Trends in Wintering Diurnal Raptor Populations from Central Colorado Christmas Bird Counts

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Abstract: Diurnal raptors counted on Audubon Christmas Bird Counts (CBC) in central Colorado from 1953-1972 were analyzed. Five count areas (Boulder, Colorado Springs, Denver, Longmont, and Fort Collins) were chosen because they all contained similar percentages of the same habitats. Fourteen species were recorded during the study period. The Red-tailed Hawk (*Buteo jamaicensis*), Rough-legged Hawk (*Buteo lagopus*), Marsh Hawk (*Circus cyaneus*), and American Kestrel (*Falco sparverius*) were most common; the Peregrine Falcon (*Falco peregrinus*) was rarest. Only general population trends were evaluated because of the large number of variables and biases involved in the CBC. Although all species had year to year fluctuations, no species appears to have declined since 1953.

The Christmas Bird Count (CBC) was initiated by the Audubon Societies, parent organizations of the National Audubon Society, in 1900. Grabner and Golden (1960) summarized the original objectives as: (1) entertainment for the participants; (2) a census of Christmas bird life; and (3) the conservation of wildlife.

Because of the length of time the CBC has been conducted and the large amount of data that they represent, many ornithologists have used CBC data to analyze winter bird populations. Hickey (1955) and others have argued convincingly that there are too many variables involved for the data to be of scientific value. Despite the many variables, I felt safe in using the data to view general population trends.

There has been much concern about the decline of raptors (Hickey 1969). These declines have been caused by many factors, but a major culprit has been hard pesticides (Fyfe *et al.* 1969). Grabner and Golden (1960) employed CBC data to analyze population trends in hawks and owls in Illinois. I used data from five Colorado CBC areas to determine if there were any changes in wintering diurnal raptor populations in the 20-year period, 1953-1972.

METHODS

Five CBC areas in Colorado were analyzed in this study: Boulder, Colorado Springs, Denver, Fort Collins, and Longmont. Each count circle contains a similar percentage of coniferous forest, open grassland, cultivated field, deciduous stream bottom, and urban area.

Data from each of the five counts were tabulated from *Audubon Field Notes* (1954-1970) and *American Birds* (1971-1973). The following information was recorded: diurnal raptor species seen and number counted, number of observers and parties, total party hours, and total party miles.

Grabner and Golden (1960) analyzed counts in which no more than ten people took part and in which no individual party consisted of more than four people. This assured the authors of an equivalent degree of coverage of all count areas analyzed. Using the same criteria as minimum requirements, I eliminated 19 of 99 available counts. Before 1950 count circles with a 7 ½ mile (12.1 km) radius and a specific center point were delineated for all five count areas analyzed here I felt that at least 10 observers and three parties were needed to fully cover each area; therefore, the 19 counts with less than the minimum were not used in the analysis.

Due to the inherent high variability of the CBC data, only simple statistical analyses were used Frequency of occurrence was computed by dividing the number of counts in which at least one individual of a raptorial species was seen by the total number of counts. It was determined for all species for the 20-year period and for four 5-year periods for six less common species. Birds per 100 party-miles and birds per party-hour for each species were analyzed graphically. Since birds per party-hour graphs had the same general trends

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as birds per 100 party-mile graphs, only the latter are included.

RESULTS

There has been a noticeable increase in the number of observers per Christmas Bird Count and parties per count during the last five years in central Colorado (Fig. 1). The number of observers per party has averaged approximately three throughout the 20-year period.

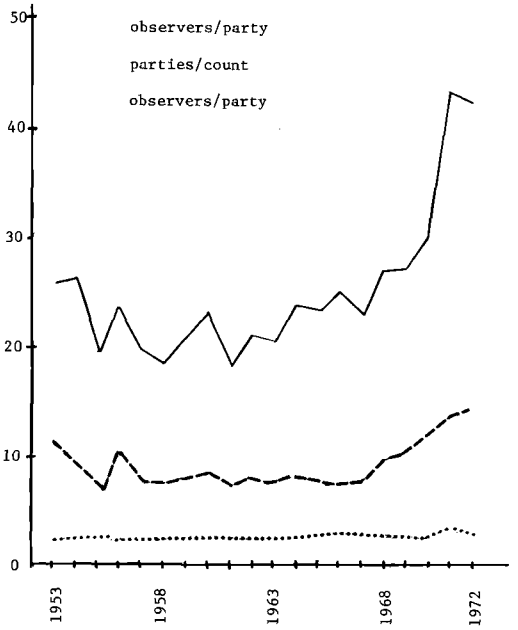

Fig 1 Observers/party, parties/count, and observers/count on five Christmas Counts in similar habitats in central Colorado, 1953-1972.

