medium-grained hornblende-biotite tonalite, hypidiomorphic granular with small glomeroporphyrocrysts of mafic minerals. CI = 7-26 (Tabor, 1961, p. 175; Ford and others, 1988, p. 34), mostly CI=15-17. Massive and coarsely jointed, with local areas of disseminated sulfide minerals. The dike has finer-grained, porphyritic, chilled margins; contact lit-par-lit complexes are common, and alteration is locally pervasive.

Enumerated_Domain:

Enumerated_Domain_Value: Tcla

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC:

INTRUSIVE ROCKS OF THE CASCADE PASS FAMILY: **Rocks of the Chilliwack composite batholith (Pliocene and Miocene): Lake Ann stock (Pliocene)**—Medium-grained hypersthene-clinopyroxene quartz monzodiorite and quartz monzonite, locally with biotite and very minor hornblende. Normatively some is granodiorite; CI=12_19 (James, 1980). Euhedral biotite common near roof above Lake Ann.

Enumerated_Domain:

Enumerated_Domain_Value: Tcni

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC:

INTRUSIVE ROCKS OF THE CASCADE PASS FAMILY: **Rocks of the Chilliwack composite batholith (Pliocene and Miocene): Miscellaneous granodiorite intrusions (Pliocene and/or Miocene)**—Biotite granodiorite, micrographic, commonly altered, with much chlorite. As mapped comprises lithologically-similar stocks cropping out on the north side of Hagan Mountain, in Sulphide Creek, and upper Noisy Creek. Also includes fine-grained biotite pyroxene amphibole granodiorite stock on Bar Creek, which may be as young as middle Pleistocene (Hildreth and others, 2003).

Enumerated_Domain:

Enumerated_Domain_Value: Tcnm

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC:

INTRUSIVE ROCKS OF THE CASCADE PASS FAMILY: **Rocks of the Chilliwack composite batholith (Pliocene and Miocene): Quartz monzonite and granite of Nooksack cirque (Pliocene)**—Quartz monzonite and granite with minor granodiorite and quartz monzodiorite. Predominantly with uralitic hornblende and relict clinopyroxene. CI=7-15.

Enumerated_Domain:

Enumerated_Domain_Value: Tcrg

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC:

INTRUSIVE ROCKS OF THE CASCADE PASS FAMILY: **Rocks of the Chilliwack composite batholith (Pliocene and Miocene): Granite of Ruth Mountain (Pliocene)**—Biotite

granite and granodiorite, commonly with large twinned perthite crystals. Minor hornblende. CI=4-17.

Enumerated_Domain:

Enumerated_Domain_Value: Tcid

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC:
INTRUSIVE ROCKS OF THE CASCADE PASS FAMILY: **Rocks of the Chilliwack composite batholith (Pliocene and Miocene): Quartz diorite and quartz monzodiorite of Icy Peak (Pliocene)**—Biotite-clinopyroxene quartz diorite to quartz monzodiorite with minor hypersthene and uraltite. Some rock is plagioclase-porphyritic. CI=15-32.

Enumerated_Domain:

Enumerated_Domain_Value: Tcgp

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC:
INTRUSIVE ROCKS OF THE CASCADE PASS FAMILY: **Rocks of the Chilliwack composite batholith (Pliocene and Miocene): Granite porphyry of Egg Lake (Pliocene)**—Hornblende and biotite granite and granodiorite porphyry with phenocrysts of quartz, plagioclase, and hornblende in a xenomorphic matrix of K-feldspar, quartz, and plagioclase. Compositionally heterogeneous and commonly altered.

Enumerated_Domain:

Enumerated_Domain_Value: Tcrgd

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC:
INTRUSIVE ROCKS OF THE CASCADE PASS FAMILY: **Rocks of the Chilliwack composite batholith (Pliocene and Miocene): Ruth Creek pluton (Miocene)**—Biotite granodiorite, some granite and quartz monzodiorite, locally with quartz eyes as large as 1 cm in diameter; CI=3-7 (Tepper, 1991, p. 78), but mostly 4-5. Rare blocky hornblende with pyroxene cores.

Enumerated_Domain:

Enumerated_Domain_Value: Tcm

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC:
INTRUSIVE ROCKS OF THE CASCADE PASS FAMILY: **Rocks of the Chilliwack composite batholith (Pliocene and Miocene): Mineral Mountain pluton (Miocene)**—Biotite granite. CI=3-7. Characterized by conspicuous quartz eyes several centimeters across which are glomerocrysts of rounded quartz grains with K-feldspar in the curved triangular interstices. Micrographic intergrowths of K-feldspar and quartz common. Conspicuous chloritic alteration.

Enumerated_Domain:

Enumerated_Domain_Value: Tcwb

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC:
INTRUSIVE ROCKS OF THE CASCADE PASS FAMILY: **Rocks of the Chilliwack composite batholith (Pliocene and Miocene): Granite of western Bear Mountain (Miocene?)**—Biotite granite and granodiorite, some with hornblende. Rock is heterogeneous; CI=2-12. Quartz eyes conspicuous. Rock is cut by numerous aplitic dikes (Tepper, 1991, p. 79).

Enumerated_Domain:

Enumerated_Domain_Value: Tcdcg

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC:
INTRUSIVE ROCKS OF THE CASCADE PASS FAMILY: **Rocks of the Chilliwack composite batholith (Pliocene and Miocene): Granite of Depot Creek (Miocene)**—Biotite-hornblende granite with relict clinopyroxene cores in hornblende. Forms a small stock below the Redoubt Glacier.

Enumerated_Domain:

Enumerated_Domain_Value: Tcrq

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC:
INTRUSIVE ROCKS OF THE CASCADE PASS FAMILY: **Rocks of the Chilliwack composite batholith (Pliocene and Miocene): Quartz monzodiorite of Redoubt Creek (Miocene)**—Biotite-pyroxene-hornblende quartz monzodiorite, quartz monzonite, granite, granodiorite, and diorite, commonly altered, with pinkish cast. CI=3-20, but most CI=11-17. Some rocks are porphyritic allotriomorphic and vermicular; micrographic quartz is common (Tepper, 1991, p. 68).

Enumerated_Domain:

Enumerated_Domain_Value:Tcbx

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC:
INTRUSIVE ROCKS OF THE SNOQUALMIE FAMILY: **Rocks of the Chilliwack composite batholith (Miocene and Oligocene): Intrusive breccia (Miocene and/or Oligocene)**—On north ridge of Mount Blum, unit consists of alaskite and other intermediate plutonic rocks mixed with hypabyssal rocks in altered porphyroclastic xenomorphic and cataclastic matrix of rhyolitic composition; rocks are thermally metamorphosed. Breccia is cut by or marginal to a variety of silicic dike rocks. Above Luna Lake, gneiss, hypabyssal dike rocks, mafic schist, and country rock gneiss clasts with vuggy quartz, pyrite, and radial amphibole bursts. Near Tapto Lakes, mafic plutonic-rock clasts, such as diorite, are mixed with andesite clasts in an altered dacitic matrix (Moore, 1972, p. 49-50).

Enumerated_Domain:

Enumerated_Domain_Value: Tcsg

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC:
INTRUSIVE ROCKS OF THE SNOQUALMIE FAMILY: **Rocks of the Chilliwack composite batholith (Miocene and Oligocene): Mount Sefrit Gabbonorite of Tepper and others (1993) (Miocene)**—Mostly olivine-bearing gabbonorite with minor two-pyroxene diorite, hornblende diorite, and quartz diorite. Rocks are dark, partly because of swarms of minute dark inclusions in calcic plagioclase (Tepper, 1985).

Enumerated_Domain:

Enumerated_Domain_Value: Tcpc

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC:
INTRUSIVE ROCKS OF THE SNOQUALMIE FAMILY: **Rocks of the Chilliwack composite batholith (Miocene and Oligocene): Perry Creek phase (Miocene and Oligocene)**—Mostly biotite-hornblende tonalite and granodiorite, commonly with relict clinopyroxene. Minor quartz monzodiorite and quartz diorite. Hornblende or biotite may predominate. Quartz is typically mesostasic. CI=8-22, but most are CI=12-19.

Enumerated_Domain:

Enumerated_Domain_Value: Tcpc

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC:
INTRUSIVE ROCKS OF THE SNOQUALMIE FAMILY: **Rocks of the Chilliwack composite batholith (Miocene and Oligocene): Perry Creek phase (Miocene and Oligocene)**—Mostly biotite-hornblende tonalite and granodiorite, commonly with relict clinopyroxene. Minor quartz monzodiorite and quartz diorite. Hornblende or biotite may predominate. Quartz is typically mesostasic. CI=8-22, but most are CI=12-19: **Tectonized tonalite** —Shattered and locally cataclastic to mylonitic, highly altered tonalite and granodiorite; mafic minerals chloritized. Also includes hornfels and shattered and recrystallized plutonic and hypabyssal rocks, with biotite, amphibole, plagioclase and quartz mosaics.

Enumerated_Domain:

Enumerated_Domain_Value: Tcbg

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC:
INTRUSIVE ROCKS OF THE SNOQUALMIE FAMILY: **Rocks of the Chilliwack composite batholith (Miocene and Oligocene): Biotite granodiorite of Little Beaver Creek (Oligocene)**—Mostly hornblende-biotite granodiorite and minor granite, locally quartz and plagioclase phyrlic; CI=3-10.

Enumerated_Domain:

Enumerated_Domain_Value: Tccv

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC:
INTRUSIVE ROCKS OF THE SNOQUALMIE FAMILY: **Rocks of the Chilliwack composite batholith (Miocene and Oligocene): Chilliwack valley phase (Oligocene)**—Biotite-hornblende tonalite, granodiorite, and minor quartz diorite, commonly with subhedral plagioclase prisms in quartz mesostasis. Minor clinopyroxene; locally. CI=7-30, but mostly CI=15-20. As mapped, probably includes several plutons.

Enumerated_Domain:

Enumerated_Domain_Value: Tccvt

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC:
INTRUSIVE ROCKS OF THE SNOQUALMIE FAMILY: **Rocks of the Chilliwack composite batholith (Miocene and Oligocene): Chilliwack valley phase (Oligocene)—Dark tonalite**—Pyroxene-hornblende tonalite with distinctive dark vitreous appearance in outcrop.

Enumerated_Domain:

Enumerated_Domain_Value: Tcig

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC:
INTRUSIVE ROCKS OF THE SNOQUALMIE FAMILY: **Rocks of the Chilliwack composite batholith (Miocene and Oligocene): Indian Mountain phase (Oligocene)**—Biotite-hornblende granodiorite and granite, with minor quartz monzonite and quartz monzodiorite. CI=3-19, most CI=12-19. Texturally heterogeneous, some quartz or K-feldspar phenocrystic but these minerals are generally mesostasic; locally granophyrlic. Rock is commonly pinkish and with chloritized hornblende and biotite. As mapped, probably includes several plutons.

Enumerated_Domain:

Enumerated_Domain_Value: Tcbr

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC:
INTRUSIVE ROCKS OF THE INDEX FAMILY: **Rocks of the Chilliwack composite batholith (Miocene and Oligocene): Baker River phase (Oligocene)**—Mostly biotite hornblende granodiorite with some tonalite and quartz diorite, locally with clinopyroxene and hypersthene. Subhedral plagioclase in quartz mesostasis common. CI=7-25, but for most rocks in southern part CI=13-18 and, in Skagit Range, CI=17-20. Mostly tonalite, quartz diorite, and rare diorite in Skagit Range and in small pluton on American Border Peak; some diorite is hornfelsic. As mapped, probably includes several plutons.

Enumerated_Domain:

Enumerated_Domain_Value: Tcbrp

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC:
INTRUSIVE ROCKS OF THE INDEX FAMILY: **Rocks of the Chilliwack composite batholith (Oligocene): Price Glacier pluton**—Biotite-hornblende quartz diorite with mesostasic quartz. CI=16-18. Tepper (1991) describes some of the rock making up this unit as part of his granodiorite of Ruth Mountain. Specific age uncertain.

Enumerated_Domain:

Enumerated_Domain_Value: Tcml

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC:
INTRUSIVE ROCKS OF THE INDEX FAMILY: **Rocks of the Chilliwack composite batholith (Oligocene): Tonalite of Maiden Lake**—Biotite-hornblende metatonalite and metaquartz diorite with highly altered plagioclase and biotite. Hypidiomorphic granular. Metamorphic minerals are chlorite, epidote, prehnite, pumpellyite, sericite and carbonate.

Enumerated_Domain:

Enumerated_Domain_Value: Tcsp

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC:
INTRUSIVE ROCKS OF THE INDEX FAMILY: **Rocks of the Chilliwack composite batholith (Oligocene): Silesia Creek pluton (Oligocene)**—Biotite-hornblende granodiorite, quartz monzodiorite and quartz diorite with inclusions and layers of biotite granodiorite and granite; some granitic xenoliths as long as 200 m. CI=5-20. Quartz diorite displays prominent magmatic alignment of feldspar and mafic minerals.

Enumerated_Domain:

Enumerated_Domain_Value: Tcba

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC:
INTRUSIVE ROCKS OF THE INDEX FAMILY: **Rocks of the Chilliwack composite batholith (Oligocene): Biotite alaskite of Mount Blum (Oligocene)**—Medium-grained biotite alaskite (granite) with prominent perthite prisms, rare hornblende, locally quartz phyric. CI=1-4

Enumerated_Domain:

Enumerated_Domain_Value: Tcp

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC:
INTRUSIVE ROCKS OF THE INDEX FAMILY: **Rocks of the Chilliwack composite batholith (Oligocene): Pocket Peak phase (Oligocene)**—Biotite granite. Medium grained, hypidiomorphic granular. Commonly with quartz eyes, which are glomerocrysts of rounded quartz grains with K-feldspar in the curved triangular interstices. CI=1-5 mostly CI=3-5. As mapped, probably includes several plutons.

Enumerated_Domain:

Enumerated_Domain_Value: Tcht

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC:
INTRUSIVE ROCKS OF THE INDEX FAMILY: **Rocks of the Chilliwack composite batholith (Oligocene): Heterogeneous tonalite and granodiorite of Middle Peak (Oligocene?)**—Quartz diorite to biotite granite, mostly mafic-poor. Many rocks hornfelsic. Also includes amphibolite of unknown origin.

Enumerated_Domain:

Enumerated_Domain_Value: Tcdg

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC:
INTRUSIVE ROCKS OF THE INDEX FAMILY: **Rocks of the Chilliwack composite batholith (Oligocene): Granodiorite of Mount Despair (Oligocene)**—Biotite-hornblende granodiorite with minor tonalite, quartz diorite, and quartz monzodiorite. Conspicuous quartz eyes which are glomerocrysts of rounded quartz grains with K-feldspar in the curved triangular interstices. CI=7-20, but mostly CI=10-12; hornblende usually predominates.

Enumerated_Domain:

Enumerated_Domain_Value: Tcdga

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC:
INTRUSIVE ROCKS OF THE INDEX FAMILY: **Rocks of the Chilliwack composite batholith (Oligocene): Granodiorite of Mount Despair (Oligocene)**—Agmatite—Swarms of dark

rounded inclusions from 0,25m to several meters across composed of mafic biotite-hornblende quartz diorite and fine-grained tonalite in a lighter colored granodiorite and tonalite matrix.

Enumerated_Domain:

Enumerated_Domain_Value: Tcmg

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC:

INTRUSIVE ROCKS OF THE INDEX FAMILY: **Rocks of the Chilliwack composite batholith**

(Oligocene): Miscellaneous gabbros and diorites (Oligocene?)—Pyroxene-hornblende gabbro, diorite, and quartz diorite. Rocks contain much uraltite. Mafic hornblende gabbro near

Mount Spickard is mixed with granitic rocks. A small body of pyroxene gabbro at Chilliwack Pass is not shown on the map.

Enumerated_Domain:

Enumerated_Domain_Value: Tcmge

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC:

INTRUSIVE ROCKS OF THE INDEX FAMILY: **Rocks of the Chilliwack composite batholith**

(Oligocene): Miscellaneous gabbros and diorites (Oligocene?)— Inclusion-rich

diorite of Ensawkwach Creek—Layered hypersthene hornfels inclusions in diorite and quartz diorite. East of Pocket Peak.

Enumerated_Domain:

Enumerated_Domain_Value: Tcclg

Enumerated_Domain_Value_Definition: ROCKS OF THE CASCADE MAGMATIC ARC:

INTRUSIVE ROCKS OF THE INDEX FAMILY: **Rocks of the Chilliwack composite batholith**

(Oligocene): Gabbro of Copper Lake (Oligocene)—Oikocrystic hornblende gabbro

surrounded by equigranular hornblende diorite. Some pyroxene in the diorite which is also zoned to quartz and biotite-bearing varieties. Cl=25_40. Cumulous textures throughout. Description adopted from Tepper (1991, p. 20-27).

Enumerated_Domain:

Enumerated_Domain_Value: Tc

Enumerated_Domain_Value_Definition: LATE OROGENIC AND POST OROGENIC DEPOSITS:

Chuckanut Formation (Eocene)—Mostly fluvial, plagioclase arkose, biotite-rich with minor muscovite, buff-weathering, medium- to thick-bedded, and minor interbeds of siltstone, mudstone, and very fine grained sandstone. Also includes minor pebble to cobble conglomerate.

Conspicuous crossbeds, convolute bedding, and plant fossils. Sandstone is locally thinner bedded and more lithic. Ochre-colored silty beds near base of unit may be paleosols. Basal beds, where exposed, commonly include bull-quartz pebble conglomerate which appears to have been derived from the underlying Easton Metamorphic Suite.

Enumerated_Domain:

Enumerated_Domain_Value: Tys

Enumerated_Domain_Value_Definition: LATE OROGENIC AND POST OROGENIC DEPOSITS:

Younger sandstone and conglomerate (middle Eocene or younger)—West of lower Bacon Creek, mostly coarse cobble conglomerate with clasts derived from the Marblemount pluton.

