

## THE SHAPE OF THE NESTING TERRITORY IN THE NEW ZEALAND FALCON

by

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### Introduction

The New Zealand Falcon (*Falco novaeseelandiae*), having evolved in the absence of mammalian predators, is relatively fearless and defends its nest territory more strenuously than almost any other raptor. Defensive strikes on man have been recorded for the Peregrine (*Falco peregrinus*) (Hendricks 1935, Hall 1955), the Goshawk (*Accipiter gentilis*) (Henderson 1924, Schnell 1958), the Red-shouldered Hawk (*Buteo lineatus*) (Williamson 1913, 1915), the Red-tailed Hawk (*Buteo jamaicensis*) (Fitch et al. 1946), the Osprey (*Pandion haliaetus*) (Craighead and Craighead 1937), the Bald Eagle (*Haliaeetus leucocephalus*) (C. White, pers. comm.), and the Common Buzzard (*Buteo buteo*) (William and Coan 1973, Brewster 1973); but these demonstrative attacks were the exception rather than the rule. Usually only the larger accipiters, owls and a few eagle species strike intruders with any frequency.

During visits to 31 nesting pairs of New Zealand Falcons in 1974-76, I was hit repeatedly by all nesting females and most of the males when they had eggs or non-flying young. Nest defense was also observed against the following intruders: the Australasian Harrier (*Circus approximans gouldi*), the Southern Black-backed Gull (*Larus dominicanus*), the Black Shag (*Phalacrocorax carbo*), the White-faced Heron (*Ardea novaehollandiae*), feral cats (*Felis catus*) and chamois (*Rupicapra rupicapra*), as well as men and dogs. Additionally, the falcons attacked horses and helicopters (M. Midgely, pers. comm.). Even less demonstrative species, like the Peregrine, the Gyrfalcon (*Falco rusticolus*), and the Bald Eagle (*Haliaeetus leucocephalus*) will attack helicopters (White and Sherrod 1973), which presumably are not associated with man. No intraspecific conflicts were observed, but trained New Zealand Falcons flown on occupied winter territories produced territorial defense reactions from both sexes up to 1 km from the summer nest area.

### Method

One to seven visits were made to 31 nesting pairs in North Canterbury and Marlborough (South Island). The falcons were usually nesting among rocks on steep (30-40°) open or scrubby hillsides at altitudes of 300-1500 m (mean 672 m) above sea level. By approaching from different directions and on different contours and by observing aerial intruders (mainly harriers), it was possible to plot roughly the boundary of the nesting territory and, by combining the results from 31 pairs, to produce a consistent model. Although the sexes and individual pairs had differing territory sizes, especially where the ground configuration was extremely broken, the boundaries set by each individual bird were well-defined and usually consistent to within about 20 m at ground level.

### Results

A generalized model of the defended nesting space, based on the 31 pairs, is shown in figure 1. The defended space included a dome-shaped area of sky over the nest site but excluded "dead" ground on the back faces of the nest ridge. Below the nest the territory rarely extended as much as 100 m. The male defended territory 200-500 m from the nest whereas females defended only 100-400 m from the nest but were more violent.

### Discussion

This model accounts for observations of strong nest defense in places other than the nest (usually the opposite side of the gully) experienced by me and by other observers in other species (Brown and Amadon 1968:92), and for the common observation that falcons are more sensitive to disturbance from above (Herbert and Herbert 1965, Nelson 1973) than from below. The model is also similar to Cade's diagram of two-dimensional Peregrine territories (1960:199). The only observations to the contrary were made by Beebe (1960:165), who considered that the marine Peale's Peregrines off the British Columbia coast were more sensitive to disturbance from below than from above. Possibly Beebe was observing a conditioned reaction to a frequent unidirectional stimulus, boats being the main method of transport in that area. I have no data for falcons nesting on flat terrain.

