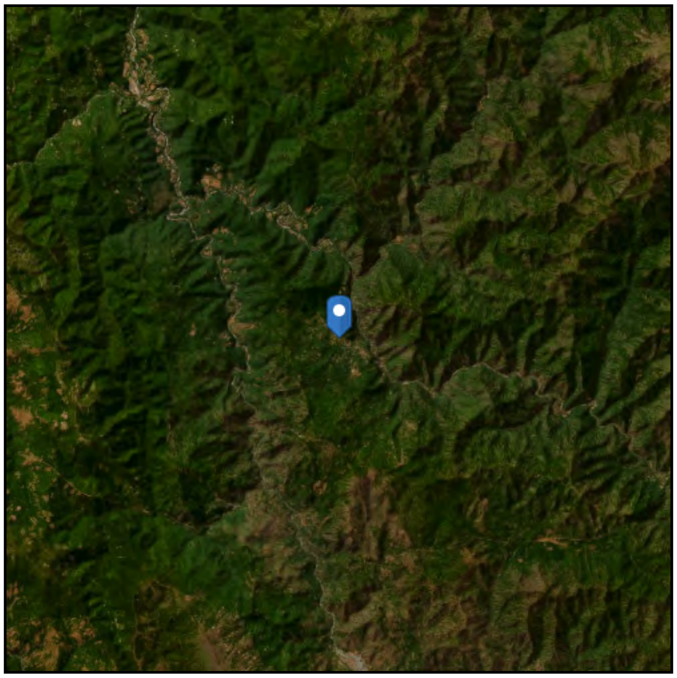
ASCE 7 Hazards Report

Address:
Iris Ln
Burnt Ranch, California
95527

Standard: ASCE/SEI 7-22
Risk Category: II
Soil Class: Default

Latitude: 40.81334
Longitude: -123.49139
Elevation: 1870.102829590664 ft (NAVD 88)



Wind

Results:

Wind Speed	93 Vmph
10-year MRI	64 Vmph
25-year MRI	70 Vmph
50-year MRI	75 Vmph
100-year MRI	80 Vmph
300-year MRI	87 Vmph
700-year MRI	93 Vmph
1,700-year MRI	100 Vmph
3,000-year MRI	104 Vmph
10,000-year MRI	113 Vmph
100,000-year MRI	130 Vmph
1,000,000-year MRI	148 Vmph

Data Source:	ASCE/SEI 7-22, Fig. 26.5-1B and Figs. CC.2-1–CC.2-4, and Section 26.5.2
Date Accessed:	Thu Jun 15 2023

Value provided is 3-second gust wind speeds at 33 ft above ground for Exposure C Category, based on linear interpolation between contours. Wind speeds are interpolated in accordance with the 7-22 Standard. Wind speeds correspond to approximately a 7% probability of exceedance in 50 years (annual exceedance probability = 0.00143, MRI = 700 years). Values for 10-year MRI, 25-year MRI, 50-year MRI and 100-year MRI are Service Level wind speeds, all other wind speeds are Ultimate wind speeds.

Site is not in a hurricane-prone region as defined in ASCE/SEI 7-22 Section 26.2.

ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS

Seismic

Default

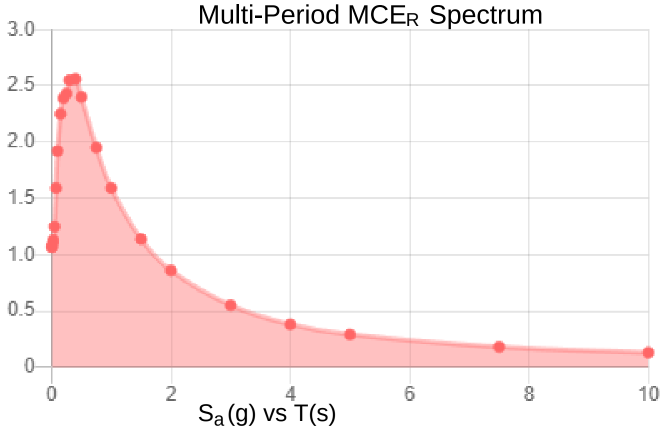
Site Soil Class:

Results:

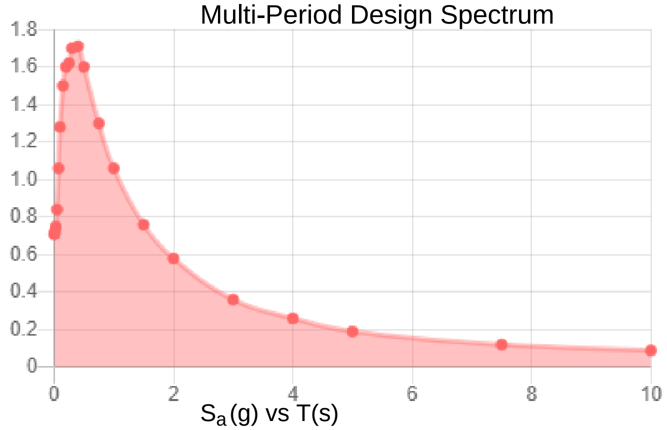
PGA_M :	0.99	T_L :	16
S_{MS} :	2.31	S_S :	1.93
S_{M1} :	1.59	S_1 :	0.73
S_{DS} :	1.54	V_{S30} :	260
S_{D1} :	1.06		

Seismic Design Category: D

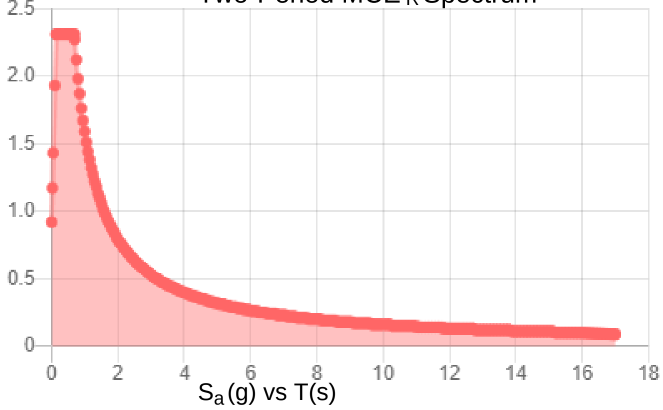
Multi-Period MCE_R Spectrum



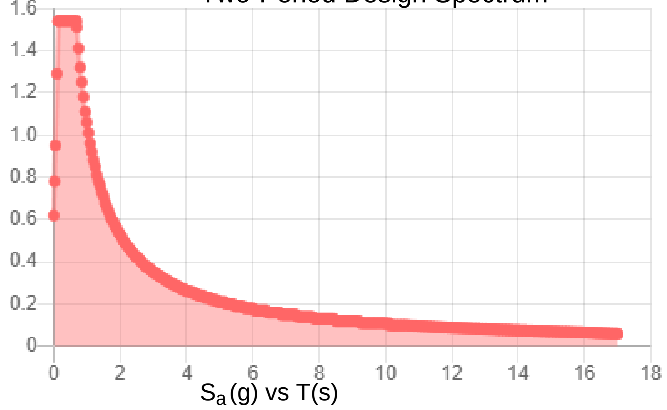
Multi-Period Design Spectrum



Two-Period MCE_R Spectrum



Two-Period Design Spectrum



MCE_R Vertical Response Spectrum

Vertical ground motion data has not yet been made available by USGS.

Design Vertical Response Spectrum

Vertical ground motion data has not yet been made available by USGS.

Data Accessed: **Thu Jun 15 2023**

Date Source:

USGS Seismic Design Maps based on ASCE/SEI 7-22 and ASCE/SEI 7-22 Table 1.5-2. Additional data for site-specific ground motion procedures in accordance with ASCE/SEI 7-22 Ch. 21 are available from USGS.