Enumerated_Domain:

Enumerated_Domain_Value: Tos

Enumerated_Domain_Value_Definition: LATE OROGENIC AND POST OROGENIC DEPOSITS:

Older sandstone and conglomerate (age uncertain)—Thick- to thin-bedded fluvial arkosic sandstone and interbedded argillite, siltstone, and very fine grained sandstone. Locally has conspicuous crossbeds, fossil leaves, and fossil logs. Basal beds commonly rich in angular fragments derived from underlying rocks. Southeast of Berdeen Lake, unit includes conglomerate

with clasts of granitic rock, greenstone, gneiss, schist, phyllite, abundant well-rounded cobbles of quartzite, and minor sandstone and limestone. On Mount Despair, unit includes pebble to cobble conglomerate with clasts of gneiss, metachert, and minor pegmatite; intruded by granodiorite of Mount Despair, indicating unit age here is early Oligocene or older. Converted to biotite hornfels, commonly with cordierite and (or) andalusite, in proximity to younger plutons.

Enumerated_Domain:

Enumerated_Domain_Value: bc

Enumerated_Domain_Value_Definition: **ROCKS WEST OF THE STRAIGHT CREEK**

FAULT: Northwest Cascades System: *Welker Peak and Excelsior nappes*: **Conglomerate of Bald Mountain (Age uncertain)**—Coarse polymictic conglomerate, chert-pebble conglomerate, grey lithic sandstone, and phyllitic black to silvery argillite. Polymictic conglomerate includes clasts of chert, argillite, green metatonalite, dacite, buff-weathering calcite-cemented quartzose sandstone, and rare bedded lithic sandstone. Clast-supported, pebbles and boulders well rounded. Clasts in conglomerates locally flattened and boudinaged. Rare siltstone and shale interbeds. East of Goat Mountain unit contains abundant fossil plant material.

Enumerated_Domain:

Enumerated_Domain_Value: bcs

Enumerated_Domain_Value_Definition: **ROCKS WEST OF THE STRAIGHT CREEK**

FAULT: Northwest Cascades System: *Welker Peak and Excelsior nappes*: **Conglomerate of Bald Mountain (Age uncertain)—Sandstone and argillite**—Highly indurated, thin- to medium-bedded sandstone; beds generally disrupted. Sandstone poorly sorted, rich in chert clasts. Black argillite, flaky to slaty. Minor chert-pebble conglomerate beds.

Enumerated_Domain:

Enumerated_Domain_Value: Kjb

Enumerated_Domain_Value_Definition: **ROCKS WEST OF THE STRAIGHT CREEK**

FAULT: Northwest Cascades System: *Welker Peak and Excelsior nappes*: **Rocks of the Bell Pass mélange (Cretaceous to Late Jurassic): Bell Pass mélange, undivided**—Disrupted argillite, slate, phyllite, sandstone, semischist, ribbon chert, and basalt of the Elbow Lake Formation of Brown and others (1987), with tectonic blocks of meta-igneous rocks, gneiss, schist, ultramafic rocks, and marble. Sandstone commonly lithic subquartzose, either volcanic rich and (or) chert rich; argillite is mostly scaly, and grades into slate and phyllite. Greenstones are recrystallized basalt, mafic tuff, diabase, and gabbro and commonly make the most prominent outcrops. Metamorphic minerals in greenstones and metasedimentary rocks are chlorite, epidote, albite, pumpellyite, rare actinolite, carbonate minerals, and indistinct masses of pumpellyite and (or) lawsonite.

Enumerated_Domain:

Enumerated_Domain_Value: bb

Enumerated_Domain_Value_Definition: **ROCKS WEST OF THE STRAIGHT CREEK**

FAULT: Northwest Cascades System: *Welker Peak and Excelsior nappes*: **Rocks of the Bell Pass mélange (Cretaceous to Late Jurassic): Blueschist of Baker Lake (Cretaceous to Jurassic metamorphic age)**—Metabasaltic rocks, meta-ribbon chert, and marble, characterized by distinctive (for the Northwest Cascades System) high-pressure/low-temperature crossite, lawsonite, some aragonite metamorphism. Metabasaltic rocks range from very fine grained schistose metatuff to incipiently recrystallized basalt.

Enumerated_Domain:

Enumerated_Domain_Value: byan

Enumerated_Domain_Value_Definition: **ROCKS WEST OF THE STRAIGHT CREEK**

FAULT: Northwest Cascades System: *Welker Peak and Excelsior nappes*: **Rocks of the Bell**

Pass mélange (Cretaceous to Late Jurassic): Yellow Aster Complex of Misch (1966) (Paleozoic protolith age)— Non-gneissic rocks—Predominantly massive metagabbro, metadiabase, metatonalite; locally includes minor gneissic igneous rocks. May include late Paleozoic or Mesozoic intrusive rocks similar to units MzPzg and MzPzt.

Enumerated_Domain:

Enumerated_Domain_Value: byag

Enumerated_Domain_Value_Definition: **ROCKS WEST OF THE STRAIGHT CREEK**

FAULT: Northwest Cascades System: *Welker Peak and Excelsior nappes:* **Rocks of the Bell**

Pass mélange (Cretaceous to Late Jurassic): Yellow Aster Complex of Misch (1966) (Paleozoic protolith age)— Gneissic rocks—Layered siliceous gneiss, quartz-rich pyroxene gneiss, gneissic megacrystic granite, and minor marble, as well as associated metagabbro, metadiabase, and metatonalite. Gneissic granite with K-feldspar megacrysts known only from Kidney Creek. Includes areas lacking siliceous gneiss, but with strongly mylonitic quartz-rich meta-igneous rocks. Talus blocks east of Park Butte grade from graphitic marble to quartz-rich pyroxene gneiss. Most rocks are highly strained and recrystallized in amphibolite or upper-greenschist facies. Locally, intruded by associated metagabbro, metadiabase, and metatonalite.

Enumerated_Domain:

Enumerated_Domain_Value: bu

Enumerated_Domain_Value_Definition: **ROCKS WEST OF THE STRAIGHT CREEK**

FAULT: Northwest Cascades System: *Welker Peak and Excelsior nappes:* **Rocks of the Bell**

Pass mélange (Cretaceous to Late Jurassic): Yellow Aster Complex of Misch (1966) (Paleozoic protolith age): Ultramafic rocks—Serpentinite and partially serpentinized dunite and harzburgite.

Enumerated_Domain:

Enumerated_Domain_Value: but

Enumerated_Domain_Value_Definition: **ROCKS WEST OF THE STRAIGHT CREEK**

FAULT: Northwest Cascades System: *Welker Peak and Excelsior nappes:* **Rocks of the Bell**

Pass mélange (Cretaceous to Late Jurassic): Yellow Aster Complex of Misch (1966) (Paleozoic protolith age): Ultramafic rocks: Twin Sisters Dunite of Ragan (1961; 1963)—Dunite and harzburgite, locally serpentinized.

Enumerated_Domain:

Enumerated_Domain_Value: bup

Enumerated_Domain_Value_Definition: **ROCKS WEST OF THE STRAIGHT CREEK**

FAULT: Northwest Cascades System: *Welker Peak and Excelsior nappes:* **Rocks of the Bell**

Pass mélange (Cretaceous to Late Jurassic): Ultramafic rocks: Pyroxenite—Massive pyroxenite consisting of mostly enstatite and minor olivine and serpentine minerals.

Enumerated_Domain:

Enumerated_Domain_Value: bv

Enumerated_Domain_Value_Definition: **ROCKS WEST OF THE STRAIGHT CREEK**

FAULT: Northwest Cascades System: *Welker Peak and Excelsior nappes:* **Rocks of the Bell**

Pass mélange (Cretaceous to Late Jurassic): Vedder Complex of Armstrong and others (1983) (Permian metamorphic age)—Amphibolite, blueschist, micaceous quartzite, and mica-quartz schist. Some garnet. Amphiboles are hornblende, actinolite, and barrosite. Some amphibolites contain albite porphyroblasts.

Enumerated_Domain:

Enumerated_Domain_Value: bm

Enumerated_Domain_Value_Definition: **ROCKS WEST OF THE STRAIGHT CREEK**

FAULT: Northwest Cascades System: *Welker Peak and Excelsior nappes:* **Rocks of the Bell**

Pass mélange (Cretaceous to Late Jurassic): Marble—Coarsely crystalline marble. Outcrops near Anderson Creek.

Enumerated_Domain:

Enumerated_Domain_Value: KJrs

Enumerated_Domain_Value_Definition: **ROCKS WEST OF THE STRAIGHT CREEK**

FAULT: Northwest Cascades System: *Welker Peak and Excelsior nappes*: **Slate of Rinker Ridge (Cretaceous to Late Jurassic)**—Slate and semischist similar to the semischist of Mount Josephine, but less thoroughly recrystallized. Metamorphic minerals are chlorite and sericite. Exposed only in lower Skagit River valley.

Enumerated_Domain:

Enumerated_Domain_Value: MzPzg

Enumerated_Domain_Value_Definition: **ROCKS WEST OF THE STRAIGHT CREEK**

FAULT: Northwest Cascades System: *Welker Peak and Excelsior nappes*: **Gabbroic intrusions (Mesozoic and Paleozoic)**—Metagabbro, metadiabase, and minor mafic metatonalite. Generally highly cataclastically deformed and altered to chlorite, epidote, albite, pumpellyite, and carbonate minerals. Many rocks with very fine grained high-relief minerals replacing plagioclase, probably pumpellyite and (or) lawsonite.

Enumerated_Domain:

Enumerated_Domain_Value: MzPzt

Enumerated_Domain_Value_Definition: **ROCKS WEST OF THE STRAIGHT CREEK**

FAULT: Northwest Cascades System: *Welker Peak and Excelsior nappes*: **Tonalitic intrusions (Mesozoic and Paleozoic)**—Metatonalite, commonly strongly cataclastically deformed. Metatonalite in the Cultus Formation of Daly (1912) consists of albitic plagioclase and quartz, commonly in micrographic intergrowths, with less than 10% chlorite, epidote, and opaque ore minerals, which have replaced hornblende and (or) biotite.

Enumerated_Domain:

Enumerated_Domain_Value: MxPzcc

Enumerated_Domain_Value_Definition: **ROCKS WEST OF THE STRAIGHT CREEK**

FAULT: Northwest Cascades System: *Welker Peak and Excelsior nappes*: **Chilliwack Group of Cairnes (1944) and Cultus Formation of Brown and others (1987) undivided (Mesozoic and Paleozoic).**

Enumerated_Domain:

Enumerated_Domain_Value: JTrc

Enumerated_Domain_Value_Definition: **ROCKS WEST OF THE STRAIGHT CREEK**

FAULT: Northwest Cascades System: *Welker Peak and Excelsior nappes*: **Cultus Formation of Brown and others (1987) (Early Jurassic and Late Triassic)**—Tuffaceous siltstone, sandstone, and argillite, mostly thin bedded to finely laminated. Also includes much rhythmite. Medium-bedded sandstone on Loomis Mountain.

Enumerated_Domain:

Enumerated_Domain_Value: JTrcd

Enumerated_Domain_Value_Definition: **ROCKS WEST OF THE STRAIGHT CREEK**

FAULT: Northwest Cascades System: *Welker Peak and Excelsior nappes*: **Cultus Formation of Brown and others (1987) (Early Jurassic and Late Triassic): Dacite and associated tuffaceous sedimentary rocks**—Generally light green vitreous metadacite with microphyric plagioclase.

Enumerated_Domain:

Enumerated_Domain_Value: PDc

Enumerated_Domain_Value_Definition: **ROCKS WEST OF THE STRAIGHT CREEK**

FAULT: Northwest Cascades System: *Welker Peak and Excelsior nappes*: **Chilliwack Group of Cairnes (1944) (Permian, Carboniferous, and Devonian)**—Mostly well bedded gray to brown and black argillite and volcanic subquartzose sandstone with minor pebble conglomerate, marble, and rare chert. Also basalt, andesite, dacite, volcanic breccia, and tuff. In sedimentary rocks, graded beds, scour structures, and load casts locally prominent; also includes some rhythmite. Locally sandstone beds strongly disrupted in argillite matrix. Rocks grade rapidly from little-deformed to phyllitic with a pronounced foliation generally subparallel to bedding. Most rocks partially recrystallized in sub-greenschist facies.

Enumerated_Domain:

Enumerated_Domain_Value: Pcmv

Enumerated_Domain_Value_Definition: **ROCKS WEST OF THE STRAIGHT CREEK**

FAULT: Northwest Cascades System: *Welker Peak and Excelsior nappes*: **Chilliwack Group of Cairnes (1944) (Permian, Carboniferous, and Devonian): Volcanic rocks of Mount Herman (Permian)**—Breccia, pillows, pillow breccia, and associated volcanic sandstone of basalt or basaltic andesite composition. Most volcanic rocks are plagioclase-phyric, some are amygdaloidal. Unit weathers orange-brown; dark- to light-green on fresh surfaces.

Enumerated_Domain:

Enumerated_Domain_Value: Pcms

Enumerated_Domain_Value_Definition: **ROCKS WEST OF THE STRAIGHT CREEK**

FAULT: Northwest Cascades System: *Welker Peak and Excelsior nappes*: **Chilliwack Group of Cairnes (1944) (Permian, Carboniferous, and Devonian): Sedimentary rocks of Mount Herman (Permian)**—Volcanic sandstone, siliceous siltstone, argillite, and limestone. Generally well bedded and with little foliation.

Enumerated_Domain:

Enumerated_Domain_Value: PDcv

Enumerated_Domain_Value_Definition: **ROCKS WEST OF THE STRAIGHT CREEK**

FAULT: Northwest Cascades System: *Welker Peak and Excelsior nappes*: **Chilliwack Group of Cairnes (1944) (Permian, Carboniferous, and Devonian): Volcanic rocks (Permian, Carboniferous, and Devonian)**—Mostly basaltic greenstone, with subordinate andesite and rare dacite or rhyolite. Breccia and tuff predominate. Mafic volcanic rocks commonly with relict plagioclase and clinopyroxene in a chlorite-epidote matrix, commonly with carbonate minerals. Plagioclase is mostly recrystallized as albite. Also includes some gabbro and diabase.

Enumerated_Domain:

Enumerated_Domain_Value: PDcl

Enumerated_Domain_Value_Definition: **ROCKS WEST OF THE STRAIGHT CREEK**

FAULT: Northwest Cascades System: *Welker Peak and Excelsior nappes*: **Chilliwack Group of Cairnes (1944) (Permian, Carboniferous, and Devonian): Limestone and marble (Permian, Carboniferous, and Devonian)**—Mostly coarsely crystalline, gray to black, and petroliferous limestone and marble; occurs in small isolated pods and blocks; locally fossiliferous.

Enumerated_Domain:

Enumerated_Domain_Value: Kg

Enumerated_Domain_Value_Definition: **ROCKS WEST OF THE STRAIGHT CREEK**

FAULT: Northwest Cascades System: *Rocks of the Autochthon*: **Gabbroic intrusions (Early Cretaceous?)**—Metagabbro with relict clinopyroxene. Altered to chlorite, epidote, albite, carbonate minerals, and montmorillonoids after olivine(?). Intrudes the Nooksack Formation at

the toe of the Roosevelt Glacier. Lithologically similar dikes (unmapped) form swarm southeast of intrusion.

Enumerated_Domain:

Enumerated_Domain_Value: KJna

Enumerated_Domain_Value_Definition: **ROCKS WEST OF THE STRAIGHT CREEK**

FAULT: Northwest Cascades System: *Rocks of the Autochthon: Nooksack Formation (Early Cretaceous to Middle Jurassic)*—Described here as sedimentary rocks, although much of the unit is incipiently recrystallized (Brown and others, 1981, 1987): **Argillite and sandstone**—Predominantly massive to laminated black argillite. Locally with thin to medium beds of mostly lithic-volcanic sandstone. Also includes minor limy siltstone and limestone. Some beds heavily bioturbated. Local detrital muscovite. Cleavage weakly developed north of Mount Baker, but pronounced to south. Argillite near top of the Wells Creek Volcanic Member rich in pyrogenic plagioclase and quartz phenocrysts. Belemnite molds characteristic.

Enumerated_Domain:

Enumerated_Domain_Value: KJnt

Enumerated_Domain_Value_Definition: **ROCKS WEST OF THE STRAIGHT CREEK**

FAULT: Northwest Cascades System: *Rocks of the Autochthon: Nooksack Formation (Early Cretaceous to Middle Jurassic)*—Described here as sedimentary rocks, although much of the unit is incipiently recrystallized (Brown and others, 1981, 1987): **Thick-bedded sandstone and argillite**—Volcanic lithic sandstone with minor interbeds of argillite.

Enumerated_Domain:

Enumerated_Domain_Value: KJng

Enumerated_Domain_Value_Definition: **ROCKS WEST OF THE STRAIGHT CREEK**

FAULT: Northwest Cascades System: *Rocks of the Autochthon: Nooksack Formation (Early Cretaceous to Middle Jurassic)*—Described here as sedimentary rocks, although much of the unit is incipiently recrystallized (Brown and others, 1981, 1987): **Grit and thick-bedded sandstone**—Poorly rounded to angular small pebble conglomerate and volcanic-lithic sandstone. Minor interbeds of argillite.

Enumerated_Domain:

Enumerated_Domain_Value: KJnv

Enumerated_Domain_Value_Definition: **ROCKS WEST OF THE STRAIGHT CREEK**

FAULT: Northwest Cascades System: *Rocks of the Autochthon: Nooksack Formation (Early Cretaceous to Middle Jurassic)*—Described here as sedimentary rocks, although much of the unit is incipiently recrystallized (Brown and others, 1981, 1987): **Volcanic-rich conglomerate and sandstone**—Massive to locally well-bedded pebble to boulder conglomerate rich in dacite and tonalite clasts. Boulders as large as 1 m diameter. Also includes some well-bedded volcanic sandstone and tuff. Belemnite fragments common.

Enumerated_Domain:

Enumerated_Domain_Value: Jnw

Enumerated_Domain_Value_Definition: **ROCKS WEST OF THE STRAIGHT CREEK**

FAULT: Northwest Cascades System: *Rocks of the Autochthon: Nooksack Formation (Early Cretaceous to Middle Jurassic)*—Described here as sedimentary rocks, although much of the unit is incipiently recrystallized (Brown and others, 1981, 1987): **Wells Creek Volcanic Member**—Incipiently recrystallized dacite, dacite breccia and tuff, and andesite, with some argillite interbeds. Metamorphic pumpellyite, chlorite, epidote, and albite.

