

# STATUS AND DISTRIBUTION OF PACIFIC BRENT GEESE *BRANTA BERNICLA NIGRICANS* WINTERING IN JAPAN

SIMON J LANE<sup>1</sup> and YOSHIHIKO MIYABAYASHI<sup>2</sup>

<sup>1</sup>Laboratory of Applied Ornithology, National Agriculture Research Centre, Kannondai, 3-1-1, Tsukuba City, Ibaraki 305, Japan.

<sup>1</sup>Current address: Departamento de Ecología Evolutiva, Museo Nacional de Ciencias Naturales, CSIC, José Gutiérrez Abascal 2, Madrid, 28006, Spain.

<sup>2</sup>Japanese Association for Wild Geese Protection, Minamimachi 16, Wakayanagi, Miyagi 989, Japan.

*Seasonal abundance and distribution of Pacific Brent Geese wintering in Japan were assessed by examining data collected on a monthly basis by the Japanese Association for Wild Geese Protection over six winters (1989–90 to 1994–95). Peak numbers of up to 4,000 Brent Geese occurred at two sites in eastern Hokkaido each October. By January none remained in this area and only 300–500 stayed in Japan at wintering sites in southern Hokkaido and northern Honshu. An examination of data collected during an annual January census by the Environment Agency of Japan suggested that these numbers have changed little over the last 25 years and there is no evidence of a decline. In January and February 1995 we surveyed 717 km of coastline in northern Japan to try and locate the remaining population, but found only another 162 individuals. We speculate that the majority of Brent Geese wintering in northeast Asia migrate in late autumn from eastern Hokkaido to sites in the Korean Peninsula and in China, although during a seven day survey of the southern coastline of Korea in January 1996 we found only 19 Brent Geese.*

**Keywords:** Brent Geese, China, Distribution, Japan, Korea, Wintering

Pacific Brent Geese *Branta bernicla nigricans* breed in the high arctic from eastern Siberia east to north-western Canada (Madge & Burn 1988). The majority of these birds winter on the Pacific coast of Baja California, Mexico, as well as the coasts of British Columbia, California, Oregon and Washington States (Dau 1992, Ward *et al.* 1993), but a small number winter in north-east Asian countries including Japan, the Korean peninsula, and The People's Republic of China.

Little information has been published as to the status of Brent Geese wintering in north-east Asia and seasonal (October to April) movements are not documented. Data which are available suggest numbers of Brent Geese in the region are very small. For Japan, Ogilvie (1978) and Owen (1980) report counts of 256 birds in January 1973, fewer than 100 in 1976

and 374 in January 1977. In Korea, 111 Brent Geese were counted in March 1975 (Min & Won 1976) and 325, 700, and 118 were recorded in 1982, 1984 and 1987 respectively (Won 1992).

The aims of this paper were to assess the numbers and seasonal distribution of Brent Geese in Japan, to briefly report the results of a survey for Brent Geese in South Korea, and to examine available data to assess whether the numbers of Brent Geese counted in January in Japan have changed since 1970.

