U.S. DEPARTMENT OF THE INTERIOR
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OPEN-FILE REPORT 93-223

SHEET 1 OF 3

Description of Map Units

FLUVIAL DEPOSITS of the San Joaquin River

Qhcj Active channel deposits of the San Joaquin River--Unconsolidated sands and silts of mixed Sierra Nevada and Coast Range origin. The Sierran granitic component dominates, characterized by mica, quartz, and feldspar. Soils show no discernible horizons and typically belong to the Columbia soil series, as mapped by Arkley (1964) and McLaughlin and Huntington (1968).

- **Qhjc2** Deposits which underlie the modern channel meander belt, floodplain, and low terraces, and are reworked by relatively frequent flooding.
- **Qhcj1** Older Holocene channel meander belt and floodplain deposits.

Qhlj Levee deposits of the San Joaquin River--Unconsolidated sands and silts of mixed Sierra Nevada and Coast Range origin. These deposits occupy the valley bottom closest to the active channel of the San Joaquin River and represent the coarse-grained facies of overbank deposits. The surface of the levee deposits slopes gently away from the river channel toward the basin. Levee deposits are infrequently flooded. Soils show no discernible horizons and typically belong to the Columbia soil series as mapped by Arkley (1964) and McLaughlin and Huntington (1968).

Qhr Basin rim and distal fan deposits--Unconsolidated fine sands, silts and clays. These deposits underlie the distal portions of Coast Range or Sierra Nevada-derived alluvial fans and are characterized by high groundwater tables and saline or alkaline soils. The surfaces of these deposits slope very gently toward the valley axis. These deposits are very rarely flooded.

Soils are fine-grained, often poorly drained, and contain accumulations of salts or carbonates. Soils belong to the Orestimba, Capay, and Camarillo soil series, as mapped on Coast Range deposits west of the San Joaquin River by McLaughlin and Huntington (1968), or to the Fresno, Traver, and Dinuba soil series as mapped on the on Sierra Nevada deposits east of the San Joaquin River by Arkley (1964).

Qhb Basin deposits of the San Joaquin River--Unconsolidated silts and clays of mixed Sierra Nevada and Coast Range origin. These deposits are nearly level and lie in the valley trough on either side of the San Joaquin River, outboard of any levee deposits (Qhlj). They occupy the lowest part of the valley, with the exception of the channel bottom itself, and represent the fine-grained facies of overbank deposits. The surface of the basin deposits slopes gently upward both toward the fans of the Coast Range on the west and toward the levee deposits of the San Joaquin River on the east. These deposits are infrequently flooded.

Soils are fine-grained and may contain accumulations of salts or carbonate. Soils typically belong to the Temple, Merced, Waukena, and Sacramento soil series, as mapped by Arkley (1964) and McLaughlin and Huntington (1968).

FLUVIAL DEPOSITS of Coast Range drainages

Qhc Active stream channel deposits--Unconsolidated sands and silts of Coast Range origin. These deposits underlie the modern floodplain and low terraces and are reworked by relatively frequent flooding. These deposits generally exhibit no soil development.

- **Qhcd** Active stream deposits of Del Puerto Creek
- **Qhco** Active stream deposits of Orestimba Creek
- **Qhcs** Active stream deposits of Salado Creek
- **Qhcl** Active stream deposits of Little Salado Creek

Qhl Levee deposits on Coast Range fans--Unconsolidated sands, silts, and gravels derived from the Coast Ranges. These deposits form long, raised landforms extending downfan. They represent the locus of deposition of the coarser component of major flows of sediment and water over the fan during flooding. Soils typically belong to the Salado or Cortina soil series, as mapped by McLaughlin and Huntington (1968).

- **Qhld** Levee deposits of Del Puerto Creek
- **Qhlo** Levee deposits of Orestimba Creek
- **Qhls** Levee deposits of Salado Creek

Qpf Late to middle Pleistocene fans and terraces, undifferentiated--Unconsolidated gravels, sands, silts, and clays derived from the Coast Ranges or Sierra Nevada. Terrace deposits in valleys of the Coast Ranges are dominantly gravels, sands and silts. Sediments become finer grained with distance downfan. In valleys of the Coast Ranges, subdivisions of this unit are identified primarily where differences in age are reflected in terrace height. These deposits are slightly to deeply weathered, and undissected to strongly dissected. Older surfaces exhibit rolling hill topography. Soils are characterized by rubification, presence of a Bt horizon, and carbonate accumulation varying from stage I to stage IV (Birkeland, 1984). Soils typically belong to the Zacharias, Positas, or Denverton soil series, as mapped by McLaughlin and Huntington (1968) and Cole and others (1948).