Enumerated_Domain:

Enumerated_Domain_Value: Kjs

Enumerated_Domain_Value_Definition: **ROCKS WEST OF THE STRAIGHT CREEK**
FAULT: Northwest Cascades System: *Shuksan nappe*: **Semischist and phyllite of Mount Josephine (Early Cretaceous?)**—Graphitic sericite-plagioclase-quartz phyllite and semischistose lithic-volcanic subquartzose sandstone. Protolith sediments thin to medium bedded. Locally highly contorted, but generally lacks prominent multiple crenulations characteristic of the Darrington Phyllite.

Enumerated_Domain:

Enumerated_Domain_Value: KJs

Enumerated_Domain_Value_Definition: **ROCKS WEST OF THE STRAIGHT CREEK**
FAULT: Northwest Cascades System: *Shuksan nappe*: **Semischist and phyllite of Mount Josephine (Early Cretaceous?): Ultramafic rocks**—Serpentinite and silica-carbonate rock.

Enumerated_Domain:

Enumerated_Domain_Value: Ked

Enumerated_Domain_Value_Definition: **ROCKS WEST OF THE STRAIGHT CREEK**
FAULT: Northwest Cascades System: *Shuksan nappe*: **Easton Metamorphic Suite (Early Cretaceous): Darrington Phyllite (Early Cretaceous)**—Silvery to black quartzose graphitic phyllite, with minor greenschist, metachert, and muscovite-quartz-albite schist. Commonly with multiple foliations and crenulation lineations; abundant quartz veins. Dominant foliation is commonly second-generation or later. Mineralogy is quartz-albite-white mica-chlorite, ± lawsonite, garnet, and margarite. Thin sections show well-crystallized white mica: fine grain size in hand sample reflects tendency of rock to break along post-peak metamorphic pressure-solution cleavage surfaces along which fine insoluble material has concentrated. Locally interlayered with unit Kes.

Enumerated_Domain:

Enumerated_Domain_Value: Kes

Enumerated_Domain_Value_Definition: **ROCKS WEST OF THE STRAIGHT CREEK**
FAULT: Northwest Cascades System: *Shuksan nappe*: **Easton Metamorphic Suite (Early Cretaceous): Shuksan Greenschist (Early Cretaceous)**—Greenschist and lesser blueschist. Locally includes iron- and manganese-rich quartzite (metachert), greenstone, and graphitic phyllite. Rare relict clinopyroxene in some greenschist. Schist varieties include dark-green, fine-grained, muscovite-chlorite-epidote-actinolite schist with common knots and masses of epidote, quartz-albite-chlorite veins, and relict pillow or breccia structure, and well-layered light-green chlorite-rich schist that appears to be metamorphosed tuff. Well-layered, Fe³⁺-poor metatuffs with conspicuous patches of albite relict after plagioclase phenocrysts are locally abundant. Blueschist bears Na-amphibole (crossite-soda actinolite-riebeckite) ± hematite (Brown, 1986). Locally interlayered with unit Ked.

Enumerated_Domain:

Enumerated_Domain_Value: Keu

Enumerated_Domain_Value_Definition: **ROCKS WEST OF THE STRAIGHT CREEK**
FAULT: Northwest Cascades System: *Shuksan nappe*: **Easton Metamorphic Suite (Early Cretaceous): Ultramafic rock (Early Cretaceous)**—Serpentinite, silica-carbonate rock, and forsterite-enstatite-tremolite-chlorite rock on Mount Sefrit (Tepper, 1985) and west of Grandy Creek.

Enumerated_Domain:

Enumerated_Domain_Value: TKsgp

Enumerated_Domain_Value_Definition: **ROCKS BETWEEN THE STRAIGHT CREEK**
FAULT AND ROSS LAKE FAULT ZONE: Terrane overlap units and stitching plutons: **Skagit Gneiss Complex (Middle Eocene to Late Cretaceous):** —Heterogeneous complex of

supracrustal schist, amphibolite, and rare marble and ultramafic rocks intruded in a lit-par-lit fashion by mostly hornblende-biotite and biotite-tonalite orthogneiss. Orthogneiss bodies range from a few centimeters thick in the banded gneisses to several kilometers thick in the mapped orthogneiss. Abundant deformed dikes and sills of light-colored pegmatitic tonalite and lineated granite: **Granite pegmatite** —Granite pegmatite (associated with unit TKeb) in mostly layer-parallel sills and dikes; country rock sparse to absent between multiple intrusions. Quartz in pegmatite generally highly strained, mylonitic to blastomylonitic.

Enumerated_Domain:

Enumerated_Domain_Value: TKsbg

Enumerated_Domain_Value_Definition: **ROCKS BETWEEN THE STRAIGHT CREEK**

FAULT AND ROSS LAKE FAULT ZONE: Terrane overlap units and stitching plutons: **Skagit Gneiss Complex (Middle Eocene to Late Cretaceous): Banded gneiss, mostly biotite gneiss**—Biotite schist, biotite-garnet schist, biotite paragneiss (some garnet, cummingtonite), hornblende-biotite paragneiss, gneissic hornblende-biotite tonalite, and tonalite gneiss. Strongly layered rocks with minor amphibolite gneiss, and hornblende schist. Commonly strongly migmatitic with concordant and crosscutting light-colored dikes of foliated, lineated, fine-grained to pegmatitic leucotonalite and lineated granite and granodiorite.

Enumerated_Domain:

Enumerated_Domain_Value: TKsbg

Enumerated_Domain_Value_Definition: **ROCKS BETWEEN THE STRAIGHT CREEK**

FAULT AND ROSS LAKE FAULT ZONE: Terrane overlap units and stitching plutons: **Skagit Gneiss Complex (Middle Eocene to Late Cretaceous): Banded gneiss, mostly amphibole gneiss and amphibolite**—Hornblende and biotite-hornblende paragneiss, gneissic amphibolite, hornblende schist, biotite schist and paragneiss, and tonalite gneiss. Rare marble. In some mapped areas, hornblende rocks are conspicuous but may not be dominant. Commonly strongly migmatitic with concordant and crosscutting light-colored dikes of foliated, lineated, fine-grained to pegmatitic leucotonalite and lineated granite and granodiorite.

Enumerated_Domain:

Enumerated_Domain_Value: TKso

Enumerated_Domain_Value_Definition: **ROCKS BETWEEN THE STRAIGHT CREEK**

FAULT AND ROSS LAKE FAULT ZONE: Terrane overlap units and stitching plutons: **Skagit Gneiss Complex (Middle Eocene to Late Cretaceous): Orthogneiss**—Gneissic hornblende-biotite tonalite. Relatively uniform crystalloblastic granitoid gneiss with rare relict euhedral oscillatory-zoned plagioclase crystals. Hornblende or biotite may predominate. Garnet locally. Quartz and biotite commonly moderately to highly strained. Locally migmatitic with concordant and crosscutting light-colored dikes of foliated, lineated, fine-grained to pegmatitic leucotonalite.

Enumerated_Domain:

Enumerated_Domain_Value: TKsom

Enumerated_Domain_Value_Definition: **ROCKS BETWEEN THE STRAIGHT CREEK**

FAULT AND ROSS LAKE FAULT ZONE: Terrane overlap units and stitching plutons: **Skagit Gneiss Complex (Middle Eocene to Late Cretaceous): Orthogneiss: Mafic orthogneiss**—Garnet-hornblende diorite orthogneiss above Diablo Lake. Also includes amphibolite and hornblende.

Enumerated_Domain:

Enumerated_Domain_Value: TKsoa

Enumerated_Domain_Value_Definition: **ROCKS BETWEEN THE STRAIGHT CREEK**

FAULT AND ROSS LAKE FAULT ZONE: Terrane overlap units and stitching plutons: **Skagit**

Gneiss Complex (Middle Eocene to Late Cretaceous): Orthogneiss: Mafic migmatite—Heterogeneous hornblende tonalite migmatite and orthogneiss rich in slivers of hornblendite and amphibolite east of Snowfield Peak. Cross-cutting dikes of light-colored, fine-grained to pegmatitic, foliated and lineated tonalite and lineated granite and granodiorite.

Enumerated_Domain:

Enumerated_Domain_Value: TKsn

Enumerated_Domain_Value_Definition: **ROCKS BETWEEN THE STRAIGHT CREEK**

FAULT AND ROSS LAKE FAULT ZONE: Terrane overlap units and stitching plutons: **Skagit**

Gneiss Complex (Middle Eocene to Late Cretaceous): Orthogneiss of The Needle—Hornblende tonalite to granodiorite orthogneiss with distinctive texture of approximately 1-mm equant crystals forming centimeter size patches rich in quartz, plagioclase, hornblende, or biotite. Dominant foliation locally axial-planar to small folds of an earlier foliation.

Enumerated_Domain:

Enumerated_Domain_Value: Tksu

Enumerated_Domain_Value_Definition: **ROCKS BETWEEN THE STRAIGHT CREEK**

FAULT AND ROSS LAKE FAULT ZONE: Terrane overlap units and stitching plutons: **Skagit**

Gneiss Complex (Middle Eocene to Late Cretaceous): Ultramafic rocks—Harzburgite tectonite, talc-tremolite schist, anthophyllite-talc-tremolite schist, chlorite-rich blackwall, and retrograde serpentinite.

Enumerated_Domain:

Enumerated_Domain_Value: TKsm

Enumerated_Domain_Value_Definition: **ROCKS BETWEEN THE STRAIGHT CREEK**

FAULT AND ROSS LAKE FAULT ZONE: Terrane overlap units and stitching plutons: **Skagit**

Gneiss Complex (Middle Eocene to Late Cretaceous): Marble and calcsilicate rocks.

Enumerated_Domain:

Enumerated_Domain_Value: TKho

Enumerated_Domain_Value_Definition: **ROCKS BETWEEN THE STRAIGHT CREEK**

FAULT AND ROSS LAKE FAULT ZONE: Terrane overlap units and stitching plutons: *Plutons of the tonalitic group: Orthogneiss of Haystack Creek (Middle Eocene to Late Cretaceous)*—Hornblende biotite gneiss with blotchy patches of aggregate mafic minerals.

Enumerated_Domain:

Enumerated_Domain_Value: TKmo

Enumerated_Domain_Value_Definition: **ROCKS BETWEEN THE STRAIGHT CREEK**

FAULT AND ROSS LAKE FAULT ZONE: Terrane overlap units and stitching plutons: *Plutons of the tonalitic group: Orthogneiss of Marble Creek (Middle Eocene to Late Cretaceous)*—Biotite tonalite to granodiorite gneiss with minor hornblende, muscovite, and well-formed igneous(?) epidote. Ranges from granitoid gneiss with intergranular quartz and relict euhedral oscillatory zoned plagioclase to highly strained flaser gneiss with anastomosing mylonite with quartz and biotite. Pluton is rich in screens and rafts of supracrustal schists and pods of ultramafic rocks.

Enumerated_Domain:

Enumerated_Domain_Value: TKto

Enumerated_Domain_Value_Definition: **ROCKS BETWEEN THE STRAIGHT CREEK**

FAULT AND ROSS LAKE FAULT ZONE: Terrane overlap units and stitching plutons: *Plutons of the tonalitic group: Orthogneiss of Mount Triumph (Tertiary and Late*

Cretaceous)—Gneissic medium-grained biotite-hornblende tonalite. Epidote locally intergrown with hornblende and biotite. Weak foliation and lineation and common cataclasis. Contact metamorphism by adjacent Chilliwack batholith has annealed some textures of earlier deformation.

Enumerated_Domain:

Enumerated_Domain_Value: TKeb

Enumerated_Domain_Value_Definition: **ROCKS BETWEEN THE STRAIGHT CREEK**

FAULT AND ROSS LAKE FAULT ZONE: Terrane overlap units and stitching plutons: *Plutons of the granodioritic group: Eldorado Orthogneiss (Middle Eocene to Late Cretaceous)*—Biotite-hornblende monzodiorite to biotite granodiorite gneiss, rare tonalite and quartz diorite (Ford and others, 1988, p. 107-108). Medium-grained subhedral to euhedral sodic plagioclase commonly filled with epidote or clinozoisite and set in a crystalloblastic to mylonitic matrix of quartz, K-feldspar, hornblende, biotite, and epidote; accessory sphene, apatite, zircon, and opaque oxides; commonly well-aligned prismatic aggregates of hornblende and biotite, but in many rocks mafic minerals are aligned in a streaky planar fabric. Common mafic enclaves locally define strong flattening and weak strike-parallel elongation. Gradational over several 100 meters into unit TKef.

Enumerated_Domain:

Enumerated_Domain_Value: TKef

Enumerated_Domain_Value_Definition: **ROCKS BETWEEN THE STRAIGHT CREEK**

FAULT AND ROSS LAKE FAULT ZONE: Terrane overlap units and stitching plutons: *Plutons of the granodioritic group: Eldorado Orthogneiss (Middle Eocene to Late Cretaceous): Flaser gneiss border zone*—Fine- to medium-grained biotite-hornblende metatonalite and metagranodiorite flaser gneiss, with augen of quartz and plagioclase or simple sodic plagioclase mosaic and rare filled plagioclase crystals set in mylonitic fabric of finer-grained quartz, plagioclase, and mafic minerals.

Enumerated_Domain:

Enumerated_Domain_Value: TKbl

Enumerated_Domain_Value_Definition: **ROCKS BETWEEN THE STRAIGHT CREEK**

FAULT AND ROSS LAKE FAULT ZONE: Terrane overlap units and stitching plutons: *Plutons of the granodioritic group: Hidden Lake stock (Middle Eocene to Late Cretaceous)*—Biotite metatonalite with relict hypidiomorphic granular texture. Rocks are granodiorite based on CIPW normative minerals and $\delta^{18}\text{O}$ values greater than 10 (Ford and others, 1988, p. 26). Plagioclase mostly filled with well-crystallized metamorphic epidote and muscovite; some grain margins have recrystallized and quartz is sutured. Some K-feldspar is microcline. Rock is massive and sharply intrusive.

Enumerated_Domain:

Enumerated_Domain_Value: TKao

Enumerated_Domain_Value_Definition: **ROCKS BETWEEN THE STRAIGHT CREEK**

FAULT AND ROSS LAKE FAULT ZONE: Terrane overlap units and stitching plutons: *Plutons of the granodioritic group: Orthogneiss of Alma Creek (Middle Eocene to Late Cretaceous)*—Biotite leucogranodiorite and leucotonalite gneiss, with minor muscovite. Hypidiomorphic granular with highly strained quartz; biotite commonly decussate. $\text{Cl} < 10$. Local 2 to 4 -cm diameter orbicules are biotite which tangentially rims quartzofeldspathic cores. Some small irregular bodies northwest of Skagit River are not shown.

Enumerated_Domain:

Enumerated_Domain_Value: TKns

Enumerated_Domain_Value_Definition: **ROCKS BETWEEN THE STRAIGHT CREEK**

FAULT AND ROSS LAKE FAULT ZONE: Chelan Mountains terrane: **Napeequa Schist (Middle Eocene to Late Cretaceous)**—Predominantly fine-grained hornblende-mica schist, mica-quartz schist, hornblende schist, amphibolite, garnet-biotite schist, and minor hornblende-zoisite schist, hornblende garbenschiefer, calc-silicate schist, marble, and ultramafic rocks. In the

Cascade River area and in the Straight Creek Fault zone, phyllitic muscovite-chlorite-quartz schist predominates. Rocks are mostly white, tan, brown to black, locally greenish with conspicuous compositional banding. Fine lamellar foliation, locally blastomylonitic. On outcrop scale the schist is isoclinally folded, commonly crenulated; small crinkle folds of prominent foliation surfaces.

Enumerated_Domain:

Enumerated_Domain_Value: Kns

Enumerated_Domain_Value_Definition: **ROCKS BETWEEN THE STRAIGHT CREEK**

FAULT AND ROSS LAKE FAULT ZONE: Chelan Mountains terrane: **Napeequa Schist (Late Cretaceous)**—Predominantly fine-grained hornblende-mica schist, mica-quartz schist, hornblende schist, amphibolite, garnet-biotite schist, and minor hornblende-zoisite schist, hornblende garbenschiefer, calc-silicate schist, marble, and ultramafic rocks. In the Cascade River area and in the Straight Creek Fault zone, phyllitic muscovite-chlorite-quartz schist predominates. Rocks are mostly white, tan, brown to black, locally greenish with conspicuous compositional banding. Fine lamellar foliation, locally blastomylonitic. On outcrop scale the schist is isoclinally folded, commonly crenulated; small crinkle folds of prominent foliation surfaces.

Enumerated_Domain:

Enumerated_Domain_Value: TKnu

Enumerated_Domain_Value_Definition: **ROCKS BETWEEN THE STRAIGHT CREEK**

FAULT AND ROSS LAKE FAULT ZONE: Chelan Mountains terrane: **Napeequa Schist (Middle Eocene to Late Cretaceous): Ultramafic rocks**—Serpentinite, talc-magnesite schist, talc schist, tremolite-talc schist, and olivine-talc rocks.

Enumerated_Domain:

Enumerated_Domain_Value: Knu

Enumerated_Domain_Value_Definition: **ROCKS BETWEEN THE STRAIGHT CREEK**

FAULT AND ROSS LAKE FAULT ZONE: Chelan Mountains terrane: **Napeequa Schist (Late Cretaceous): Ultramafic rocks**—Serpentinite, talc-magnesite schist, talc schist, tremolite-talc schist, and olivine-talc rocks.

Enumerated_Domain:

Enumerated_Domain_Value: TKcs

Enumerated_Domain_Value_Definition: **ROCKS BETWEEN THE STRAIGHT CREEK**

FAULT AND ROSS LAKE FAULT ZONE: Chelan Mountains terrane: **Cascade River Schist (Middle Eocene to Late Cretaceous)**—Mostly fine grained, highly fissile, green, brown, and black micaceous schist ranging from phyllitic sericite-quartz schist to granoblastic biotite- and muscovite-biotite-quartz-albite schist, hornblende-biotite-andesine schist, garbenschiefer, fine-grained amphibolite, and fine-grained paragneiss. Many rocks have garnet, less commonly staurolite and kyanite. Rare chloritoid. Calcareous mica schist locally. Hornblende is commonly blue green. Relict clastic textures common in metasandstone; unit also includes small-pebble metaconglomerate.

