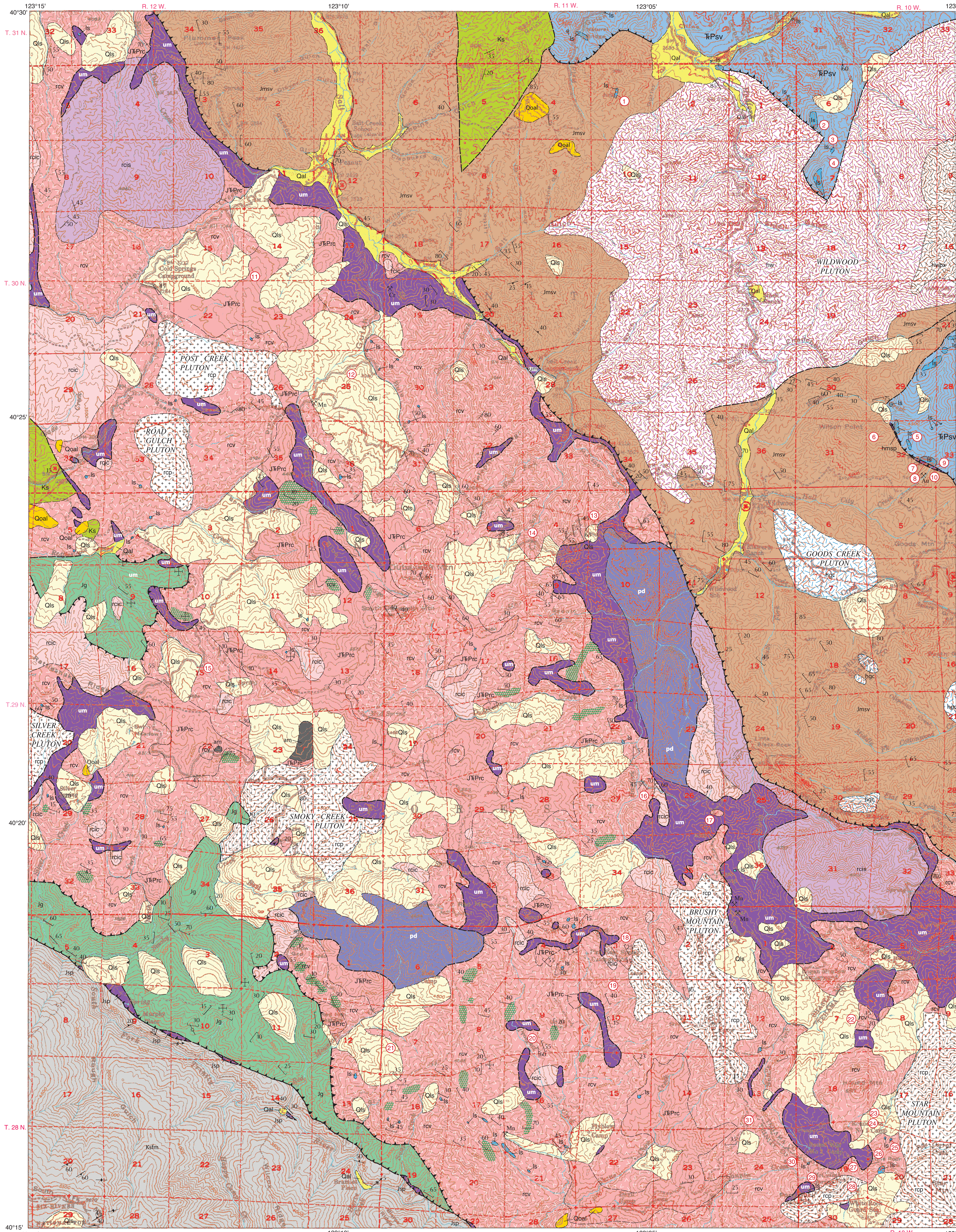
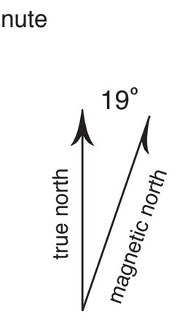
U.S. Department of the Interior
U.S. Geological Survey



Base: U.S. Geological Survey Dubakella Mtn 15-minute quadrangle, 1954; polyconic projection
North American Datum 1927.



