ABSTRACTS OF THESES AND DISSERTATIONS

THE BIOLOGY OF THE NEW ZEALAND FALCON (*Falco novaeseelandiae* Gmelin 1788).

Morphological differences of 232 New Zealand Falcons were investigated by measuring nine parameters. Three allopatric forms occupying different habitats are recognized. These are small, dark forest-living "Bush Falcons," large, pale "Eastern Falcons" living in predominantly open montane areas, and intermediate "Southern Falcons" inhabiting Fiordland, New Zealand, and the Auckland Islands. Seventeen adaptive features of New Zealand Falcons were compared with those of congeners to investigate possible taxonomic relationships. The preliminary opinion is reached that *F. novaeseelandiae* is most closely related to *F. deiroleucos, F. rufigularis,* and *F. femoralis.* Eight factors which might be adaptive toward sexual dimorphism are briefly discussed, and the hypothesis was reached that the strongest selection pressure toward sexual dimorphism operates through the attacking ability of juvenile raptors, more so in those species which specialize in the attacking aspect of hunting and less so in those which specialize in the searching aspect.

The diet of Eastern Falcons was deduced by analysis of 932 pellets and 661 prey remnants, representing about 1,434 prey individuals of about 32 species captured by 30 pairs of falcons. Analyses of 21 stomachs and 68 attacks on prey by wild falcons are documented. About 80% of prey individuals (61% by biomass) were small passerines, particularly the Yellowhammer (*Emberiza citrinella*), Greenfinch (*Chloris chloris*), Skylark (*Alauda arvensis*), New Zealand Pipit (*Anthus novaeseelandiae*), and Blackbird (*Turdus merula*). About 3.2% of individuals (38% by biomass) were introduced mammals, mainly Brown Hares (*Lepus europaeus*) and European Rabbits (*Oryctolagus cuniculus*). Skinks (*Leiolopisma* sp.) and insects (16.4% of individuals) comprised only 0.8% by biomass. The dietary values of preys and the food consumption of two New Zealand Falcons were measured experimentally and used to calculate the prey requirements of a breeding pair of falcons. Data on 280 rangle stones from 16 pairs of wild New Zealand Falcons are given.

The hunting strategies of raptors are briefly reviewed and 7 search and 4 attack behaviors recognized and described. Thirty-eight hunts by wild New Zealand Falcons and 194 hunts by trained or semitrained (at hack) falcons are categorized. Instances of nest-robbing and food storing are described.

Methods used to find 144 nest areas in 5 study areas totalling 7,800 km^2 in South Island, New Zealand, and the known history of each site are given. Ninety-four nesting territories in area A and 21 in area C averaged 3.80 and 3.95 km apart. Orientations and heights of 44 roosts of 3 types, and orientations and descriptions of 42 nests of 4 types are given. Nests were found on cliff ledges, ground ledges, under logs in forest, and among epiphytes in trees. Tape recordings and sonograms of 6 calls are supplied and 19 postures or behaviors are described and illustrated. Courtship and stages of the reproductive cycle are outlined. Mean clutch size was 2.68 (mode = 3, n = 25), mean egg size was 48.7 X 36.7 mm (n = 69), mean brood size for 32 nesting attempts was 1.88 (range 0–4), for 23 successful nestings, 2.61. Incubation was about 30–32 days, recycling time about 16 days. Data on weight gains, tarsus and rectrix growth, and developmental stages of chicks are supplied. The methods and results of

a successful captive breeding project are given.

Organochlorine levels in pectoral muscles of 12 New Zéaland Falcons and 14 other New Zealand birds of prey are tabulated. Five juvenile falcons contained a mean of 2.57 mg total DDT per kg wet weight of muscle, 5 adults 13.74 mg/kg. Shell-thinning since 1948 was 0–3.3% in 15 shells. The known status of New Zealand Falcons in all parts of New Zealand is given and summarized in two distribution maps. About 3,100–3,200 pairs of Eastern Falcons, 450–850 pairs of Bush Falcons and 140–270 pairs of Southern Falcons may exist. Probably 3,000–4,500 pairs of New Zealand Falcons is a realistic estimate.

Fox, Nicholas C. 1977. The biology of the New Zealand Falcon (*Falco novaeseelandiae* Gmelin 1788). Ph.D. thesis. University of Canterbury, Christchurch, New Zealand. 421pp.

ECOLOGY OF THE WHITE-TAILED KITE IN SAN DIEGO COUNTY

White-tailed Kites were studied from April 1975 to March 1978 in San Diego, California. The ecology and behavior of both breeding and nonbreeding kites were examined.

Data were obtained on nest sites, nesting success, diet, foraging activity, prey density, and communal roosting behavior.

Of 26 nests studied, 20 contained eggs (mean of 4.0 eggs per clutch) and 17 fledged young (mean of 1.9 fledglings per clutch). Four pairs produced a second clutch during the 1977 nesting season.

Territoriality existed to varying degrees. Intraspecific territoriality was uncommon yet readily visible. Two pairs of kites were evicted from their nesting territories by pairs nesting nearby. Interspecific territoriality was most commonly seen against Red-tailed and Marsh hawks. Other bird species were attacked less frequently.

In 2886 pellets analyzed, 3266 prey animals were represented. Of these 2759 (84.5%) were *Microtus californicus*, 344 (10.2%) *Reithrodontomys megalotis*, 143 (4.4%) *Mus musculus* and 30 (0.9%) other organisms. Only five birds and no reptiles or invertebrates were found in the pellets.

With use of the runway analysis technique, the relative *Microtus* population densities were determined in the kite's hunting areas for each site.

A stepwise multiple regression anaylsis was used to relate these variables (nest data, diet, and prey density) to number of eggs, number of hatchlings, number of fledglings, and nesting success of each nest site.

The number of eggs was related to the mean number of active *Microtus* runways (prey density) in the kites' hunting areas and to the height of the nest in the (R^2 = 52.0%). Number of hatchlings were not significantly related to any of the variables. The number of fledglings, and nesting success, were related to the percent of *Microtus* in the kite's diet (R^2 = 26.9% and R^2 = 41.1% respectively). From these results it was determined that the number of eggs is related to the prey density, and the number of fledglings and nesting success are related to the percent of *Microtus* in the diet.