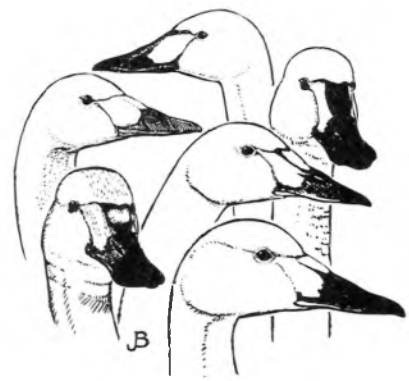
Population size, breeding success and distribution of Bewick's Swans *Cygnus columbianus bewickii* wintering in Europe in 1986-87

SJOERD DIRKSEN and JAN H. BEEKMAN



In 1986-7 two international censuses of the European wintering population of Bewick's Swans were organised, in January and March. The total of the January-census (14,600-16,000) was influenced by adverse weather, but came close to the totals reached in recent years. The census in March revealed that only a few birds are east of East Germany in the early spring migration period. Breeding success in 1986 was low. There is a large and so far unsolved discrepancy between the population size estimated in winter from censuses in Western Europe (16 to 17 thousand) and the most recent estimate of numbers at the breeding grounds in northern Russia (30 to 36 thousand).

The population of Bewick's Swans, *Cygnus columbianus bewickii*, wintering in Western Europe deserves special attention. It is relatively small, the most recent estimates being 16-17,000 individuals (Beekman *et al.* 1985, Monval & Pirot 1989). The species has dramatically changed its feeding habits in the winter quarters in the past decades. As aquatic vegetation declined, the swans largely had to switch to grassland and waste crops (Timmerman 1977, Merne 1972, Poorter 1981). Despite a complete shooting ban all over its range, 40.4 % of Bewick's Swans X-rayed at Slimbridge in 1988 and 1989 had leadshot in their tissues (Rees *et al.* 1990), so hunting still occurs.

Monitoring numbers and breeding success generates basic data that are required for protecting the species and its habitats. In our paper describing the winter census in January 1984 we reviewed the previous population size estimates, and described the distribution during the winter season (Beekman *et al.* 1985). For the reasons mentioned above it was decided to continue these population censuses. A scheme was established as a part of the activities of the IWRB Swan Research Group. Every three years a concentrated effort will be made in mid-January, along with the IWRB waterfowl census, to get an accurate estimate of population size, as well as data on breeding success and distribution. In the same winter a census is organised in another month. By selecting different months over the years, a general picture of distribution and numbers along the whole flyway will be obtained. So far, censuses in November (1983, Beekman *et al.* 1985) and March (1987, this paper) have been completed, while a census in April (1990) is the next to be carried out.

In this paper we present the results of the two censuses organised in January and March 1987 respectively. A March-census was included this time to obtain further insight into the swans' distribution during the first part of the spring-migration period.

Methods

The January census was made during the weekend of 17-18 January 1987 at the same time as the IWRB's midwinter waterfowl census. The central date for the March-census was 21 March 1987. Observers were requested to collect data on total numbers of birds, numbers of cygnets, brood size and food choice. They were also asked to count on a date as close as possible to the dates mentioned above.

The censuses were organised in cooperation with the national organisers of the waterfowl censuses in the countries involved, while some additional contacts were helpful as well. Unfortunately, no data were received from Poland. In the Netherlands it was not possible to get all the counts done in the central weekends: in January the SW-part was counted one week earlier, in March all areas along the large rivers were counted a week earlier.

Weather data were obtained from daily reports of the Royal Dutch Meteorological Institute.

Results

Census 17-18 January 1987

Weather conditions

12-15 January: cold and dry weather, with maximum temperatures below 0°C. On the 14th and 15th very strong easterly winds (up to 8 Beaufort) in the Baltic and North Sea regions. 16-20 January: cold and dry weather, maximum temperatures above 0°C on the British Isles only, weak to moderate winds from easterly directions.

Results of the census (Table 1)

In the January 1987 census a total of 14,600 - 15,950 individuals was obtained. This census was in the middle of a very cold period, which dominated the weather in the whole of Western Europe with the exception of the British Isles. In the Netherlands the census was not totally successful, as the SW part of the country was visited a week before (due to waterfowl counts combined with tidal counts which were not possible a week later). Within that week it became very cold in the Netherlands as well, which forced a lot of swans to the west and south. It seems likely that at least some of these birds were to be found in the SW of the country,

Table 1. Observed numbers of Bewick's Swans and proportions of cygnets in Europe, 17-18 January 1987.

