nest. Distances between birthplace and breeding placed were .05, 1.01, 1.19, and 1.50 km ($\bar{x} \pm SD = .94 \pm .62$ km).

I observed no banded females, perhaps because most of them dispersed from the study area. In most bird species, natal philopatry is more common among males than females (Greenwood 1980). In theory, males are best able to establish a territory in a familiar area, such as near a natal home range, whereas females should disperse to search for a male that has a territory of high quality (Greenwood 1980).

Long-eared Owls sometimes nest in loose colonies of 3 to 4 pairs (Bent 1938, Trap-Lind 1965 *in* Mikkola 1983). In the SRBPA, I observed 3 colonies of 4 pairs each. The closest nests were only 16 m apart. If natal philopatry is widespread among Long-eared Owls, it could result in increased relatedness among close-nesting pairs, either through inbreeding or from nonsexual association of offspring and parents, or siblings. Increased relatedness could lead to the evolution of cooperative traits through kin selection. Redmond and Jenni (1982) detected male-biased natal philopatry in Long-billed Curlews (*Numenius americanus*) and they speculated that cooperative mobbing by males evolved through kin selection among philopatric individuals. Poole (1982) observed adult Ospreys (*Pandion haliaetus*) feed banded fledglings that were not their own, and he suggested that kin selection among natally philopatric birds was responsible for the behavior.

Close-nesting Long-eared Owls cooperated in nest defense, with members of 2 to 3 pairs performing distraction displays near the same nest. In addition, adults may have fed young that were not their own. Fledglings from different nests became intermixed in nesting colonies, and I observed newly-fledged young from 3 different nests roosting in the same tree. In one case, a banded fledgling intruded into a nearby nest that contained unfledged young. It is not known if owls can recognize their offspring. However, if adjacent pairs are likely to be related, and if food is not in short supply, then there may be no selection against Long-eared Owls that feed neighboring fledglings.

The study was part of the Snake River Birds of Prey Research Project, Boise District, Bureau of Land Management. Additional support was provided by the New Jersey Raptor Association. I thank C. S. Houston, H. Källander, P. Kerlinger, C. D. Marti, B. R. McClelland, and R. L. Redmond for their comments on an earlier draft. E. Yensen, L. R. Powers, and J. Martin provided trapping equipment.

LITERATURE CITED

Bent, A. C. 1938. Life histories of North American birds of prey (part 2). U.S. Natl. Mus. Bull. 170.

Drent, R. 1971. Incubation. Pp. 333–420, *in* Avian biology, D. S. Farner and J. R. King, eds. Academic Press, New York.

Greenwood, P. J. 1980. Mating systems, philopatry and dispersal in birds and mammals. Anim. Behav. 28:1140–1162.

Mikkola, H. 1983. Owls of Europe. Buteo Books, Vermillion, South Dakota.

Poole, A. 1982. Breeding Ospreys feed fledglings that are not their own. Auk 99:781–784.

Redmond, R. L., and D. A. Jenni. 1982. Natal philopatry and breeding area fidelity of Long-billed Curlews (*Numenius americanus*): patterns and evolutionary consequences. Behav. Ecol. Sociobiol. 10:277–279.

Wijnandts, H. 1984. Ecological energetics of the Long-eared Owl (*Asio otus*). Ardea 72: 1–92.

Jeffrey S. Marks, *Montana Cooperative Wildlife Research Unit, University of Montana, Missoula, Montana 59812.* (Present address: *U.S. Bureau of Land Management, Boise District, 3948 Development Avenue, Boise, Idaho 83705.*) Received 13 Aug. 1984; accepted 28 Jan. 1985.

