DIVISION OF MINES
Ian Campbell, Chief

STATE OF CALIFORNIA
Edmund G. Brown, Governor

DEPARTMENT OF NATURAL RESOURCES
DeWitt Nelson, Director

EXPLANATORY DATA

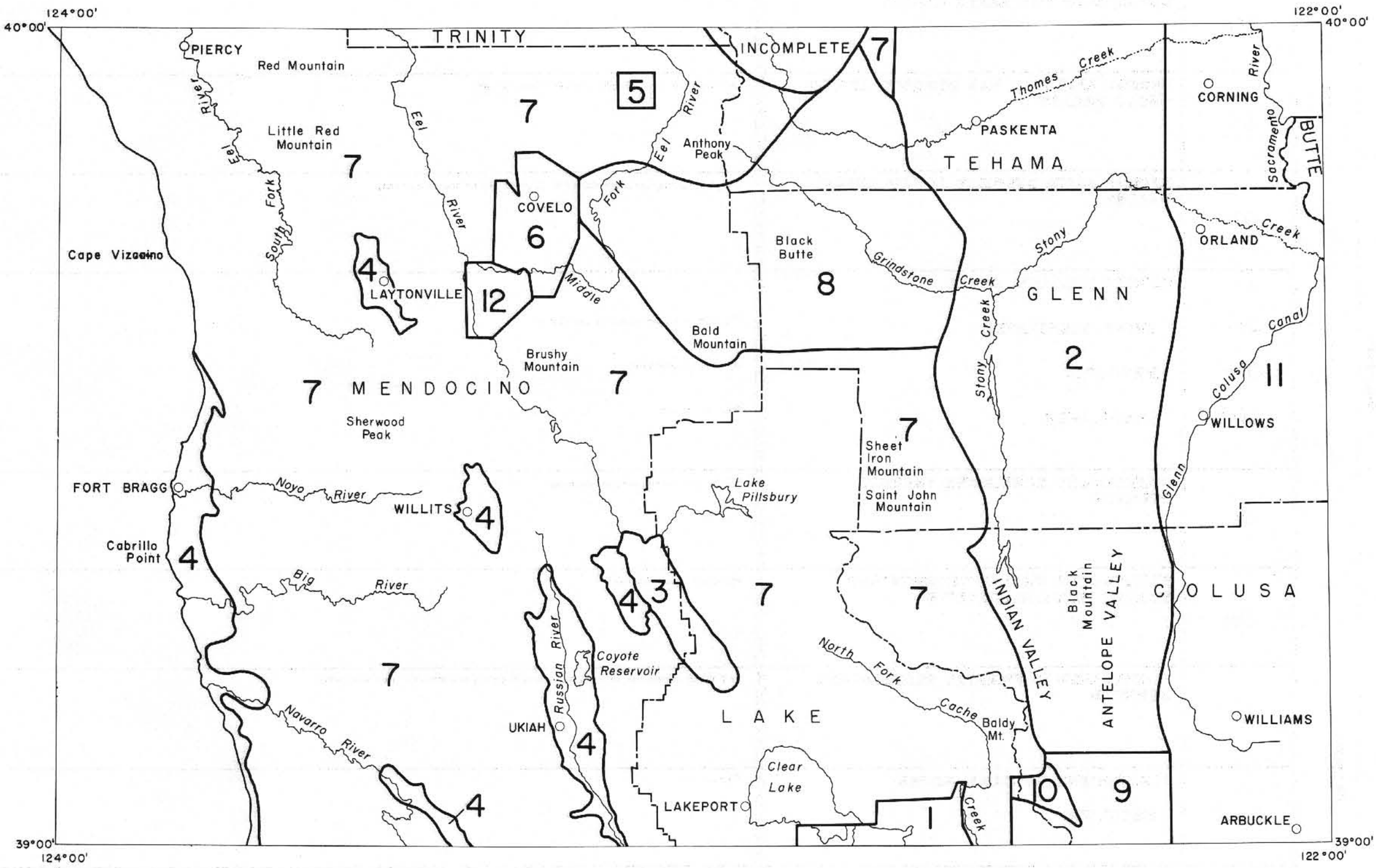
UKIAH SHEET

GEOLOGIC MAP OF CALIFORNIA

OLAF P. JENKINS EDITION
Compiled by Charles W. Jennings and Rudolph G. Strand, 1960

INDEX TO GEOLOGIC MAPPING

USED IN COMPILATION OF THE UKIAH SHEET



1. Anderson, Charles A., 1936, Volcanic history of the Clear Lake area, California: Geol. Soc. America Bull., vol. 47, no. 5, pp. 629-664, pl. 2: Geologic map of the area surrounding the southern half of Clear Lake, scale approx. 1:119,000.

