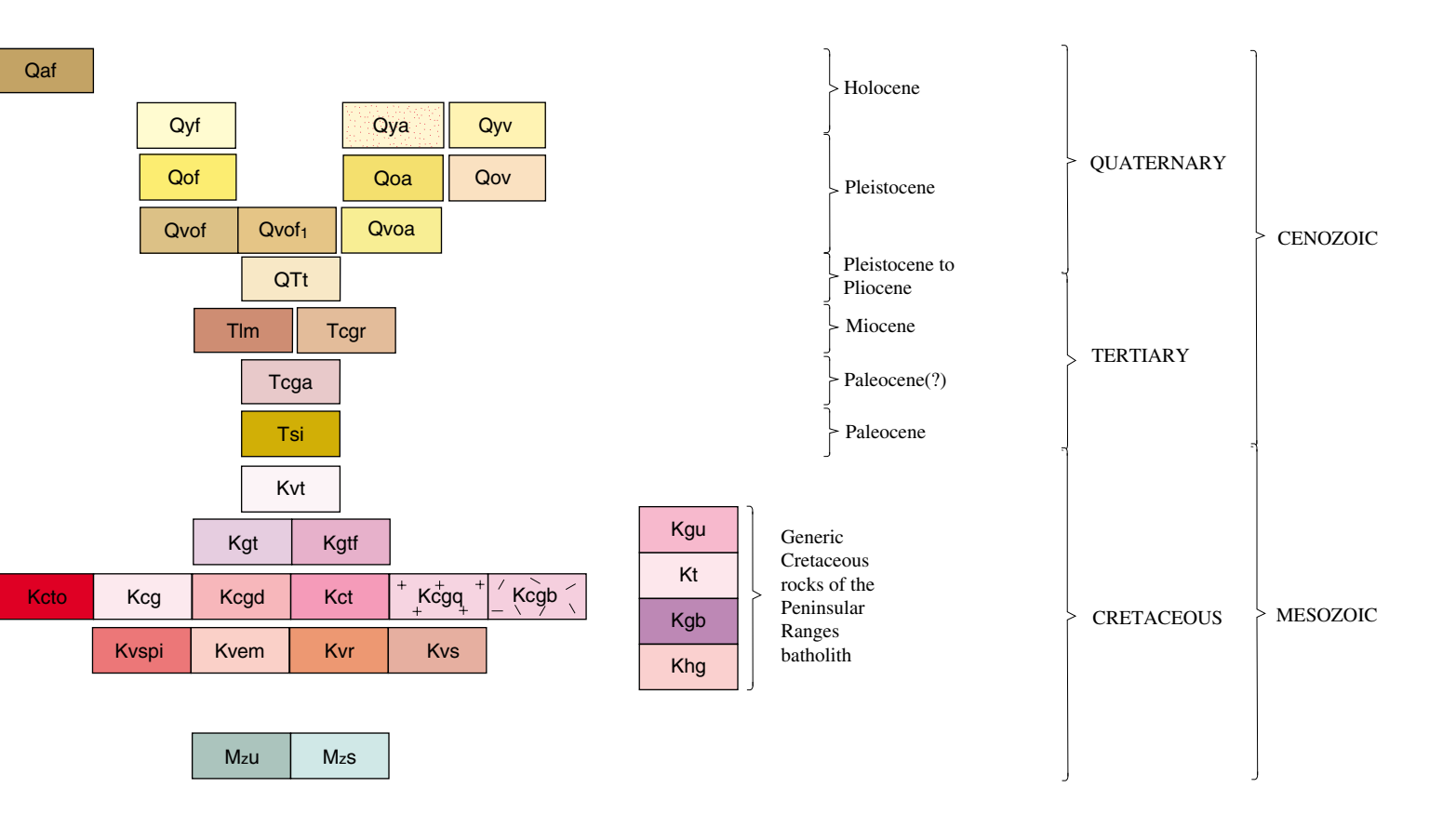


CORRELATION OF MAP UNITS



DESCRIPTION OF MAP UNITS

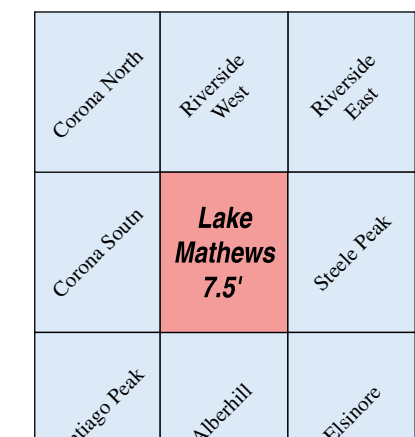
VERY YOUNG SURFICIAL DEPOSITS—Sediment recently transported and deposited in channels and washes, on surfaces of alluvial fans and alluvial plains, and on hillslopes. Soil-profile development is non-existent. Includes: **Artificial fill (late Holocene)**—Deposits of fill resulting from human construction or mining activities. **YOUNG SURFICIAL DEPOSITS**—Sedimentary units that are slightly consolidated to cemented and slightly to moderately dissected. Alluvial fan deposits (Qf series) typically have high coarse-clast ratios. Younger surficial units have upper surfaces that are capped by slight to moderately developed pedogenic-soil profiles (AC to A/CAC/Rambic/C₀ profiles). Includes: **Young alluvial fan deposits (Holocene and late Pleistocene)**—Gray-brown sand and cobble- and gravel-sand deposits derived from lithically diverse sedimentary units in the Temescal Valley. In Mosquito Canyon derived mainly from granitic rock. **Young axial channel deposits (Holocene and late Pleistocene)**—Gray, unconsolidated alluvium consisting of fine-grained sand and silt. Occurs in Temescal Valley and channels in dissected very old alluvial fan deposits on the south side of Lake Mathews. **Young alluvial valley deposits (Holocene and late Pleistocene)**—Silty to sandy alluvium on valley floors; gray, unconsolidated. **OLD SURFICIAL DEPOSITS**—Sedimentary units that are moderately consolidated and slightly to moderately dissected. Older surficial deposits have upper surfaces that are capped by moderately to well-developed pedogenic soils (A/CAC/R₀C₀ profiles and B₀ horizons as much as 1 to 2 m thick and maximum hues in the range of 10YR 5/4 and 6/4 through 7.5YR 6/4 to 4/4 and mature B₀ horizons reaching 5YR 5/6). Includes: **Old alluvial fan deposits (late to middle Pleistocene)**—Indurated, sandy and gravelly alluvial fan deposits in Temescal Valley. Slightly to moderately dissected, reddish-brown. Some deposits include thin, discontinuous surface layer of Holocene alluvial fan material. **Old axial channel deposits (late to middle Pleistocene)**—Alluvial deposits consisting mainly of sand, but containing minor gravel and silt. Gray to reddish-brown, unconsolidated to indurated. Generally slightly dissected. Restricted to