## Methods and data sources

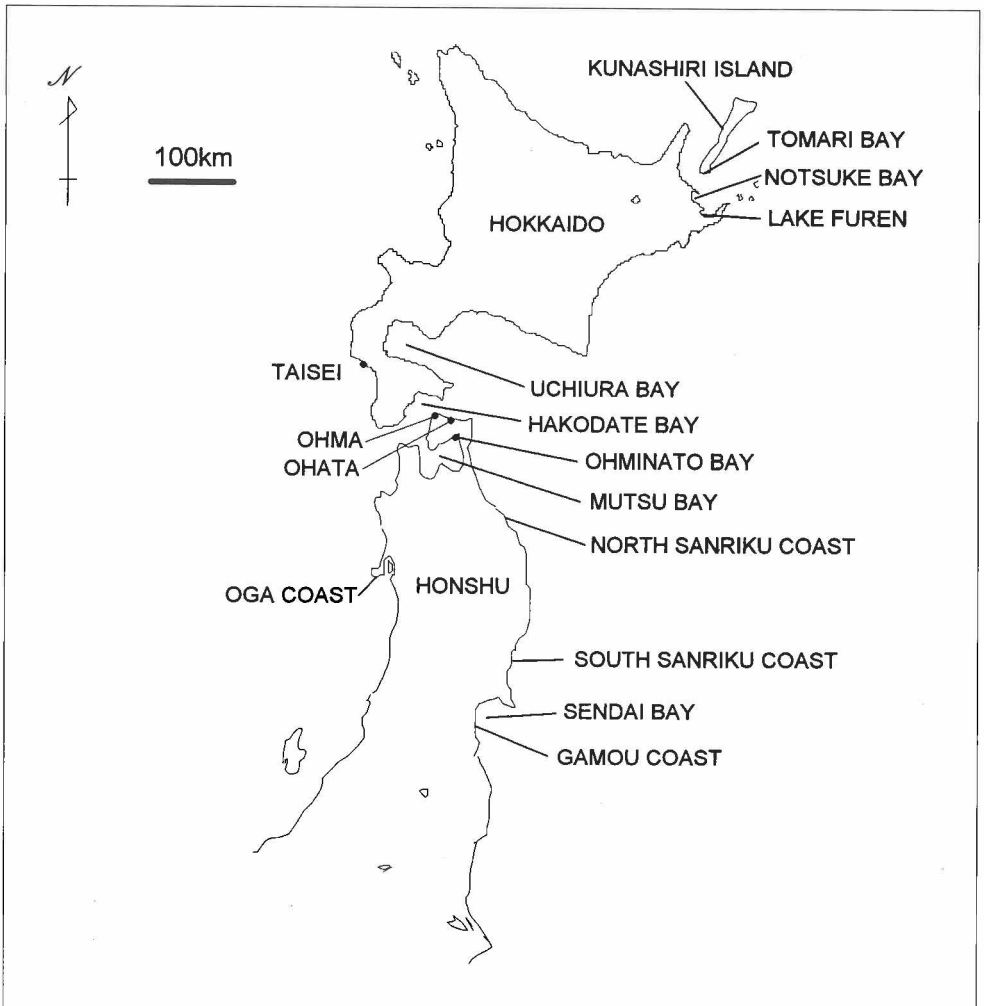
*Seasonal changes in numbers and distribution of Brent Geese wintering in Japan*

To determine the seasonal distribution of Brent

Geese in Japan we analysed data collected on a voluntary basis by members of the Japanese Association for Wild Geese Protection (JAWGP). In October 1989, a survey was instigated by JAWGP with the aim to count Brent Geese at all known major autumn staging and wintering sites on a monthly (October-April) basis. To date, the survey has run each winter for six years (1989-90 to 1994-95), although it has not always been possible to conduct surveys at all sites in every month. In addition to this source, we conducted counts ourselves on 15 January 1995 at Hakodate Bay,

southern Hokkaido, and at Notsuke Bay and Lake Furen, eastern Hokkaido, on 6 and 7 November 1995 (see **Figure 1** for locations in Japan and the appendix for their co-ordinates).

To locate any unknown wintering sites in Japan we surveyed a total of 717 km of coastline, paying particular attention to localities where small flocks had been recorded in previous years. On 17 January 1995, 31 km of coastline between Oma and Ohata in northern Honshu were searched for Brent Geese. Then, from 3 to 13 February 1995, a total of 686 km in southern Hokkaido between



**Figure 1.** Locations of important Brent Goose sites in Japan

Notsuke Bay and Taisei were surveyed.

#### Occurrence of Brent Geese in Korea

We also searched the southern coastline of the Korean Peninsula. From 13 to 19 January 1996 we visited as much of the coast as possible between the Nakdong Estuary near Pusan to Muan Bay north of Mokp'o, including areas near Wando and Yosu where Brent Geese had been observed in the mid 1970s (Min & Won 1976, Kwon & Won 1978). Surveys were usually conducted from a chartered boat which allowed us to observe many areas which would have been otherwise inaccessible. At other times we drove on coast roads and made observations at regular intervals from suitable vantage points.

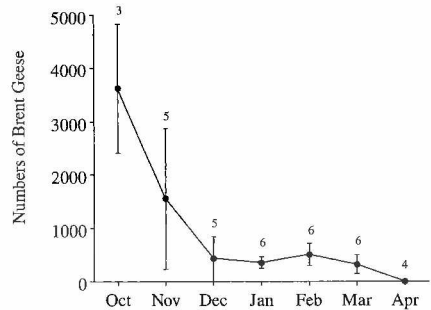
#### Midwinter status of Brent Geese in Japan since 1970

No quantitative data are known to us for total numbers of wintering Brent Geese in Japan before 1970. Data gathered since 1970 were obtained from the Nature Conservation Bureau of the Environment Agency of Japan (EAJ) which has conducted January waterfowl censuses since 1970 (Yokota *et al.* 1982, Morioka 1985, Forestry Agency of Japan 1970, Environment Agency of Japan 1972, 1973, 1974, 1975, 1976, 1977, 1978, 1981, 1989, 1990, 1994, 1995). As not all reports could be located, summaries of censuses from some years were taken from the Environment Agency of Japan (1994).

