

16 Canada Goose

Branta canadensis: Fennoscandia/continental Europe

1. POPULATION REVIEW

1.1 Range

The North American Canada Goose was introduced to Sweden in 1929 by private persons with the purpose of enriching the native fauna, and deliberately introduced for hunting purposes in Norway in 1936 and in Finland in the early 1960s. Repeated translocations and natural dispersal have extended the breeding range, and in many areas the Canada Goose now outnumbers native goose species. At present the breeding range covers most of Sweden, parts of southern and central Norway and the southwestern part of Finland, where several groups also occur further north. In Denmark, Germany, the Netherlands, France, Belgium, the Ukraine and Russia, free-flying populations have been established through introduction or from birds escaping from ornamental parks. Several of these populations are now growing rapidly.

The Canada Geese breeding in Fennoscandia are migratory except for a substantial proportion of Norwegian geese. The wintering area for Swedish/Finnish geese is limited to southernmost Sweden, Denmark and northern Germany. The Norwegian Canada Geese are

residents, short-distance migrants moving to open water along the coast or migrating to Denmark and Sweden. The Canada Geese breeding on the European continent are largely resident.

The Canada Geese introduced and now breeding in northern Europe are usually assumed to belong to the subspecies *Branta canadensis canadensis* (Cramp & Simmons 1977) although there are a few records of *Branta c. minima* from the Netherlands, Belgium, Germany, Denmark, Sweden and Finland. These are presumably escapees from collections in southern Sweden, the Netherlands or northern Germany. In West-Friesland in the Netherlands a few semi-wild pairs of the latter subspecies breed (Lensink 1996).

1.2 Delineation of flyways

After an initial period when many Swedish/Finnish Canada Geese wintered further north than they do today, the geese developed a pronounced migration to winter quarters at the limit of or south of the climate zone with mid winter snow cover. Almost all Swedish and Finnish geese move southwest to winter in a fairly limited area around the southern Baltic Sea, concentrating in coastal areas (Fig. 16.1). Norwegian Canada

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Geese exhibit stationary, short-distance as well as long-distance migratory habits. In harsh winters many geese move to areas with a milder climate.

Winter recoveries of leg-ringed (Fabricius 1983) and neck-collared geese (Fabricius unpubl.) are predominantly from southern Scandinavia and northern Germany. A small number of Finnish Canada Geese move along the east side of the Baltic passing Estonia, Latvia and Lithuania before reaching winter haunts in Poland and eastern Germany (A. Leito pers. comm., Strazds et al. 1994, Zalakevicius et al. 1995). There are scattered recoveries outside this area, most from years with very cold winters (e.g. 1986/87), or of geese which have been translocated or imprinted on other species. At least one ringed Canada Goose from Sweden (Fabricius 1983) and three from Norway (Reitan 1995a, pers. obs.) have reached England, and one bird ringed in Norway was recovered in Shetland (Heggberget 1987) whereas none from the United Kingdom have been seen in Scandinavia or on the continent except France (see Kirby this volume). Thus it is clear that the two European populations are almost completely separate. No confirmed records of North American Canada Geese are known from Fennoscandia.