Qhf Holocene fans and terraces, undifferentiated--Unconsolidated silts, clays, sands, and gravels derived from the Coast Ranges. Deposits on the terraces in the Coast Range valleys are dominantly gravels, sands and silts. Sediments become finer with distance downfan. Subdivisions of this unit are identified primarily in valleys where differences in age are reflected in terrace height. These deposits are generally unweathered and undissected. Soils typically belong to the Vernalis, Salado, Cortina, El Solyo, Stomar, Myers soil series, as mapped by McLaughlin and Huntington (1968).

- **Qhfd** Holocene fan and terrace deposits of Del Puerto Creek, undifferentiated
- **Qhfd3** Holocene fan and terrace deposits of Del Puerto Creek, younger
- **Qhfd2** Holocene fan and terrace deposits of Del Puerto Creek, intermediate
- **Qhfd1** Holocene fan and terrace deposits of Del Puerto Creek, older
- **Qhfo** Holocene fan and terrace deposits of Orestimba Creek, undifferentiated
- **Qhfo2** Holocene fan and terrace deposits of Oresimba Creek, younger
- **Qhfo1** Holocene fan and terrace deposits of Orestimba Creek, older
- **Qhfs** Holocene fan and terrace deposits of Salado Creek
- **Qhfl** Holocene fan and terrace deposits of Little Salado Creek

- **Qpfd4** Late Pleistocene fan and terrace deposits of Del Puerto Creek, younger
- **Qpfd3** Late Pleistocene fan and terrace deposits of Del Puerto Creek, intermediate age
- **Qpfd2** Late Pleistocene fan and terrace deposits of Del Puerto Creek, older
- **Qpfd1** Middle Pleistocene fan and terrace deposits of Del Puerto Creek
- **Qpfs3** Late Pleistocene fan and terrace deposits of Salado Creek, younger
- **Qpfs2** Late Pleistocene fan and terrace deposits of Salado Creek, older
- **Qpfs1** Middle Pleistocene fan and terrace deposits of Salado Creek
- **Qpfl** Pleistocene fan and terrace deposits of Little Salado Creek

Qpp Middle to early Pleistocene pediment--Unconsolidated to consolidated, weakly cemented gravels and sands that veneer high erosion surfaces along the eastern flank of the Coast Ranges. Flat hill tops and parallel, concordant ridge crests typically define remnants of the pediment surface, which occurs in a 1.5 mile-wide band along the mountain front north of Salado Creek. The surface is cut on Tertiary and Cretaceous sedimentary rocks (Dibblee, 1982). Pediment deposits are deeply weathered and highly dissected. Soils are characterized by a strong Bt horizon and up to stage IV carbonate accumulation (Birkeland, 1984). Soils typically belong to the Denverton soil series, as mapped by Cole and others (1948).

NON-FLUVIAL DEPOSITS

Qls Landslide deposits greater than approximately 1 hectare in area. Landslide scarp is indicated by lined pattern; arrows indicate interpreted direction of downslope movement.

B Pre-Quaternary bedrock, undifferentiated. This mapping unit includes Mesozoic Franciscan Assemblage, and Mesozoic and Tertiary sedimentary rocks.

Mapping procedure and criteria

Geologic map units were identified chiefly through the interpretation of air photos and topographic maps, augmented by field reconnaissance and comparisons with published and unpublished geologic maps and published soil surveys. Mapping criteria included landform shape and relative geomorphic position, cross-cutting relationships, superposition, depth and degree of dissection, tone and texture on air photographs, and relative degree of soil development. For example, extent and thickness of deposits were used as criteria for discriminating pediments from fans and terraces. Erosion surfaces without significant deposits were also mapped as pediments.

Ages of units were estimated from a reconnaissance assessment of (1) relative degree of dissection, (2) relative degree of soil development on the surface, and (3) on regional stratigraphic correlation to mapped deposits in the west-central San Joaquin Valley (Lettis, 1982, 1985).

Designation of units

Quaternary fluvial units were named according to age (Pleistocene or Holocene), landform type, and, where possible, the drainage of origin and relative age among other units in that drainage. For example, "Qpfm2" means "Quaternary, Pleistocene, fan or terrace, Martin Creek, 2nd oldest Pleistocene terrace on Martin Creek. All numbers are in ascending order from oldest to youngest. Fluvial landform types recognized are fan or terrace (f), levee (l), channel (c), and pediment (p).

Quaternary landslides are labeled "Qls". Lined pattern delineates the scarp of each slide and an arrow on the slide mass shows the interpreted direction of downslope movement.

FAULTS

The San Joaquin Fault of Herd (1979), is shown as a dotted line along the base of the escarpment at the range front. Its presence is inferred from (1) the height and linearity of the range front, (2) offset terraces and fans which occur at the range front on adjacent quadrangles, and (3) truncated pediment surfaces along the range front.

