## **Conclusions**

The second half of the watershed model review for Butte County has been presented here. In the first half of the review, general overviews of PRMS, MIKE-SHE, and WEHY were presented. Water resources issues facing Butte County that can be addressed with watershed modeling were also identified. Watershed processes critical to the successful simulation of these issues were then identified. From the initial comparison it was determined that physics-based models are the more appropriate tools to address the water resources issues facing Butte County.

In this report, the processes identified in the first half of the review are used as a means of comparing the capabilities of the three models. In these comparisons, it is clear that the PRMS model is not suitable for water resources simulations involving surface-groundwater interactions including the study of the impacts of pumping on county aquifers. Both MIKE-SHE and WEHY are capable of a wide range of water resources studies for Butte County. The WEHY model contains a more detailed snowmelt module which allows for a greater variety of simulations to be carried out. In addition, the WEHY model has an explicit description of subsurface stormflow that accounts for the steep gradients in the saturated near-surface zone and is an important process for

identifying variable source area saturated overland flow. The MIKE-SHE model uses the groundwater module to simulate the saturated subsurface which assumes small gradients.

Another fundamental difference in the two models (MIKE-SHE and WEHY) lies in how the models represent spatial heterogeneity. WEHY makes use of areally averaged equations that contain parameters directly related to the heterogeneity in land cover and soils. MIKE-SHE relies on a fine-grid network to capture the heterogeneity with point valued parameters. As a result, WEHY has greater computational efficiency, a more direct means of describing heterogeneity, and less uncertainty in model results because there are fewer parameters to compute.

Based on the information compiled relating to Butte County's water resources issues and the information presented in the model reviews, it appears that the WEHY model contains the most features needed for successful simulation of Butte County's water resources issues. It has the added advantage of not requiring purchase and the spending of money on licensing fees. The California Hydrologic Research Laboratory is familiar with the issues of Butte County, has the knowledge and tools needed for the reconstruction of spatially distributed historical atmospheric data, and has the manpower needed to carry out the watershed modeling studies for Butte County.