

Young, J. R. 1994. The influence of sexual selection on phenotypic and genetic divergence among Sage Grouse populations. Ph.D. Dissertation, Purdue Univ., West Lafayette.

I studied the mating behavior, ecology, and genetics of an isolated population of sage grouse (*Centrocercus urophasianus*) in the Gunnison Basin, Colorado. Sage grouse have a lek mating system in which only a small percentage of males mate. Sexual selection in such a mating system can lead to rapid evolution of sexual dimorphism in size, plumage characteristics and mating behavior as well as associated female preferences for such male traits. As a result, I predicted that sexual selection could increase population divergence as well as reduce population persistence. Field observations indicated that traits important to male mating success, such as mating vocalizations, had diverged in the Gunnison population relative to other sage grouse populations. To determine the effect of this divergence in male mating vocalizations on female behavior, I conducted reciprocal field playback experiments at two leks, one in Gunnison and the other in a nearby, but allopatric, northern Colorado population. Females in each population avoided male vocalizations from the other population, suggesting the existence of a pre-mating barrier. While female mating behavior differed between populations, my investigation of female nesting ecology and summer habitat use showed that Gunnison females are ecologically similar to females in other sage grouse populations. Females in Gunnison (a) chose nest sites with more sagebrush density and structure than random sites, (b) had higher nesting success in areas with greater shrub density and forb and grass cover, and (c) used flat, mesic areas with extensive grass and forb components when rearing broods. Genetic analyses of four sage grouse populations revealed moderately higher band-sharing and values compared to non-lekking bird species. In addition, some genetic differentiation exists among the four populations and between leks in Gunnison. My results demonstrate the Gunnison population is distinct in secondary sexual traits, but not female ecology. These results are consistent with the view that sexual selection can have a direct role in the initial stages of population divergence leading to speciation. My results also suggest that lek mating species may have reduced genetic variation relative to non-lekking species and subsequently are more vulnerable to environmental changes.