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HUNTING TECHNIQUES AND PREDATORY EFFICIENCY OF NESTING RED-TAILED HAWKS

by Curtiss J. Orde
Department of Biology
University of South Dakota
Vermillion, South Dakota 57069
and
Byron E. Harrell
Department of Biology
University of South Dakota
Vermillion, South Dakota 57069

Abstract

The hunting techniques and predatory efficiency of three pairs of nesting Red-tailed Hawk (*Buteo jamaicensis*) were studied for 545.5 hours, from June 1975 through September 1975. Four hunting techniques and 169 strikes were observed. The three pairs of hawks were 78.8 percent successful in their attempts at prey. There were, however, statistically significant differences between the observed hunting techniques.

Introduction

The literature is replete with feeding observations on Red-tailed Hawks, but these citings usually are one- or two-paragraph accounts of a single strike. Quantitative data have been gathered by English (1934), Errington (1930, 1932, 1933, 1935), and Errington and Breckenridge (1938). However, the majority of these data dealt with stomach analysis, pellet examination, and prey remain analysis as a basis for recording the feeding habits of Red-tails. Wakeley (1974) studied the Ferruginous Hawk (*B. regalis*) and reported the first predatory efficiency data in the genus *Buteo*. The data presented herein forms the first known report for the Red-tailed Hawk (*Buteo jamaicensis*).

Methods and Materials

Data were gathered from elevated and ground blinds and by radio tracking one female hawk fitted with a 55g transmitter. Each of three nests was observed for equal amounts of time during the study; each nest was observed throughout all daylight hours, but not necessarily all day on any one day. All observations were aided by a pair of 7X, 35 binoculars and a 15-60 power spotting scope. The one radio-tagged Red-tail was tracked with a hand-held receiver and three-element Yagi antenna.

Clay County, South Dakota, is located in the southeastern corner of the state. The nesting areas lie along the lower part of the Vermillion River Basin. Dunstan and Harrell (1973) used the same area for their study of the Great Horned Owl (*Bubo virginianus*). They observed that the area was used primarily for agricultural crops with corn, soybeans, and alfalfa the major crops grown. The remainder of the land was allotted to pastures, feeder lots, river beds, and fallow areas. These patterns of land use remained the same through 1975 when this study was conducted.

Results and Discussion

All the adult hawks hunted over similar habitats. Edges between riverbeds and soybean fields, dry riverbeds, corn fields, and alfalfa and wheat fields were hunted most extensively. The hawks preferred short vegetation, less than 10 cm, and shifted their hunting ranges in response to agricultural harvesting practices. Roadside ditches, fallow areas, and farm lanes were also used as hunting areas. The utilization of short vegetation areas was probably due to prey vulnerability in the harvested areas rather than to a reduction of the prey base in the higher vegetation areas.

Hunting Techniques

Four hunting techniques were used by the hawks during this study. To categorize each technique, the hawk's position, prior to initiation of a strike, was recorded. The four techniques were: (a) strike from a perch, (b) strike by direct flight, (c) strike from soaring flight, (d) strike by a combination of direct flight and soaring. One hundred sixty-nine strikes, using these four techniques, were observed.

Strike from a Perch. Trees, fenceposts, telephone poles, highline supports, and alfalfa stacks were used as perches from which strikes were initiated. The distance between a hawk and a prey varied from 1 to 14 m. The distance of 15 m was arbitrarily established, at the beginning of the study, as the breaking point for strike types "a" and "b". In this technique, the hawk used one or two wingbeats to become airborne then glided the short distance to strike at the prey. The distance varied depending upon the elevation of the perch. The hawk, when using fenceposts, appeared to step off the post and drop to its prey without the use of wingbeats to become airborne.

Strike by Direct Flight. A strike initiated from a perch but requiring flapping to maintain an airborne condition was termed by a strike by direct flight. The distance between the perched hawk and its prey varied from 15 to 150 m.

Strike from Soaring Flight. Strikes by a soaring hawk varied in the altitude from which the strike was initiated and involved a closed-wing dive on the prey. A short distance before impact, back-pedaling with wings spread, the hawk struck the prey. All strikes initiated from this position were directed at larger and conspicuous prey.

Direct Flight/Soar Strikes. Occasionally, a strike was initiated from a soar, and when prey was detected, the hawk soared out of sight and then used flapping flight

to fly around vegetation (which served as camouflage) to execute a "sneak attack" from the blind side. This technique was not used often and presented a problem to the hawk. The potential prey often moved, and the hawk had to make a rapid scan of the area when it reappeared from behind the vegetation. The prey's movement while the hawk was out of sight often put the hawk out of position for a successful strike. Thus, such strikes were largely unsuccessful.

Predatory Efficiency

Predation efficiency is the ratio of successful strikes to total strikes observed, with unknown outcomes omitted from the calculations. Overall, the adult Red-tails of this study were very efficient predators. Chi square tests, modeled after Cochran and Cox (1957), demonstrated no significant differences in the predatory efficiency among the adults of the three nests. Table 1 summarizes the efficiency for the adult hawks of the three nests observed. There was a slight decrease in efficiency as the number of nestlings increased. Predatory efficiency varied with the four hunting techniques observed (table 2). Hunting from a perch was the most commonly used technique and the most successful. Collopy (1973) and Ueoka and Koplin (1973) observed similar results with American Kestrels (*Falco sparverius*) and Ospreys (*Pandion haliaetus*), respectively. Wakeley (1974), on the other hand, found strikes from a perch were unsuccessful. The heavy use of this technique in our study was probably due to the short vegetation which made prey more visible and the strike distance shorter. The result was an element of surprise in favor of the hawks. The direct-flight technique was used successfully throughout the study and as in the perch technique the element of surprise was probably the greatest contributing factor. Soaring accounted for few strikes and a very low success ratio. Soaring hawks missed their prey because of the alert, fast reactions of the prey species, generally rabbits (*Sylvilagus floridanus*). The direct flight/soar technique was used on larger, alert prey, i.e., the fox squirrel (*Sciurus niger*), and was for the most part unsuccessful. The alert posture maintained by the squirrels, while the hawks hunted in the area, resulted in the low success ratio.

Acknowledgments

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Table 1. Comparative strike data for nest areas 1, 2, and 3 for the entire study.

Nest area	Number of fledglings	Total strikes	Successful strikes	Unknown outcomes	Percent success*
1	1	94	61	17	79.2
2	2	38	21	9	72.4
3	0	37	26	6	83.3
Totals	3	169	108	32	78.3

*Percent success: $\frac{\text{Successful strikes}}{\text{Total strikes} - \text{Unknown outcomes}}$

Table 2. Strike type and success during the entire study.

Technique	Total Strikes	Successful Strikes	Unknown Outcomes	Percent success	
Perch	111	76	21	84.4	NS
Direct flight	47	30	10	81.1	
Soar	7	1	1	16.7	NS
Soar/flight	4	1	0	25.0	
Totals	169	108	32	78.8	

NS Not significant
** Significant at the .01 level.
*** Significant at the .05 level.