several isolated occurrences south of Lake Mathews. **Old alluvial valley deposits (late to middle Pleistocene)**—Fluvial deposits along valley floors. Consist of moderately indurated, slightly-dissected, sandy alluvium, containing lesser silt, and clay-bearing/alluvium. Some deposits include thin alluvial deposits of Holocene age. Restricted to Gavilan Pluton area in eastern part of quadrangle. **VERY OLD SURFICIAL DEPOSITS**—Sediments that are slightly to well consolidated to indurated, and moderately to well dissected. Upper surfaces are capped by moderate to well developed pedogenic soils (A/CAC/R₀C₀ profiles having B₀ horizons as much as 2 to 3 m thick and maximum hues in the range 7.5YR 6/4 and 4/4 to 2.5YR 5/6). **Very old alluvial fan deposits (early Pleistocene)**—Mostly well-dissected, well-indurated, reddish-brown sand deposits, containing minor gravel. Commonly contains duripans and locally siltstones. Primarily occurs in Temescal Valley and on the south side of Lake Mathews. **Very old alluvial fan deposits, Unit 1 (early Pleistocene)**—Well-dissected, well-indurated, reddish-brown sand deposits, containing minor gravel. Commonly contains duripans and locally siltstones. Restricted to two small areas on west side of Temescal Valley. **Very old axial channel deposits (early Pleistocene)**—Gravel, sand, and silt; reddish-brown, well-indurated, surface well-dissected. **Conglomerate of Temescal Wash**—Boulder conglomerate, sand and gravel matrix. Fairly well indurated. Brown. Probably deposited on weathered Palaeocene surface. **Lake Mathews Formation (Miocene)**—Mudstone, conglomerate, and poorly bedded sandstone; massively bedded, nonmarine. **Rhyolite-lact conglomerate of Lake Mathews area (Miocene?)**—Cobble conglomerate, coarse-grained sandstone matrix, massive bedded, indurated. Cobble clasts include exotic red rhyolite. **Conglomerate of Arlington Mountain (Palaeocene?)**—Cobble conglomerate composed of exotic welded tuff clasts with minor clasts of exotic quartzite. Found in two small areas north of Arlington Mountain in northwest part of quadrangle. **Silverado Formation (Palaeocene)**—Nonmarine and marine sandstone, and siltstone thinly overlying thick basal conglomerate. Basal conglomerate is thoroughly weathered, pale gray to reddish-brown, pebble conglomerate, very locally is a boulder conglomerate. Occurs in Temescal Valley.