SCALE 1:50 000

1 1/2 0 1 2 3 4 MILES

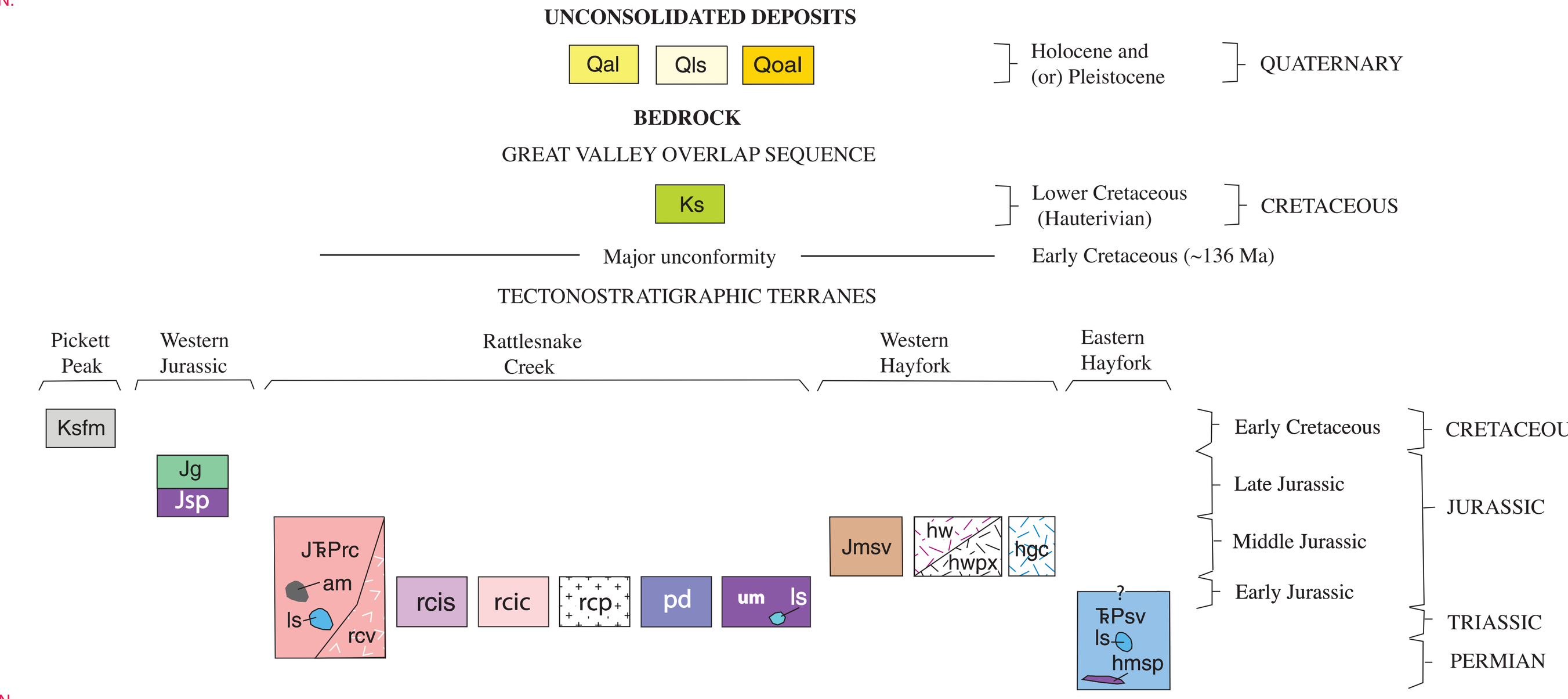
3000 0 3000 6000 9000 12000 15000 18000 21000 FEET

