
PREDICTING ABUNDANCE OF GRAY WOLVES IN MONTANA USING HUNTER OBSERVATIONS AND FIELD MONITORING

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From the early 1980s to present, wolf (*Canis lupus*) numbers in Montana have been documented by attempting to locate and count all individuals. These counts represented minimums with unknown error. We describe a method using observations by hunters, in conjunction with field monitoring to estimate wolf population size and distribution in a more systematic way. Our method consists of three general steps: 1) use a multi-season occupancy model to estimate the area occupied by wolves in packs using locations reported by a random sample of hunters, 2) estimate the numbers of wolf packs by dividing area occupied by average territory size from field monitoring, then 3) estimate the numbers of wolves by multiplying the number of estimated packs by average pack size from field monitoring. Estimated area occupied by packs increased between 2007 and 2012. From 2007 to 2009, mean estimated territory size from 38 closely monitored packs was 599.83 km².

Dividing estimated area occupied by mean territory size resulted in an increase in estimated packs between 2007 and 2012, exceeding minimum counts. From 1994 to 2011, complete counts were obtained from 413 packs within or bordering Montana, and mean pack size was estimated at 6.32 animals. Multiplying estimated packs by mean pack size resulted in an increase in estimated population size between 2007 and 2012, exceeding minimum counts. MFWP's method to estimate the wolf population is cost effective and incorporates public participation with field monitoring. Future application will test the effects of harvest and removals on occupancy, colonization, and local extinction.