Enumerated_Domain:

Enumerated_Domain_Value: Kcs

Enumerated_Domain_Value_Definition: **ROCKS BETWEEN THE STRAIGHT CREEK**

FAULT AND ROSS LAKE FAULT ZONE: Chelan Mountains terrane: **Cascade River Schist (Late Cretaceous)**—Mostly fine grained, highly fissile, green, brown, and black micaceous schist ranging from phyllitic sericite-quartz schist to granoblastic biotite- and muscovite-biotite-quartz-albite schist, hornblende-biotite-andesine schist, garbenschiefer, fine-grained amphibolite, and fine-grained paragneiss. Many rocks have garnet, less commonly staurolite and kyanite. Rare chloritoid. Calcareous mica schist locally. Hornblende is commonly blue green. Relict clastic textures common in metasandstone; unit also includes small-pebble metaconglomerate.

Enumerated_Domain:

Enumerated_Domain_Value: TKcc

Enumerated_Domain_Value_Definition: **ROCKS BETWEEN THE STRAIGHT CREEK FAULT AND ROSS LAKE FAULT ZONE:** Chelan Mountains terrane: **Cascade River Schist (Middle Eocene to Late Cretaceous): Metaconglomerate**—Gray to dark-green rocks ranging from boulder conglomerate with weak foliation to highly schistose rocks in which clasts are so highly attenuated that they are only visible on surfaces cut perpendicular to fabric lineation. Identifiable clast protoliths are quartzite, volcanic rocks, and granitoid rocks, including rocks derived from the protolith of the Marblemount pluton.

Enumerated_Domain:

Enumerated_Domain_Value: Kcc

Enumerated_Domain_Value_Definition: **ROCKS BETWEEN THE STRAIGHT CREEK FAULT AND ROSS LAKE FAULT ZONE:** Chelan Mountains terrane: **Cascade River Schist (Late Cretaceous): Metaconglomerate**—Gray to dark-green rocks ranging from boulder conglomerate with weak foliation to highly schistose rocks in which clasts are so highly attenuated that they are only visible on surfaces cut perpendicular to fabric lineation. Identifiable clast protoliths are quartzite, volcanic rocks, and granitoid rocks, including rocks derived from the protolith of the Marblemount pluton.

Enumerated_Domain:

Enumerated_Domain_Value: Kcmv

Enumerated_Domain_Value_Definition: **ROCKS BETWEEN THE STRAIGHT CREEK FAULT AND ROSS LAKE FAULT ZONE:** Chelan Mountains terrane: **Cascade River Schist (Middle Eocene to Late Cretaceous): Metavolcanic rocks**—Fine-grained leucogreenschist, commonly with relict highly flattened phenocrysts of plagioclase or mafic minerals.

Enumerated_Domain:

Enumerated_Domain_Value: Kmd

Enumerated_Domain_Value_Definition: **ROCKS BETWEEN THE STRAIGHT CREEK FAULT AND ROSS LAKE FAULT ZONE:** Chelan Mountains terrane: **Marblemount pluton (Middle Eocene to Late Cretaceous)**—Meta-quartz diorite and metatonalite and tonalitic gneiss; light-colored metatonalite dikes. Locally includes unmetamorphosed hornblende tonalite north of Skagit River. Rocks have CI=16-54 (Ford and others, 1988), are medium-grained, pale green, have numerous anastomosing zones rich in chlorite, epidote, and actinolitic hornblende, and vary from massive with relict hypidiomorphic granular texture to highly foliate and mylonitic. Plagioclase commonly transformed to unzoned, complexly twinned albite filled with epidote and (or) white mica.

Enumerated_Domain:

Enumerated_Domain_Value: Kmf

Enumerated_Domain_Value_Definition: **ROCKS BETWEEN THE STRAIGHT CREEK FAULT AND ROSS LAKE FAULT ZONE:** Chelan Mountains terrane: **Marblemount pluton (Middle Eocene to Late Cretaceous): Flaser gneiss border zone**—Dark-colored epidote-chlorite-muscovite-quartz-plagioclase flaser gneiss, locally with chlorite schist. Subhedral to subidioblastic sodic plagioclase in a foliate matrix, locally with biotite.

Enumerated_Domain:

Enumerated_Domain_Value: TKhr

Enumerated_Domain_Value_Definition: **ROCKS IN THE ROSS LAKE FAULT ZONE: Ruby Creek Heterogeneous Plutonic Belt of Misch (1966) (Middle Eocene to Late Cretaceous)**—Heterogeneous gabbro to granodiorite in small masses and dikes. Grain size and

composition varies considerably on an outcrop scale. Some rocks cataclastically foliated. Plutons of the belt intrude the phyllite and schist of Little Jack Mountain and are commonly rich in inclusions of the country rock. Also includes much medium-colored fine- to medium-grained, locally cataclastic, hornblende-biotite tonalite and abundant light-colored hornblende-biotite tonalite to granodiorite.

Enumerated_Domain:

Enumerated_Domain_Value: TKhr

Enumerated_Domain_Value_Definition: **ROCKS IN THE ROSS LAKE FAULT ZONE:**

Ruby Creek Heterogeneous Plutonic Belt of Misch (1966) (Middle Eocene to Late Cretaceous): Prominent inclusions of mafic metagabbro and ultramafic rocks—Similar to TKhr, with prominent inclusions of mafic and ultramafic components of the Skymo Complex of Wallace (1976).

Enumerated_Domain:

Enumerated_Domain_Value: TKhrd

Enumerated_Domain_Value_Definition: **ROCKS IN THE ROSS LAKE FAULT ZONE:**

Ruby Creek Heterogeneous Plutonic Belt of Misch (1966) (Middle Eocene to Late Cretaceous): Diorite—Pyroxene metadiorite, highly altered, locally cataclastic.

Enumerated_Domain:

Enumerated_Domain_Value: TKs

Enumerated_Domain_Value_Definition: **ROCKS IN THE ROSS LAKE FAULT ZONE:**

Skymo Complex of Wallace (1976) (Middle Eocene to Late Cretaceous)—Metamorphosed troctolite, gabbro, and anorthosite intruded by irregular patches and veins of lighter colored medium- to coarse-grained gabbro and rare tonalitic pegmatite. Gabbro locally grades to pyroxenite. Troctolite and gabbro weather orange-brown. Oikocrystic orthopyroxene in gabbro. Troctolite, gabbro, and anorthosite weakly layered; cumulate origin is probable. Unit is highly faulted and cut by mylonitic zones.

Enumerated_Domain:

Enumerated_Domain_Value: TKsf

Enumerated_Domain_Value_Definition: **ROCKS IN THE ROSS LAKE FAULT ZONE:**

Skymo Complex of Wallace (1976) (Middle Eocene to Late Cretaceous): Fine-grained granulites—Interlayered calc-silicate gneiss, garnet plagioclase schist, hypersthene-plagioclase gneiss, and orthogneiss (Hyatt and others, 1996).

Enumerated_Domain:

Enumerated_Domain_Value: TKlp

Enumerated_Domain_Value_Definition: **ROCKS BETWEEN THE STRAIGHT CREEK FAULT AND ROSS LAKE FAULT ZONE: Little Jack terrane: Phyllite and schist of Little Jack Mountain (Middle Eocene to Late Cretaceous)**—Mostly quartz-mica phyllite and biotite schist with local staurolite, garnet, andalusite, and sillimanite. Rare ribbon chert, local marble, and ubiquitous pods of metapyroxenite, talc-bearing metaperidotite, and serpentinite. Local amphibolite and hornblende-biotite schist. Biotite commonly porphyroblastic. Intruded by dacite porphyry dikes ranging from undeformed to mylonitic with strong, mostly northwest-trending, stretching lineation.

Enumerated_Domain:

Enumerated_Domain_Value: JTrhgs

Enumerated_Domain_Value_Definition: **ROCKS BETWEEN THE STRAIGHT CREEK FAULT AND ROSS LAKE FAULT ZONE: Hozomeen terrane: Hozomeen Group (Mesozoic and Paleozoic): Greenstone, clastic sedimentary rock, limestone, and chert (Middle**

Jurassic to Late Triassic)—Heterogeneous discontinuously bedded greenstone, graywacke, argillite, marble, and ribbon chert. Local chaotic mixing suggestive of deposition by submarine landslides. Greenstones commonly derived from Ti-rich basalt, locally with well-developed pillows. Partially recrystallized to prehnite-pumpellyite facies. Limestones mostly coarsely recrystallized, gray, and in 0.1- to 10-m pods. Deformational fabric ranges from none to (mostly) incipient slaty cleavage. Description modified from Haugerud (1985). Unit JTrhgs corresponds to the uppermost of four units described by McTaggart and Thompson (1967).

Enumerated_Domain:

Enumerated_Domain_Value: Trhc

Enumerated_Domain_Value_Definition: **ROCKS BETWEEN THE STRAIGHT CREEK**

FAULT AND ROSS LAKE FAULT ZONE: Hozomeen terrane: **Hozomeen Group (Mesozoic and Paleozoic): Chert (Late and Middle Triassic)**—Mostly ribbon chert and slaty argillite with minor greenstone and marble. Probably equivalent to third highest of four units described by McTaggart and Thompson (1967).

Enumerated_Domain:

Enumerated_Domain_Value: Pzhg

Enumerated_Domain_Value_Definition: **ROCKS BETWEEN THE STRAIGHT CREEK**

FAULT AND ROSS LAKE FAULT ZONE: Hozomeen terrane: **Hozomeen Group (Mesozoic and Paleozoic): Greenstone with minor argillite, chert, and limestone (Permian and Pennsylvanian)**—Mostly pillow basalt, pillow breccia, flows, and minor basaltic tuff, with minor argillite, volcanic lithic sandstone, ribbon chert, and limestone. Partially recrystallized to prehnite-pumpellyite facies. Probably corresponds to second highest of four units described by McTaggart and Thompson (1967).

Enumerated_Domain:

Enumerated_Domain_Value: Pzhgl

Enumerated_Domain_Value_Definition: **ROCKS BETWEEN THE STRAIGHT CREEK**

FAULT AND ROSS LAKE FAULT ZONE: Hozomeen terrane: **Hozomeen Group (Mesozoic and Paleozoic): Greenstone with minor argillite, chert, and limestone (Permian and Pennsylvanian): Limestone, chert, and minor greenstone and metatuff**—Mostly gray, well-recrystallized limestone.

Enumerated_Domain:

Enumerated_Domain_Value: wa

Enumerated_Domain_Value_Definition: water.

Enumerated_Domain:

Enumerated_Domain_Value: gl

Enumerated_Domain_Value_Definition: glacier.

Spatial_Data_Organization_Information: **mblines**

Direct_Spatial_Reference_Method: Vector

Point_and_Vector_Object_Information:

SDTS_Terms_Description:

SDTS_Point_and_Vector_Object_Type: Complete chain

Point_and_Vector_Object_Count: 246

SDTS_Terms_Description:

SDTS_Point_and_Vector_Object_Type: Point

Point_and_Vector_Object_Count: 49

Spatial_Reference_Information:

Horizontal_Coordinate_System_Definition:

Planar:

Map_Projection:

- Map_Projection_Name: Transverse Mercator
- Transverse_Mercator:
 - Scale_Factor_at_Central_Meridian: 0.999600
 - Longitude_of_Central_Meridian: -123.000000
 - Latitude_of_Projection-Origin: 0.000000
 - False_Easting: 500000.000000
 - False_Northing: 0.000000
- Planar_Coordinate_Information:
 - Planar_Coordinate-Encoding_Method: coordinate pair
 - Coordinate_Representation:
 - Abcissa_Resolution: 0.000128
 - Ordinate_Resolution: 0.000128
 - Planar_Distance_Units: meters
- Geodetic_Model:
 - Horizontal_Datum_Name: D_Clarke_1866
 - Ellipsoid_Name: Clarke 1866
 - Semi-major_Axis: 6378206.400000
 - Denominator_of_Flattening_Ratio: 294.978698
- Entity_and_Attribute_Information:
 - Detailed_Description:
 - Entity_Type:
 - Entity_Type_Label: mblines.aat
 - Attribute:
 - Attribute_Label: FID
 - Attribute_Definition: Internal feature number.
 - Attribute_Definition_Source: ESRI
 - Attribute_Domain_Values:
 - Unrepresentable_Domain: Sequential unique whole numbers that are automatically generated.
 - Attribute:
 - Attribute_Label: Shape
 - Attribute_Definition: Feature geometry.
 - Attribute_Definition_Source: ESRI
 - Attribute_Domain_Values:
 - Unrepresentable_Domain: Coordinates defining the features.
 - Attribute:
 - Attribute_Label: FNODE#
 - Attribute_Definition: Internal node number for the beginning of an arc (from-node).
 - Attribute_Definition_Source: ESRI
 - Attribute_Domain_Values:
 - Unrepresentable_Domain: Whole numbers that are automatically generated.
 - Attribute:
 - Attribute_Label: TNODE#
 - Attribute_Definition: Internal node number for the end of an arc (to-node).
 - Attribute_Definition_Source: ESRI
 - Attribute_Domain_Values:
 - Unrepresentable_Domain: Whole numbers that are automatically generated.

Attribute:

Attribute_Label: LPOLY#

Attribute_Definition: Internal node number for the left polygon.

Attribute_Definition_Source: ESRI

Attribute_Domain_Values:

Unrepresentable_Domain: Whole numbers that are automatically generated.

Attribute:

Attribute_Label: RPOLY#

Attribute_Definition: Internal node number for the right polygon.

Attribute_Definition_Source: ESRI

Attribute_Domain_Values:

Unrepresentable_Domain: Whole numbers that are automatically generated.

Attribute:

Attribute_Label: LENGTH

Attribute_Definition: Length of feature in internal units.

Attribute_Definition_Source: ESRI

Attribute_Domain_Values:

Unrepresentable_Domain: Positive real numbers that are automatically generated.

Attribute:

Attribute_Label: MBLINES#

Attribute_Definition: Internal feature number.

Attribute_Definition_Source: ESRI

Attribute_Domain_Values:

Unrepresentable_Domain: Sequential unique whole numbers that are automatically generated.

Attribute:

Attribute_Label: MBLINES-ID

Attribute_Definition: User-defined feature number.

Attribute_Definition_Source: ESRI

Attribute:

Attribute_Label: LTYPE

Attribute_Definition: locations of moraine crests and cross-section line

Attribute_Definition_Source: Author

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: moraine

Enumerated_Domain_Value_Definition: crest of glacial moraine

Enumerated_Domain:

Enumerated_Domain_Value: cross-section lines

Enumerated_Domain_Value_Definition: Location of cross sections, plate II, printed map

Spatial_Data_Organization_Information: **mbsmoc**

Direct_Spatial_Reference_Method: Vector

Point_and_Vector_Object_Information:

SDTS_Terms_Description:

SDTS_Point_and_Vector_Object_Type: Entity point

Point_and_Vector_Object_Count: 131

SDTS_Terms_Description:

SDTS_Point_and_Vector_Object_Type: Point

Point_and_Vector_Object_Count: 49

Spatial_Reference_Information:

Horizontal_Coordinate_System_Definition:

Planar:

Map_Projection:

Map_Projection_Name: Transverse Mercator

Transverse_Mercator:

Scale_Factor_at_Central_Meridian: 0.999600

Longitude_of_Central_Meridian: -123.000000

Latitude_of_Projection_Origin: 0.000000

False_Easting: 500000.000000

False_Northing: 0.000000

Planar_Coordinate_Information:

Planar_Coordinate_Encoding_Method: coordinate pair

Coordinate_Representation:

Abcissa_Resolution: 0.000128

Ordinate_Resolution: 0.000128

Planar_Distance_Units: meters

Geodetic_Model:

Horizontal_Datum_Name: D_Clarke_1866

Ellipsoid_Name: Clarke 1866

Semi-major_Axis: 6378206.400000

Denominator_of_Flattening_Ratio: 294.978698

Entity_and_Attribute_Information:

Detailed_Description:

Entity_Type:

Entity_Type_Label: mbsmoc2.pat

Attribute:

Attribute_Label: FID

Attribute_Definition: Internal feature number.

Attribute_Definition_Source: ESRI

Attribute_Domain_Values:

Unrepresentable_Domain: Sequential unique whole numbers that are automatically generated.

Attribute:

Attribute_Label: Shape

Attribute_Definition: Feature geometry.

Attribute_Definition_Source: ESRI

Attribute_Domain_Values:

Unrepresentable_Domain: Coordinates defining the features.

Attribute:

Attribute_Label: AREA

Attribute_Definition: Area of feature in internal units squared.

Attribute_Definition_Source: ESRI

Attribute_Domain_Values:

Unrepresentable_Domain: Area is always zero for point coverages. Values are automatically generated.

Attribute:

Attribute_Label: PERIMETER
 Attribute_Definition: Perimeter of feature in internal units.
 Attribute_Definition_Source: ESRI
 Attribute_Domain_Values:
 Unrepresentable_Domain: Perimeter is always zero for point coverages. Values are automatically generated.

Attribute:
 Attribute_Label: MBSMOC#
 Attribute_Definition: Internal feature number.
 Attribute_Definition_Source: ESRI
 Attribute_Domain_Values:
 Unrepresentable_Domain: Sequential unique whole numbers that are automatically generated.

