

Naugle, D.E., K.E. Doherty, and B.L. Walker. 2006. Sage-Grouse Winter Habitat Selection and Energy Development in the Powder River Basin: Completion Report.

Executive Summary: The recent surge in coal-bed natural gas (CBNG) development has resulted in rapid and large-scale changes to sagebrush habitats in the Powder River Basin (PRB) of Montana and Wyoming without a complete understanding of its potential impacts to wildlife populations. As part of a larger study investigating the impacts of CBNG on greater sage-grouse (*Centrocercus urophasianus*), we conducted research on winter habitat use in the PRB to 1) identify landscape features that influence sage-grouse habitat selection, 2) to assess appropriate scale(s) at which selection occurs, and 3) to develop a conservation planning tool by spatially depicting winter habitat quality in a GIS. Vegetation and topographic variables drove the model which predicted an independent data set of winter sage-grouse locations ($R^2 = 0.961$). After controlling for habitat quality, the addition of a variable quantifying the average number of wells/km² within 1000 m of used and available points indicated that sage-grouse avoid CBNG development in otherwise suitable habitat. An Akaike weight of 0.998 showed that the model with habitat and energy development variables included has complete support as the best model to explain the information in the data set. Knowledge that sage-grouse avoid energy development in breeding (Naugle et al. 2006) and wintering seasons (this report) shows that conservation strategies to date to protect the species have been largely ineffective. An effective conservation strategy is one that limits the cumulative impact of disturbances across a landscape at all times of the year. There is still time to develop and 2 implement an effective conservation strategy in the PRB because some areas of high quality winter habitat are still undeveloped. Winter habitat is limited for birds along the border of Montana and Wyoming. Movements of radio-marked birds indicate that this non-migratory population remains in small parcels of suitable habitat to breed, raise broods, and spend the winter. The most suitable winter habitat in Montana and northern Wyoming encompasses only 13% of total land area and has already been impacted by surface mining activities. Expansion of CBNG development threatens to extirpate birds from otherwise suitable habitats and further isolate remaining populations. Risk of complete loss of this population is high if plans proceed to develop the entire northern study area because their non-migratory status and behavioral avoidance of CBNG will leave these birds with no other options. Comparatively more undeveloped winter habitat exists further south in Wyoming (south and east of the town of Buffalo) than along the border of Montana and Wyoming. Large pieces of undeveloped habitat near Buffalo provide winter habitat for a migratory population that nest up to 28 km to the north where winter habitat is poor. Some of these same good wintering areas also contain resident populations of nesting birds that distribute themselves around active leks with >20 males in attendance. Spatially-explicit planning tools, when coupled with knowledge of bird movements and active lek locations provide a biological basis for decision-makers to formulate an effective conservation strategy for sage-grouse. The next step for stakeholders is to formulate the strategy, evaluate alternatives and initiate implementation.