Flood

Results:

Flood Zone Categorization: D

Base Flood Elevation:

Data Source:	FEMA National Flood Hazard Layer - Effective Flood Hazard Layer for US, where modernized (https://msc.fema.gov/portal/search)
Date Accessed:	Thu Jun 15 2023
FIRM Panel:	If available, download FIRM panel here
Insurance Study Note:	Download FEMA Flood Insurance Study for this area here

The ASCE 7 Hazard Tool is provided for your convenience, for informational purposes only, and is provided “as is” and without warranties of any kind. The location data included herein has been obtained from information developed, produced, and maintained by third party providers; or has been extrapolated from maps incorporated in the ASCE 7 standard. While ASCE has made every effort to use data obtained from reliable sources or methodologies, ASCE does not make any representations or warranties as to the accuracy, completeness, reliability, currency, or quality of any data provided herein. Any third-party links provided by this Tool should not be construed as an endorsement, affiliation, relationship, or sponsorship of such third-party content by or from ASCE.

ASCE does not intend, nor should anyone interpret, the results provided by this Tool to replace the sound judgment of a competent professional, having knowledge and experience in the appropriate field(s) of practice, nor to substitute for the standard of care required of such professionals in interpreting and applying the contents of this Tool or the ASCE 7 standard.

In using this Tool, you expressly assume all risks associated with your use. Under no circumstances shall ASCE or its officers, directors, employees, members, affiliates, or agents be liable to you or any other person for any direct, indirect, special, incidental, or consequential damages arising from or related to your use of, or reliance on, the Tool or any information obtained therein. To the fullest extent permitted by law, you agree to release and hold harmless ASCE from any and all liability of any nature arising out of or resulting from any use of data provided by the ASCE 7 Hazard Tool.

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) Zone 10.The **horizontal datum** was NAD 83, GRS80 spheroid Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov.

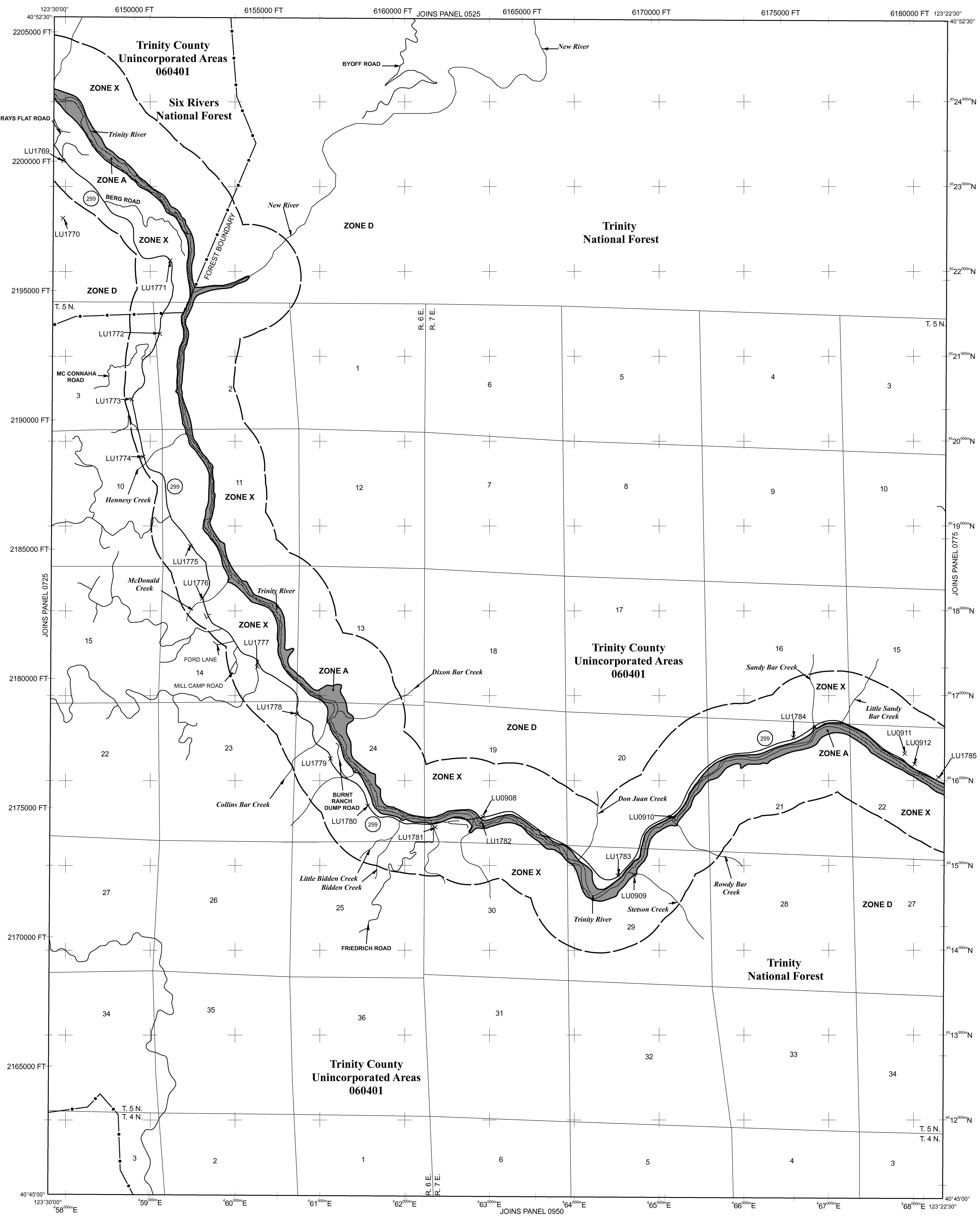
Base map transportation information shown on this FIRM was provided in digital format from Trinity County. This data was created from original 1979-1980 USGS 7.5 minute quads but have been rectified to match USGS DOQQs dated from 1993 and 1998. Additional information was compiled from U.S. Census Bureau TIGER files dated June 2002.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://msc.fema.gov.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at www.fema.gov



LEGEND

▨ SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

▨ FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

▨ OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

☐ OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

▨ COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

▨ OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

———	Floodplain boundary
— — —	Floodway boundary
– — — –	Zone D boundary
• • • • • • •	CBRS and OPA boundary
▨	Boundary dividing Special Flood Hazard Area zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
~~ *513* ~~~	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

Ⓐ——Ⓐ	Cross section Line
㉓- - - -㉓	Transect line
87°07'45", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
$^{24}76^{000m}$N	1000-meter Universal Transverse Mercator grid values, zone NAD 1983 UTM Zone 10N
600000 FT	5000-foot grid ticks: California State Plane coordinate system, zone I (FIPSZONE 0401), Lambert Conformal Conic projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
●M1.5	River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
August 16, 1988

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
April 17, 1996 - to add Base Flood Elevations and Special Flood Hazard Areas; and to change zone designations.
September 2, 2009 - January 20, 2010 - to change Base Flood Elevations, Special Flood Hazard Areas and zone designations; to add Base Flood Elevations and Special Flood Hazard Areas; to update map format; and to add roads and road names.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

N

MAP SCALE 1" = 2000'

1000	0	2000	4000	FEET
600	0	600	1200	METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0750E