Attribute:
 Attribute_Label: MBSMOC-ID
 Attribute_Definition: User-defined feature number.
 Attribute_Definition_Source: ESRI

Attribute
 Attribute_Label: PTTYPE
 Attribute_Definition: Location of small outcrop of limestone (marble), or ultramafic rock too small to show at map scale.
 Attribute_Definition_Source: Author
 Attribute_Domain_Values:
 Enumerated_Domain:
 Enumerated_Domain_Value: um
 Enumerated_Domain_Value_Definition: ultramafic rock
 Enumerated_Domain:
 Enumerated_Domain_Value: ls
 Enumerated_Domain_Value_Definition: limestone or marble

Spatial_Data_Organization_Information: **mbisofoss**
 Direct_Spatial_Reference_Method: Vector
 Point_and_Vector_Object_Information:
 SDTS_Terms_Description:
 SDTS_Point_and_Vector_Object_Type: Entity point
 Point_and_Vector_Object_Count: 180
 SDTS_Terms_Description:
 SDTS_Point_and_Vector_Object_Type: Point
 Point_and_Vector_Object_Count: 49
 SDTS_Terms_Description:
 SDTS_Point_and_Vector_Object_Type: Label point
 Point_and_Vector_Object_Count: 0

Spatial_Reference_Information:
 Horizontal_Coordinate_System_Definition:
 Planar:
 Map_Projection:
 Map_Projection_Name: Transverse Mercator
 Transverse_Mercator:
 Scale_Factor_at_Central_Meridian: 0.999600

Longitude_of_Central_Meridian: -123.000000
 Latitude_of_Projection_Origin: 0.000000
 False_Easting: 500000.000000
 False_Northing: 0.000000
 Planar_Coordinate_Information:
 Planar_Coordinate_Encoding_Method: coordinate pair
 Coordinate_Representation:
 Abscissa_Resolution: 0.000128
 Ordinate_Resolution: 0.000128
 Planar_Distance_Units: meters
 Geodetic_Model:
 Horizontal_Datum_Name: D_Clarke_1866
 Ellipsoid_Name: Clarke 1866
 Semi-major_Axis: 6378206.400000
 Denominator_of_Flattening_Ratio: 294.978698
 Entity_and_Attribute_Information:
 Detailed_Description:
 Entity_Type:
 Entity_Type_Label: mbisofoss.pat
 Attribute:
 Attribute_Label: FID
 Attribute_Definition: Internal feature number.
 Attribute_Definition_Source: ESRI
 Attribute_Domain_Values:
 Unrepresentable_Domain: Sequential unique whole numbers that are automatically generated.
 Attribute:
 Attribute_Label: Shape
 Attribute_Definition: Feature geometry.
 Attribute_Definition_Source: ESRI
 Attribute_Domain_Values:
 Unrepresentable_Domain: Coordinates defining the features.
 Attribute:
 Attribute_Label: AREA
 Attribute_Definition: Area of feature in internal units squared.
 Attribute_Definition_Source: ESRI
 Attribute_Domain_Values:
 Unrepresentable_Domain: Area is always zero for point coverages. Values are automatically generated.
 Attribute:
 Attribute_Label: PERIMETER
 Attribute_Definition: Perimeter of feature in internal units.
 Attribute_Definition_Source: ESRI
 Attribute_Domain_Values:
 Unrepresentable_Domain: Perimeter is always zero for point coverages. Values are automatically generated.
 Attribute:
 Attribute_Label: MBISOFOSS#

Attribute_Definition: Internal feature number.
 Attribute_Definition_Source: ESRI
 Attribute_Domain_Values:
 Unrepresentable_Domain: Sequential unique whole numbers that are automatically generated.

Attribute:
 Attribute_Label: MBISOFOSS-ID
 Attribute_Definition: User-defined feature number.
 Attribute_Definition_Source: ESRI

Attribute
 Attribute_Label: PTTYPE
 Attribute_Definition: Location of sample dated by radiometric or fission track methodes, and locations of reported fossils..

Attribute_Definition_Source: Author
 Attribute_Domain_Values:
 Enumerated_Domain:
 Enumerated_Domain_Value: isoage
 Enumerated_Domain_Value_Definition: radiometric or fission-track age. See Table 3 in published text keyed to sample number (<http://pubs.usgs.gov/imap/i2660/>)

Enumerated_Domain:
 Enumerated_Domain_Value: foss loc
 Enumerated_Domain_Value_Definition: Fossil locality with identified fossil. See Table 2 in published text keyed to sample number (<http://pubs.usgs.gov/imap/i2660/>)

Attribute:
 Attribute_Label: SAMPNO
 Attribute_Definition: Field number of rock sample analysed for age determination or containing fossils

Attribute_Definition_Source: Author

Attribute:
 Attribute_Label: DESCRIPTION
 Attribute_Definition: additional information about sample, includes, comments on lithology, age, fossils, minerals analysed for radiometric age etc.

Attribute:
 Attribute_Label: AGE
 Attribute_Definition: age(s) of samples dated by radimetric or fission track methodes

Attribute:
 Attribute_Label: REFERENCE
 Attribute_Definition: bibliographic reference for age of sample; see References Cited in map text (<http://pubs.usgs.gov/imap/i2660/>)

Attribute:
 Attribute_Label: MAPNO
 Attribute_Definition: number on printed map; keyed to Tables 2 or 3 respectively (see <http://pubs.usgs.gov/imap/i2660/>)

Attribute:
 Attribute_Label: UNIT
 Attribute_Definition: Source unit of sample.
 Attribute_Definition_Source: Author
 Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: AlmaCr pluton

Enumerated_Domain_Value_Definition: **Orthogneiss of Alma Creek (Middle Eocene to Late Cretaceous)**—Biotite leucogranodiorite and leucotonalite gneiss, with minor muscovite. Hypidiomorphic granular with highly strained quartz; biotite commonly decussate. $CI < 10$. Local 2 to 4 -cm diameter orbicules are biotite which tangentially rims quartzofeldspathic cores.

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: B.granodi.LittleBeav

Enumerated_Domain_Value_Definition: **Biotite granodiorite of Little Beaver Creek (Oligocene)**—Mostly hornblende-biotite granodiorite and minor granite, locally quartz and plagioclase phyrlic; $CI = 3-10$

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: BakerLk.blueschist

Enumerated_Domain_Value_Definition: **Rocks of the Bell Pass mélange (Cretaceous to Late Jurassic): Blueschist of Baker Lake (Cretaceous to Jurassic metamorphic age)**—Metabasaltic rocks, meta-ribbon chert, and marble, characterized by distinctive (for the Northwest Cascades System) high-pressure/low-temperature crossite, lawsonite, some aragonite metamorphism. Metabasaltic rocks range from very fine grained schistose metatuff to incipiently recrystallized basalt

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: Bell Pass melange

Enumerated_Domain_Value_Definition: **Rocks of the Bell Pass mélange (Cretaceous to Late Jurassic): Bell Pass mélange, undivided**—Disrupted argillite, slate, phyllite, sandstone, semischist, ribbon chert, and basalt of the Elbow Lake Formation of Brown and others (1987), with tectonic blocks of meta-igneous rocks, gneiss, schist, ultramafic rocks, and marble. Sandstone commonly lithic subquartzose, either volcanic rich and(or) chert rich; argillite is mostly scaly, and grades into slate and phyllite. Greenstones are recrystallized basalt, mafic tuff, diabase, and gabbro and commonly make the most prominent outcrops. Metamorphic minerals in greenstones and metasedimentary rocks are chlorite, epidote, albite, pumpellyite, rare actinolite, carbonate minerals, and indistinct masses of pumpellyite and(or) lawsonite

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: Biot. alaskite of Mt

Enumerated_Domain_Value_Definition: **Biotite alaskite of Mount Blum (Oligocene)**—Medium-grained biotite alaskite (granite) with prominent perthite prisms, rare hornblende, locally quartz phyrlic. $CI = 1-4$

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: CascadeRiver Schist

Enumerated_Domain_Value_Definition: **Cascade River Schist (Middle Eocene to Late Cretaceous)**—Mostly fine grained, highly fissile, green, brown, and black micaceous schist ranging from phyllitic sericite-quartz schist to granoblastic biotite- and muscovite-biotite-quartz-albite schist, hornblende-biotite-andesine schist, garbenschiefer, fine-grained amphibolite, and fine-grained paragneiss. Many rocks have garnet, less commonly staurolite and kyanite. Rare

chloritoid. Calcareous mica schist locally. Hornblende is commonly blue green. Relict clastic textures common in metasandstone; unit also includes small-pebble metaconglomerate;
Metavolcanic rocks—Fine-grained leucogenschist, commonly with relict highly flattened phenocrysts of plagioclase or mafic minerals.

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: Chilliwack Group

Enumerated_Domain_Value_Definition: **Chilliwack Group of Cairnes (1944)**

(Permian, Carboniferous, and Devonian)—Mostly well bedded gray to brown and black argillite and volcanic subquartzose sandstone with minor pebble conglomerate, marble, and rare chert. Also basalt, andesite, dacite, volcanic breccia, and tuff. In sedimentary rocks, graded beds, scour structures, and load casts locally prominent; also includes some rhythmite. Locally sandstone beds strongly disrupted in argillite matrix. Rocks grade rapidly from little-deformed to phyllitic with a pronounced foliation generally subparallel to bedding. Most rocks partially recrystallized in sub-genschist facies; **Limestone and marble (Permian, Carboniferous, and Devonian)**—Mostly coarsely crystalline, gray to black, and petroliferous limestone and marble; occurs in small isolated pods and blocks; locally fossiliferous.

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: ChilliwackVal phase

Enumerated_Domain_Value_Definition: INTRUSIVE ROCKS OF THE SNOQUALMIE FAMILY:

Rocks of the Chilliwack composite batholith (Miocene and Oligocene) Chilliwack valley phase (Oligocene)—Biotite-hornblende tonalite, granodiorite, and minor quartz diorite, commonly with subhedral plagioclase prisms in quartz mesostasis. Minor clinopyroxene; locally. $CI=7-30$, but mostly $CI=15-20$. As mapped, probably includes several plutons.

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: Conglom.ofBaldMtn

Enumerated_Domain_Value_Definition: **Conglomerate of Bald Mountain (Age uncertain)**—Coarse polymictic conglomerate, chert-pebble conglomerate, grey lithic sandstone, and phyllitic black to silvery argillite. Polymictic conglomerate includes clasts of chert, argillite, green metatonalite, dacite, buff-weathering calcite-cemented quartzose sandstone, and rare bedded lithic sandstone. Clast-supported, pebbles and boulders well rounded. Clasts in conglomerates locally flattened and boudinaged. Rare siltstone and shale interbeds. East of Goat Mountain unit contains abundant fossil plant material.

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: Cultus & Chilliwack

Enumerated_Domain_Value_Definition: **Chilliwack Group of Cairnes (1944) and Cultus Formation of Brown and others (1987) undivided (Mesozoic and Paleozoic).**

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: Cultus Formation

Enumerated_Domain_Value_Definition: **Cultus Formation of Brown and others (1987) (Early Jurassic and Late Triassic)**—Tuffaceous siltstone, sandstone, and argillite, mostly thin bedded to finely laminated. Also includes much rhythmite. Medium-bedded sandstone on Loomis Mountain.

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: dike

Enumerated_Domain_Value_Definition: Dike cutting older rocks.

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: Easton Meta.Suite

Enumerated_Domain_Value_Definition: **Easton Metamorphic Suite (Early Cretaceous): Shuksan Greenschist (Early Cretaceous)**—Greenschist and lesser blueschist. Locally includes iron- and manganese-rich quartzite (metachert), greenstone, and graphitic phyllite. Rare relict clinopyroxene in some greenschist. Schist varieties include dark-green, fine-grained, muscovite-chlorite-epidote-actinolite schist with common knots and masses of epidote, quartz-albite-chlorite veins, and relict pillow or breccia structure, and well-layered light-green chlorite-rich schist that appears to be metamorphosed tuff. Well-layered, Fe³⁺-poor metatuffs with conspicuous patches of albite relict after plagioclase phenocrysts are locally abundant. Blueschist bears Na-amphibole (crossite-soda actinolite-riebeckite) ± hematite (Brown, 1986). Locally interlayered with unit Ked.

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: Elbow Lake Fm.

Enumerated_Domain_Value_Definition: **Rocks of the Bell Pass mélange (Cretaceous to Late Jurassic): Bell Pass mélange, undivided**—Disrupted argillite, slate, phyllite, sandstone, semischist, ribbon chert, and basalt of the Elbow Lake Formation of Brown and others (1987), with tectonic blocks of meta-igneous rocks, gneiss, schist, ultramafic rocks, and marble. Sandstone commonly lithic subquartzose, either volcanic rich and(or) chert rich; argillite is mostly scaly, and grades into slate and phyllite. Greenstones are recrystallized basalt, mafic tuff, diabase, and gabbro and commonly make the most prominent outcrops. Metamorphic minerals in greenstones and metasedimentary rocks are chlorite, epidote, albite, pumpellyite, rare actinolite, carbonate minerals, and indistinct masses of pumpellyite and(or) lawsonite.

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: Eldorado Orthogneiss

Enumerated_Domain_Value_Definition: **Eldorado Orthogneiss (Middle Eocene to Late Cretaceous)**—Biotite-hornblende monzodiorite to biotite granodiorite gneiss, rare tonalite and quartz diorite (Ford and others, 1988, p. 107-108). Medium-grained subhedral to euhedral sodic plagioclase commonly filled with epidote or clinozoisite and set in a crystalloblastic to mylonitic matrix of quartz, K-feldspar, hornblende, biotite, and epidote; accessory sphene, apatite, zircon, and opaque oxides; commonly well-aligned prismatic aggregates of hornblende and biotite, but in many rocks mafic minerals are aligned in a streaky planar fabric. Common mafic enclaves locally define strong flattening and weak strike-parallel elongation. Gradational over several 100 meters into unit TKef.

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: Gabbro of CopperLk.

Enumerated_Domain_Value_Definition: **Gabbro of Copper Lake (Oligocene)**—Oikocrystic hornblende gabbro surrounded by equigranular hornblende diorite. Some pyroxene in the diorite which is also zoned to quartz and biotite-bearing varieties. Cl=25-40. Cumulous textures throughout. Description adopted from Tepper (1991, p. 20-27).

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: Grano.Mt.Despair

Enumerated_Domain_Value_Definition: **Granodiorite of Mount Despair**

(Oligocene)—Biotite-hornblende granodiorite with minor tonalite, quartz diorite, and quartz monzodiorite. Conspicuous quartz eyes which are glomerocrysts of rounded quartz grains with K-feldspar in the curved triangular interstices. Cl=7-20, but mostly Cl=10-12; hornblende usually predominates

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: Hannegan Vols.

Enumerated_Domain_Value_Definition: **Hannegan Volcanics (Pliocene): Volcanic breccia**—Mostly clinopyroxene-hornblende andesite clasts along with many clasts of older rocks in andesite tuff matrix. Many andesite dikes, sills and (or) flows; **Tuff**—White to light-brown dacite tuff and welded tuff, some rhyolite tuff, and rare andesite tuff and flow rocks, commonly highly altered. Bedding obscure.

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: HaystackCr pluton

Enumerated_Domain_Value_Definition: **Orthogneiss of Haystack Creek (Middle Eocene to Late Cretaceous)**—Hornblende biotite gneiss with blotchy patches of aggregate mafic minerals.

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: HiddenLk stock

Enumerated_Domain_Value_Definition: **Hidden Lake stock (Middle Eocene to Late Cretaceous)**—Biotite metatonalite with relict hypidiomorphic granular texture. Rocks are granodiorite based on CIPW normative minerals and $\delta^{18}\text{O}$ values greater than 10 (Ford and others, 1988, p. 26). Plagioclase mostly filled with well-crystallized metamorphic epidote and muscovite; some grain margins have recrystallized and quartz is sutured. Some K-feldspar is microcline. Rock is massive and sharply intrusive.

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: Hozomeen Group

Enumerated_Domain_Value_Definition: **Hozomeen Group (Mesozoic and Paleozoic): Chert (Late and Middle Triassic)**—Mostly ribbon chert and slaty argillite with minor greenstone and marble. Probably equivalent to third highest of four units described by McTaggart and Thompson (1967); **Limestone, chert, and minor greenstone and metatuff**—Mostly gray, well-recrystallized limestone.

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: Indian Mtn.phase

Enumerated_Domain_Value_Definition: **INTRUSIVE ROCKS OF THE SNOQUALMIE FAMILY:**

Rocks of the Chilliwack composite batholith (Miocene and Oligocene): Indian Mountain phase (Oligocene)—Biotite-hornblende granodiorite and granite, with minor quartz monzonite and quartz monzodiorite. Cl=3-19, most Cl=12-19. Texturally heterogeneous, some quartz or K-feldspar phenocrystic but these minerals are generally mesostasic; locally granophyric. Rock is commonly pinkish and with chloritized hornblende and biotite. As mapped, probably includes several plutons.

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: Kulshan

Enumerated_Domain_Value_Definition: **Rocks of Kulshan caldera (early**

Pleistocene): Rhyodacite lava flows, domes, dikes and shallow intrusions — At least seven separate eruptive units of biotite-hypersthene-hornblende-plagioclase rhyodacite (69-72% SiO₂) intrude and overlie intracaldera ignimbrite or sedimentary deposits. Five more intrude and overlie unit **KJna** on Cougar Divide (where three are shown on the geologic map), and at least one dike (30 m thick, but not shown on the map) of similar rhyodacite cuts unit **Pcmv** on the divide between Swift and Rainbow Creeks just south of the caldera. Compositionally, the lavas and dikes are similar to the dominant pumice in the ignimbrite or slightly less evolved. Phenocryst contents range widely, from 5 to 25%. Like the ignimbrite, the lavas and dikes contain plagioclase, hypersthene, hornblende, biotite, FeTi oxides, apatite, and zircon, although one or more of these may be missing in some flows; sanidine is lacking, and clinopyroxene and quartz are absent or very rare. Lithologically, the lavas and dikes are massive or flow-banded felsite; glacial erosion has stripped all but sparse remnants of glassy external zones, which tend to be altered where they survive. The felsite is pale to medium grey where fresh but is largely tan to orange-brown owing to pervasive oxidation and ferruginous films on joints and vugs. In areas of hydrothermal alteration, especially where brecciated, the lavas are pale green, cream, or white, commonly stained and streaked ochre to rusty brown due to decomposition of disseminated pyrite.

