Preliminary Geologic Map of the Visalia 30′ × 60′ Quadrangle, California

Preliminary Geologic Map 26-05

Scale 1:100,000

By
Carlos I. Gutierrez and Eleanor R. Spangler

2026

California
Department of Conservation
California Geological Survey

This map was funded in part by the
USGS National Cooperative Geologic Mapping Program
under STATEMAP award number G24AC00329, 2024

Suggested citation:
Gutierrez, C.I., and Spangler, E.R., 2026, Preliminary geologic map of the Visalia 30′ × 60′ Quadrangle, California: California Geological Survey Preliminary Geologic Map 26-05, scale 1:100,000.



STATE OF CALIFORNIA
GAVIN NEWSOM, GOVERNOR

NATURAL RESOURCES AGENCY
WADE CROWFOOT, SECRETARY

DEPARTMENT OF CONSERVATION
JENNIFER LUCCHESI, DIRECTOR

CALIFORNIA GEOLOGICAL SURVEY
JEREMY LANCASTER, STATE GEOLOGIST

Copyright © 2026 by the California Geological Survey and Department of Conservation. All rights reserved. No part of this publication may be reproduced without written consent of the copyright owners. The California Geological Survey and the Department of Conservation make no warranties as to the suitability of this product for any given purpose.

Publications are available for free download from the California Geological Survey website (https://www.conservation.ca.gov/cgs).

Web Accessibility Statement - If you find any part of this document to be inaccessible with assistive technology, visit our Accessibility web page at conservation.ca.gov to report the issue and request alternative means of access. To help us respond to your concern, please include the following three items in your request: 1. your contact information. 2. the title of this document. 3. the web address where you obtained the document.

CONTENTS

Introduction 1
Data Sources 2
Regional Geology 3
  Sierra Nevada Province 3
  Great Valley Province 4
  Coast Ranges Province 4
Description of Map Units 5
  Quaternary Surficial Units 5
  Quaternary to Tertiary Sedimentary Units 6
    Northeast side of San Joaquin Valley 6
    Southwest side of San Joaquin Valley 7
  Cretaceous Intrusive Rocks 7
  Mesozoic to Paleozoic Metamorphic Rocks 7
References 9
  Imagery and Lidar 11
Appendix A: Authorship Documentation and Product Limitations 12

FIGURES

Figure 1. Map showing the location of the Visalia 30′ × 60′ Quadrangle and surrounding area 1
Figure 2. Data sources index map for the Visalia 30′ × 60′ Quadrangle 2

PLATE

Preliminary geologic map of the Visalia 30′ × 60′ Quadrangle, California ..... SEE PDF

Preliminary Geologic Map of the Visalia 30′ × 60′ Quadrangle, California

By Carlos I. Gutierrez and Eleanor R. Spangler

INTRODUCTION

The Visalia Quadrangle covers approximately 4,987 km^2 (1,925 mi^2) of Fresno, Kings, and Tulare Counties, in central California (see Location Map on Map Sheet). The map area measures approximately 90 km (56 mi) east-west and 55 km (34 mi) north-south. Elevations range from about 54 m (177 ft) in the Tulare Lake basin northeast of Kettleman City, to over 757 m (2,480 ft) in the Sierra Nevada north of Lake Kaweah. Physiographic features of the Visalia 30′ × 60′ Quadrangle include relatively flat agricultural land in the San Joaquin Valley, the northern portion of the dry Tulare Lake Bed, rolling grasslands developed on gently sloping alluvial fans that form the lower foothills of the Sierra Nevada, and rocky outcrops in the lower slopes of the western Sierra along the eastern edge of the quadrangle.

Several significant geographic and anthropogenic features occur within the quadrangle. Geographic features include the Kings River, Kaweah River, Tule River, and numerous distributary channels and sloughs where these rivers enter the San Joaquin Valley (Figure 1). These waterways flow

