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SHRUB DENSITY CORRELATES WITH DENSITIES OF WHITE-BROWED SCRUBWRENS *Sericornis frontalis* IN THREE FOREST TYPES IN SOUTH-EASTERN QUEENSLAND

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Insectivorous bird assemblages are often strongly associated with specific forms of vegetation structure which provide a substrate on which birds may obtain food resources as well as cover, nesting sites and other features (Karr 1990). Seasonal changes in these physical characteristics of vegetation layers may greatly influence the distribution of foraging guilds, primarily due to changing invertebrate abundance and availability (Anderson 1981; Cale 1994). While species vary markedly in their apparent preferences for particular habitat types, the presence or absence of many species has been successfully predicted by structural characteristics of the vegetation (Karr 1990; Mac Nally 1994). In many other species, however, there appears to be either no clear relationship between habitat structure and population density; for some species vegetation floristics, rather than structure, provides the most apparent influence on density (Recher *et al.* 1985).

The White-browed Scrubwren *Sericornis frontalis* is one species that appears to be closely associated with a dense shrub layer while being found in a wide range of forest types (Recher *et al.* 1985; Higgins and Peter 2002).

In south-eastern Queensland, White-browed Scrubwrens occur commonly in subtropical rainforest, wet sclerophyll forests (Slater 1995), as well as the transitional forest that exists as a significant ecotone between these major vegetation types. In this study we assessed the density of the species within these three forest types in an attempt to determine how forest type and shrub layer density may influence the habitat preferences of the species.

Birds were surveyed in Brisbane Forest Park (27°20'S, 152°45'E), approximately ten kilometres west of Brisbane. Ten 10 × 100 metre transects, located along existing paths or walking tracks, were established within each of three different vegetation types (rainforest, transitional forest and wet sclerophyll forest) using a vegetation map of the area (Department of Natural Resources 1998). Transitional forest sites were identified as having significant elements of both rainforest and sclerophyll forest, primarily in the form of numerous tall eucalypts with an understorey of rainforest species. The starting point of each transect was determined by using random numbers which were used to indicate the number of paces from the entrance of the track.

A fixed-width strip of five metres either side of existing walking paths was used to assess Scrubwren densities at each site (Bibby *et al.* 2000). Each transect was surveyed three times within a period of four weeks during April-May 2001, between 06.00 hours and 08.30 hours on fine days only and the mean used in calculations.

The density of foliage in understorey of shrubs was estimated at ten randomly selected points along each transect by observing a standard 30 × 50 centimetre checkered board, painted with alternate red and white 10 × 10 centimetre squares, a method adapted from that of Fuller *et al.* (1989). The board was placed one metre above the ground, and 2.5 metres from the path used for the transect within the forest. An observer standing on the path then compared the shrub foliage obscuring the board with the Percentage Crown Type table in Walker and Hopkins (1984). This provided an estimation (±5%) of the percentage of the horizontal foliage cover.

Differences in Scrubwren density within and between the three habitat types were assessed using the Kruskal-Wallis non-parametric test, as variances among means were not equal. To determine where differences existed, a non-parametric multiple comparison test for pair-wise analysis of the three habitat types was used. Pearson's Correlation Coefficient analysis was used to assess possible linear relationships between Scrubwren density and shrub foliage density within individual habitats and within combined habitat type data.

A total of 212 Scrubwrens were observed at the 30 sites: 64 in rainforest sites; 92 in transitional sites; and 56 in wet sclerophyll sites. They were predominantly recorded foraging or moving through shrubs in the understorey vegetation, generally in pairs or small groups consisting of pairs with three to four juveniles. Although we were unable to obtain accurate counts of the numbers of fledglings in each forest type, there was no indication of juveniles being more abundant in any particular habitat type.

Mean Scrubwren density was significantly different between forest habitats (Kruskal-Wallis test: $X^2 = 6.56$, df = 2, p = 0.037)) with transitional sites having a higher mean density (21.20 ± 3.8 birds per transect) than both rainforest (13.45 ± 1.91) and wet sclerophyll (11.85 ± 4.00) sites. There was no significant difference between Scrubwren densities in rainforest and wet sclerophyll forest.