FIRM
FLOOD INSURANCE RATE MAP

TRINITY COUNTY, CALIFORNIA
AND INCORPORATED AREAS

PANEL 750 OF 2075

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

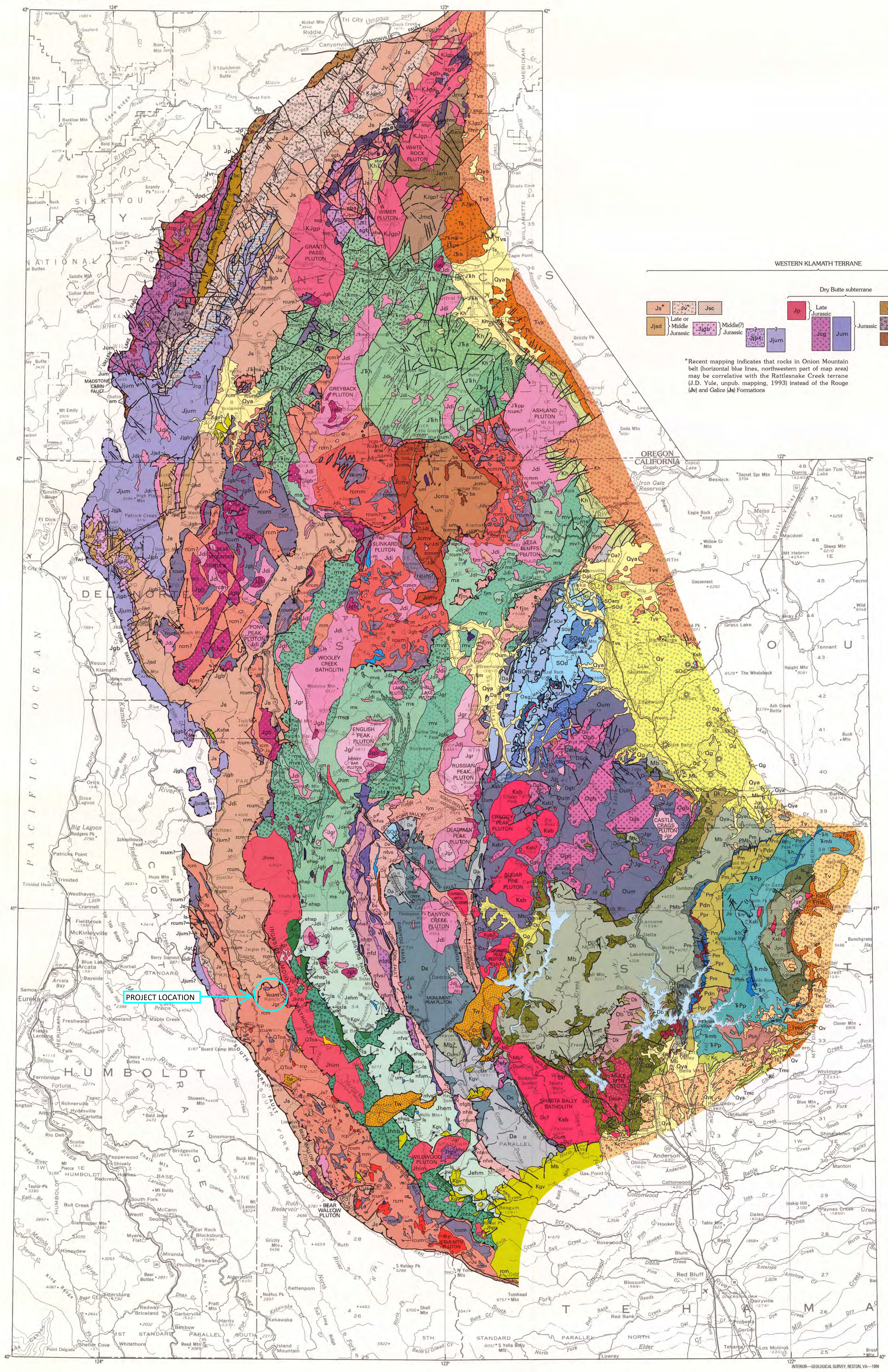
COMMUNITY	NUMBER	PANEL	SUFFIX
TRINITY COUNTY	060401	0750	E

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06105C0750E

MAP REVISED
JANUARY 20, 2010

Federal Emergency Management Agency



INTERIOR—GEOLOGICAL SURVEY, RESTON, VA—1994

Base from U.S. Geological Survey
State of California, 1968 (revised 1981);
State of Oregon, 1964–65 (revised 1982)
Lambert Conformal Conic projection;
standard parallels 33° and 45°

SCALE 1 : 500 000

10 0 10 20 30 40 MILES

10 0 10 20 30 40 50 60 KILOMETERS

AREA OF MAP

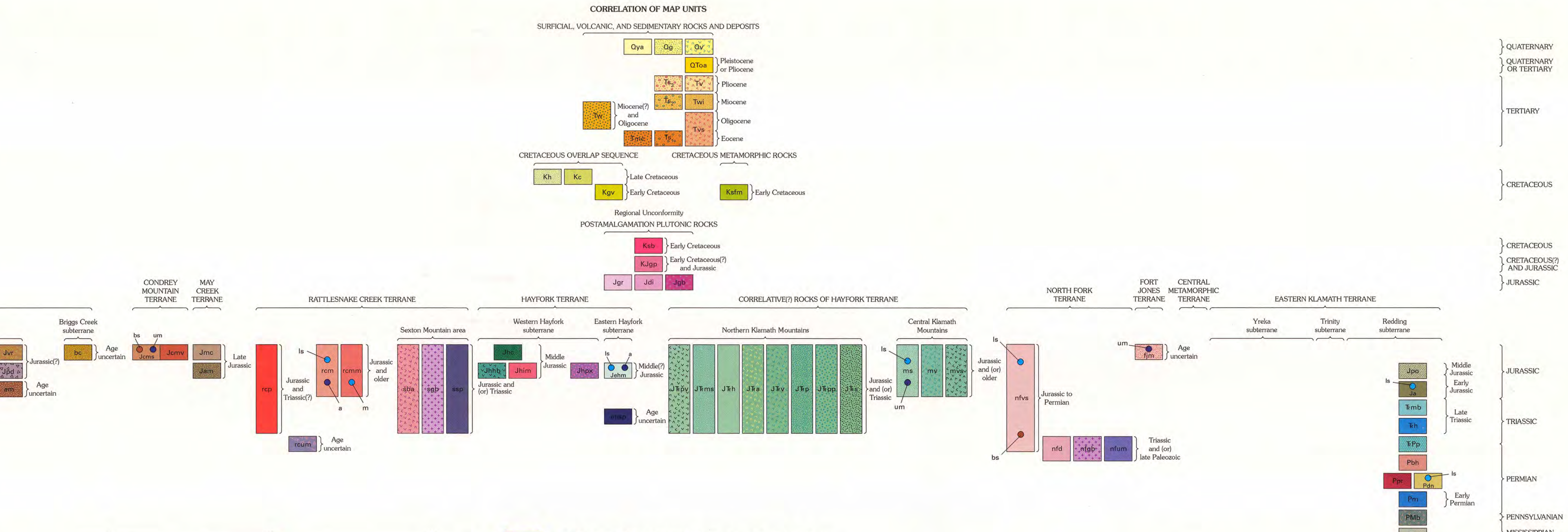
Geology compiled in 1985–89
Edited by Sean Stone and Taryn Lindquist; cartography by M. Vicki Chmill, Colleen Maurer, Maureen Kelly, and Douglas S. Aitken
Manuscript approved for publication January 25, 1990

GEOLOGIC MAP OF THE KLAMATH MOUNTAINS, CALIFORNIA AND OREGON

Compiled by
William P. Irwin

1994

CORRELATION OF MAP UNITS



*Recent mapping indicates that rocks in Onion Mountain belt (horizontal blue lines, northwestern part of map area) may be correlative with the Rattlesnake Creek terrane (J.D. Yule, unpub. mapping, 1993) instead of the Rouge (**Jv**) and Galice (**Js**) Formations