1.3 Population trends

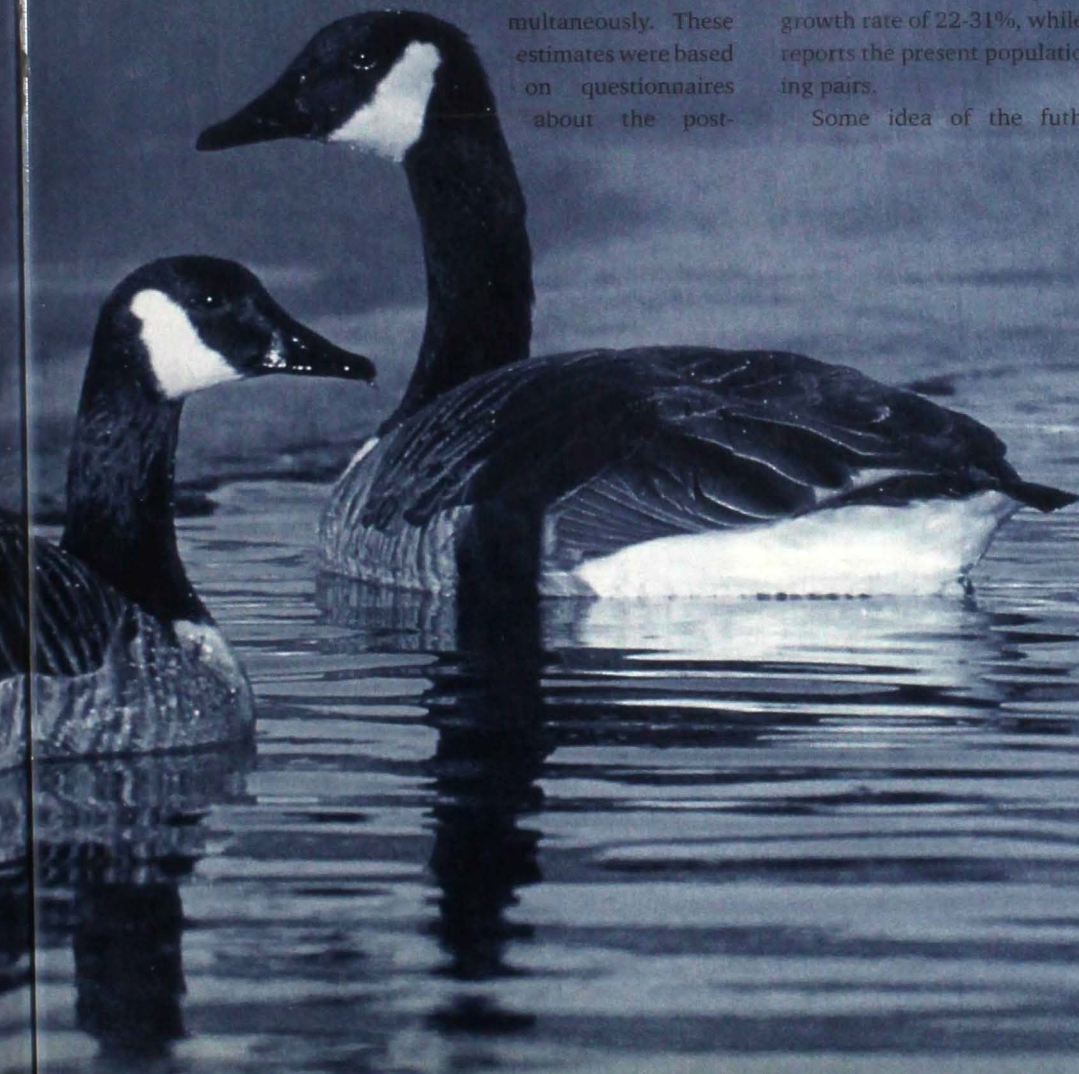
The growth of the Canada Goose population in Fennoscandia has not been subject to detailed long-term counts. Of the estimates available, the early ones from Sweden seem to be the most reliable, since they were carried out simultaneously. These estimates were based on questionnaires about the post-

breeding population during the early autumn. From 1966 to 1971, the number of birds increased from 3700 to 9000 (19% annual increase) and to 17,000 in 1976 (14% annual increase) (Fabricius 1983). In 1981 the stock was roughly estimated at 30,000 individuals (12% annual increase) (Fabricius 1983).

