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TRENDS IN WINTER DISTRIBUTION AND ABUNDANCE OF FERRUGINOUS HAWKS

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Abstract.—Christmas Bird Counts were used to assess changes in distribution and abundance of Ferruginous Hawks (*Buteo regalis*) across their wintering range from 1952 to 1984. Over this period, the number of hawks seen has increased significantly, however, most of the increase can be attributed to a dramatic rise in the number of hawks seen over the last 11 yr. On a regional basis, significant increases in abundance were found for California and the eastern portion of the Ferruginous Hawk's wintering range over the 33-yr-period. The number of hawks seen in other areas of the range over this same period has remained stable.

TENDENCIAS EN LA DISTRIBUCIÓN DURANTE EL INVIERNO Y ABUNDANCIA DE *BUTEO REGALIS*

Resumen.—Censos de navidad que se llevaron a cabo desde el 1952–1984 fueron utilizados para determinar cambios en distribución y abundancia de *Buteo regalis* en las áreas en donde pasa el invierno. A partir del 1952 el ave ha incrementado en números, aunque el aumento dramático se ha llevado a cabo durante los últimos 11 años. Desde el punto de vista regional, en los últimos 33 años, ha habido aumentos significativos en California y la parte este de la zona en donde el ave pasa el invierno. Durante el mismo lapso de tiempo, el número de halcones en otras áreas en donde las aves pasan el invierno, se ha mantenido estable.

The Ferruginous Hawk (*Buteo regalis*) was placed on the Blue List of the National Audubon Society in 1971 (Arbib 1971), as a species in "potentially dangerous, apparently non-cyclic decline," and on the Threatened List in Canada by the Committee on the Status of Endangered Wildlife in Canada in 1980 (Schmutz and Schmutz 1980). Ferruginous Hawk populations in a number of areas have been closely studied at the local or regional level (e.g., Alberta—Schmutz 1984, Schmutz et al. 1980; Washington—Fitzner et al. 1977; Idaho—Thurow et al. 1980; North

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Dakota—Gilmer and Stewart 1983, Gilmer et al. 1985; South Dakota—Lokemoen and Duebbert 1976; Utah—Howard and Wolfe 1976, Platt 1971, Smith and Murphy 1978; Nevada—Perkins and Lindsey 1983; Colorado—Harmata 1981, Olendorff 1973). However, the population status of this hawk remains largely unknown over its entire range. One source of information available to address this type of question in North America is Christmas Bird Count data. The validity of these data for such studies has been reviewed by Bock and Root (1981). In this paper we analyze 33 yr of Christmas Bird Count data to assess trends in both the distribution and abundance of the Ferruginous Hawk in various regions of its winter range.

METHODS

Christmas Bird Counts published in American Birds (formerly Audubon Field Notes) from 1952 to 1984 were searched for Ferruginous Hawk sightings in the area extending west of a line from Minnesota to Louisiana in the United States, except for North Dakota (for a list of those states included see below). This area was selected to coincide with the winter range of the Ferruginous Hawk as delineated by the AOU Check-list (AOU 1983). For purposes of analysis, the area was subdivided into six regions in order to obtain a more precise picture of their importance within the winter range of the bird. These regions were assigned two-letter abbreviations and consist of the following states: NW—Idaho, Washington, Oregon; NE—South Dakota, Nebraska, Montana, Wyoming; SW—Utah, Arizona, Nevada; SE—Kansas, Oklahoma, Colorado, New Mexico; TX—Texas; CA—California.

The data recorded from these counts ($n = 8456$) consisted of the number of Ferruginous Hawks seen, the number of party-miles travelled, and the total number of counts conducted per state. To account for effort, the data were standardized as hawks seen per 1000 miles on each count and these values were used to indicate the hawk's abundance. We calculated the mean number seen in each region within years, as well as for all six regions combined for each year. Spearman's rank correlations were used to assess population changes over time.