The simplest analysis of the count data that was undertaken was frequency of occurrence (Fig. 2). Four species, the Red-tailed Hawk, Rough-legged Hawk, Marsh Hawk, and the American Kestrel, were seen on more than 95% of the counts. The Golden Eagle (*Aquila chrysaetos*) (81%) and Prairie Falcon (*Falco mexicanus*) (61%) were also commonly seen. The Sharp-shinned Hawk (*Accipiter striatus*) (55%) was the most commonly seen *Accipiter*. The Swainson's Hawk (*Buteo swainsonii*), which normally winters in South America, was reported in 16% of the counts. The Peregrine Falcon was reported on only 10% of the counts

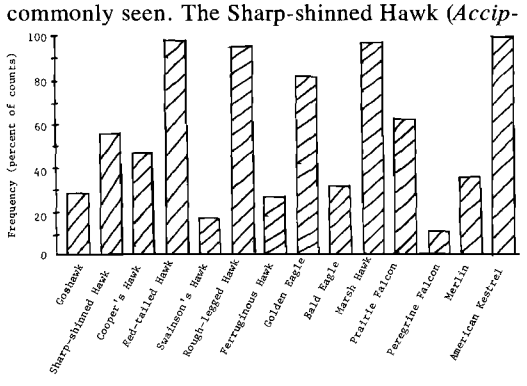

Fig 2 Frequency of occurence of diurnal raptors reported on five Christmas Counts in similar habitats in central Colorado, 1953-1972.

Five species and one genus were further analyzed by frequency of occurrence for 5-year periods; Period I - 1953 to 1957, Period II - 1958 to 1962, Period III - 1963 to 1967, and Period IV - 1968 to 1972 (Fig. 3). Three species of *Accipiter* occur in North America; the Goshawk (*Accipiter gentilis*), Sharp-shinned Hawk, and Cooper's Hawk (*A. cooperii*). They were analyzed together because their secretive habits make them difficult to find and because Cooper's Hawks and Sharp-shinned Hawks are often confused. *Accipiters* decreased in occurrence in Period II, but they returned to high levels in Periods III and IV. Golden Eagle and Merlin (*Falcon columbarius*) dropped in occurrence in Period II, but were reported at nearly equal rates after that. The Ferruginous Hawk (*Buteo regalis*) gradually declined in reportings throughout the four periods. Prairie Falcons were reported at the same level for all periods. Only the Bald Eagle (*Haliaeetus leucocephalus*) has shown a major decline in reports, dropping from 42% in Period I to 20% in Period IV.

The average number of diurnal raptors per 100 party-miles started with low values, had peak years of nearly 20 birds per 100 miles in 1956, 1958 and 1963, and moderate numbers near the end of the study (Fig. 4).

Accipiter observations varied greatly during the first 12 years but leveled out at about 0.6 birds per 100 miles during the last 8 years (Fig. 5)

Buteos per 100 party-miles fluctuated but gradually increased throughout the study period (Fig. 6). Red-tailed Hawks may have increased slightly during the same time. Rough-legged Hawks appeared to be cyclic; peaks occurred in 1955, 1961, 1965, and 1971. Wallace (1955:218) and Grabner and Golden (1960) have also found cyclic tendencies in the Rough-legged Hawk. Ferruginous Hawks apparently were never numerous during the study.

More Golden Eagles were observed early in the study period, but birds per 100 miles were fairly constant throughout the last 15 years (Fig. 7) Except for a high count per 100 miles in 1956, the winter Bald Eagle population has been low but constant. Marsh Hawk observations fluctuated greatly throughout the study.

The falcons have also fluctuated greatly (Fig 8). Most of this variability is caused by fluctuations in American Kestrels. Prairie Falcons and Merlins per 100 miles were fairly constant throughout the study; Peregrine Falcons were too scarce for this analysis.

