DISTANCES BETWEEN BIRTHPLACE AND BREEDING PLACE IN SPARROWHAWKS AND OTHER EUROPEAN RAPTORS

by
I. Newton
Institute of Terrestrial Ecology
Monks Wood Experimental Station
Abbots Ripton, Huntingdon PE17 2LS, England

Abstract

Raptors that have been studied tended to settle and breed in the neighbourhood where they were born, and band recoveries (and hence dispersed birds) fell off exponentially in successive circles out from the birthplace. Within species, geographical or annual differences in dispersal distances occurred, probably dependent on the distribution of food sources and of vacant territories. Individuals in some irruptive populations tended to disperse further than those in other populations. In European Sparrowhawks and Hobbies, females dispersed further on average than did males.

Introduction

The question of how far raptors disperse from their birthplace to their subsequent breeding place is relevant both to population theory and to conservation. In this paper I shall summarize some information on this point from European banding schemes. For any such analysis, recoveries come mainly from members of the public, and the assumption usually has to be made that any bird of appropriate age reported in the breeding season was in fact nesting at the locality concerned.

I took care to separate the immatures, for ringing has already shown that these birds may summer in partly different areas from the breeding adults of their population. So far at least three such traits have emerged: (1) the immatures may remain all summer in "winter quarters," e.g., first-year Steppe Buzzard (*Buteo b. vulpinus*); (2) they may migrate north later and spend less time on the breeding areas than adults, e.g., Broad-winged Hawk (*B. platypterus*); or (3) they may migrate north but stop short of the breeding areas, e.g., second-year Osprey (*Pandion haliaetus*) (Olsson 1958, Osterlof 1951, Matray 1974, Schifferli 1965). Moreover, different populations of a species may behave in different ways, as may the different age-groups among the nonbreeders of a single population. In the Osprey, most recoveries of yearlings in summer come from the "winter quarters," most recoveries of second-year birds are from further north but not as far as the breeding areas, and only in later years are most recoveries from the breeding areas themselves. This pattern holds in both the Old World and the New (Osterlof 1951, 1977; Henny & van Velzen 1972). In the Black Kite (*Milvus migrans*), which migrates from Europe to Africa, a more protracted pattern is found, as the majority of summer recoveries come from progressively nearer the birthplace from the first to the fourth and later years (Shifferli 1967). In several migrant species, occasional adults are reported in summer on "winter quarters." In the literature it is usually assumed that these birds are skipping a breeding attempt rather than nesting far to the south of their usual range.

Sparrowhawk

It is convenient to start with the European Sparrowhawk (*Accipiter nisus*) because more records are available for this than for ay other raptor. The species is non-migratory in Britain, and, when the young become independent in August, they disperse outwards in various directions from the nest (Newton 1975). They begin breeding in their next summer or the one after, in their first or second year.

The breeding season recoveries of this species were mostly clustered around the birthplace and became sparser with increasing distance (fig. 1). Thus about 76% of 201 recoveries were within 20 km of the birthplace, and almost all were within 50 km. Treating all the recoveries together, their density fell off exponentially in concentric circles out from the birthplace, a drop of about 99% between the 0–5 km zone and the 21–25 km zone. This pattern was established by the first autumn and hardly changed thereafter, implying that in this species most birds dispersed within a few weeks of fledging to near where they would later breed. I therefore included all first-year birds in the analysis just described, even though some of them may not have nested.

Other Species

The breeding season recoveries of other raptors also thin out with increasing distance from the birthplace, but at different rates in different species. A circle drawn at 50 km round the birthplace would include 98% of breeding season recoveries of the British Sparrowhawk, 89% of the British Kestrel (*Falco tinnunculus*), 75% of the British Merlin (*Falco columbarius*), 71% of the Swedish Goshawk (*Accipiter gentilis*), 62% of the German Buzzard (*Buteo buteo*), and 43% of Fennoscandian Ospreys of breeding age (table 7). Using data from the European and Soviet ringing schemes, Galushin (1974) calculated the mean distance between birthplace and presumed breeding place for eleven raptor species. This distance was much greater in some of the irruptive species, which depended on sporadic food sources, than in the others.

Table 1. Dispersal of Some European Raptors from Birthplace to Presumed Breeding Place.

