

## Passage of the Barnacle Goose through the Baltic area

ERIK KUMARI

At present the total world population of the Barnacle Goose *Branta leucopsis* is estimated at about 50,000 individuals and an increase in the numbers of the species has been noted during the last decade (Mörzer Bruyns, Philippona and Timmerman 1969). The populations of three different areas are isolated, to a great extent or even completely, at all seasons of the year (Boyd 1961, 1963, 1968):—

1. Greenland population—nests on the east coast of Greenland, winters in Ireland and western Scotland; at least 20,000 individuals.

2. Svalbard population—nests mainly on Spitsbergen, winters in Scotland (Solway area); up to 4,000 individuals.

3. Barents Sea population—nests on the southern island of Novaya Zemlya and on Vaigach Island, winters on north-west coasts of the European continent (particularly in the Netherlands); up to 25,000 individuals.

We shall confine ourselves to the third population only, that of Novaya Zemlya and Vaigach Island which migrates through the Baltic area. The species nests on almost inaccessible rocks of northern regions with severe climate, where until recently no field observations had been made. Only during the last 20 years have ornithologists succeeded in obtaining some scant data in its nesting places.

According to Gorbunov (1929) the Barnacle Goose nested on the southern island of Novaya Zemlya in small

colonies (of up to 75 pairs), arrived around 20th May, nested from June until the end of July and then moulted. However, the author did not visit the nesting places himself but collected these data from nomadic hunters. It was not until 1948 to 1950 that the nesting of the Barnacle Goose was observed on the southern island of Novaya Zemlya and not until 1957 on Vaigach Island (Uspenski 1951, 1958, 1964). On both of these islands nests are situated in small colonies on steep rocks. In the 1950's the population totalled only approximately 1,000 pairs. The birds arrived in the nesting places in the middle of May and laid eggs around 10th June. The goslings hatched in the second half of July. The adults moulted between the end of July and 20th August, and the departure from the nesting places took place at the end of August or at the beginning of September. At the time, a part of the moulting (i.e. flightless) birds were destroyed by people visiting the islands and this contributed to the decrease of the species.

Spangenberg and Leonovich (1960) refer to a brisk passage of the species in an easterly direction on the Kanin Peninsula (20th-25th May), but these data were obtained from the residents working here. The authors observed for themselves only four geese on 9th June 1957. According to the residents, the species was decreasing in that locality as well.

In the summer of 1960 Karpovich and Kokhanov (1967) recorded only about 50 pairs nesting on Vaigach Island as well as 50-70 non-breeding birds. In the summer of 1957, when Uspenski was there, the total number of the species had been two to two-and-a-half times higher. Local inhabitants destroyed nestlings, as well as adults in August when they are flightless. Young birds were able to fly at the beginning of September.

This is a short survey of our knowledge of the Barnacle Goose nesting in the Soviet Union.

#### General data on the passage of Barnacle Geese through the eastern and northern Baltic Sea

For 150 years it had been known that large flocks of Barnacle Geese halted during migration on the west coast and islands of Estonia, while in other parts of the Baltic area the species appeared to be rare or only occasional, particularly inland.

The Barnacle Goose had been met with only seldom on the southern coast of the Baltic Sea in Mecklenburg, German Democratic Republic (H. Schröder, in litt.). Greater numbers were recorded in some areas (particularly in the vicinity of the Wismar Bay), but a few individuals have been noted inland as well (Kuhk 1939). The species was equally rare in the neighbourhood of Hiddensee Island (H. Schildmacher, in litt.). In former East Prussia the Barnacle Goose was met with extremely rarely, only three times on the Courland Spit (Tischler 1941). The species was also a rare transit migrant in Lithuania (Ivanaukas 1939) and Latvia (E. Taurinsch, pers. com.). Only solitary individuals had been met with in the Baltic interior—in the area of Lake Peipsi (own data), in the Pskov (Zarudny 1910) and Leningrad regions (including Lake Ladoga, South Karelia and the environs of Vyborg) (A. S. Malchevski, in litt.; Putkonen 1942). The species was also regarded as a rare transit migrant near Joensuu, close to the south-east border of Finland, 130 km. to the north of Lake Ladoga (Pynnonen 1934).

The passage of the Barnacle Goose through the Gulf of Finland is more intensive than that through the Gulf of Bothnia (Merikallio 1958). Only occasional observations have been made inland. According to the short notes in the journal *Ornis Fennica* the Barnacle Goose has been recorded most frequently on the islands and coastal areas of south-west Finland, while the numbers decrease

towards the east along the Gulf of Finland and there is an especially marked drop towards the north along the Gulf of Bothnia.

