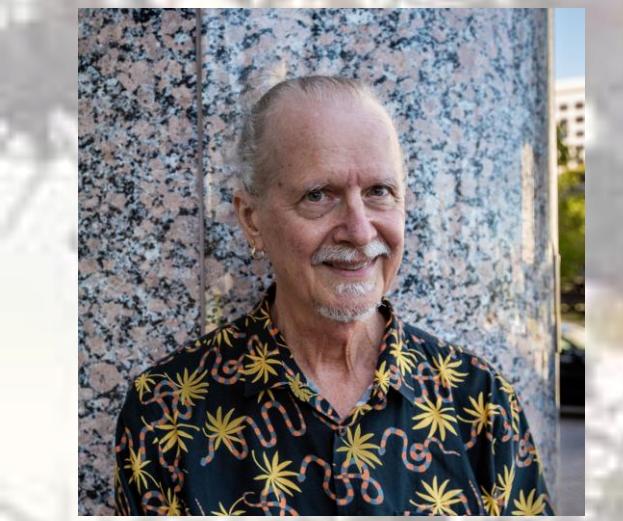


The Tectonic Origin of Lake Merritt



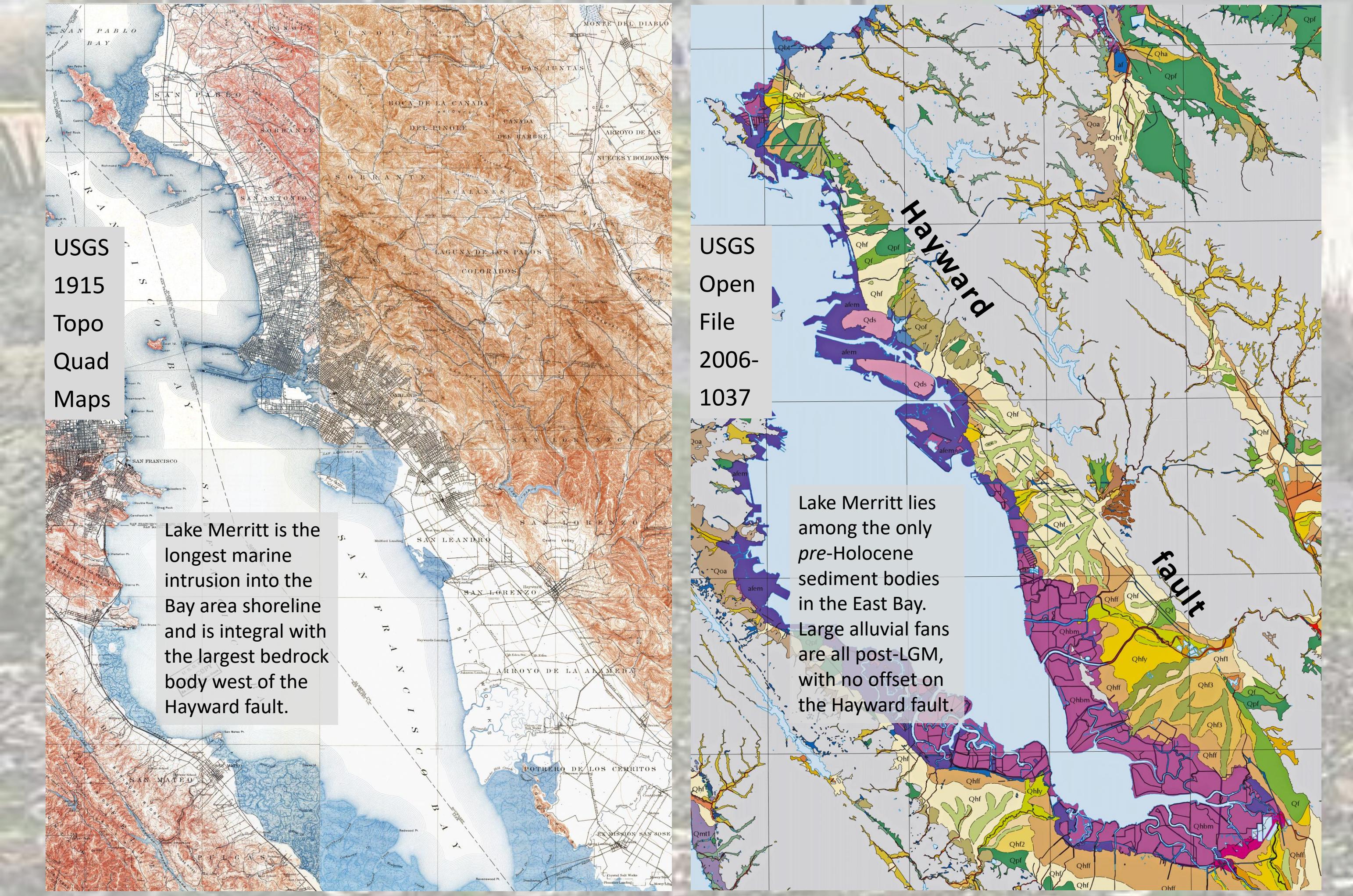
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Abstract

Lake Merritt is a striking example of a drowned river valley incised into the East Bay alluvial plain, an erosional anomaly in an aggrading landscape. It owes its persistence to a relatively high gradient stream network (Pleistocene Merritt Creek), nearer to the shore than neighboring streams, that drains tilted crustal block (Piedmont block) lying on the seaward (west) side of the Hayward fault. Whereas other East Bay streams are regularly beheaded where they cross the fault, Merritt Creek's watershed is not disrupted by fault motion.

Lake Merritt, with its entourage of Pleistocene landforms, exists today because of events that began a million years ago.