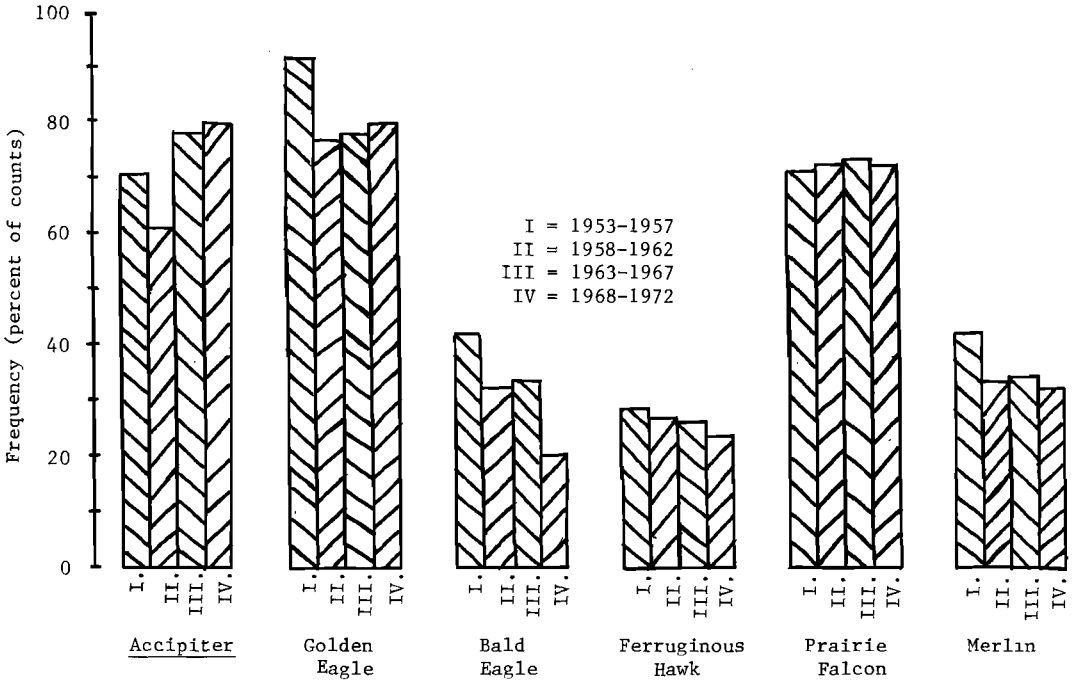

Fig. 3. Frequency of occurrence of five species and one genus of diurnal raptors reported on Christmas counts of five similar count circles in central Colorado, 1953-1972.

DISCUSSION

The information from 80 counts indicates that diurnal raptor populations have not decreased in the last 20 years, although there have been year to year fluctuations. Small to fairly large population changes may have been missed owing to the inhe-