The data for Sweden (*List of the Birds of Sweden* 1970) indicate that the species is numerous as a transit migrant in the neighbourhood of Gotland Island, occasionally also at Blekinge and Öland, elsewhere being scattered. It is rare in Scania, where in the nineteenth century it occurred considerably more frequently. The species is rare in the northern part of the Gulf of Bothnia (Wahlstedt 1967).

#### Spring passage in the Baltic area

Equally with the neighbourhood of Gotland Island, the west coast of Estonia and the West-Estonian archipelago serve as an important transit area for the Novaya Zemlya-Vaigach population, but this fact has not been mentioned even in the latest studies on the European bird fauna (for example, Bauer and Glutz 1968). Every spring, thousands of individuals concentrate for several weeks round about the middle of May in the same localities on the coast and on maritime islands. These mass halting places have been known to local residents for many decades. In the old days the birds were hunted here, the shooters using decoys specially made for that purpose of wood and cloth and painted in oils. At present in Estonia the hunting of all *Branta* species has been banned and their mass halting places have been put under state protection.

We can divide observations of the passage of the Barnacle Goose through Estonia into two periods: up to 1957, and from 1958 to the present time. During the latter period the study of the geese migration has intensified owing to the activities of the Baltic Commission for the Study of Bird Migration.

#### Period before 1957

According to the information of elderly local residents the Barnacle Goose has been a numerous transit migrant on the western shores of Matsalu Bay, on Saaremaa and Hiiumaa Islands from time immemorial. In the second half of the nineteenth century and at the beginning of the present century the Barnacle Goose has been claimed to have been present in far greater numbers than in the 1930s and 1940s. Most of the people making these claims have died and therefore there cannot be direct comparison with the records of the last twenty years when a steady increase has been observed.

The Barnacle Goose is characteristic of Estonia in the spring, whereas its halts in the autumn are of shorter duration, territorially more restricted and do not attract so much attention. There is no doubt, however, that the numbers of the species in the autumn are at least equal to those in the spring.

Loudon and Buturlin (1908) were the first to refer to the plentiful passage of the Barnacle Goose through the coastal areas of Matsalu Bay. Halting places on the west coast of Saaremaa Island were discovered by F. E. Stoll, who repeatedly visited the area between 1906 and 1910. During the period 1910 to 1950 the halting of the species in flocks of various sizes was observed in a number of places on the south and west coasts of Saaremaa Island, on Muhu Island, Hiiumaa Island,

Vormsi Island and in the vicinity of Haapsalu Bay. On the north coast of Estonia the species was represented in considerably smaller numbers during the autumn transit flight and not a single mass halting place has been discovered in this area.

#### *Occurrence from 1958 onwards*

The spring halting places of the Barnacle Goose on the west coast of Estonia and on its islands are shown on the map (Figure 1). The numerals indicate the main localities where counts have been made over several years during the first half of May. The migrating geese are then settled for a considerable period and the highest numbers are recorded.

