

## ***Integrated Modeling of Climate Stress and Resilience in Snow-Fed Arid Lands***

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The Water for the Seasons Project (WftS; funded by NSF/USDA Water Sustainability & Climate Program Grant No: 130505/130506) integrates hydroclimatic and socioeconomic models to assess climate resilience in snow-fed arid basins. Stakeholder-informed climate scenarios are being used to assess the impacts of extended droughts, extreme storms, and increased temperatures on water sustainability in the Truckee-Carson River System (TCRS) (see Figure 1). The TCRS is a prime example of a snow-fed arid-land river system, which within a relatively small geographic area encompasses many of the major water management challenges in the Western United States. The diverse hydrologic conditions - from highly managed operations on the Truckee River to free-flowing reaches in the Carson River System - combined with the complexity of water-use arrangements in the TCRS serve as a model for understanding hydroclimatic water stress and climate adaptation in snow-fed arid lands. Participatory



*Figure 1. Modeling the TCRS to Study Snow-Fed Arid Lands*

modeling is being used to assess stakeholder-specific climatic conditions that lead to water stress and to evaluate viable options for adaptation by federal, state and local water managers, urban planners, agriculturalists, Native American tribes, and other organizations and water-right holders in the system. Stakeholder input directly informs the development of the climate scenarios that are then input into a suite of coupled surface water, groundwater and operations hydrologic models of

the TCRS. Global Climate Models indicate that the major climate impacts to this system are expected to result from increases in both temperatures and the frequency and intensity of extreme storm events (dominated in the Northern Sierra by Atmospheric River events). Potential ecological impacts, infrastructure disruptions, and to the TCRS from an Atmospheric River Category 1000 storm (i.e., ARkStorm) were investigated as part of the USGS-funded ARkStorm@Tahoe Project. Findings from the WftS and ARkStorm@Tahoe Projects will be presented and the transferability of this approach for studying climate resiliency in other snow-fed arid lands basins, globally, will be discussed.