## Results

#### Seasonal changes in numbers and distribution of Brent Geese wintering in Japan

The data collected between October 1989 and November 1995 by JAWGP volunteers and ourselves were examined for seasonal changes in numbers of Brent Geese (Figure 2). Maximum numbers were consistently recorded in October (range: 3,076 to 4,000) but decreased rapidly thereafter. The mean numbers counted at the known wintering sites

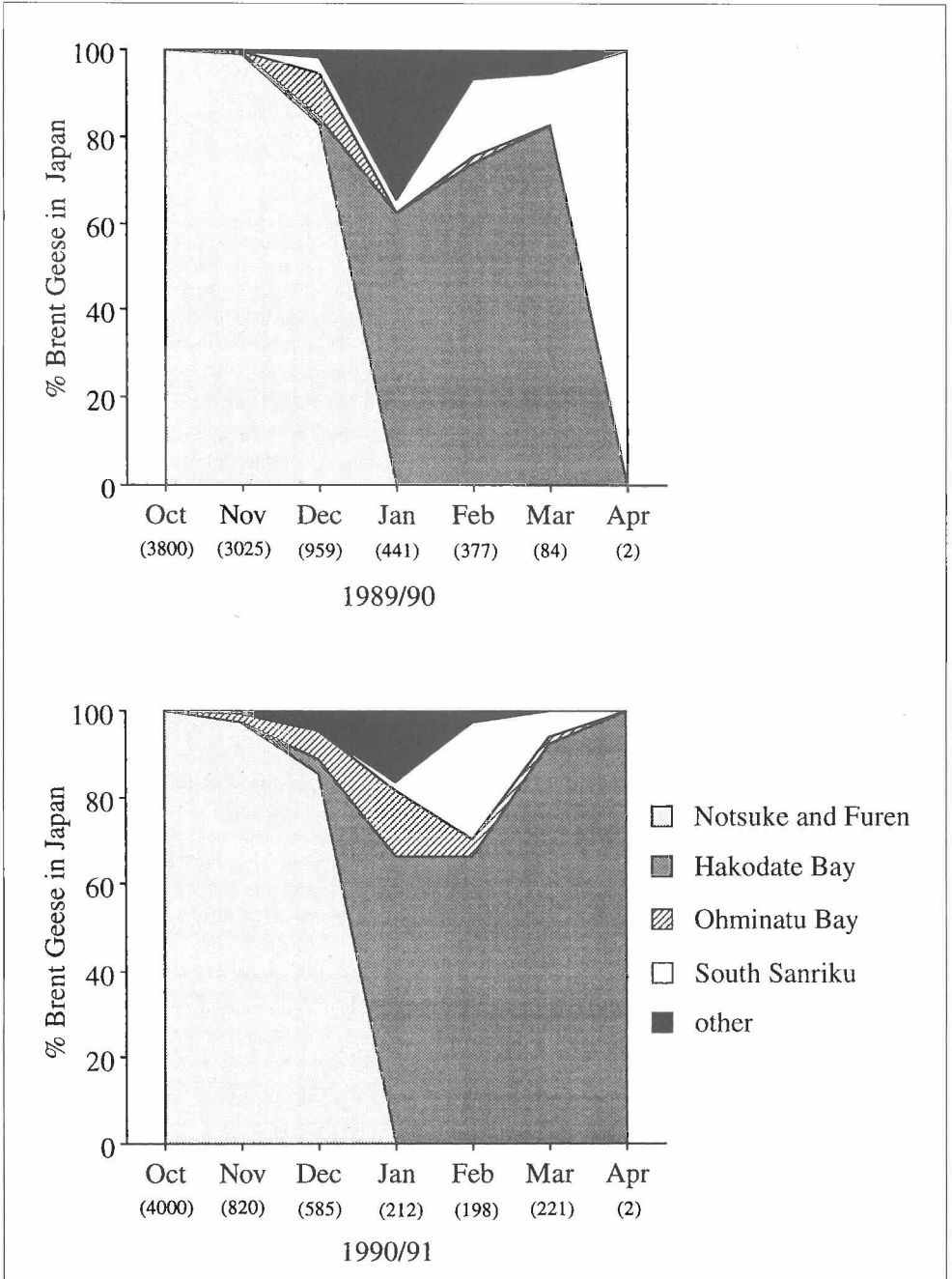


**Figure 2. Seasonal changes in numbers of Brent Geese in Japan.** Data are means ( $\pm$  95% confidence limits) for the six winters from 1989-90 to 1994-95 and for November 1995, but counts were not made in all months in some years, thus reducing the sample sizes (given over the points) in some instances. Most data were collected by members of the Japanese Association for Wild Geese Protection.

from December to March were broadly constant (range 316 to 512), but amounted to little more than 13% of the October average.

For the winters where complete, monthly coverages were achieved (1989-90 and 1990-91), the data were examined for seasonal changes in distribution (Figure 3). As numbers declined in November and December each year, there also occurred a change in distribution. In October, no Brent Geese were recorded at any localities other than Notsuke Bay and Lake Furen in eastern Hokkaido. By January, none remained in these locations and the few hundred birds which stayed in Japan from January to March were counted mainly at Hakodate Bay in southern Hokkaido and also at sites in northern Honshu including Ohminato Bay, the north and south Sanriku coastlines, Oga peninsula and the Gamou coast. Although surveys are incomplete for the four winters 1991-92 to 1994-95, the data indicates that the movements described are probably consistent from year to year.

The destinations of most (80-90%) of the Brent Geese which leave eastern Hokkaido



**Figure 3. Distribution of Brent Geese in Japan in two winters.** Figures in parentheses are monthly totals of Brent Geese. 'Other' locations include the Gamou Coast, Oga Peninsula, and the North Sanriku coast. Data are from the Japanese Association for Wild Geese Protection.

between late October and December are unknown. To test the theory that many geese disperse in small flocks around the coastlines of northern Honshu and southern Hokkaido we surveyed 717 km of coastline in January and February 1995. At one site, Uchiura Bay in Hokkaido, 162 Brent Geese were counted, but the remaining 3,000 or so birds were not located.

