Winter Elk Distribution and the Risk Of Brucellosis Transmission from Elk to Livestock in the Northern Greater Yellowstone Ecosystem

Kelly M. Proffitt,* Montana Department of Fish, Wildlife, and Parks, 1400 South 19th Avenue, Bozeman, Montana 59718

Justin A. Gude, Montana Department of Fish, Wildlife, and Parks, 1420 East 6th Avenue, Helena, Montana 59620

Predicting spatio-temporal variations in elk (*Cervus elaphus*) distributions is necessary to forecast the risk of brucellosis transmission from elk to livestock within the Greater Yellowstone Ecosystem (GYE). Using Global Positioning System (GPS) data collected from 49 telemetry-collared female elk during 2005-2006, we developed predictive resource selection function models for the brucellosis transmission risk period. To determine applicability of predictive models across the larger GYE landscape, we validated predictive models internally, as well as externally at two additional elk ranges within the GYE using 63 telemetry-collared cow elk during 2002-2009. Finally, we integrated extrapolated resource selection function maps and domestic livestock distributions to forecast elk to domestic livestock brucellosis transmission risk. We found elk distributions varied spatially and temporally during the risk period and predictive accuracy was highest in the study area where the model was developed. Predictive accuracy of extrapolated resource selection function maps was lower in other study areas indicating that risk models developed in one portion of

the GYE are not as accurate in other portions of the GYE. Relative to the other areas included in this study, the Madison Valley and northern Paradise Valley areas were predicted to have the highest risk of elk to livestock transmission risk. Predictions regarding spatio-temporal variations in transmission risk may be used to prioritize management actions aimed at reducing the potential for brucellosis transmission risk, for example hazing to reduce elk-livestock commingling or producer management of livestock distribution.