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DISTRIBUTION AND BREEDING OF THE BARN OWL TYTO ALBA ON
ANGLESEY, NORTH WALES

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PREFACE

The Barn Owl is a vulnerable species owing to its association with man; in particular, through its use of rural buildings for roosting and nesting. This paper describes aspects of its population and breeding on the island of Anglesey.

Bunn et al. (1982) have shown that the ecology of the Barn Owl Tyto alba has not been well-studied in Britain. Most of the available information relating to breeding is based on studies in Britain as a whole (D.E. Glue, in Bunn et al., loc. cit.). Detailed information on local populations is scarce. The bird is widespread on Anglesey, north Wales (Sharrock 1976), where we ourselves have worked, but initially we were unable to learn from local ornithologists approximately how many individuals were present, or how they were finely distributed.

In Britain, trees have been, and still are, an important category of nest-site for the bird (Blaker 1933, Bunn et al. 1982). On Anglesey, it uses farm buildings and derelict rural houses for roosting and nesting; suitable hollow trees are few, but it sometimes also nests in rocky outcrops, prominent in some parts of the island. It seemed likely that its population size on Anglesey might even be limited by the availability of sites in buildings. In order both to increase the potential number of nest-sites, and to provide readily accessible birds for study, nest-boxes were erected.

The island of Anglesey, north Wales, presents a mostly low-lying, undulating landscape, where mixed farming is the principal land-use. The soils are predominantly brown earths with gleys, plus poorly-drained alluvium in numerous narrow river valleys (Roberts 1958).

The present report describes (1) population distribution and size in the species on the island, and (2) data relating to breeding and juvenile survival and dispersal. A separate report (Seel, Turner and Thomson, in prep.) will describe seasonal and local variations in its diet.

METHODS

Distribution

An elementary map of the distribution of the Barn Owl on Anglesey was compiled from a combination of (1) sightings of birds, obtained from bird-watchers and local people, (2) roosting sites (indicated by the finding of pellets), (3) breeding records, and (4) birds found dead; the total number of records, c. 550, was considered to have been enough to swamp any serious effects arising from any inequalities in the distribution of observer effort. This information was accumulated over the years 1974 - 1982, and assessed on the basis of a single positive record in any 1 km square on the Ordnance Survey 1: 50 000 map of Anglesey, and summarised by 5 km squares. In the case of coastal 1 km squares, only those squares containing 50% or more land in their area were included in the analysis. The results were classified as three levels of occurrence. Only 5 km squares containing at least five 1 km land squares were accepted as producing useful information (Fig. 1).

Breeding

Our study of breeding concentrated on western and southern Anglesey. Information on a few nests was obtained in 1977,

and thereafter 110 wooden nest-boxes were erected over several years (Table 1). Each box (Flegg & Glue 1971) was fixed high up in an inaccessible position (to be reached only by a ladder) in the roof structure inside a farm building. Mostly older buildings (barns, and cattle and implement sheds) were chosen, but some boxes were also placed in modern buildings. Disturbance at the boxes was slight. The final pattern of box distribution largely reflected the distribution of farmsteads. We have also included data from a few nests on stored hay and in holes in walls and trees.

The presence of roosting and nesting birds was sought by an inspection in spring, then at about monthly intervals at occupied sites, and again at all sites in the autumn. Data on clutch-size, hatching, nestling weights and fledging success were collected. Precise laying dates were not known for most clutches, so, in addition, the weight of the heaviest nestling (for comparison with Ricklefs 1968) in young broods was used to supplement our estimates of dates of laying. A laying interval of two days and an incubation period of 33 days (Witherby et al. 1938) were also assumed.

Dispersal

120 nestlings were marked, 73 with leg rings only, 34 with wing-tags only, and 13 with both. Shortly before fledging in 1980, 10 were also given SM1 radio-transmitters (made by the AVM Instrument Company, Illinois, U.S.A.) in 'back-packs' (with a battery-life of 6 - 8 months). The following autumn

the latter birds were re-located in their day-time roosts, 1 - 3 times a week, by triangulation, using an LA12 portable radio-telemetry receiver (made by AVM).

