*Wilson Bull.*, 96(3), 1984, pp. 464–467

**Food of Gyrfalcons at a nest on Ellesmere Island.**—The Gyrfalcon (*Falco rusticolus*), our largest falcon, lives at high latitudes in a relatively impoverished environment. Several studies reporting the feeding habits of this species in Alaska and the Yukon are summarized by Sherrod (Raptor Resear. 12:49–121, 1978). Additional dietary information is available from Greenland (Hagen, Gyldendal Norsk Forlat, Oslo, 1952; Mattox et al., Arctic 25:308–311, 1972; Summers and Green, Dansk Orn. Foren. Tidsskr. 68:87–90, 1974; Fletcher and Webby, Dansk Orn. Foren. Tidsskr. 71:29–35, 1977; Jenkins, Auk 95:122–127, 1978), the United Kingdom (Bannerman, The Birds of the British Isles, Oliver and Boyd, Edinburgh and London, United Kingdom, 1956), Russia (Dementiev and Gortchakovskaya, Ibis 87: 559–565, 1945; Kistchinski, Ornithologika 1:61–75, 1958; Dementiev, Der Gerfalke, Die Neue Brehm-Bucherei, No. 264, Wittenberg, Germany, 1960), Norway (Hagen, Skr. Norske Vidensk Akad., I. Math.-Nat. Il. No. 4, 1952:1–37, 1952), Finland (Pulliainen, Ornis. Fenn. 52:19–22, 1975), and Iceland (Suetens and van Groenendael, Ardeola 12:19–44, 1966; Bengtson, Vär Fagelvärld 21:253–266, 1967; Woodin, Raptor Resear. 14:97–124, 1980). However, to date, no one has published information on the food habits of Gyrfalcons residing in the high Arctic islands of Canada (i.e., those above a latitude of 75°).

While conducting a study of the nesting behavior of a pair of white Gyrfalcons on Ellesmere Island in 1973, we had the opportunity to record the relative occurrence of various prey items in their diet. Most previous studies conclude that the Gyrfalcon is mainly ornithophagous, but the data reported here suggest otherwise for Gyrfalcons breeding in the high Arctic islands.

The eastern slopes and lowlands of Axel Heiberg Island and those of western Ellesmere Island appear richer in plant and animal life than most of the high Arctic islands. Arctic willow (*Salix arctica*) forms highly productive and extensive stands in this region. The Gyrfalcon territory we watched was in the central part of this region. The nest-site, however, was surrounded on all sides by 1.6 km or more of bleak landscape. The terrain was poorly vegetated and few birds and mammals were seen during 1973 or in previous years. Three km away from the nest lay an area of richer vegetation from which the falcons secured most of their food.

Of 23 avian species found in the region by Parmalee and MacDonald (Natl. Mus. Canada, Bull. 169, Ottawa, 1960), eight were numerous enough to be potential food for Gyrfalcons. These included Oldsquaw (*Clangula hyemalis*), Common Eider (*Somateria mollissima*), King Eider (*S. spectabilis*), Rock Ptarmigan (*Lagopus mutus*), Ruddy Turnstone (*Arenaria interpres*), European Knot (*Calidris canutus*), Long-tailed Jaeger (*Stercorarius longicaudus*) and Snow Bunting (*Plectophenax nivalis*). Among mammals, only the Arctic hare (*Lepus arcticus*), collared lemming (*Dicrostonyx groenlandicus*), and short-tailed weasel (*Mustela erminea*) could be considered as potential food for Gyrfalcons. Throughout the study period, 24-h daylight prevailed and temperatures ranged from a "night time" minimum of −6.7°C to a day time maximum of 9–10°C in still air.

On 24 May, base camp was established and four plywood observation blinds (1.2 × 1.2 × 1.8 m [L × W × H]) were placed 122 m, 366 m, 762 m, and approximately 2.5 km from the nest. A fifth blind was installed 11 m from the nest ledge on 2 July, when the young were 9 days old. The blind 366 m from the nest was occupied each day for periods ranging from a few hours to 24 h continuously. The remaining blinds were occupied sporadically and infrequently. A total of 510.5 manhours was spent watching the falcons. Prey items brought to the nest were recorded and pellets both recent and from previous breeding attempts were collected from the nest ledge, from beneath the nest, and from under perches and roosts.

