Factors Affecting Survival Of Female Greater Sage Grouse In South Phillips County, Montana, 2001-2004[TWS]

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Populations of greater sage grouse (*Centrocercus urophasianus*) have declined by 69- 99 percent from historic levels. We radio-collared 237 female sage grouse and measured 426 vegetation plots at 4 sites during 2001-2003 on a 3200-km^2 landscape in north-central Montana. We examined the relationship between hen survival and a suite of landscape-scale habitat and environmental conditions. Program MARK was used to model monthly survival rates for 11 seasonal intervals as influenced by a variety of habitat and environmental explanatory variables. Hen survival varied by season within years and by year within seasons. Nesting hens have higher breeding-season survival than non-nesting hens, and individuals at one site had lower hunting-season survival than at other sites. Although we presume hen

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survival to be high and vary little relative to other galliforms, we observed considerable variation. Process variation was 0.255 with an expected range of annual survival of 0.12-1.0. The ratio of process to total variation was 0.999, indicating that observed variation was real and not attributable to sampling variation. We observed a 4-fold difference in maximum and minimum annual survival, ranging from 0.96 for nesting birds in 2001-2002 to 0.24 for non-nesters in 2003-2004. Low annual survival in 2003 reflects compounded effects of a West Nile virus outbreak in August and a severe winter of 2003-2004. Increased hen mortality associated with severe winter weather contrasted with a prior belief that sage grouse populations are typically unaffected by winter weather conditions and underscores the importance of protecting winter sagebrush habitats.