RESULTS

Combining all regions to create a yearly mean of hawks seen per 1000 miles, we found that over the 33-yr-period there has been a highly significant increase in the number of Ferruginous Hawks seen on Christmas Bird Counts ($r_s = 0.663$, $P < 0.01$, Fig. 1). However, considering only the first 24 yr included in this sample (1952–1975), there was no significant change in the population recorded on the counts ($r_s = 0.317$, NS). Data from 1984 were analyzed to assess the impact of recently added counts on the rapid increase in the number of Ferruginous Hawks seen beginning about 1974. The mean number of hawks seen on all counts added since 1974 and included in the 1984 count was not significantly different from the mean of those counts in 1984 from locations which

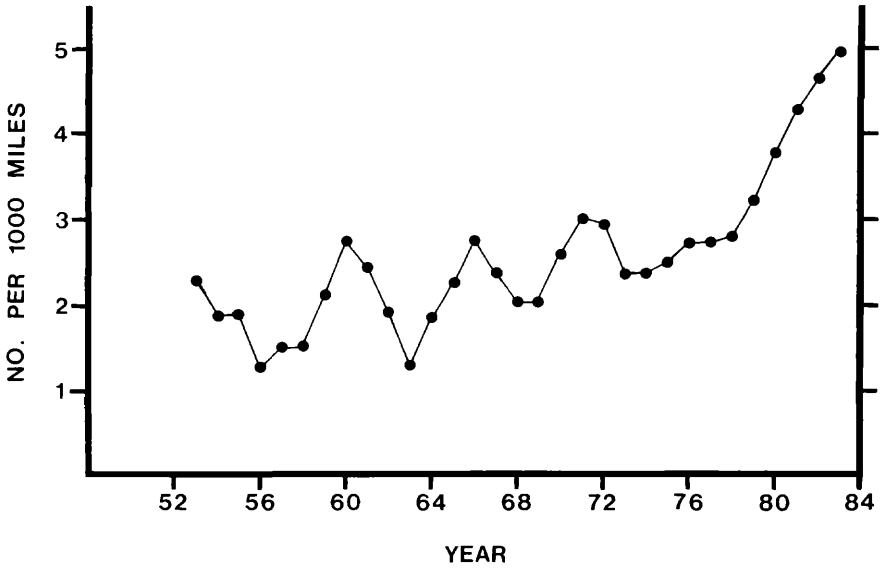

FIGURE 1. Three year running means of Christmas Bird Counts for Ferruginous Hawks, showing the number seen per 1000 mi combined for all regions from 1952 to 1984.

had also been a part of the 1974 count (t = 0.4080, df = 432, NS). Looking at the yearly means of hawks seen in each group, over the 33-yr-period, we found highly significant increases in the southeast region (r_s = 0.585, $P < 0.01$, Fig. 2) and California (r_s = 0.726, $P < 0.01$, Fig. 2), and a significant increase in the northeast region (r_s = 0.305, $P < 0.05$, Fig. 2) whereas other areas remained stable with non-significant increases in the northwest (r_s = 0.082, NS, Fig. 2), southwest (r_s = 0.043, NS, Fig. 2), and Texas (r_s = 0.271, NS, Fig. 2).

DISCUSSION

Contrary to reports of the decline and disappearance of the Ferruginous Hawk in various parts of its range (Fitzner et al. 1977, Houston and Bechard 1984, Olendorff 1973, Schmutz 1984, and Snow 1974), our data do not indicate that such problems exist on a regional or range-wide basis. In fact, the number of Ferruginous Hawks seen on Christmas Bird Counts has increased. Much of this increase can be attributed to changes over the last decade (Fig. 1). The lack of agreement for the period prior to this increase, between our data (which shows no significant increase in mean number of hawks seen from 1952 to 1975) and the studies mentioned above may be an artifact of the small sample size available and the resultant widely fluctuating values in the first years (n = 121 counts in 1952, n = 434 counts in 1984).