TABLE 1

GYRFALCON FOODS AT A NEST ON ELLESMERE ISLAND IN THE HIGH ARCTIC AS DETERMINED FROM SIGHTINGS AND ANALYSES OF PELLETS

| Species | Prey brought to the nest sightings | | | Pellets[a] | | |
|---|---|---|---|---|---|---|
| | N | % occur. | % wt. | N | % occur. | % wt. |
| Arctic hare[b] | 32 | 44 | 93.0 | 168 | 23.0 | 82.3 |
| Collared lemming | 7 | 10 | 0.7 | 298 | 40.8 | 5.1 |
| Short-tailed weasel | 3 | 4 | 1.7 | 2 | 0.3 | 0.2 |
| Mammal totals | 42 | 58 | 95.4 | 468 | 64.1 | 87.6 |
| Ruddy Turnstone | 10 | 14 | 2.3 | 78 | 10.6 | 3.2 |
| European Knot | 9 | 13 | 2.2 | 119[c] | 16.2 | 5.2 |
| Shorebird totals | 19 | 27 | 4.5 | 197 | 26.8 | 8.4 |
| Snow Bunting | 0 | 0 | 0 | 31 | 4.2 | 0.4 |
| Redpoll (*Acanthis flammea*) | 1 | 1 | 0.1 | 1 | 0.1 | <0.1 |
| Passerine totals | 1 | 1 | 0.1 | 32 | 4.3 | 0.4 |
| Duck (Anatidae spp.) | 0 | 0 | 0 | 1[d] | 0.1 | 0.1 |
| Rock Ptarmigan (*Lagopus mutus*) | 0 | 0 | 0 | 14 | 1.9 | 2.9 |
| Not identified[e] | 10 | 14 | not incl. | 21 | 2.9 | 0.6[f] |
| Totals | 72 | — | — | 732 | — | — |

[a] We examined 606 pellets.
[b] Calculated at ⅓ average adult weight.
[c] Includes three occurrences of Sanderling.
[d] Downy.
[e] Includes all other species as well as those not identified.
[f] Based on average weights of knot, turnstone, bunting, redpoll not identified to species in pelletal remains.

On 15 July, the male no longer visited the nest ledge, perhaps as a result of our intrusion. It is not known whether the male supplied food to the female out of our sight. Between 23 and 28 July, we provided pieces of hare daily as supplements to the food provided by the female for the three young. The pieces of hare left on highly visible roosting places were found and carried by the female to the nest ledge and fed to the young. In subsequent analysis of the food brought to the nest we attempted to exclude this supplemental food. Hare remains from that source did occur in pellets and probably constituted a minor bias in current year food data. Less than 10% of the total number of pellets studied appeared to have been cast during the study season, however, and only those cast during the few days of supplemental feeding could have been involved. We conclude, therefore, that the provision of hare during the study did not invalidate the overall species profile of food consumed by this Gyrfalcon family. Arctic hare not only dominated food sightings when no supplemental feeding was underway, but also dominated the contents of pellets from previous years.

We observed a total of 72 food items (exclusive of supplements) being brought to the nest, 61 of which were identified to species. A total of 606 pellets yielded 732 species occurrences. The diet contained a preponderance of Arctic hare and signficant numbers of

knots and turnstones. The genus *Calidris* formed 3.75% by weight of all food (data from pellets). All but three knots brought to the nest were the European Knot, one of which bore B. M. Band #CK68040 and was banded in Norfolk, England, on 27 August 1968. The remaining three items were Sanderlings (*Calidris alba*). Snow Buntings were not seen among any of the prey brought to the nest or in the pellets analyzed. Buntings frequented the nest ridge and were seen flying, perching, and copulating as close as 1.2 m to the sitting falcon. Old bunting nests were found in deep, wind-eroded niches in the sandstone within a few centimeters of one of the males' perches. Remains of jaeger, King Eider, and Oldsquaw were found in and near the nest, each as a single occurrence. Table 1 summarizes the results of food analysis with respect to sightings and pellets.

Early in the study, the adults fed on small young hares. Later, the adult female was observed returning to the nest with the hind quarters of larger hares, obviously flying very hard and carrying a heavy load. It appeared to be close to the maximum load that an adult female is capable of carrying in sustained flight. Once she stood for nearly a minute after landing, with drooping wings and half-open beak, panting and evidently fatigued. Pulliainen (1975) calculated a maximum carrying load of approximately 1.8 kg for Gyrfalcons.

The adults continued to bring hares to the nest as the season progressed. The young hares were usually brought to the nest only as partial carcasses, i.e., paired hind legs. They were smaller and darker in color than those young hares we saw during our daily travels. This discrepancy persisted to the end of the study, by which time young hares seen on the landscape were almost as large as adults and were white, while those brought to the nest were smaller and mostly brown.

Mammals constituted the major part of the summer diet of the Gyrfalcons we studied in 1973. Arctic hare have traditionally maintained relatively high populations in the region compared to elsewhere in the Arctic and appear to be a reliable food resource (Parker, Can. Field-Nat. 91:8–18, 1977). Late litters of hare in 1973 were numerous and accessible enough, such that the adult female could find them and bring carcasses to the nesting cliff as late as the third week of August. The Gyrfalcons were therefore able to maintain primary dependence on hares throughout the breeding season because small hares were available throughout the summer. It seems unlikely that a Gyrfalcon could kill an adult hare weighing up to 5.5 kg and certainly could not carry away even the beheaded and gutted carcass of an adult hare.

