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## USE OF HUNTING METHODS BY FERRUGINOUS HAWKS IN RELATION TO VEGETATION DENSITY

by

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### *Abstract*

To test the hypothesis that hawks increase their foraging efficiency by selecting the most appropriate hunting technique for a particular habitat type, I studied the relative use of 4 hunting methods by 2 Ferruginous Hawks in relation to the density of vegetative cover. No trends in relative use of hunting methods with increasing vegetation density could be detected, indicating either that efficiency of hunting methods did not change with increasing cover density or that factors other than cover density were more important in the hawks' choice of hunting methods for a particular site.

### *Introduction*

There is increasing interest in foraging behavior of hawks, especially in factors affecting the selection of habitats for hunting and efficiency of food gathering in various vegetation types. Besides answering important behavioral questions, such information has potential management importance in areas of changing land use.

That hawks use more than one hunting technique, which may differ in energy expenditure and in rate of return, complicates such studies. An individual bird's choice of hunting methods may depend upon its relative efficiency in terms of prey captured per unit of energy expended (Wakeley 1978b). Furthermore, the hunting method which is most efficient in one vegetation type within a bird's home range may be inferior to another method in a different vegetation type. Thus a hawk might increase its overall foraging efficiency by selecting the most appropriate technique for a particular habitat.

This study examines trends in the relative use of 4 hunting methods by 2 Ferruginous Hawk (*Buteo regalis*) in relation to increasing density of vegetative cover, and evaluates the effect of such trends, if any, on foraging efficiency. Wakeley (1978a) determined that cover density was the most important factor influencing the use of

hunting sites by these Ferruginous Hawks, so it seems logical to examine the hawks' use of hunting methods relative to this parameter.

Herein I make no attempt to extrapolate my results on only 2 hawks to the population as a whole. However, a consequence of learning by individuals must ultimately be reflected in the average response of a population.

### Methods

The study area in southern Idaho and the methods used were described elsewhere (Wakeley 1978a, b). Briefly, the study area consisted of the home ranges of 2 adult male Ferruginous Hawks and was a mosaic of vegetation types including agricultural crops (alfalfa, grains), small pastures, old fields, open shrubland, and bare areas. I measured the density of vegetative cover by a point-quadrat technique and categorized all vegetation into 1 of 4 cover-density classes: absent (<5% vegetative coverage), sparse (5–20% coverage), moderate (20–75% coverage), and dense (>75% coverage).

To determine the use of cover-density classes for foraging, I observed strikes made by the 2 adult male hawks; male 1 was watched in 1974 and male 2, in 1975. Observations were made from a blind during the nestling period. The hawks hunted (1) from the ground, (2) from a perch, (3) from low-altitude (active) flight, and (4) from high-altitude (soaring) flight. All observed strikes were categorized by the hunting method used. I used a graphical technique to look for trends in use of hunting methods with increasing vegetation density (fig. 1). Neither hawk was marked; yet with experience, I had no trouble identifying the birds at a distance and distinguishing them from other hawks in the area. Identification was confirmed when the birds returned to their nests.

### Results

I witnessed 430 strikes in 1974 and 378 strikes in 1975. Table 1 shows the distribution of these strikes among hunting methods and cover-density classes. In each year, chi-square tests indicated that there were significant differences in relative use of hunting methods in areas of different vegetation density ( $P < .01$ ).

Table 1. Number of Strikes by Ferruginous Hawks in Relation to Hunting Method and Vegetation Density.\*

| Cover density | Hunting Method |          |            |             | Total    |
|---------------|----------------|----------|------------|-------------|----------|
|               | Ground         | Perch    | Low flight | High flight |          |
| Absent        | 61( 7)         | 154( 42) | 70( 47)    | 16( 62)     | 301(158) |
| Sparse        | 9( 3)          | 7( 7)    | 33( 10)    | 16( 1)      | 65( 21)  |
| Moderate      | 7( 0)          | 17( 1)   | 6( 8)      | 17( 0)      | 47( 9)   |
| Dense         | 4( 4)          | 0( 56)   | 11( 43)    | 2( 87)      | 17(190)  |
| Totals        | 81(14)         | 178(106) | 120(108)   | 51(150)     | 430(378) |

\*Male 1 (1974) without parentheses; Male 2 (1975) within parentheses.

The number of strikes by a hunting method in each cover-density class was expressed as a percentage of total strikes within that class. Despite the significant differences in use of hunting methods within areas of different vegetation density, no consistent trends in use of hunting methods with increasing cover density could be detected (fig. 1).