RESULTS

Distribution

Fig. 1 shows the distribution of our records of Barn Owls on Anglesey. The bird was widespread overall, but appeared to be scarce in the north, moderately numerous in most of the west and centre, and most widespread in the south and east with a localised patch of abundance in the north-west.

Nest-box usage

Fig. 2 shows the final distribution of our nest-boxes, those boxes used for breeding, and other known breeding sites identified throughout the whole study period.

Table 1 indicates how the nest-boxes were used between 1978 and 1982. Throughout the period, the proportion of boxes visited increased erratically but the proportion used for breeding remained steady at c. 10%.

Breeding season

The breeding season was described primarily from 47 first clutches in which at least one egg hatched. Clutches in which no egg hatched ('unsuccessful' clutches) are excluded because the date of laying could not be determined sufficiently closely. The spread in laying dates by individual birds in any given year was considerable, and there was some variation

TABLE 1

Usage of nest-boxes by Barn Owls Tyto alba on Anglesey, 1978-82

Year	1978	1979	1980	1981	1982
No. of nest boxes available	10	64	64	108	103
Occupied for breeding: No.	1	5	7	11	10
%	10	8	11	10	10
Visited (but no breeding): No.	0	9	11	4	24
%	0	14	17	4	24
Total used by Barn Owls: No.	1	14	18	15	34
%	10	22	28	14	33

Note. 'Visiting' refers to boxes where owls or pellets were found but breeding did not occur. 'Used' encompasses both 'visited' boxes and 'breeding' boxes.

in the mean date of laying from year to year (Table 2).

Although sample sizes were small, the mean dates of the latest and earliest years for laying (1979 and 1982) were significantly different (t-test, $p < 0.05$). The overall mean date was 1 May, compared with 9 May, found by Glue, for Britain (mostly England, in fact - I.R. Taylor, in litt.).

Eggs and young

In only 22 first clutches was the exact number of eggs laid known with certainty (repeat and 'unsuccessful' clutches are excluded, the latter because it seemed evident in most cases that the number of eggs found was less than one might expect from undisturbed clutches); the frequencies were c/3 ($n = 2$), 4 (6), 5 (9), 6 (2), 7 (2) and 8 (1), giving a mean clutch-size of 4.95, S.E. 0.27 eggs (cf. 4.68 eggs in Britain (Glue)).

Of the 58 clutches known to have been laid from 1977 to 1982, 89% survived to hatching (for at least one egg), 84% had at least one surviving nestling ten days after hatching, and 83% had at least one survivor 20 days after hatching.

When the nestlings had attained sufficient size to be ringed (at an estimated mean age of 35 days after hatching), the mean size of the brood was 3.09, S.E. 0.16 ($n = 45$). Thus, between laying and this time, the average family size decreased by 38%. Complete nest failures are given in

TABLE 2

Breeding season of the Barn Owl Tyto alba on Anglesey, 1977-82

Year	No. of clutches started per 10-day period												Mean ¹ date		
	March			April			May			June				July	
	1	2	3	1	2	3	1	2	3	1	2				
1977	-	1	1	1	-	-	2	1	-	-	-	-	-	7 May	
1978	-	-	-	3	2	-	-	-	-	-	-	-	-	29 April	
1979	-	-	1	-	1	2	1	1	1	-	-	-	-	18 May	
1980	-	-	2	2	-	-	-	-	-	-	1	-	-	6 May	
1981	-	2	4	1	2	2	-	-	(1)	-	-	1	-	30 April	
1982	2	-	2	7	1	-	-	-	-	-	(1)	-	-	18 April	
Total	2	3	10	14	6	4	3	2	1(+1)	0	1(+1)	1	-	1 May	
S.E.													3.3 days		

- Notes: 1. Calculated from the original data
 2. () denotes a repeat clutch. These clutches have been excluded from the calculation of mean dates.