Of primary interest is the fact that over the last 11 yr there has been a dramatic overall increase in Ferruginous Hawk numbers. The com-

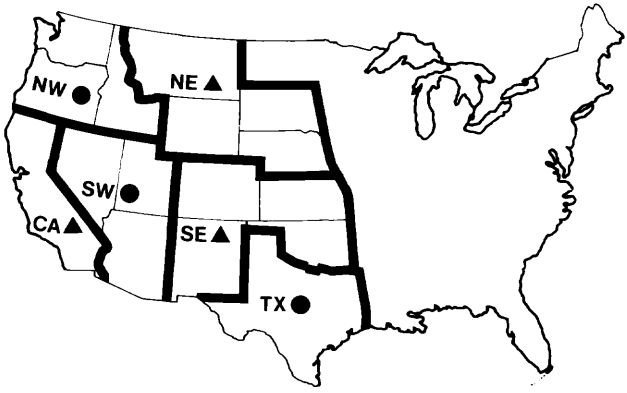

FIGURE 2. Map indicating the six regions of the Ferruginous Hawk winter range and the status of each population. A triangle indicates a significant increase; a circle indicates no significant change.

parison between the mean number of hawks seen for the established and more recent counts of the 1984 Christmas Bird Count, suggest that this increase is not attributable simply to the inclusion of new areas with disproportionately large populations of Ferruginous Hawks. Reasons for the increase are unclear and this type of study does not provide explanations. However, we would speculate that the heightened awareness of raptor conservation among the general public over the last 15 yr may have led to some decrease in mortality due to habitat loss and shooting, for example. Related to this, the greater awareness of researchers concerning the sensitivity of Ferruginous Hawks to disturbance, particularly at the nest site (Fyfe and Olendorff 1976, Olendorff and Stoddart 1974), may have lessened their impact on these birds. In addition, the introduction of artificial nest structures in several areas (Houston 1982, Howard and Hilliard 1980, Olendorff et al. 1980, Schmutz et al. 1980) and the resulting increased nesting density and reproductive success (Schmutz et al. 1984) may also have contributed to the increased numbers.

Based on banding studies of Ferruginous Hawks carried out to date, there appear to be two sub-populations of this species in existence. As pointed out by Thurow et al. (1980), the Rocky Mountains may act as the determining factor in this division. The banding returns from study areas east of the Rocky Mountains in Alberta (Schmutz and Fyfe 1987), northeastern Colorado (Harmata 1981), and North Dakota (Gilmer et al. 1985), all follow a similar pattern and are almost exclusively from areas east of the Rocky Mountains. In contrast, hawks banded west of the Rocky Mountains in Idaho (Thurow et al. 1980) have been subsequently recovered over a wide region on both sides of this mountain range. If these sub-populations are indeed valid, it would appear that both segments are contributing to, and the population as a whole is responsible for, the increases we have seen over the last few years in Ferruginous

Hawks. The southeast and northeast areas, as well as California have all shown significant increases in population size.

Although there is a paucity of Christmas Bird Count data for northern Mexico, and it was consequently omitted in our analysis, it is another area that appears to be of some importance for wintering Ferruginous Hawks. Harmata (1981), Gilmer et al. (1985), and Schmutz and Fyfe (1987) have all indicated the need to re-evaluate their existing recognized winter range. In fact, from these three studies, nine (7%) of 129 band returns were from northern Mexico. Further study of Ferruginous Hawks in this region would therefore be of great benefit to our understanding of their wintering distribution and ecology.

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GOOD NEWS

THE BREEDING BIRD CENSUS AND WINTER BIRD POPULATION STUDY WILL BE PUBLISHED AGAIN!

The Cornell Laboratory of Ornithology, the Association of Field Ornithologists, the United States Fish and Wildlife Service, and the National Audubon Society have agreed to jointly sponsor the Breeding Bird Census and the Winter Bird Population Study for five years, starting in 1988. After editorial review, BBCs and WBPSs will be published as a supplement to the Journal of Field Ornithology.

We urge all BBC and WBPS participants to continue working on their field projects and encourage everyone who has suspended work to resume their studies.

For more details and up-to-date forms and instructions, please contact: TODD ENGSTROM, *Cornell Laboratory of Ornithology, 159 Sapsucker Woods Road, Ithaca, New York 14850 (607) 254-2416.*

All completed censuses should be sent to TODD ENGSTROM at the address above.

WBPS deadline for acceptance is **15 April 1988.**

BBC deadline for acceptance is **15 September 1988.**

EARLIER SUBMISSION WILL SPEED THE EDITORIAL PROCESS.