



Influence of basin glacier coverage on trends in summer streamflow in British Columbia, Canada

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Mountain glaciers are an important source of freshwater. In late summer, glacier melt maintains streamflow during dry-weather conditions, providing reliable water supply and valuable aquatic habitat in downstream rivers. However, glaciers in many regions are losing mass and there is growing concern about the short- and long-term effects on streamflow. In British Columbia, Canada, almost half of the gauged rivers have at least one glacier in their basin. This study examined the effects of glacier cover on recent variations in summer streamflow across the province. Nonparametric analyses of August streamflow time series of 236 basins showed significantly more negative trends for glacier-fed than for non-glacier-fed streams. A multiple regression model was then fit to the August streamflow series to isolate effects of changes in glacier conditions from the effects of interannual climatic variations. Subsequent trend analyses of the regression residuals suggested first-order stationarity for unglacierized basins, but revealed widespread negative trends for glacier-fed rivers, particularly during the period from 1976 to 1996. This period was dominated by negative mass balance, supporting the hypothesis that retreating glaciers have exacerbated recent summer low flows. The negative streamflow trends in glacier-fed catchments suggest that, should the current warming trend continue and glaciers continue to recede, summer streamflow in British Columbia will decline.