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A Magazine of Ornithology of the Nebraska Region

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Published quarterly in January, April, July, and October by the Nebraska Ornithologists' Union as its official journal and sent free to all members who are not in arrears for dues. Subscriptions at $3.50 per volume in the United States and $3.75 in all countries, payable in advance. Single numbers, $1.00 each. All dues and subscriptions should be remitted to the Treasurer, Mrs. O. W. Ritchey, 315 E. 7, Hastings, Nebraska. Orders for back numbers should be sent to the Custodian, Miss Bertha Winter, University of Nebraska State Museum, Lincoln, Nebraska. All manuscripts for publication should be sent to the Editor, Nebraska State Teachers College, Chadron, Nebraska.
Population Dynamics Of Diurnal Birds Of Prey In The Panhandle Of Nebraska

by

John and Ann Mathisen

One of the most conspicuous groups of birds in our environment is the diurnal birds of prey, comprising the order Falconiformes. Their large size and soaring habits make them evident to the most un-observant citizen. The Falconiformes is one of the few groups of birds that, in many cases, can be identified while flying, making field observations relatively simple. They are of special interest because of their predatory habits and their important position in the balance of nature.

This study was undertaken to provide information concerning seasonal abundance, migration periods, and the relative species composition of the Falconiformes in the Panhandle of Nebraska. An attempt has been made to follow the population dynamics of this particular group of birds through a period of one year for this geographical region.

METHODS

The methods used for gathering the information presented in this study were simple. The writer's position requires a considerable amount of traveling in the panhandle region. On certain days when this area was traversed by auto in 1957 all birds of prey observed for approximately one quarter mile on each side of the road were identified (if possible) and tabulated. Information was recorded relative to species, location, general habitat, time of day and weather conditions. If the species could not be definitely established, the bird was classified as unidentified. Information was also recorded concerning the number of miles traveled and the number of hours observations were made. If no diurnal birds of prey were observed during the day the mileage and hours were still recorded for statistical purposes. Observations were made from both paved highways and country roads throughout the region.

The study period extended from January 1, 1957 through December 31, 1957. It should be emphasized that the conclusions reached in this study are based on data for one year only.

STUDY AREA

This study was restricted to the eleven counties comprising the Panhandle of Nebraska, approximately 14,000 square miles. This region may be roughly divided into three general habitat types: (1) cropland, largely winter wheat and other grain crops; (2) grassland, including the shortgrass prairie region and the mixed-grass of the sandhill region; and (3) Pine Ridge, a rough escarpment supporting coniferous trees. All avian predators observed were classified into one of these habitat types.

The grassland type is the most abundant in the panhandle region. Cropland would be next, followed by the Pine Ridge.

FINDINGS

A total of 623 hawks, eagles, ospreys and vultures were observed in 1957 in the panhandle region. The species observed in each month are presented in Table 1. Approximately 7 percent of the birds observed were classified as unidentified.
# FALCONIFORMES OBSERVED - 1957

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| Total Birds                  | 99   | 86   | 31   | 76   | 17  | 9    | 40   | 15   | 108   | 51   | 31   | 51   | 623   |
| Total Miles                  | 1695 | 1815 | 1130 | 2408 | 1820| 1579 | 1680 | 800  | 1165  | 1445 | 1058 | 1220 | 17,807|
| Total Hours                  | 52   | 67   | 27   | 63   | 53  | 34   | 48   | 20   | 38    | 31   | 31   | 32   | 516   |
| Total Days                   | 15   | 15   | 10   | 14   | 12  | 10   | 10   | 10   | 10    | 6    | 6    |      | 128   |

Table 1,
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Table 2.
A total of 17,807 miles were traveled during the observing period of 516 hours. Observations were made on 128 different days during the year.

Table 2 presents the number of Falconiformes observed per 100 miles, obtained by dividing the mileage into the number of birds observed and multiplying by 100. This is a simple method of representing the relative abundance of birds for each month, and also the relative species composition of the total population for the area. By using this statistic a reliable comparison can be made from month to month, year to year and species to species. It may be called an index of abundance.

It must be remembered that the analysis of this data must be in relative terms rather than absolute. For instance, no Sparrow Hawks were observed in January; this does not mean that Sparrow Hawks were absent from the region during this month. It does indicate, however, that this species was relatively scarce during this period.

