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Water In, Water Out: Using a Water Balance Model to Estimate Net Consumptive Availability

The purpose of this experiment was to provide an inventory of water that is entering and exiting different hydrologic systems. With this inventory, water management specialists can better predict the consumptive availability of water from a drainage basin. To determine the net water consumptive availability within a drainage basin, water quantity inputs (precipitation, surface water, and groundwater) and water quantity outputs (evapotranspiration, surface water outflow, and groundwater outflow) for three watersheds had to be measure and included in a water balance model, Q= P-ET-dS/dt-L. Where P, precipitation for Watersheds #1 and #2 was collected from the Ute Creek NRCS SNOTEL Site and precipitation for Watershed #3 was collected from the Zirkel SNOTEL site; ET, evapotranspiration was measured in all three watersheds with an ETgage; DS/dt or change in storage over time was measured using soil moisture sensors and soil characteristic curves; and L, deep percolation was measured using observation wells in Watersheds #1 and #2, and a known percentage of 3% of the precipitation in Watershed #3 was used. The net consumptive availability for each basin was:
Watershed #1 Ratio: 894 AF/1,710 Acres = 0.52 AF/Acre
Watershed #2 Ratio: 247 AF/380 Acres = 0.65 AF/Acre
Watershed #3 Ratio: 4,798 AF/1,770 Acres = 2.72 AF/Acre

This research demonstrates that by accounting for water quantity inputs and outputs in a watershed system, then a net consumptive availability can be calculated; and the methodology could potentially be used for more accurate snow runoff forecasting.