On some SCAMP geologic map plots, including the Lake Mathews 7.5' quadrangle, characteristic grain size information is displayed using abbreviated Alpha characters (Q₁, Q₂, Q₃), where the characters conform to the following definitions:

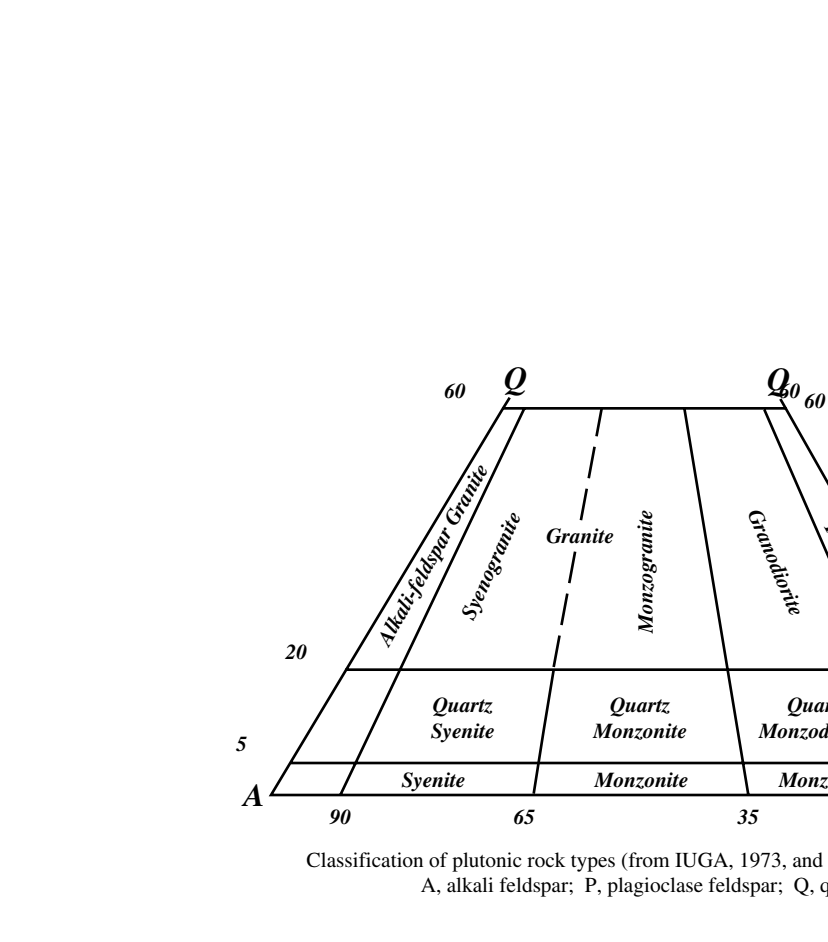
- a: armaceous (very coarse sand through very fine sand)
- b: boulder gravel (25mm)
- f: gravel (coarse through granule gravel)
- s: silt
- cl: clayey
- m: mud
- p: peat

In the Description of Map Units, the Ma following UPR ages has an attached subscript Ma₁₀ for isotopic dilution analyses, and Ma₁₀₀ for ion probe analyses.