The data pertaining to weather conditions and time of day did not indicate any definite relationship between these factors and Falconiformes activity. However, there is probably some correlation between wind velocity and the activities of birds of prey. Falconiformes, particularly the Buteos and eagles, commonly utilize air currents as a means of keeping aloft. It might generally be said that Falconiformes are more active on windy days than on days when there is little or no wind. Further, there appears to be a maximum wind tolerance. On very windy days few birds were observed.

The data recorded on habitat types indicate some correlation between species and types. However, these data are difficult to analyze because the types are unequal in size and the sampling was not proportionate. General notes on habitat are presented under the species accounts to follow.

Figure 1 (p. 13) shows graphically the relative monthly abundance of all avian predators throughout the year. Let us first consider the population changes for avian predators as a whole for the region.

The downward slope of the curve (Fig. 1) from January to May is attributed largely to decreasing numbers of Rough-legged Hawks and Golden Eagles. The upward trend in April probably indicates the spring migration period. As the migrants pass through the area the curve again drops downward until a low is reached in June. The sharp increase in July may be a reflection of increased activity by nesting birds hunting food for their nestlings and also the young birds leaving the nest toward the end of the month.

The drop from July to August may be the result of differential migration, i.e., some of the birds may have migrated or dispersed immediately after the nesting season before the appearance of migrants.

The sharp increase in September is obviously the peak of the fall migration period. Most of the species showed a decided increase during this month. After the fall migration peak in September, avian predator numbers dropped until November. The upward trend from November to December is due largely to the return of Rough-legged Hawks and Golden Eagles.

An account of the population fluctuations for the seven major species and types. However, these data are difficult to analyze because the types are unequal in size and the sampling was not proportionate. General notes on habitat are presented under the species accounts to follow.

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An account of the population fluctuations for the seven major
Notes on Summer Birds of Western Nebraska

Norman L. Ford

From July 5 to July 19, 1957, I accompanied a University of Kansas field party, under the direction of Dr. Harrison B. Tordoff, that traveled through parts of western Nebraska collecting specimens of vertebrates for the University's Museum of Natural History. Additional members of the party were: J. Knox Jones, Jr., Gary J. Myers, and Terry A. Vaughan.

From July 5 through July 9, we stayed at the Nebraska National Forest, two miles west of Halsey, Thomas County. From there we traveled north to the Valentine National Wildlife Refuge, approximately seven miles east of Kennedy, Cherry County, where we remained from July 10 through July 13. On July 14, we went still farther north to the Fort Niobrara National Wildlife Refuge, four miles east of Valentine, Cherry County, and remained there through the morning of July 16. The afternoon of July 16, we left Fort Niobrara and traveled west to the Niobrara River, eleven miles south of Gordon, Sheridan County, where we remained overnight. The morning of July 17, we resumed our westward course to Fort Robinson, three miles southwest of Crawford, Dawes County, where we stayed through July 19.

At the Nebraska National Forest we found that the lush growth of shrubs and deciduous trees along the south bank of the Middle Loup River was inhabited by more species of birds than the vast coniferous plantings of the forest. Most of the species that occurred in the forest could be found near the river in greater numbers. Two notable exceptions were the Sharp-tailed Grouse and Poor-will, which were seen only in the more open areas of the forest several miles from the river. Some of the more common breeding birds along the river were: Bell's Vireo, Red-eyed Vireo, Black-and-white Warbler, Yellowthroat, Yellow-breasted Chat, Redstart, Black-headed Grosbeak, and Rufous-sided Towhee.

Our collecting activities at the Valentine National Wildlife Refuge were concentrated around the numerous sandhill lakes of the region. Although there are nesting records of more than ten species of ducks from this area, we succeeded in getting positive records for only the Mallard and Blue-winged Teal. Other species for which we found nests or small young were: Pied-billed Grebe, Sora, American Coot, Killdeer, Upland Plover, Willet, and Yellow-headed Blackbird. We saw a pair of Long-billed Curlews on July 13. Judging from their highly aggressive behavior, they probably had a nest or young nearby, but we were unable to locate either.

