DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

OPEN-FILE REPORT
88-363

Base from U.S. Geological Survey, 1951

SCALE 1:62 500

1 0 1 2 3 MILES

1 0 1 2 3 KILOMETERS

CONTOUR INTERVAL 50'

CALIF.

QUADRANGLE LOCATION

17½°

TRUE NORTH

MAGNETIC NORTH

APPROXIMATE MEAN DECLINATION 1988

DESCRIPTION OF MAP UNITS

QUATERNARY UNITS:

Qls LANDSLIDE AND EARTHFLOW DEBRIS: Downslope movement resulting from mass wasting is widespread. However, only major slides and earthflows are shown. Mass movement is common in all terranes, especially in shear zones, melange, and schistose units.

FRANCISCAN COMPLEX (Upper Jurassic-Lower Cretaceous):

KJfu DOMINANTLY SEDIMENTARY ROCKS (TEXTURAL ZONE 1 OF BLAKE AND OTHERS, 1967): Dominantly pervasively sheared, interbedded graywacke, shale and conglomerate, with minor intercalated lenses of greenish-black mafic volcanic rock (v) and red, green or dark gray ribbon chert (ch), which in places is in apparent depositional contact with the volcanic rock. Graywacke ranges in composition (*cf.* Folk, 1974) from litharenites to lithic arkoses (Aalto, 1987), lacks K feldspar, but commonly contains small amounts of pumpellyite within plagioclase grains. This unit is part of the Yolla Bolly terrane of Jayko and Blake (1987). Rocks of this unit are relatively coherent and sustain moderate relief, but contain localized shear zones that fail in earthflows.

KJfv MELANGE: Contains blocks chiefly composed of graywacke (large blocks labeled S) and mafic volcanic rock (large blocks labeled V; also see compositional key below), with less abundant chert pebble conglomerate, red and green ribbon chert, partially to wholly recrystallized light gray limestone, serpentinized ultramafic rock, foliated textural zone 2 metagraywacke (z2) and glaucophane-bearing schistose rock, all dispersed in a sheared shaly matrix. Graywacke is similar in composition to that of unit KJfu. Blocks are commonly ellipsoidal and range in size from centimeters to tens of meters in maximum dimension. Based on its location west of the Grogan fault, this unit is probably a melange within the Central Franciscan belt (Aalto, 1987; Aalto and Murphy, 1984; Jayko and Blake, 1987). This unit is incompetent and commonly fails in earthflows creating a low relief topography.

KJfl DOMINANTLY SEDIMENTARY ROCKS (TEXTURAL ZONE 1 OF BLAKE AND OTHERS, 1967): Dominantly moderately to pervasively sheared graywacke and shale with minor conglomerate. Graywacke is similar in composition to that of unit KJfu. Intercalated chert and volcanic rock are less common than in unit KJfu. Based on its location west of the Grogan fault, this unit is probably part of the Central Franciscan belt (Aalto, 1987; Jayko and Blake, 1987). This unit typically sustains moderate to high relief.

KJ_2 METASEDIMENTARY ROCK (TEXTURAL ZONE 2 OF BLAKE AND OTHERS, 1967): Chiefly gray to gray-green phyllite with minor platy to semi-schistose graywacke and stretched pebble conglomerate. These rocks are in gradational contact with superjacent rocks of textural zone 3 (Aalto, 1983) and herein are considered to be part of the Pickett Peak terrane.

KJ_3 SCHISTOSE METASEDIMENTARY ROCKS (TEXTURAL ZONE 3 OF BLAKE AND OTHERS, 1967): South Fork Mountain Schist (east of the Redwood Mountain fault) and Kerr Ranch Schist (northwest corner of the quadrangle); consist mostly of fine-grained, silvery quartz-albite-muscovite-chlorite schist that commonly contains epidote±lawsonite±sphene±stilpnomelane. The K-Ar isotopic age of metamorphism is about 120 Ma (Lanphere and others, 1978). The South Fork Mountain Schist locally contains lenticular masses of blue-green metachert, light green to tan metatuff and light to dark green metabasalt (mb). The metavolcanic rocks contain the mineral assemblage albite-chlorite-actinolite-epidote, similar to the Chinquapin Metabasalt Member of the South Fork Mountain Schist in the Pickett Peak quadrangle (Irwin and others, 1974). All units are part of the Pickett Peak terrane of Jayko and Blake (1987). Although not widely indicated on the map, slopes underlain by textural zone 3 rock are unstable and fail in earthflows.

