WINTER ECOLOGY AND EFFECTS OF HUMAN BEHAVIOR ON BALD EAGLES IN THE NOOKSACK RIVER VALLEY, WASHINGTON

An ecological and behavioral study was conducted during the autumns and winters of 1974–75 and 1975–76 on a population of Bald Eagles (*Haliaeetus leucocephalus*) on the Nooksack River, Washington. Eagles congregate on the Nooksack during winter to feed on spawned-out salmon (*Oncorphynchus* spp.). The largest aggregations were observed along gravel bars and sloughs where salmon carcasses were most abundant. Peak numbers of 91 and 105 were recorded for two seasons. Subadult eagles arrived on the Nooksack later than adults, but departure patterns were similar. Subadults comprised 35 percent of the population. Preferred perch trees were characteristically tall and close to the feeding grounds, providing unobstructed panoramas of the river. Deciduous trees were used primarily as perching sites; whereas coniferous trees were used for roosting. Four roosting sites were located. Human activity was found to adversely affect eagle distribution and behavior. A significant displacement of eagles to areas low in human activity was observed. Human activity was especially prevalent and disturbing on the feeding grounds. Human activities confine the population to a smaller area which may increase intraspecific strife for food resources. Sensitivity to disturbance increases with age. The mean flight (flushing) distance of adults was 196 meters, but 99 meters for subadults (n = 300). This differential tolerance to disturbances may affect the accuracy of ground censuses. The effects of disturbance are lessened by the presence of vegetation buffer zones which conceal activities. Habituation of eagles to human activity seems to occur. Management recommendations for wintering grounds are presented.

Stalmaster, Mark Victor. 1976. Winter ecology and effects of human activity on Bald Eagles in the Nooksack River valley, Washington. M.S. Thesis. Western Washington State College, Bellingham. 100 pp.

BEHAVIORAL ECOLOGY OF COASTAL PEREGRINES (Falco peregrinus Pealei)

A long-term study, 1968-75, of Peregrine Falcons at Langara Island, British Columbia, produced much information on the behavior and ecology of this population.

An ethogram summarizes descriptions and functions of 43 behavior patterns in courtship, 32 in territorial advertisement and defense, and 15 in self, nest, and food defense.

Males are more active in courtship, territorial advertisement, and defense. Mainly same-sex intruders are chased, but males also evict females. Nine hypotheses of sexual-size dimorphism are considered. I conclude that aerial combat with dangerous weapons selects for smaller males, better combatants; the proportion of aerial to ground fighting sets the lower limit to the size of males.

The annual schedule of courtship, incubation, nestling, fledgling, and dispersal phases is described.

Seasonal changes in courtship are not proximate causes of egg laying. Photoperiod is an early timer for laying. Ambient temperature is a "final" timer initiating rapid follicle growth ca. two weeks before egg 1 is laid. Early egg laying gives juveniles more experience before autumn-winter hardships.

Productivity over eight years averaged 1.76 fledglings per territorial pair, and 2.32 per successful pair. Average breeding spans were: males, 6.0 years; females, 3.5 years (survival rates: 0.85, 0.75). A first-year survival rate of ca. 0.45-0.55 and a floating population at least 50 percent of the size of the breeding population were estimated.

The Langara falcons declined from ca. 21-23 pairs in the early 1950s to 5-6 pairs in 1968-75. This decline paralleled a seabird decline, apparently throughout the Queen Charlotte Islands. Falcons amalgamate territories by means of pseudopolyandry; an orderly population decline results, toward a new "equilibrium" with the prey base.

Peregrines occupy type A, B-A, and B territories, from 0.3-0.5 km to ca. 15 km in diameter. Individuals establish and adjust territory size in relation to available food. They harvest on a conservative sustained-yield basis. The result is the "natural conservation" of V. C. Wynne-Edwards, but the cause is individual selection.

Peregrines demonstrate Bergmann's Rule. Larger birds live in cooler climates and have higher mortality rates and larger clutch sizes. Clutch size offsets natural mortality and provides a floating population of optimum size.

Peregrines evolve a strategy which does not produce the most fledglings at independence (e.g., D. Lack), but which balances the survival of parents and the number and quality of fledglings. Smaller broods will produce young with better survival rates and competitive abilities. When balanced with quantity and combined with philopatry, this strategy tends to increase genetic fitness.

Nelson, R. W. 1977. Behavioral Ecology of Coastal Peregrines (*Falco peregrinus pealei*). Ph.D. dissertation. University of Calgary, Calgary, Alberta. xxi + 490 pp. May.

UTILIZATION OF NEST BOXES BY BIRDS IN THREE VEGETATIONAL COMMUNITIES WITH SPECIAL REFERENCE TO THE AMERICAN KESTREL (*FALCO SPARVERIUS*)

This study was designed to determine if, by providing artificial nest sites, a raptorial predator could be attracted into an area where suitable sites are limited. The American Kestrel (*Falco sparverius*) was a common species in the area and nest boxes designed for their use were placed in three vegetational types in western Utah and eastern Nevada. Seventy boxes were available in 1975 and 110 in 1976. Kestrels nested both years in the salt-desert shrub community but were absent from the pinyon-juniper and riparian areas. Four other bird species nested in the latter two areas, however.

In 1975 the nesting success was affected by severe weather including unseasonable cold and snow. In 1976 interaction with and predation by rodents affected utilization and success. Other factors such as existing hole-nesting populations, size, construction, and placement of the box also affect the rate of occupancy and number of boxes used.

Laurence B. McArthur. 1977. Utilization of Nest Boxes by Birds in Three Vegetational Communities with Special Reference to the American Kestrel (*Falco Sparverius*). M.S. thesis. Brigham Young University, Provo, Utah. 42 pp. April.