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# Recoveries of Ferruginous Hawks banded in Colorado

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The Ferruginous Hawk (*Buteo regalis*) is currently designated a "Migratory Bird of High Federal Interest" (Stewart 1978) since a significant portion of its range is contained within major coal producing regions of the West (Fig. 1). The species is also included on the "Blue List" of threatened birds (Arbib 1979), indicating that population size is substantially reduced from historical levels. Implicit in these designations is the need for more precise information concerning dispersal and migrational movements of this raptor especially from within potential or actual energy producing areas in the U.S.

There is a paucity of information concerning movements of Ferruginous Hawks outside of their summer range. Lincoln (1936) reported recoveries of Ferruginous Hawks in California and more recently Thurow et. al. (1980) described sightings and recoveries of hawks color-marked and banded in an area of Idaho near a geothermal withdrawal site. Aside from Salt (1939) reporting recoveries of Ferruginous Hawks banded in Canada, little additional information is readily available concerning movements and mortality factors once the hawks leave their natal area. Thus, a study was initiated to determine local and long-range movements, wintering grounds, nest site fidelity, and primary mortality factors of a local population of Ferruginous Hawks.

## Study Area and Methods

Between June 1973 and July 1976, 115 nestling (local) Ferruginous Hawks (Fig. 2) were banded in a 8733 km<sup>2</sup> section of Weld and Logan counties in northeastern Colorado. The area is typically rolling short grass prairie occasionally broken by bluffs, washes, buttes, and wooded stream bottoms and is contained in the Denver — Raton Mesa Coal Producing Region (Fig. 1). Active resource exploitation is not current but exploration for coal, uranium, natural gas, and other resources is underway. Although this section of the Great Plains is considered to be on the southeastern edge of the breeding range of the Ferruginous Hawk (Snow 1974), nesting density is high. Olendorff (1973) found 1 nesting pair per 100 km<sup>2</sup>, second in density only to the very common Swainson's Hawk (*Buteo swainsonii*). Bent (1927) and Bailey and Niedrach (1965) considered the Ferruginous

Hawk a common summer resident and a casual or less common winter resident in northeastern Colorado.

Active Ferruginous Hawk nests were found by inspecting historical sites and by searching cliffs, power poles, and erosional remnants for new nests. As Ferruginous Hawks are reported to be sensitive to human disturbance (Olendorff and Stoddart 1974; White et. al. 1979) which may result in abandonment of eggs or young, nest searches were delayed until early June when 2 to 4 week old young were usually present.

Nestling hawks were banded with USFWS lock-on bands usually between the ages of 25 and 30 days. The Bird Banding Laboratory does not accept sexing of Ferruginous Hawks by measurements with only 95% reliability but, for the purposes of this study, sex was determined by size of the tarsometatarsus. Olendorff (1974) found that long bone growth in Ferruginous Hawks was complete or nearly so,  $\frac{2}{3}$  through the nestling phase. Since no problems were encountered in determining the proper fit, hawks banded with size 7B were considered males and those banded with size 8, females.

## Results and Discussion

All 115 banded hawks fledged between 25 June and 15 July each year. Nine were recovered as of September 1981 (Table 1). Six were direct recoveries indicating first year movements and 3 were indirect recoveries of hawks 1 $\frac{3}{4}$ , 4 $\frac{1}{2}$ , and 4 $\frac{2}{3}$  years of age.

One fledgling (608-26624, Table 1) moved 21 km east in just 8 days after banding. This bird did not remain in the immediate vicinity of the nest for several weeks as has been reported (Angell 1969; Howard and Powers 1973; Smith and Murphy 1973), but apparently began wandering immediately after fledging. An initial northwest (276°) movement is shown by a direct recovery (877-40332) in October, 121 km from the banding site. This movement was possibly a function of post-fledging dispersal (Stewart 1980) or summer drift (Thurow et. al. 1980).

Eighty per cent of the direct recoveries were between 142° southeast and 180° south from the banding site (Fig. 3). The directions and recovery locations are consistent with movements of fledglings banded near Rose-

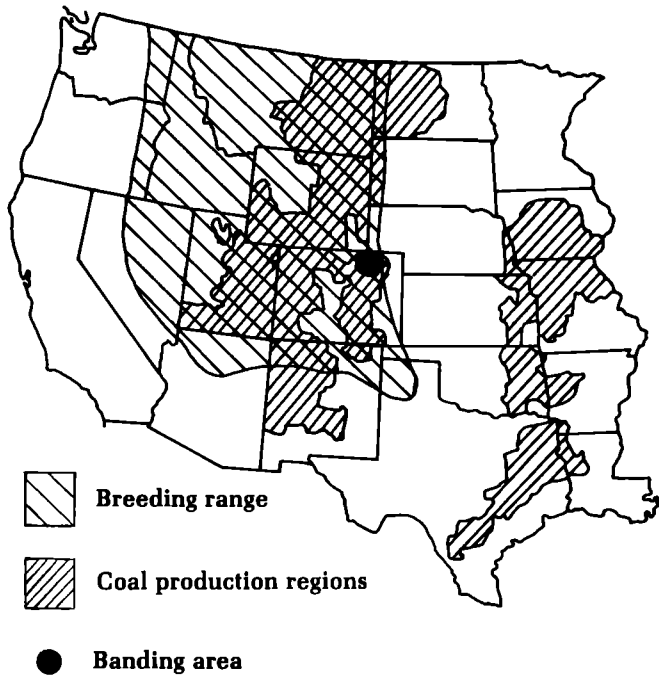


Figure 1. The breeding range of the Ferruginous Hawk and location of the banding area in relation to coal producing regions of the western United States.



