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PRELIMINARY GEOLIGIC MAP SHOWING QUATERNARY  
DEPOSITS OF THE LODI QUADRANGLE, CALIFORNIA

By

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"PRELIMINARY GEOLOGIC MAP SHOWING QUATERNARY  
DEPOSITS OF THE LODI QUADRANGLE, CALIFORNIA"

Qm	Qphe	Qha	Qhi	Qh1		Holocene	QUATERNARY
		Qm <sub>2</sub>	Qm <sub>2</sub> <sup>f</sup>	Qm <sub>2</sub> <sup>fb</sup>	Qm <sub>2</sub> <sup>e</sup>		
		Qm <sub>1</sub>	Qm <sub>1</sub> <sup>b</sup>	Qm <sub>1</sub> <sup>*</sup>	Qm <sub>1</sub> <sup>o</sup>	Pleistocene	
		Qr <sub>3</sub>	Qr <sub>3</sub> <sup>f</sup>				
		Qr <sub>2</sub>	Qr <sub>2</sub> <sup>f</sup>				

DESCRIPTION OF MAP UNITS<sup>+</sup>

- Qha HOLOCENE ALLUVIUM--Channel, levee, and floodplain deposits; chiefly silt and clay with fine sand along principal drainageways (Columbia, Sacramento, and Honcut soils).
- Qhi HOLOCENE INTERTIDAL DEPOSITS--Marsh, swamp, and channel sediments generally at least 1 m thick; mainly peat, muck, and mud (Burns, Staten, Egbert, and Ryde soils of Cosby and Carpenter; Rindge, Ryde, and Venice soils of Nazar and Swearingner).
- Qhe HOLOCENE LACUSTRINE DEPOSITS--Lacustrine and marsh sediments deposited in post-Riverbank gulleys graded to the Mokelumne River due to postglacial sea level rise; fine sand, silt, and clay (not differentiated in published soil surveys).
- Qphe EOLIAN DEPOSITS (late Pleistocene and/or early Holocene)--Well-sorted fine-grained arkosic sand; dunes in the delta being exhumed by disappearance of peat; possibly a distal part of the dune field near Antioch and Oakley; probably coeval with late Modesto eolian deposits (Qm<sub>2</sub><sup>e</sup>) (Piper and Delhi soils of Nazar and Swearingner).

MODESTO FORMATION

- Qm Undifferentiated alluvial deposits, mainly arkosic, forming toe of Mokelumne alluvial fan, generally covered by 0.3 to 1.0 m of Holocene intertidal deposits (Merced, Sacramento, Ryde, and Egbert soils).

upper member includes:

- Qm<sub>2</sub> arkosic alluvium forming Mokelumne River alluvial fan; chiefly sand, becoming finer-grained toward fan toe; probably glacial outwash (Hanford and Merced sandy loam soils).

- Qm<sub>2</sub><sup>f</sup> foothill-derived alluvial silt, clay and minor sand following distributaries across lower fans; abundant volcanic detritus (Honcut, Capay, Wyman soils).
- Qm<sub>2</sub><sup>fb</sup> foothill-derived basin and interdistributary overbank alluvium; chiefly clay and silt (Landlow soils).
- Qm<sub>2</sub><sup>e</sup> arkosic sand forming low dunes on the Mokelumne River fan and in the Delta; probably eolian, although not well sorted (Hanford loamy sand soils of Cosby and Carpenter: Delhi and Piper soils of Nazar and Swearingen).

lower member includes:

- Qm<sub>1</sub> arkosic alluvium forming Mokelumne River alluvial fan; chiefly sand; probably glacial outwash (Greenfield soils).
- Qm<sub>1</sub><sup>b</sup> basin alluvium derived from the Mokelumne and Calaveras Rivers; includes arkosic alluvium, probably glacial outwash, and locally-derived materials; chiefly fine sand and silt (Stockton soils).
- Qm<sub>1</sub><sup>\*</sup> Qm<sub>1</sub> and Qm<sub>1</sub><sup>b</sup> deposits overlain by 0.5 to 1.5 m of Qm<sub>2</sub><sup>fb</sup> deposits (Stockton soils).
- Qm<sub>1</sub><sup>o</sup> Qm<sub>1</sub> and Qm<sub>1</sub><sup>b</sup> deposits overlain by 0.5 to 2 m of Qm<sub>2</sub> deposits (Merced soils).

#### RIVERBANK FORMATION

upper unit includes:

- Qr<sub>3</sub> arkosic alluvium forming Mokelumne River alluvial fan; chiefly sand; probably glacial outwash (San Joaquin, Ramona soils, weak variants).
- Qr<sub>3</sub><sup>f</sup> foothill-derived alluvial sand and silt; contains abundant volcanic detritus (San Joaquin soils, weak variant).

middle unit includes:

- Qr<sub>2</sub> arkosic alluvium forming Mokelumne River terraces and alluvial fan; chiefly sand; probably glacial outwash (San Joaquin soils).
- Qr<sub>2</sub><sup>f</sup> foothill-derived alluvial sand and silt; contains abundant volcanic detritus (San Joaquin soils).

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+ The most typical soils series in this area as mapped by Cosby and Carpenter (1937) are given in parenthesis for all units. Typical soil series as mapped by Nazar and Swearingen (in prep.) are also given for a few units.

— , — . — . — Approximate high-water line for autumnal tides circa 1850.  
Traced or inferred from topographic maps surveyed 1906-1908.  
Not a geologic contact, but approximates landward limit of  
intertidal deposits before erection of man-made levees.

## REFERENCES

- Cosby, S. W., and Carpenter, E. J., 1937, Soil survey of the Lodi area, California: U.S. Dept. Agriculture Soil Survey, Ser. 1932, no. 14, 52 p.
- Marchand, D. E., and Allwardt, Alan, 1977, Late Cenozoic stratigraphic units, northeastern San Joaquin Valley, California: U.S. Geological Survey Open-File Report 77-748, 149 p.
- Nazar, Paul and Swearinger, Charles, in preparation, Soil Survey of San Joaquin County: U.S. Dept. Agriculture, unpubl. mapping 1975-1976 on 1:6,000 scale aerial photographs.

Note: This map is one of a series of preliminary 15' geologic maps depicting the Cenozoic deposits of the Sacramento 1° x 2° sheet. Quaternary map units are differentiated on the basis of surface morphology, geomorphic relations, comparative soil development, superposition, and lithology, as discussed by Marchand and Allwardt (1977).