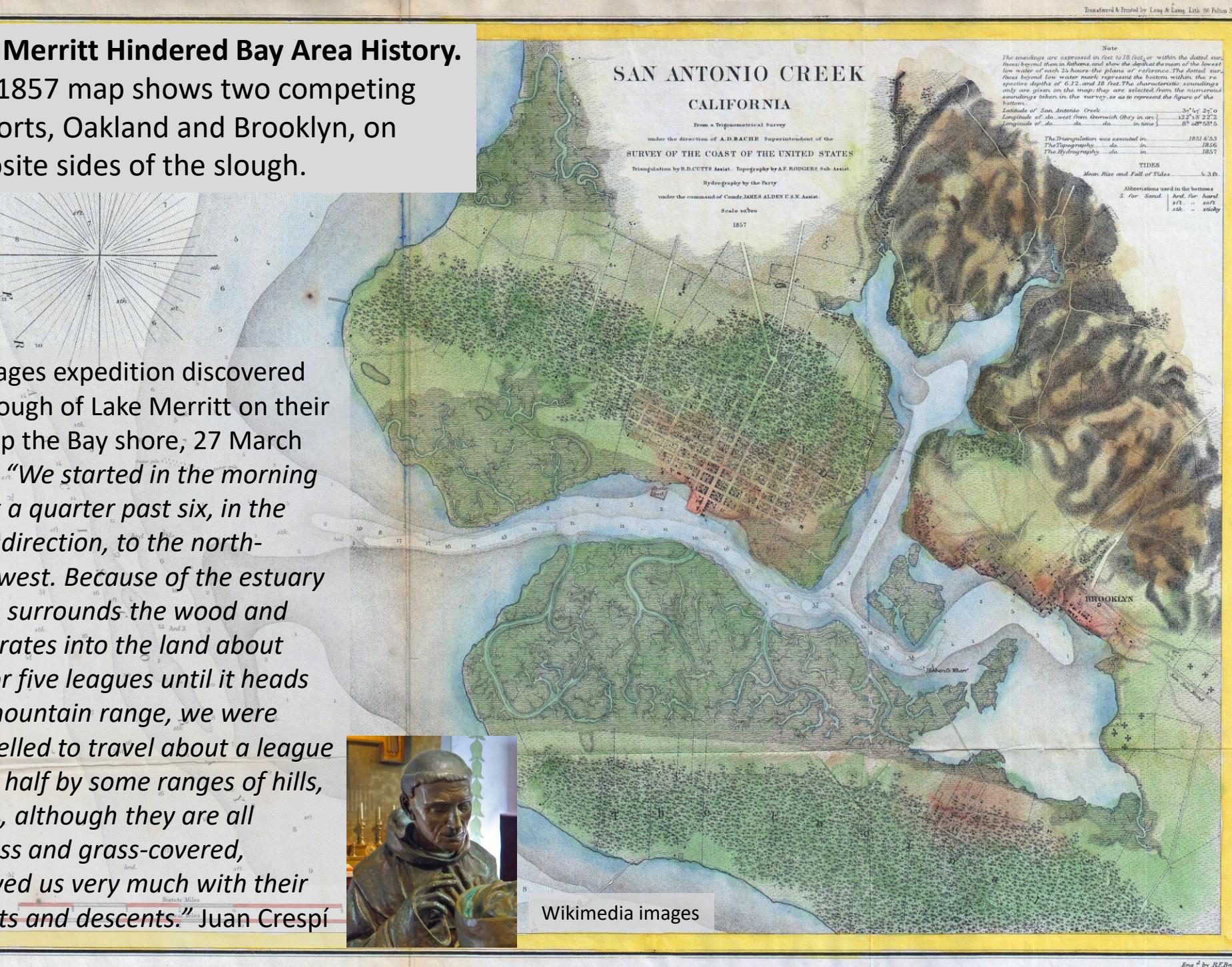
Odd lake: "Lake" Merritt is an estuary in a drowned stream valley



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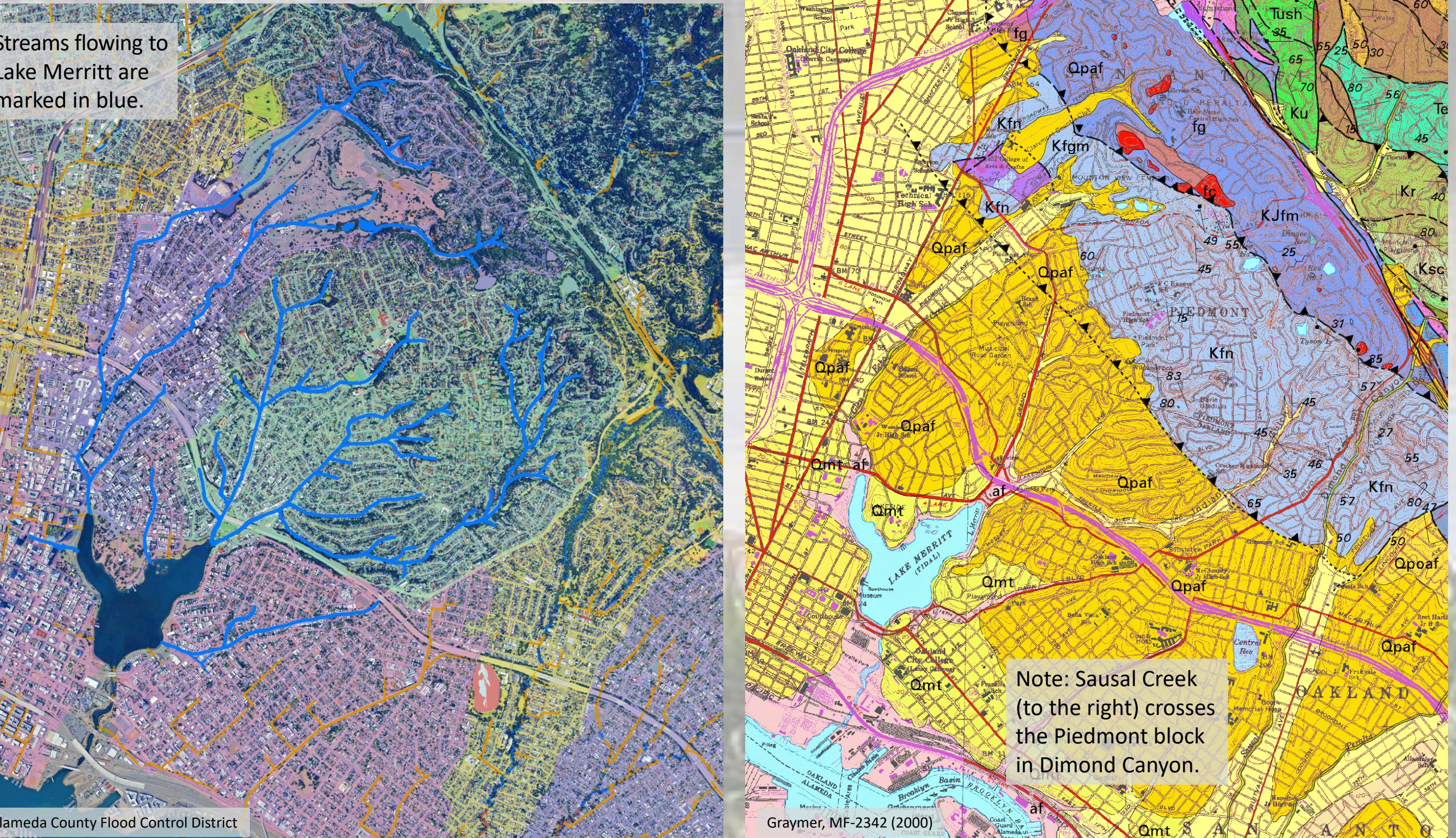


