

account for a large proportion of the variability present in avian community organization in this study.

SUMMARY

This study was undertaken to measure and evaluate 1) the effects of differing foliage volume, foliage patterns, and densities of trees on the diversity, density, and behavior patterns of the breeding birds of ponderosa pine forest, and 2) the standing crop biomass, consuming biomass, and existence energy requirements of the breeding birds on each plot. Five study plots were chosen in relatively homogeneous stands on ponderosa pine. Plots were selected in clear cut, strip cut, severely thinned, silviculturally cut, and natural areas. The trees on each study site were analyzed to determine the relative density, relative frequency, importance value, absolute density, and foliage volume in 2-m height classes for each tree species. Breeding bird behavior was examined in detail in seven different categories: activity pattern, foraging method, tree species selection, position from the trunk, perch selection, stance, and foliage use profile. The following major points were evident.

1. Breeding bird populations varied from a low of 12.5 prs/40 ha on the clear cut area in 1973 to a high of 162.8 prs/40 ha on the strip cut area in 1974. Bird densities on the natural area varied from a low of 63.0 prs/40 ha in 1973 to a high of 132.8 prs/40 ha in 1974. The number of nesting species was highest on the strip cut area where 22 species nested in 1974 and lowest on the clear cut area where three species nested in 1973.

2. When bird species diversity is related to plant species diversity, foliage height diversity, and plant volume diversity for the forested areas, it is evident that these factors are not significantly correlated with breeding bird diversity. Other factors such as territoriality, food supply, and the openness of the habitat or other foliage configurations are more important in determining breeding bird diversity than the above three factors.

3. The behavior patterns of most bird species were influenced by habitat alteration. Foraging method and stance were the two types of behavior least affected by habitat manipulation. Perch selection, tree species selection, and mean height were most affected by treatment.

4. Bird species in the ponderosa pine forest segregated primarily on a vertical basis by using different portions of the trees, or on a body weight basis. Pickers and gleaners separated primarily on a vertical basis, whereas the other three guilds (hammerers and tearers, ground feeders, and aerial feeders) segregated primarily by body weight. Species in the same guild also separated on the basis of differences in several other niche dimensions.

5. Comparisons between the foliage profiles and bird use profiles illustrated a cyclic pattern of bird use during the course of the study, perhaps in response to fluctuations in the resource base.

6. No correlation existed between territory size and breeding bird density for individual species or community densities. Territory size did vary directly with changes in the fit between the bird use profile and the foliage profile. Territory size decreased with (1) increased use of the foliage profile bulge, (2) increased utilized foliage volume per territory, and, most importantly, (3) an increased fit of the bird use profile and the foliage profile, or a combination of these.

7. The standing crop biomass on the forested study plots varied from a low of 67.0 g/ha on the control plot in 1973 to a high of 218.6 g/ha on the strip cut plot in 1974.

8. The consuming biomass on the forested study plots varied from a low of 20.2 g/ha on the natural area in 1973 to a high of 59.2 g/ha on the strip cut area in 1974.

9. The total energy flux (in terms of existence energy) on the forested areas varied from a low of 39.7 kcal/ha-day on the natural area in 1973 to a high of 112.8 kcal/ha-day on the strip cut area in 1974.

10. The most behaviorally plastic species (Solitary Vireo, Gray-headed Junco, Western Bluebird, Common Flicker, and White-breasted Nuthatch) were also the most successful species in the ponderosa pine forest in terms of overall standing crop and presence. These same five species were also located at the extremes or in gaps of their guild weight ranges.

ACKNOWLEDGMENTS

We are indebted to W. Clary and F. Larson of the Rocky Mountain Experimental Station for their assistance and the U.S. Forest Service for research support. W. Gaud, C. Slobodchikoff, G. Bateman, H. Becher, D. Beaver, and R. Raitt helped in reviewing the manuscript. W. Gaud was especially helpful in the computer analyses done throughout the study. We thank P. Czarnecki for drawing most of the figures and A. Slobodchikoff for her help in typing the manuscript. Finally, we are especially grateful to J. Szaro for all her help and encouragement.

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