Figure 2. Nestling Ferruginous Hawk just after banding.



Figure 3. Recoveries of Ferruginous Hawks banded as nestlings in northeastern Colorado, 1973-76. Solid lines indicate direct recoveries. Dashed lines indicate indirect recoveries. Age in years is shown at point of indirect recovery. Recoveries of a 4.6-year and a 1.5-month old occurred 5 km and 21 km respectively from the banding/nest site and are not shown.

bud, Alberta (Salt 1939) and further support speculation that the side of the Continental Divide a hawk is on at the initiation of fall migration determines the direction that is subsequently taken (Thurrow et. al. 1980). No direct recoveries of Ferruginous Hawks banded as nestlings in northeastern Colorado occurred west of the Continental Divide.

Recovery distances varied from 5 km to 2197 km from the nest site and involved 4 U.S. states and 1 Mexican state. One female hawk was recovered 5 km from its natal nest almost 5 years after banding. As few non-nesting adults are seen in the area, the hawk probably nested or attempted to nest in the vicinity prior to its death, indicating a certain degree of homing in Ferruginous Hawks.

Recoveries suggest that Ferruginous Hawks produced in northeastern Colorado winter primarily in Texas, at least during their first year. Fifty per cent of the direct recoveries were from Texas at a time when most birds should have reached their wintering grounds (Table 1). Wintering in central Mexico is illustrated by the recovery of 877-40318 near Nazareno, Durango in December. This recovery may actually extend the known range of the species since boundaries of raptor winter ranges (Grossman and Hamlet 1964; Brown and Amadon 1968) are difficult to discern. The recovery of 608-26626, a 1½ year old, may have been on its established wintering area in Texas but considering the location in relation to the recovery in Mexico and that most Ferruginous Hawks are well on their way back to their summer range in April, this bird was more likely migrating from an area farther south. The bird recovered in California (877-32011) was over 4 years old and probably a breeding male. The recovery site is extraneous to breeding and winter distribution maps and if the hawk actually died in January, the recovery may represent an extension of the winter range. Since the habitat in the area of the recovery is not typical of Ferruginous Hawks, he was more likely enroute between wintering areas east of the coastal mountain ranges in central California and the only known breeding area located in the extreme northeastern corner of the state (Grinnell and Miller 1944) or beyond. The hawk could have originally reached California by mixing with wintering populations from the west coast states during his first year in Mexico and returning to the summering areas with them. Mixing could occur by hawks crossing the Continental Divide over low passes as described by Thurrow et. al. (1980) during winter wanderings.

Table 2 illustrates some of the hazards hawks confront. Shooting, accidents, and starvation are recognized as primary causes of death among raptors and are concentrated on young age groups (Newton 1979). Conflicts with man and his artifacts were responsible for a sig-

**Table 1. Recoveries of Ferruginous Hawks banded as nestlings in northeastern Colorado, 1973-1976.**

Band number	Date banded	Date recovered	Recovery type <sup>1</sup>	Recovery location	Distance from banding site (km)
608-26610	30 Jun 75	Mar 80	I	Rockport CO	5
608-26618	5 Jul 75	Dec 75	D	Borger TX	748
608-26624	8 Jul 75	16 Jul 75	D	Stoneham CO	21
608-26626	11 Jul 75	Apr 77	I	Alpine TX	1413
877-21218	8 Jul 74	Jan 75	D	Sabinal TX	1847
877-20493	30 Jun 73	2 Jan 74	D	Muenster TX	1207
877-32011	27 Jun 75	9 Jan 80	I	Pulga CA	1907
877-40318	19 Jun 76	15 Dec 76	D	Nazareno DGO, Mex	2197
877-40332	19 Jun 76	2 Oct 76	D	Lynch WY	121

<sup>1</sup> D Direct recovery — indicates hawk recovered during first southward migration.

I Indirect recovery — indicates hawk recovered after first migration.

**Table 2. Longevity and fate of recovered Ferruginous Hawks banded in northeastern Colorado, 1973-1976.**

Band Number	Sex	Recovery condition	Cause of death	Recovery age (years)
608-26610	F	Dead	?	4.66
608-26618	F	Dead	Shot	.53
608-26624	F	Dead	Struck by vehicle	.01
608-26626	F	Dead	F.D. <sup>1</sup>	1.75
877-21218	M	Unknown	—	.54
877-20493	M	Dead	?	.50
877-32011	M	Dead	Shot	4.50
877-40318	M	Dead	Struck powerline	.50
877-40332	M	Dead	?	.30

<sup>1</sup> Why reported code indicates "Found dead."

**Table 3. Recovery statistics of banded Ferruginous Hawks from 4 areas in western North America.**

Banding region	Number banded	Number recovered	Percent recovered
California (Lincoln 1936)	87	15	17.2
Alberta (Salt 1939)	105	21	20.0
Colorado (This study)	115	9	7.8
Idaho (Thurrow et. al. 1980)	293	11	3.7

nificant number of recoveries. Shooting comprised a known 40% (2 of 8) of mortalities, impact injuries a known 40% and, in all probability, the circumstances of death were similar for those recovered dead (Table 2). Recovery rates appear to have decreased since 1936 (Table 3), and may be a result of fewer man-related mortalities. Recoveries were much higher when it was in vogue to shoot "chicken hawks" and fewer contemporary recoveries may be a reflection of the efficacy of protection laws and/or an increased appreciation of raptors by the general public.

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