THE BRENT GOOSE (*Branta bernicla L.*) IN THE SOVIET UNION[1]

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OWING to the rapid decline in the numbers of Brent Geese over large areas of Europe, Asia and North America, ever increasing attention has been paid to this goose in recent years. It has been recorded that during the past 40-50 years the numbers both of Eurasian (*B.b. bernicla*) and American (*B.b. nigricans*) Brent Geese have sharply declined. The Atlantic Brents (*B.b. hrota*) are little better off, although they are protected at the places where they nest and at those where they moult and also at their main wintering sites (Salomonsen, 1955). Information is lacking regarding the status of the population of the Eastern Siberian Brents (*B.b. orientalis*), but such observations as have been made give evidence of a considerable decline of these birds also. The International Committee for Bird Protection stated in 1954 that the Brent Goose is threatened with extinction and approached the governments of all interested states with an invitation to participate in full and universal protection of this species.

Interest in the Brent is also to be explained by its economic importance, particularly in the regions of the extreme north. Many aspects of the biology of the Brent, particularly their migration routes, had not been studied until recently.

All this caused the Commission for the Protection of Nature of the Academy of Sciences of the U.S.S.R. to carry out in 1957 a special inquiry by means of questionnaires in the northern and eastern regions of the U.S.S.R. (The investigation covered mainly the wide-spread network of stations of Glavsevmorput and Gidrometsluzhba*). The data obtained by this inquiry together with existing literary sources, information from inquiries and our own observations, paint the following picture of the present distribution, migration routes and, in some cases, of the numbers of Brent Geese in the Soviet Union.

Brent Geese *Branta bernicla* illustrating the taxonomy used in this paper
From left to right (from mid-North America eastwards):-
B.b. hrota, B.b. bernicla, B.b. orientalis. B.b. nigricans

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*The bodies controlling the Northern Sea Routes and the Hydro-meteorological service respectively.

The Atlantic Brent Goose (*Branta bernicla hrota Müll.*) in the Soviet Union, nests (and moults) in very small numbers only on Franz Josef Land, on Aljer, Elizabether and Jackson Islands (Gorbunov, 1932). It has been encountered as a vagrant in Taimyr (Middendorff, 1853) and on Kolguev (Trevor Battye, 1895). Tugarinov's (1941) surmise of nesting on the north island of Novaya Zemlia has not been confirmed. According to Gorbunov (1932) it arrives in Franz Josef Land from June 3rd to 12th; departure taking place in September, some birds remaining on the islands until the end of this month.

The migration routes of the Atlantic Brents pass mainly through the western parts of the Barentz Sea, as it is encountered on passage on Bear Island. The main wintering grounds of *B.b. hrota* are situated on the Atlantic coast of North America; in lesser numbers they also winter on the Pacific coast of North America and together with *B.b. bernicla* on the shores of Western Europe (Delacour, 1954).