- Contact—Generally located within ±15 meters
- - - Fault—High angle. Strike-slip component on all faults is right-lateral; dip-slip component is unknown, but probably reflects valley digitated relations. Dashed where located within ±30 meters, dotted where concealed
- Kite—Zones of tourmalinized monzonite and granodiorite.
- Strike and dip of metamorphic foliation
- 70° Inclined
- 20° Inclined
- Strike and dip of igneous foliation
- 70° Inclined
- 20° Inclined
- Vertical



SURROUNDING 7.5' QUADRANGLES



Gavilan ring complex (Cretaceous)—Composite ring structure consisting of a variety of granitic rocks that range from monzonite to tonalite. Informally named here for exposures in Gavilan Pluton area. Perris Block and Lake Mathews 7.5' quadrangle. Western part of complex was termed Estelle quartz diorite and eastern part included in Perris quartz diorite by Dudley (1935). Western part of complex was termed Estelle tonalite and eastern part was included within Bonvall tonalite by Larsen (1948). Hypersyenite is a characteristic mineral of many rocks in complex. Based on texture, degree of erosion is greater in eastern part of complex than in western part. Rocks on west side of the complex commonly have hypabyssal texture and appear to grade into volcanic textured rock. Several gold mines (e.g., Good Hope, Gavilan, and Santa Rosa mines), which constituted Pinnacite mining district (Sampson, 1935), are located within complex. Gold apparently occurs in arsenopyrite-bearing quartz veins. Located in center of ring complex, but not part of it, is near-circular Arroyo del Tono pluton. Includes: **Young alluvial fan deposits (Holocene and late Pleistocene)**—Gray-brown sand and cobble- and gravel-sand deposits derived from lithically diverse sedimentary units in the Temescal Valley. In Mosquito Canyon derived mainly from granitic rock. **Young axial channel deposits (Holocene and late Pleistocene)**—Gray, unconsolidated alluvium consisting of fine-grained sand and silt. Occurs in Temescal Valley and channels in dissected very old alluvial fan deposits on the south side of Lake Mathews. **Young alluvial valley deposits (Holocene and late Pleistocene)**—Silty to sandy alluvium on valley floors; gray, unconsolidated. **OLD SURFICIAL DEPOSITS**—Sedimentary units that are moderately consolidated and slightly to moderately dissected. Older surficial deposits have upper surfaces that are capped by moderately to well-developed pedogenic soils (A/CAC/R₀C₀ profiles and B₀ horizons as much as 1 to 2 m thick and maximum hues in the range of 10YR 5/4 and 6/4 through 7.5YR 6/4 to 4/4 and mature B₀ horizons reaching 5YR 5/6). Includes: **Old alluvial fan deposits (late to middle Pleistocene)**—Indurated, sandy and gravelly alluvial fan deposits in Temescal Valley. Slightly to moderately dissected, reddish-brown. Some deposits include thin, discontinuous surface layer of Holocene alluvial fan material. **Old axial channel deposits (late to middle Pleistocene)**—Alluvial deposits consisting mainly of sand, but containing minor gravel and silt. Gray to reddish-brown, unconsolidated to indurated. Generally slightly dissected. Restricted to several isolated occurrences south of Lake Mathews. **Old alluvial valley deposits (late to middle Pleistocene)**—Fluvial deposits along valley floors. Consist of moderately indurated, slightly-dissected, sandy alluvium, containing lesser silt, and clay-bearing/alluvium. Some deposits include thin alluvial deposits of Holocene age. Restricted to Gavilan Pluton area in eastern part of quadrangle. **VERY OLD SURFICIAL DEPOSITS**—Sediments that are slightly to well consolidated to indurated, and moderately to well dissected. Upper surfaces are capped by moderate to well developed pedogenic soils (A/CAC/R₀C₀ profiles having B₀ horizons as much as 2 to 3 m thick and maximum hues in the range 7.5YR 6/4 and 4/4 to 2.5YR 5/6). **Very old alluvial fan deposits (early Pleistocene)**—Mostly well-dissected, well-indurated, reddish-brown sand deposits, containing minor gravel. Commonly contains duripans and locally siltstones. Primarily occurs in Temescal Valley and on the south side of Lake Mathews. **Very old alluvial fan deposits, Unit 1 (early Pleistocene)**—Well-dissected, well-indurated, reddish-brown sand deposits, containing minor gravel. 