Table 3; of all clutches (apart from repeats) known to have been started in the period 1977-82, 16% failed completely. The reasons were not apparent.

Dispersal

The movements of 17 birds (16 being ours) marked as nestlings, and subsequently found again, away from their places of marking, are shown in Fig. 3.

One nestling was first found alive 8 km to the N E, and then recovered close to its point of origin. Within the first 200 days after fledging (assuming a nestling period of c. 75 days (Witherby et al. 1938)), 5 out of 10 birds were found within 1 km of their nests; the others were 1.5 - 71 km away; 7 subsequent recoveries were 3 - 26 km away.

The birds fitted with radio transmitters (Fig. 4) remained comparatively near their original boxes throughout their respective observation periods. In several instances, a bird returned to, or very close by, its original box, after a previous departure. The three birds (A, C, E), which were kept under observation longest in the slightly more distant locations, had moved only 1 - 2 km at the most; they then kept to a particular restricted locality for some weeks. Thereafter, radio contact was lost. Searches further afield on Anglesey failed to find the missing birds.

Of the three owls found dead, bird A died of unknown causes; F was underweight and may have starved; and G was in a water

TABLE 3

Incidence of complete failures of nests of Barn Owls Tyto alba on Anglesey, 1977-82

Year	Total no. of nests	No. of nest failures	
		Nests with eggs	Nests with nestlings
1977	6 (+1)	0	1 (+1)
1978	6	0	0
1979	8	1	0
1980	8	2	0
1981	14 (+1)	2	1 (+0)
1982	14	2	0
Total	56 (+2)	7	2 (+1)

Note. () = data from repeat clutches

FIGURE 3. Movements of Barn Owls (n = 16) marked as nestlings on Anglesey, 1976 and 1978-82.