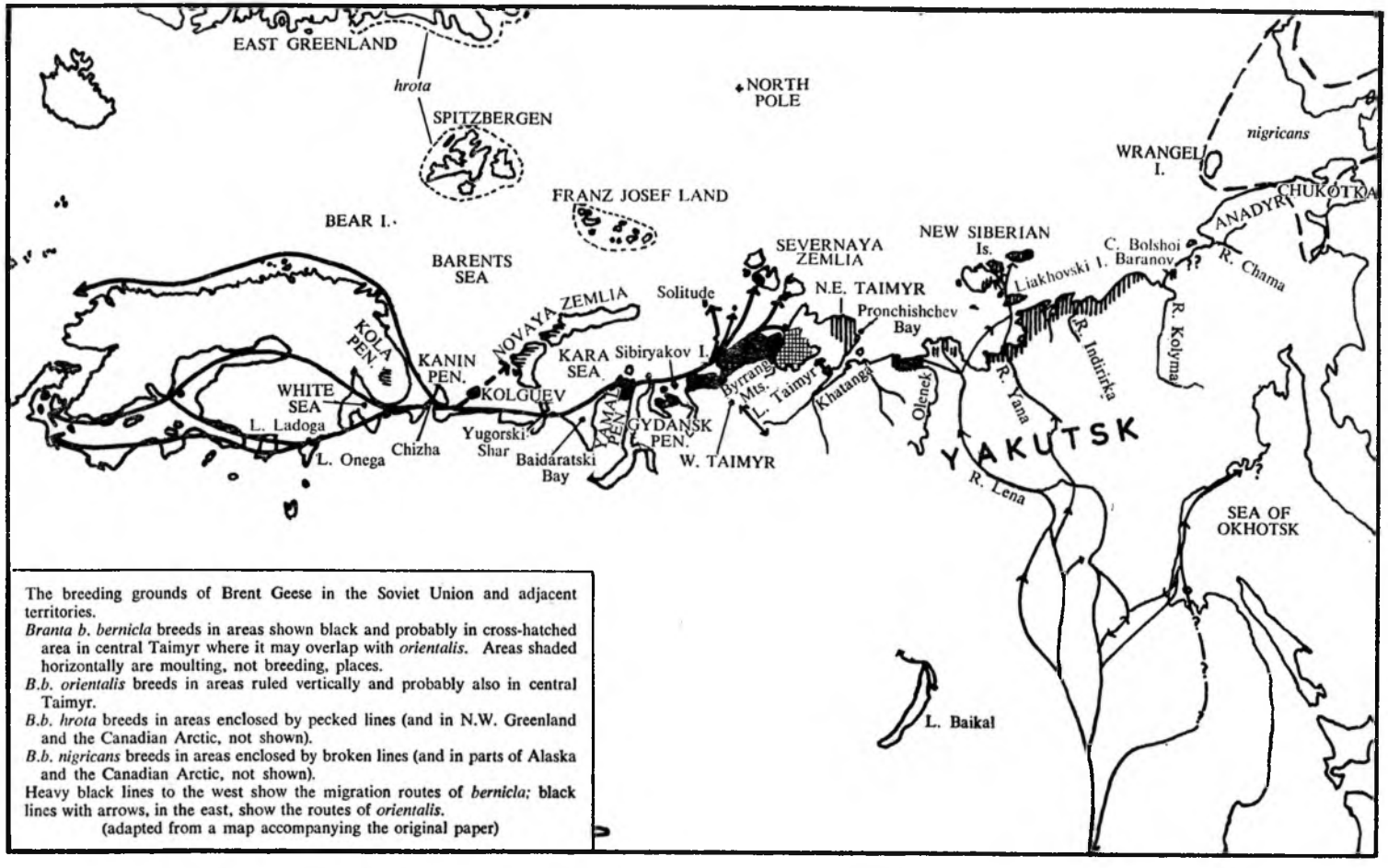
During the last 25 to 30 years the total numbers of *B.b. hrota,* according to observations at the Eastern American wintering grounds, have decreased by approximately 90%. This was due mainly to disease and to the disappearance of the main food of the birds, *Zostera marina*†, from coastal waters. To some extent the Brents changed to other foods; they began to eat other aquatic plants, *Ulva* and others, and to feed on pastures, which had not been observed before, but this did not compensate for the lost *Zostera* (Cottam, Lynch, Nelson, 1944).

Since the 1940's *B.b. hrota* has been protected on its American wintering grounds and from 1951 it has been protected also at its nesting and moulting sites in Greenland (Salomonsen, 1955).

The Eurasian Brent Goose (*Branta bernicla bernicla* L.) has its main nesting and moulting region on the north-east of Western Taimyr. Nesting and moulting of *B.b. bernicla* have also been reliably established (by Tugarinov, 1941, Ptushenko, 1952 and the data of polar stations) to occur on Kolguev, on Northern Yamal (north of 70°N, though it is absent from White Island), on the extreme north-east of the Gydansk Peninsula, in the south and south-west of Severnaya Zemlia, and on the small islands of the Kara Sea, including Uiedinenie (Solitude) Island.

Tugarinov considers it certain and Ptushenko as probable that Novaya Zemlia is a regular nesting and moulting area of *B.b. bernicla.* Brents have been observed there by many observers (on the south island by Baer, 1838, Theel, 1876, Markham, 1881, Gorbunov, 1929, Portenko, 1931, *et al.*; on the north island by Gillet, 1870, Markham, Portenko, Antipin, 1938). But all these encounters relate to unmated birds, usually in moult, sometimes on passage. No one has found a nest there and for this reason Pleske (1928) included the Brent in his list of the birds of Novaya Zemlia only as a passage migrant. This last author is obviously nearest to the truth. From our observations Brents are met with on Novaya Zemlia in small numbers and only unmated birds occur, usually in flocks of moulting Bean Geese

†The cause of the *Zostera* disease, *Labyrinthula,* is a species of single-celled, slimy fungus (Zenkevich, 1951).



The breeding grounds of Brent Geese in the Soviet Union and adjacent territories.