1 .5 0 1 2 3 4 5 KILOMETERS

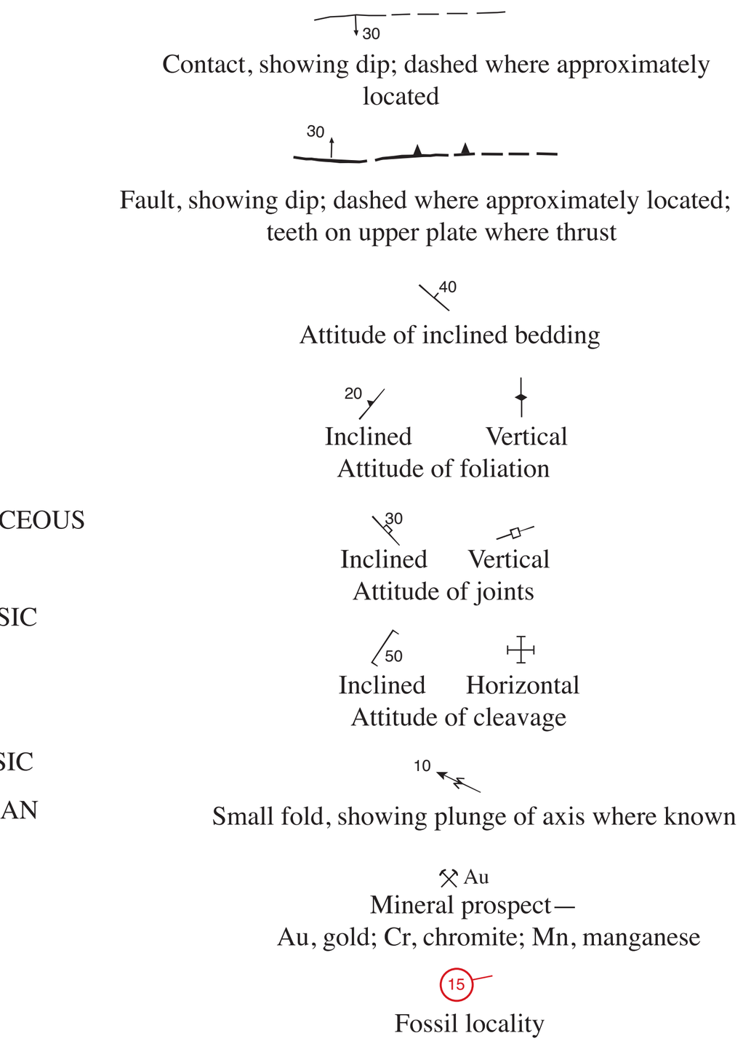
CONTOUR INTERVAL 100 FEET
DATUM IS MEAN SEA LEVEL

Geology mapped by W.P. Irwin 1968-1984; A.W. Snoke, 1968; J.D. Yule and B.L. Court, 1983; and L.A. Stern and W.B. Copeland, 1984.
GIS database and digital cartography by W.P. Irwin and C.M. Wentworth, 2010.
Edited by Theresa Iki
Manuscript approved for publication January 21, 2011

CORRELATION OF MAP UNITS



MAP SYMBOLS



DESCRIPTION OF MAP UNITS

UNCONSOLIDATED DEPOSITS

Qal — **Younger alluvium (Holocene and (or) Pleistocene)—**Unconsolidated sand and gravel in modern stream channels and on associated low terraces

Qls — **Landslide deposits (Holocene and (or) Pleistocene)—**Landsliding is particularly prominent in the Rattlesnake Creek terrane and is minimal in the Western Hayfork terrane. Most landslide deposits on the northeast slope of South Fork Mountain are not shown, although downslope movement resulting from mass wasting is widespread

Qoal — **Older alluvium (Pleistocene or older(?))—**Weakly consolidated nonmarine sand and gravel. Generally on ridge crests high above modern streams; associated with remnants of old land surfaces

BEDROCK

GREAT VALLEY OVERLAP ASSEMBLAGE

Ks — **Great Valley sequence (Lower Cretaceous)—**Well-bedded and indurated mudstone, sandstone and conglomerate that occur as erosional remnants overlying Eastern Hayfork and other pre-Cretaceous terranes with high angular unconformity. Patch at western boundary of quadrangle is part of Glade Creek outlier, which in the adjoining Pickett Peak 15′ quadrangle (Irwin and others, 1974) contains Valanginian fossils and shows an upward transition from nonmarine to marine deposition (Jones and Irwin, 1971). Outlier at northern boundary of quadrangle is mainly conglomerate and coarse sandstone; exposure is especially poor in southern part of that outlier. Fossils have not been found in the Great Valley sequence in this quadrangle. The outliers are depositional although largely bounded by steep faults

