

## **Climate effects on high elevation lakes: the influence of lake specific parameters**

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**Abstract.** High elevation systems are particularly sensitive to climate change. In the Southern Rocky Mountains, >90 percent of an estimated 2,000 natural lakes are located at high elevations (>2700 m). We gathered temperature records for a set of >450 of these lakes and found a signal of surface temperature warming since 1940, similar to other studies of lake warming trends around the globe. However, the response of lake thermal regimes depended partly on lake-specific properties. Intensive sampling of a subset of lakes in the Rawah Wilderness Area, CO, during 2015 and 2016 demonstrated that factors such as lake size, water clarity, inflow and elevation mediated the response of individual lakes that all experienced similar climate conditions. We used a mechanistic, one-dimensional lake thermal model (General Lake Model vs. 3.1.14) to simulate present and future lake-specific responses to climate. These results demonstrated the complex effects of lake-specific properties, and predicted lake types that may be most sensitive to climate-induced change to thermal structure, with implications for habitat suitability for aquatic organisms.