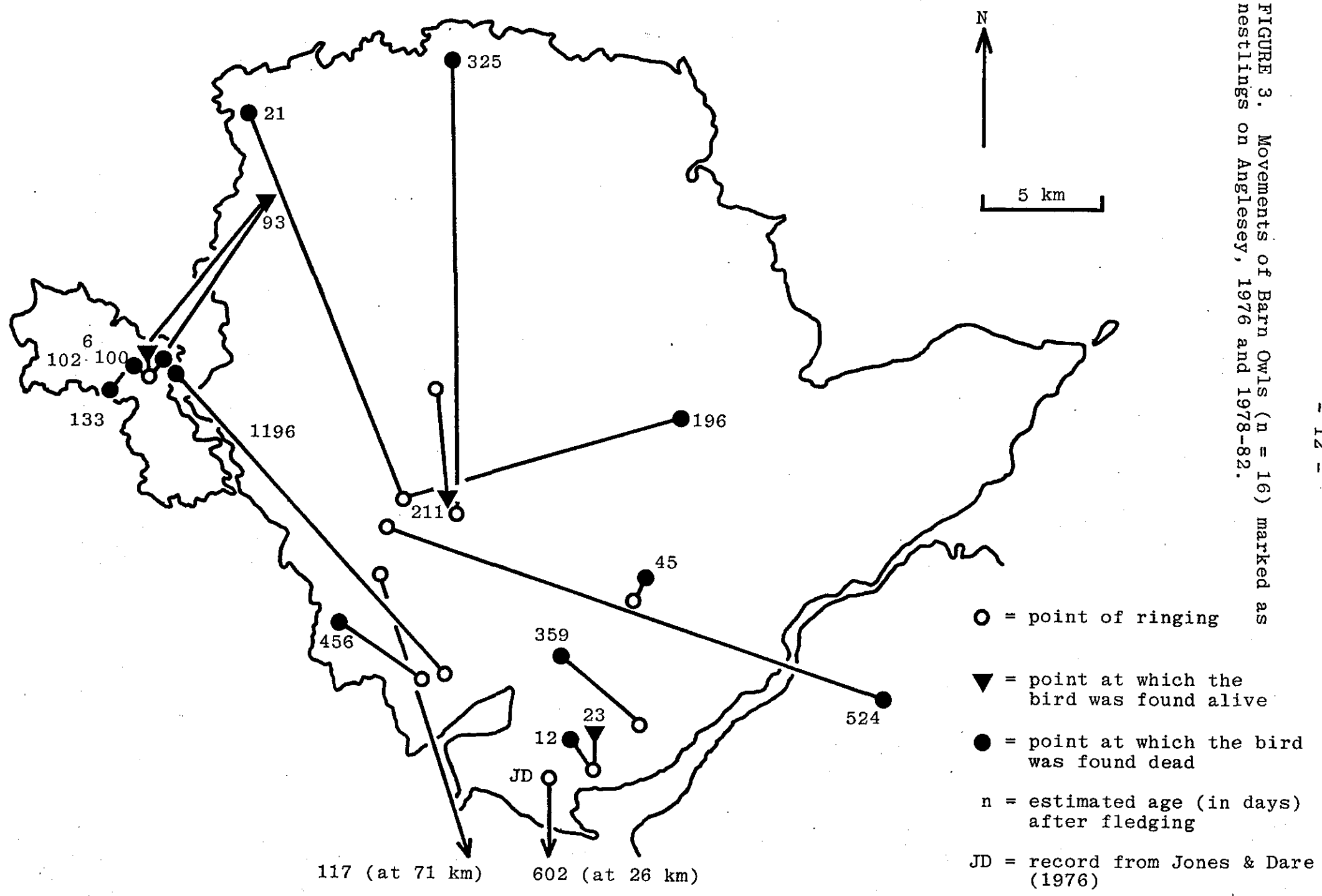
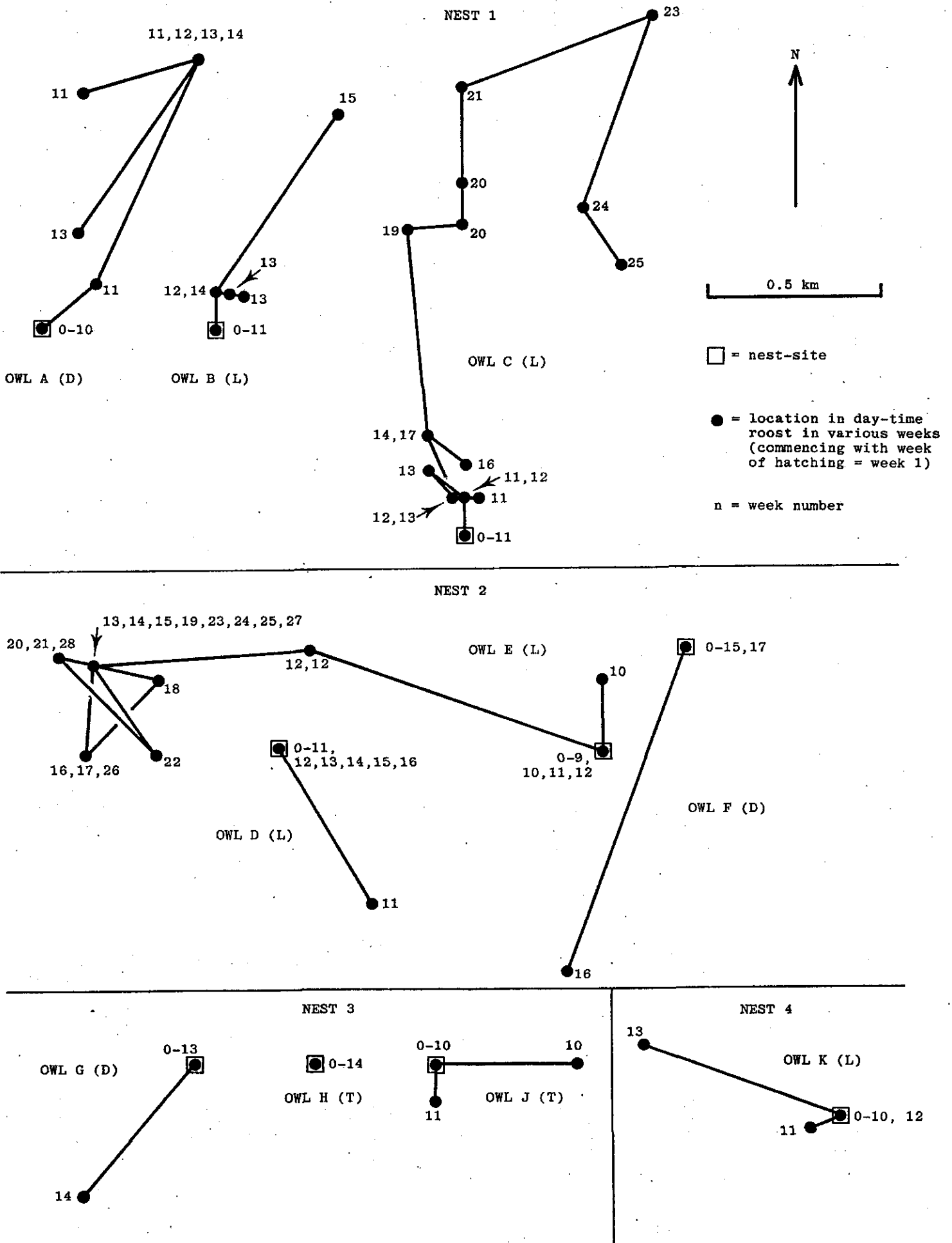