#### *Occurrence of Brent Geese in Korea*

We also considered that the Korean coast may hold many wintering Brent. Yet, despite an intensive search of the southern coast of the peninsula our survey yielded a total of only 19 which was recorded in a single flock on Jangja Island, a sand bar at the mouth of the Nakdong River.

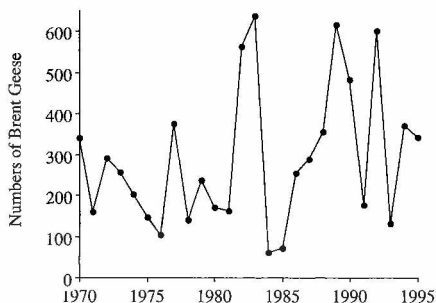
#### *Mid-winter status of Brent Geese in Japan since 1990*

The data from the EAJ surveys were examined to assess whether the numbers of wintering Brent Geese have changed over the period 1970 to 1995. No significant trends were revealed (**Figure 4**) and the average number of Brent Geese counted was  $373 \pm 218$  (mean  $\pm$ sd). However, this result needs to be treated with some caution because the numbers have probably been underestimated in some years due to incomplete coverage of all important sites. Unfortunately, it is difficult to correct for this because there is considerable ambiguity in the survey reports as to exactly which sites were searched.

## Discussion

#### *The occurrence of Brent Geese in Japan before 1970*

Prior to 1970, only sporadic reports of Brent Geese at specific sites are available, but these suggest that Brent Geese have occurred in Japan for a least 200 years. The earliest record of Brent Geese in Japan is from an 18th century ornithological guide: *Kan'bun kin'pu* by Hotta Masa'atsu which was first published in 1794



**Figure 4. Annual changes in the population of Brent Geese wintering in Japan.** There is no significant correlation with time (Spearman's rank  $r_s=0.27$ ,  $df=26$ , n.s.). The data sources are the annual waterfowl surveys of the Environment Agency of Japan.

(Suzuki 1990). This document chronicles Brent Geese in Sendai Bay and, interestingly, also gives the species a name in a dialect from southern Kyushu which may indicate that Brent Geese occurred more frequently in southern Japan 200 years ago than they do today.

