BREEDING OF *CYGNUS CYGNUS CYGNUS* IN A COASTAL AREA OF NORTHERN NORWAY

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Introduction

Round about 1950, *Cygnus c. cygnus* bred only in small numbers in Norway and was restricted to the northernmost county, Finnmark. About 1960, a few breeding pairs were recorded on certain coastal islands in the county of Troms, and during the 1970s swans were found breeding in increasing numbers in many coastal areas north of the Arctic Circle to about 70°N in the counties of Nordland and Troms (eg Fjeldsa 1972). In Finnmark, however, the present development of the breeding population is uncertain (NOU 1978).

Study area

The area is situated at 69°30'N in the county of Troms. Senja is Norway's second largest island (1590 km^2) with mountains reaching heights of 1000 m. The island is located within the submaritime zone of forests dominated by *Betula pubescens.* The outer parts of the island are much steeper than the inner districts, where there are large bogs with floating wetland systems and also some *Pinus silvestris* forests.

Material

The study is based mainly on contact with local inhabitats who have submitted written accounts of breeding in different water systems. Most of the data come from Hans Kristian Eriksen, Stonglandseidet, but data were also furnished by Hakon Elveland, Hallvard Hanssen, Hans Helge Jørgensen, Alida Nylund, Sverre Nylund, Olav Olsen Jr and Ørjan Olsvik. In addition, the author has visited most of the lakes in question.

Results

Breeding population

The known breeding localities between 1960 and 1978 are shown on the map (Fig 1). The swans have bred in nine wetland systems, in some cases using a number of lakes within the same system (Table 1).

In area 1, the swans were first found breeding in the central lake (1b) of three small lakes between 1960 and 1962 (Myrberget 1962, 1963). Between 1963 and 1965 the pair used the lower lake (1a). From 1966 to 1969 the pair used lakes 1a or 1b, but since 1970 they have used lake 1a every year except 1971. In the 1970s, breed-

Fig 1. Map of Senja with numbered breeding areas.

ing in lake 1a has been encouraged by artificially building up the small nesting islet so that it becomes free of snow early in the spring. In 1965, another pair laid three eggs in the upper lake (1c), but this pair was apparently driven away by the first pair before incubation, and three fresh eggs were found in June. The distance between lakes 1a and 1c is 1.5 km. In 1971, the thaw came very late. The swans from area 1 then moved to a small holm in the sea just outside the river mouth, where the first egg was laid on 14 May.

In area 2, swans have been observed every year since 1960. The first nest was found in 1967. In area 3, nesting also started about 1967. Nesting then occurred every year until 1971 and also most years in the 1970s (Table 1).

In 1970 three breeding pairs were known on Senja, the minimum figures for the breeding population in subsequent years being three, three, four, five, three, five, six and seven.

The northeastern part of Senja comprises areas 3, 4, 5 and 6. It was believed locally that pair 3 moved to area 4 in 1972, but this is not substantiated by the development of the population. It is possible that pairs 4, 5 and 6 are the same swans. An

Table 1. Review of the swan breeding localities on Senja from 1960 to 1978.

Area number refers to the map (Fig 1).

Area number	Size in km	m above sea level	Distance from sea in km	Breeding years 1970–1978
1a	0.9 x 0.5	14	1	1970, 1972–78*
1b	0.5 x 0.5	15	2	(Last in 1969)
1c	0.5 x 0.1	20	3	(Unsuccessful 1965)
2	0.6 x 0.3	60	1	1970–78
3	0.5 x 0.2	52	0.5	1970–71, 1973–74, 1976–78
4	1.5 x 0.5	88	1.5	1972, 1974–78
5	(6 x 1)	25	2	1973
6	1.8 x 0.6	18	1	1974, 1976
7	2.0 x 1.5	19	4	1977–78
8	0.1 x 0.2	10	2.5	1977–78
9	0.5 x 0.5	305	8.5	Unsuccessful 1978

* In 1971 on a small holm in the sea close by.

adult pair, probably from area 3, was killed when it collided with a power line in early July 1976. Collectively, these four areas have been inhabited by at least three pairs of swans in the later 1970s.

In area 9, breeding attempts were recorded only in 1978. Pairs 1, 2, 7 and 8 are definitely separate pairs. Thus it is estimated that, round about 1978, the total breeding swan population was seven or eight pairs.