A rough calculation of the size of the Swedish population in 1981 is possible using winter counts: in Sweden 5678 (L. Nilsson pers. comm.); in Denmark c. 2000 (Madsen 1986); in Mecklenburg, Germany, 3068 (H.W. Nehls pers. comm.); and an estimated 2000-3000 in western Germany (Schramm 1985, Prokosch & Rösner 1991, J. Mooij pers. obs.), which gives a total of c. 13,000. Compensating for sites not surveyed at that time, but included in later censuses, it is estimated that the Swedish population totalled 14,000-16,000 Canada Geese in 1981, of which relatively few were from Finland. In the January counts in 1988 and 1989, the total number of Canada Geese recorded in Sweden, Denmark and Germany was 23,000 and 29,000 respectively. Of these, however, at least 3000 can be expected to be from Finland according to figures given in Vikberg & Tialnen (1996). This indicates that the growth rate of the Swedish population during the period 1981-1988/89 had slowed down, presumably being rather closer to 5% than 10%.

In Finland, a rapid increase in numbers started during the 1980s and has continued (Vikberg & Moilanen 1992, P. Vikberg pers. comm.). Estimates reported by Vikberg & Tialnen (1996) are 300-350 breeding pairs in 1987 and 3000-3500 pairs in 1996 giving an annual growth rate of 22-31%, while P. Vikberg (pers. comm.) reports the present population to be 1500-3000 breeding pairs.

Some idea of the further development of the



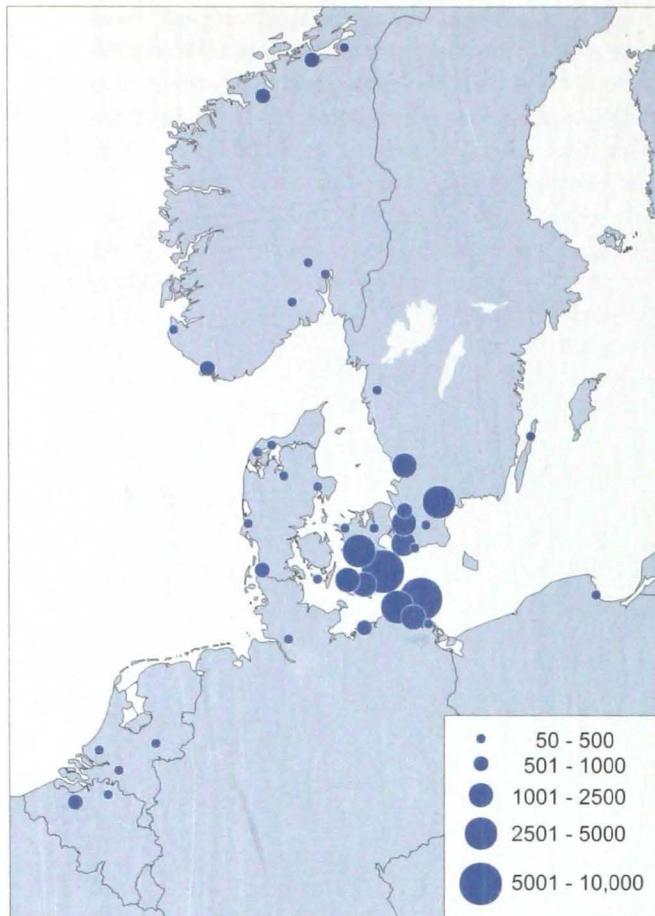


Fig. 16.1. Distribution of Canada Geese in Scandinavia and continental Europe in January 1994 (Norway in January 1993). Only sites with >50 geese are shown. Data sources: Belgium, Anselin et al. (1996); Denmark and Sweden, Wetlands International Goose Database; Germany, Biologische Station im Kreis Wesel (unpubl. data); the Netherlands, SOVON Ganzen en Zwanenwerkgroep (1995); Norway, Ole Reitan (unpubl. data).