TECTONOSTRATIGRAPHIC TERRANES

Eastern Hayfork Terrane

TRPsv, ls, hmsp — **Mélange (Early Jurassic? to Permian)—**Includes mafic volcaniclastic rocks, thin-bedded chert, argillite, pillow basalt, tuff, sandstone, limestone (ls, where shown), serpentinite (hmsp), and minor amounts of mica schist and amphibolite. Chert contains Late Triassic and Jurassic(?) radiolarians, and Middle or Late Triassic conodonts (fossil locality nos. 2, 4, 8, 9, 10; table 1); limestone yielded a Late Permian ammonite and a Late Permian Tethyan fusulinid fauna (fossil locality nos. 3, 5, 7, 9; table 1). Unit structurally overlies the Hayfork Bally Meta-andesite along Wilson Point Fault and is equivalent to the eastern Hayfork terrane of Wright (1982). Upper age of unit is constrained by Lower Cretaceous strata of the Great Valley sequence that unconformably overlie unit at south end of Klamath Mountains province

Western Hayfork Terrane

Jmsv — **Hayfork Bally Meta-andesite (Middle Jurassic)—**Mafic volcanogenic rocks that range from crystal tuff and tuff breccia to coarse breccia. Commonly characterized by euhedral augite and plagioclase phenocrysts in a light- to dark-green groundmass. Commonly well bedded and locally includes interlayers of thin-bedded chert and dark argillite. Unit is equivalent to the lower unit of the Hayfork terrane of Irwin (1974, 2010), and to the western Hayfork terrane of Wright (1982). Age is herein considered Middle Jurassic on the basis of a probable cogenetic relation with the Ironside Mountain batholith (about 170 Ma; Lanphere and others, 1968; Wright, 1981) that intrudes the meta-andesite just north of the map area. Unit thought to be entirely marine and probably represents an island-arc deposit. Limestone body (ls) and chert (fossil locality no. 1; table 1), 1.5 km southeast of Natural Bridge, may be a small thrust outlier of the Eastern Hayfork terrane

hw, hwpx — **Wildwood Pluton (Middle Jurassic)—**Dominantly medium- to coarse-grained biotite-pyroxene diorite; includes gabbroic and other facies where undivided and pyroxenite (hwpx) where divided; intrudes only the Hayfork Bally Meta-andesite (Jmsv); presumably Middle Jurassic in age based on petrologic similarity to isotopically dated Ironside Mountain batholith

hgc — **Goods Creek Pluton (Middle? Jurassic)—**Mainly medium-grained hornblende-biotite-quartz diorite. Same pattern used for small dioritic and gabbroic intrusive bodies situated along Shasta-Trinity County boundary and on Dead Horse Ridge and for probable exposures of Oliphant Creek pluton of Wright (1981)

Rattlesnake Creek Terrane

JTRPrc, am, ls, rcv — **Mélange (Jurassic to Permian)—**Sheared and dislocated bodies of pillow basalt and other mafic volcanic rocks, thin-bedded chert, argillite, serpentinite and related metasomatized rocks (um, where divided), limestone (ls, where divided), and amphibolite (am, where divided). Areas of dominantly mafic volcanic rocks (rcv, where divided) are indicated by v pattern. Chert yielded Late Triassic to Early Jurassic and rarely to Middle Jurassic radiolarians (See table 1). A few limestone bodies yielded Triassic(?) corals (fossil locality no. 25; table 1), late Paleozoic fusulinids (fossil locality no. 31; table 1), and Late Triassic ammonites (fossil locality no. 27; table 1)

Areas of clastic sedimentary rock that are mildly slaty to phyllitic and may be correlative with the Galice(?) Formation (Jg)

rcis — **Intermediate to silicic volcanic rocks (Jurassic or Triassic)—**Fine-grained, commonly leucocratic volcanic rocks; locally includes dikes and other shallow intrusions that may be equivalent to unit rcic, and minor mafic volcanic rocks

rcic — **Intrusive complex (Jurassic or Triassic)—**Areas of dikes and other shallow, irregularly shaped bodies intruding extrusive volcanic rocks equivalent to units rcv and rcis; intrusive rocks dominantly leucocratic, but range from gabbro to granite; at least in part correlative with the Tule Creek Granite Complex of the Pickett Peak 15′ quadrangle (Irwin and others, 1974); time of intrusion is probably Late Triassic or Early Jurassic