While none of Cade's (Univ. Calif. Publ. Zool. 63:151–290, 1960) data from Alaska include Arctic hare as food for Gyrfalcons, other isolated occurrences have been recorded. Bent (Life Histories of North American Birds of Prey, Pt. 2, Dover Publ., New York, New York, 1961) makes mention of it and Wynne-Edwards (Auk 69:364–366, 1952) refers to Arctic hare found beneath a Gyrfalcon nest on southern Baffin Island. Johansen (1957) and Cade (1960) stated that in western Siberia Gyrfalcons occasionally prey on snowshoe hares (*L. americanus*) and Arctic hares. Dementiev (1960) reported that Arctic hare was present in the diet of Norwegian Gyrfalcons in "small" numbers. A breeding pair of Greenland Gyrfalcons did demonstrate a reliance on Arctic hare and Snow Buntings in the absence of lemmings and ptarmigan (Summers and Green 1974). Fletcher and Webby (1977) also reported Gyrfalcon young being raised on hare.

Dementiev (Birds of the Soviet Union, Vol. 1, Engl. transl., 1951) and Cade (1960) both stated that, with regard to trophic relations, Gyrfalcons may be divided into two distinct groups: (1) the coastal and insular breeding populations feeding on aquatic birds, i.e., alcids, larids and anatids; and (2) interior populations, most of which feed predominantly on ptarmigan, even in summer. Although the Gyrfalcons in this study nested close to the sea, there were no known alcid populations in the area, the closest larid population was 48 km distant, and ducks were uncommon. Local conditions, therefore, prevented the Gyrfalcons

we watched from fitting into the feeding niches designated by Cade (1960) and Dementiev (1951) as coastal and insular.

Gyrfalcons were widely distributed throughout the high Arctic islands. Known colonies of seabirds are few and widely spaced. Ptarmigan are not known to exceed low populations there and were not observed on the project area during three previous summers. A few remains of ptarmigan in winter plumage were found near the nest but they did not amount to more than a few kills. High populations of ptarmigan have not been reported from the high Arctic islands. It therefore appears that all Gyrfalcon populations in the high Arctic do not necessarily have access to food sources regarded as typical in other areas.—DALTON MUIR, *Canadian Wildlife Service, Ottawa, Ontario K1A 0E7, Canada*; AND DAVID M. BIRD, *Macdonald Raptor Research Centre, Macdonald College of McGill Univ., 21,111 Lakeshore Rd., Ste-Anne-de-Bellevue, Quebec H9X 1C0, Canada.* *Accepted 10 Jan. 1984.*

*Wilson Bull.*, 96(3), 1984, pp. 467–469

**High incidence of plant material and small mammals in the autumn diet of Turkey Vultures in Virginia.**—Reports of feeding behavior and food of the Turkey Vulture (*Cathartes aura*) have been mainly anecdotal (Pearson, Bird-Lore 21:319–321, 1919; Kempton, Wilson Bull. 39:142–145, 1927; Hamilton, Auk 58:254, 1941). Recent reports focus on the unusual items in the diet and behaviors associated with obtaining these foods (Jackson et al., Wilson Bull. 90:141–143, 1978; Titus and Mosher, Can. Field. Nat. 94:327–328, 1980). Materials found near nests after adults have fed young also have been used to describe the diet of Turkey Vultures (Pearson 1919; Coles, Auk 61:219–228, 1944). I examined pellets cast by Turkey Vultures to determine the dietary composition and relative frequency of food types used by these birds in the autumn.

Fifty-three pellets were collected from beneath a large roost between 28 September and 9 November 1978. The roost is located on the Radford Army Ammunition Plant, 14 km west of Blacksburg, Montgomery Co., Virginia, and was previously described by Prather et al. (Wilson Bull. 88:667–668, 1976). Pellets were air dried, weighed, and dissected. All non-hair material was removed, identified, and counted. Hair was spread over a grid and a random sample of 500 hairs was removed from each pellet and microscopically identified. Dichotomous keys (Williams, J. Wildl. Manage. 2:239–250, 1938; Mathiak, J. Wildl. Manage. 2:251–269, 1938; Spires, M.Sc. thesis, VPI&SU, Blacksburg, Virginia, 1973) and a regional reference collection were used to identify the mammal hairs. I determined the presence-absence of each mammal based on the identification of its hair in samples from all pellets. Quantification of non-mammal species was also based on presence-absence in all pellets. The proportion of species' remains in each pellet does not necessarily reflect the importance of that species in the diet of Turkey Vultures since remains of different types and of different taxa are ingested at unequal rates. The data do, however, give some suggestion of the relative abundance of various food sources.

Pellets were oblong and tapered at one end. Each measured approximately 5 cm long, 3 cm wide, and 2 cm deep at the thickest part. The mean dry weight was 2.76 ± 2.17 g. The pellets were stained with a yellow-green substance and produced a pungent odor which dissipated when they were soaked in water. Most of the pellets (74%) were composed of compacted quantities of hair or other material from one species. Incorporated into most of the pellets comprised of hair were varying amounts of vegetation, feathers, snake scutes, and a small quantity of bone.

The results reflect the diverse diet of a scavenger and are not totally unexpected (Table