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Found in two small areas north of Arlington Mountain in northwest part of quadrangle. **Silverado Formation (Palaeocene)**—Nonmarine and marine sandstone, and siltstone thinly overlying thick basal conglomerate. Basal conglomerate is thoroughly weathered, pale gray to reddish-brown, pebble conglomerate, very locally is a boulder conglomerate. Occurs in Temescal Valley. **Val Verde pluton (Cretaceous)**—Relatively uniform pluton composed of biotite-hornblende tonalite. Termed Perris quartz diorite by Dudley (1935), Val Verde tonalite by Osborn (1939), and included within Bonvall tonalite by Larsen (1948). Name Val Verde adopted by Morton (1999) based on detailed study of Osborn (1939) near Val Verde, a former settlement and railway siding midway between Perris and Riverside. Apparently steep-walled Val Verde pluton is eroded to mid-pluton level. Emplacement age of pluton 105.7 Ma. ⁴⁰Ar/³⁹K age of hornblende is 100 Ma, biotite 95 Ma and potassium feldspar 88.5 Ma (Snee, pers. comm., 1999). Includes: **Val Verde tonalite**—Gray weathering, relatively homogeneous, massive to well-foliated, medium- to coarse-grained, hypotomporitic-granular biotite-hornblende tonalite; principal rock type of Val Verde pluton. Contains subequal biotite and hornblende, quartz and plagioclase. Potassium feldspar generally less than two percent of rock. Where present, foliation typically strikes northwest and dips moderately to steeply northeast. Northern part of pluton contains younger, intermittently developed, northeast-striking foliation. In central part of pluton, tonalite is mostly massive, and contains few segregational masses of mesocratic to melanocratic tonalite. Elliptical- to paracase-shaped, meso- to melanocratic inclusions are common. **Granite, undifferentiated (Cretaceous)**—Leucocratic fine- to coarse-grained massive granite and biotite monzonite. Most is equigranular and consists of quartz and alkali feldspars. In leucocratic granite, biotite is a widespread vitreous mineral. Muscovite-bearing granite occurs at Bell Mountain, Romoland 7.5' quadrangle. **Tonalite, undifferentiated (Cretaceous)**—Gray, medium-grained biotite-hornblende tonalite, typically foliated. **Gabbro (Cretaceous)**—Mainly hornblende gabbro. Includes Virginia quartzite and gabbro of Dudley (1935), and San Marcos gabbro of Larsen (1948). Typically brown-weathering, medium- to very coarse-grained hornblende gabbro, very large poikilite hornblende crystals are common, and very locally gabbro is pegmatitic. Much of gabbro is heterogeneous in composition and texture. **Heterogeneous granitic rocks (Cretaceous)**—A wide variety of heterogeneous granitic rocks occur in the Santa Ana Quadrangle. Some heterogeneous assemblages include large proportions of schist and gneiss. Rocks in the Santa Ana Mountains include a mixture of monzonite, granodiorite, tonalite, and gabbro. Tonalite composition rock is the most abundant rock type. **End of rocks of the Peninsular Ranges batholith** **Intrusive rocks associated with Santiago Peak Volcanics (Cretaceous)**—Shallow porphyritic intrusive rocks principally of intermediate composition. Composed of plagioclase, clinopyroxene and altered orthopyroxene. Siliceous porphyries composed of plagioclase, quartz, and altered pyroxene and biotite (Herzig, 1991). **Estelle Mountain volcanics (Herzig (1991) (Cretaceous)**—Heterogeneous mixture of rhyolite and latite flows, shallow intrusive rocks, and volcanoclastic rocks; andesite is rare. Informally named by Herzig (1991) for exposures in vicinity of Estelle Mountain. **Rhyolite of Estelle Mountain volcanics of Herzig (1991) (Cretaceous)**—Rhyolite; relatively uniform and homogeneous. **Intermitted Estelle Mountain volcanics of Herzig (1991) and Cretaceous sedimentary rocks (Cretaceous?)**—Complexly intermitted volcanic and sedimentary rocks, which appear to be coveal; sedimentary rocks predominantly. **Mesozoic metasedimentary rocks, undifferentiated (Mesozoic)**—Wide variety of low metamorphic grade metamorphic rocks. **Schist (Mesozoic)**—Biotite schist, in part gradational with phyllite. In lower metamorphic-grade rocks, includes cordierite biotite schist, and in highest metamorphic-grade rocks, sillimanite schist, and less commonly garnet bearing schist.