KLAMATH MOUNTAINS PROVINCE GEOLOGIC UNITS:

Jg GALICE FORMATION (UPPER JURASSIC): Consists mostly of mildly slaty argillite and metagraywacke; age of formation is Oxfordian and Kimmeridgian based on fossil pelecypods found in correlative rocks near the California-Oregon border; isotopic K-Ar age of weak metamorphic overprint is about 150 Ma (Lanphere and others, 1978).

rct RATTLESNAKE CREEK TERRANE (JURASSIC AND OLDER): Melange consisting of sheared and dislocated bodies of serpentinized ultramafic rock (sp), mafic volcanics, argillite, thin-bedded chert, gabbro (Jgb) and dioritic to granitic plutonic rocks (Jgr), mildly slaty clastic sedimentary rocks, and minor recrystallized limestone (ls). Datable fossils have not been found in this unit in the map area, but elsewhere the chert in this unit contains Late Triassic to Middle Jurassic radiolarians, and the limestone bodies variously contain Devonian(?), late Paleozoic, and Late Triassic fossils. Patches of metasedimentary rock exposed at a few places within the general area of Rattlesnake Creek terrane may be fault slices or inliers of Galice Formation.

Jgr PLUTONIC ROCKS (EARLY(?) JURASSIC): Medium- to coarse-grained rocks ranging from diorite to granite.

Jgb SADDLE GULCH GABBRO (EARLY OR MIDDLE JURASSIC): Medium- to coarse-grained gabbro; K-Ar isotopic age is 158 Ma (M.A. Lanphere, personal commun., *in* Irwin, 1985).

Jdi AMMON RIDGE PLUTON (LATE JURASSIC): Diorite and hornblendite in map area, with contact metamorphic aureole (ma); pluton is more fully developed in Willow Creek quadrangle, with K-Ar isotopic ages of 148 and 152 Ma (revised constant; Young, 1978).

SERPENTINIZED ULTRAMAFIC ROCK OF VARIABLE AGE:

sp Occurrences along Eaton Roughs and Grogan faults may be slices of Middle and Late Jurassic Coast Range ophiolite; narrow slices (mostly not shown on map) along the South Fork fault may be related to the Middle and Late Jurassic Josephine ophiolite; occurrences along the Bear Wallow fault and in the Rattlesnake Creek terrane probably are Early Jurassic or Triassic in age.

KEY TO COMPOSITION OF TECTONIC BLOCKS IN ALL FRANCISCAN UNITS:

Note: Blocks are common in melange unit KJfv, in gouge zones beneath major thrust faults (Aalto,1982; Monsen and Aalto, 1980), and in shear zones developed along high angle faults (Aalto, 1983). They are present, but less common, in all other Franciscan units.

- Mafic volcanic rock, commonly containing vesicles and albitized plagioclase laths; extensively altered to chlorite, carbonate, epidote, and pumpellyite.
- Red and green ribbon chert.
- ☆ Limestone, partially to wholly recrystallized.
- ✪ Glaucophane-bearing schistose rock.
- ☼ Serpentinized ultramafic rock: also shown as areas labeled sp along the Grogan fault.

KEY TO SYMBOLS

CONTACTS:

Depositional or of unknown character; dashed where inferred, dotted where concealed.

Thrust fault; dashed where inferred, dotted where concealed. Sawteeth on upper plate.

High angle fault; dashed where inferred, dotted where concealed. Arrows indicate relative horizontal movement.

Shear zones along the Grogan fault, Snow Camp Creek fault, and Eaton Roughs fault zone; zones commonly contain clastic sedimentary rocks, chert, limestone, volcanic rocks , and glaucophane-bearing schistose rocks dispersed in argillite that has subvertical folds and foliation (Aalto, 1983).

ORIENTATION OF BEDDING AND FOLIATION:

16 Inclined

30 Overturned

Vertical

Horizontal unright

23 / 12 Strike and dip of inclined foliation; arrow depicts trend and plunge of lineation defined by the intersection of two metamorphic foliations.

Strike of vertical foliation

FOLD ORIENTATION:

9 Anticline showing trace of axial plane and plunge of axis; dashed where located approximately

44 Overturned anticline showing trace of axial plane and plunge of axis; dashed where located approximately

13 Syncline showing trace of axial plane and plunge of axis; dashed where located approximately

74 Overturned syncline showing trace of axial plane and plunge of axis; dashed where located approximately

REFERENCES CITED

Aalto, K. R., 1982, The Franciscan Complex of northernmost California: sedimentation and tectonics: *in* J. K. Leggett, ed., Trench-forearc geology: Geological Society of London Special Publication 10, p. 419- 432.

Aalto, K. R., 1983, Franciscan Complex geology of the Pilot Creek quadrangle, northern California: Geological Society of America Abstracts with Programs, v. 15, p. 275.

Aalto, K. R., 1987, Sandstone petrology and tectonostratigraphic terranes of the NW California and SW Oregon Coast Ranges: Geological Society of America Abstracts with Programs, v. 19, p. 565.

Aalto, K. R. and Murphy, J. M., 1984, Franciscan Complex geology of the Crescent City area, northern California: *in* Blake, M. C., Jr., ed., Franciscan geology of northern California: Pacific Section, Society of Economic Paleontologists and Mineralogists, Book 43, p. 185-201.

Blake, M. C., Jr., Irwin, W. P., and Coleman, R. G., 1967, Upside-down metamorphic zonation, blueschist facies, along a regional thrust in California and Oregon, *in* Geological Survey Research, 1967: U. S. Geological Survey Professional Paper 575-C, p. C1-C9.