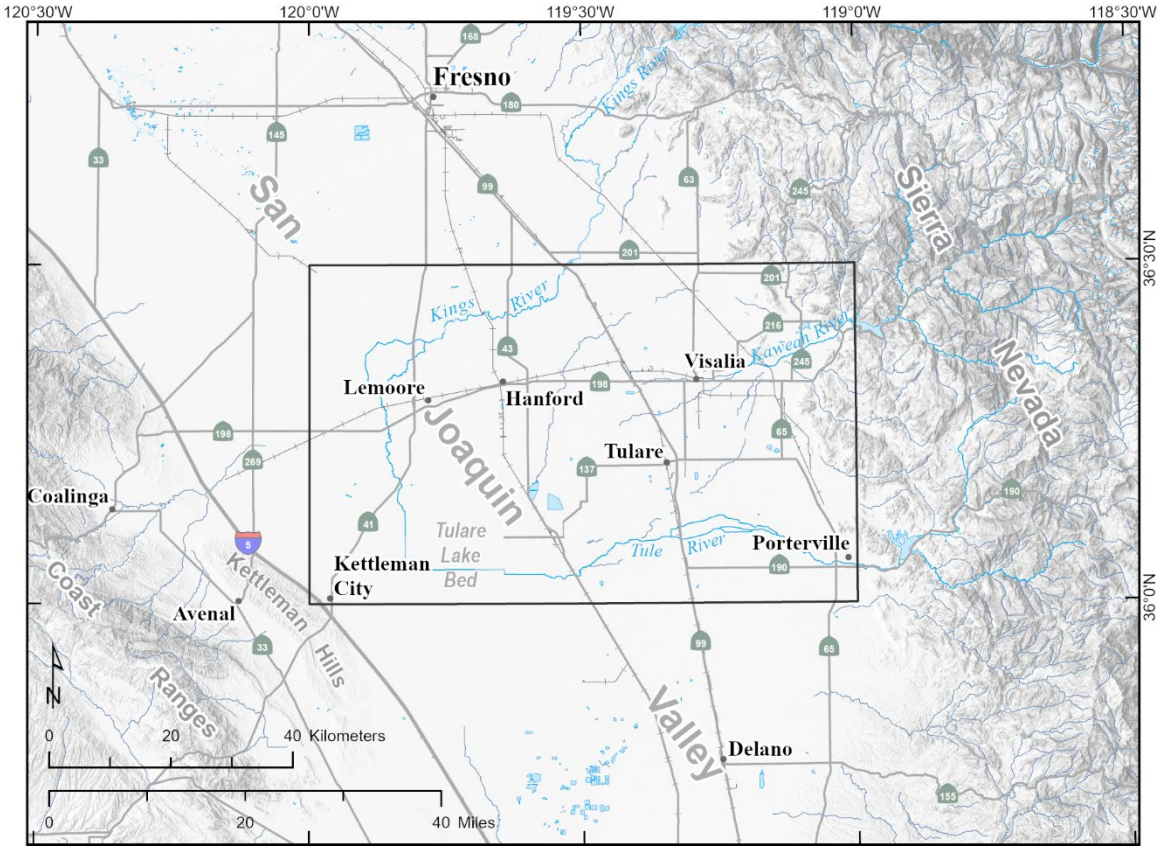

Figure 1. Map showing the location of the Visalia 30′ × 60′ Quadrangle and surrounding area.

westward from the Sierra into the Tulare basin, which contains the now dry bed of Tulare Lake, once the largest freshwater lake in the western United States. Anthropogenic features include the urbanized areas surrounding Visalia, Tulare, Hanford, and Lemoore, as well as extensive irrigated agriculture that dominates much of the valley floor and lower foothills, which have replaced native grasslands, wetlands, and riparian habitats to irrigated farmland. Major transportation corridors include State Routes 99, 198, and 43, as well as Interstate 5 and several active railroad lines.

Geologic hazards in the quadrangle include landslides associated with weaker rock units and steeper slopes, naturally occurring asbestos in ultramafic rocks (Van Gosen and Clinkenbeard, 2011), potential sources of radon gas in some of the alluvial units (Churchill, 2016), and ground subsidence related to groundwater extraction.

This geologic map depicts the distribution of bedrock and surficial deposits and illustrates their stratigraphic and structural relationships within the quadrangle. It provides a regional geologic framework for evaluating geologic resources and hazards. The map is intended for regional-scale applications and is not sufficiently detailed to support site-specific evaluations; however, it may serve as a foundation for more detailed geologic investigations and characterizations.

DATA SOURCES

The geologic map was compiled from numerous source maps and scientific studies that cover various parts of the quadrangle and represent the work of many geologists and soil scientists (Figure 2). Source maps ranged in scale from detailed 1:24,000-scale quadrangle mapping to regional compilations. As a result, the precision and level of detail represented on this map vary according to the scale and quality of the original source materials. This map builds upon the compilation completed for the preliminary geologic map of a portion of the San Joaquin Valley, California (Gutierrez and others, 2025).