Although counts in different years are not equally complete, the results for

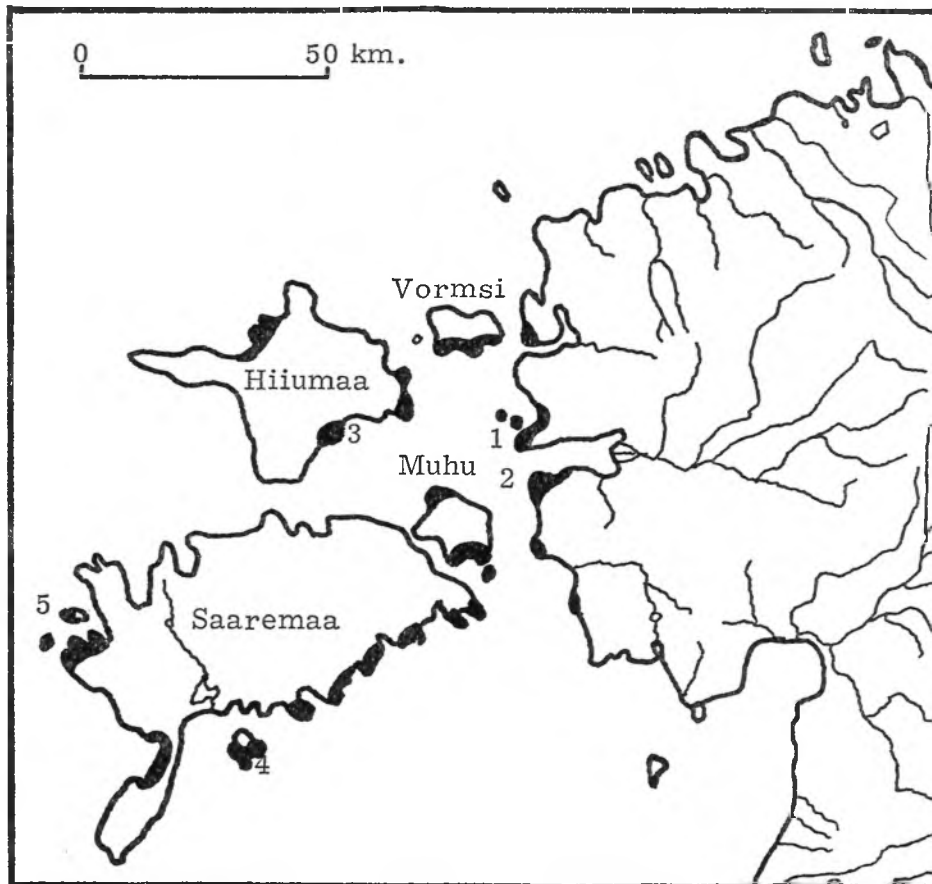


Figure 1. Halting places of the Barnacle Goose during the spring passage in Estonia. The chief ones: 1 (Puise) and 2 (Saastna)—Matsalu nature reserve, 3—area of Kassari Island, 4—Abruksa Island, 5—Vaika nature reserve (the neighbourhood of Vilsandi), and the west coast of Saaremaa Island.

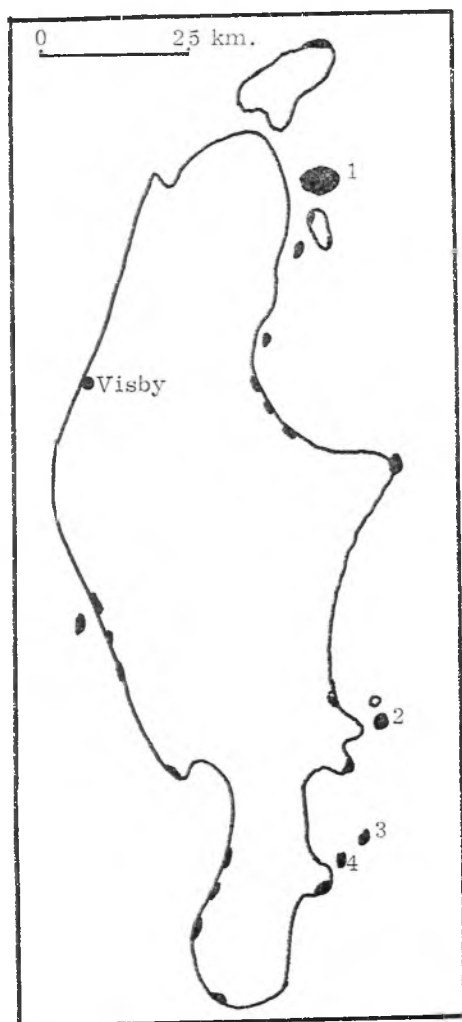


Figure 2. Halting places of the Barnacle Goose during the spring passage in the vicinity of Gotland Island (after G. Hakansson and S. Högström). The chief ones: 1—Skenholmen, 2—Laus holmar, 3—Ytterholmen, 4—Gröttingsboudd.

1964-70 are presented in Table I. Prior to that period we only have quantitative data for the Matsalu nature reserve (1 and 2 on the map); for 1958 to 1963 which are respectively:— 2,000, 2,500, 2,000, 2,500, 3,000 and 3,000.

On the strength of the three springs (1964, 1968, 1970) with sufficient counting data we may conclude that annually in the first half of May not less than 8-10,000 migrating Barnacle Geese halt in Estonia. The results of occasional observations made outside the above areas indicate that the actual numbers are considerably higher. For example, at the beginning of May over 5,000 individuals were on the east coast of Saaremaa Island, and on maritime islands (Jögi 1965). Flocks of several thousand individuals have also been observed in some places on the south coast of Saaremaa Island, on the west coast of the Sörve Peninsula and on Hiiumaa Island during the first half of May.

Over 10,000 Barnacle Geese now halt on the small coastal islands of Gotland Island each year in about 25 regular places (Figure 2). The data for some earlier years (aerial counts) were: 1961—3,775; 1962—3,875; 1963—5,995 (S. Högström, in litt.). If compared with the numbers at Matsalu in the same springs, we can say that there is the same tendency to increase at the end of April and beginning of May 1968. At the request of the Baltic Commission for the Study of Bird Migration, the counts by G. Håkansson and S. Högström on Gotland Island were synchronised with those in Estonia. Large numbers, 4,800-9,000, were recorded by the two Swedish colleagues. The largest concentrations were 580 to 2,225 birds (where in 1963 there had been 800 to 2,000). During the last decade it has been noticed that in the first three weeks of May the birds tend to concentrate at certain set places into ever bigger flocks of up to 2-3,000, whereas the peak was only 500 in the 1950s. On the eve of departure to the north-east these dissolve into smaller migrating

Table I. The numbers of Barnacle Geese in Estonia in the first half of May.