In the late 19th century specimens of Brent Geese were reportedly shot at Sendai and Aomori (=Mutsu) Bays (Blakiston & Pryer 1882) and were also to be found at the Yokohama game-market near Tokyo as the 'winter sea-geese of Hakodate' (Blakiston & Pryer 1878). These records, and others (see references in Austin 1949, Morioka 1985), reveal that Brent Geese have occurred during the last 100 years at many of today's major sites, although whether they have returned on an annual basis over the intervening period cannot be ascertained.

Whilst Brent Geese have been recorded in Japan for more than 200 years there is virtually no information on the status of the species before 1970. Austin (1949) stated that Brent Geese were 'abundant' during 'feudal time' (until 1868) but 'vanished suddenly' after this period.

#### *Distribution and numbers of Brent Geese in January since 1970*

Traditionally, Brent Geese are known to winter in Japan at Hakodate Bay on the extreme southern coast of Hokkaido and at three sites on the coasts of Honshu: Oga Peninsula, Mutsu Bay, and Gamou Coast. In addition, the north and south Sanriku Coasts and Uchiura Bay may be more recent wintering areas. Brent Geese also occur almost annually in southern and western Japan but the numbers are very small (usually one or two individuals) and are seldom reported at a site more than once (Morioka 1985).

No changes in overall numbers of Brent Geese wintering in Japan since 1970 were detected. However, the numbers are small and there is considerable variation from year to year which may be due in part to problems of incomplete coverage by the surveys as well as natural fluctuations in population size as a result of variable breeding success (Summers 1986).

#### *Seasonal movements of Brent Geese in Japan and north-east Asia*

Brent Geese begin to arrive in northern Japan at the end of September. Their origin is unknown, although Syroechkovski Jr. (1995) speculated the breeding sites of the Asian population of Brent Geese to lie between the Olenyok and Khroma Rivers in northern Russia. In October, peak numbers of up to 4,000 stage at Notsuke Bay and Lake Furen in eastern Hokkaido. This number is considerably more than reported previously for Japan, but even so there are two reasons to believe that the size of the Brent Goose population visiting the area could have been underestimated. First, if Brent Geese arrive and depart continually during October not all birds using the area would be present at one time. Second, we suspect some birds may also occur at Tomari Bay at the southern tip of the Russian administered Kunashiri Island (**Figure 1**). This point is only 24 km from Notsuke Bay and is reported to have areas of Eelgrass *Zostera* spp. (Wada 1988), an important food for Brent Geese. Like Notsuke Bay and Lake Furen, Tomari Bay may be an important staging point for Brent Geese, but this is difficult to verify

from Japan because travel between Hokkaido and Kunashiri Island is not permitted.

Brent Geese depart from eastern Hokkaido in large numbers in November. Approximately 300 to 500 birds winter at several sites in northern Japan, but the movements and locations of the remaining birds are unclear. Two possibilities could account for their whereabouts. First, they may disperse in small flocks around the coasts of northern Japan and, because of the long coastline and relatively small number of birds involved, are simply overlooked. However, our surveys in January and February 1995 to look for new Brent Goose sites located only 162 geese at Uchiura Bay, Hokkaido. We think it unlikely that upwards of 2,500 Brent Geese reside for several months on the coasts of Japan and remain unobserved.

A second possibility is that these birds migrate along the west coast of Honshu and across the Korea Strait to wintering sites in the Korean Peninsula and China (**Figure 5**). An observation in November 1984 of 11 Brent Geese on the Oki Islands in the Sea of Japan (Morioka 1985) supports this hypothesis, and Brent Geese are known to occur in Korea (Won 1992) and in Po Hai Bay, China (de Schauensee 1984). However, details of the numbers occurring in China and the Korean Peninsula are scarce and we could obtain no information as to when the geese arrive in these countries.

In China, principal wintering sites are said to be coastal regions between Qingdao and Shijiusuo, between Rongcheng and Yantai, and at Laizhou Bay. There are reports of between 500 and 5,000 Brent Geese occurring in these areas each December, but these need confirmation (J.Lu, *pers.comm.* to YM). At Changshan Island, Shandong Province, 1,200 Brent were counted on 15 February 1993 (Waterbird Specialist Group of the Chinese Ornithological Association 1994), but they are not thought to have wintered there (J.Lu, *pers.comm.* to YM).

