Map Unit Descriptions

af — Artificial fill (Holocene) - Heterogeneous mixture of artificially deposited material deposited ranging from well compacted gravel, sand, silt and clay to poorly compacted sediment high in organic content.

Qf — Alluvial fan (Holocene) - Characteristic fan-cone shapes at the mouths of eroding stream canyons.

Qal — Alluvium (Holocene and Late Pleistocene?) - Undifferentiated alluvial deposits of unconsolidated sand, gravel, silt, and lesser clay.

Ql — Lacustrine deposits (Holocene) - Undifferentiated and unconsolidated lake deposits of clay, silt and fine sand.

Qoa1 — River terrace deposits (Holocene) - Dominantly sand and gravel with lesser silt and clay deposited during higher stream stands over flat-lying to gently inclined platforms.

Qoa2 — Undifferentiated continental and marine deposits (Holocene-Pleistocene) - Undifferentiated older river terrace deposits. Weakly consolidated, moderately to poorly sorted, gravel, sand, silty sand, silt and clay deposited in a fluvial environment and subsequently uplifted.

QTfa — Falor Formation (Pliocene-Pleistocene) - Pebbly conglomerate, sandstone and siltstone that contains abundant animal and plant remains locally. Unit was deposited in a fluvial and shallow marine environment. Contact between it and underlying units is an erosional unconformity.

KJfsc — Sandstone and mélange unit of Snow Camp Mountain (Cretaceous-Jurassic) Central Belt Franciscan Complex - This unit underlies the bulk of the NF Mad River watershed and consists of bodies of dense, intact sandstone intermixed with a pervasively sheared shale-rich mélange containing smaller blocks of metagraywacke, metachert, volcanic breccia, metabasalt, metatuff, metavolcanic rocks, greenstone and glaucophane-lawsonite blueschist. Based on aerial photograph interpretation and mapping, this material appears to be similar mechanically to the incoherent unit of Coyote Creek, but appears to be more resistant to active mass-wasting. ss = sandstone, gs = greenstone, u = undifferentiated bedrock.

KJfg — Transitional rocks of the Grogan fault zone (Cretaceous-Jurassic) Eastern Belt Franciscan Complex - Phyllitic sandstone and mudstone with minor greenstone, metaconglomerate and exotic blocks of blueschist. Metaconglomerates exhibit alignment, deformation and shattering of clasts. Grogan fault zone rocks are described as intermediate in texture and degree of metamorphism between the Redwood Creek schist and the sandstone and mudstone units (Harden and others,1982). These rocks crop out along the trace of the Grogan fault and underlie much of the inner gorge of Redwood Creek.

KJfl — Coherent unit of Lacks Creek (Cretaceous-Jurassic) Eastern Belt Franciscan Complex - This unit consists of a relatively resistant assemblage of sandstone and mudstone. Intact sections of interbedded sandstone and mudstone show rhythmic bedding and sedimentary structures characteristic of turbidites. Sandstones are composed of lithic greywacke and quartzofeldspathic greywacke (Cashman et al., 1995). Massive sandstone beds are up to 10 m thick and are typically 0.1 - 3 m thick where interbedded with mudstone.

KJfc — Incoherent unit of Coyote Creek (Cretaceous-Jurassic) Eastern Belt Franciscan Complex - This unit consists dominantly of a fine-grained sandstone and shale assemblage that has been pervasively sheared into a mélange by tectonic processes. The unit underlies the Redwood Creek basin east of the Grogan fault. The Coyote Creek unit is further characterized by the presence of greenstone, chert and minor conglomerate. Greenstone blocks are found as "floaters" in pervasively sheared mudstone matrix. Soils developing on the bedrock are typically clay rich and highly susceptible to erosion and sliding.

KJfr — Redwood Creek schist (Cretaceous-Jurassic) Eastern Belt Franciscan Complex - This unit is mostly light green to dark gray fine-grained foliated and crenulated (numerous small folds) quartz-mica schist and underlies the western half of the watershed from Lord Ellis Summit to O'Kane. The unit is distinctive because of its strongly developed platy (metamorphic) textures and high quartz/mica content. The Redwood Creek schist and South Fork Mountain Schist seen in the Willow Creek section appear nearly identical at hand-sample scale. Several other types of rocks occur within the Redwood Creek schist, including meta-sandstone, greenstone (altered basalt) and tuff. Large variations in texture, composition and degree of deformation are reportedly seen within this unit (Cashman and others, 1995). Outcrops occasionally contain minor amounts of epidote, actinolite, lawsonite and graphite.

KJfs — South Fork Mountain Schist (Cretaceous-Jurassic) Eastern Belt Franciscan Complex - The dominant rock is dark gray to green quartz-albite-muscovite-chlorite schist and has similar mineralogical characteristics to the Redwood Creek schist. Includes foliated greenstone and quartz-gneissic rocks. The surface expression is geomorphically variable. It has a well-developed foliation (platy texture), is fine-grained and typically has quartz veins oriented parallel to the foliation based on our field examination of hand specimens and outcrop exposures.

