

CUMBRIA SAND MARTIN SURVEY 1991

Introduction and Methods

The Sand Martin (*Riparia riparia*) is one of a number of species whose populations have been affected by drought in their wintering grounds south of the Sahara. In Cumbria, local ornithologists noted a sharp fall in numbers in 1968-69, a modest recovery during the seventies, and a further reduction in numbers in 1984. Since then numbers have remained low, but with an apparent slight increase in recent years. In Britain as a whole the breeding population has been estimated at 100-500,000 pairs, about half that believed to be present before the Sahel drought began in 1968 (Sharrock 1976, Cowley 1979, Marchant et al 1990).

The Cumbria Bird Club decided to organise a county survey of breeding sand martins in 1991 as no previous survey of this species had been carried out in the whole county, and there were reports that some colonies were under threat.

The club had organised a survey of wintering goosanders the previous winter (Priestley 1992) and the network of organisers and fieldworkers, with experience of the river systems, was still in place. Observers were allocated sections of each river valley and were asked to locate all occupied colonies and count the number of holes in each colony. Each colony was identified with a six figure map reference, the type of site (eg riverbank) was described and known or suspected threats were described. As there were unoccupied holes in nesting colonies, observers were also asked to estimate the number of holes occupied (hereafter referred to as 'sample counts') at a minimum of two colonies in their survey areas either by physical inspection of all the holes, or by observation of the colonies over a period of time.

Results

A total of 5055 nest holes were counted within 185 occupied colonies. The proportion of holes occupied in 50 of these colonies was assessed, but statistical tests showed that this sample was not representative of the whole population of colonies either in terms of size or location. Ten of the colonies were selectively removed so that the remaining 40 were representative of the whole and the mean proportion of holes occupied in this sample was calculated as 68.6%. Applying this calculation to the total number of holes gave an estimate of 3468 pairs of breeding sand martins for the whole county within 95% confidence limits of 3402-3533 pairs (details in appendix 1). This proportion has been applied to all hole counts, where relevant, in all the estimates and tables which follow.

The number and percentage of colonies and occupied holes, together with estimated mean colony size (in pairs) in river banks, quarries and other sites is shown in Table 1. Colony size in river banks varied between a single pair and 142 pairs, and in quarries between 5 and 367 pairs. Of the 10 largest colonies six were in quarries and 4 were in river banks.

In a subsample of 128 colonies, 108 (84.4%) were in sand, 8 (6.2%) in clay with sand or silt, 6 (4.7%) in silt with gravel or clay, 5 (3.9%) in man made drains and 1(0.8%) in a slag tip. The mean height of the nesting face in 22 river bank colonies was 2.2m.

Out of 158 colonies, observers reported no present or perceived threats to 70. The suggested threats to the remaining 88 colonies are shown in Table 2. In some cases observers listed more than one threat per colony. By far the most important threat was seen as the dumping of material in front of nesting sand faces to prevent river erosion. Farm rubbish, unwanted building materials, stone from fields and scrap cars were all reported to have been used. Bank erosion and flooding were also important. In quarries, the greatest threat was believed to be from bank collapse following heavy rain, but quarrying activity and the abandonment of quarrying were also mentioned. Of 16 quarries containing sand martin colonies, only one was apparently worked out.

The numbers and percentages of colonies and pairs together with estimated mean colony size within each catchment is shown in Table 3. On average, the largest river bank colonies were in the Esk/Lyne, lower Eden and upper Lune catchments, with the smallest in the coastal river zones and the upper Eden. The largest quarry colonies were in the lower Eden. Altogether nearly 75% of all breeding pairs were in the Eden valley catchment.

Discussion

An examination of the sample counts showed that estimates of the proportion of holes occupied, based on inspection of the nest holes (eg presence or absence of scratch marks), or inspection combined with observation, were significantly higher than those from observation alone ($X^2=17.9$, d. f. 2, $p<0.01$). It was possible that inspection over-estimated occupancy as birds often used the entrances of unused holes as perches while waiting to gain access to the nest, when both parents were feeding young, and the other parent was in the nest hole. Observation alone may have under-estimated occupancy rates, as it was probable that at least an hour was needed to record all the birds, particularly earlier in the season, and some observation periods at colonies were of much shorter duration. Guidance on this should be given in future surveys of this species. Overall however, the sampling method proved to be successful in enabling population estimates to be made. The results suggested that Cumbria may hold between 0.6 and 3.3% of the total British population of breeding sand martins.