Branta b. bernicla breeds in areas shown black and probably in cross-hatched area in central Taimyr where it may overlap with *orientalis*. Areas shaded horizontally are moulting, not breeding, places.

B.b. orientalis breeds in areas ruled vertically and probably also in central Taimyr.

B.b. hrota breeds in areas enclosed by pecked lines (and in N.W. Greenland and the Canadian Arctic, not shown).

B.b. nigricans breeds in areas enclosed by broken lines (and in parts of Alaska and the Canadian Arctic, not shown).

Heavy black lines to the west show the migration routes of *bernicla;* black lines with arrows, in the east, show the routes of *orientalis.*

(adapted from a map accompanying the original paper)

and White-fronted Geese, this being the case both on the south island and in the southern part of the north island. We encounter here a phenomenon typical of Brent, the settling down of individuals (mainly not fully mature) and their moulting in an area crossed by the usual migration routes but far from breeding sites.

Some birds, perhaps regularly, also settle down and moult on the Kanin Peninsula (in the Chizha region, according to a personal communication from E. P. Spangenberg) and, according to information from inquiries, on the Kola Peninsula (in 1949 and 1950 in July and August a few dozen moulting Brent Geese were observed in the area of the middle course of the River Ponaya). Single birds are encountered during the summer months in the region of Lake Ladoga and, a fact which merits special attention, in exceptional cases they nest there. In particular a brood of Brent Geese was observed during the summer of 1956 by the Nizhniaia Nazia River (a communication from I. Riznich).

Brent fly to their Eurasian nesting sites mainly by the White Sea—Baltic route*, most following the shores of the Gulf of Finland, crossing Lake Ladoga and to some extent Lake Onega and Onega Bay on the White Sea. Some birds while on passage keep to the shores of the Gulf of Bothnia and, passing overland over the lakes of Finland and Karelia, reach the Karelian shore of the White Sea. Passage routes of minor importance cross the Gulf of Riga and Lakes Chudskoie and Ilmen (Menzbir, 1893; Tugarinov, 1941; Kumari, 1957). The passage of Brent over the Gulfs of Finland, Bothnia and Riga takes place from the end of April to the end of May, the most intensive passage occurring in the middle of May.

Besides the White Sea—Baltic route, Eurasian Brent also travel along the northern coasts of Scandinavia when migration from winter quarters to their nesting sites. Birds flying by this route reach Eastern Murman in the second half of May.

On the Western shores of the Kanin Peninsula the migration routes given above merge into one, the Brent flying only along the continental coasts of the Barentz and Kara Seas. The Kanin Peninsula, according to an oral communication from E.P. Spangenberg, is crossed by the birds along the valleys of the rivers Chizha and Shoina, mainly in the period from June 5th to 15th. It is characteristic that Brent Geese do not appear on passage in the Archangel region nor in the Dvinsk Bay of the White Sea in general (Manzbir, 1893), nor in the Mezen region, nor on the northern shores of the Kanin Peninsula.

Brent Geese reach Kolguev between June 10th and 20th and Novaya Zemlia at about the same time and according to our observations they arrive here in spring from the south-west.

The birds penetrate into the Kara Sea apparently only through Yugorski Shar, as passage has not been recorded either on northern Vaigach nor at the extreme south of Novaya Zemlia; nor do the birds fly along the western coast of Vaigach. According to our observations and material obtained from inquiries, Brent pass over Yugorski Shar in the period from

*Ringing of Brent has only been carried out to an insignificant extent and therefore their migration routes are described only on the basis of visual observations.

June 1st to 15th, the most intensive passage taking place between June 8th and 15th. In passing over Yugorski Shar the main mass of the birds keeps to the southern coast of Vaigach, where some flocks come down for rest and food.

The birds cross over Baidaratski Bay at its mouth; they are not observed in the regions of the Amderma, Ust-Kara, Mare-Sale and Cape Khorosovoi polar stations. They also do not appear in the Gulf of Obsk, in the region of the Cape Kamennyi polar station. The geese reach Northern Yamal, June 10th to 15th and about this time they appear on Western Taimyr. Latest of all, June 18th to 22nd, the birds reach Severnaya Zemlia* and the region of Lake Taimyrskoe.

Despite the presence of well defined passage routes along sea coasts and over large lakes, Brent not uncommonly occur far inland. For example, birds, apparently only or mainly of this subspecies, have been repeatedly encountered in White Russia, in the Ukraine, in the central districts of the European part of the RSFSR, in Bashkiria and even in the southern part of Western Siberia (Tugarinov, 1941).

