

# Greater Sage Grouse Chick Survival as a Function of Grazing Management, Morphometric and Habitat Variables in Central Montana

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Chick survival is the lowest and most variable vital rate for grouse, but it is important because surviving individuals contribute to the breeding population each year. We estimated the effects of grazing, morphometric, and habitat variables on chick survival in a greater sage-grouse population in central Montana where the Natural Resources Conservation Service and landowners implemented Sage-Grouse Initiative (SGI) rotational grazing systems during 2011-2019. We used a Kaplan-Meier survival function with staggered entry and right-censoring to evaluate chick survival, log-rank models to test for differences among categorical variables, and Cox proportional hazards models to evaluate chick mortality risk as function of time-dependent and continuous variables. Annual survival estimates for 521 chicks were highly variable (range: 0.19-0.60) and differed significantly among years. Median survival time was 42 d (95% CI=33-59 d, all years pooled). Male chicks had substantially higher survival risk than females, and there was some evidence for a higher mortality risk associated with use of SGI pastures during and post enrollment, though we had low sample sizes in pre-SGI categories. Our results suggest SGI grazing management did not benefit chick survival, and that annual effects and sex of chicks were important. Managers might expect female-biased survival and fewer males displaying on leks in the spring following a year with disturbances that affect chick survival.