At the Fort Niobrara National Wildlife Refuge most of our time was spent collecting mammals. As a result, we obtained few birds from that area. The birds taken were collected either along the banks of the Niobrara River or in the wooded canyons which cut through the high pine-covered ridge along the north bank of the river. We found two species here, Rock Wren and Wood Thrush, that were not found at any of the other localities.

At our final area of study we used Fort Robinson as our base, and collected in the rocky, pine-covered ridges and wooded canyons west of the fort in Sioux County. Although the habitat in which we hunted in Sioux County is much like that of
the Fort Niobrara (i.e., deciduous woods in canyons and along river banks, pine covered ridges), its closer proximity to the Rocky Mountains and Black Hills results in a marked difference in the avifauna of the two areas. A number of typically Rocky Mountain species nest in Sioux County; none of these, judging from our observations, nest around Fort Niobrara. We were much impressed with the mixed assortment of eastern woodland, prairie, and mountain species which share the various Pine Ridge habitats. There seems to be little known about the distribution, ecology and relationships of these species. A thorough study of this area would prove interesting and rewarding.

The members of the field party are greatly indebted to the administrative personnel of the following agencies for providing us with excellent living quarters and other assistance: the Nebraska National Forest at Halsey, the Valentine National Wildlife Refuge, the Fort Niobrara National Wildlife Refuge, and the University of Nebraska State Museum. I am personally indebted to Dr. Harrison B. Tordoff for his help in preparing the manuscript for publication.

The following is a complete list of birds collected. Subspecific names employed were determined by examination of specimens.

Mallard. *Anas platyrhynchos platyrhynchos*. Three specimens were obtained eleven miles east of Kennedy. On July 11, Tordoff collected an immature female (KU 34072) and on July 12, he caught an adult male (KU 34071) that would not fly although all of its flight feathers were present. On July 13, I collected a downy young female (KU 34073). On the lakes the Mallard was second only to the Blue-winged Teal in abundance.

Blue-winged Teal. *Anas discors*. Three specimens were obtained at the same locality as the Mallards. On July 11, Tordoff and I each collected a downy young from a brood of seven (KU 34074 and KU 34076). On July 12, I took a downy young female from a brood of nine (KU 34075).

Sharp-tailed Grouse. *Pediocetes phasianellus jamesi*. Two birds were collected one mile south and three and one-half miles west of Halsey. On July 7, Tordoff shot an adult female (KU 34078) that had a well-developed brood patch. No young birds were seen with the female. On July 8, Tordoff caught a juvenal male (KU 34077) from a brood of twelve. We found this species in the sandhills of the Nebraska National Forest, both within and outside of the conifers. At least three broods of young birds were seen.

Virginia Rail. *Rallus limicola limicola*. Two specimens were obtained by Myers on July 9, four miles west of Halsey. One bird was an adult male (KU 34079) and the other was an adult female (KU 34080) with an enlarged oviduct, but without ruptured follicles in the ovary. The birds were in a grassy, sedgy slough along the Middle Loup River.

American Coot. *Fulica americana americana*. On July 11, Tordoff caught a downy young female (KU 34081) on a pond, eleven miles east of Kennedy.

Upland Plover. *Bartramia longicauda*. On July 11, Tordoff caught a juvenal male (KU 34082) eleven miles east of Kennedy.

Willet. *Catoptrophorus semipalmatus inornatus*. On July 13, Tordoff shot a juvenal male (KU 34083) capable of flight, eleven miles east of Kennedy.

Black-billed Cuckoo. *Crocys erythrophthalmus*. An adult female (KU
with ruptured follicles in the ovary was collected by Tordoff on July 7, one mile south and three and one-half miles west of Halsey.

Poor-will. *Phalaenoptilus nuttallii nuttallii*. I shot an adult female (KU 34085) that had a soft-shelled egg in her oviduct on July 8, one mile south and three and one-half miles west of Halsey. On several occasions, individuals were seen at night on roads in the forest.

White-throated Swift. *Aeronautes saxatalis saxatalis*. On July 17, Tordoff shot a molting adult male (KC 34086) five and one-half miles west of Crawford in Sioux County. On July 18, I found a small breeding colony approximately seven and one-half miles west of Crawford. The nest holes were located high up on a north-facing cliff and I was unable to secure any eggs or young. In early August, Vaughan returned to the colony and succeeded in climbing to one of the nest holes. He found young in the nest at that time.