Year	Matsalu	Neighbourhood of Kassari	Abruka	Vaika	West coast of Saaremaa	Elsewhere	Estimated total
1964	4000	2000	1500	1500	1000	800	10800
1965	5000	?	?	?	?	?	?
1966	6000	?	1000	?	?	?	?
1967	6000	4000	?	4000	?	?	?
1968	4000	1700	2500	4000	800	1000	14000
1969	3000	2500	?	2500	700	?	?
1970	3000	2500	?	1500	500	500	8000

All the figures have been given in round numbers.

parties of a few dozen to a few hundred birds.

Since these large concentrations of the Barnacle Goose can be observed simultaneously in Estonia and on Gotland Island in the first half of May, there is no reason to doubt that they are different birds. These areas serve as the two chief places of concentration for the species on its migration route (Figure 3) from the wintering area to the nesting places, the total numbers of over 20,000 here being similar to those of the wintering population in the Netherlands (Timmerman 1962; Bofenschen and Kramer 1969). It is interesting to note that not a single halting place of the Barnacle Goose on spring migration has been recorded to the north-east of Estonia, though the distance between the Baltic countries and the nesting places is over 2,000 km. and the birds are unlikely to cover such a long distance without stopping. Probably there are a few undetected halting places somewhere in the area of the White Sea or on the south coast of the Barents Sea.

The birds wintering in the Netherlands usually begin their spring migration in March (Philippona 1962; Stichmann and Timmerman 1965). They halt in the

North Friesland archipelago up to the end of April. Counts there by Timmerman on 8th-13th April 1965 yielded a total of 10-15,000 individuals (Wolf 1970). Hamburger Hallig Island serves as an important intermediate halting area, for on 14th March 1968 Danish ornithologists registered 3-4,000 Barnacle Geese there, while not a single regular spring halting place has been recorded in Denmark (Mette Fog, in litt.). Passing across the basal part of the Jutland Peninsula (Schleswig-Holstein), the mass migration of the Barnacle Geese is an annual phenomenon between the middle of March and the end of April in the south-east Danish archipelago, in Moen, Lolland, and Falster, but they occur only irregularly in the areas lying to the north (Salomonsen 1963).

Afterwards the route probably lies over the waters of the Baltic Sea, since the species has been met with in the coastal areas of south Sweden to a lesser extent in the spring than it could have been expected (S. Ulfstrand, in litt.; and short notes in the journal *Vår Fågelvärld*). The geese arrive in the halting places in the neighbourhood of Gotland either at the end of March or at the beginning of

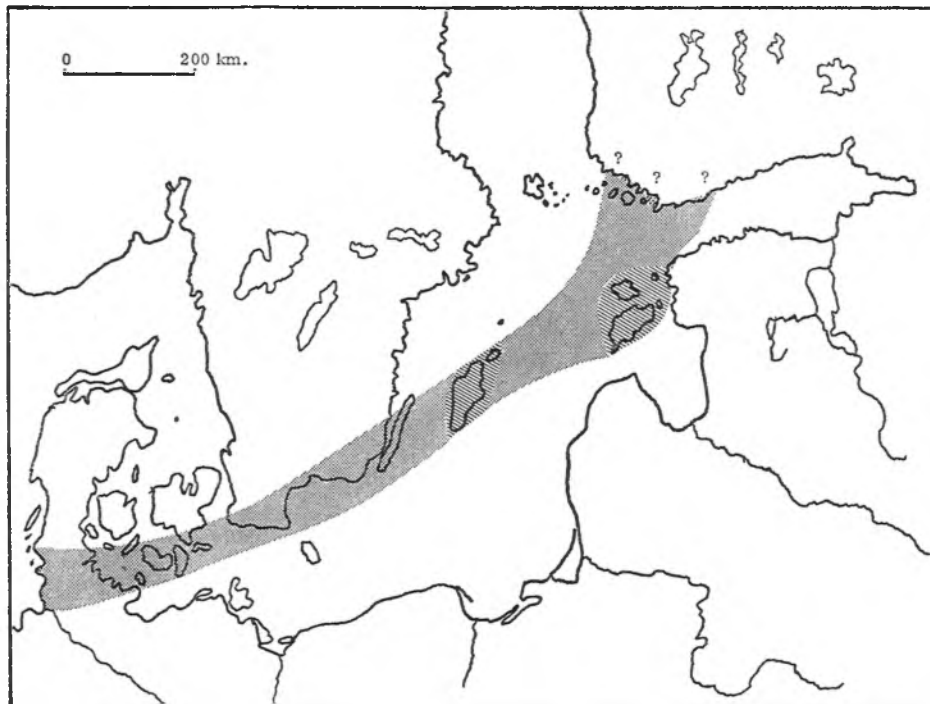


Figure 3. Spring migration route of the Barnacle Goose in the Baltic Sea. Hatching indicates halting areas, stippling — passage.