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: Lake Ann stock

Enumerated_Domain_Value_Definition: INTRUSIVE ROCKS OF THE CASCADE PASS FAMILY:

Rocks of the Chilliwack composite batholith (Pliocene and Miocene): Lake Ann stock (Pliocene)—Medium-grained hypersthene-clinopyroxene quartz monzodiorite and quartz monzonite, locally with biotite and very minor hornblende. Normatively some is granodiorite; CI=12-19 (James, 1980). Euhedral biotite common near roof above Lake Ann.

Enumerated_Domain:

Enumerated_Domain_Value: Lake Ann stock hornf

Enumerated_Domain_Value_Definition: INTRUSIVE ROCKS OF THE CASCADE PASS FAMILY:

Rocks of the Chilliwack composite batholith (Pliocene and Miocene): Lake Ann stock (Pliocene)—hornfels adjacent to Lake Ann stock.

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: MarbleCr.pluton

Enumerated_Domain_Value_Definition: **Orthogneiss of Marble Creek (Middle**

Eocene to Late Cretaceous)—Biotite tonalite to granodiorite gneiss with minor hornblende, muscovite, and well-formed igneous(?) epidote. Ranges from granitoid gneiss with intergranular quartz and relict euhedral oscillatory zoned plagioclase to highly strained flaser gneiss with anastomosing mylonite with quartz and biotite. Pluton is rich in screens and rafts of supracrustal schists and pods of ultramafic rocks.

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: Marblemount pluton

Enumerated_Domain_Value_Definition: **Marblemount pluton (Middle Eocene to Late Cretaceous)**—Meta-quartz diorite and metatonalite and tonalitic gneiss; light-colored metatonalite dikes. Locally includes unmetamorphosed hornblende tonalite north of Skagit River.

Rocks have Cl=16-54 (Ford and others, 1988), are medium-grained, pale green, have numerous anastomosing zones rich in chlorite, epidote, and actinolitic hornblende, and vary from massive with relict hypidiomorphic granular texture to highly foliate and mylonitic. Plagioclase commonly transformed to unzoned, complexly twinned albite filled with epidote and (or) white mica.

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: MineralMtn.pluton

Enumerated_Domain_Value_Definition: INTRUSIVE ROCKS OF THE CASCADE PASS FAMILY:

Rocks of the Chilliwack composite batholith (Pliocene and Miocene): Mineral Mountain pluton (Miocene)—Biotite granite. Cl=3-7. Characterized by conspicuous quartz eyes several centimeters across which are glomerocrysts of rounded quartz grains with K-feldspar in the curved triangular interstices. Micrographic integrowths of K-feldspar and quartz common. Conspicuous chloritic alteration.

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: Mount Baker

Enumerated_Domain_Value_Definition: **Rocks of the Mount Baker volcanic center**

(Holocene and Pleistocene): Andesite of present-day Mount Baker stratovolcano

(Holocene and late Pleistocene) — Plagioclase-rich pyroxene andesite (56-63% SiO₂; mostly olivine-bearing) lava flows and flow breccia with subordinate agglutinate, scoria, and pyroclastic-flow deposits — all erupted from the central vent of the modern stratovolcano. Unit includes andesite lava remnants along Kulshan, Heliotrope, and Glacier Creeks; **Andesite of Table Mountain (middle Pleistocene)** — Plagioclase-rich pyroxene andesite lava flows (59-62.5% SiO₂) that form stacks as thick as 150 m at Table Mountain and 250 m at nearby Kulshan Ridge. Glacially scoured remnants, mostly glassy and polygonally jointed, make up much of the surface in the Heather Meadows ski area.

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: Mt.Sefrit gabbronori

Enumerated_Domain_Value_Definition: INTRUSIVE ROCKS OF THE SNOQUALMIE FAMILY:

Rocks of the Chilliwack composite batholith (Miocene and Oligocene): Mount Sefrit Gabbronorite of Tepper and others (1993) (Miocene)—Mostly olivine-bearing gabbronorite with minor two-pyroxene diorite, hornblende diorite, and quartz diorite. Rocks are dark, partly because of swarms of minute dark inclusions in calcic plagioclase (Tepper, 1985).

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: Napeequa Schist

Enumerated_Domain_Value_Definition: **Napeequa Schist (Middle Eocene to Late**

Cretaceous)—Predominantly fine-grained hornblende-mica schist, mica-quartz schist, hornblende schist, amphibolite, garnet-biotite schist, and minor hornblende-zoisite schist, hornblende garbenschiefer, calc-silicate schist, marble, and ultramafic rocks. In the Cascade River area and in the Straight Creek Fault zone, phyllitic muscovite-chlorite-quartz schist predominates. Rocks are mostly white, tan, brown to black, locally greenish with conspicuous compositional banding. Fine lamellar foliation, locally blastomylonitic. On outcrop scale the schist is isoclinally folded, commonly crenulated; small crinkle folds of prominent foliation surfaces.

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: Nooksack Formation

Enumerated_Domain_Value_Definition: **Nooksack Formation (Early Cretaceous to Middle Jurassic): Argillite and sandstone**—Predominantly massive to laminated black argillite. Locally with thin to medium beds of mostly lithic-volcanic sandstone. Also includes minor limy siltstone and limestone. Some beds heavily bioturbated. Local detrital muscovite. Cleavage weakly developed north of Mount Baker, but pronounced to south. Argillite near top of the Wells Creek Volcanic Member rich in pyrogenic plagioclase and quartz phenocrysts. Belemnite molds characteristic; **Thick-bedded sandstone and argillite**—Volcanic lithic sandstone with minor interbeds of argillite.

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: Perry Creek phase

Enumerated_Domain_Value_Definition: INTRUSIVE ROCKS OF THE SNOQUALMIE FAMILY:

Rocks of the Chilliwack composite batholith (Miocene and Oligocene): Perry Creek phase (Miocene and Oligocene)—Mostly biotite-hornblende tonalite and granodiorite, commonly with relict clinopyroxene. Minor quartz monzodiorite and quartz diorite. Hornblende or biotite may predominate. Quartz is typically mesostasic. CI=8-22, but most are CI=12-19. As mapped, probably includes several plutons.

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: Qtzmonzodi.RedoubtCt

Enumerated_Domain_Value_Definition: INTRUSIVE ROCKS OF THE CASCADE PASS FAMILY:

Rocks of the Chilliwack composite batholith (Pliocene and Miocene): Quartz monzodiorite of Redoubt Creek (Miocene)—Biotite-pyroxene-hornblende quartz monzodiorite, quartz monzonite, granite, granodiorite, and diorite, commonly altered, with pinkish cast. CI=3-20, but most CI=11-17. Some rocks are porphyritic allotriomorphic and vermicular; micrographic quartz is common (Tepper, 1991, p. 68).

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: Ruth Cr.pluton

Enumerated_Domain_Value_Definition: INTRUSIVE ROCKS OF THE CASCADE PASS FAMILY:

Rocks of the Chilliwack composite batholith (Pliocene and Miocene): Quartz monzodiorite of Redoubt Creek (Miocene): Ruth Creek pluton (Miocene)—Biotite granodiorite, some granite and quartz monzodiorite, locally with quartz eyes as large as 1 cm in diameter; CI=3-7 (Tepper, 1991, p. 78), but mostly 4-5. Rare blocky hornblende with pyroxene cores.

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: Semisch&phy.MtJoseph

Enumerated_Domain_Value_Definition: **Semischist and phyllite of Mount Josephine (Early Cretaceous?)**—Graphitic sericite-plagioclase-quartz phyllite and semischistose lithic-volcanic subquartzose sandstone. Protolith sediments thin to medium bedded. Locally highly contorted, but generally lacks prominent multiple crenulations characteristic of the Darrington Phyllite.

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: SilesiaCr pluton

Enumerated_Domain_Value_Definition: INTRUSIVE ROCKS OF THE INDEX FAMILY: **Rocks of the Chilliwack composite batholith (Oligocene): Silesia Creek pluton**

(Oligocene)—Biotite-hornblende granodiorite, quartz monzodiorite and quartz diorite with inclusions and layers of biotite granodiorite and granite; some granitic xenoliths as long as 200 m. CI=5-20. Quartz diorite displays prominent magmatic alignment of feldspar and mafic minerals.

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: Skagit Gneiss

Enumerated_Domain_Value_Definition: *Terrane overlap units and stitching plutons: Skagit*

Gneiss Complex (Middle Eocene to Late Cretaceous)—Heterogeneous complex of supracrustal schist, amphibolite, and rare marble and ultramafic rocks intruded in a lit-par-lit fashion by mostly hornblende-biotite and biotite-tonalite orthogneiss. Orthogneiss bodies range from a few centimeters thick in the banded gneisses to several kilometers thick in the mapped orthogneiss. Abundant deformed dikes and sills of light-colored pegmatitic tonalite and lineated granite; **Banded gneiss, mostly biotite gneiss**—Biotite schist, biotite-garnet schist, biotite paragneiss (some garnet, cummingtonite), hornblende-biotite paragneiss, gneissic hornblende-biotite tonalite, and tonalite gneiss. Strongly layered rocks with minor amphibolite gneiss, and hornblende schist. Commonly strongly migmatitic with concordant and crosscutting light-colored dikes of foliated, lineated, fine-grained to pegmatitic leucotonalite and lineated granite and granodiorite; **Orthogneiss**—Gneissic hornblende-biotite tonalite. Relatively uniform crystalloblastic granitoid gneiss with rare relict euhedral oscillatory-zoned plagioclase crystals. Hornblende or biotite may predominate. Garnet locally. Quartz and biotite commonly moderately to highly strained. Locally migmatitic with concordant and crosscutting light-colored dikes of foliated, lineated, fine-grained to pegmatitic leucotonalite; **Mafic orthogneiss**—Garnet-hornblende diorite orthogneiss above Diablo Lake. Also includes amphibolite and hornblendite; and **Orthogneiss of The Needle**—Hornblende tonalite to granodiorite orthogneiss with distinctive texture of approximately 1-mm equant crystals forming centimeter size patches rich in quartz, plagioclase, hornblende, or biotite. Dominant foliation locally axial-planar to small folds of an earlier foliation.

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: Tonalite of Maiden L

Enumerated_Domain_Value_Definition: INTRUSIVE ROCKS OF THE INDEX FAMILY: **Rocks of the Chilliwack composite batholith (Oligocene): Tonalite of Maiden Lake**—Biotite-hornblende metatonalite and metaquartz diorite with highly altered plagioclase and biotite. Hypidiomorphic granular. Metamorphic minerals are chlorite, epidote, prehnite, pumpellyite, sericite and carbonate.

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: Vedder Cmplx

Enumerated_Domain_Value_Definition: **Rocks of the Bell Pass mélange (Cretaceous to Late Jurassic): Vedder Complex of Armstrong and others (1983) (Permian metamorphic age)**—Amphibolite, blueschist, micaceous quartzite, and mica-quartz schist. Some garnet. Amphiboles are hornblende, actinolite, and barrosite. Some amphibolites contain albite porphyroblasts.

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: Vol.rks.MtRahm

Enumerated_Domain_Value_Definition: **Volcanic rocks of Mount Rahm (Oligocene)**—Dacitic to less commonly andesitic breccias, tuffs, and flows with some feldspathic sandstone and conglomerate interbeds. Welded dacite tuff common.

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: Vol.rks.ofMt.Herman

Enumerated_Domain_Value_Definition: **Chilliwack Group of Cairnes (1944)**

(Permian, Carboniferous, and Devonian): Volcanic rocks of Mount Herman

(Permian)—Breccia, pillows, pillow breccia, and associated volcanic sandstone of basalt or basaltic andesite composition. Most volcanic rocks are plagioclase-phyric, some are amygdaloidal. Unit weathers orange-brown; dark- to light-green on fresh surfaces.

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: Wells Creek Member

Enumerated_Domain_Value_Definition: **Nooksack Formation (Early Cretaceous to Middle Jurassic): Wells Creek Volcanic Member** —Incipiently recrystallized dacite, dacite breccia and tuff, and andesite, with some argillite interbeds. Metamorphic pumpellyite, chlorite, epidote, and albite.

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: Yellow Aster

Enumerated_Domain_Value_Definition: **Rocks of the Bell Pass mélange (Cretaceous to Late Jurassic): Yellow Aster Complex of Misch (1966) (Paleozoic protolith age): Non-gneissic rocks**—Predominantly massive metagabbro, metadiabase, metatonalite; locally includes minor gneissic igneous rocks. May include late Paleozoic or Mesozoic intrusive rocks similar to units MzPzg and MzPzt and **Gneissic rocks**—Layered siliceous gneiss, quartz-rich pyroxene gneiss, gneissic megacrystic granite, and minor marble, as well as associated metagabbro, metadiabase, and metatonalite. Gneissic granite with K-feldspar megacrysts known only from Kidney Creek. Includes areas lacking siliceous gneiss, but with strongly mylonitic quartz-rich meta-igneous rocks. Talus blocks east of Park Butte grade from graphitic marble to quartz-rich pyroxene gneiss. Most rocks are highly strained and recrystallized in amphibolite or upper-greenschist facies. Locally, intruded by associated metagabbro, metadiabase, and metatonalite.

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: Younger ss & cgl

Enumerated_Domain_Value_Definition: **Younger sandstone and conglomerate (middle Eocene or younger)**—West of lower Bacon Creek, mostly coarse cobble conglomerate with clasts derived from the Marblemount pluton

Spatial_Data_Organization_Information: **mbstruct**

Direct_Spatial_Reference_Method: Vector

Point_and_Vector_Object_Information:

SDTS_Terms_Description:

SDTS_Point_and_Vector_Object_Type: Entity point

Point_and_Vector_Object_Count: 2302

SDTS_Terms_Description:

SDTS_Point_and_Vector_Object_Type: Point

Point_and_Vector_Object_Count: 49

Spatial_Reference_Information:

Horizontal_Coordinate_System_Definition:

Planar:

Map_Projection:

Map_Projection_Name: Transverse Mercator

Transverse_Mercator:

Scale_Factor_at_Central_Meridian: 0.999600

Longitude_of_Central_Meridian: -123.000000

Latitude_of_Projection_Origin: 0.000000

False_Easting: 500000.000000

False_Northing: 0.000000

Planar_Coordinate_Information:

Planar_Coordinate_Encoding_Method: coordinate pair

Coordinate_Representation:

Abcissa_Resolution: 0.000128

Ordinate_Resolution: 0.000128

Planar_Distance_Units: meters

Geodetic_Model:

Horizontal_Datum_Name: D_Clarke_1866

Ellipsoid_Name: Clarke 1866

Semi-major_Axis: 6378206.400000

Denominator_of_Flattening_Ratio: 294.978698

Entity_and_Attribute_Information:

Detailed_Description:

Entity_Type:

Entity_Type_Label: mbstruct.pat

Attribute:

Attribute_Label: FID

Attribute_Definition: Internal feature number.

Attribute_Definition_Source: ESRI

Attribute_Domain_Values:

Unrepresentable_Domain: Sequential unique whole numbers that are automatically generated.

Attribute:

Attribute_Label: Shape

Attribute_Definition: Feature geometry.

Attribute_Definition_Source: ESRI

Attribute_Domain_Values:

Unrepresentable_Domain: Coordinates defining the features.

Attribute:

Attribute_Label: AREA

Attribute_Definition: Area of feature in internal units squared.

Attribute_Definition_Source: ESRI

Attribute_Domain_Values:

Unrepresentable_Domain: Area is always zero for point coverages. Values are automatically generated.

Attribute:

Attribute_Label: PERIMETER

Attribute_Definition: Perimeter of feature in internal units.

Attribute_Definition_Source: ESRI
 Attribute_Domain_Values:
 Unrepresentable_Domain: Perimeter is always zero for point coverages. Values are automatically generated.

Attribute:
 Attribute_Label: MBSTRUCT#
 Attribute_Definition: Internal feature number.
 Attribute_Definition_Source: ESRI
 Attribute_Domain_Values:
 Unrepresentable_Domain: Sequential unique whole numbers that are automatically generated.