FIGURE 4. Movements of juvenile Barn Owls (labelled A-K, n = 10) from four nests on Anglesey in 1980, and marked with radio transmitters. (Letters in parentheses indicate final outcome of observations: D = bird found dead, L = radio contact lost, T = detached transmitter recovered from ground).



tank, presumably drowned. Despite extensive searches, the fate of the other birds remained unknown, but birds H and J had apparently freed themselves from their transmitters (subsequently found in hedges).

Once the owls had abandoned their original boxes, most day-time roosts detected were not in buildings but in trees (Table 4). Often, once the birds had been located by radio, they could be seen perching, about three metres above the ground, amongst the leafy branches of larger hedgerow trees.

DISCUSSION

Voous (1960), Sharrock (1976), and Bunn et al. (1982) indicate that in Britain the Barn Owl is near to the northern limits of its total range. The widespread occurrence of the species on Anglesey suggests that it was not limited at least by roosting sites - farm buildings, both derelict and in use, are common all over the island. However, the bird's local distribution suggests two associations with the habitat: (1) with inland marshy ground (viz. (a) NW Anglesey:- 5 km squares: SH 38 north-east (around Llyn Alaw), SH 38 south-west (valley of the R. Alaw, plus Llyn Llywenon); (b) SE Anglesey:- SH 47 south-east (upper region of the Malltraeth Marsh); (2) with river-dissected farmland (in the south and east of Anglesey). The greater abundance of the birds in those places may reflect local differences in food resources and opportunities for successfully deploying the bird's particular feeding techniques.

TABLE 4

Day-time roosts of young Barn Owls Tyto alba on Anglesey in 1980, as determined by radio-tracking

Bird	No. of observations from the first occasion that the bird was known to be roosting away from its original nest-box.			Total
	In farm buildings	In trees	Unknown	
A	5	3	0	8
B	0	6	0	6
C	1	13	2	16
D	6	1	0	7
E	2	16	1	19
F	1	0	1	2
G	1	0	0	1
H	0	0	0	0
J	0	2	0	2
K	2	1	0	3
Total	18	42	4	64
%	28	66	6	100

Our data very much suggest that the Barn Owl population in western and southern Anglesey was not after all limited by the availability of nest sites. What then becomes apparent is that the breeding population was comparatively stable in size.