In the eastern portion of the quadrangle, where bedrock units are exposed, mapping by Alfors and Putnam (1964), Putnam and Alfors (1964), and Clemens-Knott (1992, 2011), as well as smaller-scale

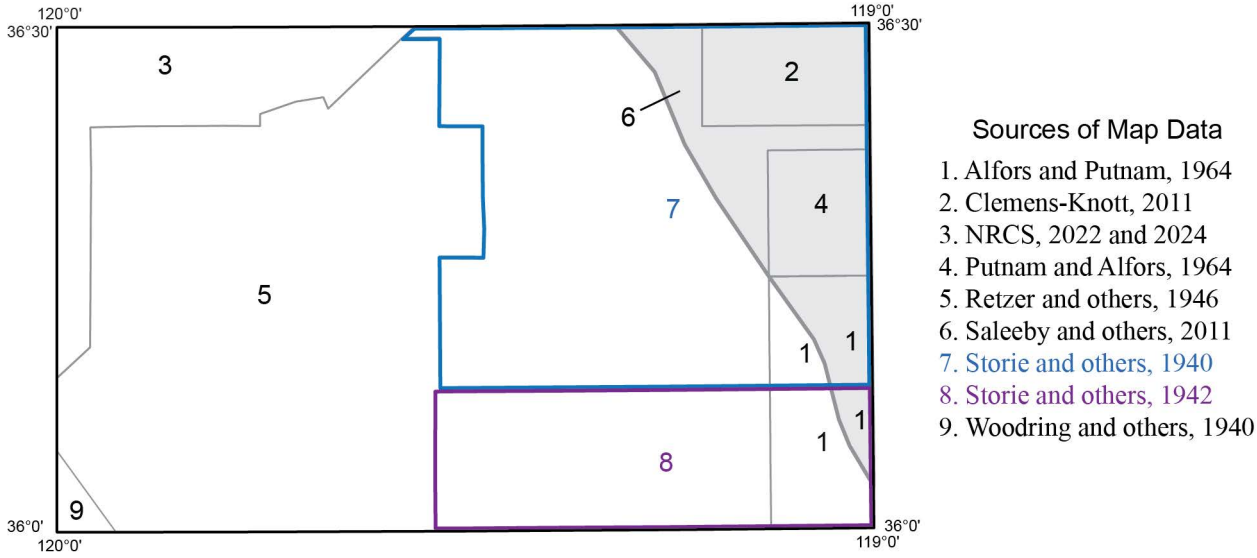

Figure 2. Data sources index map for the Visalia 30′ × 60′ Quadrangle.

mapping by Saleeby (1978, 1979) and Saleeby and others (2011) were used. Mapping by Alfors and Putnam (1964) covers the Lindsay and Porterville 7.5-minute Quadrangles, and Putnam and Alfors (1964) covers the Rocky Hill 7.5-minute Quadrangle. Detailed mapping by Clemens-Knott (1992, 2011) focused on rocks of the Stokes Mountain plutonic suite, which is partly exposed in the northeast portion of the quadrangle. Although less detailed, mapping by Saleeby (1978, 1979) and Saleeby and others (2011), which focused on the Kings River ophiolite and Kaweah serpentinite mélange, provided valuable constraints for refining the reconnaissance-level mapping by Alfors and Putnam (1964) and Putnam and Alfors (1964).

A large portion of the quadrangle is covered by Quaternary to Tertiary sedimentary units. Sedimentary units exposed in the Kettleman Hills in the southwestern corner of the quadrangle were compiled primarily from Woodring and others (1940) and supplemented by mapping in adjacent quadrangles by Dibblee (2006a, 2006b). Sedimentary units on the northeast side of the valley were largely interpreted from soils mapping (Retzer and others, 1946; Storie and others, 1940; Storie and others, 1942; NRCS, 2022 and 2024) following a similar methodology that was used for other studies in the central valley, primarily in areas farther north within the San Joaquin Valley (Marchand and Allwardt, 1981; Wills and others, 2022a and 2022b; White, 2016).

The most detailed and reliable mapping available for each area was compiled using Geographic Information System (GIS) software. Where appropriate, contacts were refined or remapped based on geomorphic interpretation of high-resolution, lidar-derived digital elevation models (DEM) and aerial imagery. Extensive agricultural modification of the landscape has obscured primary geomorphic features across much of the quadrangle, limiting the effectiveness of geomorphic interpretation in many areas.

REGIONAL GEOLOGY

The Visalia 30′ × 60′ Quadrangle spans three geomorphic provinces of California: the Sierra Nevada, the Great Valley, and the Coast Ranges. The quadrangle is located primarily within the southern San Joaquin Valley but extends eastward into the western Sierra Nevada foothills and includes a small portion of the Kettleman Hills in the southwestern corner. The geology of the quadrangle records a history of Paleozoic magmatism and sedimentation, subsequent continent margin deformation and related late Mesozoic arc magmatism and metamorphic overprinting, followed by Cenozoic basin development, Quaternary sedimentation, and active tectonism.

