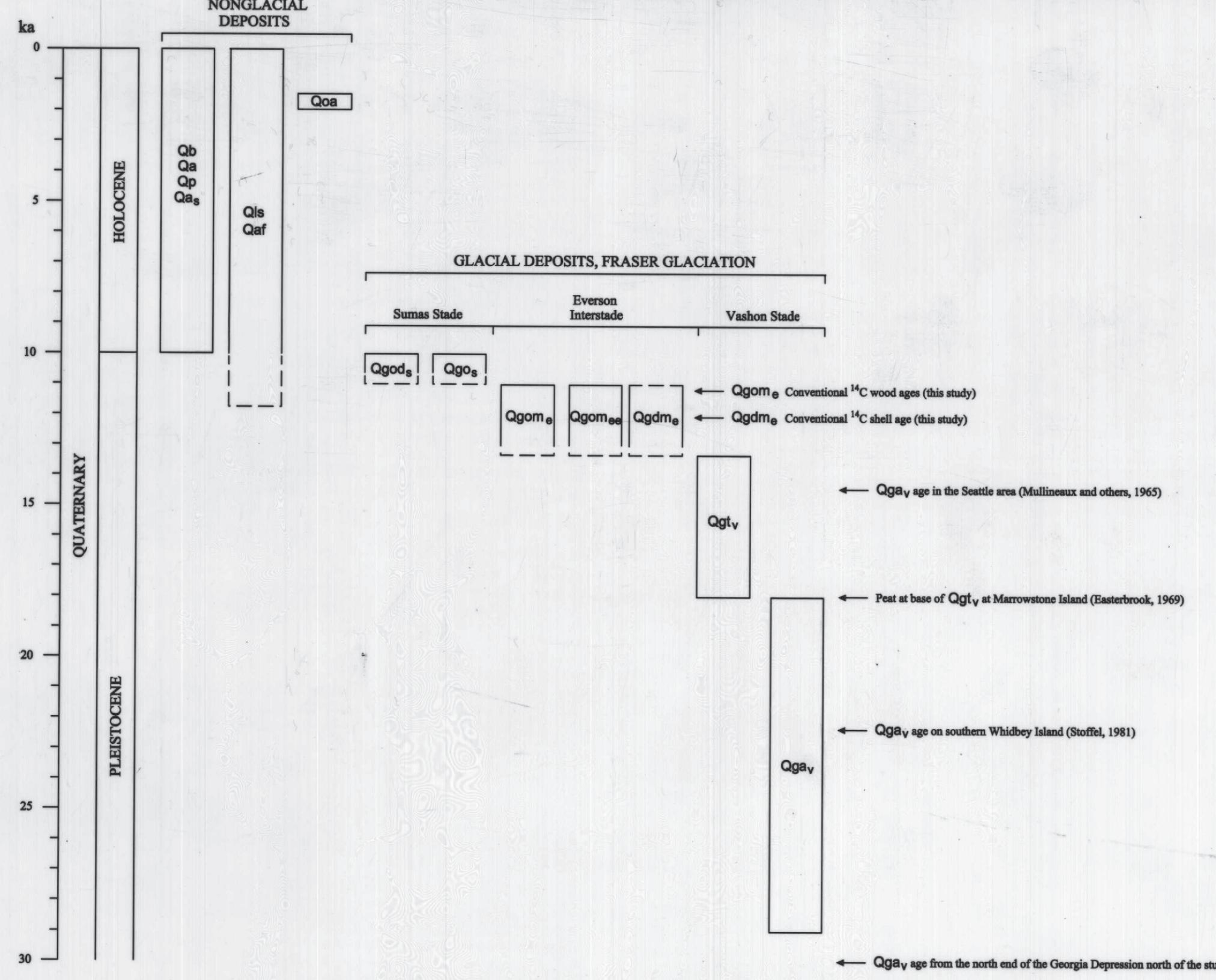
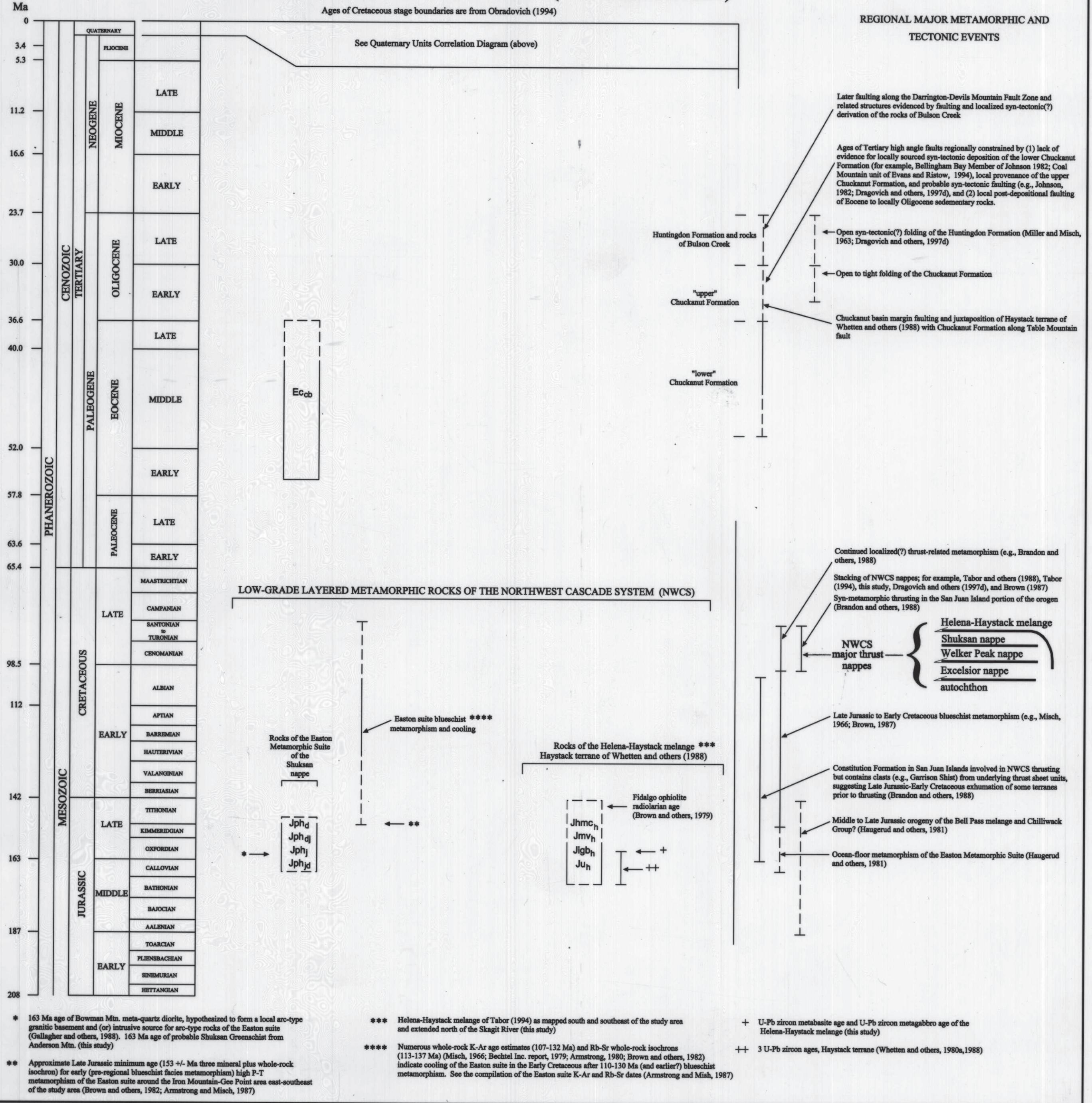