The total number of *B.b. bernicla* at the present time is less than 20,000 (this figure is based on a calculation of the number of birds wintering in Western Europe and includes also a certain number of *B.b. hrota* which winter there) (Salomonsen, 1955).†

The overwhelming majority of Eurasian Brent Geese nest and moult in a relatively limited territory in the north-east of Western Taimyr. According to data obtained from inquiries, only here in the valley of the River Lenivaya and on the upper courses of the streams Granatovaya, Kamenaya, Sludyanaya, Toll and some others have there been recorded in recent years assemblies of nesting and moulting birds running into thousands of individuals.

In the region of Lake Taimyr *B.b. bernicla* is not numerous (data of the polar station communicated by V. M. Sdobnikov), and it is possible that in this area birds of the subspecies *B.b. orientalis* (see below) are much more common.

According to the data of the commercial hunting station Omulevaya 200-300 pairs nest at each of the following sites: Sibiryakov Island, the River Sosnovaya (left bank of the Gulf of Yeniseisk, where assemblies of moulting Brents are also observed; and the skerries of Minin. Brent are very few in number on Severnaya Zemlia; for example, in 1957 only isolated pairs were seen in the region of the polar station Bukhta Solenechnaya, and in the neighbourhood of the Krasnoflotskaya station 20-30 birds were counted. The number nesting on the small islands of the south-east Kara Sea is small; on Uiedinenie Island only a few pairs nest and that not every year.

The autumn departure of *B.b. bernicla* from its nesting and moulting sites begins in the middle of August and finishes during the first few days of September. At the end of August birds are already flying over Yugorski Shar and the Kanin Peninsula; in the first half of September they are over the Baltic. The routes of the spring and autumn migrations are basically

*Although in 1957 the first birds on the south-west of Severnaya Zemlia (Krasnoflotski Islands) were observed as early as the first ten days of June.

†According to a communication from E.P. Spangenberg the total number of Brent Geese flying over the Kanin Peninsula in 1957 came to about 10.000.

the same; but it is noted that on the Baltic Brent are much more numerous in autumn than in spring (Ptushenko, 1952). In the extreme north, as a rule, the birds fly at night in autumn and do not make long stops (Tugarinov and Tolmachev, 1934; communication of E.P. Spangenberg; our observations).

The wintering area of *B.b. bernicla* embraces the coasts of Denmark, Holland, Belgium, England, Ireland†, south-west Sweden, north-west Germany, north and west France (Delacour, 1954).

The number of Eurasian Brent has decreased during the past half century by at least 90%. Even at the end of the last century Brent Geese were so numerous on the Atlantic shores of central Europe that, according to the model description of Naumann, " the voices of the countless flocks drowned the noise of the sea and their swarms in the distance darkened the sky like smoke." (According to Alpheraky, 1904, p.145). The assemblies on the nesting and moulting grounds were also immense. For example, Birulia (1907, p.120) wrote that in 1901 it was " difficult to state, even approximately, how many thousands of geese assembled to moult " at the mouth of one river (River Kolomiitseva, Gulf of Taimyr, Western Taimyr).

Increased hunting on their wintering grounds and during passage and improvements carried out on a considerable part of the coastal territories of Western Europe long ago began to cause a gradual decline in the numbers of Brent Geese. The decline in numbers became particularly sharp from the 1930's and this, like the decline in numbers of *B.b. hrota,* was linked with the disappearance in the North Atlantic of the basic food of Brent Geese—*Zostera marina**. According to Salomonsen (1955), in Holland, for example, not less than 10,000 Brent Geese wintered annually up to 1931; in 1953 only 1,000 were counted there. According to this same author the number of Brent Geese obtained in Denmark declined from 7,000 in 1941 to 2.500 in 1951. A sharp decline in the number of Brent Geese is also established on their breeding and moulting grounds. For example, in the Gulf of Taimyr, where Birulia observed huge assemblies in 1907, only a few broods were encountered in 1949 while flocks of moulting males and un-paired birds were not met with at all (communication of P. M. Sdobnikov).

The hunting of *B.b. bernicla* on its moulting and nesting grounds does not in general play a perceptible role in affecting the numbers of the birds in view of the extremely small human population in these regions, particularly in Western Taimyr. However, since the numerical strength of the Brent Goose has been very seriously undermined, even a relatively small increase in hunting in the regions of the Far North at once exercises an unfavourable influence. Thus, according to numerous observations made by those wintering in polar stations, there was an especially noticeable decline in the numbers of birds arriving in 1950 and 1951. Precisely during this period (1949-1951) there took place on Taimyr a geological survey and aerial photography which brought into the area a large number of people and thus caused increased hunting of Brent among other species. With the ending of these activities and the decrease in the number of hunters on Taimyr the numbers of Brent became to some extent stabilized.

