

Linking elk movement patterns to landscape composition and forage availability in Yellowstone National Park. James D. Forester, Dean P. Anderson, Monica G. Turner

Ungulate movement patterns are influenced by interactions between foraging rates, energetic costs, and predation risk. Ten elk in Yellowstone National Park were equipped with GPS radio collars set to record their locations at five hour intervals. We used spatial linear regression to examine how step lengths and turning angles between locations were influenced by available forage biomass, landscape composition, slope, elevation, and distance to nearest road. Habitat variables were quantified at 50 and 500 m radii around the beginning location of each step. We used AIC and cross validation to select our final statistical models. Step lengths were shorter when the elk were closer to roads or in areas dominated by regenerating forest stands. Longer steps were associated with steep slopes and areas of high forage biomass. Turning angles did not show a significant relationship with any of the independent variables. Our results suggest that elk respond not only to abiotic features of the landscape but to the composition of cover types created by large fire events. Because increased movement is one mechanism by which elk may escape detection by predators, our results may also illustrate behavioral responses by elk to predation pressure. Shorter move lengths were observed in areas that provided the greatest cover and longer moves were associated with areas in which less time was required to obtain adequate forage. The link between landscape composition and elk behavior is an important step towards understanding the long-term dynamics of the elk population in Yellowstone.