Jg — Galice Formation (Jurassic) - Very fine- to coarse-grained gray phyllitic metagraywacke. Finer portions altered to slate and phyllitic slate. Level of metamorphism generally increases westward through the unit. Numerous exposures streams show graded bedding typical of turbidite sequences. Intruded by scattered metamorphic-felsite dikes and sills. Areas underlain by slates and phyllitic slate are especially subject to slope failure.

Jr — Rogue (?) Formation (Jurassic) - Mafic (high in magnesium and iron) to intermediate volcanic flows and tuffs, now altered to greenstone. Some volcanic conglomerates in the upper portion of the unit. Stringers and layers of chert or siliceous argillite to 1 inch thick are present sporadically.

gn — Friday Camp gneiss (Jurassic?) - Weakly foliated hornblende-diorite gneiss. Alternatively, unit may be related to an ophiolite sequence and gneiss appearance may be due to cumulate layering in gabbro within the sequence. May also be altered Rogue Formation.

TrPz — Western Paleozoic and Triassic belt mélange (Triassic) - Fine-grained volcanic rocks, fine- to medium-grained greywacke, chert and siliceous argillite, lenses of serpentinite, local limestone and conglomerate and small intrusive igneous bodies. Individual rock units are discontinuous and overall rock character is highly fractured and chaotic.

ps — Undifferentiated Ultramafic rocks (Mesozoic) - Seen as sporadic sheared lenses and sheet-like masses of peridotite and serpentinite. Larger bodies are serpentinized peridotite, while smaller bodies are largely serpentinite. No occurrences of asbestos have been noted in this unit.

i — Small igneous plugs, dikes and sills (Mesozoic) - Only the largest masses were shown on the map. Found at widely scattered locations throughout region.

wc — Willow Creek Pluton (Mesozoic) - Coarse granodiorite composed almost entirely of extremely large quartz and feldspar grains that have been crushed and sheared.

Landslide Symbols

ROCK SLIDE: Slope movement with bedrock as its primary source material. This class of failure includes rotational and translational landslides; relatively cohesive slide masses with failure planes that are deep-seated in comparison to those debris slides of similar areal extent. The slide plane is curved in a rotational slide. Movement along a planer joint or bedding surface may be referred to as translational. Complex versions with combinations of rotational heads and translational movement or earthflows downslope are common. Landslide boundary indicates confidence; solid line- definite, dashed line - probable, dotted line - questionable. indicates a scarp, arrows show direction of movement. Qls denotes deposit when present.

EARTHFLOW: Slow to rapid movement of mostly fine-grained soil with some rocky debris in a semi-viscous, highly plastic state. After initial failure, the mass may flow or creep seasonally in response to changes in groundwater level. These types of slope failures often include complexes of nested rotational slides and deeply incised gullies. Landslide boundary indicates confidence; solid line- definite, dashed line - probable, dotted line - questionable. indicates scarp, arrows show direction of movement. Qls denotes deposit when present.

DEBRIS SLIDE: Mass of unconsolidated rock, colluvium, and coarse-grained soil that has moved slowly to rapidly downslope along a relatively steep, shallow, translational failure plane. Debris slides form steep, unvegetated scars in the head region and possibly irregular, hummocky deposits in the toe region. Scars commonly erode and remain unvegetated for several seasons depending on slope aspect. Landslide boundary indicates confidence; solid line- definite, dashed line - probable, dotted line - questionable. Landslide deposit is locally absent. indicates scarp, no arrows are used to portray landslide movement direction. Qls denotes deposit when present.