Swedish/Finish populations can be gained from the winter counts. Coverage in Germany has improved since reunification (J. Mooij pers. obs.), accounting for the abrupt increase in winter numbers counted between 1989 and 1990 (Fig. 16.2). For the period 1990-1994, the total number of Canada Geese counted in the internationally coordinated goose counts in Sweden, Denmark and Germany increased from 36,294 to 45,599 (Fig. 16.2) corresponding to an annual increase of about 6%, where it seems reasonable to assume that Finnish birds contributed more to the growth than Swedish.

The totals for the winter counts of the Fennoscandian/continental Europe Canada Goose population in 1993 and 1994 were almost identical, while 1995 showed a marked decrease to 42,216 Canada Geese (Fig. 16.2). In January 1996, Sweden and Denmark recorded even lower numbers, while in Germany, information was only available from the coastal area of Mecklenburg-Vorpommern (and not completely synchronised with the January counts, H.W. Nehls pers. comm.). This gives a total of only 32,556 geese in 1996. In January 1997, Denmark recorded 23,275, Sweden 10,960 and coastal Mecklenburg-Vorpommern 12,019

making an all-time high of 46,254 Canada Geese. To these figures from 1996 and 1997, an unknown number in the rest of Germany should be added. Although the yearly variation is relatively large, the trend from 1992 onwards indicates a stabilisation or even decrease in recent years (Fig. 16.2). It should be noted that compared to other goose species, the Western Palearctic mid winter counts for the Canada Goose still have so many gaps that they must be used with caution in analyses of trends and estimation of total numbers.

In Norway the first successful introductions took place around 1960. From 1972-1984 there was an increase from 185-230 to 5000-7000 individuals (Heggberget 1991, Reitan 1995b) giving an annual increase of 29-35%. The total Norwegian population is now estimated to comprise more than 15,000 geese, but there exists no estimation of autumn population size after 1990 in any part of Norway (Reitan 1995a). Numbers seem to be increasing all over the country (O. Reitan pers. obs.).

The pattern of population increase described for Fennoscandia is similar to that recorded for the introduced population in the British Isles from 1953 to 1991 (see Kirby this volume). The initial increase seems however to have been faster in the Finnish, Norwegian and Swedish populations.

The breeding populations in Germany, the Netherlands and Belgium have increased markedly in recent years. For Germany, Rheinwald (1993) estimated the feral population at about 500 breeding pairs which would give 3000-5000 birds in total. In the Netherlands, the wintering population of Dutch-born geese increased from 18 breeding pairs in 1987 to 108 in 1994 (Lensink 1996) giving an annual increase of 29%. Around 1995, the winter population had risen to about 2000 birds (B. Voslamber pers. comm.). In Belgium, the first breeding record was in 1972 (E. Kuijken pers. comm.) the population has increased markedly since the mid 1980s to about 280-300 breeding pairs and a total of 2500-3000 individuals in 1996 (Devos et al. 1989, Anselin et al. 1997, A. Anselin pers. comm.).

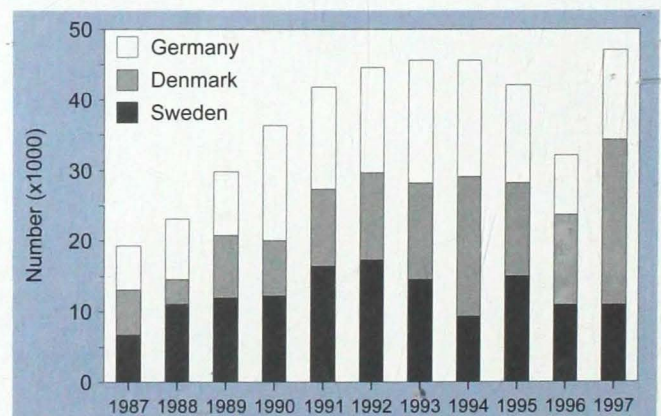


Fig. 16.2. January totals of Canada Geese counted in Sweden, Denmark and Germany 1987-1997. Totals for Germany in 1996 and 1997 are not fully complete.