Our seven day survey for Brent Geese on the southern coasts of Korea in January 1995 found only 19 individuals which suggests that the areas we covered are not important wintering sites for the species in Asia. The total

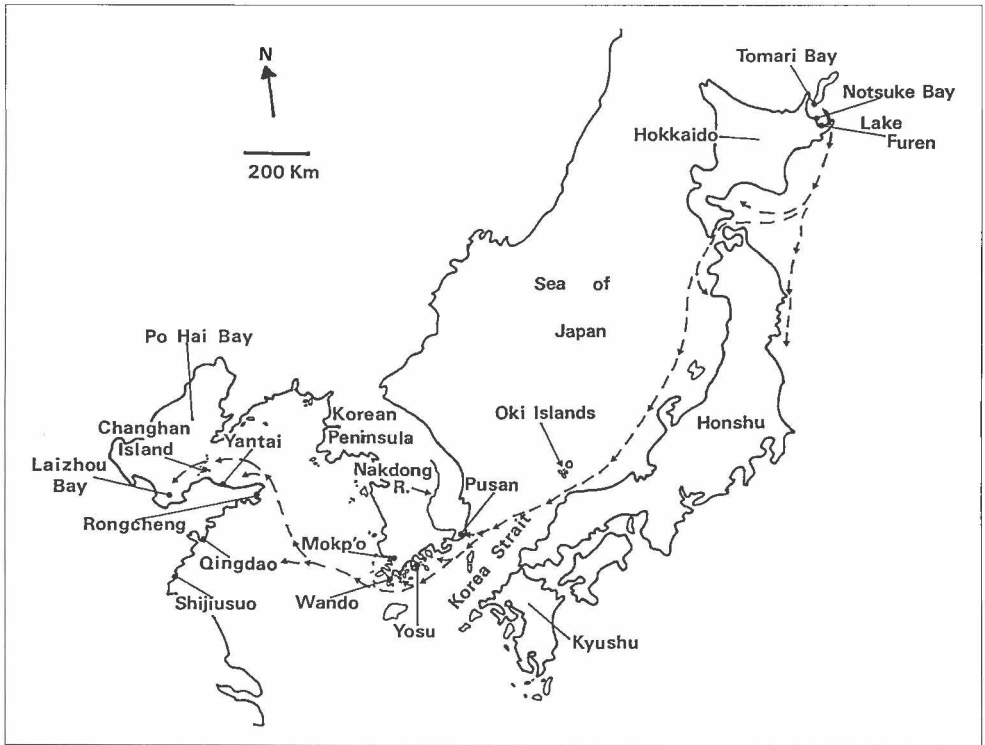


Figure 5. Proposed migration route (dashed line) for Brent Geese wintering in northeast Asia.

is considerably lower than previous records of up to 700 recorded in the same areas in the 1980s (Won 1992). Perhaps the southern coast of Korea has declined in importance as a wintering location in recent years.

There appears to be no information on the status of Brent Geese in North Korea, although Scott (1989) lists several coastal areas as important for migratory wildfowl and so it is possible that this country may hold wintering Brent Geese.

Based on the available evidence we suggest the following scenario for the movements of wintering Brent Geese in the northeast Asian region as a working hypothesis to be investigated by future research (Figure 5). In the autumn all of the Asian wintering population stage at Lake Furen and Notsuke Bay in eastern Hokkaido, and perhaps also at Tomari Bay in the Kuril Islands. In November and December, 300-500 geese move south to various points in southern Hokkaido and

northern Honshu, whilst the remaining 3,000+ birds migrate to sites in the Korean Peninsula and China where they remain until the following Spring.

*In Japan we thank the members of the Japanese Association for Wild Geese Protection (JAWGP) who collected the data on the distribution of Brent Geese, and especially Kenji Arima, Shigeki Iwabuchi, Takeyoshi Matsuo, and Yasushi Suzuki (JAWGP) for advice and contribution to field work; Norio Murano (Hokkaido Institute of Environmental Sciences) for assistance in Hokkaido; Megumi Koga for translating Japanese texts; Miyako Tsurumi (Yamashina Institute for Ornithology) for help in obtaining some 'hard to find' references; Patricia Vázquez for preparing Figure 5; and Shoji Okinaga and Nobuo Takeshita (JAWGP) for field work and partial financial support. In Korea we thank Sang-Hoon Han (Korean Wildlife Information and Research Centre) for arranging the surveys; and Woon-Kee Paek*

(National Science Museum) and Sook-Hee Jung (Chosun University) for help conducting surveys and logistic support. SJL was hosted by Kazuo Nakamura at the Laboratory of Applied Ornithology and held a fellowship from the Science and Technology Agency of Japan following nomination by the Commission of the European Communities Directorate General for Science, Research and Development.

