

Pairing and breeding of Mute Swans in relation to natal area

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Introduction

An intensive study has been made of the population of the Mute Swan *Cygnus olor* in an area of 550 square miles (1,440 square kilometres) in south Staffordshire. The area is based on National Grid co-ordinates SO900 900 and extends 40 squares (kilometres) north and 36 squares east. The study was started in 1961 and up to December 1977 a total of 3,785 swans has been ringed within the study area. Two previous papers dealt with pairing and breeding behaviour (Minton (1968) and with flocks, their size, age structure, and status at different times of the year (Minton 1971). The present paper concerns the behaviour of birds hatched, ringed as pulli and later paired within the study area. Of the 1,205 pulli ringed up to December 1975, 196 were recorded in later years as paired birds within the study area and 494 were recorded in subsequent years but never as paired birds. Of the remainder, 383 were not seen again after ringing, 132 were reported dead during their first year of life.

Catching, marking and monitoring

The ease with which pulli are caught depends largely on how accustomed they are to members of the public. Broods reared in parks and on sites where people feed swans regularly can often be enticed with bread to walk ashore, where they can be surrounded and hand caught. Such broods tend to be sedentary and are easily found but many family parties move from their breeding sites on to the river complexes and considerable time is sometimes needed to locate them. On the whole, these broods tend to be more cautious of people and less interested in bread. On the wider regions of rivers and gravel pits, canoes are used to shepherd the pulli into backwaters or into shallow water where they are picked up by hand or caught using a swan pole—an aluminium shepherd's crook attached to the end of a long bamboo pole (c. 12 ft, 3.6 m).

Pulli are ringed on the left leg with a metal numbered BTO ring and a large numbered or lettered yellow Darvic plastic ring is added to the right leg. The Darvic ring is large enough to be read at a distance with

binoculars, thus enabling re-sightings of individual birds to be made without having to catch them (Ogilvie 1973).

Table 1 shows the ringing success from 1961–1975. At first, few pulli were ringed, but as teams became more experienced and catching techniques improved greater success was achieved. During March, April and May teams of volunteers cover the entire study area at least four times to locate all the pairs. The Darvic ring numbers or letters of each individual are recorded and the bird sexed, generally by appearance and behaviour but occasionally by cloacal examination. Further visits are made to all areas throughout the summer to determine the number of breeding and non-breeding pairs. Nesting sites and territories are located and plotted. A breeding pair is defined as one which nests and lays eggs, a non-breeding pair holds territory, or holds territory and builds a nest but does not lay eggs. Later in the season the hatching success of each breeding pair is determined and family parties are again located in August and September to determine the number of young reared to fledging.

Age and sex when first paired

Equal numbers of ringed male and female pulli (98 male and 98 female) were sub-

Table 1. Numbers of pulli Mute Swans fledged and ringed each year, 1961–1975.

Year	No. pulli fledged	No. pulli ringed	% pulli ringed
1961	75	24	32
1962	154	86	56
1963	119	47	39
1964	125	78	62
1965	170	30	18
1966	123	44	36
1967	119	84	71
1968	117	64	55
1969	72	55	76
1970	120	100	83
1971	108	96	89
1972	120	109	91
1973	113	109	96
1974	160	154	96
1975	127	125	98
Totals	1,822	1,205	66

sequently recorded as paired birds within the study area. The remarkably even division of the sexes means that the analysis is not complicated by a bias in the sample.

Table 2 summarizes the age of birds when first recorded as paired. This gives no indication that the sex of a bird affects the age at which it will pair. Most birds paired in their second (42%) or third year (30%). Some were not recorded as paired birds until their fourth (17%) or later (10%) years.

Table 2. Age of Mute Swans when first recorded paired.

Age in years	Male	Female	Total
1	0	2	2
2	40	42	82
3	31	28	59
4	18	16	34
Over 4	9	10	19
Totals	98	98	196

Of the two females paired in their first year one was paired to an adult male on 19 May 1963 on a stretch of river. Unfortunately the male was killed on 22 June by flying into overhead wires and the young female then moved into the Alvecote moulting flock where she was last seen on 23 August. The second female was paired on 28 March 1968 to a three-year-old male which had been paired to another bird in the previous year on the same reservoir. This pair was not recorded again. Neither pair nested.

Table 3 shows that the majority of birds paired in their second and third year did not breed that year. Of those paired for the first time in their fourth year 47% bred, and of the birds paired when older than that 68% bred. The data are fairly uniform between the sexes but there is a suggestion of precociousness on the part of males. The chance of breeding when first paired in-

creases after the third year and again suggests that it is the age of a bird more than the sex which determines whether or not it breeds the year it first pairs.

Minton (1968) showed breeding when first paired in 3.7% of second year birds, 42.1% of third year birds, 55.0% of fourth year birds and 71.0% of birds over four years. A comparison with Table 3 suggests a recent increase in the proportion of second year birds breeding but no apparent difference in other age ranges.

From 1961 to 1967 Minton's study showed only two females breeding at the age of two, neither of which had been ringed as pulli in the study area. There were 10 records of birds ringed as pulli and breeding in their second year from after 1967 (Table 4). Half of the birds hatched young successfully, a similar figure to the population of the study area as a whole. There is no indication that any were infertile. Two of the birds mated together and three more took mates also known to be two years old, having been ringed as first year birds within the study area. The results may also indicate an earlier maturing of birds over the past decade.

