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MINOR AMENDMENTS

Page 3, last para, line 2 should read: "maybe as early as 2000 ybp (Holdaway 1996)...."

Pages 14-16. Chapter Headings should read: Chapter 2: Sexing; Chapter 3: Diet; Chapter 4: Range, Spacing and Habitat use; Chapter 5: Communal Roosting

Page 90, para 2, line 9 should read: "...therefore this behaviour appears...."

Spacing and Ecology of the
Australasian Harrier (*Circus approximans*)
in the Rangitikei – Manawatu Sand Country



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for the degree of Masters of Science in Zoology
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New Zealand

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ABSTRACT

Between March 2000 and May 2001 138 Australasian Harriers were trapped, individually banded, measured, sexed and aged. Morphometric measurements and molecular sexing methods were used to identify the best way to accurately assign gender to harriers. Morphometric sexing is 96% accurate when based on six measurements; weight, back talon, culmen, middle talon, hallux and toe. Of these, weight, back talon and culmen are the most reliable indicators of sex. Molecular sexing applied to DNA from 11 birds proved to be an accurate means of sexing and is a first for this species.

Mammal (61.2%) and bird (36.2%) prey dominate the diet of the harrier at Pukepuke Lagoon, especially lagomorphs and small passerines. Mammalian prey in pellets peaked in August and again in December, was highest in the early-breeding season and lowest in the non-breeding season. Birds were most frequent in pellets in the non-breeding season (peaking in May and June) and least in the early-breeding season (August). Other prey averaged only 5.9% of the total prey in pellets over the year. Harriers are generalist feeders of live prey and carrion, but may become specialised when prey abundance and availability in the environment is high. Impact of harriers on economic, recreational, and threatened endemic species is discussed.

Eight harriers were radio-tagged and tracked intensively over seven months. Male home ranges averaged 405.51 ha in the breeding season and 669.71 ha in the non-breeding season. Female home ranges averaged 340.60 ha in the breeding season and 864.92 ha in the non-breeding season. In females, but not in males, there was significant difference between seasonal ranges. Range sizes and shapes varied between all individuals with no common pattern emerging. Breeding season range overlaps were scarce, but tended to be large and associated with closely nesting pairs. In the non-breeding season there were large overlaps in ranges of most birds. Range overlap was not related to age or sex. Temporal ranges overlapped little for most birds, except those nesting close together. For males and females pasture accounted for over 70% of the habitat in all ranges and seasons, but the birds utilised only 38% of pasture. Swamp accounted for less than 5% of the total habitat but was the most frequently used by harriers (41%).

Three communal roosts were observed for 27 evenings and six mornings. The earliest harrier, and the latest, landed in a roost 90 minutes and four minutes respectively before complete darkness. On average there were 39 minutes between the first and last harriers to land, and most landed shortly after sun moved below the horizon. The highest light reading for a harrier landing in a roost was 715.1 lux and the lowest 0.3 lux. High numbers of birds over roosts was associated with poor weather (wind and rain). Both the breeding and non-breeding season produced fairly similar positive linear increases in bird numbers as light intensity decreased. Differing habitat type and composition at the three roosts did not affect the general behaviour of harriers in response to changing light intensity and weather conditions. In New Zealand communal roosting by harriers may relate to a combination of foraging, social and resource pressures within the local area.

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