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RANGE USE BY WINTERING ROUGH-LEGGED HAWKS IN SOUTHEASTERN IDAHO[1]

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Key words: *Rough-legged Hawk;* Buteo lagopus; *home range, range use, range fidelity, migration.*

Rough-legged Hawks (*Buteo lagopus*) are the most numerous raptors, both as migrants and winter residents, in many areas of the western United States (Bock and Lepthien 1976). Information on the winter ecology of this species, however, is incomplete. Descriptions of the movements and ranges of Rough-legged Hawks are from limited observational data (Craighead and Craighead 1956, Sylvén 1978). Knowledge of winter range fidelity is based on one hawk sighted over four successive winters (Sylvén 1978). In this paper I describe patterns of range use and range fidelity exhibited by Rough-legged Hawks during a study of this species' winter ecology in southeastern Idaho.

Research was conducted in 1982 to 1983 on the 2,315 km² Idaho National Engineering Laboratory (INEL). Big

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TABLE 1. Winter ranges of four Rough-legged Hawks in southeastern Idaho from date of trapping to spring dispersal.

Hawk	Inclusive dates of observation	No. of days	No. of locations	Area (km²)
12	29 Apr. 1982– 9 Apr. 1983	162	530	541.2
13	30 Mar. 1982– 2 Mar. 1983	123	186	70.2
16	20 Feb. 1982–23 Feb. 1983	115	94	186.9
17	7 Mar. 1982–11 Mar. 1983	105	246	170.2

sagebrush (*Artemisia tridentata*) and understory species including wheatgrasses (*Agropyron* spp.) and winterfat (*Eurotia lanata*) were dominant cover types. A more complete description of vegetation is given by Harniss and West (1973). Average daily temperature between October and April, in the period of most intense observations, was 1.7°C and precipitation averaged 2.2 cm. Black-tailed jack rabbits (*Lepus californicus*) were at peak abundance during this study (J. Anderson, pers. comm.), and montane voles (*Microtus montanus*) were at low levels throughout the study area (B. Keller, pers. comm.). Both mammals were important prey species of the hawk population (Watson 1984).

Hawks were trapped with carrion-baited noose carpets, were wing-marked with coded patagial markers, and were equipped with tail-mounted radiotransmitters. Details of trapping techniques are given elsewhere (Watson 1985). Hawks were located with a portable receiver system and followed visually from dawn to dusk. Attempts were made to monitor each hawk once every two weeks but snow frequently limited observations to accessible individuals. Flights in fixed-wing aircraft were taken to locate lost and dispersing hawks. Seventy-eight percent of all radio locations were verified visually. Home range size was estimated by computer using the area of the convex polygon formed by connecting relocations on the range perimeter.

Nine adult hawks (about 15% of the population) were equipped with transmitters and monitored 413 hours for 35 to 166 days per hawk throughout winter. Hawks exhibited two patterns of range use. Three hawks drifted with extensive extra-range movements among non-overlapping ranges. Ranges of these individuals were occupied 5 to 81 days and were separated by 33 to 70 km. Signal loss of two females and a 35-km movement of a male coincided with the passage of a major weather front beginning 27 January, which lowered temperatures from −3.9 to −22.8°C, and increased snow depths from 10.2 to 12.7 cm. Snow cover reduced small mammal availability, particularly in areas of dense shrub cover where snow drifted and contributed to the tendency of individuals to move. Snow depths over 10 cm and increased rabbit carrion along highways increased the numbers of hawks on the INEL (Watson, 1986). Others have reported the movement of this species and increased carrion feeding following snowfall (Schnell 1968, Klein and Mason 1981).

The remaining radio-tagged hawks occupied well-defined seasonal ranges that varied considerably in size (Table 1). Range size and shape were largely influenced by the distribution of utility poles. In 73% of locations hawks perched on utility poles and the activity centers of ranges fell within 3 km of power lines and major highways for all hawks. The influence of power-line configuration on range characteristics was not unexpected since the use of utility poles for hunting by this species is well documented (Schnell 1968, Marion and Ryder 1975), and rabbit carrion, which comprised over 50% of prey consumed by hawks on the INEL (Watson 1984), was located on roads that were often paralleled by power lines.