Hairy Woodpecker. *Dendrocopos villosus septentrionalis*. Tordoff shot an adult male (KU 34087) on July 16, four miles east of Valentine.

Downy Woodpecker. *Dendrocopos pubescens leucurus > medianus*. On July 18, five miles north of Harrison, Sioux County, I shot an adult male (KU 34088) of this species that proved to be intermediate between *leucurus* and *medianus*. The remiges and wing coverts are more heavily spotted with white than those of *leucurus* but not so densely spotted as those of *medianus*.

Eastern Kingbird. *Tyrannus tyrannus*. An adult female (KU 34089) with a large brood patch was obtained by Tordoff on July 7, one mile south and three and one-half miles west of Halsey. This species was seen at each of the collecting localities.

Western Kingbird. *Tyrannus verticalis*. Vaughan shot an adult female (KU 34090) on July 19, three miles west of Crawford in Sioux County.

Scissor-tailed Flycatcher. *Muscivora forficata*. On July 9, Tordoff shot an adult male (KU 34091) four miles west of Halsey. This is probably one of the northernmost records of this species in Nebraska. According to Repp, et al. (1958. Revised Check-list of Nebraska Birds. Occas. Papers Nebraska Ornith. Union, 5:17) the Scissor-tailed Flycatcher is “A rare summer resident along the Kansas boundary. There are breeding records from Adams, Lancaster, and Logan Counties.” This species has been reported as far north as Manitoba.

Western Wood Pewee. *Contopus sordidulus veliei*. An adult female (KU 34092) with a well-developed brood patch was obtained by Tordoff on July 18, five miles north of Harrison. Several other individuals were seen west of Fort Robinson.

Horned Lark. *Eremophila alpestris enthymia*. I obtained two specimens on July 6, one mile south and three and one-half miles west of Halsey. One was an adult female (KU 34093) with a well-developed brood patch and the other was an adult male (KU 34094). On July 8, I found an immature male (KU 34095) dead on the highway, one mile north of Halsey. This species was commonly seen along roads at all localities.

Rough-winged Swallow. *Stelgidopteryx ruficollis serripennis*. Myers shot an adult male (KU 34096) on July 8, at the Dismal River, eight miles west and two miles south of Dunning, Blaine County.

Pigmy Nuthatch. *Sitta pygmaea melanotis*. Tordoff secured a juvenile male (KU 34097) from a family group of five or six individuals on July 18, five miles north of Harrison.
This species was previously thought to be only a rare winter visitant (Rapp, et al., op. cit., :20). This specimen provides the first evidence of breeding of the Pigmy Nuthatch for Nebraska. The nearest reported breeding area of this species known to me is Loveland Canyon in southwestern South Dakota.

Robin. *Turdus migratorius*. Vaughan shot an unsexed bird (KU 34098) on July 7, one mile south and three and one-half miles west of Halsey. The plumage of this specimen is so badly faded and worn that it is virtually impossible to identify it to subspecies with any certainty.

Bell’s Vireo. *Vireo bellii bellii*. On July 9, Myers collected an adult male (KU 34100) and ajuvenal male (KU 34101) four miles west of Halsey. On July 15, at the Fort Niobrara Wildlife Refuge, four miles east of Valentine, I shot an adult female (KU 34099) that had a brood patch.

Red-eyed Vireo. *Vireo olivaceus*. Tordoff collected a juvenal male (KU 34105) on July 6, one mile south and three and one-half miles west of Halsey. At the same locality, Vaughan shot two males (KU 34102 and KU 34103) on July 7, and Myers shot an adult male (KU 34104) on July 8. Shortly after Tordoff collected the juvenile, we saw a Blue Jay (*Cyanocitta cristata*) catch its sibling. The Blue Jay was vigorously attacked by the adult vireos but succeeded in making off with the young bird.

Black-and-white Warbler. *Mniotilta varia*. This species was common in the deciduous trees along the Middle Loup River in the Nebraska National Forest. Four specimens were obtained one mile south and three and one-half miles west of Halsey. On July 7, Tordoff shot a singing male (KU 34106) that was molting.

On the same date I shot an adult male (KU 34107) and a juvenal male (KU 34108). On July 8, I secured another juvenal male (KU 34109). On July 9, Myers shot an adult male (KU 34110) four miles west of Halsey. On several occasions we observed adults feeding fledglings.