Neckband a Handicap in an Aggressive Encounter between Tundra Swans.— Neckbands are used in North American studies of geese and swans, and while the impact of neckbands on bird behavior is poorly understood it is assumed of little consequence

(Craven 1979). Ankney (1975) suggested neckbands contributed to starvation of female Lesser Snow Geese (*Chen caerulescens*), but Raveling (1976) disputed his conclusion. Neckbands may have caused an apparent decline in productivity of Black Brant (*Branta bernicla*) by disrupting pair bonds (Lensink 1968) or lowering success in agonistic encounters (Abraham et al. 1983). Here we describe how a neckband handicapped a Tundra Swan (*Cygnus columbianus*) in an aggressive encounter.

During July and August, 1982, we marked one subadult and 32 adult Tundra Swans with blue plastic neckbands on the Colville River delta, which lies between Barrow and Prudhoe Bay, Alaska. A 3 mm-thick neckband developed by Izembek National Wildlife Refuge, Cold Bay, Alaska was used.

On 30 May 1983, during peak swan arrival, Simpson observed 6 adult Tundra Swans on the shore of a large, partially ice-free lake in the northwest corner of the delta. After several minutes of aggressive posturing and charges, 2 swans departed quietly, leaving 2 apparently mated pairs. One of the remaining swans wore a blue neckband but distance from the bird prevented reading the alpha-numeric characters.

One of the unmarked swans threatened the banded bird with a "ground stare" (Scott et al. 1972) and attacked. It grasped the neckband from the front with its bill and rapidly beat the bird with its wings. The neckbanded swan was unable to escape and, so held, could only give weak, ineffective head jabs and wing blows. After about a minute of steady beating, the banded bird broke free and took flight with its mate close behind. The victor followed a short distance, then returned to its mate and the pair performed an extended, vocal "quivering wings" display (Cooper 1979).

The defeated pair was not seen there for the remainder of the summer. On 31 May and 3 June, pairs in which one swan wore a neckband were seen nearby, but distance from the birds again prevented reading the neckbands. No swans nested near the lake, but a pair in which both birds were neckbanded fed there regularly in late June. Hence, the aggressive encounter apparently was related to competition for the limited open-water habitat available before nesting.

Aggressive interactions between Tundra Swans are common on the breeding grounds (Scott 1977, L. Hawkins unpubl. data). Intensity and frequency of encounters are highest during arrival, initial occupation of breeding territories, and at hatching. Both male and female vigorously defend a breeding territory which is used for feeding and loafing during nesting and brood rearing, and contains the nest. Threats, charges, and aerial chases with minimal contact between swans are most common, but 3 additional intense fights between resident breeding swans and intruders were witnessed during the 2 summers. None of these birds was neckbanded, however.

We thank the U.S. Fish & Wildlife Service, Office of Special Studies, and Office of Migratory Birds; Arctic Institute of North America; Dayton Fund of the Bell Museum of Natural History; and University of Minnesota Agricultural Experiment Station for financial support. James Cooper, Dirk Derksen, James G. King, Todd Peterson, Thomas Rothe, and anonymous reviewers provided helpful comments on the manuscript.

LITERATURE CITED

Abraham, K. F., C. D. Ankney, and H. Boyd. 1983. Assortative mating by brant. Auk 100:201–203.

Ankney, C. D. 1975. Neckbands contribute to starvation in female Lesser Snow Geese. J. Wildl. Manage. 39:825–826.

Cooper, J. A. 1979. Trumpeter Swan nesting behaviour. Wildfowl 30:55–71.

Craven, S. R. 1979. Some problems with Canada Goose neckbands. Wildl. Soc. Bull. 7: 268–273.

Lensink, C. J. 1968. Neckbands as an inhibitor of reproduction in Black Brant. J. Wildl. Manage. 32:418–420.

Raveling, D. G. 1976. Do neckbands contribute to starvation of Lesser Snow Geese? J. Wildl. Manage. 40:571–572.

Scott, D. 1977. Breeding behaviour of wild Whistling Swans. Wildfowl 28:101–106.

Scott, P., and the Wildfowl Trust. 1972. The Swans. Houghton Mifflin Company, Boston. 242 pp.

