

## Seasonal Variation in Connectivity Behavior of Bighorn Sheep

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**ABSTRACT:** Connectivity between bighorn sheep (*Ovis canadensis*) herds is important for the spread of *Mycoplasma ovipneumoniae*. We modeled seasonal variation in connectivity between herds using GPS location data from rams across the state of Nevada. First, we used a hidden Markov model to decompose the GPS trajectories into home-ranging and foraging behavioral states based on the characteristics of the movement trajectories. We then used step selection functions fit to the foraging trajectories to model seasonal habitat suitability based on slope, ruggedness, distance to water, and vegetation type. Finally, we predicted seasonal connectivity among herds using Circuitscape, which represents the landscape as an electrical circuit with varying levels of resistance to the flow of current between nodes dependent on the local habitat. To assess seasonal changes in the connectivity of the landscape, we created spatially explicit metapopulation models using season-specific connectivity values in the dispersal function and measured changes in system-wide connectivity.

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**KEY WORDS:** bighorn sheep, connectivity, foray behavior, *Mycoplasma ovipneumoniae*, pathogen transmission risk, seasonal habitat suitability.