Boundaries of ranges were not defended, and overlap

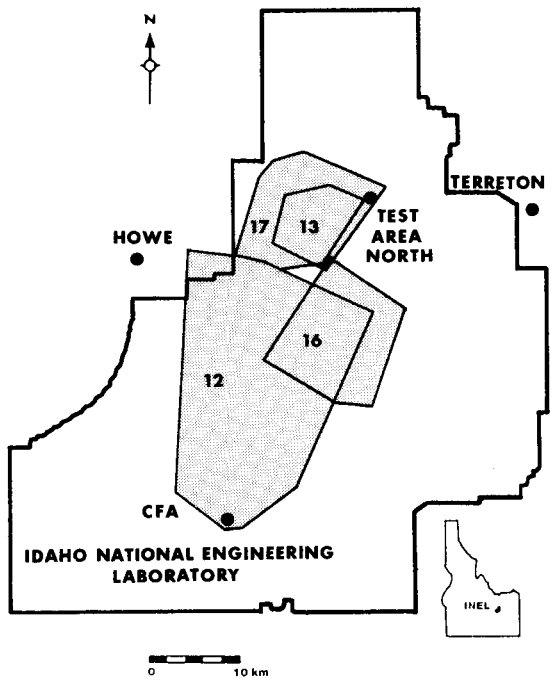

FIGURE 1. Ranges of four Rough-legged Hawks in southeastern Idaho during winter 1982–1983.

was common (Fig. 1). Unmarked hawks were consistently present on ranges of marked birds, suggesting that the number of overlapping ranges was greater than that documented and that there was little or no territoriality. Eleven episodes of aggression between marked hawks and intruders resulted from their defense of carrion and favored perches. The relatively large size of ranges and the abundance of other hawks on the winter range precluded defense of fixed geographical areas. Also, winter gregariousness, which is demonstrated by the tendency of this species to roost communally (Schnell 1969) or migrate in flocks (Bent 1937) probably increased tolerances between birds on hunting ranges.

Distribution of resident hawks on their seasonal ranges changed every three to four weeks and coincided with four periods of changing weather. Period 1 began with relatively mild weather conditions in the fall, followed by Periods 2, 3 and 4 which began 22 November, 29 December, and 27 January with major storm fronts. For three hawks, activity in midwinter during the period of maximum snow depths and minimum temperatures (Periods 3 and 4) was confined to the center of the seasonal range. After that time movements radiated outward prior to spring migration. Ranges for Periods 1 through 4 averaged 46.1%, 54.7%, 12.0%, and 5.6% of seasonal ranges for all hawks, respectively. The fourth hawk (No. 12) shifted between adjacent ranges during winter which partially accounted for its larger seasonal range (Table 1).

Hawks displayed several types of movements in spring from late February to mid-April. One bird left the area in early March; another remained on his range until 14 April. Three hawks moved extensively from and returned to established ranges beginning 48 days prior to migration. These movements were distinguished from other range shifts by their length (up to 60 km from previously occupied ranges) and by their consistent northward orientation. Similar movements have been described for Bald Eagles (*Haliaeetus leucocephalus*) which began migration but returned to winter ranges after failing to locate food or encountering severe weather (A. Harmata, pers. comm.;

R. McClelland, pers. comm.). These, however, were not obvious factors influencing Rough-legged Hawk movements.

Range fidelity was determined from seven hawks that were trapped in winter 1981–1982, and 15 others in winter, 1982–1983. Eleven females and eleven males were captured, and two birds were in juvenile plumage. Eleven sightings of at least six marked hawks were made in winters up to three years subsequent to their being marked. All observations were along highways. Hawks were seen 225 km southeast (Labarge, WY), 440 km south (Scipio, UT), 295 km north (Wilsall, MT) and 260 km west (Nampa, ID) of the study area. Three marked hawks were seen on the INEL. Lack of individual identification precluded determining if hawks returned to ranges occupied in previous winters. However, all birds seen on the INEL were located on seasonal ranges previously occupied by marked hawks. The wide distribution of hawks sighted in surrounding areas was not unexpected since the major prey species (voles and rabbits) are subject to population fluctuations and low availability in certain years and were at lower densities in winters following the marking of hawks (J. Anderson, pers. comm.; B. Keller, pers. comm.). Thus hawks moved through ranges they previously occupied and remained where sufficient prey was available.

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MOVEMENTS AND DAILY ACTIVITY PATTERNS OF A BROWN PELICAN IN CENTRAL CALIFORNIA[1]

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INTRODUCTION

The Brown Pelican (*Pelecanus occidentalis*) has been the subject of numerous studies (Schreiber and Schreiber 1980), yet little is known of its daily movements and activity patterns. Briggs et al. (1983) presented data showing that attendance of Brown Pelicans on central California roosts during the fall was lowest around midday, suggesting an activity peak at that time. Herbert and Schreiber (1975) found that Brown Pelican attendance at a Florida marina was highest during midday and suggested that the birds foraged mostly during the morning hours.

In this paper we present results of a radiotagging study designed to follow the daily activity patterns of a Brown Pelican near Monterey Bay, California, during the fall of 1983. Our study demonstrates a successful method of transmitter attachment that allows collection of detailed data in a continuous manner.

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