rcp — **Plutonic complex (Early Jurassic and (or) LateTriassic)—**Medium- to coarse-grained rocks that range from gabbro to quartz diorite; includes Star Mountain, Brushy Mountain, Silver Creek, Smoky Creek, Road Gulch, and Post Creek plutons. U-Pb isotopic analysis of zircon from six localities of the quartz diorite in the Rattlesnake Creek terrane, mostly beyond the boundary of the Dubakella Mountain quadrangle, yielded ages of 193 Ma to 207 Ma (see Wright, 1981). Contact relations with adjacent units are unclear and may be faults

um, ls — **Serpentinite (age uncertain)—**Dominantly serpentinized peridotite, but includes greenstone, rodingite and other metasomatized rocks of uncertain origin, volcanic rocks, chert, and limestone (ls, where divided). Locally gradational with unit pd and other units of JTRPrc

pd — **Blocky peridotite (age uncertain)—**Dominantly tectonized harzburgite; moderately serpentinized; characterized by bold, blocky outcrops; locally includes nearly unserpentinized dunite; grades into unit um

Western Jurassic Terrane

Jg — **Galice (?) Formation (Late Jurassic)—**Mildly slaty to phyllitic argillite, graywacke, and stretched-pebble conglomerate; unfossiliferous in this quadrangle; kink folds common; unit presumably correlative with the Late Jurassic (Oxfordian and Kimmeridgian) Galice Formation of southwestern Oregon; isotopic age of metamorphic overprint is about 150 Ma (Lanphere and others, 1978)

Jsp — **Serpentinite (Late? Jurassic)—**Occurs as tectonic slices along the South Fork Fault; may be related to the Josephine ophiolite of Harper (1980), which is exposed farther north along the western margin of the Klamath Mountains, rather than to nearby serpentinite (um) of the Rattlesnake Creek terrane

Pickett Peak Terrane

Ksfm — **South Fork Mountain Schist (Early Cretaceous)—**Mostly fine-grained quartz-albite-muscovite-chlorite schist with sparse lawsonite; the schist contains abundant large lenticular segregations and veinlets of coarse quartz. Unit locally includes the Chinquapin Metabasalt Member (not shown separately), which consists of fine-grained albite-chlorite-actinolite-epidote gneiss with local crossite-rich layers; also includes rare metachert. Age of protolith is Late Jurassic(?) and Early Cretaceous(?); Early Cretaceous age of metamorphism is based on isotopic ages of about 120 Ma (Lanphere and others, 1978)

Table 1. Fossil localities in the Dubakella Mountain 15' quadrangle

Map No.	Sample No.	Lithology*	Fossils	Age	Reference
1	20-82	C	Radiolarians	Late Triassic (Late Norian) to Early Jurassic (Hettangian)	C.D. Blome, written commun., 1982
2	76-80	C	Radiolarians	Late Triassic (late Karnian to late middle Norian)	Irwin and others, 1982
3	7-81	L	Fusulinids	late Permian (Tethyan fauna)	Nestell and others, 1981
4	27-81	C	Radiolarians	Mesozoic	Irwin and others, 1982
5	84-77	L	Fusulinids	late Permian (Tethyan fauna)	Nestell and others, 1981
6	42-83	C	Radiolarians	Mesozoic	C.D. Blome, written commun.,1983
7	D702	L	Ammonite	late Permian	Irwin and Galanis, 1976
	83-77	L	Fusulinids	late Permian (Tethyan fauna)	
8	82-77	C	Radiolarians	Triassic or Jurassic	Irwin and others, 1982
9	30-73	L	Fusulinids and foraminifers	late Permian (Tethyan? fauna)	Irwin and Galanis, 1976
	29-68	L	do.	do.	do.
	7-61	L	do.	do.	do.
10	80-77	C	Radiolarians	Triassic	Irwin and others, 1982
		C	Conodonts	Middle or Late Triassic	Irwin and others, 1983
11	21-76	C	Radiolarians	Late Triassic (Karnian or Norian)	Irwin and others, 1982
12	37-76	C	Radiolarians	Triassic or Jurassic	do.
13	39-76	C	do.	do.	do.
14	8-77	C	do.	do.	do.
15	38-83	C	do.	Mesozoic	C.D. Blome, written commun., 1983
16	47-84	C	do.	Late Triassic (Norian)	C.D. Blome, written commun., 1984
17	40-76	C	do.	Early or Middle Jurassic	Irwin and others, 1982
	46-84	C	do.	Early Jurassic	C.D. Blome, written commun., 1984
18	43-77	C	do.	Mesozoic(?)	do.
19	49-83	C	do.	Late Triassic or Early Jurassic	C.D. Blome, written commun., 1983
20	75-83	C	do.	Mesozoic	do.
21	40-83	C	do.	do.	do.
22	57-83	C	do.	Early Jurassic	do.
23	54-83	C	do.	Mesozoic (Late Triassic?)	do.
24	53-83	C	do.	Late Triassic or Early Jurassic	do.
25	33-68	L	Corals	Triassic(?)	Irwin and Galanis, 1976
26	52-83	C	Radiolarians	Late Triassic	C.D. Blome, written commun., 1983
27	D705 3-61	L	Ammonites	Late Triassic (Karnian)	Silberling and Irwin, 1962
28	51-83	C	Radiolarians	Triassic to Middle Jurassic	C.D. Blome, written commun., 1983
29	37-68	L	Conodonts	Late Triassic	Irwin and others, 1983
30	46-83	C	Radiolarians	Late Triassic	C.D. Blome, written commun., 1983
31	1-61	L	Fusulinids	late Paleozoic	Irwin and Galanis, 1976