2. Anonymous, Geologic maps of the west side of the Sacramento Valley, California, scale approx. 1:100,000, unpublished, 1953-55.

3. Banks, Philip; Iwamura, Tom; West, Lawrence J., Geologic map, Garrett tunnel route: California Dept. Water Res., scale approx. 1:60,000, unpublished, 1957.

4. California Div. Water Resources, 1956, Geology, hydrology, and water quality of the alluviated areas of Mendocino County and recommended standards of water well construction and sealing: California Div. Water Res. Water Quality Inv. Rept., no. 10, 211 pp., pls. 3, 4, 5, 6, 7-1, 7-2, 7-3 and 7-4, scale 1:63,360.

Reiche, Parry, Fault south of Westport (Cape Vizcaino and Branscomb quadrangles), personal communication, 1959.

5. Chesterman, Charles W., Nephrite and associated rocks in the Leech Lake Mountain area, Mendocino County, California, scale approx. 1:11,500, California Div. Mines, unpublished, 1956.

6. Clark, Samuel G., 1940, Geology of the Covelo district, Mendocino County, California: California Univ., Dept. Geol. Sci. Bull., vol. 25, no. 2, pp. 119-142, fig. 2, General geologic map of the Covelo district, scale approx. 9/16 inch equals 1 mile, fig. 4, Geological map of area southwest of Round Valley, scale approx. 7/8 inch equals 1 mile. Serpentine "ub" from Irwin (see Item 7) and "QP" from California Division of Water Resources (see Item 4).

*7. Irwin, William P., and Tatlock, Donald B., 1955, Geologic map of northwestern California, *in* Geology, mineral resources, and mineral industry, Appendix to Natural resources of northwestern California: U.S. Dept. Interior, Pacific Southwest Field Committee, pl. 1 Geologic map of northwestern California, scale approx. 1:800,000.

Irwin, William P., Geologic reconnaissance of the northern Coast Ranges and Klamath Mountains, California, with a summary of the mineral resources: California Div. Mines Bull. 179 (1960, in press), pl. 1, Geologic map of northwestern California, scale 1:500,000.

Irwin, William P., 1957, Franciscan group in Coast Ranges and its equivalents in Sacramento Valley, California: Am. Assoc. Petroleum Geologists Bull., v. 41, no. 10, pp. 2284-2297.

Bailey, E. H., and Irwin, W. P., 1959, K-feldspar content of Jurassic and Cretaceous graywackes of northern Coast Ranges and Sacramento Valley, California: Am. Assoc. Petroleum Geologists Bull., v. 43, no. 12, pp. 2797-2809, fig. 2, scale approx. 1 inch equals 20 miles.

8. Kilmer, F., Voloshin, V., Cipperly, J., Hicks, B., Geologic map to accompany the Thomes-Grindstone tunnel alignment study: California Dept. Water Res., scale approx. 1:160,000, unpublished, 1959.

9. Lawton, John E., Geology of the north half of the Morgan Valley quadrangle and the south half of the Wilbur Springs quadrangle, scale 1:62,500, Stanford University, unpublished Ph.D. thesis, 1956. (Modified in part by Anonymous, Geologic map of the west side of the Sacramento Valley, see Item 2.)