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AGE		THIS STUDY: Undifferentiated units	THIS STUDY: San Joaquin River (j)	THIS STUDY: Del Puerto Creek (d)	THIS STUDY: Orestimba Creek (o)	THIS STUDY: Salado Creek (s)	THIS STUDY: Little Salado Creek (l)	SAN JOAQUIN VALLEY: Marchand & Allwardt (1981) NE San Joaquin Valley	SAN JOAQUIN VALLEY: Bartow etal. (1985) NW San Joaquin Valley	SAN JOAQUIN VALLEY: Lettis (1982) West-central San Joaquin Valley	DELTA REGION: (Modified from Atwater 1980) Sacramento-San Joaquin Delta Area	Approx. Age
QUATERNARY	HOLOCENE	Qls	Qhc, Qhl, Qhf	Qhcj | Qhcj2, Qhcj1; Qhlj; Qhb, Qhr	Qhcd; Qhld, Qhfd; Qhfd3, Qhfd2, Qhfd1	Qhco; Qhlo, Qhfo; Qhfo2, Qhfo1	Qhcs; Qhls, Qhfs	Qhcl; Qhfl	Post-Modesto: IV, III, II, I	Alluvium of Patterson and San Luis Ranch, undivided; Alluvium of Patterson	Alluvium of Patterson	Intertidal alluvium Flood Plain alluvium	10 ka
	PLEISTOCENE LATE	Qpf	(Pleistocene units not present)	Qpfd4, Qpfd3, Qpfd2	(Pleistocene units not present)	Qpfs3, Qpfs2	Qpfl	Modesto Formation: upper member, lower member	Alluvium of San Luis Ranch: upper mbr., lower mbr.	Alluvium of San Luis Ranch: upper member, lower member	Modesto Formation: upper mbr., lower mbr.	120 ka
	PLEISTOCENE MIDDLE	Qpp		Qpfd1		Qpfs1		Riverbank Formation: upper unit, middle unit, lower unit	Alluvium of Los Banos: upper member, middle member, lower member	Alluvium of Los Banos: upper member, middle member, lower member	Riverbank Formation: upper unit, middle unit, lower unit; Modesto and Riverbank Formations, undivided	
	PLEISTOCENE EARLY							Turlock Lake Formation: upper unit, Corcoran Clay mbr., lower unit; North Merced Gravel [1]	(no units present)	Tulare Formation: upper member, Corcoran Clay mbr., lower member	Turlock Lake Formation, undivided	700 ka; 2.0 Ma

Table 1. Quaternary map units in the Patterson and Crows Landing 7.5-minute quadrangles, correlated with nearby studies. Timing and correlation of units are approximate. Periods of non-deposition and landscape stability typically occur between depositional units.

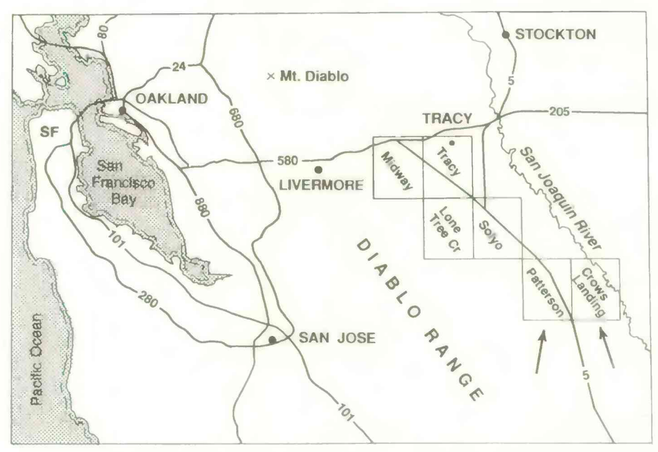

Figure 1: The Patterson and Crows Landing, California 7.5-minute quadrangles are located on the east flank of the northern Diablo Range southeast of Tracy, east of the San Francisco Bay area, California. Heavy lines denote major highways, with corresponding route number. Quaternary geologic maps of the Solyo and Lone Tree Creek, and Tracy and Midway 7.5-minute quadrangles are available as separate USGS Open-File Reports (Noller, et al., 1993, and Sowers et al., 1993)

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PRELIMINARY MAPS SHOWING QUATERNARY GEOLOGY OF THE PATTERSON AND CROWS LANDING 7.5-MINUTE QUADRANGLES, CALIFORNIA

By

J. M. Sowers[1], J. S. Noller[1], and W. R. Lettis[1]

[1]WILLIAM LETTIS AND ASSOCIATES