Sierra Nevada Province

The eastern portion of the quadrangle includes the western foothills of the Sierra Nevada. Bedrock exposures consist primarily of Paleozoic to early Mesozoic metasedimentary, metaigneous, and metavolcanic rocks, and Cretaceous plutonic rocks of the Sierra Nevada batholith. Metamorphic rocks exposed in the foothills represent island-arc, oceanic, and associated sedimentary assemblages that were accreted to the continental margin and subsequently intruded by granitic plutons associated with Jurassic to Cretaceous phases of the Sierra Nevada magmatic arc, which developed along the western margin of North America during prolonged Mesozoic subduction of the Farallon Plate (Bateman and Eaton, 1967; Ducea, 2001).

In the map area, the foothills metamorphic belt consists of the western facies of the Kings Sequence, the Calaveras Complex, and the Kings-Kaweah ophiolite belt. The foothills metamorphic belt is characterized by northwest-trending structural fabrics, faults, and shear zones that record multiple

episodes of Mesozoic deformation (Saleeby, 2011). Plutonic rocks in the quadrangle consist of the Early Cretaceous Stokes Mountain plutonic suite (Clemens-Knott, 2011) and undifferentiated Cretaceous granitic rocks. Late Cenozoic uplift and westward tilting of the Sierra Nevada, coupled with increased erosion during Quaternary glacial periods, strongly influenced the evolution of the neighboring San Joaquin Valley by supplying large volumes of sediment that were transported westward by river systems to form extensive alluvial deposits along the western foothills of the Sierra (Marchand and Allwardt, 1981; Unruh, 1991).

Great Valley Province

Most of the quadrangle lies within the Great Valley geomorphic province. The valley is a structural trough that developed along the western flank of the Sierra Nevada and accumulated a thick sequence of Late Cretaceous marine rocks and younger Cenozoic continental and marine deposits (Bartow, 1991). Throughout much of the quadrangle, basement rocks are deeply buried beneath thousands of meters of sediment derived primarily from the Sierra Nevada and, to a lesser extent, the Coast Ranges. The surface geology is dominated by late Pliocene to Holocene alluvial, fluvial, and lacustrine deposits. Extensive alluvial fans extend westward from the Sierra Nevada foothills and merge across the valley floor. These fan deposits include the Riverbank and Modesto Formations, which record multiple episodes of alluvial fan construction associated with climatic fluctuations during the Pleistocene (Marchand and Allwardt, 1981). Younger Holocene deposits occur within active river channels, on alluvial fans, within floodplains, and in low-lying basins.

The western part of the valley within the quadrangle includes a portion of the Tulare Basin. This broad topographic depression accumulated fine-grained lacustrine, marsh, and flood-basin deposits during the late Quaternary and once supported the largest freshwater lake in the western United States (Atwater and others, 1986). Sedimentation within the basin was controlled by fluctuations in climate, river discharge, and basin subsidence. Tulare Lake has largely disappeared due to water diversion and agricultural development; however, it has partially refilled at times during years of unusually heavy precipitation in the Sierra, and its former extent remains evident in the region′s geomorphology and sedimentary deposits.

Coast Ranges Province

A small portion of the southwestern corner of the quadrangle lies within the Coast Ranges geomorphic province and includes the northeastern flank of the Kettleman Hills. Rocks exposed in the Kettleman Hills consist primarily of marine and nonmarine sedimentary strata ranging in age from Miocene to Pleistocene. These units include the San Joaquin and Tulare Formations, which record the transition from marine deposition in the ancestral San Joaquin basin to continental sedimentation associated with uplift of the Coast Ranges (Woodring and others, 1940; Bartow, 1991). Folding and uplift of these strata have produced a series of northwest-trending anticlinal ridges that form prominent topographic features along the western margin of the San Joaquin Valley. These structures have accumulated economic quantities of oil and gas.

DESCRIPTION OF MAP UNITS

Quaternary Surficial Units

Quaternary surficial deposits are divided based on their geomorphic expression and depositional environments, such as fans, floodplains, alluvial valleys, and high energy river deposits. These units are further subdivided by relative age based on topographic position, degree of erosional dissection, and soil development.

af **Artificial fill (historic)—**Anthropogenic deposits of earth materials; may be engineered or non-engineered.

adf **Artificial dam fill (historic)—**Engineered earth-fill materials used to construct the dams at Lake Kaweah.

Qa **Alluvial deposits (late Holocene)—**Unconsolidated clay, silt, sand, and gravel largely deposited by fluvial processes.

Qw **Wash deposits (late Holocene)—**Unconsolidated silt, sand, gravel, and typically minor clay deposited in stream channels.

Qf **Alluvial fan deposits (late Holocene)—**Unconsolidated silt, sand, and gravel; deposited at the mouths of drainages, typically with fan-shaped morphology; deposits may be well to crudely stratified; surfaces are generally not dissected.

Ql **Lake deposits (Holocene)—**Silt and clay deposited in Tulare Lake.

Qs **Sand deposits (Holocene)—**Sand deposits along the western margin of Tulare Lake, east of Kettleman City.