Species (region, number)	% of all breeding season band recoveries within following distances (km) from birthplace					Reference
	20	50	100	200	500	
Osprey (Fennoscandia, 79)	?	43	59	67	77	Osterlof 1977
Black Kite (Switzerland, 11)	?	?	91	?	100	Schifferli 1967
Goshawk (Sweden, 55)	31	71	84	93	98	Hoglund 1964
Sparrowhawk (Britain, 201)	76	98	99	100	100	B.T.O. records
Buzzard (Britain, 15)	73	93	100	100	100	B.T.O records
(Germany, 45)	?	62	?	98	100	Mead 1973
(Denmark, 10)	30	60	80	100	100	Nielsen 1977
(Fennoscandia, 15)	67	95	100	100	100	Olsson 1958
Kestrel (Britain, 18)	61	89	89	100	100	Snow 1968
(Holland, 150)	?	63	80	93	100	Cavé 1968
(Switzerland, 35)	?	43	46	51	91	Schifferli 1965
Merlin (Britain, 16)	38	75	81	100	100	Mead 1973°°
Hobby (Germany, 12)°	92	100	100	100	100	Fiuczynski 1978

Note: °Probably all males, females disperse further; °°amplified by letter.

The most extreme was the Rough-legged Buzzard (*Buteo lagopus*), with a mean dispersal distance of nearly 2,000 km (number of recoveries was not given).

Within species, geographical trends occurred, which accorded with regional differences in the stability of food sources. Mean distances between birthplace and breeding place were longer for the Kestrel (277 ± 57) and Common Buzzard (295 ± 105) in northern and eastern Europe than they were in western and central Europe (146 ± 59 and 60 ± 11 km), and longer still than they were in Britain (Galushin 1974, table 1). Among Goshawks in northern Europe, movements were longer in poor food years than in good ones (Haukioja & Haukioja 1970). Presumably birds had to search further, on average, in poor food conditions than in good ones until they found vacant areas with sufficient food.

Sex Differences

In two species, dispersal between birthplace and breeding place could be examined separately for the sexes, and in both species females moved farthest. In the Sparrowhawk this was evident from the British ring recoveries, in which two-thirds of males had moved less than 10 km from their birthplace, and two-thirds of females had moved more than 10 km (table 2). In the Hobby (*Falco subbuteo*), it was evident from a local study near Berlin, in which 85% of 180 male Hobbies seen breeding had been raised in the area, compared with only 11% of 174 females ($P<0.001$). As the

Table 2. Sex Difference in the Dispersal Distances of British Sparrowhawks between Birthplace and Presumed Place of First Breeding.

	Dispersal distance	
	Less than 10 km	More than 10 km
Males	20	11
Females	9	20

Significance of difference, $x^2 = 6.7$, $P<0.01$

Figure 1. Breeding season recoveries of ringed Sparrowhawks showing distance of recovery from birthplace, which is represented by the center of the circle at the cross lines.

sex ratio among nestlings ringed in the area was about equal, this difference implied a much greater fidelity to birthplace among males than among females (it was too great to be due to differential mortality) (Fiuczynski 1978). Such sex differences in dispersal may occur because males and females are exposed to different ecological conditions, or they may be inherent, perhaps serving to reduce inbreeding. Thus despite the many intensive studies that have been made of colour-ringed populations of other birds, hardly any brother-sister or parent-child matings have been recorded, and when they did occur, they were less successful than matings between unrelated individuals (Lack 1954, Greenwood et al. 1978).

Acknowledgments

I am grateful to the British Trust for Orinithology for use of ringing data, and to the Nature Conservancy Council for financing part of this work.

Literature Cited

Cavé, A. J. 1968. The breeding of the Kestrel, *Falco tinnunculus* L., in the reclaimed area Oostelijk Flevoland. *Netherlands J. Zool.* 18:313–407.

Fiuczynski, D. 1978. Zur Populationsökologie des Baumfalken (*Falco subbuteo* L., 1758). *Zool. Jb. Syst. Bd.* 105:193–257.

Galushin, V. 1974. Synchronous fluctuations in populations of some raptors and their prey. *Ibis* 116:127–34.

Greenwood, P. J., Harvey, P. H., and Perrins, C. M. 1978. Inbreeding and dispersal in the Great Tit. *Nature* 271:52–4.

Henny, C. J., and van Velzen, W. T. 1972. Migration patterns and wintering localities of American Ospreys. *J. Wildl. Manage.* 36:1133–41.

Höglund, N. 1964. Der Habicht *Accipiter gentilis* Linné in Fennoscandia. *Viltrevy* 2:195–270.

Lack, D. 1954. *The natural regulation of animal numbers.* Oxford: Clarenden.

Matray, P. F. 1974. Broad-winged Hawk nesting and ecology. *Auk* 91:307–24.

Mead, C. J. 1973. Movements of British raptors. *Bird Study* 20:259–86.

Newton, I. 1975. Movements and mortality of British Sparrowhawks. *Bird Study* 22:35–43.

Nielson, B. P. 1977. Migratory habits and dispersal of Danish Buzzards *Buteo buteo. Dansk Orn. Foren. Tidsskr.* 71:1–9.