†Ireland does *not* lie in the normal wintering area (Eds.).

*The destruction of *Zostera* on the Atlantic coasts of Europe was first recorded in 1932 (Zenkevich, 1951).

At present Brent Geese are protected in most regions where they winter. In Holland all hunting of Brents has been forbidden since 1950; in England they have been protected since 1954; in Sweden they have been protected everywhere since this same date except in four provinces. In Ireland hunting Brent Geese was forbidden for a period of three years in 1955 (Salomonsen, 1955).

The Eastern Siberian Brent Goose (*Branta bernicla orientalis* Tugarinow). Apparently the main nesting region of *B.b. orientalis,* like that of *B.b. bernicla,* is very small. As Birulia (1907) pointed out, the main nesting territory of the birds is confined to the maritime plains of the tundra between the rivers Yana and Khroma. According to this same author, the Brents encountered there are almost exclusively breeding birds, unpaired birds and males which have left the broods being very rarely observed.* If one refers the birds of Chukotsk, Anadyr and Wrangel to the following subspecies (*B.b. nigricans*), one can suppose that the eastern limit of the breeding range of *B.b. orientalis* is situated in the area between the Rivers Kolyma and Chauna. In any case it nests at Cape Bolshoi Baranov (Tugarinov, 1941), which perhaps is the most extreme easterly point of the breeding range of *B.b. orientalis.*

The existing fragmentary data make it possible to refer to this race the Brent Geese which occupy Eastern Taimyr and the central areas of this Peninsula and consequently to give as the western limit of distribution of *B.b. orientalis* not the River Khatanga, as has hitherto been accepted (Tugarinov, 1941; Ptushenko, 1952), but Lake Taimyr. The area of *B.b. orientalis* also embraces the Liakhovski Islands and the Anzhu (New Siberian) Islands, but the statements of Tugarinov and Ptushenko as to Brents nesting and moulting on De Long's Islands are incorrect (our observations).

The main route of the spring flight of these birds begins in China and, apparently passes along the eastern slopes of the Khingan range there. More to the west, even in the most easterly regions of Mongolia, odd birds are only occasionally encountered, according to A. G. Bannikov.

The geese enter the Soviet Union by crossing the Amur but only between the railway stations of Magdachi and Shimanovskaya (Shulpin 1936), or a little to the west of the mouth of the River Kumara (Tugarinov, 1941). After this one may assume that the flight follows the valley of the Zeia and its main tributaries. The birds reach the basin of the Lena through the upper courses of the Rivers Gonoma, Timpton, Aldan and probably, Uchur. They are never seen further to the west, in the valley of the Oleksa, nor further east, in the valley of the Maia (Skalon, 1946, 1956).

The Brents reach the Aldan along the River Uchur and the Lena along the River Batoma. On the latter the birds are never encountered north of the mouth of the River Siniaia, about 250 km above Yakutsk (Ivanov, 1929). Brent fly over the Amur mainly between May 20th and 30th and at the end of this month they reach the Yakutsk region (the beginning of passage

*The author appears to suggest that 'males which have left the broods' are seen in other areas, but male Brents, like other geese, do not leave their broods (Eds.).

here takes place May 24th-25th; Skalon, 1956). It is observed that until they reach the Aldan and the Lena the birds fly at a great height and no stopping places on the route are known.

Further north the birds fly low over the water, following all the bends of the rivers. The main route follows the valley of the middle and lower Lena. Smaller numbers fly over the Aldan and the Yana. Brent appear in the lower reaches of the Lena and Yana at the end of May. From there most fly east, to the area between the Yana and the Khroma, to the New Siberian Islands, to the lower reaches of the Indirirka, the Alazeia, and to the Zakolym tundras. In all these areas passage begins in the first days of June (Tugarinov, 1941; data of the polar stations). Apparently, besides this main flight, there is a poorly developed spring passage to the north along the shores of the Sea of Okhotsk (Shulpin, 1936; Tugarinov, 1941). In Yakutia the regular spring passage of Brent Geese has been observed nowhere outside the valleys of the Lena and Yana.