Qyf **Young alluvial fan deposits (Holocene to late Pleistocene)—** Unconsolidated to slightly consolidated silt, sand, and gravel; deposited at the mouths of drainages, typically with fan-shaped morphology; deposits may be crudely to well stratified; surfaces are slightly to moderately dissected.

Qls **Landslide deposits (Holocene to late Pleistocene)—**Unconsolidated, chaotic deposits of soil, colluvium, and weathered bedrock resulting from mass wasting processes.

Qof **Old alluvial fan deposits (late to middle(?) Pleistocene)—** Slightly to moderately consolidated silt, sand, and gravel deposited at the mouths of drainages, typically with fan-shaped morphology; deposits may be crudely to well stratified; surfaces are moderately to highly dissected. This unit only occurs along the southwestern side of the San Joaquin Valley; deposition was broadly coeval with formation of alluvial fans associated with the Modesto and Riverbank Formations along the northeastern side of the valley.

Quaternary to Tertiary Sedimentary Units

Northeast side of San Joaquin Valley

Modesto Formation (late Pleistocene)—Arkosic alluvial sediments consisting of gravel, sand, silt, and clay, deposited as a series of coalescing fans; represents glacial outwash deposits derived from the interior of the Sierra Nevada, with lesser contributions from local foothill sources (Marchand and Allwardt, 1981). Marchand and Allwardt (1981) interpreted the unit as Wisconsin in age (Tahoe and Tioga glaciations) based on youthful topography, geomorphic position, soil development, a disconformity between the Modesto and Riverbank Formations that likely correlates to a significant interglacial period, and radiocarbon age dates. The formation is subdivided into two informal members:

Qmu **Upper member—** Arkosic alluvial sand and silt; may also include minor local arkosic eolian sand; recognized by its topographic position between the lower post-Modesto terrace and flood plain surfaces and the higher terraces and fan surfaces of the lower member and Riverbank Formation; generally associated with Cajon and Hanford soils (Marchand and Allwardt, 1981).

Qml **Lower member—**Arkosic alluvial sand associated with terraces at or slightly above the highest topographic level associated with upper member; generally associated with Chino, Dinuba, Farwell, Fresno, Hesperia, Honcut, and Traver soils (Marchand and Allwardt, 1981).

Qmlb **Lower member, basin deposits—**Alluvial sand, silt, and clay deposited in interdistributary areas, lower fans, and flood basins; commonly stratified; generally associated with Fresno and Pond soils (Marchand and Allwardt, 1981).

Qr **Riverbank Formation, undivided (Pleistocene)—** Arkosic sand, silt, and minor gravel; deposited as a series of coalescing fans; represents glacial outwash deposits from the interior of the Sierra Nevada, with lesser contributions from local foothill sources (Marchand and Allwardt, 1981). Marchand and Allwardt (1981) suggest the age of the Riverbank Formation ranges from 130,000 to 450,000 years based on post-Riverbank erosional dissection, soil development, marine isotope stages, and age dates. The formation is subdivided into three informal units—upper, middle, and lower—the first two of which are present in the map area:

Qru **Upper member—**Arkosic sand forming terraces and fan surfaces topographically at or above Modesto Formation level; generally associated with Exeter and Ramona soils (Marchand and Allwardt, 1981).

Qrm **Middle member—** Arkosic sand typically forming terraces and fan surfaces topographically at or above the upper member of the Riverbank Formation; generally associated with Ducor, Hovey, Lewis, Madera, Porterville, San Joaquin, Seville, and Yokohl soils (Marchand and Allwardt, 1981).

Southwest side of San Joaquin Valley

QTt **Tulare Formation (Pleistocene and Pliocene)—**Typically consists of poorly consolidated, silty to pebbly, cross-bedded sandstone and conglomerate (Woodring and others, 1940).

San Joaquin Formation (Pliocene)—Consists of shale, clayey to silty mudstone, mostly fine-grained silty sandstone, and minor conglomerate; chiefly marine but the lack of marine fossils and presence of terrestrial plant remains and fresh-water shells in some areas suggest partially non-marine origins (Woodring and others, 1940; Dibblee, 2006). The formation has been subdivided by Woodring and others (1940) into two informal members based on molluscan biostratigraphic zones.

Tsju **Upper member—** Described by Woodring and others (1940) as the strata occurring from the upper Mya zone down to the base of the Pecten zone.

Tsjl **Lower member—** Described by Woodring and others (1940) as the strata occurring below the base of the Pecten zone to the base of the Cascajo conglomerate member.

Cretaceous Intrusive Rocks

Kgr **Granitic rocks (Cretaceous)—**Granodiorite, diorite, tonalite, and granite (Alfors and Putnam, 1964; Putnam and Alfors, 1964).