1.4 Breeding success

Clutch size varies between 2-10 eggs (Fabricius 1987). A non-significant clutch size variation of 4.84-5.30 eggs between areas was recorded in four breeding groups in different parts of Sweden, while the same groups showed a significant year effect ranging from 4.48-5.63 (Sjöberg & Sjöberg 1992). In two Swedish areas hatching success differed markedly, 51% and 72% respectively (Fabricius 1983). Gosling mortality is often low. The proportion of yearlings in the hunting bag in Sweden varied between 24% and 37% in 1986-1991 (Å. Andersson unpubl.). This is lower than for the Greylag Goose *Anser anser* but higher than for the Taiga Bean Goose *Anser fabalis fabalis* for the same period. It seems that the annual variation in fledgling success is relatively low compared to goose species breeding further north.

1.5 Mortality

Fabricius (1983) analysed Swedish ringing data from established populations as well as translocated families and found that about 70% of recoveries of leg-ringed birds were reported shot; another 23% were reported as found dead and apparently include a high proportion of birds hit during hunting. The survival rate of geese ringed as goslings was calculated to be 72% for the first year compared to 58% during the second year and 67-74% for the following three years of age (Fabricius 1983 using the Haldane method). The resighting frequency from banding to the age of one year of neck-collared Canada Geese in central and northern Sweden was at a minimum of 82% and 76% respectively (Å. Andersson unpubl., G. Sjöberg & K. Sjöberg unpubl.). After their second year of life, at least 84% and 73% of the females were observed in central and northern Sweden respectively. For males the rate is lower (64% and 59%) presumably due to emigration. For geese ringed at an age of at least one year, resighting frequency varied between 61% and 97% for different areas, years and sexes.

2. BREEDING GROUNDS AND BREEDING ECOLOGY

2.1 Distribution

Range: In Sweden, translocations were common during the 1950s-1970s creating a patchy distribution, followed by spontaneous colonisation of the areas in between during the 1980s and 1990s widening the range. Today the species breeds throughout southern and central Sweden as well as in coastal and parts of inland northern Sweden. There are few Canada Geese on the lakes in southernmost Sweden (Nilsson 1994). While some areas along the coast have dense populations, large coastal areas are still not colonised.

In Norway, the distribution of the Canada Goose is discontinuous and only half a dozen areas have substantial populations (Heggberget & Reitan 1994). The largest breeding groups occur in the Trøndelag coun-

ties, the Agdar counties in the south, the lowland areas around Oslo fjord and in some districts in western Norway. A few breeding records are reported north of the Arctic Circle. Along the Norwegian-Swedish border in Nord-Trøndelag/Jämtland breeding occurs up to the sub-alpine zone at an altitude of 650 meters above sea level.

In Finland, the main breeding area covers the south-western and western coastal areas with a more scattered distribution in the central and eastern part of the country (Väisänen et al. 1998). A few have crossed the Swedish border just north of the Bothnian Bay (P. Vikberg pers. comm., R. Väisänen pers. comm.).

In Denmark, a small breeding population (<50 pairs) exists in the western part of the island of Sjælland (J. Madsen pers. obs.). In Germany, where the Canada Geese started to breed in the 1960s, the core areas are in the northwest in Niedersachsen, Nordrhein-Westfalen and Schleswig-Holstein (Mooij 1995), although local groups breed elsewhere, e.g. in Bayern (Rheinwald 1993, J. Mooij pers. obs.). In the Netherlands, concentrations are along the Rhine and close to the Belgian border, but small groups breed in the west and north (Lensink 1996). The Belgian breeding population is limited to the provinces of East Flanders, West Flanders and Antwerp (A. Anselin & E. Kuijken pers. comm.). In France there are groups scattered over the country (Hagemeijer & Blair 1997).

