# **Bull Elk Survival, Vulnerability, and Antler Size in a Transboundary Elk Population

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Migration is a behavioral strategy used to access resources or avoid predation in spatially and temporally heterogenous landscapes. On the eastern slopes of the Rocky Mountains, elk migrate to higher elevation summer ranges to access higher forage quality and avoid predation risk. Thus, the decision to migrate has both individual and population level consequences. Antler growth and development is driven primarily by age and forage quality. Thus, if migratory animals can gain access to higher quality forage and avoid predation, migratory males will have higher fitness than residents. However, migration often results in transboundary populations being exposed to different levels of harvest as they move across the landscape. Our goal was to investigate these potential drivers of male elk survival and antler size in a transboundary, partially migratory population in a multi-carnivore system. We collared 75 bull elk in 2018-2020 for a total of 105 elk-years (?x=35 collars/year). Male elk survival and antler size was largely a function of age. Human harvested was the primary cause of mortality(n=33) with wolf predation having little effect on survival (n=2). Antler-point-restrictions resulted in low yearly survival rates for male elk over 4 years of age (S=0.42). While migration itself did not enhance antler size or survival, we found a negative effect of increasing forage biomass (and hence decreasing forage quality) on antler size. These advancements will help managers to understand how vulnerability to natural and human predation risk affects male elk age structure and antler size.