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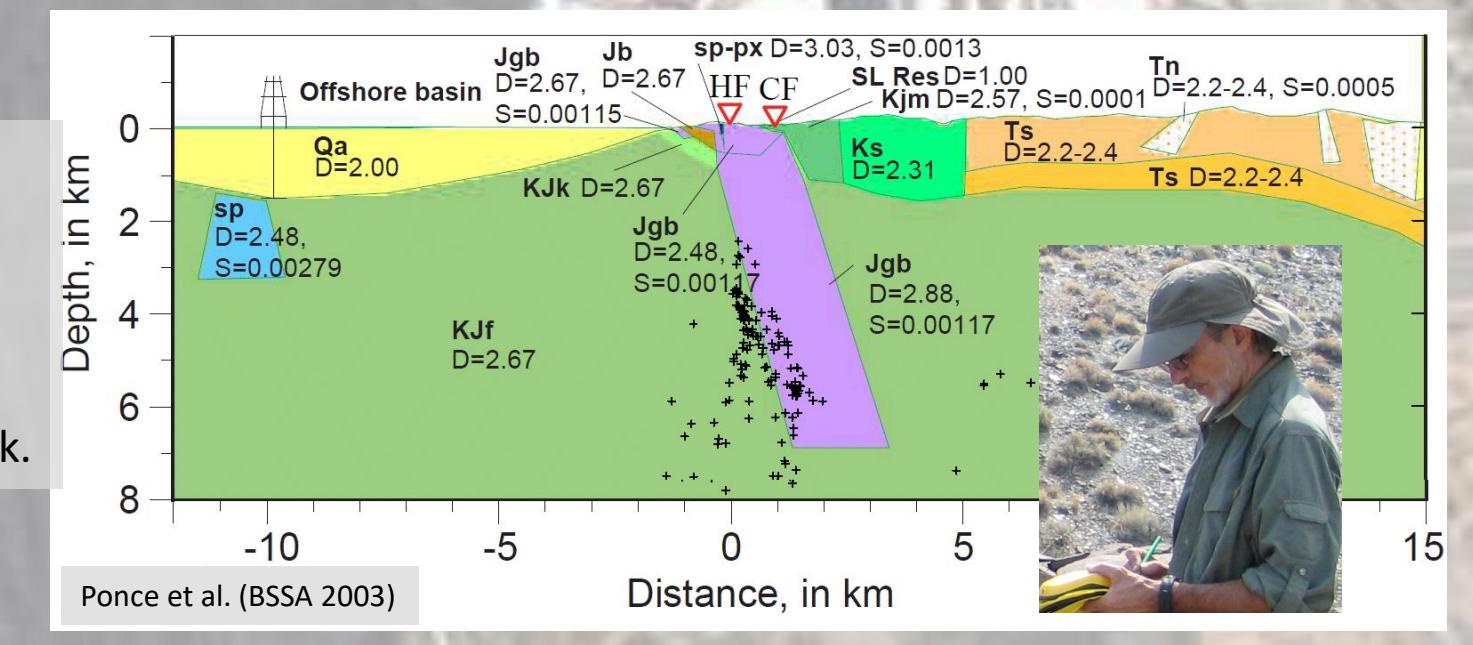
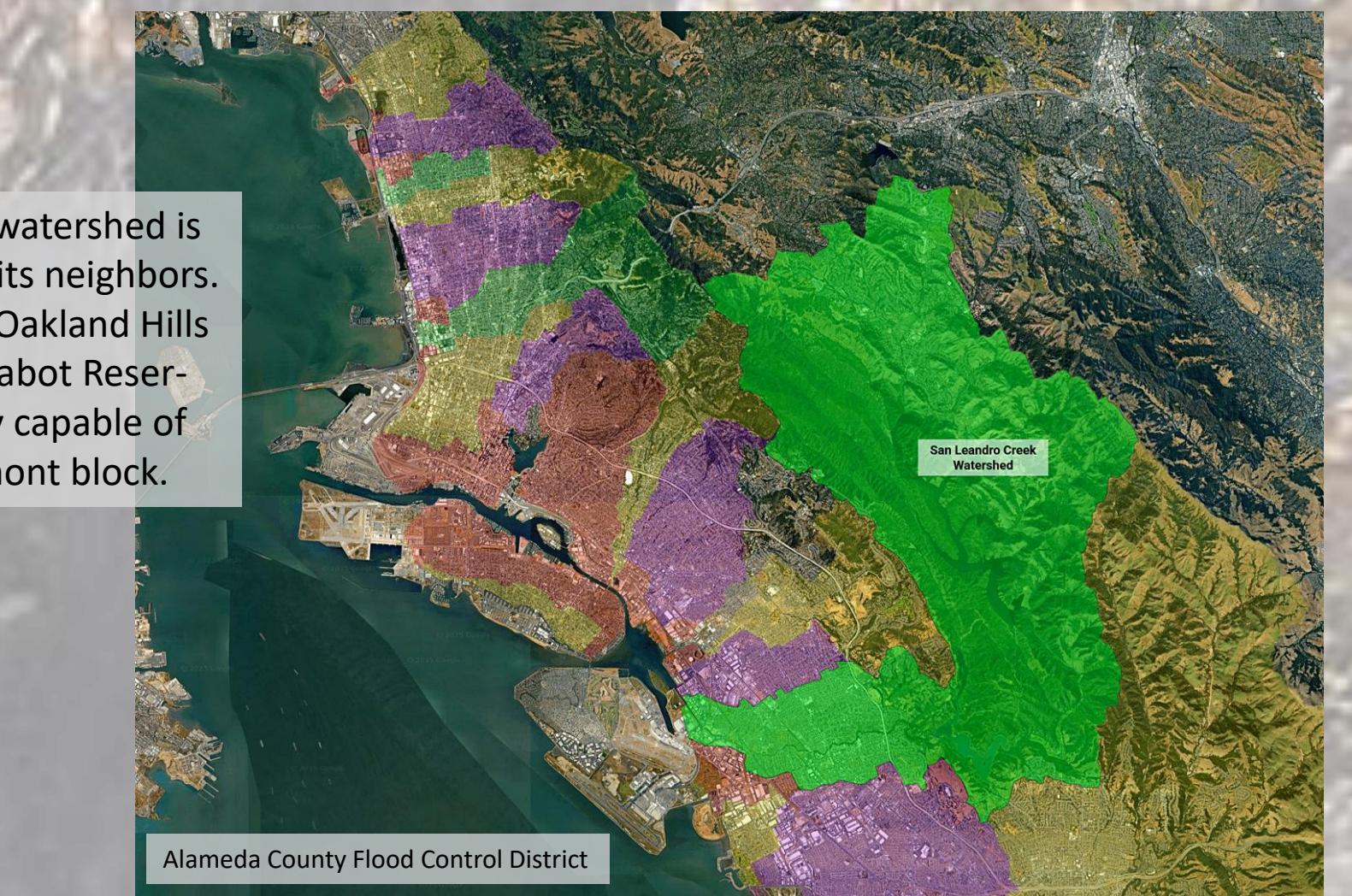
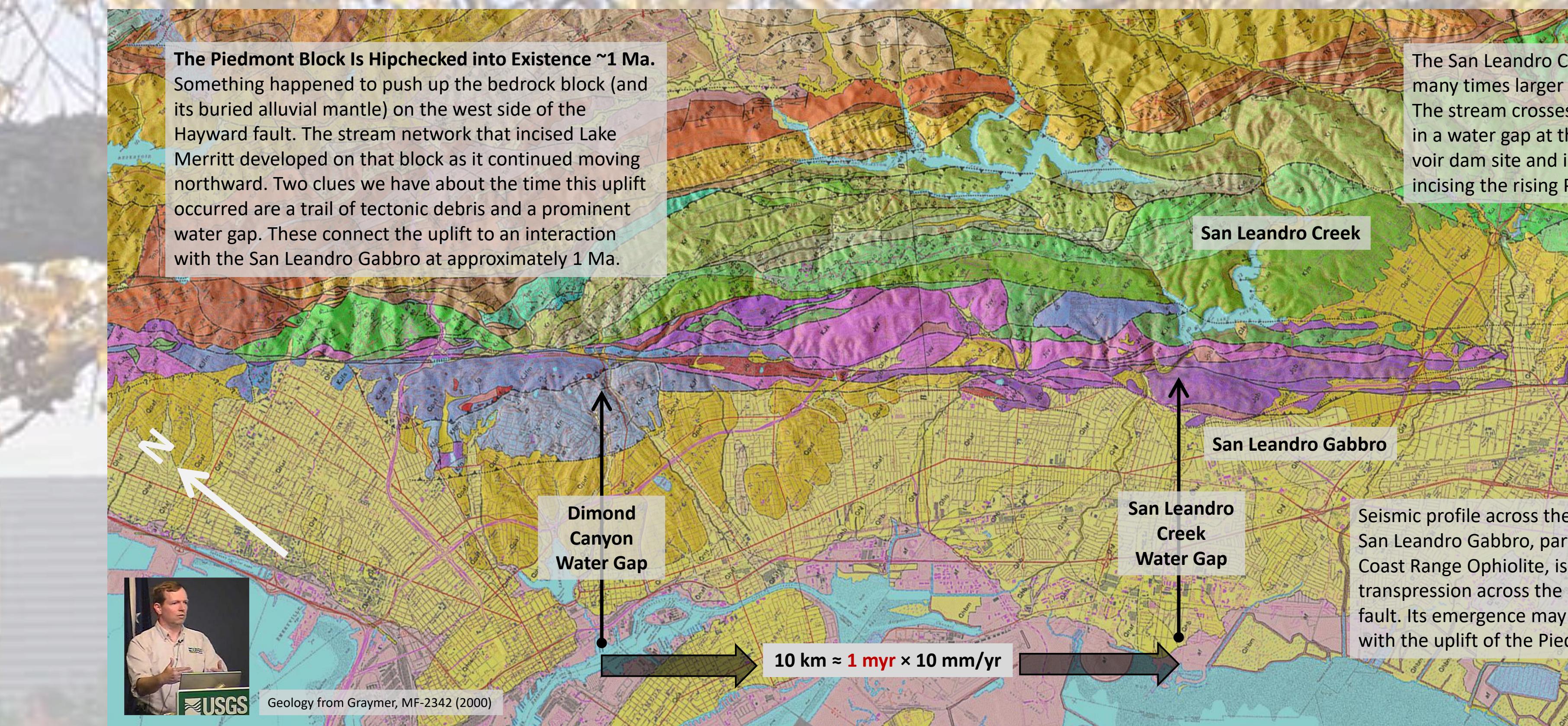
Its compact stream network lies on the uplifted Piedmont block . . .