Country	Total swans observed	Ages recorded % cygnets	*n* swans
Sweden	1		
Denmark	22	13.6	22
Poland	?		
East Germany	0		
West Germany	0		
The Netherlands	5200-6560	5.1	430
Belgium	120		0
France	77	5.5	77
England	8018	8.7	6519
Northern Ireland	107		0
Ireland	1041	7.6	753
Total	14600-15950	7.2	

Netherlands counts partly a week before because of interference with other waterfowl counting schemes. The lower figure is the census-weekend total, the higher includes birds counted a week before and probably (partly) missed a week later.

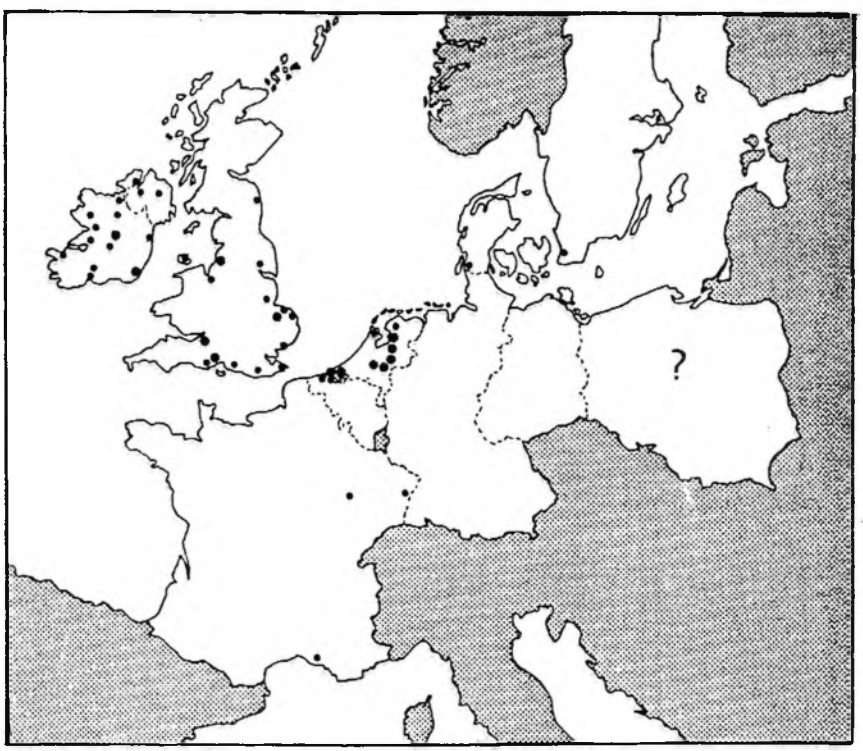


Figure 1. Distribution of Bewick's Swans during the census of 17-18 January 1987. One dot represents one site or a cluster of nearby sites. Small dot = 1-160 swans (<1% of total); large dot = >160 swans (≥1% of total). Sites which held over 500 swans are mentioned in the text.

Table 2. Observed numbers of Bewick's Swans and proportions of cygnets in Europe, 21 March 1987.

Country	Total swans observed	Ages recorded % cygnets	*n* swans
Sweden	0		
Denmark	1080	14.8	418
Poland	?		
East Germany	560	7.3	560
West Germany	4301	6.9	2982
The Netherlands	5406	10.2	1279
Belgium	12	16.7	12
France	29	0.0	24
England	3171		0
Northern Ireland	0		
Ireland	6	0.0	6
Total	14565	9.2	

Netherlands counts partly a week before because of interference with other waterfowl counting schemes

and were thus missed during the census. The correct figure is therefore probably closer to the upper limit, which indicates that the census-total is close to the total estimated for 1983-84. It is clear however that the weather has influenced the quality of this census.

The distribution of the observed birds is given in Figure 1. Nearly all the Bewick's Swans were located in the western part of the wintering range: (north-)east of the Netherlands only 23 individuals were found! The difference in dispersion with the mild winter of 1983-84 is striking: Poland, Denmark, East and West Germany accounted for more than a thousand swans in January 1984. In England the total of 6,164 in the Ouse Washes was remarkable. Other areas holding more than 500 individuals were only found in the Netherlands: along the rivers IJssel and Waal and on Walcheren (in the Delta area).