Stokes Mountain plutonic suite (Early Cretaceous)—Plutonic rocks exposed in the northeastern portion of the quadrangle that consist dominantly of gabbro and tonalite with lesser granodiorite (Clemens-Knott, 2011).

Ksgb **Gabbro—**Two-pyroxene leucogabbro to quartz gabbro and hornblende gabbro; includes hornblende troctolites exposed on Colvin Mountain and east of the town of Elderwood (Clemens-Knott, 2011).

Ksgr **Granitic rocks—**Granodiorite, diorite, and tonalite.

Mesozoic to Paleozoic Metamorphic Rocks

J$_{Tr}$ks **Kings sequence, western facies (Early Jurassic to Late Triassic)—** Siliciclastic schists, mafic to felsic metavolcanic rocks, and marble (Saleeby, 2011).

M$_z$P$_z$c **Calaveras Complex (Middle Triassic to Permian)—**Bedded radiolarian chert, chert-argillite, diamictite, and marble (Saleeby, 2011).

M$_z$P$_z$cm **Marble—**Marble and limestone lenses; locally includes cherty and dolomitic marbles.

P$_z$ksm **Kaweah serpentinite mélange (Permian to Carboniferous)—**Consists of coherent to semi-coherent ophiolitic blocks within a pervasively deformed matrix of schistose serpentinite or silica-carbonate rock derived from serpentinite (Saleeby, 1979). Block sizes range from millimeters to tens of kilometers in length but are typically between 25 and 500 meters in length; compositions include chert, ophicalcite, silica-carbonate rock, basalt, gabbro, metabasite, and serpentinized peridotite (Saleeby, 1979).

P$_z$kmv **Mafic volcanic rocks—**Pillow basalts, pillow breccia, and hyaloclastite; includes

pillowed and massive basalt and mafic dike complex mélange blocks derived from the Early Ordovician Kings River ophiolite (Saleeby, 2011); basalt is locally vesicular.

Pzkgb **Gabbro—**Hornblende-clinopyroxene gabbroids; also includes clinopyroxene gabbro and anorthositic gabbro mélange blocks derived from the Early Ordovician Kings River ophiolite (Saleeby, 2011).

Pzkms **Metasedimentary rocks—**Black slate and phyllite; locally includes bedded radiolarian chert blocks.

Ok **Kings River ophiolite (Early Ordovician)—**In the Antelope Valley area, consists of pillow basalt, breccia, basaltic and diabase dikes, and massive basalt (Saleeby, 1978).

REFERENCES

Alfors, J.T., and Putnam, G.W., 1964, Reconnaissance geologic map of parts of the Porterville, Lindsay, and Frazier Valley Quadrangles, and part of the Kaweah Quadrangle [unpublished]: California Division of Mines and Geology, reconnaissance mapping for the State Geologic Map, scale 1:62,500.

Atwater, B.F., Adam, D.P., Forester, R.M., and Morrison, S.D., 1986, A fan dam for Tulare Lake, California, and implications for the Wisconsin glacial history of the Sierra Nevada: Geological Society of America Bulletin, v. 97, p. 97-109.

Bartow, J.A., 1991, The Cenozoic evolution of the San Joaquin Valley, California: U.S. Geological Survey Professional Paper 1501.

Bateman, P.C., and Eaton, J.P., 1967, Sierra Nevada batholith: Science, v. 158, p. 1407-1417.

Churchill, R.K., 2016, Radon potential in western Tulare County, California: California Geological Survey Special Report 238, 92 p., scale 1:100,000.

Clemens-Knott, D., 1992, Geologic and isotopic investigations of the Early Cretaceous Sierra Nevada batholith, Tulare Co., CA, and the Ivrea Zone, NW Italian Alps: Examples of interaction between mantle-derived magma and continental crust [Ph.D. thesis]: California Institute of Technology Pasadena, 349 p., scale 1:62,500.

Clemens-Knott, D., 2011, Geologic map of the Stokes Mountain region, western Sierra Nevada mountains, California: Geological Society of America Map and Chart Series 100, scale 1:22,700, 10.1130/2011.MCH100.

Croft, M.G., and Gordon, G.V., 1968, Geology, hydrology, and quality of water in the Hanford - Visalia area, San Joaquin Valley, California: U.S. Geological Survey Open-File Report OF-68-67, Plate 2, scale 1:250,000.

Dibblee, T.W., Jr., 2006a, Geologic map of the Kettleman Plain Quadrangle, Kings County, California: Dibblee Geological Foundation Map DF-280, scale 1:24,000.

Dibblee, T.W., Jr., 2006b, Geologic map of the Los Viejos Quadrangle, Kings County, California: Dibblee Geological Foundation Map DF-281, scale 1:24,000.