Attribute:
 Attribute_Label: MBSTRUCT-ID
 Attribute_Definition: User-defined feature number.
 Attribute_Definition_Source: ESRI

Attribute:
 Attribute_Label: PTTYPE
 Attribute_Definition: strike and dip of planar structures and bearing and plunge of linear structures

Attribute_Definition_Source: Author
 Attribute_Domain_Values:
 Enumerated_Domain:
 Enumerated_Domain_Value: _I_lineation_i_
 Enumerated_Domain_Value_Definition: inclined lineation
 Enumerated_Domain:
 Enumerated_Domain_Value: bedding w/tops
 Enumerated_Domain_Value_Definition: strike and dip of bedding; top direction known

Enumerated_Domain:
 Enumerated_Domain_Value: bedding
 Enumerated_Domain_Value_Definition: strike and dip of bedding; top direction unknown
 Enumerated_Domain:
 Enumerated_Domain_Value: crumpled bedding
 Enumerated_Domain_Value_Definition: strike and dip of bedding, somewhat folded on outcrop scale; top direction unknown
 Enumerated_Domain:
 Enumerated_Domain_Value: horizontal lineation
 Enumerated_Domain_Value_Definition: strike of lineation
 Enumerated_Domain:
 Enumerated_Domain_Value: foliation
 Enumerated_Domain_Value_Definition: strike and dip of aligned planar minerals in metamorphic rocks

Enumerated_Domain:
 Enumerated_Domain_Value: fault_ball
 Enumerated_Domain_Value_Definition: position of ball symbol showing downthrown side of high-angle fault
 Enumerated_Domain:
 Enumerated_Domain_Value: vert foliation

Enumerated_Domain_Value_Definition: strike of vertical foliation
 Enumerated_Domain:
 Enumerated_Domain_Value: ot bedding w/tops
 Enumerated_Domain_Value_Definition: strike and dip of overturned bedding; original top
 direction known
 Enumerated_Domain:
 Enumerated_Domain_Value: vert bedding
 Enumerated_Domain_Value_Definition: Vertical bedding; top direction unknown
 Enumerated_Domain:
 Enumerated_Domain_Value: vert bedding w/tops
 Enumerated_Domain_Value_Definition: vertical bedding; top direction known
 Enumerated_Domain:
 Enumerated_Domain_Value: horz foliation
 Enumerated_Domain_Value_Definition: horizontal foliation
 Enumerated_Domain:
 Enumerated_Domain_Value: flat bedding
 Enumerated_Domain_Value_Definition: horizontal bedding
 Enumerated_Domain:
 Enumerated_Domain_Value: _I_fold_i_
 Enumerated_Domain_Value_Definition: minor fold with inclined axis
 Enumerated_Domain:
 Enumerated_Domain_Value: _I_lineation_att_I_
 Enumerated_Domain_Value_Definition: inclined lineation combined with foliation
 Attribute:
 Attribute_Label: DIP
 Attribute_Definition: Dip of planar structure (angle of plane to horizontal) or plunge of lineation
 (angle of lineation to horizontal)
 Attribute_Definition_Source: Author
 Attribute_Domain_Values:
 Attribute:
 Attribute_Label: STRIKE
 Attribute_Definition: Strike of planar structure (azimuth of horizontal line on plane) or azimuth of
 linear structure
 Spatial_Data_Organization_Information: **mbrocksamp**
 Direct_Spatial_Reference_Method: Vector
 Point_and_Vector_Object_Information:
 SDTS_Terms_Description:
 SDTS_Point_and_Vector_Object_Type: Entity point
 Point_and_Vector_Object_Count: 1108
 SDTS_Terms_Description:
 SDTS_Point_and_Vector_Object_Type: Point
 Point_and_Vector_Object_Count: 49
 Spatial_Reference_Information:
 Horizontal_Coordinate_System_Definition:
 Planar:
 Map_Projection:
 Map_Projection_Name: Transverse Mercator
 Transverse_Mercator:

Scale_Factor_at_Central_Meridian: 0.999600
 Longitude_of_Central_Meridian: -123.000000
 Latitude_of_Projection-Origin: 0.000000
 False_Easting: 500000.000000
 False_Northing: 0.000000
 Planar_Coordinate_Information:
 Planar_Coordinate-Encoding_Method: coordinate pair
 Coordinate_Representation:
 Abscissa_Resolution: 0.000128
 Ordinate_Resolution: 0.000128
 Planar_Distance_Units: meters
 Geodetic_Model:
 Horizontal_Datum_Name: D_Clarke_1866
 Ellipsoid_Name: Clarke 1866
 Semi-major_Axis: 6378206.400000
 Denominator_of_Flattening_Ratio: 294.978698
 Entity_and_Attribute_Information:
 Detailed_Description:
 Entity_Type:
 Entity_Type_Label: mbrocksamp.pat
 Attribute:
 Attribute_Label: FID
 Attribute_Definition: Internal feature number.
 Attribute_Definition_Source: ESRI
 Attribute_Domain_Values:
 Unrepresentable_Domain: Sequential unique whole numbers that are automatically generated.
 Attribute:
 Attribute_Label: Shape
 Attribute_Definition: Feature geometry.
 Attribute_Definition_Source: ESRI
 Attribute_Domain_Values:
 Unrepresentable_Domain: Coordinates defining the features.
 Attribute:
 Attribute_Label: AREA
 Attribute_Definition: Area of feature in internal units squared.
 Attribute_Definition_Source: ESRI
 Attribute_Domain_Values:
 Unrepresentable_Domain: Area is always zero for point coverages. Values are automatically generated.
 Attribute:
 Attribute_Label: PERIMETER
 Attribute_Definition: Perimeter of feature in internal units.
 Attribute_Definition_Source: ESRI
 Attribute_Domain_Values:
 Unrepresentable_Domain: Perimeter is always zero for point coverages. Values are automatically generated.
 Attribute:

Attribute_Label: MBROCKSAMP#
 Attribute_Definition: Internal feature number.
 Attribute_Definition_Source: ESRI
 Attribute_Domain_Values:
 Unrepresentable_Domain: Sequential unique whole numbers that are automatically generated.

Attribute:
 Attribute_Label: MBROCKSAMP-ID
 Attribute_Definition: User-defined feature number.
 Attribute_Definition_Source: ESRI

Attribute:
 Attribute_Label: PTTYPE
 Attribute_Definition: archival category
 Attribute_Definition_Source: Author
 Attribute_Domain_Values:
 Enumerated_Domain:
 Enumerated_Domain_Value: archival
 Enumerated_Domain_Value_Definition: most representative sample or unusual specimen in easily retrieved archive, North Cascades National Park, Marblemount, WA

Attribute_Domain_Values:
 Enumerated_Domain:
 Enumerated_Domain_Value: store
 Enumerated_Domain_Value_Definition: sample in boxed storage, North Cascades National Park, Marblemount, WA

Attribute_Domain_Values:
 Enumerated_Domain:
 Enumerated_Domain_Value: combine
 Enumerated_Domain_Value_Definition: multiple samples from same collection site in archive and store.

Attribute_Domain_Values:
 Enumerated_Domain:
 Enumerated_Domain_Value: special
 Enumerated_Domain_Value_Definition: unusual disposition of sample and/or thin section

Attribute_Label: SAMPNO
 Attribute_Definition: Field number of sample
 Attribute_Definition_Source: Author

Attribute:
 Attribute_Label: SEL
 Attribute_Definition: number indicating category (archival or store, etc.) and existence of thin section for sample
 Attribute_Definition_Source: Author
 Attribute_Domain_Values:
 Enumerated_Domain:
 Enumerated_Domain_Value: 1
 Enumerated_Domain_Value_Definition: archival sample, no thin section

Attribute_Domain_Values:
 Enumerated_Domain:
 Enumerated_Domain_Value: 2

Enumerated_Domain_Value_Definition: archival sample with thin section

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: 3

Enumerated_Domain_Value_Definition: stored sample without thin section

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: 4

Enumerated_Domain_Value_Definition: stored sample with thin section

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: 5

Enumerated_Domain_Value_Definition: Thin section exists, but sample missing from NCNP collection or record incomplete (see description field below)

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: 7

Enumerated_Domain_Value_Definition: Sample and/or thin section sent to Dave Tucker, Western Washington University, Bellingham, WA (see description field below)

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: 6

Enumerated_Domain_Value_Definition: multiple samples at collection site. Some may have thin sections (see description field below)

Attribute:

Attribute_Label: DESCRIPTION

Attribute_Definition: additional information about sample, includes, comments on lithology, age, references, etc. For "combine" samples, identifies those with thin sections

Attribute_Definition_Source: Author

Attribute:

Attribute_Label: UNIT

Attribute_Definition: Source unit of sample

Attribute_Definition_Source: Author

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: B.granodiorite of Little Beaver Cr

Enumerated_Domain_Value_Definition: **Biotite granodiorite of Little Beaver Creek (Oligocene)**; number of samples of this unit = 14; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Bell Pass melange: Vedder Complex

Enumerated_Domain_Value_Definition: **Rocks of the Bell Pass mélange (Cretaceous to Late Jurassic): Vedder Complex of Armstrong and others (1983) (Permian metamorphic age)**; number of samples of this unit = 8; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Bell Pass melange: Yellow Aster Cmplx

Enumerated_Domain_Value_Definition: **Rocks of the Bell Pass mélange (Cretaceous to Late Jurassic): Yellow Aster Complex of Misch (1966) (Paleozoic protolith age)**; number of samples of this unit = 50; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Bell Pass melange; Baker Lk blueschist

Enumerated_Domain_Value_Definition: **Rocks of the Bell Pass mélange (Cretaceous to Late Jurassic): Blueschist of Baker Lake (Cretaceous to Jurassic metamorphic age)**; number of samples of this unit = 5; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Bell Pass melange; Elbow Lk. Fm.

Enumerated_Domain_Value_Definition: **Rocks of the Bell Pass mélange (Cretaceous to Late Jurassic): Bell Pass mélange, undivided**; number of samples of this unit = 50; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Bell Pass melange; ultramafite

Enumerated_Domain_Value_Definition: **Rocks of the Bell Pass mélange (Cretaceous to Late Jurassic): Ultramafic rocks**; number of samples of this unit = 6; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Bell Pass melange; Twin Sisters

Enumerated_Domain_Value_Definition: **Rocks of the Bell Pass mélange (Cretaceous to Late Jurassic): Ultramafic rocks: Twin Sisters Dunite of Ragan**; number of samples of this unit = 1; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Biot. alaskite of Mt. Blum

Enumerated_Domain_Value_Definition: **INTRUSIVE ROCKS OF THE INDEX FAMILY: Rocks of the Chilliwack composite batholith (Oligocene): Biotite alaskite of Mount Blum (Oligocene)**; number of samples of this unit = 11; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Cascade River Schist

Enumerated_Domain_Value_Definition: **Cascade River Schist (Middle Eocene to Late Cretaceous)**; number of samples of this unit = 11; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Chilliwack bath:BakerR phase:PriceGl plu

Enumerated_Domain_Value_Definition: **INTRUSIVE ROCKS OF THE INDEX FAMILY: Rocks of the Chilliwack composite batholith (Pliocene and Miocene): Price Glacier pluton**; number of samples of this unit = 4; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Chilliwack bath;Baker R.phase

Enumerated_Domain_Value_Definition: **INTRUSIVE ROCKS OF THE INDEX FAMILY: Rocks of the Chilliwack composite batholith (Oligocene): Baker River phase (Oligocene)**;

number of samples of this unit = 34; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Chilliwack Group

Enumerated_Domain_Value_Definition: **Chilliwack Group of Cairnes (1944)**

(Permian, Carboniferous, and Devonian); Limestone and marble (Permian, Carboniferous, and Devonian); number of samples of this unit = 46; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Chilliwack Group: sed.rks.of Mt.Herman

Enumerated_Domain_Value_Definition: **Chilliwack Group of Cairnes (1944)**

(Permian, Carboniferous, and Devonian): Sedimentary rocks of Mount Herman (Permian); number of samples of this unit = 3; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Chilliwack Group: vol.rks.of Mt.Herman

Enumerated_Domain_Value_Definition: **Chilliwack Group of Cairnes (1944)**

(Permian, Carboniferous, and Devonian): Volcanic rocks of Mount Herman (Permian) ; number of samples of this unit = 14; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Chilliwack Group: volcanic rocks

Enumerated_Domain_Value_Definition: **Chilliwack Group of Cairnes (1944)**

(Permian, Carboniferous, and Devonian): Volcanic rocks (Permian, Carboniferous, and Devonian); number of samples of this unit = 22; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Chilliwack Grp, Cultus Fm, undivided

Enumerated_Domain_Value_Definition: **Chilliwack Group of Cairnes (1944) and Cultus Formation of Brown and others (1987) undivided (Mesozoic and Paleozoic);** number of samples of this unit = 12; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Chilliwack val.phase:dark ton

Enumerated_Domain_Value_Definition: INTRUSIVE ROCKS OF THE SNOQUALMIE FAMILY:

Rocks of the Chilliwack composite batholith (Miocene and Oligocene): Chilliwack valley phase (Oligocene): Dark tonalite; number of samples of this unit = 4; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Chilliwack valley phase

Enumerated_Domain_Value_Definition: INTRUSIVE ROCKS OF THE SNOQUALMIE FAMILY:

Rocks of the Chilliwack composite batholith (Miocene and Oligocene): Chilliwack valley phase (Oligocene); number of samples of this unit = 51; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Chuckanut Formation

Enumerated_Domain_Value_Definition: LATE OROGENIC AND POST OROGENIC DEPOSITS : **Chuckanut Formation (Eocene)**; number of samples of this unit = 6; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Conglomerate of Bald Mountain

Enumerated_Domain_Value_Definition: **Conglomerate of Bald Mountain (Age uncertain)**; number of samples of this unit = 5; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Cultus Formation

Enumerated_Domain_Value_Definition: **Cultus Formation of Brown and others (1987) (Early Jurassic and Late Triassic)**; number of samples of this unit = 25; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Darrington Phyllite

Enumerated_Domain_Value_Definition: **Easton Metamorphic Suite (Early Cretaceous): Darrington Phyllite (Early Cretaceous)**; number of samples of this unit = 7; for description see downloadable pdf of Description of Map Units:

<http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: dike

Enumerated_Domain_Value_Definition: **dike which cuts Rocks of the Chilliwack composite batholith: Pocket Peak phase (Oligocene)**; number of samples of this unit = 1; for description see downloadable pdf of Description of Map Units:

<http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Eldorado orthogneiss

Enumerated_Domain_Value_Definition: Terrane overlap units and stitching plutons: *Plutons of the granodioritic group*: **Eldorado Orthogneiss (Middle Eocene to Late Cretaceous)**; number of samples of this unit = 17; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Eldorado orthogneiss: flaser gneiss

Enumerated_Domain_Value_Definition: Terrane overlap units and stitching plutons: *Plutons of the granodioritic group*: **Eldorado Orthogneiss (Middle Eocene to Late Cretaceous):**

Flaser gneiss border zone; number of samples of this unit = 5; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Eldorado orthogneiss: metadikes

Enumerated_Domain_Value_Definition: foliated dikes cutting Terrane overlap units and stitching plutons: *Plutons of the granodioritic group*: **Eldorado Orthogneiss (Middle Eocene to Late Cretaceous)**; number of samples of this unit = 16; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Ensawkwach diorite

Enumerated_Domain_Value_Definition: INTRUSIVE ROCKS OF THE INDEX FAMILY: **Rocks of the Chilliwack composite batholith (Oligocene): Miscellaneous gabbros and diorites (Oligocene?): Inclusion-rich diorite of Ensawkwach Creek**; number of samples

of this unit = 10; for description see downloadable pdf of Description of Map Units:

<http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Gabbro of Copper Lake

Enumerated_Domain_Value_Definition: INTRUSIVE ROCKS OF THE INDEX FAMILY: **Rocks of the Chilliwack composite batholith (Oligocene): Gabbro of Copper Lake (Oligocene)**; number of samples of this unit = 4; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Granite of Depot Cr

Enumerated_Domain_Value_Definition: INTRUSIVE ROCKS OF THE CASCADE PASS FAMILY: **Rocks of the Chilliwack composite batholith (Oligocene): Granite of Depot Creek (Miocene)**; number of samples of this unit = 2; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Granite of Ruth Mtn.

Enumerated_Domain_Value_Definition: INTRUSIVE ROCKS OF THE CASCADE PASS FAMILY: **Rocks of the Chilliwack composite batholith (Oligocene): Granite of Ruth Mountain (Pliocene)**; number of samples of this unit = 7; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Granite of W. Bear Mtn.

Enumerated_Domain_Value_Definition: INTRUSIVE ROCKS OF THE CASCADE PASS FAMILY: **Rocks of the Chilliwack composite batholith (Oligocene): Granite of western Bear Mountain (Miocene?)**; number of samples of this unit = 8; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Granite porphyry of Egg Lake

Enumerated_Domain_Value_Definition: INTRUSIVE ROCKS OF THE CASCADE PASS FAMILY: **Rocks of the Chilliwack composite batholith (Oligocene): Granite porphyry of Egg Lake (Pliocene)**; number of samples of this unit = 5; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Granodiorite of Mt.Despair

Enumerated_Domain_Value_Definition: INTRUSIVE ROCKS OF THE INDEX FAMILY: **Rocks of the Chilliwack composite batholith (Oligocene):Granodiorite of Mount Despair (Oligocene)**; number of samples of this unit = 17; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Grd. Mt.Despair: agmatite

Enumerated_Domain_Value_Definition: : INTRUSIVE ROCKS OF THE INDEX FAMILY: **Rocks of the Chilliwack composite batholith (Oligocene):Granodiorite of Mount Despair (Oligocene): Agmatite**; number of samples of this unit = 8; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Hannegan Volcanics

Enumerated_Domain_Value_Definition: **Hannegan Volcanics (Pliocene): Volcanic breccia and Tuff**; number of samples of this unit = 18; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Hetero. ton. and granod. of Middle Pk.