*Abbreviations: C, chert; L, limestone

SYNOPSIS

The Dubakella Mountain 15' quadrangle is located just south of the Hayfork quadrangle and just east of the Pickett Peak quadrangle. It spans a sequence of four northwest-trending tectonostratigraphic terranes of the Klamath Mountains geologic province that includes, from east to west, the Eastern Hayfork, Western Hayfork, Rattlesnake Creek, and Western Jurassic terranes, as well as, in the southwest corner of the quadrangle, part of a fifth terrane, the Pickett Peak terrane of the Coast Ranges geologic province (see Generalized Terrane Map).

The Eastern Hayfork terrane is a broken formation and mélange of volcanic and sedimentary rocks that include blocks of limestone and chert. The limestone contains late Permian microfossils of Tethyan faunal affinity. The chert contains radiolarians of Mesozoic age, mostly Triassic, but none clearly Jurassic.

The Western Hayfork terrane is an andesitic volcanic arc that consists mainly of agglomerate, tuff, argillite, and chert, and includes the Wildwood pluton. That pluton is related to the Middle Jurassic (about 170 Ma) Ironside Mountain batholith that is widely exposed farther north beyond the Dubakella Mountain quadrangle.

The Rattlesnake Creek terrane is a highly disrupted ophiolitic mélange of probable Late Triassic or Early Jurassic age. Although mainly ophiolitic, the mélange includes blocks of plutonic rocks (about 200 Ma) of uncertain genetic relation. Some scattered areas of well-bedded mildly slaty detrital rocks of the mélange appear similar to Galice Formation (unit Jg) and may be inliers of the nearby Western Jurassic terrane.

The Western Jurassic terrane consists mainly of slaty to phyllitic argillite, graywacke, and stretched-pebble conglomerate and is correlative with the Late Jurassic Galice Formation of southwestern Oregon.

The Pickett Peak terrane, the most westerly of the succession of terranes of the Dubakella Mountain quadrangle, is mostly fine-grained schist that includes the blueschist facies mineral lawsonite and is of Early Cretaceous (about 120 Ma) metamorphic age.

Remnants of the Great Valley sequence of dominantly Cretaceous marine sedimentary strata, which once covered much of the southern fringe of the Klamath Mountains, are present at three places in the Dubakella Mountain quadrangle.

Mineral production in the quadrangle has included small amounts of gold, chromite, and manganese.

This map of the Dubakella Mountain 15' quadrangle is a digital rendition of U.S. Geological Survey Miscellaneous Field Studies Map MF-1808 (Irwin and others, 1985), with various improvements and additions.

REFERENCES CITED

Harper, G.D., 1980, The Josephine ophiolite—remains of a Late Jurassic marginal basin in northwestern California: Geology, v. 8, no. 7, p. 333-337.

Irwin, W.P., 1974, Reconnaissance geologic map of the Hayfork quadrangle, Trinity County, California: U.S. Geological Survey, Miscellaneous Field Studies Map MF-576, scale 1:62,500.