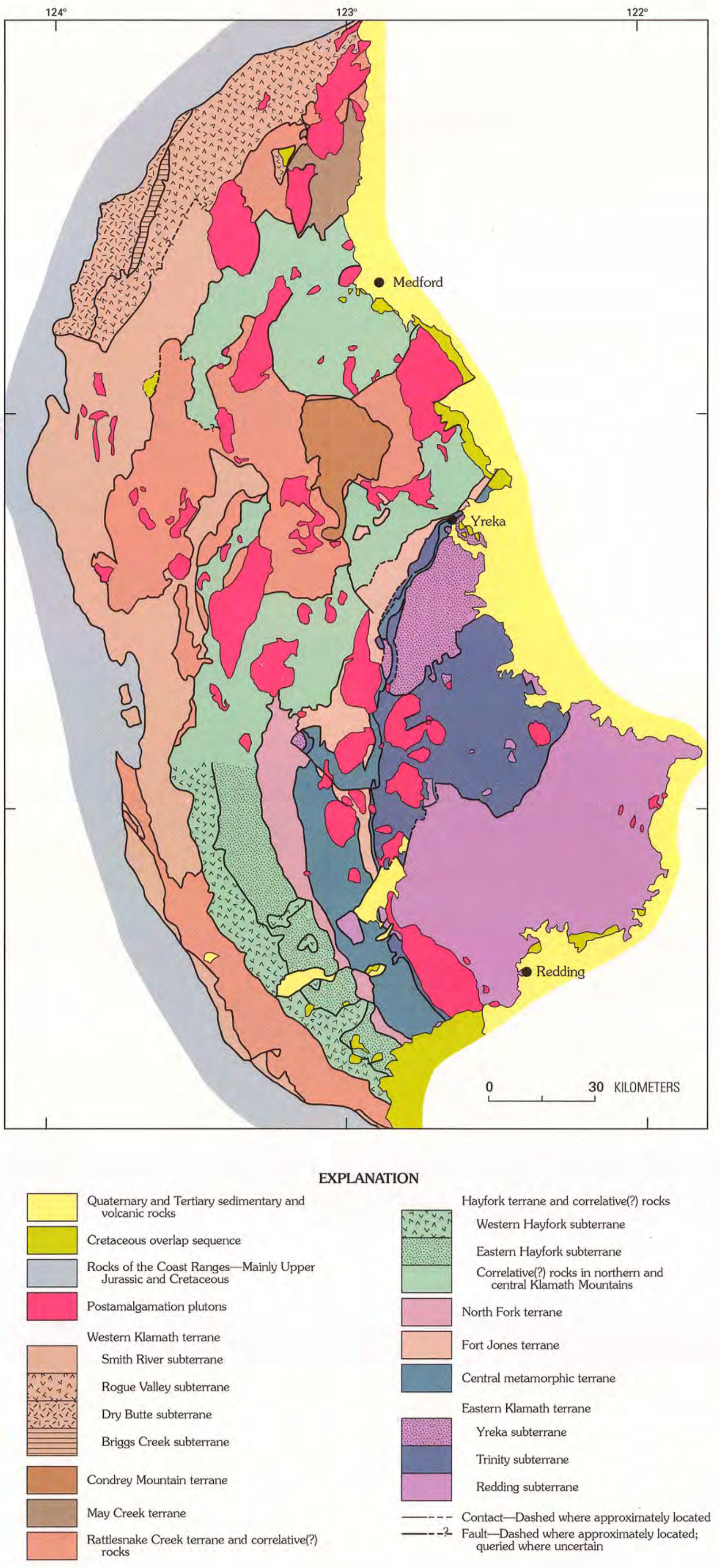


Figure 1. Terranes, subterranes, and other lithotectonic units of Klamath Mountains province

DESCRIPTION OF MAP UNITS

SURFICIAL, VOLCANIC, AND SEDIMENTARY ROCKS AND DEPOSITS

Qya **Younger alluvial deposits (Quaternary)**—Unconsolidated silt, sand, and gravel along modern streams, on terraces, and as valley fill. Includes some areas of Pleistocene pediment gravels (Red Bluff Formation) along south border of map area. Unit is shown along east and south borders of map area, but only a few large areas are shown within Klamath Mountains province

Qg **Glacial deposits (Quaternary)**—Unconsolidated glacial debris. Shown principally in Mount Shasta region at east edge of map area; numerous small patches within Klamath Mountains province not shown

Qv **Volcanic rocks (Quaternary)**—Basaltic and andesitic flows and pyroclastic rocks of Cascade Ranges along east edge of map area; includes large areas of chaotic volcanic landslide deposits northwest of Mount Shasta

QToa **Older alluvium (Pleistocene or Pliocene)**—Weakly consolidated nonmarine silt, sand, and conglomerate associated with high-level remnants of old land surfaces

Ts_3 **Sedimentary rocks (Pliocene)**—Unit includes (1) the Tehama Formation along south border of map area in western part of Great Valley, consisting of weakly consolidated sand and gravel and including the Nomlaki Tuff Member of the Tehama Formation near base of the Tehama, and (2) the Tuscan Formation along south border of province in eastern part of Great Valley, consisting of volcanic-derived siltstone, sandstone, and conglomerate and tuff. Thin veneer of pediment gravels of the Red Bluff Formation (Pleistocene) that unconformably overlies and conceals much of the Tehama and Tuscan Formations is not shown

Tv **Volcanic rocks (Pliocene)**—Basaltic and andesitic flows, breccia, and tuff of Cascade Range along southeast border of map area

Ts_2 **Sedimentary rocks (Miocene)**—Nonmarine sandstone, shale, conglomerate. Found as small patches containing minor coal in southwestern Oregon. Overlain by Pliocene volcanic rocks at easternmost edge of map area

Twi **Wimer Formation (Miocene)**—Weakly consolidated marine siltstone and sandstone. Found as high-level erosional remnants in Smith River region

Tw **Weaverville Formation (Miocene? and Oligocene)**—Weakly consolidated siltstone, sandstone, conglomerate, and tuff; nonmarine; locally contains coal beds. Late Oligocene and early Miocene(?) in age on the basis of palynomorphs (Barnett, 1982)

Tvs **Volcanic and sedimentary rocks (Oligocene and Eocene)**—Andesitic and basaltic flows, breccia, tuff, minor rhyolitic tuff, and intercalated sedimentary units of Cascade Range along east border of map area

Tmc **Montgomery Creek Formation (Eocene)**—Weakly indurated, thick-bedded arkosic sandstone, conglomerate, and shale; nonmarine and mostly fluviatile; locally includes coal beds. Approximately 800 m thick. Rests unconformably on Late Cretaceous and older rocks along southeast border of map area

Ts_1 **Sedimentary rocks (Eocene)**—Mainly fluvial sandstone and conglomerate. Mostly nonvolcanic and derived from underlying older rocks. Unconformably overlies the Hornbrook Formation along east border of map area in Oregon

CRETACEOUS OVERLAP SEQUENCE

Kh **Hornbrook Formation (Late Cretaceous)**—Shallow- and deep-water marine and nonmarine shale, sandstone, and conglomerate. Unit is about 1,200 m thick (Nilsen, 1984) and lies unconformably on Klamath basement rocks. Unit is mainly Cenomanian to Maestrichtian in age but includes minor Albian rocks (T.H. Nilsen, written commun., 1990)

Kc **Chico Formation (Late Cretaceous)**—Marine shoreline and shallow-shelf deposits of siltstone, sandstone, and conglomerate of Turonian and Santonian age (Sliter and others, 1984). Unit lies unconformably on Klamath basement rocks north and east of Redding. Generally only mildly deformed and gently dipping

Kgv **Great Valley sequence (Early Cretaceous)**—Dominantly marine, well-indurated shale, sandstone, and conglomerate. Shale locally contains calcareous beds and nodules. Main area of unit is at southern end of map area, but sedimentary outliers are found at several places within map area. Correlative strata (not shown), which are part of the Snow Camp terrane of Blake and others (1985), crop out on north side of Canyonville fault at northern end of map area. Onlap of Klamath basement terranes by the Great Valley sequence was generally from west to east. At southern end of map area, oldest overlap strata resting on Jurassic and older basement are nonmarine to marine Valanginian-age deposits (Jones and Irwin, 1971) of the Glade Creek and Big Bar outliers. Eastward, Hauterivian-age beds (Murphy and others, 1969) lie depositionally on basement rocks of Early Cretaceous (Shasta Bally batholith, 136 Ma; Lanphere and Jones, 1978) and older ages. In map area, unit is mainly Early Cretaceous but includes minor early Late Cretaceous rocks (see Blake and others, 1984)

CRETACEOUS METAMORPHIC ROCKS

Ksfm **South Fork Mountain Schist (Early Cretaceous)**—Mainly fine-grained quartz-albite-muscovite-chlorite schist and minor lawsonite; K-Ar isotopic age of metamorphism about 120 Ma (Lanphere and others, 1978). Widely exposed west of map area

POSTAMALGAMATION PLUTONIC ROCKS

[Includes some plutons of uncertain affiliation]

Ksb **Plutons of Shasta Bally belt (Early Cretaceous)**—Mostly quartz diorite, trondhjemite, and granodiorite in composition; 133 to 136 Ma in isotopic age; probably postaccretion (see Irwin, 1985a). Also includes several small Cretaceous plutons in easternmost part of the Redding subterrane (fig. 1)

KJgp **Plutons of Grants Pass belt (Early Cretaceous? and Jurassic)**—Mostly quartz diorite

Jgr **Granitoid rocks (Jurassic)**—Plutonic rocks ranging from quartz diorite to granite in composition

Jdi **Diorite (Jurassic)**—Mostly diorite, but locally includes gabbro and quartz diorite. Includes weakly foliated hornblende-diorite gneiss in Willow Creek quadrangle