Folk, R. L., 1974, Petrology of sedimentary rocks: Hemphill Publishing Co., Austin, Texas, 182p.

Harden, D. R., Kelsey, H. M., Morrison, S. D., and Stephens, T. A., 1982, Geologic map of the Redwood Creek drainage basin, Humboldt County, California: U. S. Geological Survey Water Resources Map WRI-OFR 81-496, scale 1:62,500.

Irwin, W. P., 1985, Age and tectonics of plutonic belts in accreted terranes of the Klamath Mountains, California and Oregon, *in* Howell, D.G., ed., Tectonostratigraphic terranes of the circum-Pacific region: Circumpacific Council for Energy and Mineral Resources, Earth Science Series, no. 1, p. 187-199.

Irwin, W. P., Wolfe, E. W., Blake, M. C., Jr., and Cunningham, C. G., Jr., 1974, Geologic map of the Pickett Peak quadrangle, Trinity County, California: U. S. Geological Survey Map GQ-1111, scale 1:62,500.

Jayko, A. S., and Blake, M. C., Jr., 1987, Geologic terranes of coastal northern California and southern Oregon, *in* Schymiczek, H. and Suchsland, R., eds., Tectonics, sedimentation and evolution of the Eel River and other coastal basins of northern California: Pacific Section, American Association of Petroleum Geologists, Miscellaneous Publication 37, p. 1-12.

Kelsey, H. M. and Allwardt, A. A., 1983, Evidence for a major Quaternary fault in the Central Belt Franciscan, Northern California: Geological Society of America Abstracts with Programs, v. 15, p. 316.

Lanphere, M. A., Blake, M. C., Jr., and Irwin, W. P., 1978, Early Cretaceous metamorphic age of the South Fork Mountain Schist in the northern Coast Ranges of California: American Journal of Science, v. 278, p. 798-815.

Manning, G. A. and Ogle, B. A., 1950, Geology of the Blue Lake quadrangle, California: California Division of Mines Bulletin 148, 36p.

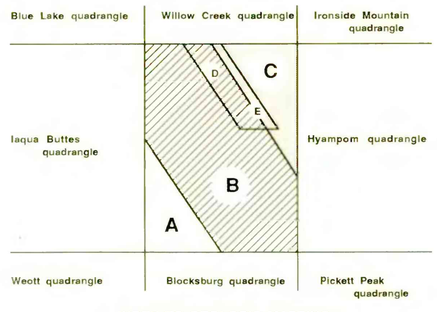
Monsen, S. A. and Aalto, K. R., 1980, Petrology, structure and regional tectonics: South Fork Mountain Schist of Pine Ridge Summit, northern California: Geological Society of America Bulletin, v. 91, p. 369-373.

Rowland, R. E., 1966, Geology of the Grouse Creek area, South Fork Mountain, California: Los Angeles, University of California, M. S. thesis, 106p.

Young, J. C., 1978, Geology of the Willow Creek quadrangle, Humboldt and Trinity Counties, California: California Division of Mines and Geology, Map Sheet 31, scale 1:62,500, with text 16p.

NOMENCLATURE EMPLOYED ON THIS MAP

Formal and informal map units are named chiefly according to nomenclature employed by Irwin and others (1974) for the Pickett Peak quadrangle immediately to the southeast. The *Kerr Ranch Schist* was named by Manning and Ogle (1950), who also used the names *Grogan fault* and *Redwood Mountain fault* for faults within the Blue Lake quadrangle to the northwest that extend into the Pilot Creek quadrangle. All subsequent workers have referred to the *Grogan fault* as the *Grogan fault* because this misspelling occurred on the Manning and Ogle map, and the name *Grogan* is used on this map. Harden and others (1982) named the *Snow Camp Creek fault* , and Kelsey and Allwardt (1983) the *Eaton Roughs fault zone*. The *South Fork* and *Bear Wallow faults* (Irwin and others, 1974), which extend from the Pickett Peak quadrangle into the Pilot Creek quadrangle, are correlative respectively with faults called the *Coast Range thrust fault* and *Hennesey Ridge thrust fault* by Young (1978) in the Willow Creek quadrangle.



INDEX TO GEOLOGIC MAPPING

Mapping in area A by H. M. Kelsey, area B by K. R. Aalto, area C by W. P. Irwin, area D by K. R. Aalto with some data from Rowland (1966), and area E by Rowland (1966) with minor modification by W. P. Irwin.

RECONNAISSANCE GEOLOGIC MAP OF THE PILOT CREEK QUADRANGLE, HUMBOLDT AND TRINITY COUNTIES, CALIFORNIA

By
K. R. Aalto, W. P. Irwin, and H. M. Kelsey

1988

This report is preliminary and has not been reviewed for conformity with U.S. Geological Survey editorial standards and stratigraphic nomenclature. Any use of trade names is for descriptive purposes only and does not imply endorsement by the USGS.