

Public Abstract

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Title:Occupancy Modeling of Ruffed Grouse in the Black Hills National Forest

Ruffed grouse (*Bonasa umbellus*) are important game birds and the management indicator species for quaking aspen (*Populus tremuloides*) in the Black Hills National Forest (BHNF). As a result, a robust monitoring protocol which reflects the status, trends, and habitat associations of ruffed grouse is necessary. To evaluate these processes, we used ruffed grouse drumming counts combined with occupancy modeling. Ruffed grouse occupancy in the BHNF was low (0.12) and positively influenced by the amount of aspen. Detection probability was also low (0.28) and primarily influenced by date and wind speed. Using occupancy and detection estimates, we evaluated multiple occupancy sampling designs to determine which design required the least effort to achieve occupancy estimates with a desired level of precision. The most efficient sampling design was the standard multi-season design with 3 repeat surveys at each site. However, site requirements using this design were high due to low ruffed grouse occupancy and detection rates in the BHNF. Thus, managers must decide how to allocate and distribute effort towards monitoring. We also addressed ruffed grouse micro-site selection of drumming sites (activity centers) to determine what structure and adjacent vegetative characteristics were correlated with selection of activity centers. Selection was driven by vegetative cover above 1 meter in height, suggesting ruffed grouse selected activity centers that provided protection from predators. By evaluating both broad-scale occupancy and small-scale activity center selection, forest management decisions to encourage ruffed grouse at both the population and individual level in the BHNF will be more robust.