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Hydrological resilience to forest fire in the subarctic Canadian Shield

Christopher Spence[1], Newell Hedstrom[1], Suzanne Tank[2], William Quinton[3], David Olefeldt[4], Stefan Goodman[5], and Nicole Dion[6]

[1]Environment Canada, Saskatoon, Canada (chris.spence@canada.ca)
[2]Department of Biology, University of Alberta, Edmonton, Canada (suzanne.tank@ualberta.ca)
[3]Department of Geography, University of Alberta, Edmonton, Canada (wquinton@wlu.ca)
[4]Department of Biology, University of Alberta, Edmonton, Canada (david.olefeldt@ualberta.ca)
[5]Environment and Natural Resources, Government of the Northwest Territories, Yellowknife, Canada (stefan_goodman@gov.nt.ca)
[6]Environment and Natural Resources, Government of the Northwest Territories, Yellowknife, Canada (nicole_dion@gov.nt.ca)

Forest fires are becoming more frequent and larger in the subarctic Canadian Shield, so understanding the effect of fire on catchment scale water budgets is becoming increasingly important. The objective of this study was to determine the water budget impact of a forest fire that partially burned a ~450 km^2 subarctic Canadian Shield basin. Water budget components were measured in a pair of catchments; one burnt and another unburnt. Burnt and unburnt areas had comparable net radiation, but ground thaw was deeper in burned areas. Snowpacks were deeper in burns. Differences in streamflow between the catchments were within measurement uncertainty. Enhanced winter streamflow from the burned watershed was evident by icing growth at the streamflow gauge location, which was not observed in the unburned catchment. A new framework to assess hydrological resilience to forest fire across the region revealed that watersheds with higher bedrock and open water fractions are more resilient to hydrological change after fire in the subarctic shield, and resilience decreases with increasingly wet conditions.