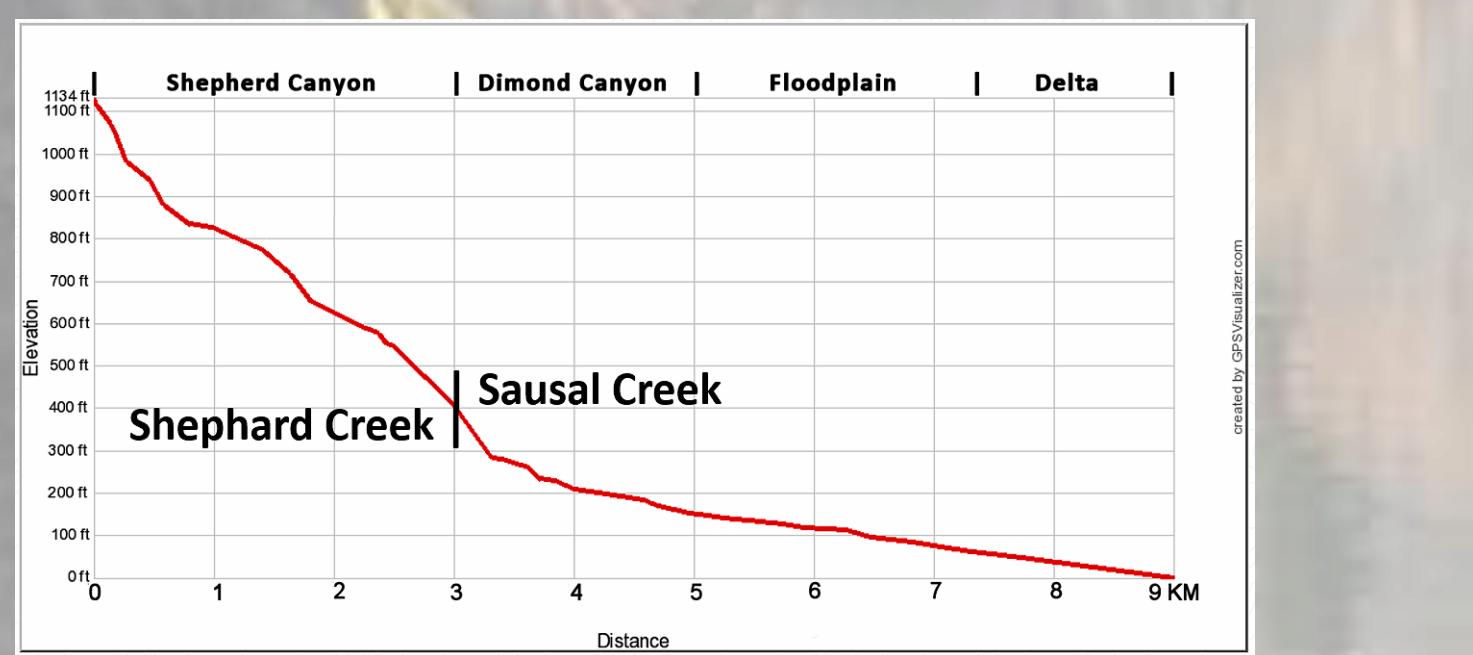
. . . unlike others warped by the Hayward fault



