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Densities of Red-tailed Hawk Nests in Aspen Stands in the Piceance Basin, Colorado

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This note describes dissimilar nesting densities of the Red-tailed Hawk (*Buteo jamaicensis*) in 2 areas in Colorado. Although Red-tailed Hawks nest in a variety of habitats (Knight et al. 1982; Smith and Murphy 1982) hawks were observed nesting only in aspen (*Populus tremuloides*) trees.

Between 21 June and 1 July 1983, Red-tailed Hawk nests were surveyed in pure stands of aspen in 2 areas (designated A and B) in the Piceance Basin, Garfield County, Colorado. Areas A and B are approximately 38 and 28 km², respectively, north of Debeque, Mesa County, Colorado, at elevations between approximately 2400 and 2500 m. Both areas have similar types of vegetation. Area A was 28.7 km² in size and contained 24 aspen stands covering 3.1 km². Area B was 14.0 km² in size and contained 17 aspen stands covering 2.8 km². The remainder of the areas consisted primarily of shrubs (1 to 3 m in height) including mountain mahogany (*Cercocarpus montanus*), serviceberry (*Amelanchier utahensis*), Gambel oak (*Quercus gambelii*), big sagebrush (*Artemisia tridentata*) and others, with occasional areas composed of annual grasses.

Surveys of all aspen stands in both areas were done by helicopter (approximately 40% of the survey) or on foot. For those stands surveyed on foot, transects were walked at 50-m intervals following the elevational contours of each stand until all trees were examined. Nests were deemed occupied if young were seen in the nest, if the nest was recently decorated by greenery, or if a nest was

defended by an adult hawk. Locations of occupied nests were marked on 7.5-min topographical maps. Nearest neighbor analyses (Clark and Evans 1954) were conducted to determine if hawk nests were spaced randomly throughout each area.

Density of occupied nests was one/5.74 km² on area A, and mean distance between nests was 2.23 (\pm 0.46 S.D.) km. Mean distance between nests in area B was 0.68 (\pm 0.33 S.D.) km, with 1 breeding pair/2.00 km². Mean density of nests and distances between nests on areas A and B were comparable with data found in the literature (Table 1). However, mean distance between nests on area B (0.68 km) was lower than all values reported (Table 1).

In area A, nearest neighbor analysis indicated that occupied nests tended toward uniform distribution and were significantly different from random ($R = 1.84$; $c = 3.60$, $P < 0.01$). In area B, occupied nests were not significantly different from random distribution ($R = 1.19$; $C = 0.93$, $P < 0.10$). The percentage of area covered by aspen on area A (11%) was less than that of area B (20%). In addition, there were more trees within the aspen stands on area A that were small (3-5 m high) (R.W. Beck and Associates 1983a, 1983b) and apparently ill-suited for Red-tailed Hawk nest sites. Therefore, available nesting habitat in the vicinity of occupied nests in area A may have been more limited than in area B. Indeed, there was a mean of 0.60 km² (range = 0.01 - 1.14 km²) of suitable nesting habitat (trees > 5m in height) within a 1-km radius of the nests in area A. In area B there was a mean of 1.04

Table 1. Nesting density and distance between Red-tailed Hawk nests.

AREA/BREEDING PAIR (KM ²)	DISTANCE BETWEEN NESTS (KM)	SOURCE
7.5	1.79	McInville & Keith 1974
	2.13	
	2.05	
	1.90	
	1.60	
	2.40	
--	5.60	Knight et al. 1982
6.2	1.50	
--	3.30	Springer & Kirkley 1978
--	0.84	Smith & Murphy 1973
--	6.40	Wiley 1975
5.1	1.76	Hagar 1957
--	2.08	Seidensticker & Reynolds 1971
2.6	---	Gates 1972
1.3	1.76	Fitch et al. 1946
8.8	---	Orians & Kuhlman 1956
6.2	---	
6.9	---	Luttich et al. 1971
24.9	---	Corman 1973
7.9	---	in Springer & Kirkley 1978
		Johnson 1975
7.7 ± 6.8	2.5 ± 1.58	$\bar{x} \pm$ S.D. of reported values
5.74	2.23	This study, Area A mean (N = 5)
2.00	0.68	This study, Area B mean (N = 6)

km² (range = 0.62 - 1.48 km²) of suitable habitat within a 1-km radius of nests in that area. Although dissimilar, the means were not statistically different (Student's *t* test; 0.05 < *p* < 0.10).

Newton (1976) suggested that Red-tailed Hawk densities are determined by availability of nesting sites and food. Thus, an explanation for the lower density of nests and the greater distances between nests on area A may have been availability of nesting sites. However, the apparently high density of nests and low mean distance between nests on area B remains unexplained.

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THESIS ABSTRACTS

THE SHARP-SHINNED HAWK (*Accipiter striatus* Vieillot) IN INTERIOR ALASKA

Breeding ecology of the Sharp-shinned Hawk (*Accipiter striatus*) was studied at 19 nests in interior Alaska from 1978 to 1981. Hawks nested in conifers in dense, young stands of mixed deciduous and coniferous trees. Sharp-shins primarily ate small birds, apparently hunted the most productive habitats and captured prey in proportion to availability. Growth and food requirements of 4 captive-reared nestlings were monitored to supplement data on wild young. A typical family required an estimated 13,620 g of prey during the breeding season. In comparison to other studies, Sharp-shinned Hawks in Alaska 1) reoccupied old nest areas more frequently, 2) occupied smaller home ranges, 3) nested in greater densities, 4) completed breeding cycles more quickly, 5) laid more eggs and 6) hatched and fledged more young. Nest future studies, which are important because of the sharp-shin's extensive range and susceptibility to pollution and habitat destruction, Alaskan birds could serve as standards of comparison. — **Clarke, Ronald Gordon. 1984. M.S. Thesis, University of Alaska, College, Alaska.**

CHARACTERIZATION OF NESTING HABITAT OF GOSHAWKS (*Accipiter gentilis*) IN NORTHWESTERN CALIFORNIA

Habitat use of nesting Goshawks (*Accipiter gentilis*) was studied during 3 breeding seasons in Six Rivers National Forest, Humboldt and Trinity Counties, California. Habitat characteristics of the nesting areas were examined on 4 levels: community patterns, nest stand, nest site and the nest and nest tree, for 10 nests. Nest stands typically were dense single-storied stands of young Douglas-fir (*Pseudotsuga menziesii*) with scattered hardwood components and large mature trees and a park-like understory. Locations varied in slope and elevation, but consistently faced northeast. Nest sites typically were small stands of dense mature trees within the nest stands. Tree density and canopy closure were less in nest sites than in the surrounding nest stands. Nests generally were constructed of sticks, were adjacent to the stem, and were below or within the lower quarter of the canopy on the downslope side of a Douglas-fir. Distance to the nearest water source and human disturbance ranged widely. Potentially suitable foraging and alternate nesting areas averaged 41 m and 30 m respectively from the nest tree. — **Hall, Patricia A. 1984. M.S. Thesis, Humboldt State University, Arcata, California.**