Census 21-22 March 1987

Weather conditions

14-15 March: a dry weekend, westerly winds, maximum temperatures a few °C above zero. 16-22 March: rising temperatures, northerly to westerly winds (5-6 Beaufort), rain and some snow over the whole range, max. temperatures up to 10 °C, slightly decreasing over the week.

Results of the census (Table 2)

In the March 1987 census a total of 14,600 individuals was obtained. Most Bewick's

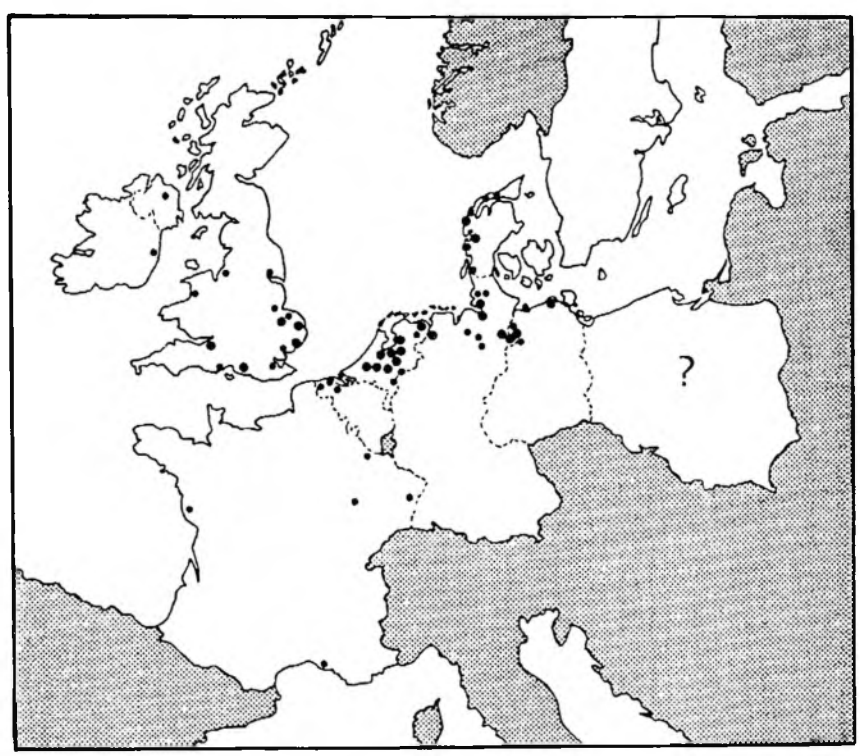


Figure 2. Distribution of Bewick's Swans during the census of 21-22 March 1987. See Figure 1.

Swans had left Ireland in the second half of March, and the numbers in England had dropped to less than half the January total. The majority was counted in the Netherlands and West Germany, although the total for the Netherlands is probably somewhat too high. In this country large parts were counted a week earlier because of existing waterfowl count schemes. The relatively low figure for East Germany is remarkable. It is a pity that no data are available from Poland.

The total of the March census is 80-90 % of the assumed population size. A census outside the midwinter census period in January is likely to be less complete, because fewer of the less important sites are visited, and lead to a smaller total. Therefore it can be concluded that by the end of March at most one or two thousand, and maybe even fewer, Bewick's Swans are further east than East Germany. The distribution during the March census is given in Figure 2. In this period most Bewick's Swans are feeding in wet grassland areas in the Netherlands and West Germany. Areas where 500 or more were seen were: in England, the Ouse Washes; in the Netherlands, along the River IJssel, the polders along the Border Lakes, and the area SE of Lake Zuidlaren; in West Germany, along the River Ems, and at both the upper and lower River Elbe; and in Denmark, the Skjern Å area.

Breeding success

A proportion of 7.2 % juveniles was calculated for the January census. However, very little data on juvenile proportions in the Netherlands reached us for this census: only 430 were aged. The proportion given for this country in Table 1 is probably too low, which therefore holds for the weighted population-mean as well. It is likely that the figure should be at least 8 to 9 %. During the March census some more data were gathered on breeding success. The weighted mean is 9.2 %. It can be concluded that 1986 was a poor breeding season. In 1983-84 the proportion was 11.3 %, which already was relatively low compared to other years (Beekman *et al.* 1985).

Discussion

The total Northwest European winter-population of Bewick's Swans has been counted four times in recent years:

1982-1983	15,350-15,850(IWRB midwintercount + supplements, Beekman *et al.* 1985)
1983-1984	16,300 (Beekman *et al.* 1985)
1985-1986	16,910 (IWRB midwintercount - whole two-week period!- Monval & Pirot 1989)
1986-1987	14,600-15,950 (this paper)

From these figures it seems that the size of the population has been quite stable during the mid-eighties and can be estimated to be 16 to 17,000.