LORI L. HAWKINS, *Department of Fisheries and Wildlife, University of Minnesota, St. Paul, Minnesota 55108;* and SUSAN G. SIMPSON, *South Dakota Department of Game, Fish and Parks, 445 East Capitol, Pierre, South Dakota 57501.* Received 24 May 1984; accepted 28 Jan. 1985.

Recoveries of Ferruginous Hawks Banded in South-central North Dakota.—The objectives of this note are to describe dispersal patterns, migration routes, wintering areas, and mortality of Ferruginous Hawks (*Buteo regalis*) banded in North Dakota. We also discuss papers summarizing recoveries of this species banded in other areas, including those of Lincoln (1936), Salt (1939), Thurow et al. (1980), and Harmata (1981).

From 1977 through 1979 we banded 1010 Ferruginous Hawks within a 16,519-km^2 study area encompassing Stutsman, Kidder, Burleigh, and Logan counties in south-central North Dakota. Banding was done in conjunction with nesting studies of the Ferruginous Hawk (Gilmer and Wiehe 1977, Gilmer and Stewart 1983). We also included 21 additional Ferruginous Hawks banded in the same area in 1976 by J. W. Grier. All birds were banded as nestlings, 3 weeks or older, with U.S. Fish and Wildlife Service leg bands. Guidelines described by Fyfe and Olendorff (1976) were followed to prevent injury to young birds. Although male and female Ferruginous Hawks differ in size, the wide overlap did not permit reliable sexing. We grouped recoveries into seasons for analysis: fall (1 August to 31 October), winter (1 November to 31 January), spring (1 February to 30 April), and summer (1 May to 31 July). We calculated band recovery rates by dividing the total reported recoveries of banded birds by the total number of birds banded.

Forty Ferruginous Hawk recoveries were reported through 1982. Four were recovered within 10 km of their nests between 30 and 80 days following fledging. However, most young and adults probably left the nest site vicinity within 40 days following the peak period of fledging—about the first week of July (Konrad and Gilmer, unpubl. data), a finding also noted by Thurow et al. (1980).

Evidence of a premigration drift or dispersal (Stewart 1980) was suggested by recoveries 350 km northwest and 600 km southwest of banding sites within 55 days of fledging. In Idaho, prevailing winds and reduced prey populations in natal areas may have encouraged young birds to drift northeasterly (Thurow et al. 1980). However, these factors did not satisfactorily explain the dispersal movements we observed, which may have been random (Brown and Amadon 1968). Factors such as terrain features may also have influenced these movements.

Recovery patterns observed for Ferruginous Hawks we banded define a migration route through the midwestern states into Mexico (Fig. 1). Only one bird was recovered west of the Rocky Mountains. None was recovered east of the Mississippi River, but few sightings occur in the east (Adams 1978). Ferruginous Hawks banded in Alberta (Salt 1939) and Colorado (Harmata 1981) had recovery patterns similar to those we banded, while hawks banded as nestlings in southern Idaho (Thurow et al. 1980) were recovered in a wide region on both sides of the Rocky Mountains.

Texas and Mexico appeared to be important wintering areas for Ferruginous Hawks banded in south-central North Dakota. About 46% of all winter and spring recoveries of hawks we banded were reported from those regions. Harmata (1981) also reported Texas as a primary wintering area for Ferruginous Hawks produced in northeastern Colorado.

Spring migration for some <1-year-old hawks may be a leisurely drift northward, as suggested by recoveries of our banded birds in Oklahoma (8 April), Kansas (20 April, 15 May), and South Dakota (20 May, 18 June), all of which occurred when Ferruginous Hawk pairs in North Dakota usually had eggs or young. Since there is no evidence that this species breeds during the first year, it seems likely that prior to breeding age Ferruginous Hawks may wander widely, seeking areas with adequate prey. Weather patterns may also influence seasonal movements of these hawks.

Three Ferruginous Hawk recoveries were reported from locations 250 to 500 km northwest of the banding site in southern Saskatchewan. Two were year-old birds re-