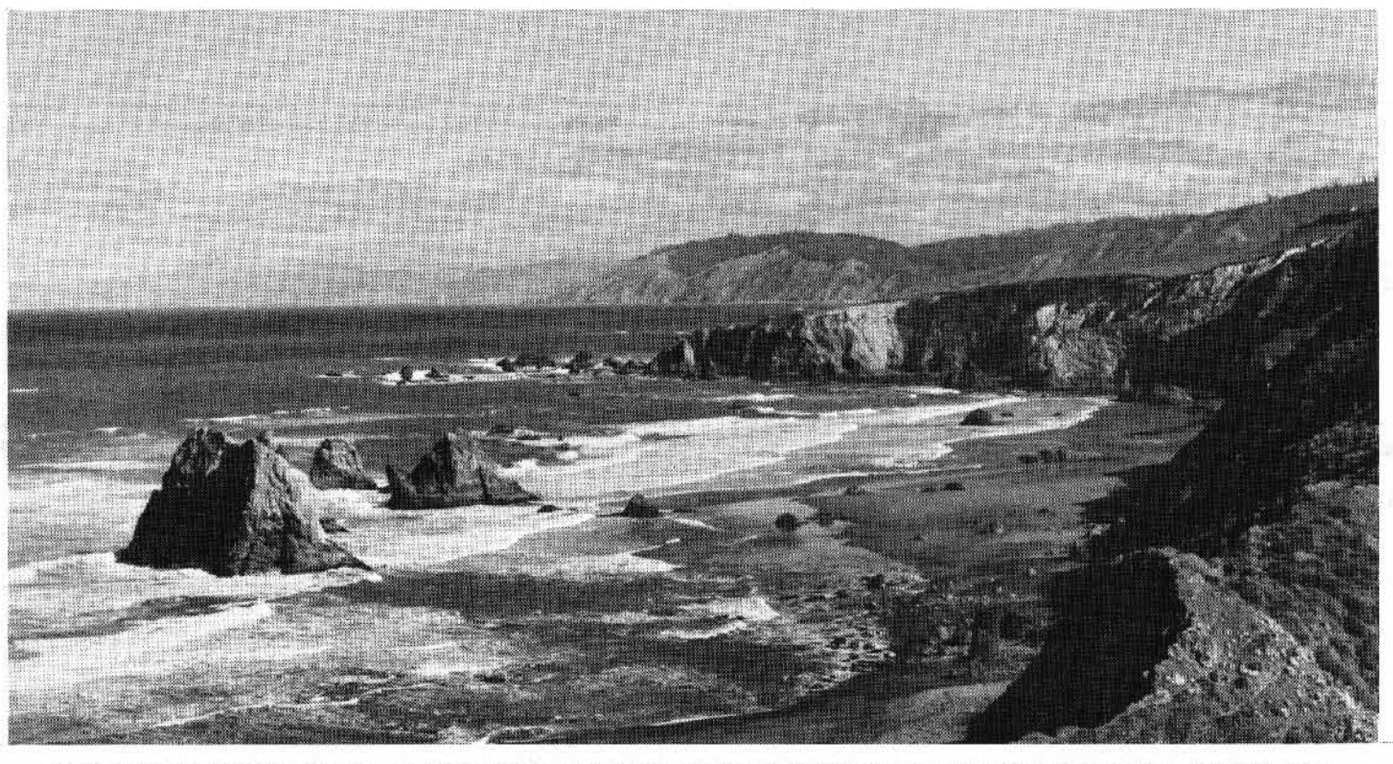
10. Myers, W. B., Geologic map of the Wilbur Springs area, scale 1:62,500, U.S. Geological Survey, unpublished, 1942-43.

11. Olmsted, Franklin H., and Davis, George H., 1958, Geologic features and ground-water storage capacity of the Sacramento Valley, California: U.S. Geol. Survey open file report, Geologic map of the Sacramento Valley, scale 1:125,000.

12. Wyatt, W. Charles, and Taylor, Charles, Areal geology and geologic sections, Dos Rios Tunnel Route: California Dept. Water Res., scale 1:32,000, unpublished, 1958.

* Franciscan greenstone, some minor masses of serpentine, stream alluvium, terrace deposits, Cache formation, and Recent volcanic rocks in the Clear Lake area, were added from mapping by: T. W. Dibblee, 1947; S. J. Rice, 1959; C. W. Jennings and R. G. Strand, 1958, and in part after Upland Soil Maps of: Mendocino County, 1951; Lake County 1955; and Glenn County, 1957: California Div. Forestry, Univ. of Calif. and U.S. Dept. Agriculture Cooperative Soil-Vegetation Survey Project, scale 1:125,000. Modifications of metasedimentary rock contacts by S. J. Rice, California Div. Mines, 1960.