Irwin, W.P., 2010, Reconnaissance geologic map of the Hayfork 15' quadrangle, Trinity County, California: U.S. Geological Survey Scientific Investigations Map 3119, map scale 1:50,000, [http://pubs.usgs.gov/sim/3119].

Irwin, W.P., and Galanis, S.P., Jr., 1976, Map showing limestone and related fossil localities in the Klamath Mountains province, California and Oregon: U.S. Geological Survey Miscellaneous Field Studies Map MF-749, scale 1:500,000.

Irwin, W.P., Jones, D.L., and Blome, C.D., 1982, Map showing sampled radiolarian localities in the western Paleozoic and Triassic belt, Klamath Mountains, California: U.S. Geological Survey Miscellaneous Field Studies Map MF-1399, scale 1:250,000.

Irwin, W.P., Wardlaw, B.R., and Kaplan, T.A., 1983, Conodonts of the western Paleozoic and Triassic belt, Klamath Mountains, California and Oregon: Journal of Paleontology, v. 57, no. 5, p. 1,030-1,039.

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 Geological Quadrangle Map GQ-1111, scale 1:62,500.

Irwin, W.P., Yule, J.D., Court, B.L., Snoke, A.W., Stern, L.A., and Copeland, W.B., 1985, Reconnaissance geologic map of the Dubakella Mountain quadrangle, Trinity, Shasta, and Tehema Counties, California: U.S. Geological Survey Miscellaneous Field Studies Map MF-1808, scale 1:62,500.

Jones, D.L., and Irwin, W.P., 1971, Structural implications of an offset Early Cretaceous shoreline in northern California: Geological Society of America Bulletin, v. 82, no. 4, p. 815-822.

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, no. 6, p. 798-815.

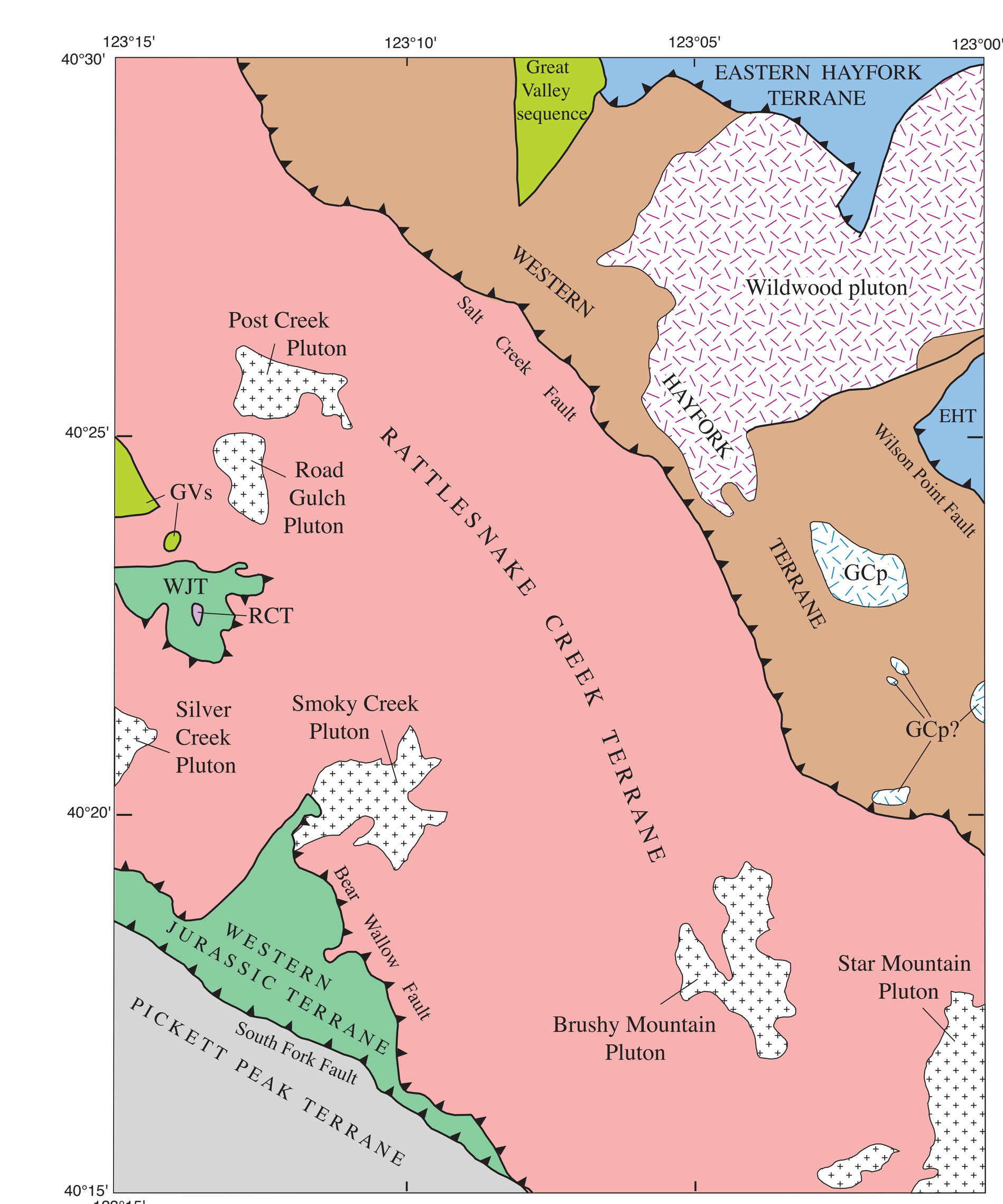
Lanphere, M.A., Irwin, W.P., and Hotz, P.E., 1968, Isotopic age of the Nevadan orogeny and older plutonic and metamorphic events in the Klamath Mountains, California: Geological Society of America Bulletin, v. 79, no. 8, p. 1,027-1,052.