April, that is simultaneously with the arrival on the west coast of Saaremaa Island (the distance between the two islands is 200 km.). In the period 1953-1970 the species arrived in Estonia in March on only three occasions: 27th March 1961—Matsalu; 25th March 1961—Vaika; 27th March 1968—Vaika. The arrival in the Matsalu nature reserve is most frequently in the middle of April. The birds, having reached maximum numbers by the middle of May depart quite suddenly (20th-26th May) in a north-easterly direction. In some years solitary flocks remain until the beginning of June (Jögi 1965; Renno 1968).

Migrating from Estonia in a north-easterly direction the species is lost sight of in the area of the Gulf of Finland. On the Porkkala Peninsula, west of Helsinki, no noticeable passage has been observed (G. Bergman, in litt.) It appears as an occasional visitor to the north coast of Estonia but not, as a rule, in the areas east of Tallinn. The birds arrive in Novaya Zemlya and Vaigach Island in the second half of May.

Recoveries of the Barnacle Geese ringed in the Netherlands shed some light on the present problem. Goose netting there was initiated in the winter of 1956-57 as the joint effort of professional goose trappers and ornithologists, and during the first three winters 114 individuals were captured (Eygenraam 1960). By the end of 1966 1,236 individuals had been ringed, predominantly in Friesland, Gelderland and Utrecht, and 97 recoveries obtained. These prove that the whole population wintering in the Netherlands comes from the north-east (Boyd 1968) and that it has no connection with the population nesting in Greenland as was suggested by Jennov (1963). Of these recoveries 20 were obtained in the Soviet Union (Shewarjowa 1961; Bauer and Glutz 1968; the Netherland ringing centre, in litt.). With the exception of two autumn recoveries in north Estonia, the recoveries were obtained in the spring:—six in west Estonia at the end of April and in the first half of May, one on the Kola Peninsula in May, six on the Kanin Peninsula in May, two on Kolguev Island in May and June, and three in the nesting places on Vaigach Island in June and July. Despite the small number of recoveries, they serve to illustrate the spring migration route of the Barnacle Goose. It is imperative to carry out further special field researches in Karelia, the area of the White Sea and in the southern part of the Barents Sea.

#### Autumn passage in the Baltic area

The departure of the Barnacle Goose from its nesting places takes place at the end of August or the beginning of September. The autumn migration differs considerably from that in the spring. The birds do not halt for long while traversing the Baltic area. Small flocks (making a total of up to a few hundred birds in the course of one season) have been observed in September near Virma on the south coast of the White Sea (Kumari 1963). The transit through Finland is greatly dispersed and takes place in September and October.

In Estonia the autumn migration lasts from the middle of September until the middle of November. Halts of shorter duration take place in places not coinciding, on the whole, with those of the spring. The liveliest migration has been recorded in October. The species also arrives regularly on the north coast of Estonia where it occurs very rarely in the spring. Between the middle of September and the middle of October in 1958, 1960 and 1962 the species occurred on the north coast of Estonia (Viinistu, Lohusalu, Pöösaspea) with total numbers of 1,600-2,200 birds in each place. On the protruding capes of Hiiumaa Island (Tahkuna, Ristna), on the outermost tip of the Sörve Peninsula, and on the westernmost tip of Saaremaa Island only 250-800 individuals were recorded at each locality. In these autumns the total estimated numbers of the Barnacle Geese traversing Estonia were not less than 10,000.

Counts for the subsequent years have yielded still larger numbers of the species on passage, particularly in the West Estonian archipelago. A lively migration took place in the autumn of 1967 (Vorsmi Island, Muhu Island, west coast of Saaremaa Island) when on 28th-30th October on Vilsandi Island alone (Vaika nature reserve) at least 6,000 birds passed, not including the 1,500 remaining there until 18th November (L. Aumees, in litt.). An even more intensive passage occurred in the autumn of 1969 when at least 7,000 birds traversed the area of Kassari Island mostly during four and a half hours on 18th October (J. Kallas, in litt.) and not less than a couple of thousand traversed the west coast of Saaremaa Island on 17th-18th October. On the night of 21st/22nd October a mass migration could be heard passing through the Ristna foreland and Hiiumaa Island. In the same autumn on three occasions between 29th October and 13th

November small flocks were met with at Matsalu where the species is usually absent in autumn (V. Paakspuu, in litt.).