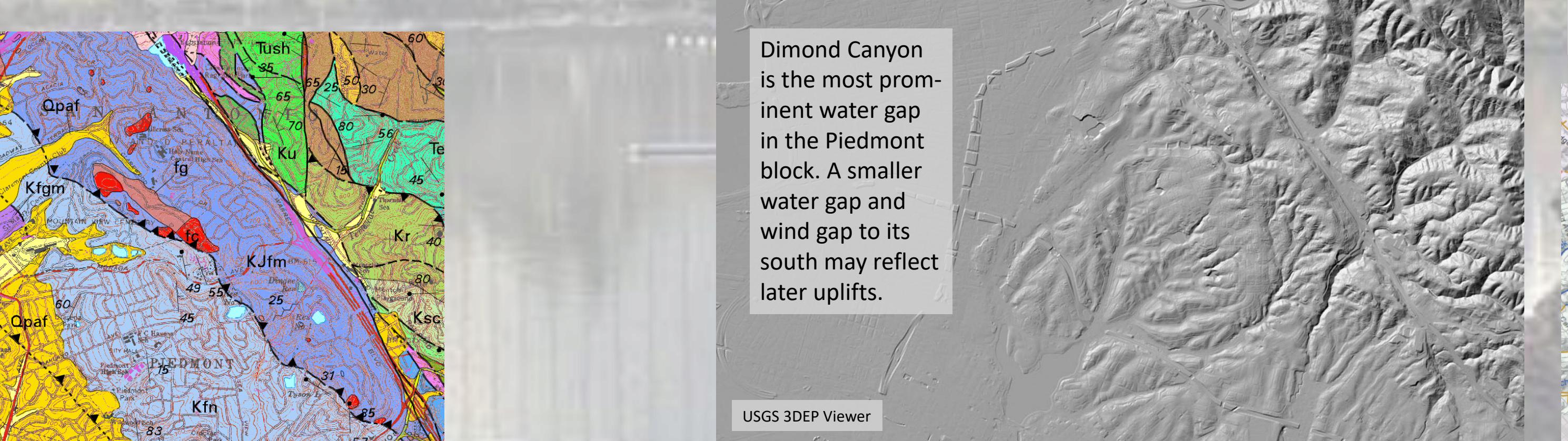
The Piedmont block: Born in a tectonic wrestling match ~1 million years ago