For a complete list of published geologic maps of this area see Division of Mines Special Report 52.



Typical view of Mendocino County coast showing headlands composed of Cretaceous sedimentary rocks. Waves have cut back and behind tiny promontories leaving small islands (stacks) entirely removed from the cliffs of the mainland. View toward northwest, north of Westport. *Photo courtesy of Redwood Empire Association.*

STRATIGRAPHIC NOMENCLATURE—UKIAH SHEET

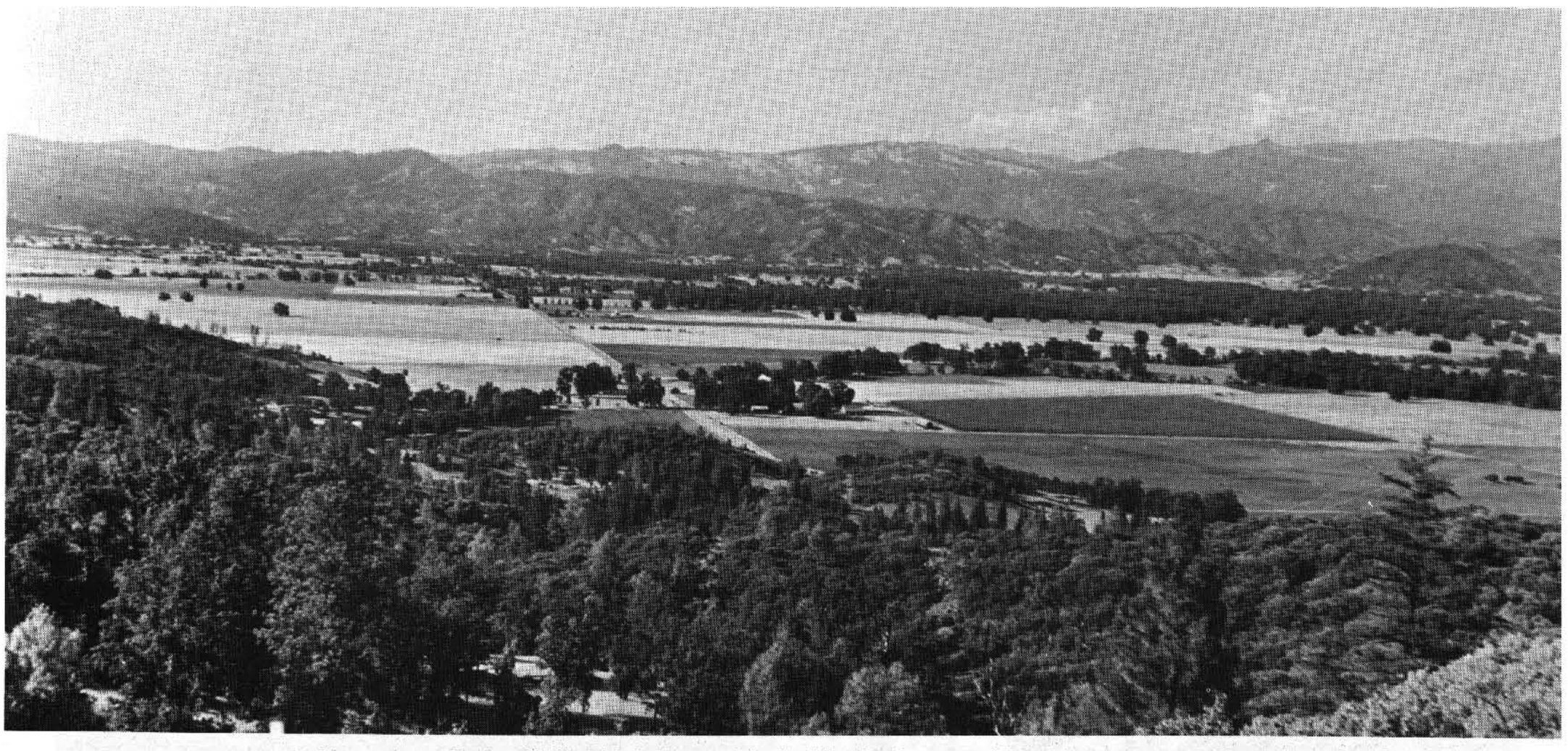
AGE	STATE MAP SYMBOL	STATE MAP UNIT	STRATIGRAPHIC UNITS AND CHARACTERISTIC LITHOLOGIES (The formations grouped within an individual State Map Unit, are listed in stratigraphic sequence from youngest to oldest.)
CENOZOIC — QUATERNARY — Recent	Qs	**RECENT DUNE SAND**	Dune Sand
CENOZOIC — QUATERNARY — Recent	Qal	**RECENT ALLUVIUM**	Alluvium; Recent breccia, conglomerate and sand of C. A. Anderson; valley fill
CENOZOIC — QUATERNARY — Recent	Qsc	**RECENT RIVER AND MAJOR STREAM CHANNEL DEPOSITS IN THE GREAT VALLEY**	River deposits (deposits along channels, flood plains, and natural levees of major streams)
CENOZOIC — QUATERNARY — Recent	Qf	**RECENT ALLUVIAL FAN DEPOSITS IN THE GREAT VALLEY**	Alluvial-fan deposits (Pleistocene and Recent)
CENOZOIC — QUATERNARY — Recent	Qb	**RECENT BASIN DEPOSITS IN THE GREAT VALLEY**	Flood-basin deposits (deposited in flood stages of major streams)
CENOZOIC — QUATERNARY — Recent		**RECENT VOLCANIC ROCKS:**	
	Qrv	**UNDIFFERENTIATED**	Undifferentiated andesite and basalt
	Qrv^r	**RHYOLITIC**	Hypersthene dacite
	Qrv^p	**PYROCLASTIC**	Basaltic ejecta
CENOZOIC — QUATERNARY — Pleistocene	Qt	**QUATERNARY NONMARINE TERRACE DEPOSITS**	River and stream terrace deposits
CENOZOIC — QUATERNARY — Pleistocene	Qm	**PLEISTOCENE MARINE DEPOSITS AND MARINE TERRACE DEPOSITS**	Marine terrace deposits