Audubon’s Warbler. *Dendroica auduboni auduboni*. This species was common in the Pine Ridge Region. On July 18, Tordoff shot a juvenal male (KU 34112) five and one-half miles west of Crawford in Sioux County, and a molting adult male (KU 34113) five miles north of Harrison. On July 10, five miles west of Crawford, I shot an adult female (KU 34111) that had a brood patch.

Ovenbird. *Seiurus aurocapillus cinerus*. Tordoff shot a singing male (KU 34114) on July 18, five and one-half miles west of Crawford in Sioux County, where the species was common in deciduous woods on the canyon floors. This subspecies is not reported for Nebraska by Rapp, et al (op. cit., :26), but the Fifth Edition of the A. O. U. Check-list of North American Birds (1957) lists it as a breeding bird in central Nebraska.

Yellowthroat. *Geothlypis trichas*. This species was found in suitable habitat at all localities except Sioux County. On July 8, Tordoff collected a juvenal male (KU 34115) one mile south and three and one-half miles west of Halsey.

American Redstart. *Setophaga ruticilla ruticilla*. A common breeding
bird in the deciduous trees along the Middle Loup River in the Nebraska National Forest. Three specimens were obtained on July 7, one mile south and three and one-half miles west of Halsey. Tordoff and Vaughan each collected an adult male (KU 34118 and KU 34119) and Myers collected a juvenile male (KU 34120).

Yellow-headed Blackbird. *xanthocephalus.* This species was very common throughout the Sandhill Region. I shot an adult male (KU 34121) on July 11, eleven miles east of Kennedy. At the same locality on July 13, Tordoff shot an adult male (KU 34122) which had such badly worn plumage that the head appeared white in the field.

Orchard Oriole. *Icterus spurius.* Tordoff shot two adult males (KU 34123 and KU 34124) on July 7, one mile south and three and one-half miles west of Halsey.

Western Tanager. *Piranga ludoviciana.* Two adult males were obtained in the Pine Ridge by Tordoff. The first (KU 34125) was taken July 18, five miles north of Harrison. The second (KU 34126) was taken July 19, one mile north and ten miles west of Crawford in Sioux County.

Scarlet Tanager. *Piranga olivacea.* Two singing adult males were obtained. The first (KU 34127) was shot by Tordoff on July 7, one mile south and three and one-half miles west of Halsey. I shot the second (KU 34128) on July 14, at the Fort Niobrara National Wildlife Refuge, four miles east of Valentine. Even though we did not find the Western and Scarlet Tanagers occurring together at any locality, it seems probable that their ranges meet somewhere in western Nebraska, and that hybridization may occur in that area. At least one hybrid between these two species has been described (Tordoff, 1950, *Wilson Bulletin.* 62:3-4, 1 pl.).

Black-headed Grosbeak. *Pheucticus melanocephalus melanocephalus.* A total of eight specimens was obtained. Five of these were taken one mile south and three and one-half miles west of Halsey. On July 6, I shot an adult female (KU 34134) that had a brood patch, and Tordoff shot a singing adult male (KU 34133). On July 7, Tordoff shot a juvenile male (KU 34135). On the same date I shot an adult male (KU 34129) and a juvenile male (KU 34136). On July 16, I shot an adult male (KU 34130), eleven miles south of Gordon, Sheridan County. On July 18, Tordoff shot an adult male (KU 34132), five and one-half miles west of Crawford in Sioux County, and I shot an adult male (KU 34131), five miles north of Harrison. This species was common in Thomas and Sioux counties. We did not see Rose-breasted Grosbeaks (*Pheucticus ludovicianus*) at any locality and none of the specimens of Black-headed Grosbeaks show obvious evidence of hybridization.

Indigo Bunting. *Passerina cyanea.* On July 19, Tordoff obtained an adult male (KU 34137) one mile north and ten miles west of Crawford in Sioux County.

Lazuli Bunting. *Passerina amoena.* On July 19, Tordoff shot an adult male (KU 34140), occupying a territory adjacent to that of the Indigo Bunting he had collected. Neither bird shows any obvious hybrid characters.