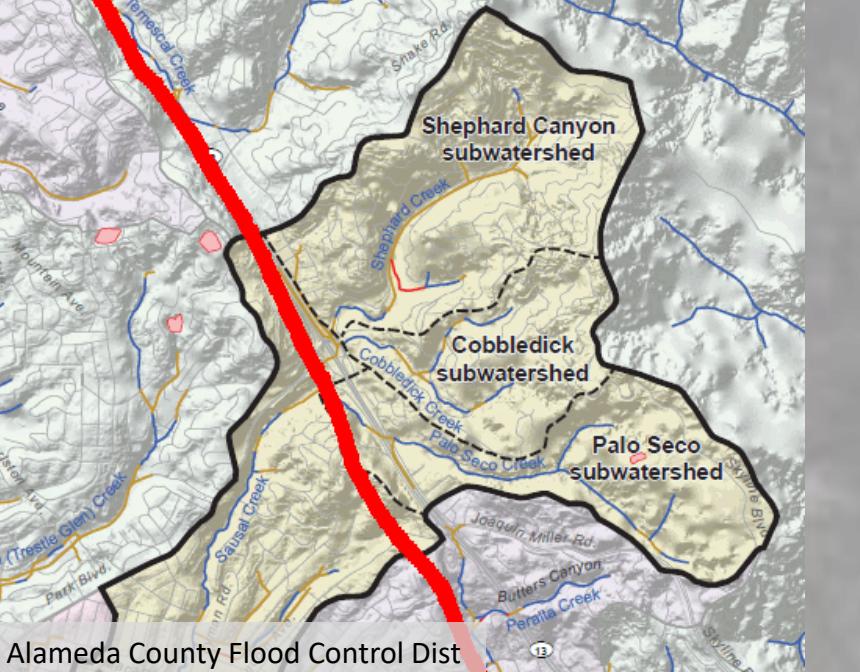
Sausal/Shepherd Creek's longitudinal profile shows a knick-point. Coarse early Holocene alluvium is mapped beneath its delta. Both may reflect the stream finding a new base level as the Hayward fault carried Dimond Canyon past its headwaters.



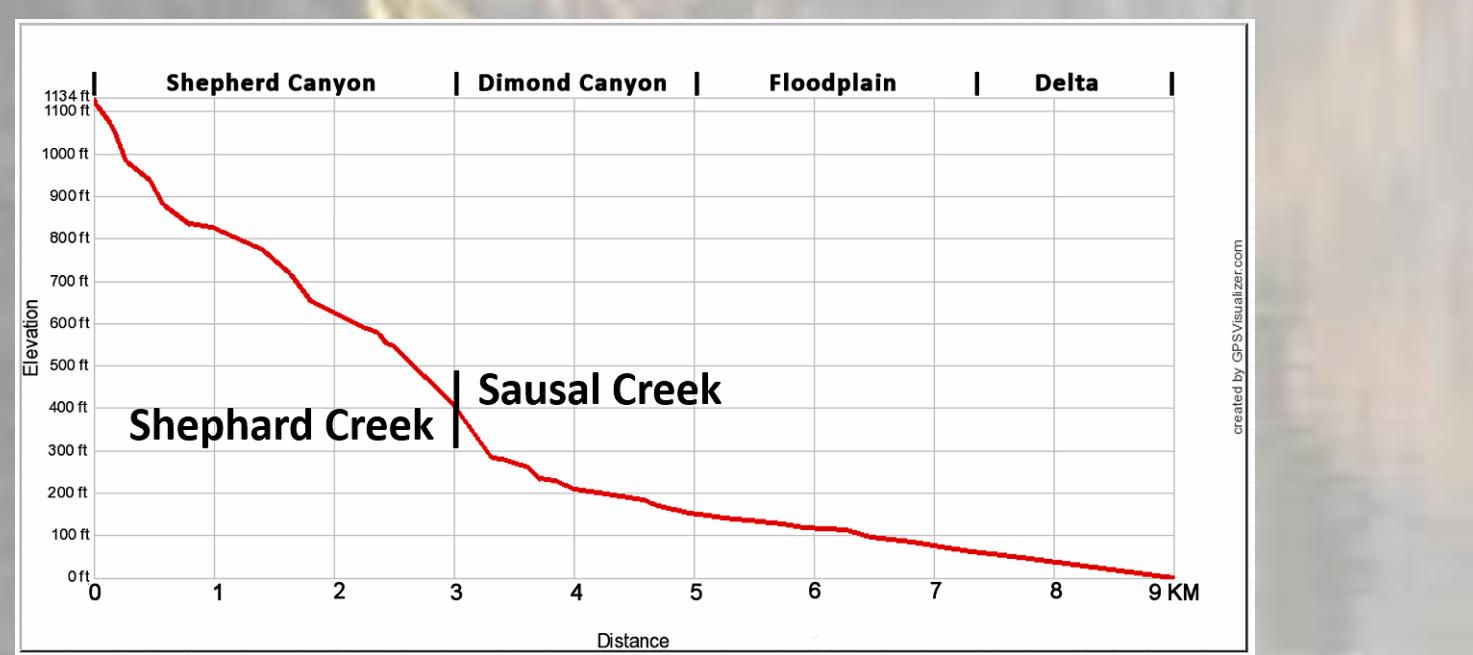
Geomorphic evidence: Water gaps



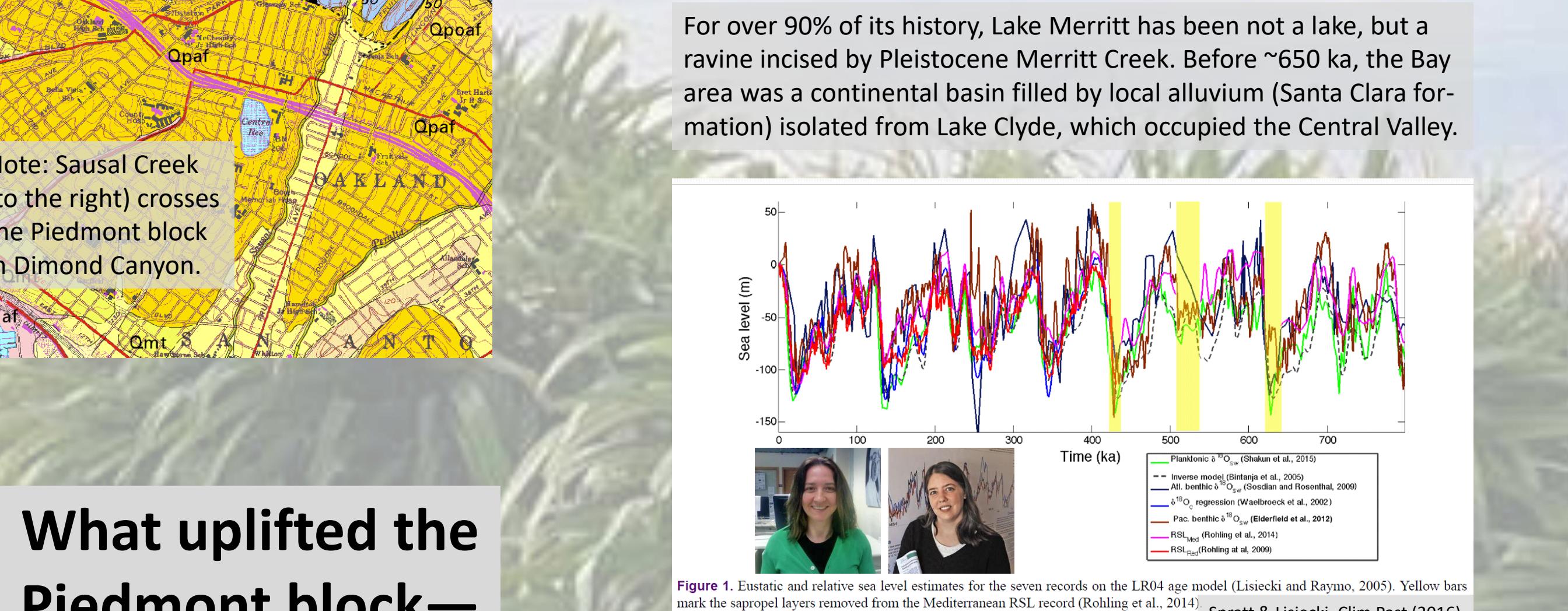
Sausal Creek, formed by the union of three small tributaries, now occupies Dimond Canyon as an underfit stream.