From the lower course of the Lena some birds fly west but in fewer numbers than to the east; the workers at the polar stations see them regularly at the mouth of the Olenko and sometimes on the lower reaches of this river, at Taimylyr and Tiumiateia. Very interesting observations on the westerly passage of Brents have been communicated by the polar stations at Volochanka (middle course of the Kheta, Southern Taimyr), Lake Taimyr and Pronchishchev Bay and also by a number of people spending the spring months in the central parts of the Byrrang range. All these data indicate a regular passage to Eastern Taimyr and also to the eastern regions of Western Taimyr from the south-east.

At Volochanka and Lake Taimyr the birds regularly fly to the north-west at the end of May. North of Lake Taimyr, to the Byrrang range, the birds arrive only from the south according to the data obtained by inquiries. The workers of the polar station at Pronchishchev Bay observe that in this region Brent fly from the south in spring and, having reached Kuldim Bay, turn to the north-west, following the northern slopes of the Byrrang range. These observations give reason to suppose that *B.b. orientalis*, not *B.b. bernicla*, nests and moults in Eastern and Central Taimyr. Not only the direction of flight but also the dates of arrival give evidence of this. Birds (which by the time of arrival can only be *B.b. orientalis*) arrive here as early as the end of May and the very beginning of June, while *B.b. bernicla* at this time is still in the region of the White Sea and the coast of Murman and reaches Taimyr only in the middle of June (not earlier than 10th). Apparently one of the passage routes of birds going to Eastern Taimyr and Pronchishchev Bay passes the mouth of the Olenko and the mouths of the Gulfs of Anabar and Khatanga (Brents are not encountered on the Preobrazhenie Islands). The passage routes of *B.b. orientalis* to the Kheta and the southern shores of Lake Taimyr are not known.

It is of interest to note here that a number of species of birds other than Brent Geese also fly from Western (and even more from Central) Taimyr east to southern Asiatic winter quarters and that in consequence not Eastern but at least Central Taimyr must be regarded as the area where their western and eastern populations meet. In particular one may mention here the fact that Bean Geese, ringed in the Ust-Yeneisk region, have been met

with on spring passage in the Irkutsk district (in Western Taimyr; Shevareva, 1958).

Data are lacking on the total numbers of *B.b. orientalis*. It can only be said that, according to information received as the results of inquiries, in the Yakutsk region (on the main path of spring passage) the number of birds passing amounts to thousands. In the region of the polar station Lake Taimyr some hundreds (more than five hundred) fly through from the south-east and about 1,000 birds nest in a radius of 50 km. The number of birds passing Volochanka is counted in tens. On north-eastern Taimyr, in the region of Andrei Island only single nests are encountered and no gatherings of moulting birds are observed. In the region of Pronchishchev Bay nesting Brent are not numerous but inside the bay some hundreds of moulting birds are encountered annually. Occasionally single, apparently nesting birds, are encountered on the shores of the Khatanga and Anabar Gulfs. On the lower reaches of the Olenko and the Lena, Brent nest in small numbers; assemblies of unmated birds are unknown there.

Along the Yana, the Syalakh, the Muksunovka, on the lower reaches of the Khroma, the birds are apparently still numerous, despite the fact that mass taking of eggs and hunting have been carried on there for a long time (Birulia, 1907; information from inquiries). Thus, in the maritime tundras between Sviaty Nos and Makrushina Strelka, according to information from inquiries, at least 10,000 Brent Geese nest. But here also there are no assemblies of moulting birds. It can be supposed that in the continental tundras, further east, the numbers of Brent Geese are everywhere relatively small.

Brent Geese frequent the Liakhov Islands, as Birulia (1907) noted, mainly for nesting purposes. On Bolshoi Liakhov Island, mainly its eastern part, according to a communication from V. D. Lebedev, the total number of birds nesting in 1956 amounted to only a few pairs. Brents are no more numerous on Maly Liakhov Island. They are not met with at all, according to our observations, on Belkovski Island and on Zemlia Bunga. On Kotelny Island they are rare. Faddeevski Island and, in particular, Novaya Sibir Island are the main sites where *B.b. orientalis* forms moulting assemblies (the number of breeding Brents is very small there). On Novaya Sibir in particular the number of moulting birds is counted in thousands (about 1,000 are obtained here every year (Shevareva, 1958)).

