

Table 2. Diet values and food consumption of two New Zealand Falcons.

	Rabbit	Whole chick	Hare muscle	Whole birds	Whole mouse
Month of diet period	June	July	June	Oct.	Oct.
Number of days	14	13	12	14	14
Mean ambient temperature (°C)	9.3	8.0	10.2	11.5	11.1
<i>Male</i>					
Maintained body weight (g)	293	293	293	293	293
Mean daily food consumption (g)	45.5	45.6	38.7	37.8	30.6
% body wt. consumed/day	15.5	15.6	13.2	12.9	10.4
% body wt. consumed at 10°C	15.3	15.2	13.2	13.2	10.6
Food consumption (g/day) at 10°C	44.8	44.5	38.7	38.7	31.1
Wt. food (g) equivalent to 100 g mouse	144	143	124	124	100
<i>Female</i>					
Maintained body weight (g)	424	424	424	424	424
Mean daily food consumption (g)	55.4	56.9	48.6	39.7	34.0
% body wt. consumed/day	13.1	13.4	11.5	9.4	8.0
% body wt. consumed at 10°C	13.0	13.0	11.5	9.7	8.2
Food consumption (g/day) at 10°C	55.1	55.1	48.8	41.1	35.2
Wt. food (g) equivalent to 100 g mouse	157	157	139	117	100
Mean wt. (g) equivalent to 100 g mouse	151 ± 6	150 ± 7	132 ± 7	120 ± 4	100

## A ROADSIDE RAPTOR CENSUS IN THE EASTERN GREAT BASIN—1973-1974

by

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### *Abstract*

Roadside raptor surveys were conducted throughout a 12-month period in the eastern Great Basin of Utah. An index of relative abundance was calculated for each species of diurnal raptor present. Communal Bald Eagle roosts were checked routinely and numbers of eagles recorded.

Bald Eagle numbers appear to be stable, but the numbers of Golden Eagles and Ferruginous Hawks have declined since 1968. This decline is probably due to a drop in jackrabbit numbers. The available data do not allow the development of trends for the other raptor species.

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### Introduction

From May 15, 1973, to May 15, 1974, periodic counts were made of birds of prey in the semiarid valleys west of Provo, Utah. This area of approximately 932 square kilometers is typically cold desert habitat.

Two principle routes, extending through portions of Utah and Tooele counties, in the west central portion of the state, were followed (Woffinden 1975). The first was approximately 119 km long, involving a total observation area of approximately 590 hectares (a linear strip 119 km long and 0.5 km wide). The second route was a westerly extension of the first, being approximately 77 km in length and including an additional 370 hectares of area.

Both routes had numerous utility poles along them, and they were direct routes to wintering Bald Eagle (*Haliaeetus leucocephalus*) communal roosts (Edwards 1969).

Raptor counts were often peripheral to other activities and were made at different times during the day throughout the 12-month period. A total of 71 counts were conducted. Weather conditions were recorded with each survey. Binoculars and a 20-45X spotting scope were used for identification, sexing, and aging of raptors.

Bald Eagle communal roosts were checked throughout the winter months of the survey period. The total number of birds observed, as well as the numbers of adults and juveniles, was recorded.

An index of relative abundance was calculated as follows:

$$\frac{\text{Total number of a species observed}}{\text{Total number of km traveled}} \times 1,000 = \text{index.}$$

For example, 145 Golden Eagles (*Aquila chrysaetos*) were observed as 12,720 kilometers were traveled, which would yield an index of 11.4 ( $145/12,720 \times 1,000$ ).

In addition to this index, the population size of each species of raptor was estimated using the Bounded Count Method described by Overton (1969).

### Acknowledgments

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### Results

A total of approximately 12,720 km was driven while making the counts. In all, 1,275 raptors were observed, 1 for every 10.0 km traveled (table 1).

Bald Eagles and Rough-legged Hawks (*Buteo lagopus*) had the greatest frequency indices of any of the raptor species even though they were only winter visitors to the area (table 1). Both adult and juvenile Bald Eagles were first observed on October 30, 1973, and were last seen on April 5, 1975 (fig. 1). Peak numbers were observed in mid-January, with a total of 80 individuals (62 mature, 18 juvenile) being observed during one complete census. During the census period, 330 mature and 141 juvenile Bald Eagles were observed for a mature:juvenile ratio of nearly 3:1.

Rough-legged Hawks (*Buteo lagopus*) were first observed in the study area on October 30, 1973, and were last seen on March 30, 1974.

Age could be determined for only 66 of the 145 Golden Eagles observed. The number of adult individuals was only slightly greater than juveniles (35 adult, 31 juvenile) in this resident species.

Ferruginous Hawks (*Buteo regalis*) were first observed in the study area on July 24, 1973, and last observed March 6, 1974. A number of pairs nested in the census area during the spring and summer of 1973 and 1974 (Woffinden 1975).

It was possible to accurately sex only 10 Kestrels (*Falco sparverius*). Seven of this total were males. Of the 78 Marsh Hawks (*Circus cyaneus*) for which sex could be determined, 43 were males.

The results of the analysis to determine the population size of the various raptor species by using the Bounded Count Method (Overton 1969) are summarized in table 1.

