

Seeking Snow and Breathing Hard: Behavioral Tactics in Mountain Goats to Combat Warming Temperatures

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The world glaciers and persistent summer snowpack are being lost due to warming temperatures. For cold-adapted species, habitat features may offer opportunities for cooling during summer heat yet the loss of snow and ice may compromise derived thermoregulatory benefits. Herein we offer insights about habitat selection for snow and the extent to which other behavioral adjustments reduce thermal debt among high elevation mammals. Specifically, we concentrate on mountain goats (*Oreamnos americanus*), a species whose native distribution is tied areas where large patches of persistent summer snow are declining, and which became extinct during geologically warmer epochs. To examine sensitivity to possible thermal stressors and use of summer snow cover, we tracked marked and unmarked mountain goats in Glacier National Park, Montana, USA, to test hypotheses about selection for cold microclimates including shade and snow during periods of relatively high temperature. To understand functional responses of habitat choices, we measured microhabitat temperatures and a component of goat physiology “breaths per minute” as an index for metabolic expenditure. Individuals 1) selected areas closer to snow on warmer summer days, and 2) on snow had a 15% mean reduction in respiration when accounting for other factors, which suggests remnant snow plays an important role in mediating effects of air temperature. The use of shade was not as an important variable in models explaining respiration. Despite the loss of 85% of glaciers in Glacier National Park, summer’s remnant snow patches are an important reservoir by which animals reduce heat stress and potential hyperthermia.