

Evaluating summer migrations to mineral licks by two mountain ungulates

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ABSTRACT: A deficiency in trace minerals is a common cause of impairment to an organism's physiological functions and can negatively affect the demographic vigor of populations. Bighorn sheep (*Ovis canadensis*) and mountain goats (*Oreamnos americanus*) often ingest soil at areas called "licks" to obtain trace minerals that are lacking in their diets. Based on location data from collared bighorn sheep females in 5 herds in Montana, USA, we observed a common occurrence of short-duration migrations to specific, low elevation sites of most instrumented individuals during the summer months. We predicted these movements were to mineral licks to satisfy mineral imbalances associated with pregnancy and lactation. Our objectives of this study were to 1) identify potential mineral lick sites through collar location data and satellite imagery, 2) quantify bighorn sheep movements to potential licks, and 3) assay soil samples from 17 known mineral licks used by bighorn sheep and/or mountain goats for the concentration of 7 trace minerals. We successfully identified 5 – 14 potential lick sites per herd based on the physical characteristics shown by satellite imagery and locations of collared bighorn sheep. Based on 429 movement paths from 118 individuals that contained locations within potential lick sites, we found that summer migrations averaged 2.82 – 17.18 km in length and 50 – 100% of collared animals travelled to potential lick sites per herd. We found that sodium, calcium, and magnesium were overwhelmingly abundant at known lick sites, which is in accordance with past mineral lick site studies for bighorn sheep and mountain goats. These 3 minerals are known to be important for pregnancy and lactation, and support our hypothesis that these minerals are the reason for long-distance, energetically costly, and potentially dangerous summer migrations to lick sites.

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