

Estimating Groundwater Contributions to Streamflow in Headwater Catchments

William E. Sanford

Department of Geosciences, Colorado State University <William.Sanford@colostate.edu>

Abstract. Groundwater/surface water interactions are important in the water balance of streams in headwater catchments. Groundwater contributions to streamflow (baseflow) help regulate discharge (especially during low flow periods) and modify surface water chemistry. Discharge from streams to groundwater can be important for maintaining water levels in adjacent riparian features, such as wetlands. It is therefore important to quantify the amount of baseflow to headwater streams in order to identify variations that may occur due to climate variability and land use changes.

As an example, the determination of baseflow using the chemical mass balance method was done for a small headwaters tributary stream in the Sierra Nevada, California, USA. Using specific conductance as the chemical parameter, it was observed that during snowmelt period, baseflow was at its greatest but contributed as little as 7% of streamflow. After snowmelt periods, baseflow accounted for up to 100% of the streamflow. Over the four year period of the study, baseflow accounted for a minimum of 30% of the total streamflow. The large contribution of groundwater during low flow periods suggests that chemical loading to the streams during low flow periods is dominated by groundwater chemistry.