# Understanding Variation in Singing Behavior: a Missing Link in the Analysis of Count Data for Shrub-Steppe Songbirds ™

Brett L. Walker
Wildlife Biology Program, School of Forestry
The University of Montana, Missoula, MT 59812

Count data, e.g., line transects, point counts, are widely used in avian research and monitoring programs. Although counts rely heavily on detections of singing males, our understanding of variation in the major factors influencing singing behavior is incomplete for many songbirds. I investigated factors influencing the detectability of Brewer's Sparrows in a population of color-banded males of known pairing status and nest stage in Washington state in 1998-1999. In Brewer's Sparrows (and other shrub-steppe songbirds), a

major source of variation in male singing rates, and therefore, in detectability, is male reproductive stage, i.e., pairing status and nest stage. The detectability of paired males (0.12-0.39) is dramatically lower than that of unpaired males (0.87-0.90) for counts 3-20 minutes long. Male parental care, including male incubation and brooding, is common and further reduces the detectability of paired males. Moreover, even when count protocols are fully standardized, substantial annual variation in female arrival date, via its effects on male pairing status, may bias count data by as much as 50 percent. Variation in female arrival date may explain previous reports of high temporal and geographic variation in abundance in this and other shrub-steppe species. Understanding the main sources of variation in singing, including the effects of pairing status, female arrival date, and male parental behavior, is prerequisite for proper interpretation of point count data based on vocal detections. I outline a method for using tape-recorded count data to monitor pairing success in shrub-steppe breeding birds.