Jgb **Gabbro (Jurassic)**—Includes minor pyroxenite

WESTERN KLAMATH TERRANE

[Consists of Smith River, Rogue Valley, Dry Butte, and Briggs Creek subterranes (see fig. 1; Blake and others, 1985)]

Js **Sedimentary rocks (Late Jurassic)**—Includes the Galice Formation; mildly slaty to phyllitic argillite, graywacke, and stretched-pebble conglomerate. Locally contains pyroclastic interlayers. Contains sparse pelecypods of Late Jurassic (Oxfordian to Kimmeridgian) age (Imlay and others, 1959) north of Smith River, but none found to south. Kink folds common. Unit locally metamorphosed to mica schist along tectonic boundaries of terrane. Isotopic age of metamorphic overprint is approximately 150 Ma (Lanphere and others, 1978). Locally contact metamorphosed to hornfels and chiastolite-bearing schist adjacent to plutons

Jv **Volcanic rocks (Late Jurassic)**—Includes the Rogue Formation. Consists of basaltic and andesitic volcanic and volcaniclastic rocks, interbedded shale and mudstone, and locally interbedded chert. Conformably underlies and locally interlayered with the Galice Formation in the Rogue Valley subterrane. Uncommon in the Smith River subterrane. Zircon from dacitic tuff breccia in the type Rogue Formation yielded a U-Pb age of approximately 157 Ma, and dacitic dikes that cut upper part of the Rogue are dated at approximately 150 Ma (Saleeby, 1984). Triassic radiolarian chert found (Roure and De Wever, 1983) at locality within general outline of unit is presumably of extraneous origin

Jsc **Shale and chert (Late Jurassic)**—Shale, siltstone, mudstone, and thin-bedded radiolarian chert associated with ophiolite of Onion Mountain area

Josephine ophiolite of Harper (1980) (Jurassic)—Divided into:

Jjsd **Sheeted dikes and (or) pillow basalt (Late or Middle Jurassic)**—Includes basalt in ophiolite of Onion Mountain area. Beds within and above volcanic part of unit contain latest Callovian or earliest Oxfordian radiolarians (E.A. Pessagno, Jr., and C.D. Blome, written commun., 1989)

Jjgb **Gabbro (Middle? Jurassic)**—Includes gabbro in ophiolite of Onion Mountain area

Jjpx **Pyroxenite (Jurassic)**

Jjum **Ultramafic rocks (Jurassic)**—Includes ultramafic rocks of Onion Mountain area and other ultramafic rocks of the Western Klamath terrane except units **Jum** and **Jpd** of the Dry Butte subterrane

Dry Butte subterrane

[Includes informally named Chetco River complex of Hotz (1971a)]

Jp **Plutons (Late Jurassic)**—Mainly tonalite and quartz diorite; also includes muscovite-bearing granodiorite plutons; K-Ar isotopic analyses indicate ages of approximately 153 Ma (Hotz, 1971a)

Jcg **Cumulate gabbro (Jurassic)**—Mainly cumulate two-pyroxene gabbro, locally metamorphosed, and minor hornblende-plagioclase metagabbro; locally includes diorite and quartz diorite

Jum **Ultramafic rocks (Jurassic)**—Cumulate peridotite, dunite, pyroxenite, and wehrlite

Jvr **Volcanic rocks (Jurassic?)**—Rhyodacite flows and porcelaneous tuff, with local andesite and basalt flows

Jpd **Peridotite (Jurassic?)**—Harzburgite and dunite; both tectonite and cumulate fabrics; locally completely serpentinized; separated from other units by faults (Smith and others, 1982)

am **Amphibolite (age uncertain)**—Amphibole schist and quartz-rich hornblende gneiss with local impure marble; exposed at places along Madstone Cabin fault and along province boundary near Chetco Peak; relation to the Dry Butte subterrane uncertain

Briggs Creek subterrane

bc **Briggs Creek amphibolite of Garcia (1979) (age uncertain)**—Informal unit of Garcia (1979). Mainly amphibolite but includes micaceous quartzite, quartz schist, and recrystallized manganiferous chert

CONDREY MOUNTAIN TERRANE

Condrey Mountain Schist (Late Jurassic)—Isotopic ages measured on various lithologies range from 118 to 170 Ma and are equivocal (see Helper, 1986a). May be correlative with the Galice Formation of the Western Klamath terrane and (or) with the South Fork Mountain Schist of Coast Ranges province (Helper, 1986b; Brown and Blake, 1987). Divided into:

Jcms **Metasedimentary rocks**—Graphitic quartz-albite-muscovite schist. Generally well foliated, fine to medium grained, and gray to blue black. Contains blueschist (**bs**) that is mostly flaggy and composed of alternating blue crossite-rich layers and green chlorite-epidote-rich layers. Unit locally includes ferruginous and manganiferous metachert and serpentinized ultramafic rocks (**um**)

Jcmv **Metavolcanic rocks**—Metavolcanic rocks of greenschist facies. Unit locally includes interlayers of fine-grained metasedimentary rocks (**Jcms?**)

MAY CREEK TERRANE

Jmc **May Creek Schist (Late Jurassic)**—Fine- to medium-grained quartzite, phyllite, micaceous quartzofeldspathic schist, impure calcareous schist, and rare marble. Grades to south into foliated volcanogenic metasedimentary rocks, including tuffaceous mafic metasandstone and metagraywacke. Unit was formerly considered a gradational metamorphic facies of the Applegate Group by previous workers (Wells and Peck, 1961); unit now shown to be in fault contact with undivided rocks of the Applegate Group (Smith and others, 1982; M.M. Donato, written commun., 1990). Protolith age is considered to be Jurassic or older

Jam **Amphibolite (Late Jurassic)**—Medium-grained hornblende-plagioclase amphibolite that may represent metamorphosed dikes, sills, and tholeiitic basalt. Metamorphic age is Late Jurassic on the basis of isotopic ages of 145 and 147 Ma measured on hornblende (M.M. Donato, oral commun., 1991). Protolith age is considered to be Jurassic or older

RATTLESNAKE CREEK TERRANE

[Includes type area in southern part of Klamath Mountains province (Irwin, 1972), questionably correlative rocks of Preston Peak area, melange of Takilma area, ophiolite of Sexton Mountain area, and metamorphosed melange of Marble Mountains, Seiad Valley, Condrey Mountain, and Dutchman Peak areas]

rcp **Plutonic rocks (Jurassic and Triassic?)**—Medium- to coarse-grained rock ranging from diorite to granite. Includes Star Mountain pluton that has a U-Pb isotopic age of approximately 200 Ma (Wright, 1981)

rcm **Melange (Jurassic and older)**—Consists of sheared and dislocated bodies of serpentinized peridotite, pillow basalt and other mafic volcanic flows and tuff, thin-bedded chert, argillite, intermediate-composition to silicic volcanic rocks, dikes and irregular intrusive bodies ranging from gabbro to granite, weakly slaty mudstone, sandstone, and conglomerate, and minor limestone (**ls**) and blocks of amphibolite (**a**). Chert contains Late Triassic to Middle Jurassic radiolarians; limestone contains Devonian(?) and younger corals, late Paleozoic fusulinids, and Late Triassic ammonites and conodonts (Irwin, 1985b; Irwin and others, 1985)

rcmm **Metamorphosed melange (Jurassic and older)**—Tectonically disrupted metasedimentary and metavolcanic rocks in Marble Mountains Wilderness area (Donato and others, 1982), in Condrey Mountain quadrangle (Hotz, 1967), and in Dutchmans Peak area (Smith and others, 1982). Consists of quartz-biotite-muscovite schist and other quartzose metasedimentary rocks that include metaquartzite (metachert?), lenses of micaceous and quartzitic marble (**m**), and of amphibolitic metavolcanic rocks, metadiabase, metagabbro, and metamorphosed ultramafic rocks. Probably metamorphosed equivalent of unit **rcm**

rcum **Serpentinized ultramafic rocks (age uncertain)**—Mainly sheared serpentinized peridotite. Locally is blocky tectonitic harzburgite and minor dunite. Includes metaperidotite (pattern), consisting mainly of olivine and variable amounts of actinolite, anthophyllite, and chlorite, in areas adjacent to unit **rcmm** (Coleman and others, 1988)