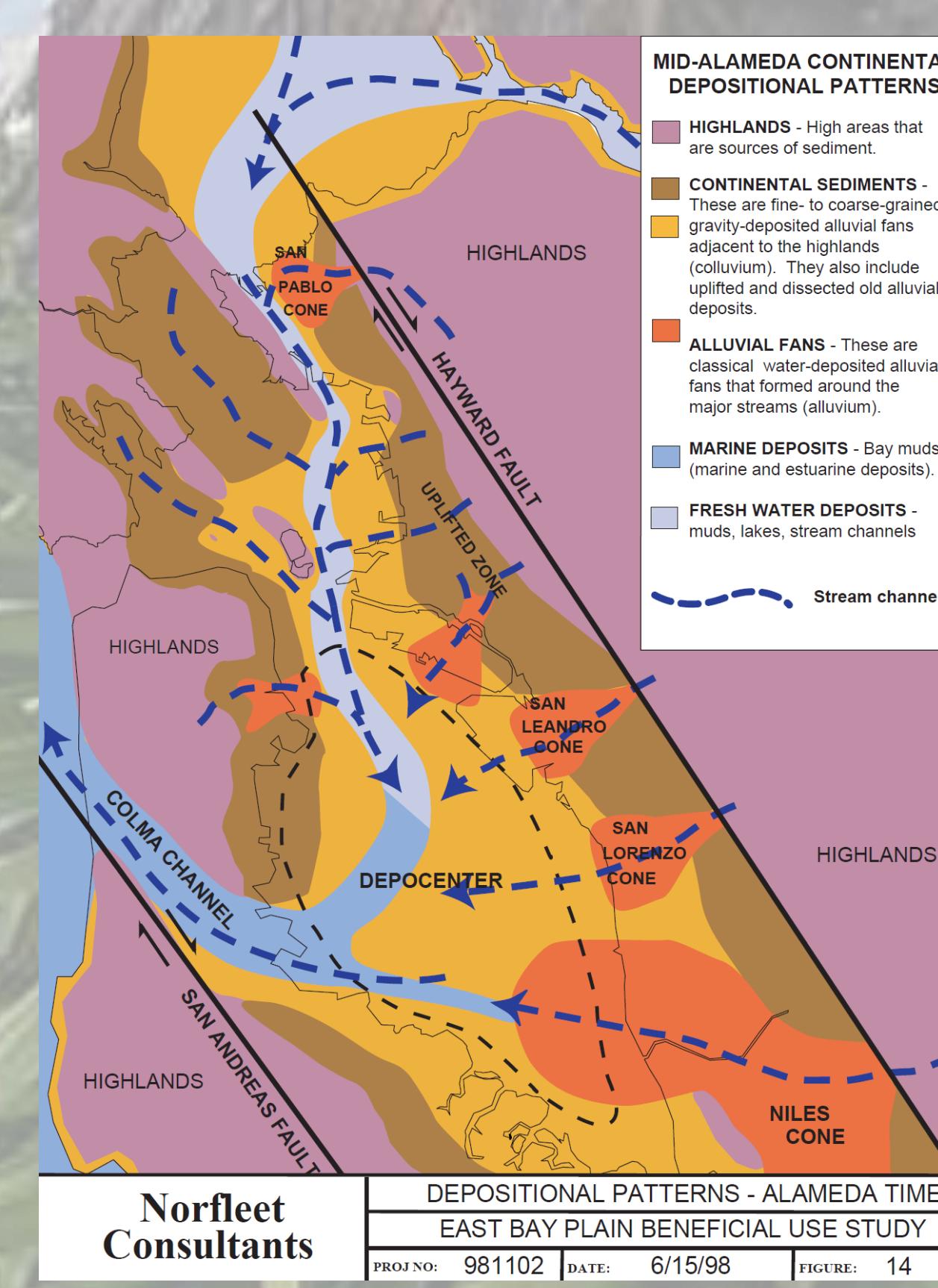
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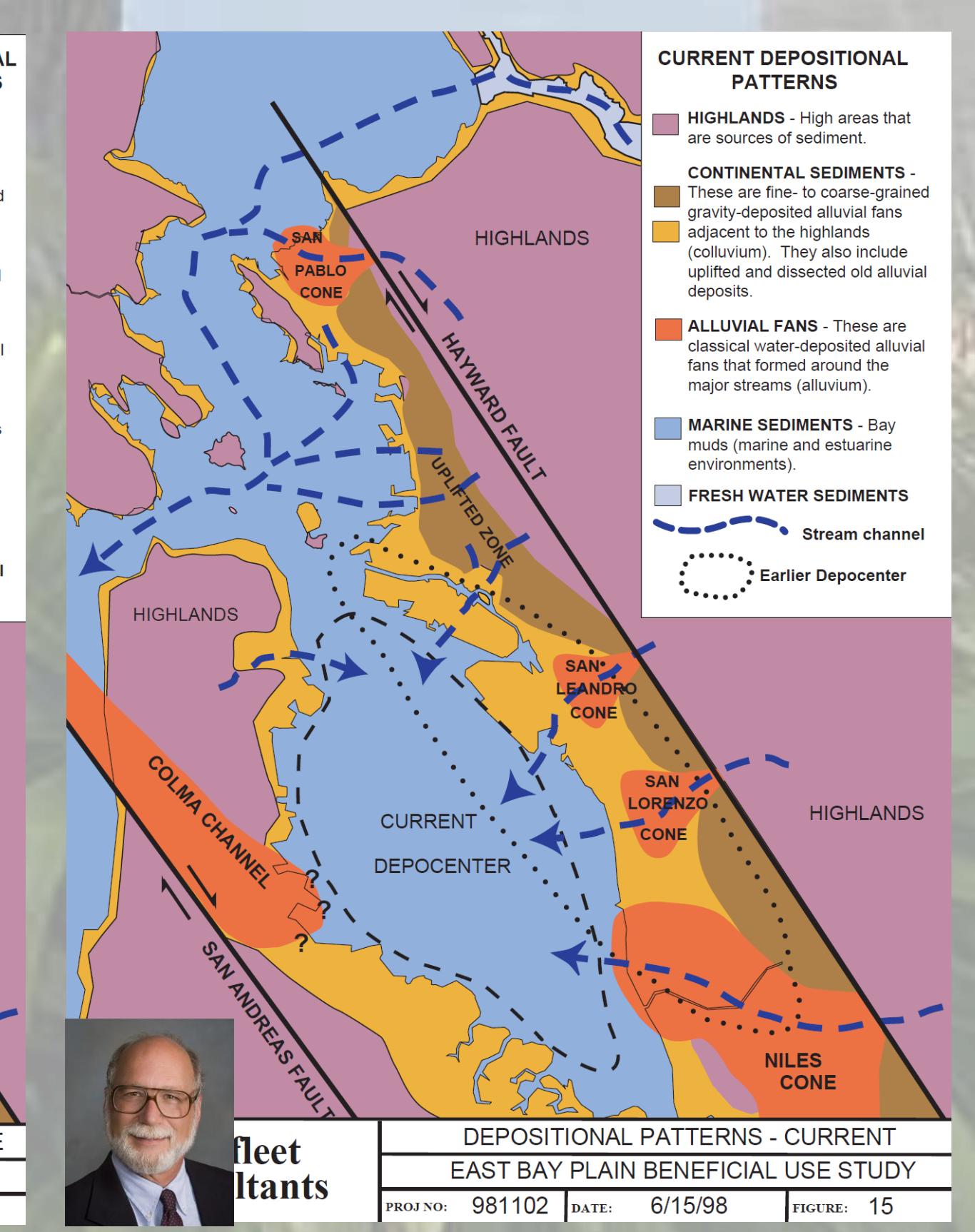
San Francisco Bay from 1 Ma to today: Constraining the history of temporarily Lake Merritt