Ducea, M.N., 2001, The California arc: Thick granitic batholiths, eclogitic residues, lithospheric-scale thrusting, and magmatic flare-ups: GSA Today, v. 11, no. 11, p. 4-10.

Cordell, Durell, 1941, Metamorphism in the southern Sierra Nevada northeast of Visalia, California: University of California Publications, Bulletin of the Department of Geological Sciences, vol. 25, no. 1, p. 1-117, Map 1: Geologic map of Visalia, California (dated 1936), scale 1:125,000.

Graymer, R.W., and O'Neal, M.D., 2025, Geologic map of the Sierra Nevada, California and western Nevada, *in* O'Neal, M.D., Graymer, R.W., Langenheim, V.E., eds., Sierra Nevada Earth Science Atlas: California Geological Survey Geologic Data Map 9, Plate 1A, scale 1:400,000.

Gutierrez, C.I., Spangler, E.R., and Young, E.K., 2025, Preliminary geologic map of a portion of the San Joaquin Valley, California, *in* Boyd, D., Clements, B., Nakamura, K., Gerhardt, A., Escobar, L., Gutierrez, C., Spangler, E., and Young, E., Preliminary Surface and Subsurface Geological Mapping of Portions of the Fresno and Bakersfield 1° × 2° Quadrangles, South-Central San Joaquin Basin, California: California Geological Survey Preliminary Subsurface Geologic Model 25-01, Plate 3, scale 1:100,000.

Jahns, R.H., 1954, Geologic Provinces of California: California Division of Mines Bulletin 170.

Marchand, D.E., and Allwardt, A., 1981, Late Cenozoic stratigraphic units, northeastern San Joaquin Valley, California: U.S. Geological Survey Bulletin 1470, iv, 70 p., https://doi.org/10.3133/b1470.

Matthews, R.A. and Burnett, J.L., 1965, Geologic map of California, Fresno sheet: California Division of Mines and Geology, Geologic Atlas of California GAM 05, scale 1:250,000.

NRCS, 2022, Soil Survey Geographic (SSURGO) database for eastern Fresno area, California: U.S. Department of Agriculture, Natural Resources Conservation Service, available online, accessed 9/23/2022.

NRCS, 2024, Soil Survey Geographic (SSURGO) database for Fresno County, California, western part: U.S. Department of Agriculture, Natural Resources Conservation Service, available online, accessed 5/22/2025.

O′Neal, M.D., Graymer, R.W., and Langenheim, V.E., eds., Sierra Nevada Earth Science Atlas: California Geological Survey Geologic Data Map 9.

Plafker, George, 1956, Geology of the southwest part of the Kaweah 30' quadrangle, California [M.S. thesis]: University of California, scale 1:62,500.

Putnam, G.W., and Alfors, J.T., 1964, Geologic map of part of the Rocky Hill Quadrangle [unpublished]: California Division of Mines and Geology, scale 1:24,000.

Retzer, J.L., Gardner, R.A., Koehler, L.F., and Cole, R.C., 1946, Soil survey of Kings County, California: U.S. Department of Agriculture Soil Survey Series 1938, No. 9, scale 1:63,360.

Saleeby, J.B., 1978, Kings River ophiolite, southwestern Sierra Nevada foothills, California: Geological Society of America Bulletin, v. 89, p. 617-636, DOI: 10.1130/0016-7606(1978)89<617:KROSSN>2.0.CO;2.

Saleeby, J.B., 1979, Kaweah serpentinite mélange, southwest Sierra Nevada foothills, California: Geological Society of America Bulletin, Part I, v. 90, p. 29-46.

Saleeby, J.B., 2011, Geochemical mapping of the Kings-Kaweah ophiolite belt, California-Evidence for progressive mélange formation in a large offset transform subduction initiation environment, *in* Wakabayashi, J., and Dilek, Y., eds., Mélanges—Processes of Formation and Societal Significance: Geological Society of America Special Paper 480, p. 31-73, DOI:10.1130/2011.2480(02).

Saleeby, J.B., Busby, C.J., Goodin, S.E., and Sharp, W.D., 1978, Early Mesozoic paleotectonic-paleogeographic reconstruction of the southern Sierra Nevada region, California, *in* Howell, D., ed., Mesozoic Paleogeography of the Western United States: Society of Economic Paleontologists and Mineralogists, Pacific Section, p. 311-336.

Saleeby, J., Saleeby, Z., and Sousa, F., 2013, From deep to modern time along the western Sierra Nevada Foothills of California, San Joaquin to Kern River drainages, *in* Putirka, K., ed., Geologic Excursions from Fresno, California, and the Central Valley: A Tour of California′s Iconic Geology: Geological Society of America Field Guide 32, p. 37-62, doi:10.1130/2013.0032(03).