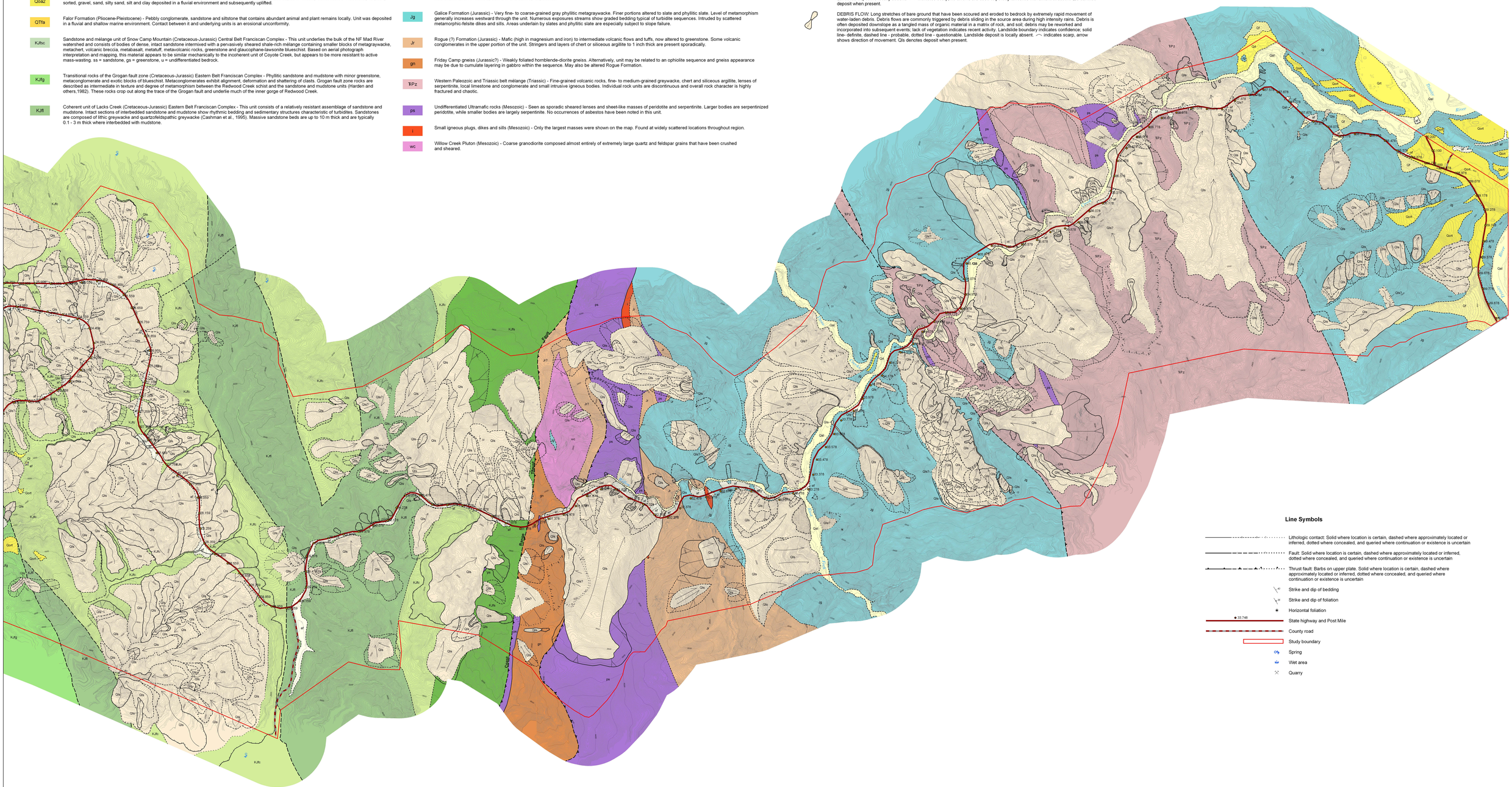
DEBRIS FLOW: Long stretches of bare ground that have been scoured and eroded to bedrock by extremely rapid movement of water-laden debris. Debris flows are commonly triggered by debris sliding in the source area during high intensity rains. Debris is often deposited downslope as a tangled mass of organic material in a matrix of rock, and soil; debris may be reworked and incorporated into subsequent events; lack of vegetation indicates recent activity. Landslide boundary indicates confidence; solid line- definite, dashed line - probable, dotted line - questionable. Landslide deposit is locally absent. indicates scarp, arrow shows direction of movement. Qls denotes deposit when present.

References:

Harden, D.R., Kelley, H.M., Morrison, S.D., and T.A. Stephens, 1991, Geologic map of the Redwood Creek drainage basin, Humboldt County, California, U.S. Geological Survey, Water Resources Investigations / Open File Report WRI-OFR 91-486, scale 1:62,500.

Kilbourne, R.W., 1985, Geology and geomorphic features related to landsliding, Blue Lake 7.5' quadrangle: California Division of Mines and Geology Open File Report OFR-85-4 S.F., scale 1:24,000.

Young, J.C., 1978, Geology of the Willow Creek 15' quadrangle, Humboldt and Trinity counties, California: California Division of Mines and Geology Open File Report, Map Sheet 31, scale 1:62,500.



Line Symbols

- Lithologic contact: Solid where location is certain, dashed where approximately located or inferred, dotted where concealed, and queried where continuation or existence is uncertain
- Fault: Solid where location is certain, dashed where approximately located or inferred, dotted where concealed, and queried where continuation or existence is uncertain
- Thrust fault: Barbs on upper plate. Solid where location is certain, dashed where approximately located or inferred, dotted where concealed, and queried where continuation or existence is uncertain
- Strike and dip of bedding
- Strike and dip of foliation
- Horizontal foliation
- 33.748 — State highway and Post Mile
- County road
- Study boundary
- Spring
- Wet area
- Quarry

UTM GRID AND 2005 MAGNETIC NORTH DECLINATION

MAP LOCATION

SCALE 1:12,000

0 1,000 2,000 4,000 Feet

0 0.5 1 Miles

0 500 1,000 2,000 Meters

CONTOUR INTERVAL 10 FEET
INDEX CONTOURS AT 200 FEET

GEOLOGIC MAP OF THE HIGHWAY 299 CORRIDOR HUMBOLDT COUNTY, CALIFORNIA BLUE LAKE TO WILLOW CREEK (PM 6.6 - PM 40.0) PLATE 1, SHEET 2 OF 2 (EASTERN PORTION)

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2005

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