EXECUTIVE SUMMARY

A groundwater study of the Scott Valley, Siskiyou County, California, was conducted to improve understanding of the relationship between land and water use on flow conditions in the Scott River. This work is based on extensive data presently available in the public record, including over 1,000 well logs, soil and geologic data, groundwater elevations, well tests, high-resolution land surface elevation data, crop and riparian vegetation mapping, climatological data and stream gage records. As part of this work, a high-resolution groundwater model of the Scott Valley has been prepared, suitable for characterization of valley-wide groundwater conditions and groundwater/surface-water interactions.

Two model simulations were conducted to illustrate the model capabilities and to provide insight on groundwater conditions in the Scott Valley. The groundwater model was applied to examine groundwater conditions given recent levels of groundwater use, and under an alternative water use condition representing partial build-out of the existing groundwater capacity. The "partial build-out" case, in comparison to the "recent" case, provides a mechanism for examining the impacts of groundwater pumping on the aquifer and on the Scott River. While pumping and water use vary somewhat from year to year, depending on cropped acreage, crop distribution, weather and water supply conditions, these two cases are taken as representative of two distinct development conditions and provide a basis for examining hydrologic conditions and relationships within the alluvial aquifer. These cases are identified for illustrative purposes and can be modified or refined in future scenario evaluations.

Simulation of water use under the "recent" condition sets groundwater pumping at the amounts estimated and summarized by the California Department of Water Resources (DWR) for the year 2000. Simulation of water use under "partial build-out" of well capacity sets groundwater pumping at an amount reflecting 60% of the well capacity available in the year 2000, and adjusts irrigation recharge accordingly. Pumping and irrigation-related recharge are pro-rated based on crop classes and spatially assigned to the model in accordance with mapped GIS coverages. Other sources of recharge, including mountain-front recharge and winter stream flows, are based on average conditions for the period 1971 to 2000. The "recent" condition reflects a net increase in groundwater use of approximately 9,800 acre-feet per year as compared to the "partial build-out" condition.

While structured as a hypothetical, the "partial build-out" pumping condition would have occurred at some point in the past. Based on drilling dates of the well logs available to this study, this condition would likely have occurred in or around the early 1980s. A review of monthly estimates of applied groundwater developed by DWR suggests that a 60% reduction in well capacity would potentially limit the application of irrigation water from wells in the months of June through September, but have little impact on groundwater usage in May.

The groundwater model, as configured for these illustrative simulations, tracks changes to groundwater elevations and surface-water/groundwater interactions through four distinct seasons, although monthly or other time intervals could be incorporated in future scenarios. The model simulation results were examined to identify differences in

groundwater elevations and to quantify stream depletion impacts associated with the net change in groundwater use between the "partial build-out" and "recent" water use condition. The following conclusions were drawn from this analysis:

- Simulation results are generally consistent with observed water-level data, including long-term trends at wells monitored over a period of decades.

- Groundwater elevations in winter are minimally affected by long-term pumping. Groundwater elevations in late summer/early fall have been subject to declines on the order of a few feet, depending on location. (Groundwater elevation declines due to pumping are superimposed on seasonal or annual fluctuations that can be of much greater magnitude.)

- Groundwater declines from pumping tend to be greater in the outlying areas of the basin including upland gulches; similarly, groundwater elevation increases from recharge events may be more pronounced in these areas.

- The Scott River and tributaries can be and have been impacted by increased levels of groundwater pumping. These impacts, termed "stream depletion", involve a combination of a reduction in gains to the stream from groundwater and increased seepage losses from the stream to groundwater, depending on location and time of year.

- Stream depletion can occur from pumping at any location within the Scott Valley; however, the magnitude and timing of impacts to the river or tributaries depends on the amount, duration, location and depth of pumping.

- The model has been applied to generate a stream depletion relationship for the existing basin-wide distribution of pumping which shows that, in composite, increases in groundwater pumping are conveyed to equivalent reductions in streamflow within approximately five years, with the bulk of the impact occurring in the first year or two.

- The simulated net increase in pumping between the "partial build-out" condition (approximately, 1980s) and the "recent" condition (2000) indicates a corresponding stream depletion impact of approximately 16 cfs during the late summer season, July through September. The stream depletion is a change that would be superimposed on surface water flows resulting from the combination of other inflows and outflows, including run-off, ambient stream gains/losses, surface diversion and return flow.

- Higher stream depletion impacts occur during the summer than during the winter/early spring period, reflecting the seasonal occurrence of irrigation pumping.

- The stream depletion impact resulting from changes in groundwater use prior to the partial build-out condition, i.e., from the 1950s to the 1980s, was not quantified as part of this study.

- The magnitude of stream depletion resulting from an increase in groundwater pumping from “partial build-out” conditions to “recent” conditions is consistent with the observed reduction in baseflow of the Scott River over recent decades, adjusted to account for climate impacts.

The groundwater model provides a reasonable representation of existing conditions and is a useful tool for examining broad questions related to groundwater use in the Scott Valley. Many other scenarios can be evaluated through specification of alternative conditions to the model input packages. For example, scenarios may be structured to examine how the location and timing of groundwater diversion and use, or how managed recharge, might enhance late season flows of the Scott River. Scenarios might involve recharge ponds, modification of pumping locations or schedules, alternate irrigation application methods or other approaches for increasing aquifer recharge.

The groundwater model may be updated and refined as additional information is obtained. Focused data investigations may be particularly useful for improved assessment of specific management scenarios or improved understanding of localized conditions.