After translocation of a group of Russian-reared feral Canada Geese in 1987 to an area southeast of the Sea of Azov, about 300 birds were recorded there in the autumn 1991 (O.S. Gabuzov pers. comm.). One breeding record is reported from Lake Ladoga (Medvedev 1992). In the Ukraine there is a population at Askania Nova north of Krim (T. Ardamatskya pers. comm.), the size of which is not known.

There are a few nesting records from Latvia (Strazds et al. 1994, Adamsons & Roze 1995) and Switzerland (Hagemeijer & Blair 1997). On the Faroe Islands, one pair ringed in Britain arrived in 1984 and established a small breeding group which still survives there (Anon. 1987, J. Kjeld Jensen pers. comm., Hagemeijer & Blair 1997).

Habitat and feeding ecology: Breeds almost exclusively on islands in lakes or rivers, along the coast or in marshes. The availability of nesting islands greatly influences the breeding distribution. In forested areas, the Canada Goose shows a clear preference for small islands or islets and usually nests solitarily, while in areas with extensive shore meadows and pastures medium-sized and larger islands attract a number of pairs, sometimes forming loose colonies with 50 or more pairs. When coexisting with Greylags on lakes, the Canada Geese usually nest on islands while the Greylag Goose nests in reed beds or marshes in the vicinity. Along the coast, the two species often breed on the same islands though Greylags usually prefer more sheltered nest sites than Canada Geese (Å. Andersson unpubl.).

During the breeding period, Canada Geese feed

mainly on terrestrial plants including cereals, other grasses and herbs. Broods often share good feeding habitats on pastures with Greylag Goose families. Moulting geese rely more on reeds and emergent vegetation.

2.2 Moulting migration and moulting areas

Pairs with goslings moult on the breeding sites. Sub-adults and adults without goslings assemble in groups during the moult. In Finland, Norway and Sweden flocks of moulting Canada Geese usually do not exceed 100 birds. Results from neck-collar programmes indicate that these flocks are more or less locally recruited. Most flocks moult on lakes similar to those used for breeding. The only record of a larger concentration of moulting birds is from Lake Tåkern where 800 geese spent the summer in 1988 (L. Gezelius pers. comm.). Cramp & Simmons (1977) referring to Bauer & Glutz von Blotzheim (1968) state that moulting birds appear at Hiddensee in Mecklenburg-Vorpommern in July. This must be a mistake because the source only says that the geese appear in mid July, which is after the moult. However, Klafs & Stübs (1977) report a few observations from that area in June and July which indicate moulting. Thus, it seems that no large-scale moult migration has developed in breeding areas in northern Europe (cf. the British population; see Kirby this volume). During the period of intense translocation, some records of Canada Geese moving about 300 km for the moult were reported.

2.3 Research

Release programmes, establishment and population development are summarised by Heggberget (1991) and Heggberget & Reitan (1994) for Norway, by Fabricius (1983) for Sweden, by Viberg & Moilanen (1992) for Finland and by Teixeira (1995) and Lensink (1996) in the Netherlands. A more general up-date was given by Madsen & Andersson (1990). Studies of breeding ecology of the Canada Goose have been carried out mainly in Norway and Sweden. Behavioural studies concern courtship, pair formation and signal systems (Radesäter 1974, Fabricius et al. 1974, Fabricius 1991). Aspects of dispersal (Sjöberg & Sjöberg 1998), reproduction (Gautvik 1992, Fosse 1992, Opdal 1996, Sjöberg & Sjöberg 1992, Sjöberg 1994a, b) and foraging ecology (Åström 1993) have been the subject of recent studies. Neck-collar programmes have been in operation in Sweden 1987-1992 and are still continuing in Norway. In the Netherlands and Belgium, annual censuses of breeding pairs are made (Lensink 1996, A. Anselin pers. comm.).

