Proposed sampling methods to study the effects of grazing intensity on bird communities in the Cascade-Siskiyou National Monument

Investigator:
John Alexander
Klamath Bird Observatory
1497 East Main Street
Ashland, OR 97520

Summary

The Klamath Bird Observatory (KBO) is evaluating bird abundance relative to grazing utilization within the Cascade Siskiyou National Monument. Vegetation and bird census data were collected in spring of 2002 and will be collected in 2003 and 2004. KBO will generate species lists for total frequencies and relative bird abundances. Additionally, we will evaluate the ability of grazing utilization to explain variation in relative abundance for the 35 most commonly occurring birds in our surveys.

Methodology

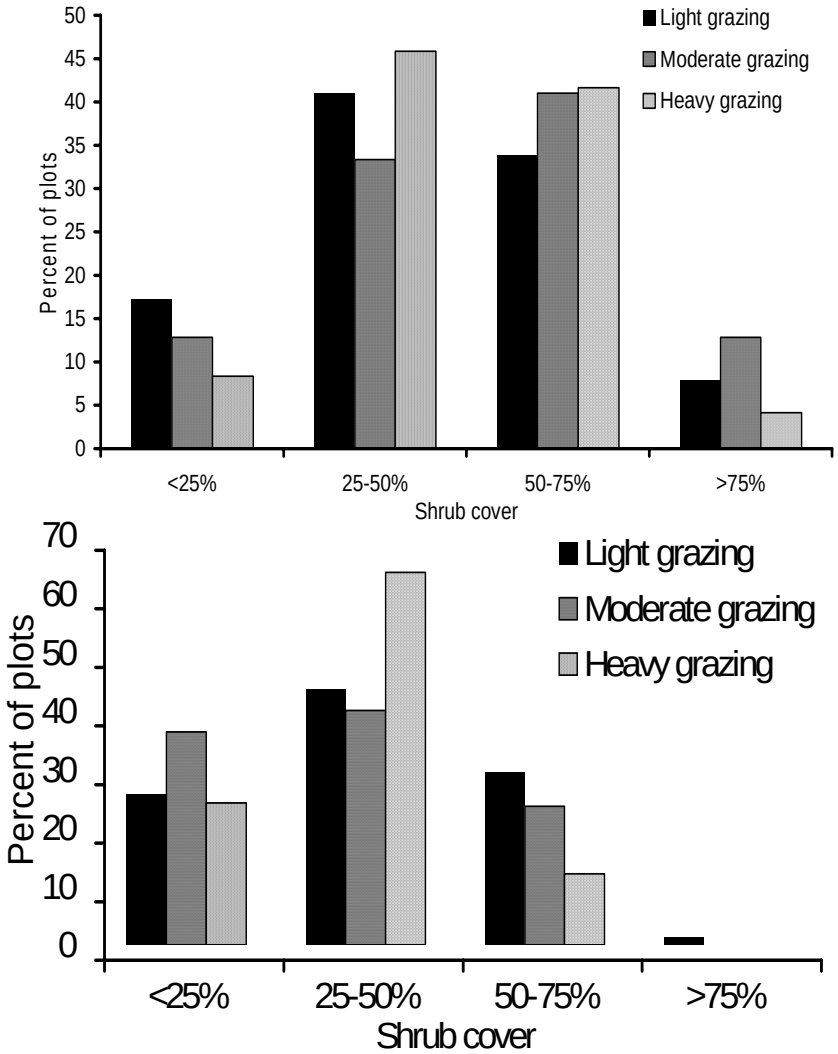
Site Selection

In 2002, the KBO collected vegetation and bird data at 500 points throughout the Cascade-Siskiyou National Monument. Vegetation data from these surveys were used to identify vegetation types within the study area. Based on these data we identified five habitat types: mixed-conifer (dominated by Douglas Fir), true fir, shrub/conifer, oak/shrub, and oak/pine. In 2003 and 2004, survey efforts will focus on mixed conifer and oak woodland habitats; points that were established in the shrub/conifer and true-fir vegetation types will not re-visited during future surveys. Oak/shrub and oak/pine vegetation types will be combined into a single "Oak" vegetation type.

Grazing utilization classes will be identified from maps supplied by Medford BLM. The original classifications are ranked (light to heavy grazing) on a scale of 1 to 5. We will condense these into coarser categories: 1 will be assigned as "low grazing", 2 and 3 as "medium grazing", and 4 and 5 as "high grazing".

One of the experimental design concerns is that grazing intensity and vegetation structure, especially shrub cover, are highly correlated within the Cascade-Siskiyou National Monument. Shrub cover for each of the points was recorded as 0-25%, 25-50%, 50-75%, and 75-100% during vegetation surveys in 2003. To evaluate the relationship between grazing intensity and shrub cover, we compared the proportion of points in the different cover categories among the three utilization classes (Fig. 1). There is no evidence that the proportion of points in each shrub cover class varied among utilization classes in mixed conifer ($X^2 = 4.06$, $P = 0.64$) or oak habitat ($X^2 = 8.36$, $P = 0.21$).

Figure 1. Proportion of points in four shrub-cover classes in each of three grazing utilization classes. The top panel is mixed-conifer, the lower panel is oak.



Data Collection Methods

All census points will be surveyed twice during each year (2003 and 2004). Surveyors will gather bird abundance using standardized point count census methodologies (Ralph et al. 1993). We will space points to ensure independent sampling and conduct five-minute bird counts between sunrise and 1100 PDT on each station. Surveyors will record all landbird species seen and heard and estimate the distance to each detected bird encountered during each census.

Field crews will collect vegetation data at each station using a relevé method (Ralph et al. 1993). Total cover and range in height for the tree layer (≥5 m), shrub layer (≥ 0.5 m and < 5 m), and herb layer (< 0.5 m) will be estimated and the number of sub-layers within each of these three structural categories determined in using this method. We will visually estimate maximum and minimum DBH of trees in the tree layer. The degree each plant species provides cover within each sub-layer will be determined using eight classes (0, ≤ 1, 1-5, 5-25, 25-50, 50-75, 75-100%),

and permanent standing or running water occurring within 50 m will be noted during vegetation sampling.

Statistical Analyses

All statistical analyses will use SAS (Version 1.8). Relative abundance and standard deviation will be calculated as means (PROCMEAN). Bird abundance will be analyzed using a generalized linear model (PROC GENMOD) specifying a Poisson distribution and log link with habitat and utilization class as explanatory variables. Because the same stations will be surveyed repeatedly during the course of the year, we will use generalized estimating equations that adjust for potential correlation among stations (Horton and Lipsitz 1999). We will fit models with utilization class, habitat (where appropriate) and utilization x habitat interaction parameters, and use Wald statistics to determine whether these parameters significantly improve the fit of the model to the data. Habitat will be used in the model only for those species that are detected within all three utilization classes in both habitats and at a relative abundance of greater than 0.1 in at least one of the utilization classes in both habitats. Species that do not meet this criteria will be considered either oak or conifer specialists. For these species we plan to restrict the analysis to a single habitat type, removing habitat from the model.

References

Horton, N. J., and S. R. Lipsitz. 1999. Review of software to fit generalized estimating equation regression models. *Amer. Stat.* 53:160-169.

Ralph, C.J. 1993. Handbook of field methods for monitoring landbirds. United States Department of Agriculture, Forest Service, General Technical Report PSW-GTR-144.