Only limited historical data were available. Fred Gould recorded a reduction from 72 to 18 breeding pairs of sand martins during 1975-79 on a stretch of the river Kent. This suggested that Cumbria suffered a similar reduction in numbers as the rest of Britain following the Sahel drought. However, Mike Carrier noted a sharp drop in numbers between 1982 (205 nests) and 1984 (45 nests) at the main quarry at Faugh, suggesting that a further decline in numbers occurred in the early eighties. The figures for the same stretch of the River Kent for 1977 (32 pairs), and the present survey (28 pairs), suggested that the decline may have been halted, although parts of the river are still threatened by improvement works.

On the rivers Esk, Lyne, Irthing and Caldew in the north of the county, a total of 237 nest holes were recorded in 1985, but two years later this had risen to 993, dropped to 837 in 1988, and was 928 during this survey (Mike Carrier unpub.) These figures could indicate a strong recovery since the mid-eighties, or could reflect a redistribution of colonies possibly due to changes in available nesting sites in quarries and rivers in the Lower Eden catchment.

It is possible that colonies may have been missed, particularly away from the rivers, where most survey work took place, but the figures confirmed that quarries were a significant breeding resource for sand martins in the county, holding nearly 30% of all nests.

The data suggest that the future conservation of suitable breeding sites for the sand martin in Cumbria will be largely dependent on the adoption of more sympathetic river bank management by farmers and landowners and the co-operation of quarry owners and managers. If, in the future, a sample survey rather than a full county survey is attempted, the results given here suggest that coverage of a limited number of sites within the Eden valley will take in a substantial proportion of the whole population.

Appendix

Due to the high proportion of larger colonies and quarry sites in the sampled subset of colonies, the variances of the mean colony sizes (unoccupied holes) of those which were sampled and those which were not differed significantly, ($F=6.6$ d. f. 49,107, $p<0.01$), as did the proportion of holes in different habitats ($X^2=27.7$, d. f. 1, $p<0.01$). By removing 10 counts from the sample data, the sample was made representative of the population as a whole (Sample \times rest, variances $F_{142,41}=1.2$, ns, means $t=1.7$, df 183, ns, proportions in different habitats, $X^2=3.0$, df 1, ns). Using this smaller sample, the data were first subjected to an arcsine transformation to approximate a normal distribution and then back-transformed to give an estimate of the mean. Confidence limits were calculated from a normal approximation to the binomial.

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References

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Table 1. The number of sand martin colonies and breeding pairs, together with estimated mean colony size in different nesting habitats in Cumbria 1991.

<i>Habitat</i>	<i>Number of colonies</i>	<i>%</i>	<i>Estimated breeding pairs</i>	<i>%</i>	<i>Estimated mean colony size</i>
Riverbanks	163	88.2	2459	70.9	15.1
Quarries	16	8.6	955	27.5	59.6
Other	6	3.2	54	1.6	9.0
tals	185		3468		

Table 2. Potential and actual threats to sand martin colonies in Cumbria reported by observers in 1991.

<i>Threats</i>	<i>River bank</i>	<i>Quarries</i>	<i>Other</i>	<i>Total</i>	<i>%</i>
Bank protection	32	-	-	32	30.2
Erosion	19	-	1	20	18.9
Floods	14	-	-	14	13.2
Cattle trampling	6	-	2	8	7.6
Sandslump from heavy rain	-	6	-	6	5.7
Fishermen	5	-	1	6	5.7
Walkers	3	-	-	3	2.8
Farmwork	3	-	-	3	2.8
Predation	3	-	-	3	2.8
High tides	1	-	1	2	1.9
Human disturbance	1	-	1	2	1.9
River improvement	2	-	-	2	1.9
Sand extraction	-	2	-	2	1.9
Cessation of quarrying	-	1	-	1	0.9
Building	1	-	-	1	0.9
Vandalism	1	-	-	1	0.9

Table 3. The number and percentage of sand martin colonies and estimated total pairs, together with mean estimated colony size in river bank and other sites within each river catchment in Cumbria 1991.

Catchments	Number of colonies	%	RIVER BANKS			Number of colonies	%	QUARRIES		
			Estimated pairs	%	Mean Colony size			Estimated size	%	Mean Colony
Esk/Lyne	12	7.4	391	15.9	32.6	-	-	-	-	-
Upper Eden	56	34.4	427	17.4	7.6	-	-	-	-	-
Lower Eden	53	32.5	1215	49.4	22.9	12	54.6	847	84.0	70.6
Kent/Leven/Duddon	3	1.8	19	0.8	6.3	-	-	-	-	-
Wampool/Ellen	-	-	-	-	-	6	27.3	75	7.5	12.5
Derwent	5	3.1	32	1.3	6.4	1	4.5	5	0.5	5.0
Ehen/Irt/Esk	17	10.4	86	3.5	5.1	3	13.6	81	8.0	27.0
Upper Lune	17	10.4	289	11.7	17.0	-	-	-	-	-