Movements in relation to natal site

First pairing

Table 5 analyses the distance from the natal site to the place where the birds were first recorded as paired birds. A total of 36 males and 60 females were within 5 miles¹ of their natal site. Of these, 13 males and 32 females were within one mile of their hatching site often on exactly the same territory on which they were reared. The majority of birds listed

¹ All measurements have been made in miles and are expressed so here. 1 mile = 1.6 km, 5 miles = 8 km.

Table 3. Age of Mute Swans when first recorded breeding

Age in years when first recorded paired	Male			Female			Both sexes % breeding
	Number of non-breeding birds	Number of breeding birds	% breeding	Number of non-breeding birds	Number of breeding birds	% breeding	
1	0	0	0	2	0	0	0
2	33	7	18	39	3	7	12
3	23	8	26	18	10	36	31
4	10	8	44	8	8	50	47
Over 4	2	7	78	4	6	60	68

Table 4. Hatching success of Mute Swans ringed as pulli and breeding within the study area at 2 years of age.

Sex	Year of hatching	Year first paired	Age of mate in years	Breeding success
♂	1968	1970	>3	Hatched 7 young
♀	1970	1972	2	Hatched 7 young
♂	1970	1972	6	Eggs stolen
♂	1971	1973	>3	Eggs stolen
♂	1971	1973	2	Eggs stolen
♂	1971	1973	2	Paired together, hatched 4 young
♀	1971	1973	2	
♀	1971	1973	>3	Eggs stolen
♂	1974	1976	3	Hatched 4 young
♂	1974	1976	2	Eggs stolen

Table 5. Distance from natal site to where first recorded as paired birds.

Distance	Age in years, and sex										Totals	
	1		2		3		4		Over 4		♂	♀
	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀
0-1 miles (0-1.6 km)	0	1	6	13	2	8	4	5	1	5	13	32
1-5 miles (1.6-8.0 km)	0	1	9	15	7	8	4	1	3	3	23	28
5-10 miles (8.0-16.0 km)	0	0	14	9	10	5	5	4	1	0	30	18
10-15 miles (16.0-24.0 km)	0	0	7	5	10	5	2	4	4	2	23	16
Over 15 miles (24.0 km)	0	0	4	0	2	2	3	2	0	0	9	4
Totals	0	2	40	42	31	28	18	16	9	10	98	98

in Table 5 were also sighted at various distances from their hatching site prior to being observed as paired birds. Of the birds first seen paired within 5 miles of their hatching site, 66% of the males and 51% of the females were recorded previously as having moved beyond this distance range and 14% and 23% had moved beyond 10 miles, mostly to join flocks. More than 75% of the birds were recorded prior to first pairing in at least one of the moulting or wintering flocks within the local area. Clearly therefore although birds may move well away from their natal area prior to pairing they tend to return to it, especially the females.

First breeding

Table 6 analyses the distance from the natal site to where the birds first bred. In addition

to the breeding birds noted in Table 3 this includes birds that bred for the first time after at least one year as a member of a non-breeding pair. As for first pairing, three times as many females nested within one mile of their natal site as did males. Twice as many males as females nested over five miles away.

After hatching, family parties remain together for at least four months before breaking up and during this period move throughout their territory, often with frequent return visits to the vicinity of the nest. These movements may serve to impress the territory and natal site on cygnets. Observations of ringed birds within the area suggest that the majority of cygnets do not travel great distances during their first year. Only 6% of the 132 first year birds ringed within the area and recovered dead were more than 20 miles from the natal site. Over

Table 6. Distance from natal site to where first recorded as breeding birds.

Distance	Age in years, and sex								Totals	
	2		3		4		Over 4			
	♂	♀	♂	♀	♂	♀	♂	♀	♂	♀
0-1 miles (0-1.6 km)	1	3	1	5	3	4	2	7	7	19
1-5 miles (1.6-8.0 km)	1	0	0	10	5	2	7	3	13	15
5-10 miles (8.0-16.0 km)	2	0	6	0	4	5	3	2	15	7
10-15 miles (16.0-24.0 km)	2	0	5	3	3	2	5	3	15	8
Over 15 miles (24.0 km)	1	0	1	1	1	1	1	1	4	3
Totals	7	3	13	19	16	14	18	16	54	52

half of those birds first paired in their second year (18% males and 34% females), were first seen paired within five miles of the natal site. Both of the birds paired in their first year and over 40% of the birds first seen paired in their third and fourth years (18% males and 24% females), were within five miles of their natal site. The female clearly pays a greater role than the male in the selection of a territory.

Whether a pair can establish a territory and breed near to the natal site depends largely on whether or not the territory is occupied by the previous incumbents; these usually force the young birds to move on.

In the two-year-old birds 29% of the males and 100% of the females first nested within five miles of the natal site, the females actually all within one mile. Of three- and four-year-old birds 31% of the males and 64% of the females nested for the first time within five miles of the natal site. This again suggests a far stronger tendency on the part of females to return to breed in an area which they know.

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Summary

An intensive study of the behaviour of Mute Swans *Cygnus olor* hatched and later paired within a 1,440 square kilometre area of south Staffordshire has been in progress since 1961. Movements of individual birds have been monitored using resightings of large coloured tarsal rings. In all 98 males and 98 females were subsequently recorded as paired birds within the study area. Most birds first paired in either their second or third year. The chance of breeding when first paired increases after the third year. Comparison with a previous analysis from 1961 to 1967 suggests an earlier maturing of birds over the past decade. Although birds may move well away from their natal area 23% of the sample were first seen paired within one mile (1.6 km). Females show a greater tendency to return. Breeding birds show the same basic pattern with more females than males nesting close to their natal site.

References

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