That the 1969 autumn mass migration extended further to the west is confirmed by observations from Denmark (Mette Fog, in litt.): on 20th October, 200 birds were at Saltbaekvig (Zealand); on 20th-25th October, 3,000 birds near Blavands Huk (West-Jutland) (at the same time there were numerous records in Schleswig-Holstein); 21st-24th October, 400 birds were heading westward in south-east Jutland; 24th-28th October, 2,000 were to the west of Skaekback (south-west Jutland); on 27th October, 800 were halting on Saltholm Island (Öresund). Occurrences on these dates and in these localities as well as in such numbers are unusual for Denmark.

During the autumn passage (October, November) a few hundred Barnacle Geese regularly visit the coastal areas of south-eastern and southern Sweden (Falsterbo and Ottenby ornithological stations, Kalmarsund, etc.—surveys of their activities published in the journal *Vår Fågelvärld* and numerous short notes).

Before arriving in the winter quarters in the Netherlands the Barnacle Geese make intermediate halts in the Danish archipelago and in the northern part of the German Federal Republic. An intensive passage took place in the autumn of 1967 in the East Baltic area. In November a total of 613 birds halted in six localities of the Danish archipelago, the bulk, 250 birds, being recorded at Saltbaekvig Bay, in the northern part of Zealand Island (Mette Fog, in litt.). In December 200-280 birds were in the Cuxhaven sector in East Friesland (Ed. v. Toll, in litt.). The west coast of Schleswig-Holstein serves as a regular halting area. Counts on 26th November 1961 yielded a total of 25,000 birds, including approximately 2,000 on Hamburger Hallig Island (Jennov 1963). According to observations from 1935 to 1965 (Wolf 1970) the first Barnacle Geese arrive in the North Friesland archipelago during the first ten days of October, while regular numbers of 3-4,000 are reported in the second half of November. The total numbers involved may be as many as 10,000. In January, when the cold sets in, the birds leave for their wintering quarters in the Netherlands. It is not known whether the Barnacle Goose annually winters in the North and East Friesland archipelago (Stichmann and Timmerman 1965; Bofenschen and Kramer 1969).

#### Numerical fluctuations and conservation

Timmerman's (1962) thorough survey shows that it was during the last twenty years that large numbers of Barnacle Geese invaded two wintering areas in the Netherlands (West Friesland in the north and the Delta area in the south-west) in addition to a few less important sites. During the period 1917-1938 only a few hundred individuals wintered in the Netherlands; in the years 1939-1952 the number was between a few hundred and several thousand; only since 1953 have the numbers of the species been almost constantly growing. In 1960 the wintering population of the Netherlands was estimated at 19-20,000, while at present a total of 25,000 is indicated (Mörzer Bruyns, Philippona and Timmerman 1969).

Several authors (Harrison 1952; Ringleben 1957) are of the opinion that such an increase in the numbers of wintering geese in the coastal areas of the North Sea was due to vast areas of seabed being reclaimed, and providing suitable feeding places. This might be so to some extent, but it is necessary to find reasons to explain the nesting success in the north and the successful course of the migration in intermediate areas.

In connection with the above there arises a problem which is rather difficult to solve now. Granted that the spring passage of the Barnacle Goose on the coast of west Estonia in the second half of the nineteenth century was considerably more substantial, where could the winter quarters of the species have been situated in those times? Before 1920 the species was represented in the winter quarters in the Netherlands in only small numbers. Yet around 1910 hundreds were shot every spring in their halting places in West Estonia. Therefore they must have had good wintering areas in some localities of west Europe.

In the course of a severe winter in 1962-63 only 3-4,000 stayed in the Netherlands (Stichmann and Timmerman 1965). At the same time up to a couple of thousand birds concentrated in the reserves of Belgium (Robyns de Schneidauer 1967; E. Kuyken, in litt.), where in ordinary winters there are, at maximum, a few scores. In that year the species occurred even on the north coast of France (F. Roux, in litt.).

The Barnacle Goose has such a small population that its nesting, mass halting, and wintering areas should be put under protection. The hunting of the species has been banned only in the Netherlands,

Baltic countries and in the greater part of Sweden (with the exception of Gotland Island). Even more dangerous for the species than hunting appear to be the changes in its habitats. Lebrét's (1965) prophecy concerning the Netherlands causes anxiety, for during the coming years a number of regular wintering places will disappear owing to large-scale amelioration work.