QUATERNARY UNITS CORRELATION DIAGRAM



BEDROCK CORRELATION DIAGRAM (PROTOLITH AGES)



Geologic Units

SEDIMENTARY AND VOLCANIC DEPOSITS AND ROCKS

Quaternary Sedimentary Deposits

Nonglacial Deposits

Qs Surficial deposits, undivided (Holocene and Pleistocene) (cross sections only)

Qb Beach deposits (Holocene) - Sand and gravel deposits

Qa Alluvium of the Skagit River valley (Holocene) - Clay, silt, and fine sand with minor sand and cobble gravel; rare peat; organic matter common; local volcanoclastic materials derived from Cascade volcanoes, particularly Glacier Peak; finer facies associated with deltaic-estuarine settings (Samish Bay) where fluvial facies are interbedded with fossil-bearing shallow marine (locally deltaic) and tidal flat or estuarine facies

Qo Older alluvium and lahar run-out deposits of the Skagit River Valley (Holocene) - Iron-stained sand, silt, and clay; minor volcanoclastic sands and gravels of probable Glacier Peak volcanic origin; forms terraces generally 5 to 15 m above modern floodplain

Qs Alluvium of the Samish River valley (Holocene) - Cobble gravel, gravel, sand, silt, clay; rare peat

Qp Peat (Holocene)