CENOZOIC — QUATERNARY — Pleistocene	Qc	**PLEISTOCENE NONMARINE SEDIMENTARY DEPOSITS**	Red Bluff formation and related terrace deposits—*gravels, clay and sand*
CENOZOIC — QUATERNARY — Pleistocene		**PLEISTOCENE VOLCANIC ROCKS:**	Rhyodacite
	Qpv^r	**RHYOLITIC**	
CENOZOIC — QUATERNARY — Pleistocene	QP	**PLIOCENE-PLEISTOCENE NONMARINE SEDIMENTARY DEPOSITS**	Cache formation—*laucustrine and fluvial deposits,* unnamed Plio-Pleistocene deposits bordering alluviated valleys in Mendocino County
CENOZOIC — QUATERNARY — Pleistocene	✳	**QUATERNARY AND/OR PLIOCENE CINDER CONES**	Quaternary cinder cones in Clear Lake area
CENOZOIC — TERTIARY — Pliocene	Puc	**UPPER PLIOCENE NONMARINE SEDIMENTARY ROCKS**	Tehama formation—*silt, sand, gravel, and clay*
CENOZOIC — TERTIARY — Pliocene		**PLIOCENE VOLCANIC ROCKS:**	
	Pv^b	**BASALTIC**	Basalt of the Cache formation
	Pv^p	**PYROCLASTIC**	Nomlaki tuff member of Tehama formation
CENOZOIC — TERTIARY — Pliocene	Pml	**MIDDLE AND/OR LOWER PLIOCENE MARINE SEDIMENTARY ROCKS**	Undifferentiated marine deposits in northwestern part of map area which are considered to be of Pliocene and Miocene age
CENOZOIC — TERTIARY — Miocene	Mm	**MIDDLE MIOCENE MARINE SEDIMENTARY ROCKS**	Temblor formation of S. Clark—*gray sandstone, conglomerate, some shale, and a few coal seams*
CENOZOIC — TERTIARY — Eocene	E	**EOCENE MARINE SEDIMENTARY ROCKS**	Capay formation—*gray fine-grained sandstone;* "Meganos formation"—*gray sandstone with fragments of carbonaceous material, thin conglomerate bed*
CENOZOIC — TERTIARY — Paleocene	Ep	**PALEOCENE MARINE SEDIMENTARY ROCKS**	Martinez formation—*fine-grained gray sandstone*
CENOZOIC — TERTIARY — Undivided		**TERTIARY VOLCANIC ROCKS:**	
	Tv^b	**BASALTIC**	Basalt (Orland Buttes area—considered to be early Pliocene by Kirby,[1] and u. Eocene or l. Oligocene by Durrell [2])