At the all-Union conference on the study and preservation of geese held in the Matsalu state nature reserve (Estonia) in May 1970 special weight was laid on the protection of Barnacle Geese during migration. The hunting of the species should be banned in every country all the year round and seasonal sanctuaries should be set up in its mass halting places. A number of measures have already been taken in Estonia, but it is also necessary to put regular mass halting places on Gotland Island under protection and to ban goose hunting of every kind there.

Furthermore, it is necessary to proceed with the study of the Barnacle Goose in all the areas where the species occurs in great numbers at any season. The Netherlands (and to a smaller extent the areas of the German Federal Republic adjoining the North Sea) seem to be the only wintering areas for the whole of the Barnacle Goose population nesting in the

Soviet Union. We shall welcome further joint efforts by specialists in bird preservation and ornithology in the Netherlands, the German Federal Republic, Sweden and the Soviet Union to discuss the world problems connected with the study and protection of this beautiful and rare goose species.

#### Acknowledgements

The author has collected material for the present article over a long period and only part has been used in the present survey. In addition, numerous publications and a large amount of material obtained from colleagues in our country as well as abroad have been used. The author wishes to express his sincerest gratitude to the following colleagues: L. Aumees, Dr. G. Bergman, Cand. mag. Mette Fog, G. Hakansson, S. Högström, J. Kallas, Dr. E. Kuyken, Prof. Dr. S. A. Malchevski, Cand. biol. S. Onno, V. Paakspuu, Cand. biol. O. Renno, Dr. F. Roux, H. Ränk, Dr. H. Schildmacher, H. Schröder, Prof. Dr. R. Tenovuo, Ed. v. Toll, Dr. S. Ulfstrand, Cand. biol. V. B. Zimin. An especially large number of migration observations have been carried out in Estonia by L. Aumees, J. Kallas, V. Paakspuu and H. Ränk to whom the author is particularly grateful.

#### Summary

The Barnacle Goose *Branta leucopsis* is a numerous transit migrant on the west coast and islands of Estonia (particularly in the spring). Mass halting places in the same localities have been known to local residents for at least 150 years. In earlier times the geese were hunted from hides, but nowadays hunting has been banned and its mass halting places have been put under state protection. The greatest numbers occur during the first twenty days of May when up to 10,000 individuals are present. At the same time every spring, a similar number can be recorded in regular halting places in the vicinity of Gotland Island (Sweden). The whole population nesting in Novaya Zemlya and Vaigach Island, and wintering in the Netherlands, passes through these two areas. The autumn migration is dispersed and the birds do not halt for any considerable time. During the last ten years a constant increase in numbers has been observed, owing primarily to the breeding success. The species has not been sufficiently studied in the nesting areas and very little is known about migration to the north-east of Estonia. It is necessary to continue the study of the biology, migration and distribution of the Barnacle Goose as well as to guarantee the protection of the species all the year round, in nesting and wintering areas.

#### References

- BAUER, K. M. and U. N. GLUTZ VON BLOTZHEIM. 1968. *Handbuch der Vögel Mitteleuropas*. Vol. 2. Frankfurt am Main: Akademische Verlagsgesellschaft.
- BOFENSCHEN, G. and H. KRAMER. 1969. Überwinterungsplätze der Wildschwäne und Wildgänse im Bereich der Nordsee- und der westlichen Ostseeküste. *Decheniana* 122 : 87-116.
- BOYD, H. 1961. The number of Barnacle Geese in Europe 1959-1960. *Wildfowl Trust Ann. Rep.* 12 : 116-24.
- BOYD, H. 1963. The present status of the different species of wildfowl. Pages 249-306 in: *Wildfowl in Great Britain*. London: H.M.S.O.
- BOYD, H. 1968. Barnacle Geese in the west of Scotland, 1957-1967. *Wildfowl* 19 : 96-107
- EYGENRAAM, J. A. 1960. Goose-netting in the Netherlands. *Wildfowl Trust Ann. Rep.* 11 : 77-79.