Saleeby, J. and Sharp, W., 1980, Chronology of the structural and petrologic development of the southwest Sierra Nevada foothills, California; Geological Society of America Bulletin 91, v. 6: 317-20. https://doi.org/10.1130/0016-7606(1980)91<;317:COTSAP>2.0.CO;2.

Sousa, F.J., Saleeby, J., Farley, K.A., Unruh, J.R., and Lloyd, M.K., 2017, The southern Sierra Nevada pediment, central California: Geosphere, v. 13, no. 1, p. 82-101, doi :10 .1130 /GES01369.1.

Storie, E.R., Owen, B.C., Carpenter, E.J., and Leighty, W.J., 1940, Soil survey of the Visalia area, California: U.S. Department of Agriculture Soil Survey Series 1935, No. 16, scale 1:63,360.

Storie, E.R., Owen, B.C., Layton, M.H., Anderson, A.C., Leighty, W.J., and Nikiforoff, C.C., 1942, Soil survey of the Pixley area, California: U.S. Department of Agriculture Soil Survey Series 1935, No. 23, scale 1:63,360.

Unruh, J.R., 1991, The uplift of the Sierra Nevada and implications for the tectonic history of the western Basin and Range Province: Geological Society of America Bulletin, v. 103, p. 1395-1404.

U.S. Geological Survey, 2016, National Hydrography Dataset (ver. 2.1), accessed ca. 2016.

Van Gosen, B.S., and Clinkenbeard, J.P., 2011, Reported historic asbestos mines, historic asbestos prospects, and other natural occurrences of asbestos in California: U.S. Geological Survey Open-File Report 2011-1188, 22 p., 1 pl.

White, D.W., 2016, Stratigraphy and transmissivity of the Kaweah River fan, Visalia, California [Ph.D. thesis]: California State University, Fresno, 132 p.

Wills, C.J., O′Neal, M.D., Holland, P.J., and Key, E.L., 2022a, Preliminary geologic map of the Merced 30′ × 60′ Quadrangle, California: California Geological Survey Preliminary Geologic Map 22-10, scale 1:100,000.

Wills, C.J., O′Neal, M.D., Holland, P.J., Parrish, B.M., Key, E.L. and Delattre, M.P., 2022b, Preliminary geologic map of the Oakdale 30′ × 60′ Quadrangle, California: California Geological Survey Preliminary Geologic Map 22-09, scale 1:100,000.

Woodring, W., Stewart, R., and Richards, R.W., 1940, Geology of the Kettleman Hills oil field, California: Stratigraphy, paleontology, and structure: U.S. Geological Survey Professional Paper 195, Report: v. 170 p., 2 plates, https://doi.org/10.3133/pp195.

Imagery and Lidar

U.S. Geological Survey, 2023, USGS Original Product Resolution CA_SanJoaquin_2021_A21: U.S. Geological Survey, 1-meter resolution, 191.

U.S. Geological Survey, 2024, USGS Original Product Resolution CA_SierraNevada_B22: U.S. Geological Survey, 0.5-meter resolution, http://nationalmap.gov/elevation.html.

U.S. Department of Agriculture, 2022, Farm Service Agency–Aerial Photography Field Office, National Agriculture Imagery Program (NAIP), 15 cm resolution, https://datagateway.nrcs.usda.gov.

U.S. Department of Agriculture, 2024, Farm Service Agency–Aerial Photography Field Office, National Agriculture Imagery Program (NAIP), 15 cm resolution, https://datagateway.nrcs.usda.gov.

APPENDIX A: AUTHORSHIP DOCUMENTATION AND PRODUCT LIMITATIONS

PUBLICATION TITLE: Preliminary geologic map of the Visalia 30′ × 60′ Quadrangle, California

Preliminary Geologic Map 26-05

LIMITATIONS: This map is considered preliminary, and the California Department of Conservation makes no warranties as to the suitability of this product for any given purpose. This map should not be considered as an authoritative or comprehensive source for landslide and seismic hazard data. For landslide data, please visit the California Geological Survey Landslides web page at: https://www.conservation.ca.gov/cgs/landslides. For seismic hazards data and Zones of Required Investigation, please visit the California Geological Survey Seismic Hazards Program web page at: https://www.conservation.ca.gov/cgs/sh/program.

First Author – Carlos Gutierrez, PG 8686



Date: June 30, 2026



Second Author – Eleanor R. Spangler, PG 9440, CEG 2744



Date: June 30, 2026



This authorship document accompanies the geologic map with the following citation:

Gutierrez, C.I., and Spangler, E.R., 2026, Preliminary geologic map of the Visalia 30′ × 60′ Quadrangle, California: California Geological Survey Preliminary Geologic Map 26-05, scale 1:100,000.