Although this population size estimate seems to be based on good censuses, some doubt has arisen recently. Mineyev (1991) estimates the population on the breeding grounds in the European northeast of the USSR to be 30 to 36,000 individuals. This figure is the result of an extrapolation of aerial counts of parts of the tundras between the White Sea and the Ural. As it seems unlikely that half of the swans were overlooked during the recent censuses in western Europe, there are only two possible reasons for this discrepancy:

First, a part of the north Russian population may winter elsewhere. There are some reports of birds wintering in Iran and even older ones from the Caspian and Aral sea (Cramp & Simmons 1977, Timmerman 1977). The use of this migration route is supported by a few more recent ring recoveries of British ringed birds between these wintering sites and the Pechora region (Rees 1991). The suggestion therefore is that although no information on numbers and sites is available part of the population may winter in these southern wintering areas instead of western Europe.

Second, extrapolations from aerial censuses in large areas holding widely different densities of swans are difficult and may well lead to estimates which have very large confidence limits.

It seems that the answer to the validity of both these suggestions is primarily in the hands of our Soviet colleagues. Although we realise that there will be great logistical problems, we hope that researchers and observers will have the possibility to explore both the breeding grounds as well as the southern migration route in more detail in the next few years. It need not be stressed that marking swans will continue to be necessary to elucidate the relations between western and (possible) southern wintering areas.

Again, it is impossible to mention by name all the hundreds of observers whose efforts resulted in the data presented here. Our thanks go to them and to: J-Y. Pirot (IWRB), L. Nilsson (Sweden), U.G. Sörensen (Denmark), W. Neubauer (East Germany), G. Dahms (West Germany), L.M.J. v.d. Bergh and J.B.M. Thissen (The Netherlands), K. Devos and P. Meire (Belgium), P.J. Dubois (France), E.C. Rees and D.G. Salmon (England), P.M. Bradley (Northern Ireland), O.J. Merne (Ireland). Two referees reviewed a draft of the manuscript and made some helpful comments.

Presentation of a poster on this topic at the 3rd International Swan Symposium was kindly made possible through the financial support of World Wildlife Fund-Netherlands and the Prins Bernhard Fonds.

References

Beekman, J.H., Dirksen, S. & Slagboom, T.H. 1985. Population size and breeding success of Bewick's Swans wintering in Europe in 1983-4. *Wildfowl* 36: 5-12.

Cramp, S. & Simmons, K.E.L. 1977. *The Birds of the Western Palearctic.* Vol. 1. Oxford University Press.

Merne, O.J. 1972. Bewick's Swans feeding on waste potatoes and other agricultural crops. *British Birds* 65: 394-395.

Mineyev, Yu. N. 1991. Distribution and numbers of Bewick's Swans *Cygnus bewickii* in the European Northeast of the USSR. In: J. Sears & P.J. Bacon (eds.) *Proc. 3rd Int. Swan Symp.*, Oxford, 1989. *Wildfowl.* Special Supplement No. 1

Monval, J-Y. & Pirot, J-Y. 1989. Results of the IWRB International Waterfowl Census 1967-1986. *IWRB Special Publication* No. 8. Slimbridge.

Poorter, E.P.R. 1981. *Cygnus columbianus bewickii* in the border lakes of the IJsselmeer polders. In: G.V.T. Matthews & M. Smart (eds.) *Proc. 2nd Int. Swan Symposium,* Sapporo, 1980. IWRB, Slimbridge: 49-57.

Rees, E.C. 1991. Bewick's Swans at spring staging areas in the western USSR. In: J. Sears & P.J. Bacon (eds.) *Proc. 3rd Int. Swan Symp.*, Oxford, 1989. *Wildfowl.* Special Supplement No. 1

Rees, E.C., Bowler, J.M. & Butler, L. 1990. Bewick's and Whooper Swans: the 1989-90 season. *Wildfowl* 41: 176-181.

Timmerman, A. 1977. De Kleine Zwaan. *Vogeljaar* 25: 113-123.

Sjoerd Dirksen, IWRB Swan Research Group, Smaragdplein 3, 3523 EA Utrecht, The Netherlands
Jan H. Beekman, IWRB Swan Research Group, Zoologisch Laboratorium, Rijksuniversiteit Groningen, Postbus 14, 9750 AA Haren, The Netherlands