2.4 Protection and conservation

Hunting legislation: During the breeding period Canada Geese are protected in the Nordic countries. The open season starts on 11-25 August in Sweden, 20 August in Finland, and 10-21 August in Norway (the further north the later the start). Sweden, with the largest breeding population, has the most liberal legis-

lation outside the open season. In order to prevent damage to crops Canada Geese may be shot on arable fields throughout the country from 20 July and in the southernmost part of Sweden also from 1 January-31 March. Canada Geese causing problems by fouling in parks and on beaches may be shot under licence issued by the County Administration.

Public awareness: The rapid increase of the Canada Goose and the problems they cause have changed the earlier positive attitude and, in areas with dense populations, the species is now considered a nuisance at least in Sweden. Small-scale culling is usually accepted by the public.

3. STAGING AREAS

3A. SWEDEN

Shortly after fledging, Canada Geese breeding in forested areas leave the breeding lakes and usually form post-breeding flocks in the nearest arable area where they remain until autumn migration. Flocks exceeding 500 birds occur on relatively few sites at that time of the year.

Despite extensive neck-collar programmes, detailed knowledge of the migration pattern is limited. In late autumn a concentration takes place and flocks numbering 1000-2000 geese have been reported. It is still unknown whether the flocks move directly to the wintering grounds or if they use staging areas en route. In some areas there seems to be a time lapse of some weeks between departure from autumn sites to arrival at the winter quarters. Neck-banded birds have produced no resightings until the birds arrive on their wintering areas (G. Sjöberg, Å. Andersson & K. Sjöberg unpubl. report) and extremely few ringed geese are reported shot between autumn and wintering areas. Though a few coastal sites in the province of Halland on the Swedish west coast may function as staging areas for birds from northern Sweden during the autumn migration, direct flights to winter quarters are likely for most flocks.

In spring, geese breeding in central Sweden usually migrate directly to areas close to their breeding sites without being seen along the migration route. In contrast, geese from more northern areas were observed staging along a broad corridor extending from Scania, north-northeast through central Sweden. The geese used to stop for a week or more (G. Sjöberg, Å. Andersson & K. Sjöberg unpubl. report).

3.B NORWAY

The pattern is similar to that found in Sweden. Concentrations of 1000-2000 Canada Geese have been recorded from a few places which may function as staging areas (Heggberget 1991, O. Reitan pers. obs.).

4. WINTERING AREAS

4A. NORWAY

4A.1 Distribution

Range: Wintering sites are located mainly near the coast and in fjords, at least north to Nord-Trøndelag county (Reitan 1995b). In addition, several wintering sites occur along open rivers and lakes inland.

Habitat and feeding ecology: Canada Geese in Norway seem to prefer winter habitats near the sea, along open rivers or on large lakes with ice-free sites. A common factor amongst winter habitats is open water in combination with foraging opportunities close to lakes or rivers.

4A.2 Abundance

Phenology: The Canada Geese generally arrive on the wintering grounds in November. During winter, some birds move on to other wintering grounds (Fig. 16.1, O. Reitan pers. obs.). Departure is during March or in early April.

Trends and numbers: Some wintering groups seem to have increased, while others have decreased recently. According to neck-banded birds, an increasing number of Norwegian Canada Geese, mainly from the southern breeding groups, have wintered in Denmark and along the southwest coast of Sweden in recent years. Norwegian birds may occasionally winter in the Netherlands, Germany and France. The total number of Canada Geese wintering in Norway is unknown. In January 1993, a total of 2720 Canada Geese were counted in Norway (Table 16.1), and in 1995, 2220. However, coverage in both years is known to be poor in respect of Canada Geese. It is estimated that at least 4500 Canada Geese were present in Norway in January 1995 (O. Reitan pers. obs.).

4A.3 Research

Census: Censuses were carried out all over Norway in January 1993-1995. After the 1995 census, geese will be censused as part of the international swan surveys (i.e. next in 2000). In some areas geese are counted together with other waterbirds as part of the international mid winter counts.

Ringling: All neck-banding and most leg-ringing of Canada Geese has been carried out during the moult in summer.

