Variations in Precipitation and Temperature Signals and Characteristic Responses in Autumn and Spring Seasonal Hydrographs: Implications to Water Resource Management in the Gunnison River Basin

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Abstract. Snowpack provides most of the water supply to the Colorado River, yet studies show that autumn streamflow is also positively correlated to streamflow during the following spring and summer. This suggests a connection between hydroclimatic conditions in the autumn and those that influence snowpack development. Timing, magnitude and other attributes of seasonal flows, precipitation and temperature for average, wet and dry hydroclimatic conditions for the Gunnison River were characterized for unimpaired basin conditions. Results show that as hydroclimate changes from dry to wet conditions, variations in seasonality are evident as early as September and timing of autumn and spring seasonal hydrographs shifts later as the hydroclimate becomes wetter. These results suggest that hydroclimatic conditions that influence snowpack development in the Gunnison Basin are established by autumn and are detectable in streamflow, temperature and precipitation as early as September, seven months prior to peak snowmelt runoff. Determining streamflow signatures characteristic of precipitation and temperature signals at other gages in the Colorado River system will provide information that may be useful in improving water supply forecast accuracy and extending lead time for planning. Results may also have applications in protecting and managing native and endangered fishes in the Colorado River system.

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