GEOLOGIC SUMMARY

All but the southeast corner of the Lake Mathews quadrangle is in the Perris Block, a relatively stable, rectangular in-plan area located between the Elsinore and San Jacinto fault zones in the northern Peninsular Ranges Province. In the southwest corner of the quadrangle, a small triangular-shaped area that is part of the Santa Ana Mountains structural block, is separated from the Perris Block by a short segment of the Elsinore fault zone. The active Elsinore fault zone, a major component of the San Andreas fault system, consists of a series of an echelon northeast-striking right lateral faults located in a graben-like structure. There is limited relief within the quadrangle because of the presence of two prominent erosion surfaces. The lower Perris surface (about 1,500 feet elevation) has low relief and dominates the physiography of the northern half of the quadrangle. This surface is discontinuously covered by coarse-grained, clastic, non-marine sedimentary rocks of the middle Miocene-age Lake Mathews Formation. A higher Gavilan-Lakeview surface (about 2,100 feet elevation) occurs in the eastern part of the quadrangle, and is locally covered by small exposures of fluvial conglomerate that contain exotic clasts of red rhyolite. The Lake Mathews quadrangle is underlain almost entirely by Cretaceous and older bedrock rocks. Two different types of metamorphic rocks are exposed in the quadrangle. In the northeast is a northwest-trending exposure of amphibolite grade biotite-bearing schist of probable Mesozoic age. This schist separates massive textured granitic rocks to the west from foliated and layered granitic rocks to the east. The large exposure of metamorphic rock between Temescal Wash and Lake Mathews is low metamorphic grade, typically siliceous, but highly variable in composition. Cretaceous plutonic rocks in the quadrangle are part of the composite Peninsular Ranges batholith, and represent a wide variety of mafic to intermediate composition granitic rocks. Most are massive-textured with the exception of the crudely foliated biotite-hornblende tonalite of the Val Verde pluton in the northeast corner of the quadrangle. The Gavilan pluton, which consists of biotite monzonite, granodiorite and lesser amounts of biotite-hornblende granodiorite, by far, accounts for most of the granitic rocks in the quadrangle. It is a shallow level pluton emplaced by magmatic stopping into largely intermediate composition volcanic and volcanoclastic rocks and metamorphic rocks in its western and southern extent and into gabbroic rocks in its northern extent. The pluton appears to be tilted up to the northeast with the texture of the rock changing from subpyroclastic rock containing beta-quartz-appearing phenocrysts in the southwestern part of the pluton to coarse-grained hypotomporitic texture rock in the eastern part. Located in the upper part of the pluton and in overlying wall rock in the shallow western part of the pluton is widespread metamorphic tonalite. Locally parts of the tonalite have been completely replaced by tourmaline but more commonly tourmaline occurs in discrete thin zones, generally along joints. Some of the larger masses of tourmaline rock, locally termed tourmaline blonvont, contain cassiterite and sulfides. One large mass of cassiterite-bearing tourmaline rock supported a tin mining and smelting operation. **Tonalite**—Masses of mafic biotite-hornblende tonalite. Represents deepest part of pluton. **Granodiorite and quartz latite, undifferentiated**—Nearly equal amounts of plutonic and volcanic rocks in some areas, unit is mostly quartz latite. Found near intrusive contacts with Mesozoic volcanic rocks. **Granodiorite and gabbro, undifferentiated**—Mixed granodiorite and gabbro. In northern and northeastern part of pluton granitic rock contains high concentrations of stoped hornblende gabbro. In some areas granitic and gabbro are intimately intermixed producing very heterogeneous rock. **Genetic Cretaceous granitic rocks of the Peninsular Ranges batholith** **Granite, undifferentiated (Cretaceous)**—Leucocratic fine- to coarse-grained massive granite and biotite monzonite. Most is equigranular and consists of quartz and alkali feldspars. In leucocratic granite, biotite is a widespread vitreous mineral. 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GEOLOGIC MAP OF THE LAKE MATHIEWS 7.5' QUADRANGLE, RIVERSIDE COUNTY, CALIFORNIA

Version 1.0

By

Douglas M. Morton¹ and F. Harold Weber, Jr.²

Digital preparation by

Van M. Diep¹ and Ursula Edwards-Howells³

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