Enumerated_Domain_Value_Definition: INTRUSIVE ROCKS OF THE INDEX FAMILY: **Rocks of the Chilliwack composite batholith (Oligocene): Heterogeneous tonalite and granodiorite of Middle Peak (Oligocene?)**; number of samples of this unit = 6; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Hozomeen Group

Enumerated_Domain_Value_Definition: **Hozomeen Group (Mesozoic and Paleozoic): Chert (Late and Middle Triassic) and Greenstone with minor argillite, chert, and limestone (Permian and Pennsylvanian)**; number of samples of this unit = 39; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Indian Mtn. Phase

Enumerated_Domain_Value_Definition: INTRUSIVE ROCKS OF THE SNOQUALMIE FAMILY: **Rocks of the Chilliwack composite batholith (Miocene and Oligocene): Indian Mountain phase (Oligocene)**; number of samples of this unit = 17; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Intrusive breccia

Enumerated_Domain_Value_Definition: : INTRUSIVE ROCKS OF THE SNOQUALMIE FAMILY: **Rocks of the Chilliwack composite batholith (Miocene and Oligocene): Intrusive breccia (Miocene and/or Oligocene)**; number of samples of this unit = 13; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Lake Ann stock

Enumerated_Domain_Value_Definition: : INTRUSIVE ROCKS OF THE CASCADE PASS FAMILY: **Rocks of the Chilliwack composite batholith (Miocene and Oligocene): Lake Ann stock**; number of samples of this unit = 3; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Marblemount pluton

Enumerated_Domain_Value_Definition: **Marblemount pluton**; number of samples of this unit = 7; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Marblemount pluton:flaser gn. border

Enumerated_Domain_Value_Definition: **Marblemount pluton; Flaser gneiss border zone** number of samples of this unit = 2; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: MB:andesite of Bastille Ridge

Enumerated_Domain_Value_Definition: **Rocks of the Mount Baker volcanic center (Holocene and Pleistocene): Andesite of Bastille Ridge (middle Pleistocene)**; number

of samples of this unit = 1; for description see downloadable pdf of Description of Map Units:
<http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: MB:andesite of Black Buttes

Enumerated_Domain_Value_Definition: **Rocks of the Mount Baker volcanic center (Holocene and Pleistocene): Andesite of Black Buttes (middle Pleistocene);** number of samples of this unit = 5; for description see downloadable pdf of Description of Map Units:
<http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: MB:andesite of Coleman Pinnacle

Enumerated_Domain_Value_Definition: **Rocks of the Mount Baker volcanic center (Holocene and Pleistocene): Andesite of Coleman Pinnacle (middle Pleistocene);** number of samples of this unit = 2; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: MB:andesite of Cougar Divide

Enumerated_Domain_Value_Definition: **Rocks of the Mount Baker volcanic center (Holocene and Pleistocene): Andesite of Cougar Divide (middle Pleistocene);** number of samples of this unit = 1; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: MB:andesite of Forest Divide

Enumerated_Domain_Value_Definition: **Rocks of the Mount Baker volcanic center (Holocene and Pleistocene): Andesite of Forest Divide (middle Pleistocene);** number of samples of this unit = 1; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: MB:andesite of Lava Divide

Enumerated_Domain_Value_Definition: **Rocks of the Mount Baker volcanic center (Holocene and Pleistocene): Andesite of Lava Divide (middle Pleistocene);** number of samples of this unit = 1; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: MB:andesite of present-day cone

Enumerated_Domain_Value_Definition: **Rocks of the Mount Baker volcanic center (Holocene and Pleistocene): Andesite of present-day Mount Baker stratovolcano (Holocene and late Pleistocene);** number of samples of this unit = 5; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: MB:andesite of Swift Creek

Enumerated_Domain_Value_Definition: **Rocks of the Mount Baker volcanic center (Holocene and Pleistocene): Andesite of Swift Creek (late Pleistocene);** number of samples of this unit = 1; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: MB:andesite of The Portals

Enumerated_Domain_Value_Definition: **Rocks of the Mount Baker volcanic center (Holocene and Pleistocene): Andesite of The Portals (late Pleistocene);** number of

samples of this unit = 4; for description see downloadable pdf of Description of Map Units:
<http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: MB:basalt of Lake Shannon

Enumerated_Domain_Value_Definition: **Rocks of the Mount Baker volcanic center (Holocene and Pleistocene): Basalt of Lake Shannon (late Pleistocene)**; number of samples of this unit = 1; for description see downloadable pdf of Description of Map Units:
<http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: MB:basalt of Sulphur Creek

Enumerated_Domain_Value_Definition: **Rocks of the Mount Baker volcanic center (Holocene and Pleistocene): Basalt of Sulphur Creek (Holocene)**; number of samples of this unit = 2; for description see downloadable pdf of Description of Map Units:
<http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: MB:misc. lava-flow remnants

Enumerated_Domain_Value_Definition: **Rocks of the Mount Baker volcanic center (Holocene and Pleistocene): Miscellaneous lava-flow remnants (Pleistocene)**; remnant in upper Thompson Creek; remnant on southwest slope of Lookout Mountain; number of samples of this unit = 3; for description see downloadable pdf of Description of Map Units:
<http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Metagabbro intrusions

Enumerated_Domain_Value_Definition: **Gabbroic intrusions (Mesozoic and Paleozoic)**; number of samples of this unit = 7; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Metatonalite intrusions

Enumerated_Domain_Value_Definition: **Tonalitic intrusions (Mesozoic and Paleozoic)**; number of samples of this unit = 6; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Gabbroic intrusions

Enumerated_Domain_Value_Definition: **Gabbroic intrusions (Early Cretaceous?)**; number of samples of this unit = 2; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Mineral Mountain pluton

Enumerated_Domain_Value_Definition: INTRUSIVE ROCKS OF THE CASCADE PASS FAMILY: **Rocks of the Chilliwack composite batholith (Pliocene and Miocene): Mineral Mountain pluton (Miocene)**; number of samples of this unit = 24; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Misc. gabbros and diorites

Enumerated_Domain_Value_Definition: INTRUSIVE ROCKS OF THE INDEX FAMILY: **Rocks of the Chilliwack composite batholith (Oligocene): Miscellaneous gabbros and diorites (Oligocene?)**; number of samples of this unit = 19; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:
 Enumerated_Domain_Value: Misc. granodiorite intrusions
 Enumerated_Domain_Value_Definition: INTRUSIVE ROCKS OF THE CASCADE PASS FAMILY:
Rocks of the Chilliwack composite batholith (Pliocene and Miocene): Miscellaneous granodiorite intrusions (Pliocene and/or Miocene); number of samples of this unit = 3; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:
 Enumerated_Domain_Value: Mt Sefrit Gabbonorite
 Enumerated_Domain_Value_Definition: INTRUSIVE ROCKS OF THE SNOQUALMIE FAMILY:
Rocks of the Chilliwack composite batholith (Miocene and Oligocene): Mount Sefrit Gabbonorite of Tepper and others (1993) (Miocene); number of samples of this unit = 3; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:
 Enumerated_Domain_Value: Napeequa Schist
 Enumerated_Domain_Value_Definition: **Napeequa Schist (Middle Eocene to Late Cretaceous);** number of samples of this unit = 57; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:
 Enumerated_Domain_Value: Nooksack Formation
 Enumerated_Domain_Value_Definition: **Nooksack Formation (Early Cretaceous to Middle Jurassic): Argillite and sandstone; Thick-bedded sandstone and argillite; Grit and thick-bedded sandstone; and Volcanic-rich conglomerate and sandstone;** number of samples of this unit = 38; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:
 Enumerated_Domain_Value: Nooksack Formation: Wells Creek Member
 Enumerated_Domain_Value_Definition: **Nooksack Formation (Early Cretaceous to Middle Jurassic): Wells Creek Volcanic Member;** number of samples of this unit = 7; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:
 Enumerated_Domain_Value: Older sandstone and conglomerate
 Enumerated_Domain_Value_Definition: LATE OROGENIC AND POST OROGENIC DEPOSITS:
Older sandstone and conglomerate (age uncertain); number of samples of this unit = 18; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:
 Enumerated_Domain_Value: Orthogneiss of Alma Creek
 Enumerated_Domain_Value_Definition: *Plutons of the granodioritic group:* **Orthogneiss of Alma Creek (Middle Eocene to Late Cretaceous);** number of samples of this unit = 2; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:
 Enumerated_Domain_Value: Perry Cr. phase
 Enumerated_Domain_Value_Definition: INTRUSIVE ROCKS OF THE SNOQUALMIE FAMILY:
Rocks of the Chilliwack composite batholith (Miocene and Oligocene): Perry Creek

phase (Miocene and Oligocene); number of samples of this unit = 44; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Perry Cr. Phase; tectonized

Enumerated_Domain_Value_Definition: INTRUSIVE ROCKS OF THE SNOQUALMIE FAMILY:

Rocks of the Chilliwack composite batholith (Miocene and Oligocene): Perry Creek phase (Miocene and Oligocene): tectonized tonalite; number of samples of this unit = 4; for description see downloadable pdf of Description of Map Units:

<http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Phyllite and sch of Little Jack Mtn

Enumerated_Domain_Value_Definition: **Phyllite and schist of Little Jack Mountain (Middle Eocene to Late Cretaceous);** number of samples of this unit = 33; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Pocket Peak phase

Enumerated_Domain_Value_Definition: INTRUSIVE ROCKS OF THE INDEX FAMILY: **Rocks of the Chilliwack composite batholith (Miocene and Oligocene): Pocket Peak phase (Oligocene);** number of samples of this unit = 17; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Q.di and q.monzodi. of Icy Pk

Enumerated_Domain_Value_Definition: INTRUSIVE ROCKS OF CASCADE PASS FAMILY: **Rocks of the Chilliwack composite batholith (Miocene and Oligocene): Quartz diorite and quartz monzodiorite of Icy Peak;** number of samples of this unit = 16; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Q.monz. and gr. of Nooksack cirq

Enumerated_Domain_Value_Definition: : INTRUSIVE ROCKS OF CASCADE PASS FAMILY: **Rocks of the Chilliwack composite batholith (Miocene and Oligocene): Quartz monzonite and granite of Nooksack cirque (Pliocene);** number of samples of this unit = 9; for description see downloadable pdf of Description of Map Units:

<http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Q.monzodiorite of Redoubt Cr.

Enumerated_Domain_Value_Definition: INTRUSIVE ROCKS OF CASCADE PASS FAMILY: **Rocks of the Chilliwack composite batholith (Miocene and Oligocene): Quartz monzodiorite of Redoubt Creek (Miocene);** number of samples of this unit = 17; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Rocks of Kulshan caldera

Enumerated_Domain_Value_Definition: Rocks of Kulshan caldera (early Pleistocene): **Rhyodacite lava flows, domes, dikes and shallow intrusions and Ignimbrite of Swift Creek;** number of samples of this unit = 15; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Ruby Cr Heterogeneous Plutonic Belt
Enumerated_Domain_Value_Definition: **Ruby Creek Heterogeneous Plutonic Belt of Misch (1966) (Middle Eocene to Late Cretaceous)**; number of samples of this unit = 10; for description see downloadable pdf of Description of Map Units:

<http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Ruth Cr. pluton

Enumerated_Domain_Value_Definition: : INTRUSIVE ROCKS OF CASCADE PASS FAMILY: **Rocks of the Chilliwack composite batholith (Miocene and Oligocene): Ruth Creek pluton (Miocene)**; number of samples of this unit = 1; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Semisch. and phyllite of Mount Josephene

Enumerated_Domain_Value_Definition: Shuksan nappe: **Semischist and phyllite of Mount Josephine (Early Cretaceous?)**; number of samples of this unit = 13; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Shuksan Greenschist

Enumerated_Domain_Value_Definition: Shuksan nappe: **Shuksan Greenschist (Early Cretaceous)**; number of samples of this unit = 13; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Silesia Cr. Pluton

Enumerated_Domain_Value_Definition: INTRUSIVE ROCKS OF THE INDEX FAMILY: **Rocks of the Chilliwack composite batholith (Oligocene): Silesia Creek pluton (Oligocene)**; number of samples of this unit = 5; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Skagit: ultramafic rock

Enumerated_Domain_Value_Definition: *Terrane overlap units and stitching plutons*: **Skagit Gneiss Complex (Middle Eocene to Late Cretaceous): Ultramafic rocks**; number of samples of this unit = 6; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Skagit: banded biot. Gneiss

Enumerated_Domain_Value_Definition: *Terrane overlap units and stitching plutons*: **Skagit Gneiss Complex (Middle Eocene to Late Cretaceous): Banded gneiss, mostly biotite gneiss**; number of samples of this unit = 56; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Skagit: banded hrnbl. Gneiss

Enumerated_Domain_Value_Definition: *Terrane overlap units and stitching plutons*: **Skagit Gneiss Complex (Middle Eocene to Late Cretaceous): Banded gneiss, mostly amphibole gneiss and amphibolite**; number of samples of this unit = 28; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Skagit: granite pegmatite

Enumerated_Domain_Value_Definition: *Terrane overlap units and stitching plutons: Skagit Gneiss Complex (Middle Eocene to Late Cretaceous): Granite pegmatite:* amphibolite screens; number of samples of this unit = 3; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Skagit: lineated orthogneiss

Enumerated_Domain_Value_Definition: *Terrane overlap units and stitching plutons: Skagit Gneiss Complex (Middle Eocene to Late Cretaceous): Orthogneiss;* number of samples of this unit = 12; for description see downloadable pdf of Description of Map Units:

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Enumerated_Domain:

Enumerated_Domain_Value: Skagit: mafic orthogneiss

Enumerated_Domain_Value_Definition: *Terrane overlap units and stitching plutons: Skagit Gneiss Complex (Middle Eocene to Late Cretaceous): Orthogneiss: Mafic orthogneiss;* number of samples of this unit = 3; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Skagit: mafic migmatite

Enumerated_Domain_Value_Definition: *Terrane overlap units and stitching plutons: Skagit Gneiss Complex (Middle Eocene to Late Cretaceous): Orthogneiss: Mafic migmatite;* number of samples of this unit = 1; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Skagit: orthogneiss

Enumerated_Domain_Value_Definition: *Terrane overlap units and stitching plutons: Skagit Gneiss Complex (Middle Eocene to Late Cretaceous): Orthogneiss:* number of samples of this unit = 67; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Skagit: orthogneiss of the Needle

Enumerated_Domain_Value_Definition: *Terrane overlap units and stitching plutons: Skagit Gneiss Complex (Middle Eocene to Late Cretaceous): Orthogneiss of The Needle;* number of samples of this unit = 4; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Skymo Complex

Enumerated_Domain_Value_Definition: **Skymo Complex of Wallace (1976) (Middle Eocene to Late Cretaceous);** number of samples of this unit = 36; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Slate of Rinker Ridge

Enumerated_Domain_Value_Definition: **Slate of Rinker Ridge (Cretaceous to Late Jurassic);** number of samples of this unit = 3; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Stitching: orthogneiss of Haystack Creek

Enumerated_Domain_Value_Definition: *Terrane overlap units and stitching plutons: Plutons of the tonalitic group: Orthogneiss of Haystack Creek (Middle Eocene to Late*

Cretaceous); number of samples of this unit = 11; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Stitching: orthogneiss of Marble Creek

Enumerated_Domain_Value_Definition: Terrane overlap units and stitching plutons: *Plutons of the tonalitic group: Orthogneiss of Marble Creek (Middle Eocene to Late Cretaceous)*; number of samples of this unit = 6; for description see downloadable pdf of

Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Tonalite of Maiden Lk.

Enumerated_Domain_Value_Definition: INTRUSIVE ROCKS OF THE INDEX FAMILY: **Rocks of the Chilliwack composite batholith (Oligocene): Tonalite of Maiden Lake**; number of samples of this unit = 3; for description see downloadable pdf of Description of Map Units:

<http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Volcanic rocks of Big Bosom Buttes

Enumerated_Domain_Value_Definition: **Volcanic rocks of Big Bosom Buttes**

(Oligocene): Breccia; Dacite tuff; and Monolithologic granite breccia; number of samples of this unit = 24; for description see downloadable pdf of Description of Map Units:

<http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Volcanic rocks of Mt. Rahm

Enumerated_Domain_Value_Definition: **Volcanic rocks of Mount Rahm (Oligocene)**;

number of samples of this unit = 8; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

Enumerated_Domain:

Enumerated_Domain_Value: Volcanic rocks of Pioneer Ridge

Enumerated_Domain_Value_Definition: **Volcanic rocks of Pioneer Ridge**

(Oligocene): Dacite flows and Mudflow breccia; number of samples of this unit = 10; for description see downloadable pdf of Description of Map Units: <http://pubs.usgs.gov/imap/i2660/>

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Attribute_Definition_Source: Author

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Enumerated_Domain:

Enumerated_Domain_Value: what

Enumerated_Domain_Value_Definition: Whatcom County

Attribute_Domain_Values:

Enumerated_Domain:

Enumerated_Domain_Value: Skagit

Enumerated_Domain_Value_Definition: Skagit County

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City: Menlo Park

State_or_Province: CA

Postal_Code: 94025

Country: USA

Contact_Voice_Telephone: 650-329-4935

Contact_Facsimile_Telephone: 650-329-4936

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Digital_Transfer_Information:

Format_Name: *Mount Baker geologic map as a PDF file*

Format_Specification: *Adobe Acrobat Document*

Format_Information_Content: PDFs (2 files) of geologic map and cross sections, correlation chart, generalized geologic map, and maps of previous work and sources of data

Transfer_Size: 21.6 MB

Digital_Transfer_Option:

Online_Option:

Computer_Contact_Information:

Network_Address:

Network_Resource_Name: <http://pubs.usgs.gov/imap/i2660/>

Digital_Form:

Digital_Transfer_Information:

Format_Name: *accompanying pamphlet as a PDF file*

Format_Specification: *Adobe Acrobat Document*

Format_Information_Content: Introduction, Acknowledgements, Summary of Geologic History, expanded description of rock units, tables, and reference list

Transfer_Size: 732 KB

Digital_Transfer_Option:

Online_Option:

Computer_Contact_Information:

Network_Address:

Network_Resource_Name <http://pubs.usgs.gov/imap/i2660/>

Digital_Form:

Digital_Transfer_Information:

Format_Name: mbcovers2.tar.gz
Format_Version_Number: 1
Format_Version_Date: 2006
Format_Specification: ARC/INFO v. 7.1.1
Format_Information_Content: 7 ARC/INFO export (.e00) files.
File-Decompression_Technique: TAR and gzip (see the readme for more information about TAR and gzip).

Transfer_Size: 4.2 MB

Digital_Transfer_Option:

Online_Option:

Computer_Contact_Information:

Network_Address:

Network_Resource_Name: <http://pubs.usgs.gov/ds>

Fees: No fees for digital forms of the report.

Ordering_Instructions: *Digital files (both PDFs and database files) can be obtained on-line as described above at the publication web-site, or by sending a request to the Database Coordinator at the address shown above.*

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Contact_Organization: USGS Information Services

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Address_Type: mailing address

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City: Denver

State_or_Province: CO

Postal_Code: 80225-0046

Country: USA

Contact_Voice_Telephone: (303) 202-4200

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Resource_Description: USGS Miscellaneous Investigations I-2660 and USGS Data Series consist of both traditional geologic map products and ARC/INFO format geospatial databases. Furthermore, the traditional geologic map products (map sheets and pamphlets) can be obtained either as paper or as digital files.

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Non-digital_Form: Paper copies of the map sheets and pamphlet can be obtained by contacting USGS Information Services via the contact information listed above.

Metadata_Reference_Information:

Metadata_Date: 8/17/06

Metadata_Contact:

Contact_Information:

Contact_Organization_Primary:

Contact_Organization: United States Geological Survey

Contact_Person: Karen L. Wheeler

Contact_Address:

Address_Type: 345 Middlefield Rd. MS 973

City: Menlo Park

State_or_Province: California

Postal_Code: 94025

Contact_Voice_Telephone: 650-329-4935

Contact_Facsimile_Telephone: 650-329-4936

Contact_Electronic_Mail_Address: kwheeler@usgs.gov]

Metadata_Standard_Name: FGDC Content Standards for Digital Geospatial Metadata

Metadata_Standard_Version: FGDC-STD-001-1998

Metadata_Time_Convention: local time

Metadata_Extensions:

Online_Linkage: <http://www.esri.com/metadata/esriprof80.html>

Profile_Name: ESRI Metadata Profile