

## **A Long-Term Context for Snow Water Equivalent Trends in Rocky Mountain National Park**

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**Abstract.** The seasonal snowpack in Rocky Mountain National Park is critical to the local and downstream water supply and the ecosystem of the park, and is important for winter recreational opportunities. Recent regional studies of trends in observed snow water equivalent (SWE) over 3+ decades have illustrated that temperatures are rising, snow accumulation is decreasing, averaging on the order of -2 to -4 cm/decade; and snowmelt is tending to be earlier, averaging on the order of -2 to -4 days/decade. To place these trends in observed SWE into a longer-term context, multi-century SWE reconstructions based on tree-ring widths were examined to determine whether similar multi-decade trends have occurred in the past. To estimate SWE trends for the study area into the future, projections from CMIP5 climate models linked to hydrologic models were examined to identify models that best fit the observed data, and these model projections were used to estimate SWE trends for the rest of the 21<sup>st</sup> century. Results of the paleo analysis suggest that similar multi-decade declining trends in SWE have occurred in the study area at certain times over the past four centuries. Results of the model projections suggest that trends observed during the past 3+ decades are likely to continue over the next 8+ decades.