## References

- Austin, O.L. 1949. *Waterfowl in Japan*. General Headquarters, Supreme Commander for the Allied Powers. Natural Resources Section Report No. 118.
- Blakiston, T. & Pryer, H. 1878. A catalogue of the birds of Japan. *Ibis* 2:209-249.
- Blakiston, T. & Pryer, H. 1882. Birds of Japan. *Trans. Asiatic Soc. Japan* 10:84-186.
- Dau, C.P. 1992. The fall migration of Pacific flyway Brent *Branta bernicla* in relation to climatic conditions. *Wildfowl* 43:80-95.
- de Schauensee, R.M. 1984. *The birds of China*. Oxford University Press, Oxford.
- Environment Agency of Japan. 1972. *The report of the annual census of waterfowls Anatidae in January 1972*. Wildlife Protection Division, Nature Conservation Bureau, Environment Agency of Japan, Tokyo. (In Japanese).
- Environment Agency of Japan. 1973. *The report of the annual census of waterfowls Anatidae in January 1973*. Wildlife Protection Division, Nature Conservation Bureau, Environment Agency of Japan, Tokyo. (In Japanese).
- Environment Agency of Japan. 1974. *The report of the annual census of waterfowls Anatidae in January 1974*. Wildlife Protection Division, Nature Conservation Bureau, Environment Agency of Japan, Tokyo. (In Japanese).
- Environment Agency of Japan. 1975. *The report of the 6th annual census of waterfowls Anatidae in January 1975*. Wildlife Protection Division, Nature Conservation Bureau, Environment Agency of Japan, Tokyo. (In Japanese).
- Environment Agency of Japan. 1976. *The report of the 7th annual census of waterfowls Anatidae in January 1976*. Wildlife Protection Division, Nature Conservation Bureau, Environment Agency of Japan, Tokyo. (In Japanese).
- Environment Agency of Japan. 1977. *The report of the 8th annual census of waterfowls Anatidae in January 1977*. Wildlife Protection Division, Nature Conservation Bureau, Environment Agency of Japan, Tokyo. (In Japanese).
- Environment Agency of Japan. 1978. *The report of the 9th annual census of waterfowls Anatidae in January 1978*. Wildlife Protection Division, Nature Conservation Bureau, Environment Agency of Japan, Tokyo. (In Japanese).
- Environment Agency of Japan. 1981. *The report of the 12th annual census of waterfowls Anatidae in January 1981*. Wildlife Protection Division, Nature Conservation Bureau, Environment Agency of Japan, Tokyo. (In Japanese).
- Environment Agency of Japan. 1989. *The report of the 20th annual census of waterfowls Anatidae in January 1989*. Wildlife Protection Division, Nature Conservation Bureau, Environment Agency of Japan, Tokyo. (In Japanese).
- Environment Agency of Japan. 1990. *The report of the 21st annual census of waterfowls Anatidae in January 1990*. Wildlife Protection Division, Nature Conservation Bureau, Environment Agency of Japan, Tokyo. (In Japanese).
- Environment Agency of Japan. 1994. *The report of the 25th annual census of waterfowls Anatidae in January 1994*. Wildlife Protection Division, Nature Conservation Bureau, Environment Agency of Japan, Tokyo. (In Japanese with English summaries).
- Environment Agency of Japan. 1995. *The report of the 26th annual census of waterfowls Anatidae in January 1995*. Wildlife Protection Division, Nature Conservation Bureau, Environment Agency of Japan, Tokyo. (In Japanese with English summaries).
- Forestry Agency of Japan 1970. *The report on the annual census of waterfowls Anatidae in January 1970*. Wildlife Protection Division, Nature Conservation Bureau, Forestry Agency of Japan, Tokyo. (In Japanese).
- Forestry Agency of Japan 1971. *The report on the*