We have already suggested (Uspenski, 1956) that some immature *B.b. orientalis* fly still further to moult—to the north-west of North America—utilising the shortest route and crossing the outskirts of the Central Arctic. This suggestion was based mainly on various observations of flight from south to north and from north to south made on the De Long Islands and in the north of the Eastern Siberian sea. Here are some of these observations: from the vessel "Mod" situated at 75°N on about the meridian of the mouth of the Kolyma on May 21st, 1923, a large flock of Brent Geese was seen flying north. (It is true that the observers were not fully certain of the species of these birds as they were flying at a great height) (Sverdrup, 1930). The workers of the polar station on Henrietta Island have recently observed flocks of geese (almost certainly Brents) flying north from the end of May to the middle of June and flying south in the second half of August. Toll saw several flocks of geese at the end of August and at the beginning of

September, 1902; there can be no doubt that these were also Brent Geese, flying from north to south (Report of the Russian Polar Expedition, 1904). On this same Bennet Island on June 24th, 1956, we saw a small flock of Brent Geese (of 12-14 birds), flying north and keeping to this course until they were lost to sight on the horizon.

Judging from the dates of flight all these Brents have been unpaired birds, flying to moult (the main mass of unpaired birds arrives on Novaya Sibir from the end of June to the beginning of July, Birulia, 1907); the flights from north to south could consist of unpaired birds moving from their moulting sites to their wintering grounds.

For a long time the passage of birds, including Brent Geese, north from the New Siberian Islands served as one of the most important pieces of evidence for the existence of as yet undiscovered land somewhere near the junction of the Laptev and Eastern Siberian Seas—Sannikov's Land. The investigations of recent years have finally proved that Sannikov's Land does not actually exist. Thus only one answer can be given to the question of the destination of birds leaving the New Siberian Islands or flying north or south over the Eastern Siberian Sea; the birds are flying over the ice of the Central Arctic to moult in North America or are returning from doing this.

In recent years this supposition has begun to be confirmed by the results of bird ringing. The Ringing Bureau has already received reports of Brent Geese, ringed in North America*, having been obtained in various regions of the north-east of the U.S.S.R. (Shevareva, 1958). Some of these birds (most probably *B.b. orientalis*) which were mostly ringed as immature during moult in the area between the Yukon and the Kuskokwim, were obtained on Kotelny Island, on Novaya Sibir, at the delta of the Kolyma.

The departure of *B.b. orientalis* from its nesting and moulting grounds begins everywhere in the second half of August and finishes early in September. The autumn passage routes of these Brents do not coincide with those used in spring and so far remain an unsolved riddle. Maak (1886) long ago observed that Brent Geese do not appear in autumn in Yakutia. According to a statement of this same author (Maak, 1859), a noticeable passage of these birds is observed on the lower course of the Amur, in the Maly Khingan region. Here they appear at the end of September. Baxton (according to Shulpin, 1936) reports an intensive passage of these birds along the northern shores of the Sea of Okhotsk—at Ola, Okhotsk, along the River Ulia.

The investigations of subsequent years have added nothing of importance to these observations. It can only be said that the autumn passage routes which have been traced, along the shores of the Sea of Okhotsk (at least from the Piagin Peninsula to the Ulia) and over the Amur at Maly Khingan are sections of the main passage route of these birds. In autumn (and in spring also) they are very rare on the Kuriles, on Sakhalin, in Primorie and in northern Japan (Shulpin, 1936; Gizenko, 1955; Vorobiev, 1954).

It is possible that the birds fly from their breeding and moulting grounds to the shores of the Sea of Okhotsk quickly, at a great height and

*Ringing of *B.b. orientalis* has not been carried out in the Soviet Union.

at night (like *B.b. bernicla*), as a result of which they remain everywhere unnoticed on the Continent. South of the Amur it seems most likely that they follow the same routes as in spring, along the eastern slopes of the Khingan range.

The main wintering area of *B.b. orientalis* consists of the shores of the Gulf of Bokhaivan (Chzhili Bay) and of the Yellow Sea (Tugarinov, 1941).

The wintering conditions of *B.b. orientalis* and the extent to which they are hunted during the winter months are unknown. On their spring passage routes, especially on the Lena, hunting is intensive (Skalon, 1956). A large number is also obtained on the moulting grounds (on Novaya Sibir, about 1,000 a year) and at the nesting sites; until recent years the taking of eggs was widely practised. The information received from polar stations and that obtained by enquiry gives evidence in the overwhelming majority of cases of a rapid decrease in the numbers of *B.b. orientalis*.

The American Brent Goose (*Branta bernicla nigricans* Lawr). In the Soviet Union this is to be found only in the extreme north-east; on Chukotka, Wrangel Island, in the region of the Gulf of Anadyr.

