IMPROVING ESTIMATES OF WOLF ABUNDANCE IN MONTANA

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Estimating wolf (*Canis lupus*) abundance is a key component of wolf management in Montana. Montana Fish, Wildlife and Parks (MFWP) has successfully implemented a Patch Occupancy Model (POM) to estimate area occupied and resulting wolf abundance for the past decade. Estimates of abundance, however, depend on assumptions that territory size is fixed, consistent statewide, and includes minimal overlap; additionally, these assumptions are based on data collected pre-harvest. In reality, territories vary spatiotemporally, and this variability may be even greater under harvest. This variability in turn could affect precision and accuracy of abundance estimates. Furthermore, MFWP requires tools to both keep POM calibrated into the future, and to predict how territorial behavior might change in response to changing environmental conditions or management actions. Critically, these tools must be useful with limited data because intensive monitoring efforts are no longer sustainable. We developed theoretical models of territorial behavior towards accomplishing this goal. Results demonstrate, for example, that territories are expected to be on average smaller where prey are more clumped and abundant, and larger where human influence is greater. Predictions from our models are supported empirically. This provides evidence for how territories will vary based on ungulate populations and human use, which in turn can help guide understanding of the effects of management decisions, e.g., degree of harvest pressure. We are currently parameterizing the models with field data and developing empirical models to contrast with the theoretical models. Altogether, this work will help keep POM calibrated into the future with limited data.