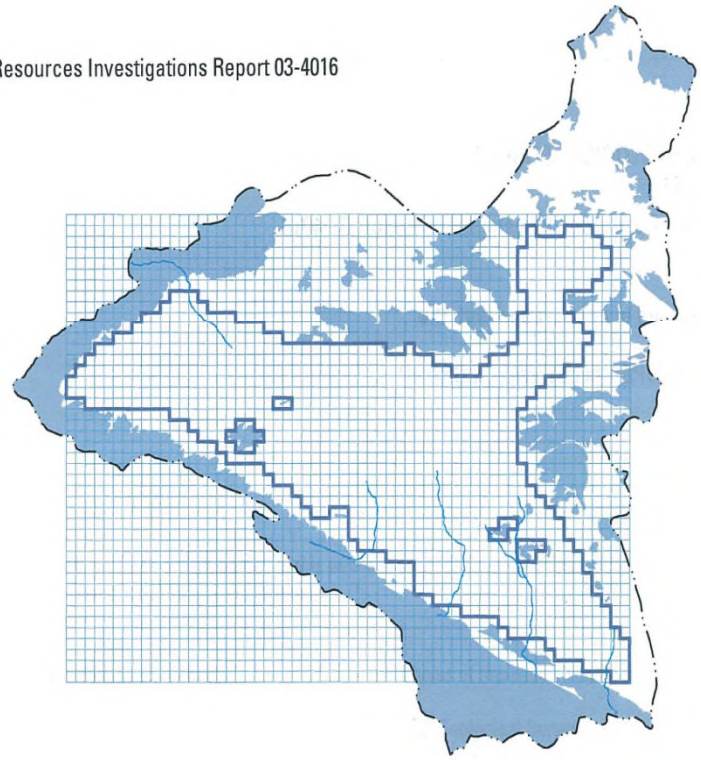
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

Simulation of Ground-Water Flow and Land Subsidence, Antelope Valley Ground-Water Basin, California

Water-Resources Investigations Report 03-4016



Prepared in cooperation with the **Antelope Valley Water Group**

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Ground water moves from areas of high water-level altitudes to areas of low water-level altitudes; therefore, the general direction of ground-water flow can be inferred from contours of water level. Ground water flowed from areas of recharge along the mountain fronts and stream channels toward areas of discharge around Rosamond, Buckhorn, and Rogers Lakes (dry) (fig. 4). In the Finger Buttes and West Antelope subbasins, ground water generally moved from northwest to southeast. In the Neenach subbasin, ground water generally moved from west to east. In the Buttes and Pearland subbasins, ground water generally moved from southeast to northwest. In the Lancaster subbasin, ground water moved from the upslope areas in the southwestern, southern, and southeastern parts of the subbasin to the discharge areas in the northern and northeastern part of the subbasin. In the North Muroc subbasin, there was a small water-level gradient toward the north where some ground water flowed into the Fremont Valley Basin.

Since the 1920s, ground-water use has exceeded estimated natural recharge. This overdraft has caused water levels to decline by more than 200 ft in some areas and by at least 100 ft in most of the study area. In agricultural areas, declining water levels began to level off in the late 1970s and, in some areas, water levels began to rise. Since 1983, water levels have risen by as much as 45 ft in areas where land use is predominately agriculture (Carlson and others, 1998). In urban areas, water levels have continued to decline.

Water-level data collected in spring 1996 (Carlson and others, 1998) represent regional water levels after more than 75 years of ground-water development in the basin (fig. 7). In the Lancaster subbasin, depth to water is more than 100 ft below land surface throughout most of the subbasin and the water table has declined to a level that has eliminated the discharge of ground water by evapotranspiration. In the eastern and western parts of the subbasin where most of the agricultural pumping has occurred, depth to water is more than 200 ft below land surface; in some areas, depth to water is more than 300 ft below land surface. In the area around Palmdale, where most of the pumping for public supply has occurred, depth to water is more than 500 ft below land surface. In the Finger Buttes, Neenach, and West Antelope subbasins, depth to water ranges from about 150 ft to more than 350 ft below land surface. In the Buttes and Pearland subbasins, depth to water ranges from about 50 ft to about 250 ft below land surface, and in the North Muroc subbasin, depth to water ranges from about 100 ft to near 200 ft below land surface. Water-level altitudes are highest in the Neenach (2,800 ft above sea level) Pearland (2,800 ft above sea level) and Finger Buttes subbasins (data from a single data point in the Finger Buttes subbasin suggest that the water-level altitudes in this subbasin may be about 3,200 ft above sea level) (Carlson and others, 1998). The lowest water-level altitude is in the Lancaster subbasin in the area around Palmdale (2,050 ft above sea level) (fig. 7).

In the Neenach subbasin, ground water now moves to the northeast and flows into the Lancaster subbasin. In the Buttes and Pearland subbasins, ground water generally continues to move southeast to northwest. In the Lancaster subbasin, ground water flows from areas of natural recharge toward areas of low water-level altitude in the south-central part of this subbasin (fig. 7). Although not evident from the contours shown on figure 7, there also is an area of low water-level altitude centered near the primary production wells at Edwards Air Force Base, near the south end of Rogers Lake (Carlson and others, 1998); ground water flows from the boundary between the Lancaster and North Muroc subbasin toward this ground-water low (Rewis, 1995). An area of high water-level altitude exists in the central part of the Lancaster subbasin southwest of Rosamond Lake (fig. 7); the high water levels may be the result of limited agricultural pumping and low-permeability alluvial material in this area. Because pumping for agriculture has been limited, little drawdown has occurred over time. Recharge from the infiltration of wastewater from the Lancaster Water Reclamation Plant discharged to ponds in the area also may be contributing to the high water-level altitudes. In the North Muroc subbasin, the water-level gradient is fairly flat, but a small amount of water may continue to flow toward the Fremont Valley Basin from the North Muroc subbasin.