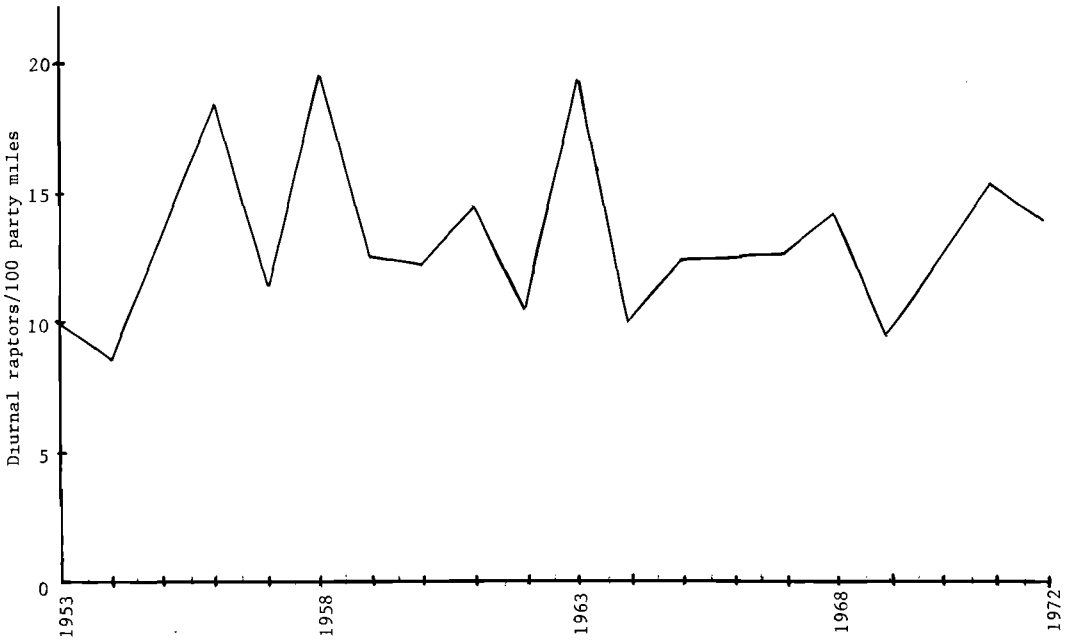

Fig. 4. Average number of diurnal raptors/100 party miles on five Christmas Counts in similar habitats in central Colorado, 1953-1972.

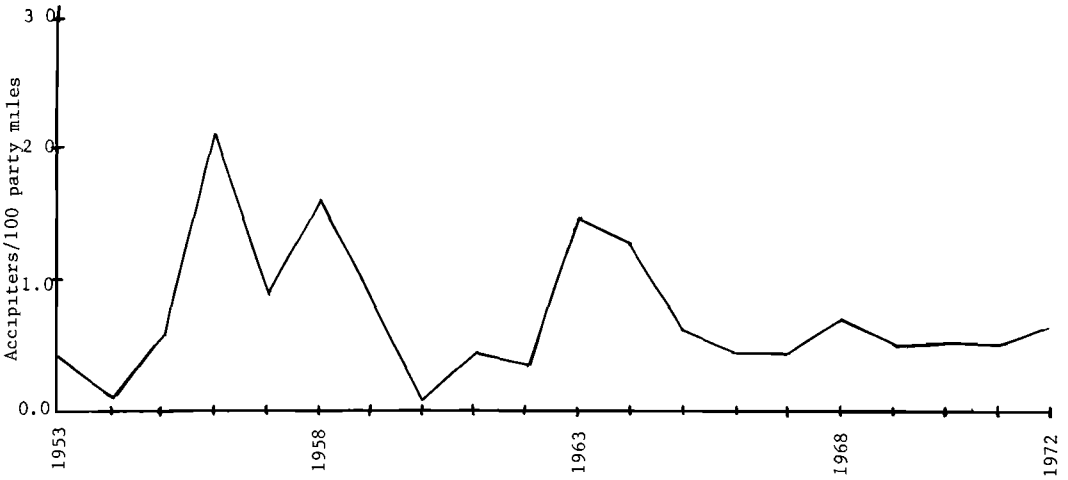

Fig. 5. Average number of Accipiters reported per 100 party miles on five Christmas Counts in similar habitats in central Colorado, 1953-1972.

rently high variability of Christmas Bird Counts.

Of the 19 counts that were excluded from the analysis, most were before 1960. All 20 counts from Colorado Springs and Denver were used in the analysis; only 15 Boulder, 14 Longmont, and 11 Fort Collins counts were used. Denver and Colorado Springs counters reported *Accipiters* more frequently probably because they always fielded larger groups. As an extreme example, they were the only counts to field the minimum of 10 persons and 3 parties in 1956 when 2.16 *Accipiters* per 100 miles were recorded. From 1965-1972, all counts were fielding enough persons to make better searches of *Accipiter* habitat. During this period there was a nearly constant reported population of 0.6 *Accipiters* per 100 miles. The *Accipiter* population has probably been stable throughout the 20-year period.

Although *Accipiter* counts are more accurate when a large number of observers are involved, the effect of many observers on all other species is less apparent. During 1970 - 1972, many raptors were recorded; for example, 329 in 1971 These were also the years when the average number of observers per count for the five counts exceeded 40. If there were actual increases in

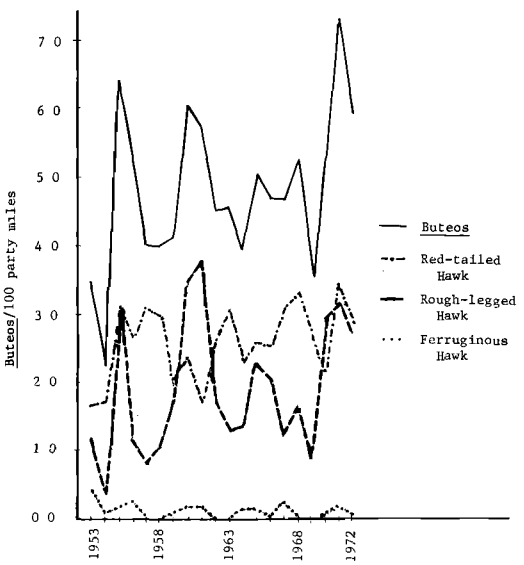

Fig 6 Average number of Buteos reported per 100 party miles on five Christmas Counts in similar habitats in central Colorado, 1953-1972.

