Spatial Responses of Bighorn Sheep to Forest Canopy in North-central Washington

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ABSTRACT Fire suppression has allowed conifers to encroach into historically open grasslands and shrublands across western North America. Woody encroachment may reduce habitat quantity and quality for bighorn sheep (*Ovis canadensis*), which rely on open escape terrain. We examined the influence of conifer canopy cover, along with topography and forage resources, on habitat selection by bighorns in north-central Washington. Our study took place where thinning and prescribed fire treatments have been applied to encroaching forest to restore historic landscape conditions within and adjacent to existing bighorn habitat. To model habitat selection of bighorns using Resource Selection Functions, we estimated Utilization Distributions (UDs) from Global Positioning System (GPS) locations of 21 radio-collared bighorns (14 females and 7 males) using the Brownian bridge movement model. We defined seasons as lambing (1 May to 15 June), summer (16 June to 15 September), and winter (1 December to 29 February), and created 99% home ranges from UDs for each individual bighorn sheep for each season (as well as an annual UD for each animal). We generated random points within each 99% home range to represent available habitat. We used logistic regression to compare bighorn GPS locations (used) to random points (available) after assigning them to habitat variables that we created in a geographic information system. As we predicted, bighorn sheep selected areas with lower tree canopy cover, even when controlling for topography and potential foraging habitat. Bighorns also selected for steeper slopes; however, distance to escape terrain, aspect, ruggedness, slope X ruggedness, distance to forage, and distance to escape terrain X distance to forage, as well as categories of Tasseled Cap greenness, varied in their ability to predict habitat selection by bighorn sheep. Bighorn sheep in our study area selected habitats with lower canopy cover than generally available. Restoring or maintaining open habitat in areas with woody encroachment may influence movements and increase the value of habitat for bighorn sheep.

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