After ~650 ka the Central Valley drained through the San Francisco Bay basin to the Colma channel. The basin was a dry valley that filled with continental deposits (Alameda formation), topped with marine clays during interglacials.

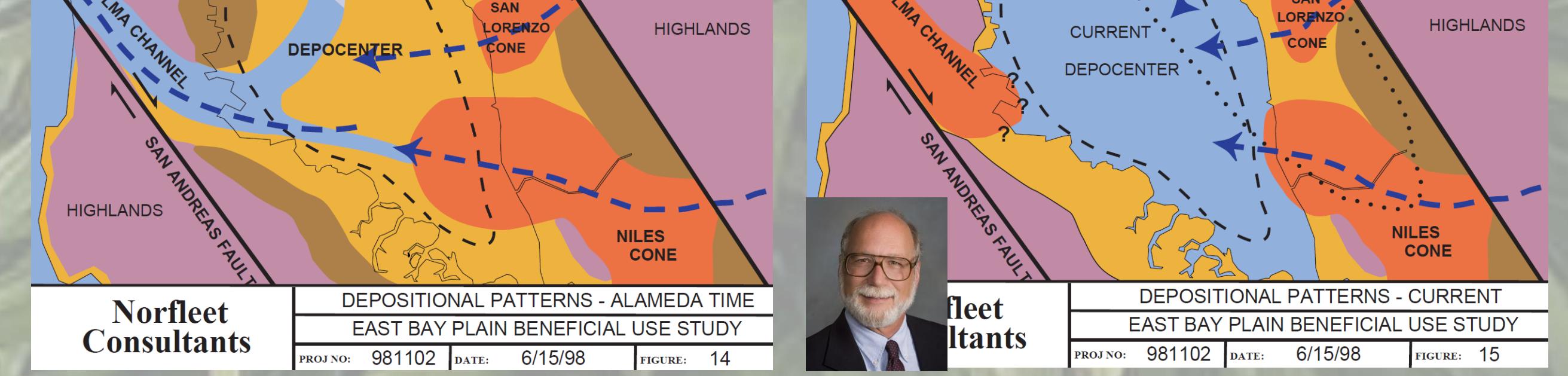


Shortly before MIS5e, ~150 ka, the Bay outlet changed to a more direct drainage route promoting stream incision. Eolian LGM deposits in Alameda and downtown Oakland postdate MIS5e. E-W Oakland estuary is a Holocene streamcourse.



Lake Merritt Today

The land around Lake Merritt bears imprints of the last glacial cycle, starting with terraces deposited during the last highstand in Marine Isotope Stage 5e, the Sangamon Interglacial. There's also the eolian dunefield underlying downtown Oakland, laid down during the Last Glacial Maximum, and on the northeast side of the lake are low hills made of the mantle of ancient alluvium on the uplifted Piedmont block. In sum, today's jewel of Oakland has been a million years in the making. Previous glacial cycles must have left their mark on the East Bay, but they now lie deeply buried beneath today's landscape.



S. Figueras, Groundwater Study and Water Supply History of the East Bay Plain (1998)