
DETERMINING RESILIENT WATERSHEDS FOR LONG-TERM CONSERVATION IN A CHANGING CLIMATE

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Streams and riparian areas are highly productive habitats for wildlife and fish. To maintain these critical habitats, rigorous prioritization of conservation and restoration efforts is necessary to make the best use of limited resources. In a changing climate, identifying sites with the ability to buffer change is essential for managing Rocky Mountain water resources.

Watersheds in the northern Rockies require persistent snowpack for late-season stream flows and cool water temperatures, yet snowpacks are declining and climate models forecast that this trend will continue. We hypothesize that in the US Northern Rocky Mountains, high-elevation watersheds that receive less solar radiation due to slope, aspect, and shading by steep slopes will have significantly greater ability to maintain cooler water temperatures and higher late summer discharges under warming climate conditions. We also hypothesize that the magnitude of the aspect-shading effect will override other controlling variables. A GIS model of southwest Montana was developed to select sites for preliminary testing of our framework. Discharge data was collected for six paired watersheds with opposing aspects, similar high elevation area, and similar geology. Preliminary results show that basins dominated by steep north and northeast slopes (> 50 %) produce baseflow discharges that are 2 to 4 times larger than baseflows in basins dominated by steep southerly aspects. The project is ongoing, but our framework based on topographic attributes may be successfully used to inform land managers and restoration efforts about which watersheds are most likely to support stream and riparian habitats under changing climate conditions.