ABSTRACT

TITLE:	Dam Release and Monsoon Controlled Recharge and Drawdown of Riparian Aquifers, Dolores River, Colorado
AUTHOR(S):	Gianniny, Dr. Gary L.; Kenny , Dr. Ray; Boley, Melissa
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ABSTRACT: The Dolores River in Southwestern Colorado is a mountain stream which starts high in the San Juan Mountains and has a snowmelt dominated annual spring runoff. The semi-arid environment downstream of McPhee Reservoir has a low annual precipitation, ranging 18-40 cm and a high inter-annual variation. The impoundment of McPhee Dam along the Dolores River has greatly affected the duration and magnitude of peak discharge events, which, in turn, has had impacts on the riparian vegetation and groundwater levels downstream of McPhee Dam. Few published studies have quantified groundwater dynamics in riparian aquifers and dam controlled streams, and this study is aimed at furthering knowledge in this field. Three study sites along the Dolores River, one upstream of McPhee and two downstream, were analyzed in this study using a transect of three piezometers at each study site. Piezometers were installed 2-4 m below the surface in silt to cobble dominated substrate, and were observed from May to October 2010. All observed piezometer levels downstream of McPhee Reservoir resembled the dam release hydrograph. Peak flows during early summer dam releases showed a temporal offset between wells at each site, with the wells closest to the river fluctuating most closely with river fluctuations; temporal offset varied by the well location and was dependent on the material of the pointbar. The duration and magnitude of high flow events were the key factors in effective recharge of the riparian aquifers. Longer duration dam releases created higher groundwater levels and more gradual drawdown times than shorter duration precipitation events of equal magnitude. In addition to these large scale recharge events, daily water level variations of 2-5 cm were observed in each well within a 24-hour period. These well variations are thought to be related to significant diurnal air temperature fluctuations and associated evapotranspiration. The measurements obtained from this study provide important information regarding the effects of dam management on groundwater levels in riparian aquifers. This information will become increasingly critical with anticipated climate change in the region.