Indigo Bunting × Lazuli Bunting hybrid. *Passerina cyanea × P. amoena.* On July 19, five miles west of Crawford, I shot a male bunting (KU 34138) which appears to be a hybrid between *P. cyanea* and *P.
amoena. The bird weighed 14.8 grams, was in worn plumage, and had large testes (9x7 mm.). The blue of the head and throat is intermediate between the purplish blue of cyanea and the light cerulean blue of amoena. The blue extends down onto the breast and, in the region of the tawny breast band of amoena, is mixed with a scattering of tawny feathers. The belly and under tail coverts are white as in amoena. The middle wing coverts are tipped with white, forming a wing bar, and a newly acquired greater wing covert on each wing shows a trace of white near the tip, but in neither case is the area of white as broad as in amoena. Wing and tail measurements (wing, 66 mm.; tail, 52 mm.), although worn, are those of cyanea, being shorter than the minimum measurements for amoena. Other measurements (exposed culmen, 10.4 mm.; tarsus, 16.5 mm.) are in the area of overlap between the two species. A recently fledged male bunting (KU 34139) in company with the hybrid male, and presumed to be its offspring, was also collected. This young bird shows no distinctive hybrid characteristics although this is to be expected in view of the close similarity in juvenal plumage of these two species of buntings.

Pine Siskin. Spinus pinus pinus. Two adult females with brood patches were obtained. The first (KU 34142) was taken by Tordoff on July 18, five and one-half miles west of Crawford in Sioux County. I shot the second (KU 34141) on July 19, five miles west of Crawford.

American Goldfinch. Spinus tristis tristis. Two adult males were taken one mile south and three and one-half miles west of Halsey. The first (KU 34143) was taken by Tordoff on July 6, and the second (KU 34144) by Myers on July 7.

Red Crossbill. Loxia curvirostra benti. An adult male (KU 34145) was secured by Tordoff on July 19, one mile north and ten miles west of Crawford in Sioux County. This bird and one accompanying it were the only ones seen.

Rufous-sided Towhee. Pipilo erythrphthalmus arcticus. This species was common in both the deciduous and coniferous woods of the Nebraska National Forest, and was seen at all localities except the Valentine National Wildlife Refuge. I collected two juvenile females (KU 34149 and KU 34150) on July 6, one mile south and three and one-half miles west of Halsey. On the same date at the same locality, Vaughan shot an adult male (KU 34147) that is intermediate between the races arcticus and erythrphthalmus. On July 8, at this locality, Myers shot an adult male (KU 34148). Vaughan collected another adult male (KU 34146) on July 19, one mile north and ten miles west of Crawford in Sioux County.

Grasshopper Sparrow. Ammodramus savannarum perpallidus. This species was common in the sandhills of the Nebraska National Forest. Tordoff shot an adult male (KU 34151) on July 7, one mile south and three and one-half miles west of Halsey.

Lark Sparrow. Chondestes grammacus strigatus. This species was common in the open conifer stands of the Nebraska National Forest. Three specimens were obtained one mile south and three and one-half miles west of Halsey. On July 6, Tordoff shot an adult female (KU 34152) that had a brood patch and ruptured follicles in the ovary, and I shot an adult male (KU 34153) that was molting. On July 8, I shot an adult female (KU 34154).
Field Sparrow. *Spizella pusilla arenacea*. This species was common in brushy areas of the sandhills in the Nebraska National Forest. Two specimens were taken on July 6, one mile south and three and one-half miles west of Halsey. The first, an adult female (KU 34155), was obtained by Myers. The second, a juvenal female (KU 34156), was obtained by Tordoff.—Museum of Zoology, University of Michigan, Ann Arbor, Michigan.

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species follows. The population curves for these six species are presented in Figures 2 through 4.

ROUGH-LEGGED HAWK: This species may well be called the winter hawk of western Nebraska. A peak of abundance is reached in December and January. The index shows a steady decline in numbers from January to May as they return to their breeding grounds in the Arctic region. They were not observed again until September 17 after being absent from June through August. Rough-legged Hawk numbers continued to increase through the fall period with a sharp increase from November to December. Rough-legged Hawk movements seem to follow a rather gradual dispersion as opposed to sharp migrational peaks characteristic of many species under consideration.

The Rough-legged Hawk occurred most commonly in the cropland type. The Pine Ridge type appears to be least desirable for this species.