Nestell, M.K. Irwin, W.P., and Albers, J.P., 1981, Late Permian (early Djulfian) Foraminifera from the southern Klamath Mountains, California: Geological Society of America Abstracts with Programs, v. 12, no. 7, p. 519.

Silberling, N.J., and Irwin, W.P., 1962, Triassic fossils from the southern Klamath Mountains, California: U.S. Geological Survey Professional Paper 450-B, p. B60-B61.

Wright, J.E., 1981, Geology and U-Pb geochronology of the western Paleozoic and Triassic subprovince, Klamath Mountains, northern California: Santa Barbara, Calif., University of California, Ph.D. dissertation, 300 p.

Wright, J.E., 1982, Permo-Triassic accretionary subduction complex, southwestern Klamath Mountains, northern California: Journal of Geophysical Research, v. 87, no. B5, p. 3,805-3,818.



GENERALIZED TERRANE MAP

The Dubakella Mountain 15' quadrangle includes parts of four generally subparallel northwest-trending terranes (the Eastern Hayfork, Western Hayfork, Rattlesnake Creek, and Western Jurassic terranes) that were sequentially accreted to North America during Jurassic time to become parts of the Klamath Mountains geologic province. Later, during Early Cretaceous time, a fifth terrane (Pickett Peak terrane) was accreted to become part of the Coast Ranges geologic province. The Cretaceous Great Valley sequence overlap assemblage, which once covered much of the southern Klamath Mountains, remains in the quadrangle as three erosional outliers. Abbreviations: EHT, Eastern Hayfork terrane; RCT, Rattlesnake Creek terrane; WJT, Western Jurassic terrane; GCp, Goods Creek pluton and related small plutons; and GVs, Great Valley sequence.

Reconnaissance Geologic Map of the Dubakella Mountain 15′ Quadrangle, Trinity, Shasta, and Tehama Counties, California

By

William P. Irwin, J. Douglas Yule, Bradford L. Court, Arthur W. Snoke, Laura A. Stern, and William B. Copeland

2011

Any use of trade, firm, or product names in this publication is for descriptive purposes only and does not imply endorsement by the U.S. Government.

This map was printed on an electronic plotter directly from digital files. Dimensional calibration may vary between electronic plotters and between X and Y directions on the same plotter, and paper may change size due to atmospheric conditions; therefore, scale and proportions may not be true on plots of this map.

For sale by U.S. Geological Survey, Information Services, Box 25286, Federal Center, Denver, CO 80225, 1-888-ASK-USGS

Digital files available at http://pubs.usgs.gov/sim/3149/