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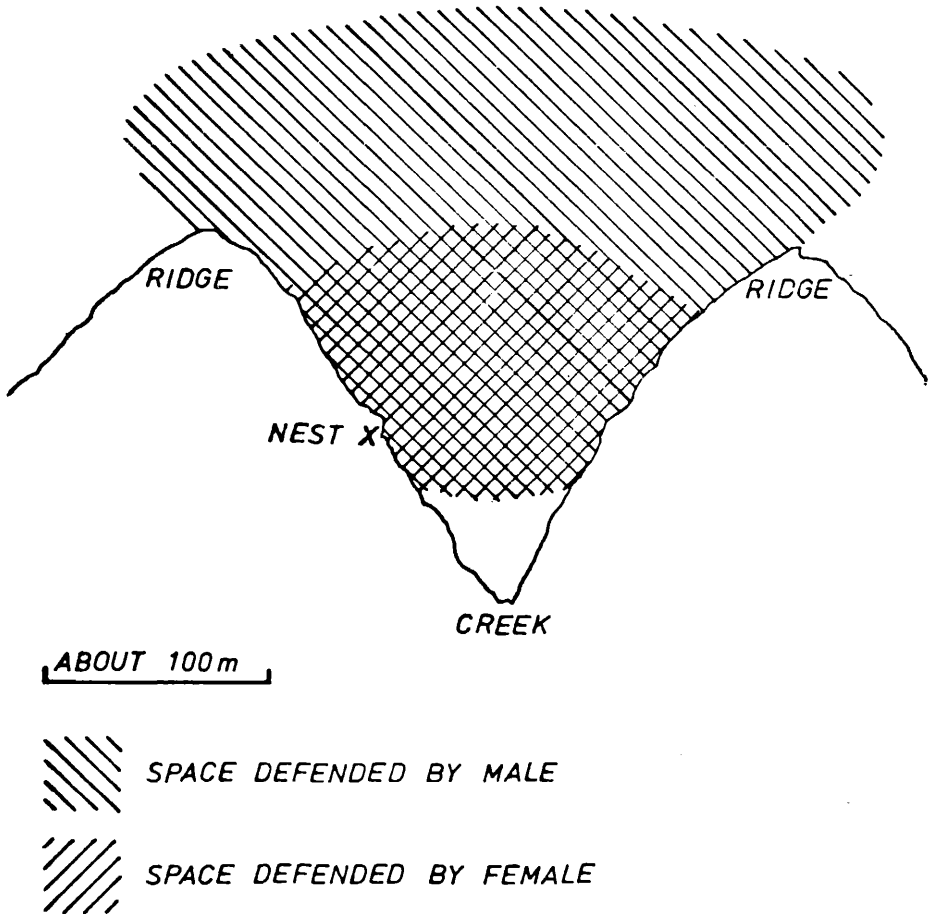


Figure 1A

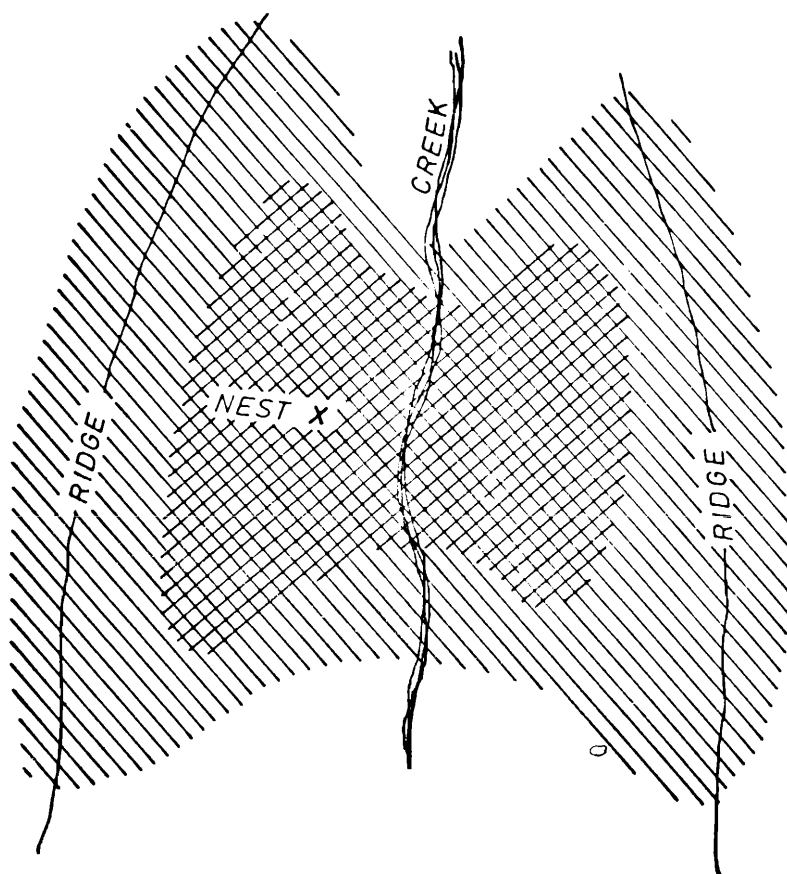


Figure 1B

Figure 1. A model of the nesting territory defended by a pair of New Zealand Falcons based on observations of 31 breeding pairs. A: Transverse of the defended space. B: The defended space viewed from above.