Sexton Mountain area

Ophiolite of Sexton Mountain area (Jurassic and (or) Triassic)—Included with the Rattlesnake Creek terrane on the basis of lithology and regional relations. Divided into:

sba **Basaltic volcanic rocks**—Mainly pillows and pillow breccia, basalt flows and flow breccia, and agglomerate. Includes diabasic and gabbroic dikes and sills

sgb **Gabbro**—Both layered and massive varieties

ssp **Serpentinite**—Serpentinized peridotite and dunite. Locally contains chromite deposits

HAYFORK TERRANE

[Consists of Eastern Hayfork and Western Hayfork subterranes in southern part of map area, probably correlative units **ms**, **mv**, and **mvs** in central part, and questionably correlative units formerly of Applegate Group in northern part]

Western Hayfork subterrane

Jhc **Chert, argillite, and meta-andesite (Middle Jurassic)**—Thin-bedded chert interlayered with argillite and meta-andesite. Overlies and interfingers with the Hayfork Bally Meta-andesite

Jhhb **Hayfork Bally Meta-andesite (Middle Jurassic)**—Mafic volcaniclastic rocks ranging from coarse agglomerate to crystal tuff. Commonly characterized by euhedral augite and plagioclase crystals in light- to dark-green groundmass. Locally includes thin-bedded chert and argillite. K-Ar isotopic ages measured on meta-andesite are 156 Ma (M.A. Lanphere, oral commun., 1977) and 168 to 177 Ma (Fahan, 1982). Unit represents volcanic-arc deposit. Intruded by the Ironside Mountain batholith (**Jhim**) and probably cogenetic. May be correlative with units **mv** and **mvs** in central part of map area and with units **JTRpv**, **JTRh**, **JTRa**, **JTRv**, **JTRp**, and **JTRpp**

Jhim **Ironside Mountain batholith and related plutons (Middle Jurassic)**—Mostly medium-grained monzodiorite but includes diorite and minor gabbro and pyroxenite. Age is Middle Jurassic on the basis of ages of about 170 Ma (K-Ar analyses, revised constant, Lanphere and others, 1968; U-Pb analyses, Wright and Fahan, 1988). Intrudes the Hayfork Bally Meta-andesite (**Jhhb**). Related plutons include Forks of Salmon, Wildwood, and Walker Point plutons

Jhpx **Pyroxenite (Middle? Jurassic)**—Included in Wildwood and Walker Point plutons

Eastern Hayfork subterrane

Jehm **Melange (Middle? Jurassic)**—Includes mafic volcaniclastic rocks, thin-bedded chert, tuff, sandstone, limestone (**ls**), serpentinite, and minor mica schist and amphibolite (**a**). Chert contains Late Triassic and Jurassic radiolarians and Middle or Late Triassic conodonts. Limestone yielded a Late Permian ammonite and a Late Permian Tethyan fusulinid fauna. Upper age of unit is limited by unconformity at base of superjacent Lower Cretaceous strata of the Great Valley sequence

ehsp **Serpentinite (age uncertain)**

CORRELATIVE(?) ROCKS OF HAYFORK TERRANE

Northern Klamath Mountains

Correlative(?) rocks of the Hayfork terrane in northern Klamath Mountains (Jurassic and (or) Triassic)—Divided into:

JTRpv **Pyroxene volcanic rocks**—Mainly porphyritic augite andesite to andesitic basalt flows. Includes interbedded andesitic breccia and tuff breccia; dacitic to rhyodacitic breccia, tuff, and flows; and porphyritic basalt and basaltic intrusive rocks. May be equivalent to the Hayfork Bally Meta-andesite (**Jhhb**) of the Western Hayfork subterrane. Locally contains interlayers of metasedimentary rocks (**JTRms**)

JTRms **Metasedimentary rocks**—Mildly metamorphosed shale, mudstone, sandstone, conglomerate, cherty tuff, thin-bedded chert, and marble. Interlayered with pyroxene volcanic rocks (**JTRpv**). May include Upper Triassic limestone near Wilderville

JTRh **Hornblende volcanic rocks**—Mainly porphyritic hornblende andesite flows interlayered with argillite. Includes andesitic pyroclastic rocks interbedded with andesitic to dacitic and rhyodacitic flows and agglomerates. Dashed lines indicate local units of aphanitic bedded tuff, volcaniclastic mudstone, and rare marble

JTRa **Andesitic and dacitic volcanic rocks**—Includes tuff, tuff breccia, and agglomerate

JTRv **Vesicular andesite and basalt**—Vesicular basaltic to porphyritic andesitic flows. Pillow breccia and pillow basalt found locally near top of unit. Marble containing volcaniclastic debris is locally present

JTRp **Porphyritic andesite**—Mostly flows and agglomerate, which contain plagioclase phenocrysts, clasts of porphyritic andesite, and local interbeds of crystal tuff

JTRpp **Porphyritic pyroxene andesite**

JTRs **Metasedimentary rocks**

Central Klamath Mountains

Correlative(?) rocks of the Hayfork terrane in central Klamath Mountains (Jurassic and (or) older)—Divided into:

ms **Metasedimentary rocks**—Includes slate, feldspathic metagraywacke, metachert, quartzite, and chert-argillite breccia. Locally contains pods (olistoliths?) of limestone (**ls**), chert, serpentinized peridotite (**um**), and rare amphibolite, which range in length from less than 1 m to more than 100 m. Boundary between unit and the Eastern Hayfork subterrane (**Jehm**) is unknown. Queried outcrops northeast of Yreka may be part of the North Fork terrane (Mortimer, 1984)

mv **Metavolcanic rocks**—Intermediate-composition to felsic, pillowed to massive, predominantly aphyric flows, tuff, and minor intrusive rocks. Locally resemble and may be genetically related to units **mvs** and **Jhhb**. Queried outcrops northeast of Yreka may be part of the North Fork terrane (Mortimer, 1984)

mvs **Volcanogenic metasedimentary rocks**—Mainly pale- to dark-greenish gray volcaniclastic rocks and rare flows of andesite and basalt. Locally interbedded with slate. Graded bedding locally abundant. Includes crystal tuff containing phenocrysts of pyroxene and (or) hornblende and, in some cases, plagioclase. Metamorphic assemblage is commonly actinolite-epidote-albite-biotite. Unit probably equivalent to the Hayfork Bally Meta-andesite (**Jhhb**)

NORTH FORK TERRANE

nfvs **Volcanic and sedimentary rocks (Jurassic to Permian)**—Basaltic volcanic and volcaniclastic rocks and interlayered argillite, thin-bedded chert, and limestone (**ls**). Chert and siliceous argillite contain radiolarians of Permian, Triassic, and Early Jurassic ages. Limestone is generally oolitic, and some lenses contain Permian fusulinids. Blocks (olistoliths?) of blueschist-facies metavolcanic rocks (**bs**) are present in Salmon River area

North Fork ophiolite (Triassic and (or) late Paleozoic)—Divided into:

nfd **Diabase and basalt**

nfgb **Gabbro**—Zircon from plagiogranite pod in gabbro of Salmon River area yielded late Paleozoic (265–310 Ma) isotopic age (Ando and others, 1983)

nfum **Ultramafic rocks**—Dominantly serpentinized harzburgite

FORT JONES TERRANE

fjm **Metasedimentary and metavolcanic rocks (age uncertain)**—Micaceous quartzite and phyllite (representing bedded chert, shale, and sandstone) and actinolitic schist and phyllonite (representing metavolcanic rocks). Contains blueschist-facies metamorphic minerals; near Yreka, contains blocks of blueschist (×) that yield K-Ar isotopic ages of about 220 Ma (Late Triassic) (Hotz and others, 1977). Also contains ultramafic rocks (**um**) of unknown affinity in outlier west of Yreka. Includes the Stuart Fork Formation

CENTRAL METAMORPHIC TERRANE

Da **Abrams Schist (Devonian)**—Predominantly metasedimentary rocks, including quartz-mica schist, calc schist, micaceous marble, and minor intercalated amphibolite schist. As mapped, includes the Grouse Ridge Formation of Davis and others (1965). In Scott Valley-Yreka area, unit as mapped also includes unnamed metasedimentary rocks (Potter and others, 1977) and, in undivided southernmost part of terrane, part of the underlying Salmon Schist. Rb-Sr age of approximately 380 Ma (Lanphere and others, 1968). Cometamorphic with the Salmon Schist