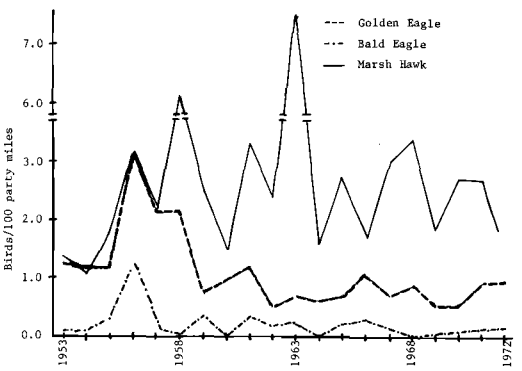

Fig. 7. Average numbers of Golden Eagles, Bald Eagles, and Marsh Hawks reported per 100 party miles on five Christmas Counts in similar habitats in central Colorado, 1953-1972.

populations, they are now shown graphically, since party-miles increased during these years, dampening the effect of the higher raptor counts. Duplicate counts are a distinct possibility, particularly in Denver and Colorado Springs where an average of 73 and 50 observers respectively were listed during the 3-year period. Perhaps an upper limit of 30 observers per count should be placed on the analysis of non-*Accipiter* populations.

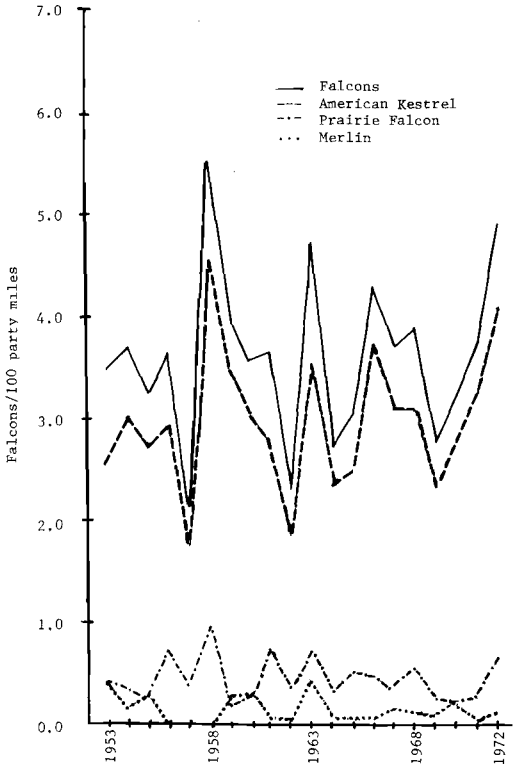

Fig. 8. Average number of falcons reported per 100 party miles on five Christmas Counts in similar habitats in central Colorado, 1953-1972.

The Swainson's Hawk is acknowledged to be a strong migrant. The majority of the population winters in South America (Brown and Amadon, 1968). At first inspection, the 18 Swainson's Hawks reported appear to be misidentification. However, Bailey and Niedrach (1965) report the winter range of this species to extend south from Colorado and list four specimens collected in Colorado during the winter. Observers should make very careful identification of the Swainson's Hawk before reporting it in its northern winter range.

The endangered Peregrine Falcon is known to winter in Colorado but in low numbers. Six of the nine reports of Peregrines in the 80 Christmas Bird Counts were from Colorado Springs. Some might possibly have been escapees from the U S Air Force Academy or local falconers.

Low numbers of Ferruginous Hawks, Golden Eagles, Prairie Falcons, and Bald Eagles should cause little concern as the five areas reporting those species do not afford much favorable habitat. The first four species are more common farther east on the plains, while many Bald Eagles winter along Colorado rivers.

In review, CBC data indicates that wintering raptor populations have not declined in the last 20 years in Colorado. However, fairly large changes in raptor numbers could be hidden in the high variability of the Christmas Bird Count.

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