According to the observations of the workers of the polar stations Brent Geese are not encountered at Valkarai in north-west Chukotka. It is very possible that there is here a gap in the distribution of *B. bernicla,* to the west of which is *B.b. orientalis* while *B.b. nigricans* is to the east. A well defined spring passage from the east has been traced as far as Cape Schmidt (i.e. most probably from American wintering grounds). The birds arrive on Wrangel Island exclusively from the south-east (Bannikov, 1941). An examination of a series of Brent Geese in the Zoological Museum of Moscow State University has also convinced us that the birds of Wrangel Island are most likely to belong to the race *B.b. nigricans.**

The birds arrive at their nesting (and moulting) grounds at the end of May. At Cape Schmidt on the northern coast of Chukotka, Brent arrive as early as the last ten days of May, according to the observations of the workers of the polar station. On Wrangel Island they arrive from the middle of May (Bannikov, 1941). In Cross Bay they arrive from the end of May (Belopolski, 1934); in Anadyr, in the last ten days of May (Portenko, 1939) and even in mid-May (communication of the meteorological station). The early dates for arrival in the north-east of the Soviet Union can be considered as additional proof that *B.b. nigricans* nests there and not *B.b. orientalis* which arrives on its nesting grounds usually not earlier than the end of May or the beginning of June.

So far as can be judged from the fragmentary data, an especially active spring passage route passes along the northern coast of Chukotka. It seems most likely that before reaching Chukotka the birds using this route cross over the base of the Seward Peninsula with the main northbound stream (Bailey, 1948).

In spring the birds also regularly pass along the southern coast of Chukotka (this route perhaps going across St. Lawrence Island) and along

*Tugarinov (1941) and Ptushenko (1952) only suggest the possibility of *B.b. nigricans* nesting on Chukotka and Wrangel Island.

the south coast of the Anadyr estuary (possibly across the islands of Nunivak and St. Matthew).

It is obvious that within the Soviet Union *B.b. nigricans* is most numerous on Wrangel Island where the number of nesting birds is reckoned in thousands. On Chukotka far fewer are encountered: from information obtained by enquiries and from the data of polar stations Brent only nest in numbers along the River Amguema and in the neighbourhood of Neshkan. They are usual but not numerous in the area of the Gulf of Anadyr (including Cross Bay). At Anadyr only a few hundreds pass in spring.

As in the case of *B.b. orientalis*, the autumn migration routes of *B.b. nigricans* do not coincide with those used in spring. In autumn passage is not observed on the north coast of Chukotka; from Wrangel Island the birds fly in a different direction from that taken in spring, to the south-west.

Apparently the Brents fly in autumn only along the south shores of Chukotka and the Gulf of Anadyr. They arrive in these localities by cutting across the Chukotsk Peninsula along river valleys. According to information received from enquiries a similar southerly passage is observed in autumn on the River Amguema. The departure of *B.b. nigricans* from its nesting sites finishes everywhere at the beginning of September. The birds winter on the Pacific coast of North America, south to California.

According to counts made on their wintering grounds in 1953 the numbers of *B.b. nigricans* amount to about 175,000 (Salomonsen, 1955). But in the past numbers were larger. An annual and noticeable decline in numbers is reported from the north-east of the U.S.S.R. by the majority of correspondents answering the questionnaire sent out by the Commission for the Protection of Nature.

It can be concluded that Brent Geese (speaking of the species *B. bernicla* as a whole) are very unevenly distributed in the far north of the Soviet Union. It is possible to name a few limited territories which form the summering areas of the main mass of the birds. As has already been described, these are North-West Taimyr, the maritime tundras of the area between the rivers Yana and Khroma, the island of Novaya Sibir (New Siberia), and, apparently, Wrangel Island. The migration routes of Brent Geese which have been traced, though not completely, in the Soviet Union, are, as a rule, extremely narrow and confined to sea coasts and the valleys of certain rivers.

These peculiarities of distribution greatly simplify the organisation of the necessary protection of the birds in our country, the extreme urgency of which is quite obvious. In particular, it appears to us that immediate steps should be taken to provide sanctuaries in the localities where the main assemblies of nesting and moulting birds occur and also to prohibit hunting, in the first place on the Lena, the Aldan, in the Karelian A.S.S.R., in the Leningrad district and on the Kanin Peninsula. The passage of the birds on a narrow front likewise makes it possible to carry out regular counts of their numbers, especially those of *B.b. orientalis* on the Lena and those of *B.b. bernicla* on the Kanin Peninsula.

Finally one cannot omit to mention the desirability of organising mass ringing of Brent Geese in the U.S.S.R., without which many questions of their biology and distribution cannot be solved.

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