Although the mean density of shrub foliage was similarly higher in transitional (78.22 + 7.05 percent) forest as compared to rainforest (67.83 + 3.18) and wet sclerophyll

(64.34 + 4.61) sites, these differences were not statistically significant. Nonetheless, shrub foliage density at individual sites, irrespective of forest type, was correlated with Scrubwren density at each site to assess possible relationships between these two variables. A Pearson's Correlation analysis was significant and positive (r^2 = 0.415, p = 0.02), indicating that Scrubwren density increased with the density of the shrub layer.

The density of White-browed Scrubwrens in Brisbane Forest Park was found to be significantly higher in transitional forest than in nearby subtropical rainforest and wet sclerophyll forest. This higher density appeared to have been influenced by the higher density of the shrub layer of the transitional forest type, even though this relationship was not evident when shrub foliage densities were averaged for each forest type.

Although the ecological basis of this relationship has yet to be studied in detail for this species, features such as the profitability of foraging opportunities and relative value for predator avoidance are likely to be important (Fuller *et al.* 1989; Karr 1990). Certainly, the importance of a dense shrub layer in which juvenile birds can find refuge is now well known in species as varied as fairy-wrens (Rowley and Russell 1997) and megapodes (Goth and Vogel 2003). The prevalence of numerous species within and close to otherwise highly disturbed areas may be highly dependent on the presence of thicketed areas (see Fahrig and Merriam 1994). Further investigations into the ecological significance of such features are certainly warranted.

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REFERENCES

Anderson, S. H. (1981). Correlating habitat variables and birds. *Stud. Avian Biol.* **6:** 538–542.

Bibby, C. J., Burgess, N. D., Hill, D. A. and Mustoe, S. (2000). 'Bird Census Techniques'. Ed. 2. (Academic Press: London.)

Department of Natural Resources. (1998). Brisbane Forest Park Information Map. Scale 1:30000. Ed. 2. (Dept. of Natural Resources: Brisbane.)

Cale, P. (1994). Temporal changes in the foraging behaviour of insectivorous birds in a sclerophyll forest in Tasmania. *Emu* **94:** 116–126.

Fahrig, L. and Merriam, G. F. (1994). Conservation of fragmented populations. *Cons. Biol.* **8:** 50–59.

Fuller, R. J., Stuttard, P. and Ray, C. M. (1989). The distribution of breeding songbirds within mixed coppiced woodlands in Kent, England in relation to vegetation age and structure. *Annalen Zoologici Fennici.* **26:** 265–275.

Goth, A. and Vogel, U. (2003). Juvenile dispersal and habitat selectivity in the megapode *Alectura lathami* (Australian brush-turkey). *Wildl. Res.* **30:** 69–74.

Higgins, P. J. and Peter, J. M. (2002). 'Handbook of Australian, New Zealand and Antarctic Birds. Vol. 6.' (Oxford University Press: Melbourne.)

Karr, J. R. (1990). Interactions between Forest Birds and their Habitats: A Comparative Synthesis. In 'Biogeography and Ecology of Forest Bird Communities.' (Ed A. Keast.) Pp. 379–386. (SPB Academic Publishing: The Hague.)

Mac Nally, R. (1994). Habitat-specific guild structure of forest birds in southeastern Australia: a regional scale perspective. *J. Anim. Ecol.* **63:** 988–1001.

Recher, H. F., Holmes, R. T., Schulz, M., Shields, J. and Kavanagh, R. (1985). Foraging patterns of breeding birds in eucalypt forest and woodland of southeastern Australia. *Aust. J. Ecol.* **10:** 399–419.

Rowley, I. and Russell, E. (1997). 'Fairy-wrens and Grasswrens *Maluridae*.' (Oxford University Press: Oxford).

Slater, P. J. (1995). The interaction of bird communities with vegetation and season in Brisbane Forest Park. *Emu* **95:** 194–207.

Walker, J. and Hopkins, M. S. (1984). Vegetation. In 'Australian Soil and Land Survey Handbook.' (Eds R. C. McDonald, R. F. Isbell, J. G. Speight, J. Walker and M. S. Hopkins) Pp. 28–67. (Inkata Press: Melbourne.)