Ds **Salmon Schist (Devonian)**—Mostly fine- to medium-grained hornblende-epidote-albite schist. Locally phyllonitic and retrograded. Probably represents metamorphosed mafic volcanic rocks. As mapped, includes unnamed amphibolite in Scott Valley-Yreka area that has K-Ar isotopic age of 390 to 399 Ma (Hotz, 1977)

EASTERN KLAMATH TERRANE

[Consists of Yreka, Trinity, and Redding subterranes]

Yreka subterrane

DSg **Gazelle Formation (Early Devonian to Early? Silurian)**—Shale, mudstone, siltstone, sandstone, limestone, bedded chert, and siliceous mudstone; poorly to well bedded; total thickness may exceed 1,300 m. Divided into three informal units (Potter and others, 1977), but units not distinguished in map area

SOmc **Moffett Creek Formation (Silurian and Ordovician?)**—Tan-weathering shale and mudstone, calcareous siltstone, sandstone, and minor bedded chert, siliceous mudstone, and limestone; mostly massive and disrupted; generally unfossiliferous, but chert contains Ordovician or Silurian radiolarians; commonly in fault contact with adjacent units, but locally is depositionally overlain by the Gazelle Formation (Potter and others, 1977)

SOam **Antelope Mountain Quartzite (Silurian and (or) Ordovician)**—Well-bedded quartz sandstone. Beds commonly 0.5 to 1.5 m thick. Locally thin and rhythmically bedded. Includes beds and lenses of chert adjacent to the Duzel Phyllite. Thickness may be 1,500 to 1,700 m. Depositionally overlies the Duzel Phyllite (Hotz, 1977)

SOd **Duzel Phyllite (Silurian and (or) Ordovician)**—Phyllitic calcareous siltstone and calcareous sandstone (Potter and others, 1977). Locally resembles the Moffett Creek Formation. As mapped, includes the Schulmeyer Gulch sequence of Hotz (1977) west and north of the Antelope Mountain Quartzite

Osg **Schist of Skookum Gulch of Potter and others (1977) (Ordovician? and older)**—Mainly melange of albite-chlorite-epidote-actinolite schist and phyllite containing limestone lenses and tectonic blocks of glaucophane-lawsonite rock and plutonic rocks (Hotz, 1977). Plutonic rocks (**p**) range from quartz diorite to plagiogranite and yield U-Pb isotopic ages of about 565 to 570 Ma (Early Cambrian) (Wallin and others, 1988)

Trinity subterrane

Ov **Volcanic rocks and diabase (Ordovician?)**—Mafic volcanic rocks consisting of massive flows, breccias, and local volcaniclastic beds; unconformably overlain by Ordovician rocks in Lovers Leap area (Potter and others, 1977); relation to underlying ophiolitic rocks uncertain

Ogb **Gabbro and diorite (Ordovician)**—Cumulate and layered hornblende gabbro grading into hornblende diorite and quartz diorite. Includes younger pegmatitic gabbro. U-Pb isotopic ages measured on layered gabbro and diorite are as old as 455 to 480 Ma (Lindsley-Griffin, 1977; Wallin and others, 1988)

Oum **Trinity ultramafic sheet (Ordovician)**—Dominantly serpentinized tectonitic peridotite (harzburgite and lherzolite) and minor dunite; in part, may represent an ophiolite (Lindsley-Griffin, 1982). Intruded by Ordovician gabbro (**Ogb**)

Redding subterrane

Jpo **Potem Formation (Middle and Early Jurassic)**—Marine argillite, tuffaceous sandstone, and minor limestone and coarse pyroclastic deposits. Normally gray to black, but locally weathers red to reddish purple. Locally highly fossiliferous. Probably late Pliensbachian to early Bathonian in age (Sanborn, 1960)

Ja **Arvison Formation of Sanborn (1960) (Early Jurassic)**—Marine andesitic pyroclastic beds, flows, breccia, and conglomerate and interbedded tuff, tuffaceous sandstone, and minor limestone (**ls**). May be gradational upward into the Potem Formation. Probably Sinemurian and early Pliensbachian in age (Sanborn, 1960)

TRmb **Modin Formation of Sanborn (1960) and Brock Shale, undivided (Late Triassic)**—The Modin Formation consists of three members of Sanborn (1960): the basal Hawkins Creek Member, consisting of coarse pyroclastic and conglomeratic beds that contain limestone clasts that have fossils of ages similar to the Hosselkus Limestone; the medial Devils Canyon Member, consisting of tuffaceous limestone and sandstone; and the upper Kosk Creek Member, consisting of thin-bedded argillite; total thickness approximately 1,675 m; probably late Norian to Rhaetian in age; conformably(?) overlies the Brock Shale. The Brock Shale consists of argillite and interbeds of tuff and tuffaceous sandstone; approximately 120 m thick; probably Norian in age (Sanborn, 1960); conformably overlies the Hosselkus Limestone

TRh **Hosselkus Limestone (Late Triassic)**—Thin-bedded to massive, light-gray marine limestone. Locally pinches out, and ranges up to approximately 120 m thick. Conformable with the overlying Brock Shale and the underlying Pit Formation. Highly fossiliferous in basal part. Karnian and early Norian(?) in age (Sanborn, 1960)

TRPp **Pit Formation (Triassic and Permian?)**—Marine shale, mudstone, siltstone, and pyroclastic rocks. Includes minor lenses of limestone similar to the Hosselkus Limestone, and quartz keratophyre and metadacite tuff and flows. Thickness ranges from approximately 600 to 1,500 m. Conformably underlies the Hosselkus Limestone, and overlies and interfingers with the Bully Hill Rhyolite. Unit has generally been considered to be Middle and Late Triassic in age (Albers and Robertson, 1961), but tuffaceous chert that may possibly be in basal part of formation contains Permian radiolarians (Silberling and Jones, 1982)

Pbh **Bully Hill Rhyolite (Permian)**—Quartz keratophyre and metadacite tuff, tuff breccia, and shallow intrusive rocks; locally includes flows similar to the Dekkas Andesite. Thickness ranges from approximately 30 m to as much as 760 m. Unit locally intertongues with the overlying Pit Formation and the underlying Dekkas Andesite

Ppr **Pit River stock and related plutons (Permian)**—The Pit River stock is medium- to coarse-grained quartz diorite, granodiorite, and albite granite. Isotopic (U-Pb) age is 261 Ma (Fraticelli and others, 1985). Other small plutons of albite quartz diorite and mafic diorite (pattern) along general outcrop belt of the McCloud Limestone (unit **Pm**) are probably similar in age to and cogenetic with the Dekkas Andesite

Pdn **Dekkas Andesite and Nosoni Formation, undivided (Permian)**—Equivalent to the Bollibokka Group of Coogan (1960). The Dekkas Andesite is mostly volcanic breccia and pyroclastic rocks but includes interbedded mudstone, tuffaceous sandstone, and local limestone (**ls**); tuffaceous beds contain fusulinids of Guadalupian age (Albers and Robertson, 1961); interfingers with the underlying Nosoni Formation. The Nosoni is mostly tuffaceous mudstone and tuff and subordinate sandstone, conglomerate, and mafic flows; contains abundant fossils of Guadalupian and Leonardian(?) age (Albers and Robertson, 1961; Miller, 1986). In southern part of outcrop belt, thickness of the Dekkas is approximately 300 to 1,060 m and the Nosoni is as much as 610 m (Albers and Robertson, 1961). In northern part, thickness of the undivided Dekkas and Nosoni is nearly 6 km (Miller, 1986). Separated from the underlying McCloud Limestone by disconformity and, locally, by intrusive rocks

Pm **McCloud Limestone (Early Permian)**—Light-gray limestone and minor chert lenses and nodules. Thickness may be as much as 1,525 m. Contains abundant corals and fusulinids; mainly Wolfcampian and Leonardian(?) in age (Albers and Robertson, 1961). Separated at many places from the overlying Nosoni and the underlying Baird Formations by mafic quartz diorite intrusions and by faults