- GORBUNOV, G. P. 1929. Materials on the fauna of mammals and birds of Novaya Zemlya *Trudy instituta po izučenju severa* 40 : 169-239. (In Russian)
- HARRISON, J. G. 1952. The recent status and distribution of wild geese in north-west Germany. Wildfowl counts 1947-1952. *IWRI publ. Nr. 3* : 23-31.
- JENNOV, J. G. 1963. Some remarks on the number of Barnacle Goose (*Branta leucopsis* Bechst.). *Dansk Ornith. Foren. Tidsskr.* 57 : 221-8. (In Danish, with English summary).
- JÖGI, A. 1965. Migration of divers (Gaviae) and anseriform (Anseres) in the environment of Suurvain, Estonia. A dissertation. (In Estonian)
- IVANAUSKAS, T. 1959. *Birds of the Lithuanian S.S.R.* Vol. 2. Vilnius. (In Lithuanian)
- KARPOVICH, V. N. and V. D. KOKHANOV. 1967. Bird fauna of the Vaigach Island and the north-east coast of the Jugor Peninsula. *Trudy Kandalakshkogo zapovednika* 5 : 268-338. (In Russian)
- KUHK, R. 1939. *Die Vögel Mecklenburgs*. Güstrow.
- KUMARI, E. 1963. Number dynamics of some migrating seabirds on the White Sea and in the eastern part of the Baltic Sea. *Comm. of the Baltic Comm. for the Study of Bird Migration* 2 : 67-80.
- LEBRET, T. 1965. The prospects for wild geese in the Netherlands. *Wildfowl Trust Ann. Rep.* 16 : 85-91.
- List of the Birds of Sweden*. 1970. 6th Edition. Stockholm: Svensk Natur. (In Swedish)
- LOUDON, H. BAR. and S. A. BUTURLIN. 1908. Eine ornithologische Fahrt an die Matzal Wiek. *Journ. f. Orn.* 56 : 61-72.
- MERIKALLIO, E. 1958. Finnish birds, their distribution and numbers. *Fauna Fennica* 5.
- MÖRZER BRUYNS, M. F., J. PHILIPPONA and A. TIMMERMAN. 1969. *Survey of the winter distribution of palearctic geese in Europe, Western Asia and North Africa*. Zeist, Netherlands: Goose Working Group of the IWRB.
- PHILIPPONA, J. 1962. The surroundings of Beetsterzwaag and Gorredijk as a haunt for geese. *Limosa* 35 : 17-28. (In Dutch, with English summary)
- PUTKONEN, T. A. 1942. Die Vogelfauna der Gegend von Viipuri. *Ann. zool. Vanamo* 9, No. 2.
- PYNNÖNEN, A. 1934. Migration of the Barnacle Goose, *Branta leucopsis* (Bechst.) in Finland. *Ornis Fennica* 11 : 18-21. (In Finnish)
- RENNO, O. 1968. Passage of the Barnacle Geese at Matsalu. *Trudy zapovednikov Est.S.S.R.* 1 : 174-6. (In Russian)
- RINGLEBEN, H. 1957. *Die Wildgänse Europas*. Wittenberg Lutherstadt: Die neue Brehm-Bücherei.
- ROBYNS DE SCHNEIDAUER, T. 1967. 1962-1967 wildgeese counts. *Gerfaut* 57 : 242-53.
- SALOMONSEN, F. 1963. *Översigt over Danmarks fugle*. Kobenhavn.
- SHEWARJOVA, T. P. 1961. Ringing results of the geese. *Kolčevanie i mečenie zhivotnykh* 1 : 35-45. (In Russian)
- SPANGENBERG, E. P. and V. V. LEONOVICH. 1960. Birds of the NE coast of the White Sea. *Trudy Kandalakshkogo zapovednika* 2 : 213-336. (In Russian)
- STICHMANN, W. and A. TIMMERMAN. 1965. Durchzug und Überwinterung der Gänse in Norddeutschland, den Niederlanden und Belgien 1960/61, 1961/62 und 1962/63. *Vogelwarte* 23 : 140-8.
- TIMMERMAN, A. 1962. On the occurrence of the Barnacle Goose in the Netherlands. *Limosa* 35 : 199-218. (In Dutch, with English summary)
- TISCHLER, F. 1941. *Die Vögel Ostpreussens und seiner Nachbargebiete*. Königsberg und Berlin.
- USPENSKI, S. M. 1951. Nesting places of the Barnacle Geese in Novaya Zembla. *Okhrana prirody* 13 : 124-7 (In Russian)
- USPENSKI, S. M. 1958. Some birds in the North-East of the European part of the U.S.S.R. *Ornitologia* 1 : 35-47. (In Russian)
- USPENSKI, S. M. 1964. Die Weisswangengans in der Sowjetunion. *Falke* 11 : 7-10.
- WAHLSTEDT, J. 1967. Fågelfaunan på Haparanta Sandskär. *Vår Fågelvärld* 26 : 131-51.
- WOLF, W. 1970. Die Weisswangengans- oder Nonnengans (*Branta leucopsis*) als Überwinterer an der schleswig-holsteinischen Westküste. *Jordsand-Mitteilungen* 2 : 2-10.
- ZARUDNY, N. 1910. *Birds of the Pskov Government*. St. Petersburg. (In Russian)
- Prof. E. Kumari, Eesti NSV Teaduste Akadeemia, Zoologia ja Botaanika Instituut, Vanemuise 21, Tartu, Estonian S.S.R.