### Discussion

As man has altered natural habitats, various raptor species have declined in numbers (Hickey 1969). Population trends of this nature cannot be accurately assessed without quantitative data from prior years. Additionally, in many instances, wildlife and resource managers are not aware of the number and species of nongame animals that inhabit the lands for which they are responsible. It is hoped that the data presented here will help fill these types of voids for the eastern Great Basin.

Bald Eagles had the greatest relative abundance index of any of the raptors discussed (45.0). This figure increases greatly (to 996.0) if an index is calculated including only the kilometers traveled during the approximate five-month period when Bald Eagles were present in the study area. Southern's (1963, 1964) population estimates of Bald Eagles wintering in his study area in Illinois show an adult:juvenile age ratio agreeing with that observed in this study. Johnson and Enderson (1972) saw only 6 individuals during their winter surveys in Colorado.

The Bald Eagle is an important winter visitor to Utah. Its communal roosting sites should be protected and maintained wherever possible. Some of these sites are on public land, while others are on private property. Fortunately, the private land owners involved provide protection for the eagles. Data from previous years of this ongoing study indicate that the number of Bald Eagles in the study area is stable.

The number of Golden Eagles appears to have decreased, however (Murphy 1975). This decrease is believed to have been a response to a decline in numbers of the black-tailed jackrabbit (*Lepus californicus*), on which the eagles are largely dependent for food. Even though the total number of nesting Golden Eagles has decreased recently, the production of nesting pairs is not significantly less than normal (Murphy 1975).

This is not the case with the Ferruginous Hawk (Woffinden 1975). A drastic decline in numbers and a significant drop in production of nesting pairs have been observed recently (Woffinden 1975). This decline is apparently a response to a drop in jackrabbit numbers, and it may well be that the decline in jackrabbits as well as the raptors that utilize them for food is simply a periodic fluctuation.

Lack of previously collected data does not allow us to suggest trends in the other raptors discussed, but it is hoped that the data presented in this paper may aid in the establishment of future trends.

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Table 1  
 Frequency of raptor sightings, relative abundance indices, and population estimates of raptors in the eastern Great Basin, 1973-74.

Species	Number observed	Km traveled per individual	Index of relative abundance	Population size (Bounded Count)	Confidence interval <sup>1</sup>
Bald Eagle ( <i>Haliaeetus leucocephalus</i> )	573	22.1	(13.8)*	45.0	80-745
Rough-legged Hawk ( <i>Buteo lagopus</i> )	173	73.5	(45.7)	13.0	26-102
Golden Eagle ( <i>Aquila chrysaetos</i> )	145	87.7	(54.5)	11.4	11-49
Ferruginous Hawk ( <i>Buteo regalis</i> )	136	93.5	(58.1)	10.7	9-28
Marsh Hawk ( <i>Circus cyaneus</i> )	127	100.2	(62.2)	10.0	6-15
Sparrow Hawk ( <i>Falco sparverius</i> )	40	318.0	(197.5)	3.1	5-43
Swainson's Hawk ( <i>Buteo swainsoni</i> )	32	397.5	(246.9)	2.5	5-24
Red-tailed Hawk ( <i>Buteo jamaicensis</i> )	28	454.3	(282.2)	2.2	4-23
Prairie Falcon ( <i>Falco mexicanus</i> )	17	798.3	(464.8)	1.3	3-22
Burrowing Owl ( <i>Speotyto cunicularia</i> )	3	4240.1	(2633.6)	0.2	2-21
Merlin ( <i>Falco columbarius</i> )	2	6360.1	(3950.4)	0.2	1-20
Turkey Vulture ( <i>Cathartes aura</i> )	1	12720.1	(7900.7)	0.1	1-20

\*Miles traveled per individual

<sup>1</sup>Alpha = 0.05

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## REVERSING FEMALE DOMINANCE IN BREEDING RAPTORS

by

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In past years we have had trouble with female aggression in Merlins (*Falco columbarius*). This aggression seems to occur only at certain times of year and becomes most pronounced (in our cases) around the equinoxes. The females become very aggressive and chase and attack their mates. In one of our cases the male was killed from a pair which had successfully raised four young the year before. Other cases of aggression with Merlins have come to our attention (Fyfe, Adamson pers. comm.).

In all cases mentioned above the aggression did not appear to be due to imprinting, but rather to the birds' high-strung temperament, and possibly because they were confined to pens where the male could not readily escape. The females seem to become highly territorial and do not even permit the presence of their mates in their territory.

We discussed methods of reversing or repressing this aggression and finally decided to clip the wing tips of the females in the spring before putting them into the breeding chambers with the males. The males are kept in the breeding pens the year round, but the females are removed in September or October and are kept out until the following April.

The wings were clipped to a rounded shape, like an accipiter's wing, with a pair of scissors. The birds could fly and reach any part of the pen but were severely handicapped.

We clipped one female this spring just prior to putting her in the breeding pen. She flew up to a perch and remained there in a frozen position for forty minutes. Meantime the male was flying round the pen. Finally he flew over near the female and caused her to duck to avoid being hit. After forty minutes the female moved, but there was no further aggression, and courtship and copulation followed shortly after. The male seemed to have asserted his dominance and seemed to court more aggressively thereafter.

This method could possibly be used on imprinted birds with good results where imprinting could possibly be reversed.