
AWRA 2011 ANNUAL WATER RESOURCES CONFERENCE
Albuquerque, New Mexico

November 7-10, 2011

Copyright © 2011 AWRA

**HIGH-RESOLUTION MODELING OF GROUNDWATER RESPONSES
TO STREAMFLOW AND CHANNEL CONDITIONS IN NEW MEXICO**

Deborah Hathaway*, Gilbert Barth

ABSTRACT: Water operations decisions to support improved habitat for riparian and aquatic species are being made in many regions of the West, including New Mexico. To improve understanding of hydrological relationships in the near-river zone, and to assess impacts of water operation alternatives or drought on ecology-based hydrological metrics, a groundwater modeling approach has been applied on rivers in New Mexico that simulates the effect of variable river hydrographs and channel conditions on shallow groundwater elevations and on river seepage losses. Very high-resolution three-dimensional groundwater models for the near-river region have been developed and are being applied to assess hydrologic changes associated with alternate streamflows, river channel conditions or water use patterns. To represent variable stream hydrographs and channel conditions, the width and depth of wetted river channel and flooded overbank areas are set as flow-dependent boundary conditions, obtained from a companion surface water routing model. To incorporate variable water demand by vegetation, riparian plant functional groups are identified that can be separately assigned potential evapotranspiration rates, seasonally varying rates of water use and rooting depths. Simulations illustrating the method on rivers in New Mexico include evaluation of a modified channel alignment, focused on quantifying groundwater elevation changes in a sensitive wetland area and changes to river losses relevant to downstream delivery obligations; and, evaluation of the effect of modified stream peak flows on river losses/gains and shallow groundwater, with implications for existing consumptive and environmental uses.

* Principal Hydrologist, S.S. Papadopoulos & Associates, Inc., 3100 Arapahoe Avenue, Suite 203, Boulder, CO 80302 USA,
Phone: 303-939-8880, Fax: 303-93--8877, Email: dhathaway@sspa.com