Bunn et al. (1982) provide good evidence for the ability of the bird to breed at one year old. However, our observations on box-visiting suggest that there was a high proportion of non-breeders: such birds were merely using the boxes for roosting, in some instances for long periods (as indicated by the quantities of pellets present in the boxes), but in others on a temporary basis for, perhaps, as little as a night or two at a time (despite an apparent absence of disturbance). These ones could have been either young birds or included some of the older birds. Territorial exclusion seems an improbable cause for non-breeding - the Anglesey landscape seems to have more than enough space for the population at the present level. Another explanation would appear to be a basic insufficiency of food such that only a proportion of the birds were capable of breeding.

Several aspects of our data suggest that food may have been a severe limitation on the population size of the Barn Owl on Anglesey in the study years: (1) the apparent existence in the summer of single non-breeding birds roosting in the boxes; (2) the ephemeral nature of roosting at some boxes; (3) considerable variation between pairs in laying date each year; (4) considerable variation between pairs in clutch-size; (5) several complete failures at rearing clutches; and

(6) an appreciable decrease in family size during the combined incubation-nestling period. Variation between pairs in laying date can probably be related in part to variation between territories in the composition of the food resources therein (Seel, Turner and Thomson, in prep.).

The distribution of movements with respect to both orientation and distance was limited by the shape and size of Anglesey and the location of the marking points. Within these limits, dispersion appeared to be more or less at random, except that in SE Anglesey most birds were recovered on Anglesey itself, rather than on the Welsh mainland. However, the young birds clearly had the capacity to colonise any part of the island quite quickly.

The results from the transmitter-carrying birds were characterised by (1) a comparatively stationary phase of variable duration, and (2) an abrupt loss of contact. In view of the results from the dispersal of marked birds, it seems probable that the loss of contact with some of the transmitter-carrying birds was due to their suddenly dispersing beyond our detection range (3.7 km was the observed maximum). National ringing recoveries also suggest that at c. 100 days old most young Barn Owls are more than 3 km away from their nests (Bunn et al. 1982).

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SUMMARY

The Barn Owl on Anglesey, north Wales, was widely distributed, but appeared to show some associations with inland marshy ground and river-dissected farmland. The level of usage of nest-boxes over a large part of the island suggested that the population size of the species was not limited by the availability of nest-sites. The boxes were visited erratically for roosting, but the numbers of pairs breeding in them remained comparatively steady over several years. Breeding data are presented. A comparison between recoveries of birds ringed as nestlings and birds marked with radio-transmitters suggested that juvenile dispersal, following parental care, may be far-ranging.

REFERENCES

- BLAKER, G.B. 1933. The Barn Owl in England. *Bird Notes & News* 15: 169-172, 207-211.
- BUNN, D.S., WARBURTON, A.B. & WILSON, R.D.S. 1982. The Barn Owl. Calton. Poyser.
- FLEGG, J.J.M. & GLUE, D.E. 1971. Nest-boxes. 4th Ed. Tring. British Trust for Ornithology.

JONES, P.H. & DARE, P. 1976. Birds of Caernaryonshire.

Llandudno. Cambrian Ornithological Society.

RICKLEFS, R.E. 1968. Patterns of growth in birds. Ibis 110:
419-451.

ROBERTS, E. 1958. The County of Anglesey. Soils and
Agriculture. Memoirs of the Soil Survey of Great
Britain. London. H.M.S.O.

SEEL, D.C., TURNER, J.C.E. & THOMSON, A.G. In prep.
Variations in the diet of the Barn Owl on Anglesey,
North Wales..

SHARROCK, J.T.R. 1976. Atlas of breeding birds in Britain
and Ireland. Berkhamsted. Poyser.

VOOUS, K.H. 1960. Atlas of European Birds. London.
Nelson.

WITHERBY, H.F., JOURDAIN, F.C.R., TICEHURST, N.F. & TUCKER, B.W.
1938. Handbook of British Birds. Vol. 2. London.
Witherby.

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