Human-Induced Variability of a Formerly Large River: The San Joaquin River, California

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Abstract. The upper 230 km of the geomorphically complex San Joaquin River between the Merced River and Friant Dam has been significantly modified and simplified: 1) hydrologically by upstream dam construction for irrigation, power generation and flood control, as well as by water importation from the Sacramento-San Joaquin River Delta, 2) hydraulically by construction of a flood control system that incorporates levees and flood bypass channels, as well as local non-project levees, and 3) morphologically by extensive in-channel sand and gravel mining and groundwater overdrafting-induced subsidence. Control of flood flows, and water delivery by canal, rather than down-river, combined with in-channel sand and gravel mining have resulted in a poorly defined channel that links a series of valley floor ponds that are bordered by a narrow strip of riparian vegetation in the terrace-confined reach between Friant Dam (RK 400) and Gravelly Ford (RK 344). On the active alluvial fan of the San Joaquin River between Gravelly Ford and Mendota Dam (RK 308), the meandering channel has been leveed, and the bulk of the flood flows are diverted into the Chowchilla Bypass channel. Except during floods, the channel of the San Joaquin River is dry and supports almost no riparian vegetation. Water imported from the Delta is routed down the meandering channel as far as Sack Dam (RK 273) where it supports a narrow riparian community. The formerly multiple-channel, anastomosed reach between Sack Dam and the Merced River (RK 177) has been converted into a single channel bordered by intensive agriculture. The channel conveys primarily poor quality agricultural tailwater except under flood conditions when Mariposa and Eastside Bypass flows are returned to the river, and supports limited riparian vegetation with little or no regeneration.