MARSH HAWK: This species is present throughout the entire year in the panhandle region and was the most abundant hawk in 1957. Populations remained at a relatively low level during the winter months. The data indicate a sharp increase in April which probably represents the spring migration movement. As the migration period passes, the Marsh Hawk population reaches a low in May and June and is composed of the breeding birds. The characteristic increase mentioned previously occurred in July and August. This is probably due to increased activity on the part of nesting birds and young birds leaving the nest. The fall migration of Marsh Hawks apparently occurred in October, a month later than most species. By November the panhandle population had stabilized for the winter months.

The habitat preferences of the Marsh Hawk seems to follow the same general pattern as the Rough-legged Hawk.

GOLDEN EAGLE: This large bird of prey is most abundant during the winter months in western Nebraska, although it is present throughout the year. In some respects the population followed the same general pattern as the Rough-legged Hawk. From a high population in January there was a steady decline until April. No Golden Eagles were observed in April or May although they are known to nest in this region. Certainly, they are not abundant in spring and summer compared to other birds of prey. From September through December there was an upward population trend, probably resulting from an influx of birds from the north.

More Golden Eagles were observed in the grassland type than in either cropland of Pine Ridge. This species apparently has a preference for grassland.
RED-TAILED HAWK: The data collected on this Buteo indicate that summer is the time of greatest abundance. The slight increase in April may indicate a migration period; but it is nothing more than an indication. The Red-tailed Hawk is known to nest in the panhandle region. The increase in September probably represents the fall migration period. It is of interest that most of the Red-tail observations in September were immature birds. This species was not observed in December, January, February or March.

This hawk was most often observed in the cropland type, although many were also observed in grassland. None were observed in the Pine Ridge area.

SWAINSON’S HAWK: This Buteo was not observed during the winter months. No Swainson’s Hawks were recorded until April 19. The increase in July may be a result of increased activity of nesting birds as they hunt for food. The peak in September probably represents the fall migration period. The last Swainson’s Hawk
was observed on September 19. This species shows a definite affinity for the grassland type. The percentage of Swainson's Hawks in this type was greater than any other species.

SPARROW HAWK: This species was observed in all months except December and January. The increased index in April probably represents the spring migration period. The Sparrow Hawk population remained at a relatively low level during the months of May and June. This was another species that showed a decided increase in July followed by a downward trend in August. September was the peak of fall migration. Sparrow Hawks were more abundant during this month than any other species.

The Sparrow Hawk was the most abundant species in the Pine Ridge area, and apparently has a preference for this habitat type.

PEREGRINE FALCON: This predator probably occurs throughout the year in the panhandle region, although none was observed in May, June or November. They were never really abundant. The peak of abundance occurred in September which may indicate the fall migration period. There was no evidence of a spring migration period. It is possible that the spring migration was replaced by a gradual northward movement during the winter months of January, February and March.

This species appeared to prefer cropland to the other two types. The sample size was small, however, and it would be difficult to draw a re-
liable conclusion regarding habitat preferences.

CONCLUSIONS

The following conclusions appear to be justified on the basis of the data resulting from this study:

1. The population of avian predators is constantly changing in western Nebraska; these changes occur in both total numbers and species composition.

2. April and September are apparently the months of migration for most species under consideration. However, the fall migration of Marsh Hawks occurs in October.

3. Some species, notably the Rough-legged Hawk, appear to move gradually to and from wintering grounds in western Nebraska as opposed to a short period of migration characteristic of most species.

4. Most species show an increased density in July. This may be a result of both increased activity of nesting birds as the food demands of their young become greater, and the young birds leaving the nest toward the end of the month.

5. In the panhandle region, common winter residents are: Rough-legged Hawks, Golden Eagles, Marsh Hawks and Peregrine Falcons. The most common summer species are: Swainson's Hawks, Red-tailed Hawks and Sparrow Hawks.

6. Marsh Hawks and Rough-legged

\[\text{Figure 3}\]

--- Red-tailed Hawk.

--- Golden Eagle.
Hawks were the two most abundant species inhabiting the Panhandle of Nebraska in 1957.

7. Some Falconiformes show a more or less definite preference for one of the three habitat types classified as cropland, grassland and Pine Ridge.—Alliance.