- annual census of waterfowls Anatidae in January 1971. Wildlife Protection Division, Nature Conservation Bureau, Forestry Agency of Japan, Tokyo. (In Japanese).
- Kwon, K.-C. & Won, P.-O. 1978. Winter sea bird census in the south coast of Korean Peninsula (ii) (Yeosu-Seungpo). *J. Res. Inst. Sci. Tech., Kyung Hee University, Seoul. Korea* 6:29-49. (In Korean with English summary).
- Madge, S. & Burn, H. 1988. *Wildfowl: An identification guide to the ducks, geese and swans of the world*. Helm, London.
- Min, B.-Y. & Won, P.-O. 1976. An offshore winter seabird survey on the south coast of Korean Peninsula (Mogpo-Wando-Yeosu area). *J. Yamashina Instit. Ornithol.* 45:53-67.
- Morioka, H. 1985. Occurrence of the Brent Goose on the Oki Islands, with notes on the distribution of the species in Japan. *Mem. Nation. Sci. Mus., Tokyo.* 18:209-217.
- Ogilvie, M.A. 1978. *Wild Geese*. Poyser, Berkhamsted.
- Owen, M. 1980. *Wild Geese of the world: Their life history and ecology*. Batsford, London.
- Scott, D.A. (Ed.). 1989. *A directory of Asian wetlands*. IUCN, Gland, Switzerland.
- Summers, R.W. 1986. Breeding production of Dark-bellied Brent Geese *Branta bernicla* in relation to lemming cycles. *Bird Study* 33:105-108.
- Suzuki, M. 1990. Hotta Masa'atsu's Kan'bun-kin'pu - An evaluation as an illustrated ornithological guide. *Rep. Res. Inst. for Jap. Culture* 26:177-214. (In Japanese with German summary).
- Syroechkovski, E.E. Jr. 1995. Current status of Asian population of Pacific Black Brant *Branta bernicla nigricans*. *Bull. Geese Study Group of Eastern Europe and Northern Asia* 1:57-67. (In Russian with English summary).
- Wada, M. (Ed.). 1988. *Odiatou*. Editing committee of the 100th anniversary of Odiatou town, Odiatou, Bekkai, Japan. (In Japanese).
- Ward, D. H., Derkson, D.V., Kharitonov, S.P., Stishov, M. & Baranyuk, V.V. 1993. Status of Pacific Black Brant *Branta bernicla nigricans* on Wrangel Islands, Russian Federation. *Wildfowl* 44:39-48.
- Waterbird Specialist Group of the Chinese Ornithological Association 1994. *Waterbird research in China*. East China Normal University Press, Beijing. (In Chinese).
- Won, P.-O. 1992. *Animal treasures (natural monuments) in Korea*. Daewon-sa, Seoul. (In Korean).
- Yokota, Y. Kurechi, M. & Otsu, M. 1982. XXVI. Distribution and status of geese in Japan. *Aquila* 14:209-227.

## Appendix. Coordinates of locations mentioned in the text.

	Location	Coordinates		
China	Changshan Island	37°55'N 120°45'E		
	Laizhou Bay	37°10'N 119°14'E		
	Qingdao	36°04'N 120°22'E		
	Rongcheng	37°10'N 122°25'E		
	Shijiusuo	35°25'N 119°25'E		
	Yantai	37°30'N 121°22'E		
Korea	Jangja Island, Nakdong River	35°03'N 128°58'E		
	Mokp'o	34°50'N 126°25'E		
	Muan Bay	34°53'N 126°23'E		
	Pusan	35°05'N 129°02'E		
	Wando	34°22'N 126°40'E		
	Yosu	34°50'N 127°30'E		
Japan	Gamou Coast	38°20'N 141°00'E		
	Hakodate Bay	41°49'N 141°12'E	to	41°24'N 140°12'E
	Lake Furen	43°21'N 145°29'E	to	43°15'N 145°14'E
	Mutsu Bay	41°16'N 141°16'E	to	40°50'N 140°38'E
	North Sanriku Coast	40°33'N 141°40'E		
	Notsuke Bay	43°37'N 145°21'E	to	43°31'N 145°12'E
	Oga Coast	39°50'N 139°50'E		
	Ohata	41°22'N 141°11'E		
	Ohminato Bay	41°15'N 141°10'E		
	Oki Islands	36°05'N 133°00'E		
	Oma	41°29'N 140°55'E		
	Uchiura Bay	42°35'N 141°12'E	to	41°48'N 141°17'E
	Sendai Bay	38°24'N 141°35'E	to	37°49'N 140°55'E
	South Sanriku coast	38°49'N 141°34'E		
	Taisei	42°14'N 139°48'E		
Tomari Bay	43°45'N 145°27'E			