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BASE OF FRESH GROUNDWATER IN THE SACRAMENTO VALLEY, CALIFORNIA

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A base of fresh groundwater (BFW) contour map was created to identify the approximate lower limit and the thickness of the fresh groundwater aquifer system in the Sacramento Valley. The BFW map is useful for groundwater resource and storage analyses, groundwater modeling, and delineating structural geologic features in the Sacramento Valley.

Two BFW maps covering the Sacramento Valley were previously created; Olmsted and Davis (1961) and Berkstresser (1973). The BFW map in this study relies on a substantial amount of new subsurface geophysical and water quality data that has been collected since the earlier BFW maps.

Fresh groundwater is defined in this study as water containing less than 1,000 mg/l total dissolved solids (TDS), approximately 1,550 $\mu\text{mhos/cm}$ specific conductance, instead of 2,000 mg/L TDS used in the earlier studies. The BFW was estimated based on a comparative analysis of geophysical logs and lithologic data from approximately 2,800 geophysical logs from water resource wells and CA Division of Oil and Gas well records. The BFW selection criteria were calibrated using water chemistry data and constrained by comparing multiple well-logs and lithologic information in the same geographic area.

The BFW boundary occurs primarily in late Tertiary to Quaternary unconsolidated sediments at depths near land surface to more than 3,500 feet below ground surface. The BFW is an uneven boundary that in some places reflects the major geologic structures underlying the Sacramento Valley, and in other areas, transgresses underlying geologic structures. In some areas, the BFW boundary is well above the base of post-Eocene marine strata. This is most likely caused by high artesian pressures and upward vertical gradients in deep aquifers in the Sacramento Valley, which have been documented in DWR monitoring wells. This suggests that migration of poor quality water into continental sediments that previously contained freshwater has occurred over geologic time. This finding has implications for brackish and saline water upconing beneath areas of prolonged groundwater pumping in the Sacramento Valley.

<https://gsa.confex.com/gsa/2013CD/webprogram/Paper219191.html>