

# Climate change scenarios in the upper Colorado River basin

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**Abstract.** Over the upper Colorado River basin, the effects of a changing climate will be most prevalent during the accumulation of winter snowpack and the subsequent spring runoff. In this study, we use the Snowmelt Runoff Model developed at the U. S. Department of Agriculture's Hydrology and Remote Sensing Laboratory to investigate runoff variations due to modifications in temperature and precipitation. Previous studies have shown that precipitation changes and runoff are linearly related, while temperature alterations have a more complex effect on snow melt timing. Our project shows results similar to these, with a 4 °C increase in the daily average temperature causing peak instream flows to occur an average of four weeks earlier. The Colorado-Big Thompson (CBT) diversion project will be directly effected by these variations in water supply. The CBT reservoir management strategy will have to be re-evaluated, since water stores will be required to last for longer periods during the summer. If not enough water is collected, shortages could develop along Colorado's Front Range and eastern plains, as well as downstream of the CBT dams along the Colorado River. Forest fire management policy may also have to adapt, since a longer snow-free period during the summer could lead to increased fire danger throughout the watershed.