

Estimating nutritional carrying capacity of bighorn sheep in the Elk Valley

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ABSTRACT: Bighorn sheep (*Ovis canadensis*) in British Columbia's Elk Valley utilize high elevation grasslands during winter. Grasslands that serve as winter range are uncommon in the Elk Valley and may contribute to an upper limit to bighorn sheep population size. We developed an approach to estimate the nutritional carrying capacity for bighorn sheep winter range in the Elk Valley to determine whether availability and quality of winter range may limit bighorn sheep populations. Our aim was to produce a tool capable of supporting current and future resource management decisions by permitting bighorn sheep population size to be compared with nutritional carrying capacity of available winter range, including predicted changes in winter range carrying capacity over time. We developed a winter resource selection function using global positioning system telemetry data and mapped bighorn sheep winter ranges to constrain forage availability spatially. Species contributing to bighorn sheep winter diet were identified through a literature review of previous diet composition studies and consultation with experts. We estimated energy available to bighorn sheep at >2,000 vegetation plots using a relationship between the forage biomass of plant species consumed by bighorn sheep and percent cover of that forage species at each plot. Data were used to develop a spatially explicit forage model to estimate the distribution of energy across bighorn sheep winter ranges in the Elk Valley. Finally, we calculated nutritional carrying capacity by summing the energy available across winter ranges, weighted by relative selection, and divided this total by the average winter energetic requirements.

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KEY WORDS: bighorn sheep, carrying capacity, forage quality, winter range, resource selection