PMb **Baird Formation (Permian to Mississippian)**—Mostly mafic pyroclastic rocks and interbedded tuffaceous sandstone, mudstone, siliceous mudstone, tuff, flows, and minor limestone and chert. Thickness approximately 915 to 1,525 m. Contains abundant brachiopods, bryozoans, and corals that range in age from Late Mississippian to Late Pennsylvanian or Early Permian (Watkins, 1974). Unit is mainly Mississippian and Pennsylvanian in age but ranges into the Permian (Wolfcampian) at Hirz Mountain (Watkins, 1985)

Mb **Bragdon Formation (Mississippian)**—Interbedded dark shale, siltstone, sandstone, grit, and locally abundant pebble-conglomerate beds. May be as much as 1,828 m thick (Diller, 1906). Conformably underlies the Baird Formation. May rest unconformably on older rocks that consist of the Kennett Formation at some places and at other places the Balaklala Rhyolite or the Copley Greenstone. Generally unfossiliferous but locally contains fossiliferous limestone and siltstone near top of unit (Watkins, 1974). Metamorphosed to spotted slate and quartz-biotite schist in aureole of the Shasta Bally batholith (Irwin, 1963)

Dk **Kennett Formation (Middle and Early? Devonian)**—Interbedded dark siliceous shale, rhyolitic tuff, and limestone (**ls**). The limestone is rich in corals, conodonts, and brachiopods of late Eifelian age (Boucot and others, 1974). In Shasta Lake region, the Kennett is a maximum of 122 m thick and grades downward into the Balaklala Rhyolite (Kinkel and others, 1956). Unit shown along Spring Creek fault is highly contorted cherty shale, thin and discontinuous, and of questionable formational affiliation (Albers and others, 1964)

Dmm **Mule Mountain stock (Devonian)**—Mostly medium- to coarse-grained albite granite, trondhjemite, and quartz diorite. Isotopic (U-Pb) age is 400 Ma (Albers and others, 1981). Outcrop is generally highly weathered

Db **Balaklala Rhyolite (Middle and (or) Early Devonian)**—Consists of silicic flows, breccia, and tuff. Lower part is mostly pyroclastic, and upper part is mostly flows. May be as much as 1,067 m thick in southern part of the Redding subterrane, where it forms a volcanic pile that thins toward its edges (Kinkel and others, 1956); generally absent in northern part. Early Devonian age is based on probable cogenetic relation and intrusion by the Mule Mountain stock. Middle Devonian age is suggested by presence of a fossil marine fish (Boucot and others, 1974) and by gradational relation to the Kennett Formation

Dc **Copley Greenstone (Early Devonian)**—Mainly andesitic and basaltic volcanic breccia, tuff, and pillow lavas. Thickness is at least 1,128 m and may be as much as 1,829 m (Kinkel and others, 1956). Upper part contains interbeds of rhyolitic tuff and grades into the overlying Balaklala Rhyolite. Formation rests on the Trinity ultramafic sheet, but contact is not exposed and may be a fault. Unit is unfossiliferous. Age is Early Devonian on the basis of stratigraphic relation with the Balaklala Rhyolite and on intrusion by, and possible cogenetic relation with, the Mule Mountain stock. Metamorphosed to gneiss and amphibolite adjacent to the Shasta Bally batholith (Albers and others, 1964)

Contact—Dashed where approximately located; dotted where concealed; queried where uncertain

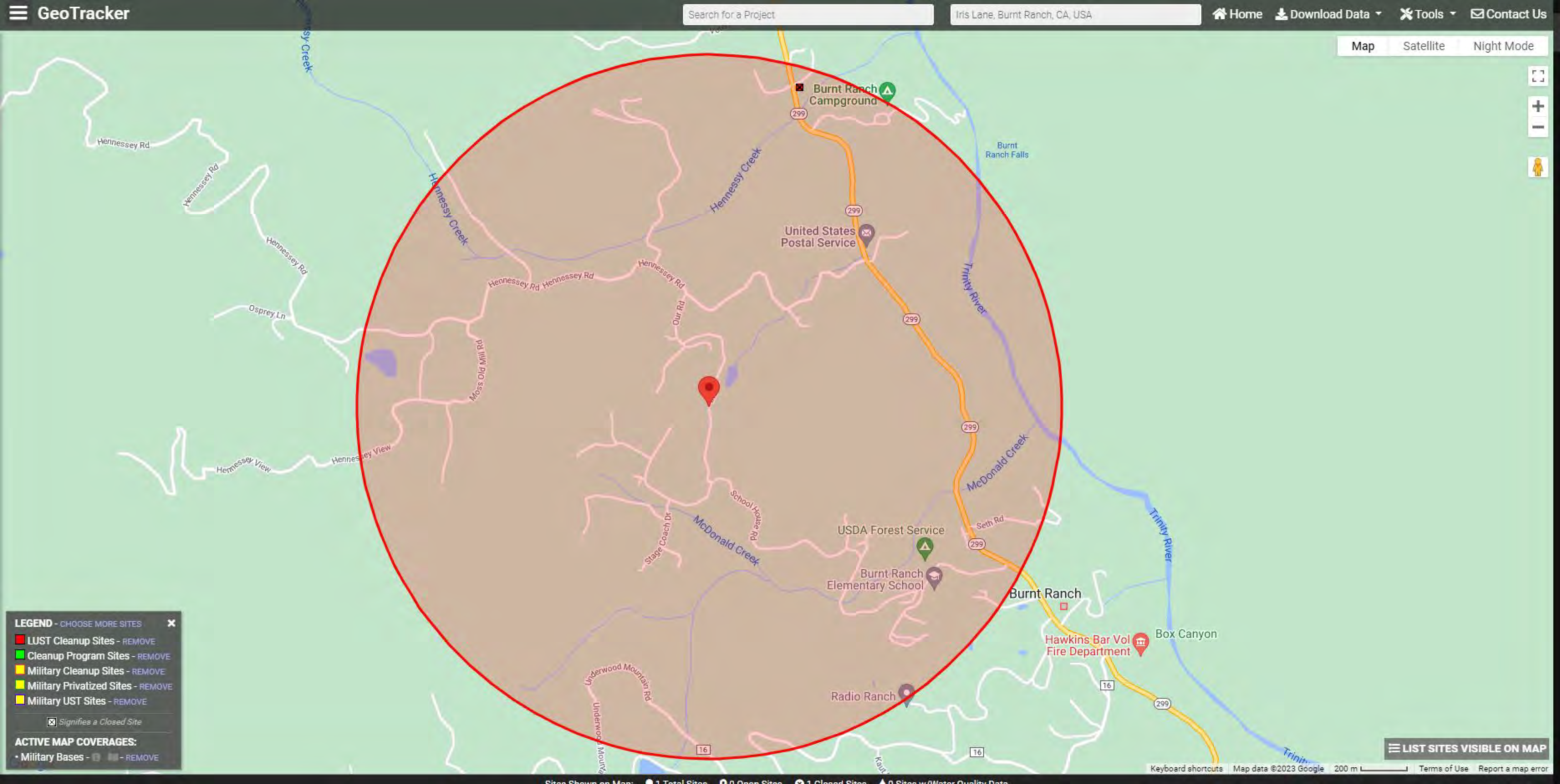
Fault—Dashed where approximately located; dotted where concealed

Thrust fault—Dashed where approximately located; dotted where concealed. Sawteeth on upper plate

Fold axis
- **Antiform**—Showing direction of plunge
- **Overturned antiform**
- **Synform**

Volcanic cone

For sale by U.S. Geological Survey, Map Distribution, Box 25286, Federal Center, Denver, CO 80225



Iris Lane, Burnt Ranch, CA, USA

LEGEND - CHOOSE MORE SITES

- 🟥 LUST Cleanup Sites - REMOVE
- 🟩 Cleanup Program Sites - REMOVE
- 🟨 Military Cleanup Sites - REMOVE
- 🟨 Military Privatized Sites - REMOVE
- 🟨 Military UST Sites - REMOVE

☒ *Signifies a Closed Site*

ACTIVE MAP COVERAGES:

- Military Bases - REMOVE

Sites Shown on Map: 1 Total Sites 0 Open Sites 1 Closed Sites 0 Sites w/Water Quality Data