

Evaluating Ability of Cameras to Accurately Estimate Vital Rates for Desert Bighorn Sheep (*Ovis canadensis nelsoni*)

GRETE WILSON-HENJUM, Department of Wildland Resources and Ecology Center, Utah State University, Logan, UT, 84321, USA, grete2h5@gmail.com

KEZIA MANLOVE, Department of Wildland Resources and Ecology Center, Utah State University, Logan, UT, USA 84321

KATHY LONGSHORE, Western Ecological Research Center, US Geological Survey, Boulder City, NV, USA 89005

ABSTRACT: Researchers and managers use camera traps to monitor desert bighorn sheep (*Ovis canadensis nelsoni*) water guzzler use in southern Nevada. Desert bighorn sheep populations face threat from recurrent disease outbreak and increasing drought regimes. Addressing desert bighorn conservation questions and management action requires accurate occupancy and population modeling. However, the ability of non-randomly positioned trail cameras to accurately estimate bighorn sheep population vital rates remains unclear. Here we paired camera and observer data to estimate camera trap detection probabilities and group size biases from camera to improve their applicability for population vital rate estimation. We conducted our analysis at three scales: describing the probability of capturing a photo of bighorn over the duration of a period when they are present; describing the probability of capturing a photo of newly arriving groups of sheep upon arrival; and describing the bias of group size estimates of demographic groups captured in photos compared to observer counts. Estimates of detection probability and bias were modeled as a function of site, camera type used, group size present, and ambient temperature. The probability of camera traps detecting bighorn over the duration of their presence ranged widely across sites (approximates 0.14-0.45). Detection of new group arrival ranged similarly ranged widely across sites (approximately 0.05, var = 0.85). Group size bias correction demonstrated a low bias across sites and demographic groups (approximately 2.07-10.47). Our results provide managers a way to adjust camera-derived estimates to alert managers to potential changes in desert bighorn vital rates and help prioritize future active monitoring efforts.

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KEY WORDS: bighorn sheep, camera traps, detection probability, vital rates.