Breeding habitats

As shown in Table 1, most lakes are rather small, 0.5 to 2 km long and 0.5 to 1 km wide. Only one locality, area 5, is markedly larger.

All successful breeding attempts occurred below 100 m above sea level. Most localities lay 1 to 2 km from the nearest sea. (In one case a small islet in the sea was used for the nest).

The vegetation is fairly rich in most breeding localities. Common species in most lakes are *Equisetum fluviatile, Menyantes trifoliata* and *Carex spp* such as *C. vesicaria. Equisetum* seems to be an important food plant for the swans in the middle of the summer.

The closest distance between successful breeding pairs was 3 km.

Reproduction

Most of the eggs were laid in the latter half of May. The number of eggs in 12 clutches varied between three and six, the average being 4.8 (Table 2).

Table 2. Clutch and brood size distribution.

In calculating the mean, zero is excluded.

	0	1	2	3	4	5	6	Sample size	Mean
Number of eggs	–	–	–	1	4	4	3	12	4.8
Young in early July	3	1	3	6	7	7	–	27	3.7
Young Aug/Sept	6	6	9	12	6	1	–	40	2.6

It was never shown that a nest was predated, even if predators such as *Aquila chrysaetos* and red fox *Vulpes vulpes* obviously showed interest in the incubating swans. In 1961 a nest in area 1b was probably destroyed due to human disturbance during egg-laying (Myrberget 1962). In the late spring 1971, the nest in area 2 was flooded in early July. We have occasionally found unfertilized eggs or dead newly-hatched young in the nests but, in general, hatching losses seem to be low.

Brood size was, on average, 3.7 in July and 2.6 in August/September (Table 2). In three of 37 hatched broods, all young disappeared soon after hatching.

In three cases the brood contained one young which was unable to fly and was left by the parents. In one case it is possible that the parents returned for the young. In both of the other cases the young died shortly after the parents had departed. One of these chicks was dissected, but there appeared to be nothing wrong with the anatomy of the wing (Eriksen 1971 and pers comm).

In 1977 and 1978 the nest in area 8 was on a very small lake in bog land. The parents soon took the young to a nearby and obviously more favourable lake but in both cases only one young survived. In 1979 the pair nested in a small lake in the immediate vicinity and bred three young.

In the period 1970 to 1978, there were at least 38 breeding attempts within the area. It is probable that 35 pairs hatched young and 32 pairs raised about 80 fledging young. Reproduction was particularly poor in 1971 and 1975. In 1971, with a late thaw, three pairs produced two fledgelings. In 1975 three pairs produced one cygnet, the number of hatched young that survived the first days determining the net production. In these two years, production was also poor for terrestrial birds such as *Lagopus lagopus* (Myrberget 1978) and 1975 was poor also for *Larus spp* (Myrberget *et al* 1976). Unfavourable weather was probably the main reason for bad production in both years. In 1975 the main proximate cause may have been a poor production of insects, which are the main food for the young during

the first days (Blomgren 1974; Haapanen *et al* 1977).

The families usually leave the breeding lakes during the period 20 September to 10 October, but have been known to remain until 20 October.

Discussion

The increase in the Senja population of *C. cygnus* during the last 20 years may continue, since there are other potential breeding areas on the island. The reasons for the increase must be the same as those which have led to the general increase in Fennoscandinavian swan populations in the period (Fjeldsa 1972, Haapanen *et al* 1973) and will not be discussed here. Some of the swans on Senja are very tame, just like those in many other newly inhabited Nordic areas.

The net reproduction rate, 2.6 cygnets per successful pair, is approximately the same as that found in other northern areas in Fennoscandia (Fjeldsa 1972; Blomgren 1974; Haapanen *et al* 1977) but less than in the eutrophic lakes in southern Sweden (Elmelid *et al* 1977).

Summary

On Senja island (1590 km^2, 69°30'N) the breeding population of *Cygnus c. cygnus* increased from one pair in 1960 to seven to eight pairs in 1978. Of 38 recorded breeding attempts in 1970 to 1978, 35 hatched young and 32 produced about 80 fledging cygnets. Two bad production years coincided with bad production in other birds.

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