THE FUSCOUS HONEYEATER: FOOD RESOURCES AND THE BIRD COMMUNITY.

BY

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DECLARATION

I certify that the substance of this thesis has not already been submitted for any degree and is not being currently submitted for any other degree.

I certify that any help received in preparing this thesis, and all sources used, have been acknowledged in this thesis.

Gillian Dunkerley

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If nothing else, I now know why insects are considered difficult to work on!

ABSTRACT

Honeyeaters (Family Meliphagidae) are common, diverse and dominant in many Australian habitats. This study examined the role of the Fuscous Honeyeater (*Lichenostomus fuscus*) in a bird community of eucalypt woodland on the Northern Tablelands of New South Wales.

From mid-1984 to mid-1988, the bird community was studied at Eastwood State Forest, 12km south-east of Armidale. Preliminary observations found that the Fuscous Honeyeaters were aggressive and quite concentrated in their distribution, being seen mostly in areas of many gum trees (in the subgenus *Symphyomyrtus*). Woinarski and Cullen (1984) found that gums had more arthropods, especially lerps (Family Psyllidae: Hemiptera) on their leaves than stringybarks did (subgenus *Monocalyptus*). Recher (1985) suggested that this was the reason why more birds were found in areas with many gums than in areas with many stringybarks. Gums often grow on better soils and consequently, often have more nutrients in their leaves (Lambert and Turner 1983). This thesis aimed to examine the relationships between arthropods, types of eucalypts, the bird community, and in particular the behaviour and ecology of the Fuscous Honeyeater.

A censusing program was designed to establish the distribution of Fuscous Honeyeaters, and of other bird species. One hundred census points were located within the Forest and the vegetation was assessed at these points. Stringybarks (*Eucalyptus (Monocalyptus) caliginosa*) were found to be the most common tree species and had an importance value of 54.2% (see Chapter 2). The other significant tree species, in order of declining importance, were *E. viminalis* (15.2%),*E. blakelyi* (13.0%) and *E. melliodora* (7.8%, all species in *Symphyomyrtus*). The total density of trees was 245 individuals/ha, and the density of mistletoes was 4.8 individuals/ha. Birds were counted monthly at sixty points throughout Eastwood from autumn 1986 to autumn 1987, and again in autumn 1988. Concurrently, data were collected on several environmental variables, such as flowering indices of trees and mistletoes. Flowering was mostly poor during this study.

Seventeen species, including Fuscous Honeyeaters, made up 83.6% of the avifauna (Chapter 3) with a total density of nearly 20 birds/ha. Fuscous were the most common species of bird in Eastwood (nearly 4/ha). They were significantly associated with areas of many gums, low altitudes, a sparse understorey and, seasonally, where plants were flowering. Variation in numbers of Fuscous accounted for much of the variation in total numbers of all birds, implying that Fuscous had a strong influence on other bird species. Small insectivores, such as other insectivorous

honeyeaters and thornbills, rarely occurred in the areas where Fuscous were common. Behavioural observations of interactions between birds indicated that Fuscous were aggressively dominant to other small insectivores. This dominance suggests that Fuscous occurred where they preferred to be, and reasons were sought for this.

Since Fuscous Honeyeaters feed mostly on insects and the carbohydrates associated with them, taken from the foliage of eucalypts (Ford *et al.* 1986), the foliage arthropod fauna on the various species of trees was investigated. Sampling of the canopy of the four most important tree species was done from March 1987 to March 1988 (Chapter 4). Leaf clippings were examined and measures of numbers and biomasses calculated. This gave an indication of the standing crop of arthropods, available as food for birds. The four tree species differed in total abundance of arthropods in 3 (out of 13) months for numbers and in 6 months for biomass. Stringybarks usually had the most insects. Arachnids, hemipterans and larvae comprised most of the fauna. Due to high variability, groups of arthropods were seldom different between the tree types, but stringybarks often had more larvae. Most arthropods were not greatly seasonal in abundance.

To establish if the birds were having an impact on the foliage arthropod fauna, bird exclusion cages were placed on saplings of gums and stringybarks from summer 1985/86 to autumn 1987(Chapter 5). The numbers of arthropods inside the cage, and on an adjacent control branch, were counted seasonally. Arthropods were nearly always more common inside the cages, implying that birds were significantly depleting their food, and this effect was most pronounced on the gums, suggesting the gums were preferred foraging substrates. There were, however, rarely differences in abundance of arthropods between stringybarks and gums. Most increases in numbers were due to outbreaks of hemipterans, and there were more carbohydrate-rich lerps on the gums.

Data from several studies at Eastwood were drawn together to establish the diet and foraging preferences of the Fuscous Honeyeater (Chapter 6). Of the four available data sets, none found differences in total numbers of arthropods between the various tree types. From foraging observations, however, Fuscous were found to prefer foraging on gums, particularly *E. viminalis*. Comparisons of the available arthropods with diet data from stomach flushing and faecal analysis, found that Fuscous prefer hemipterans and avoid larvae and arachnids. This suggests that gums may offer more of their preferred food, but the preferences may not be strong due to the fact that arthropods were usually scarce. Experimental food manipulation found that Fuscous can detect and quickly exploit localized food increases. Social factors, however, may have more influence on the congregation of Fuscous in the areas of many gums.

The social organization of Fuscous Honeyeaters was established by observations throughout the censusing period, and during four breeding seasons (Chapter 7). Fuscous bred from late-August to late-January, with the season varying from 4 to 5 months. Most nests were studied in an area of high density of Fuscous, where there were many gums. Fuscous bred as monogamous pairs and the female built the nest, incubated the eggs, brooded the young and maintained the nest. Both male and female fed the nestlings and fledglings. Reproductive success, measured as the percentage of nests that fledged at least one young, was 28.2% over the four years, but varied from a low of 7.5% in a dry year, to 40.9%. Nests that had close neighbours were more successful than isolated nests. The advantages of close nesting may be due to increased detection and more effective mobbing of predators and perhaps, improved foraging efficiency. Although intraspecific competition for food may have been high due to the increased density of Fuscous, this would be partly offset by the reduction in numbers of other small insectivores meaning decreased inter-specific competition, and by co-operative chasing of intruders. Presumably, the increased reproductive success of nesting close together made grouping viable.

The aggression of Fuscous, and their numerical dominance, meant that they had a strong influence on the other species of birds, particularly the small insectivores. The bird community at Eastwood tends to have two suites of species (Chapter 8). Species that are larger than, or feed differently from, Fuscous, are often found where Fuscous are common, in areas of many gums. Small insectivores, on the other hand, appear to avoid places where Fuscous are abundant, and so are numerous in stringybark-rich areas. The Fuscous Honeyeater, therefore, appears to have an organizing role in the community, at least where small insectivorous birds are involved.

Other bird communities in Australia, particularly those in eucalypt forests and woodlands or heath, appear to be similarly organized. Nectarivorous honeyeaters predominate when nectar or alternative carbohydrates are abundant, and more insectivorous species are numerous at other sites. Honeyeaters can comprise up to 60% or more of the avifauna, and usually include the most aggressive species. These dominant species are mostly separated by habitat, and it is suggested that the relatively unpredictable nature of increases in food are responsible. Other, less aggressive, species must fit in around the dominants and specialize in foraging on relatively unused substrates, in habitats where food is sparse or flock around temporarily abundant food sources. The abundance and aggression of one family of birds, the honeyeaters, produces an uniquely Australian community organization.

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