#### *Discussion*

I expected to find that the hawks hunted from the ground or from a perch more often in areas of absent or sparse cover than in moderate or dense cover. A hawk's low viewing angle, especially from the typical fencepost perch, would seemingly exaggerate the prey-concealing effect of any vegetation present, making that technique less efficient in moderately or densely vegetated areas. However, this hypothesis was not supported by the results.

The results were apparently not influenced by the relative availability of hunting perches near each habitat type. Hunting perches (wooden fenceposts, telephone poles, juniper trees) were present throughout the study area within or adjacent to all vegetation types. The availability of perches was not quantified, but their number and placement seemed more than adequate to meet the hawks' requirements.

Earlier (Wakeley 1978b), I showed that both hawks increased their overall foraging efficiency by emphasizing their more efficient hunting technique (sit-and-wait hunting from a perch or from the ground). Hawks apparently did not adjust their efficiency further by matching the best hunting method to a particular type of cover, perhaps because there was no difference in relative efficiency of the 4 methods as cover density increased. Another possibility is that some factor other than vegetation density was more important in the hawks' choice of hunting methods for a particular area. Unfortunately, my data are not sufficient to resolve this question.

#### *Acknowledgments*

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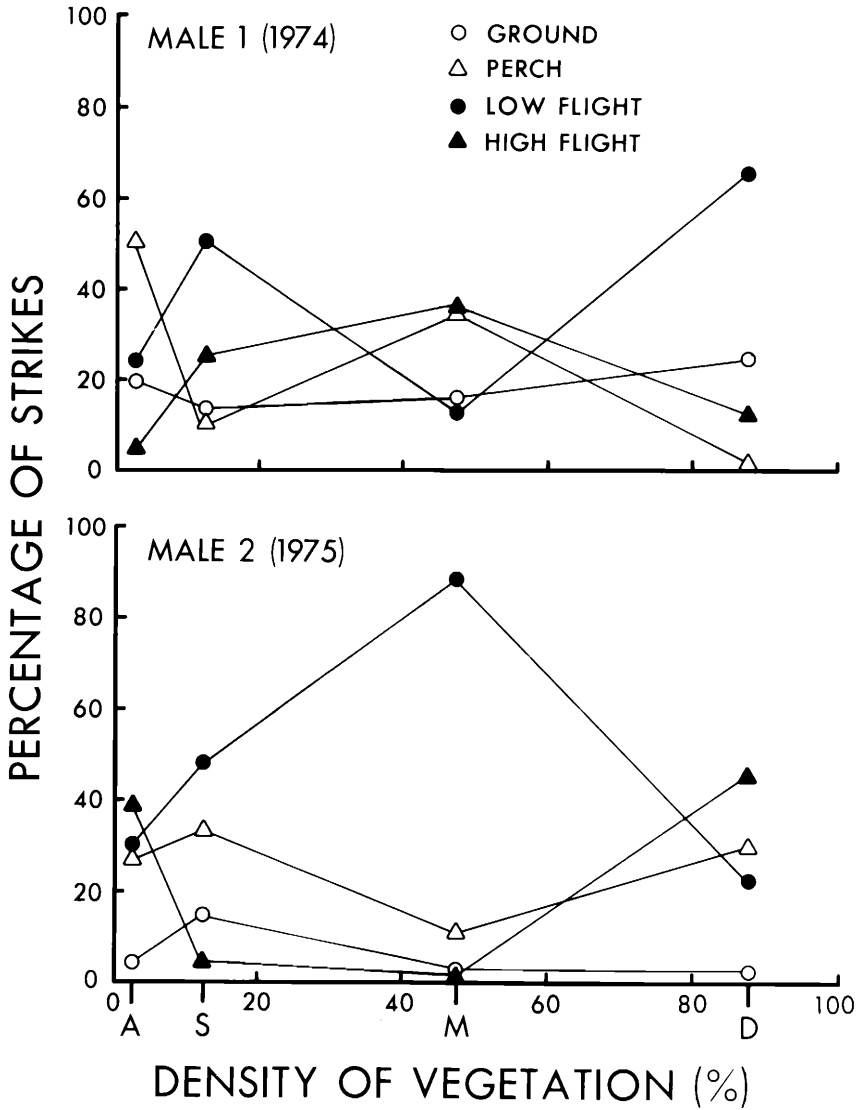


Figure 1. Relationship between density of vegetative cover and relative use of hunting methods by Ferruginous Hawks. Vegetation density is plotted at the midpoint of the cover-density class for absent (A), sparse (S), moderate (M), and dense (D) vegetation.