STRATIGRAPHIC NOMENCLATURE—Continued

AGE	STATE MAP SYMBOL	STATE MAP UNIT	STRATIGRAPHIC UNITS AND CHARACTERISTIC LITHOLOGIES (The formations grouped within an individual State Map Unit, are listed in stratigraphic sequence from youngest to oldest.)
MESOZOIC — CRETACEOUS — UNDIVIDED	K	**UNDIVIDED CRETACEOUS MARINE SEDIMENTARY ROCKS**	Unnamed Cretaceous or Upper Jurassic—*sandstone, shale and conglomerate*
	Ku	**UPPER CRETACEOUS MARINE SEDIMENTARY ROCKS**	Forbes, Guinda, Funks, Sites, Yolo, and Venado formations—*sandstone, siltstone, shale, conglomerate;* unnamed U. Cretaceous formation—*sandstone, shale, and conglomerate,* including the "Salt Creek" conglomerate [3]; "Yager formation—*dark gray mudstone, shale, graywacke, and conglomerate*
	Kl	**LOWER CRETACEOUS MARINE SEDIMENTARY ROCKS**	Rocks of the Shasta series including Horsetown and Paskenta formations—*sandstone, shale, and conglomerate.* Includes detrital serpentine in the Wilbur Springs area
	KJf	**FRANCISCAN FORMATION**	Franciscan formation—*sandstone, shale, chert, and conglomerate,* locally small areas of greenstone, limestone, basalt, glaucophane schist, and related metamorphic rocks
	KJfv	**FRANCISCAN VOLCANIC AND METAVOLCANIC ROCKS**	Greenstone of the Franciscan formation (includes some rocks which may not be Franciscan)
	ub	**MESOZOIC ULTRABASIC INTRUSIVE ROCKS**	Serpentine and peridotite
JURASSIC	Jk	**KNOXVILLE FORMATION**	Knoxville formation—*shale, sandstone, and conglomerate.* Includes some detrital serpentine in the Wilbur Springs area
UNDIVIDED	ms	**PRE-CRETACEOUS METASEDIMENTARY ROCKS**	Metasedimentary rocks consisting predominantly of phyllite, mica-quartz schist, and slate. May be metamorphosed Franciscan rocks, or part of an older basement complex
	mv	**PRE-CRETACEOUS METAVOLCANIC ROCKS**	Metavolcanic rocks consisting predominantly of chlorite schist. May be metamorphosed Franciscan rocks, or part of an older basement complex

NOTES

[1] Kirby, J. M., 1943, Sites region *in* Geologic formations and economic development of the oil and gas fields of California: California Div. Mines Bull. 118, pp. 606-608.
[2] Durrell, C., 1959, The Lovejoy formation of northern California: University of California Pubs. in Geol. Sci., vol. 34 no. 4, pp. 193-220.
[3] The contact between the Upper and Lower Cretaceous strata has been placed at the base of the "Salt Creek" conglomerate. Some geologists would place the contact at the base of the Venado formation which lies higher in the section.