Olsson, O. 1958. Dispersal, migration, longevity and death causes of *Strix aluco, Buteo buteo, Ardea cinerea* and *Larus argentatus. Acta Vertebratica* 1:91–189.

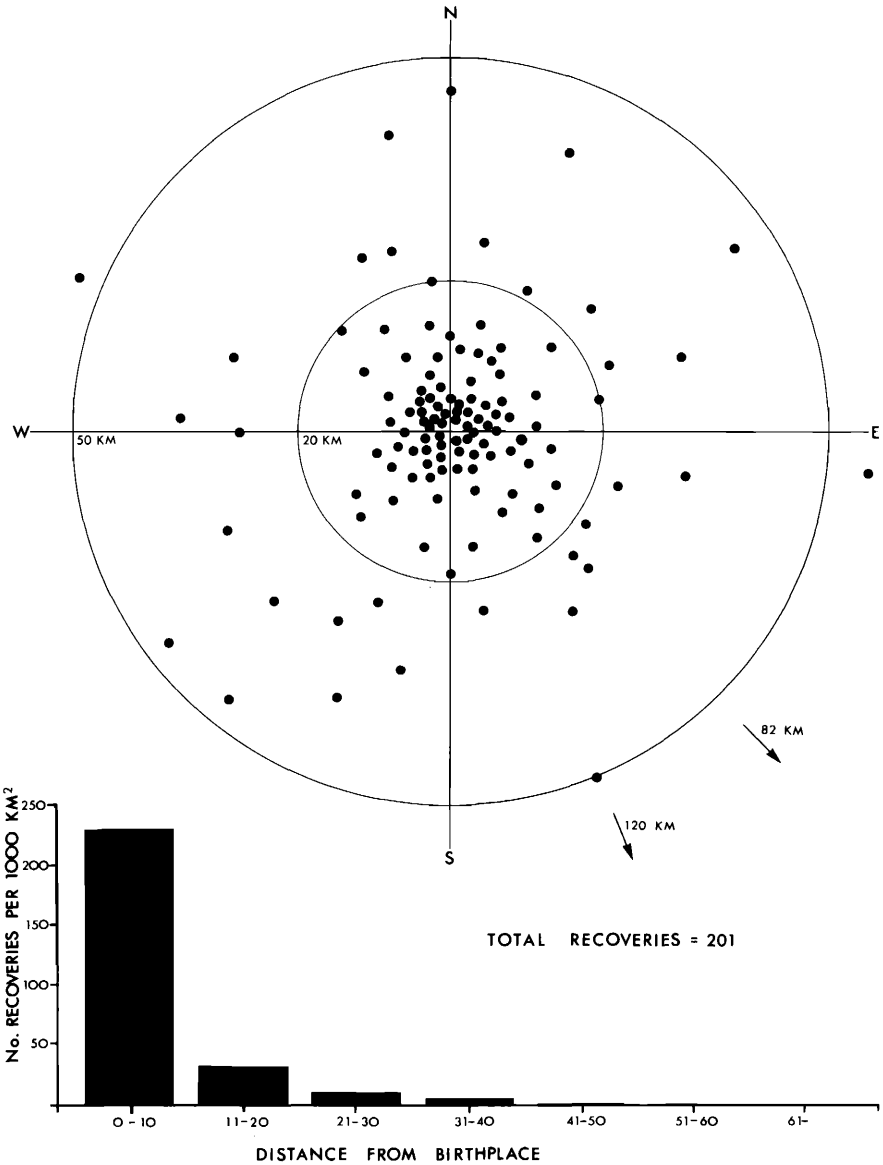
Osterlof, S. 1951. Fiskgjusens, *Pandion haliaetus* (L), flyttning. *Var F*ågelvårld 10:1–15.

Osterlof, S. 1977. Migration, wintering areas, and site tenacity of the European Osprey *Pandion h. haliaetus* (L). *Ornis Scand.* 8:61–78.

Schifferli, A. 1965. Vom Zugverhalten der in der Schweiz brutenden Turmfalken *Falco tinnunculus,* nach den Ringfunden. *Orn. Beob.* 62:1–13.

Schifferli, A. 1967. Vom Zug Schweizerischer und Deutscher Schwarzer Milane nach Ringfunden. *Orn. Beob.* 64:34–51.

Snow, D. W. 1968. Movements and mortality of British Kestrels *Falco tinnunculus. Bird Study* 15:65–83.


N
W
E
S
50 KM
20 KM
82 KM
120 KM
TOTAL RECOVERIES = 201
No. RECOVERIES PER 1000 KM²
250
200
150
100
50
0 - 10
11-20
21-30
31-40
41-50
51-60
61-
DISTANCE FROM BIRTHPLACE