

Management of the Lahaina aquifer area with the aid of a 3-D numerical SUTRA model, Maui, Hawaii

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ABSTRACT

A groundwater flow model of the Lahaina area of west Maui has been developed using the US Geological Survey's three-dimensional solute transport (3-D SUTRA) computer code. The code is capable of simulating three-dimensional, variable-density groundwater flow and solute transport in heterogeneous anisotropic aquifers. The groundwater model for the Lahaina area simulates freshwater, the underlying brackish-water transition zone and saltwater and incorporates hydrogeologic features such as valley-fill barriers beneath several of the streams. New estimates of recharge during 1926–2008, historical distributions of monthly pumpage, and the position of mean sea level at monthly intervals are used as input to the model. The resulting freshwater-lens size and position were simulated for the period 1926–2008. The groundwater flow model is useful as a tool to forecast the effects of future groundwater withdrawal and changes in recharge distributions. The relative benefits of redistributing groundwater withdrawal using existing infrastructure or adding more wells to spread out pumping are compared using different model scenarios. The effects of changes in recharge caused by drought conditions, changing land use, or modified streamflow above the aquifers are also simulated. The results of these scenarios are available to water-system managers so that they can most effectively manage the groundwater resource.

Figure 1/...

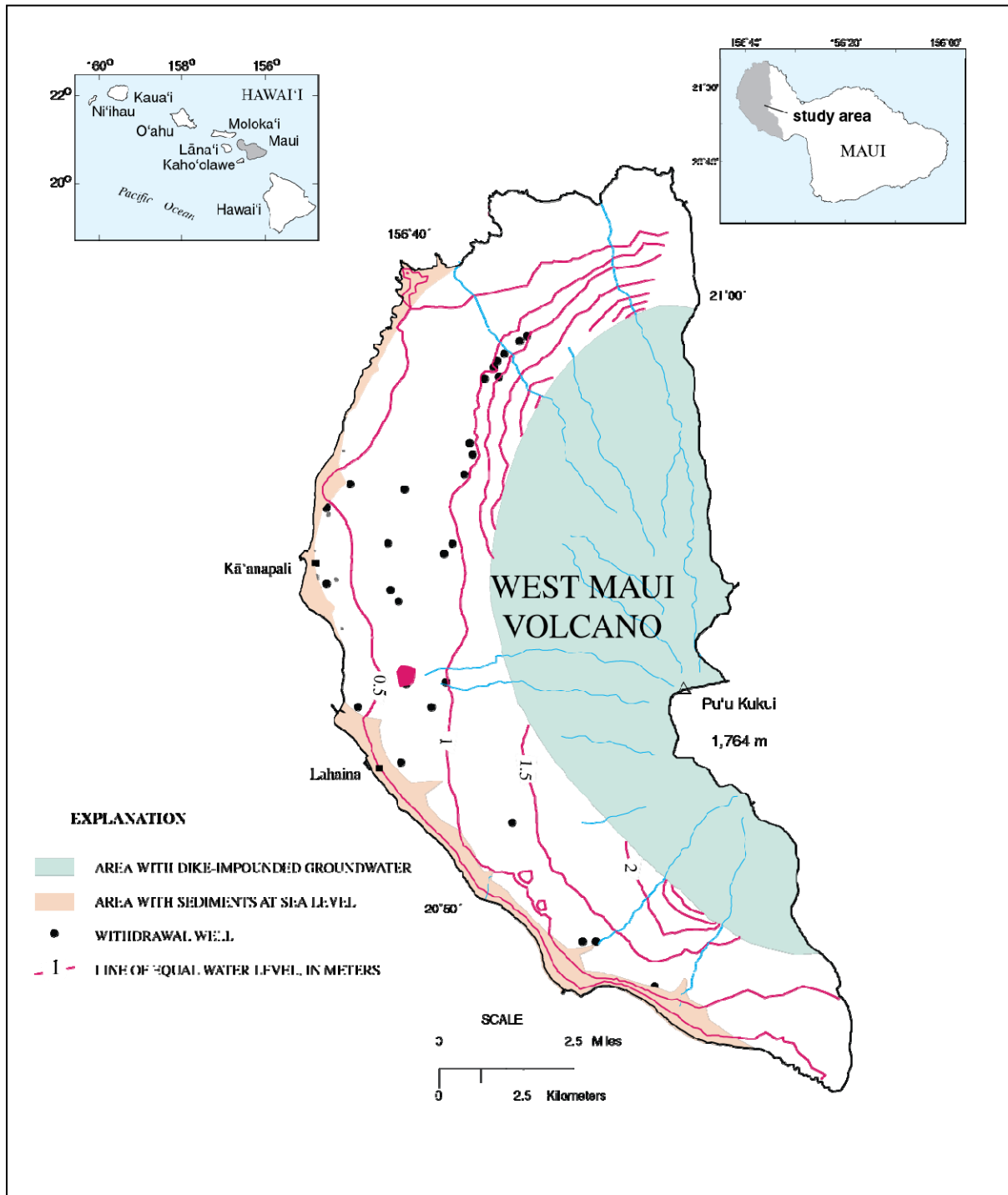


Figure 1. Study area (extent of model) and simulated water-table contours in 2008, Maui Hawaii, USA.