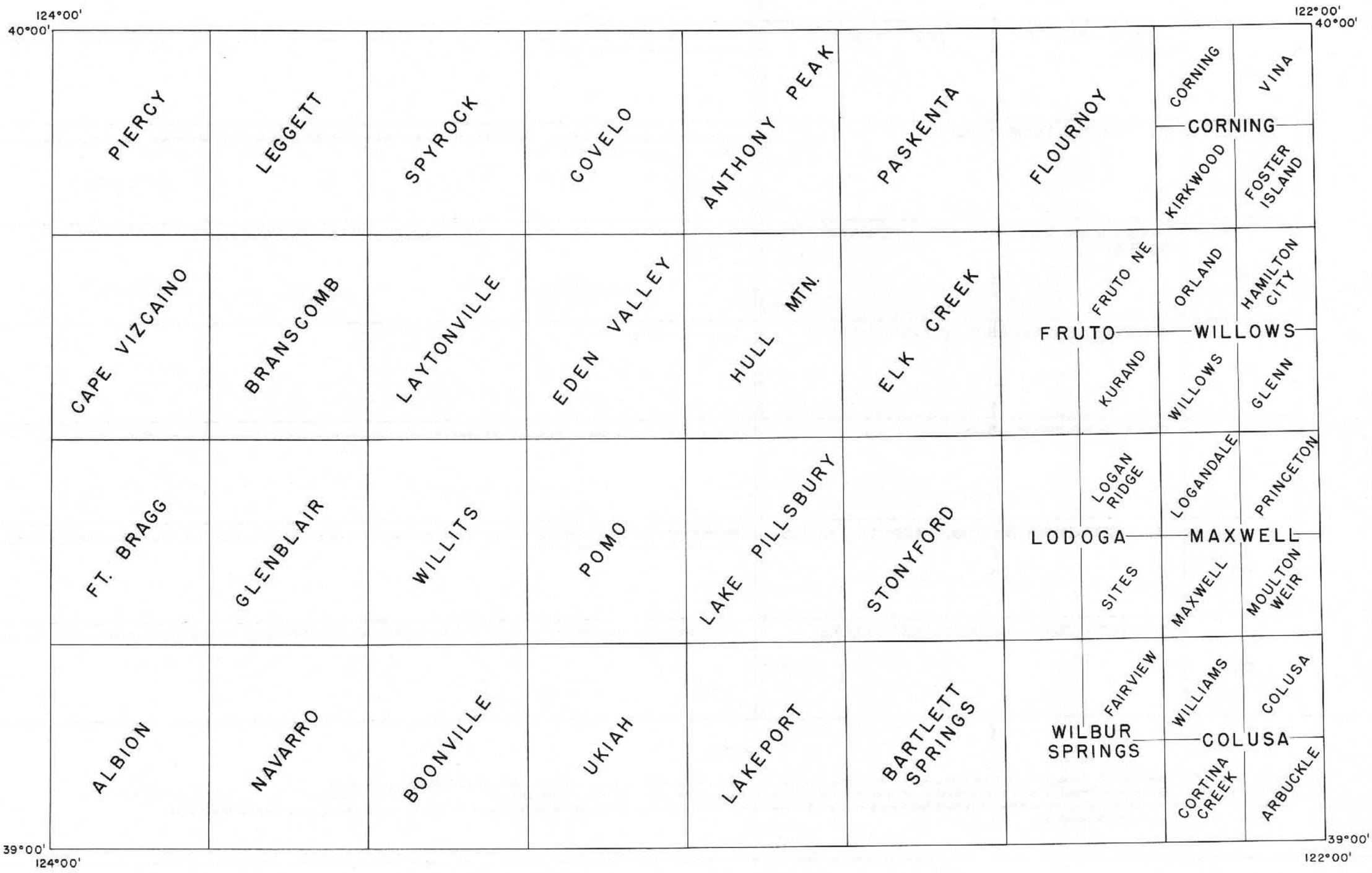
View northeast across Round Valley, site of the town of Covelo. This valley is a structural basin, believed to be bounded by faults. The steep-faced linear ridge on the far side of the valley is composed of rocks of the Franciscan formation, and is interpreted as an eroded fault-scarp feature. The drilling of water wells near the center of the valley has indicated that the alluvium reaches a maximum thickness of more than 700 feet. Leech Lake Mountain area, located on the right skyline, contains some unusually well exposed sills of ultramafic rocks. *Photo by Salem J. Rice.*

TOPOGRAPHIC QUADRANGLES

WITHIN THE UKIAH SHEET

AVAILABLE FROM THE U. S. GEOLOGICAL SURVEY

1960



Bold arcuate ridges (hogbacks) exposed in middleground are formed of steep eastward-dipping Knoxville sedimentary rocks. Serpentine forms higher ridges on right side of photo and is also exposed in the immediate foreground. View is from the Paskenta-Covelo road, facing southeast toward the Sacramento Valley. Lower Cretaceous beds in distance. *Photo by Salem J. Rice.*