Qf Alluvial fan deposits (Holocene and Pleistocene?) - Cobble, sand, and boulder diamictite; local lenses of gravel, sand, silt, and clay; locally sourced

Qls Landslide deposits (Holocene and Pleistocene?) - Diamictite, locally sourced

Glacial Deposits, Fraser Glaciation of Armstrong and others (1965) (Pleistocene)

Sumas Stade

Generally low-density proglacial outwash deposited during the Sumas readvance north of the study area

Qgod_g Deltaic glacial outwash - Gravel and sand with rare silt interbeds; massive to thickly bedded, commonly with pronounced foreset beds; mixed provenance with minor clasts of probable Twin Sisters Dunitic and Mount Baker andesitic origin; occurs in erosional terraces with topset beds at about 100 ft. above present mean sea level in the Samish and Skagit valleys; deposits grade upvalley into Qgav

Qgo_s Fluvial outwash - Sandy cobble gravel, gravel, and minor gravelly sand, rare silt and clay; minor clasts of probable Twin Sisters Dunitic and Mount Baker andesitic origin; occurs mostly as erosional terraces 1 to 30 m above the Samish River valley floor; grades downvalley into Qgod_g

Everson Interstad

Generally low-density glaciomarine deposits

Qgom_g Glaciomarine drift - Clayey silt, silty clay, and clay-rich diamictite; locally contains lenses and layers of sandy or gravelly outwash; contains macrofossils only in the southernmost portion of the map area

Qgom_e Fluvial-deltaic-turbiditic glaciomarine outwash - Sand, gravel with minor interlayered silts and silty sands; rare diamictite

Qgom_{ee} Emergence (beach) deposits - Sand and gravel on wave-cut topographic benches

Vashon Stade

Moderate- to high-density glacial deposits

Qglv Till; locally includes layers and lenses of gravel and sand (see dynamic till symbol below)

Qgb_v Advance outwash - Sandy gravel, sand, and scattered lenses of cobble gravel with lesser silt and clay interbeds; mostly composed of moderately to well-sorted, distinctly stratified medium to coarse sand and pebbly sand with minor amounts of fine sand, silty sand, or sandy silt and scattered lenses and layers of pebble-cobble gravel

Tertiary Sedimentary Rocks

Chuckanut Formation

Ec_{cb} Bellingham Bay Member (Oligocene? to Eocene) - Conglomerate, arkose, siltstone, shale, and rare coal

LOW-GRADE LAYERED METAMORPHIC ROCKS OF THE NORTHWEST CASCADE SYSTEM

Mesozoic Metamorphic Rocks of the Shuskan Nappe of Tabor and others (1994)

Eastern Metamorphic Suite of Mich (1960) (Jurassic) - Metasedimentary clastic and rare metavolcanic rocks. Metapelitic (suite of) to siliceous metapelitic of the Darrington Phyllite grades to the semischist of Mount Josephine with increasing sand, and (rarely) gravel content of the protolithic sediments; Darrington Phyllite predominantly graphitic quartzose phyllite with lesser calcareous graphitic quartzite phyllite (metamorph?) to micaceous quartzo-felsitic phyllonitic or mylonitized near the thrust contact with the overlying Helena-Haystack melange.

Divided into:

Jph_d Darrington Phyllite (<10 percent semischist);

Jph_j Darrington Phyllite (10-50 percent interlayered semischist)

Jph_{js} Semischist of Mount Josephine (10-50 percent interlayered phyllite)

Jph_{jh} Semischist of Mount Josephine (<10 percent phyllite)

Basaltic to basaltic andesitic metatuff greenschist interlayers

Mesozoic Metamorphic Rocks of the Haystack Thrust Nappe of Whetten and others (1988) and the Helena-Haystack Melange of Tabor (1994) (Jurassic)

Generally, blocks in a serpentinized matrix melange overlying the Easton Metamorphic Suite

Jhmc_h Heterogeneous metamorphic rocks of Butler Hill - Metabasalt, phyllitic to slaty graphite-bearing meta-argillite, metasdandrite, and rare metachert

Outcrops dominated by metabasalt

Jmv_h Metabasalt - Commonly augite-bearing; pillows and pillow breccia commonly preserved

Pillow metabasalt

Jigb_h Augite-bearing metagabbro

Ju_h Serpentinite with lesser talc schist, talc-tremolite schist, and tremolite schist with rare diopside-bearing clinopyroxenites; alpine ultramafic bodies occurring as tectonic slices with the melange, serpentinite common along the thrust contact between the Easton Metamorphic Suite and the Helena-Haystack melange

Serpentinite pods and outcrops too small to show at map scale

Geologic Map Symbols

