Evaluating the Effects of Habitat Condition, Climate and Predator Density on Shiras Moose Demography

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Abstract

Over the past two decades, populations of Shiras moose (*Alces alces shirasi*) in western Wyoming have declined. Recent work on the Jackson herd in northwest Wyoming suggests that the 1988 Yellowstone fires and regional drought contributed to a considerable decline in calf recruitment, which coincided with the recovery of grizzly bears (*Ursus arctos horribilis*) and gray wolves (*Canis lupus occidentalis*) to the Greater Yellowstone Ecosystem (GYE). Predation is also presumed to have contributed to declines in calf recruitment, but the relative influence of these predators has yet to be evaluated. We analyzed a time series of vital rates to identify the spatial extent and intensity at which predator density, habitat condition, and interacting abiotic factors limit population growth. We focused on neonate and winter calf survival because calves are the most vulnerable age class and because calf recruitment been shown to be one of the most important vital rates influencing population dynamics in large herbivores. Variables affecting calf survival were calculated at the seasonal home range scale from 100 individuals in the Jackson herd, and 90 individuals in an adjacent herd directly to the south, where moose are exposed to markedly lower predator density. We detected effects of grizzly bear density and habitat condition on neonate survival. Wolf density negatively influenced winter calf survival, but the effect was weak. Our spatial analysis of individual fitness in these two herds suggests that Shiras moose in the GYE have struggled to cope simultaneously with the effects of sub-optimal

habitat conditions and predator density, highlighting the need to prioritize efforts to conserve Shiras moose as climate change continues to progress.