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Abstract: Recent energy development has resulted in rapid and large-scale changes to western shrub-steppe ecosystems without a complete understanding of its potential impacts on wildlife populations. We modeled winter habitat use by female greater sage-grouse (*Centrocercus urophasianus*) in the Powder River Basin (PRB) of Wyoming and Montana, USA, to 1) identify landscape features that influenced sage-grouse habitat selection, 2) assess the scale at which selection occurred, 3) spatially depict winter habitat quality in a Geographic Information System, and 4) assess the effect of coal-bed natural gas (CBNG) development on winter habitat selection. We developed a model of winter habitat selection based on 435 aerial relocations of 200 radiomarked female sage-grouse obtained during the winters of 2005 and 2006. Percent sagebrush (*Artemisia* spp.) cover on the landscape was an important predictor of use by sage-grouse in winter. The strength of habitat selection between sage-grouse and sagebrush was strongest at a 4-km2 scale. Sage-grouse avoided coniferous habitats at a 0.65-km2 scale and riparian areas at a 4-km2 scale. A roughness index showed that sage-grouse selected gentle topography in winter. After controlling for vegetation and topography, the addition of a variable that quantified the density of CBNG wells within 4 km2 improved model fit by 6.66 Akaike's Information Criterion points (Akaike wt = 0.965). The odds ratio for each additional well in a 4-km2 area (0.877; 95% CI = 0.834–0.923) indicated that sage-grouse avoid CBNG development in otherwise suitable winter habitat. Sage-grouse were 1.3 times more likely to occupy sagebrush habitats that lacked CBNG wells within a 4-km2 area, compared to those that had the maximum density of 12.3 wells per 4 km2 allowed on federal lands. We validated the model with 74 locations from 74 radiomarked individuals obtained during the winters of 2004 and 2007. This winter habitat model based on vegetation, topography, and CBNG avoidance was highly predictive (validation R^2 = 0.984). Our spatially explicit model can be used to identify areas that provide the best remaining habitat for wintering sage-grouse in the PRB to mitigate impacts of energy development.