

Smith, L.S. 2009. Greater Sage-Grouse and Energy Development in Northeastern Utah: Implications for Management. Master's Thesis, Utah State University, Logan. 104 pages.

Abstract: Concern regarding the effect of energy development on greater sage-grouse (*Centrocercus urophasianus*) is increasing as the search for fossil fuel intensifies. Sage-grouse may be especially sensitive to energy development because they require large, diverse areas of sagebrush (*Artemisia* spp.) habitat to complete their life cycle. Additionally, the network of pipelines, roads, and wells required by energy development may fragment sagebrush habitat isolating populations and contributing to genetic drift, inbreeding, local extinction, or rapid divergence. Seep Ridge, located in northeastern Utah, is one area where sage-grouse habitat and energy development plans overlap. Approved leases call for the construction of an additional 4,000 natural gas wells in an area currently occupied by a small sage-grouse population. This research was completed to 1) collect baseline data on the survival, reproductive success and habitat use of the Seep Ridge sage-grouse population, 2) examine sage-grouse habitat use patterns in relation to development, and 3) describe sage-grouse mitochondrial genetic diversity in 3 northeastern Utah populations relative to other parts of the species range.

I captured and monitored 16 sage-grouse from the Seep Ridge population in 2007 and 2008. Adult mortality rate of the Seep Ridge population was high (65.2%) and recruitment was low (7.1%) compared to other sage-grouse populations in Utah. Additionally, the monitored sage-grouse used habitats located farther from wells more frequently than habitat located near wells, relative to well spacing. Current habitats occupied by this population do not meet recommended guidelines.

No unusual haplotype compositions were observed in the genetic survey of the northeastern Utah sage-grouse populations. However, differences in haplotype composition between the Anthro Mountain and Strawberry Valley populations and other northeastern grouse populations indicate there may be a barrier to gene flow in the area. I also documented that the Seep Ridge population is connected to another population inhabiting Ute Tribal land. This observation suggests that the populations inhabiting Ute Tribal land may constitute a source population to recolonize Seep Ridge during the post-energy development periods.

I recommend that mitigation measures incorporate restricting development in breeding habitat, maintaining connections between populations, and actions to reduce adult mortality on the summer range. I also recommend that biologists continue collecting genetic samples from northeastern Utah sage-grouse populations to understand population structure, divergent evolution, and inform decisions concerning translocation.