4A.4 Protection and conservation

Hunting legislation: Hunting of Canada Geese was allowed for the first time in Norway in autumn 1986 in eight municipalities in the Trøndelag counties. In the following years, hunting was allowed in an increasing number of districts, and in 1992 in all parts of Norway (Reitan 1995a). Prior to 1997, the hunting season was from 21 August to 31 October, and since 1997 has been extended to 10 August to 23 December (see also section 2.4 above).

The hunting bag in Norway was estimated to c. 3500

Table 16.1. Total numbers of Canada Geese counted in Fennoscandia/continental Europe in mid January.

	Numbers	Year	Source
Belgium	1200-1500	1994	2
Denmark	19,687	1994	1
Finland	9	1993	1
France	98	1994	1
Germany	16,556	1994	1
Latvia	1	1993	1
Lithuania	5	1993	1
The Netherlands	475	1994	1
Norway	2720	1993	1
Poland	162	1994	1
Sweden	9356	1994	1
Total	48,935		

Source: 1. Wetlands International Goose Database; 2. Anselin et al. (1996).

Canada Geese in autumn 1993 (Direktoratet for naturforvaltning 1996).

Agricultural conflict: In some districts there have been conflicts between agriculture and Canada Geese but the problems seem to be local.

4B. SWEDEN

4B.1 Distribution

Range: The winter distribution is restricted to southwestern Sweden (Fig. 16.1). Depending on the severity of the winter, about 75-95% of the wintering Canada Geese occur in southwestern Scania, the remaining occurring in Halland, Västergötland, Blekinge and Öland. Almost all the regular wintering sites are located south of the -2°C January and February isotherms where average snow depth during these months does not exceed 10 cm. In cold winters the Canada Geese move south, abandoning all sites except those in southwestern and western Scania and southernmost Halland. During the introduction phase, many Canada Geese spent the winter further north along rivers where they were artificially fed. This habit came to an end in the early 1960s, although a remnant flock of 400-600 geese still winters at Lake Storsjön in Jämtland (latitude 63°N) at a hole in the ice kept open by local people.

Habitat and feeding ecology: Coastal bays close to arable land comprise the dominant wintering habitat. The agricultural landscape is characterised by large fields, intensively used for growing cereals, rape and root crops. In early autumn the Canada Geese primarily exploit newly harvested fields, changing to winter cereals as soon as these sprout - the preferred food throughout late autumn and winter. Remains from the harvest of sugar beet and potatoes are frequently used when available. During periods with snow cover, rape is the most preferred food source (Nilsson & Persson 1991).

4B.2 Abundance

Phenology: The Canada Geese arrive in southwestern Scania in late November and during December, as they

do in Denmark and Germany, supporting the hypothesis that the geese go directly to their winter quarters without visiting staging areas.

Trends and numbers: From 1978-1983, numbers varied between 6000-7000 geese with the exception of 1982 when only 1042 occurred due to cold weather (Nilsson 1984). Later, during the 1980s, there was a peak in 1986 with over 15,000 followed by a new low during the cold winter 1986/87 (Nilsson 1988). Since then, numbers counted have varied between 9000-17,000 birds. Because of cold weather movements, there is no point in analysing numbers and trends in individual countries; a comprehensive outline for the whole Fennoscandian/continental European population is given in section 1.3 (above).

4B.3 Research

Census: Canada Geese have been censused since counts began in January 1978. A number of well known goose sites are visited and additional information is received from the mid winter duck counts (IWC). Count effort is similar from year to year, although many sites with Canada Geese are not visited. This, however, mainly affects the reliability of the estimate of total numbers not so much the trend figures.

Ringling: No leg-ringing or neck-banding has been carried out during winter.

4B.4 Protection and conservation

Hunting legislation: An open season was first established in 1970 (two counties) with a duration of one month. Since then the season has successively been extended concurrent with the population increase. The species may now be hunted from 11 August (25 August in the north) to 31 December over the whole country. In the four southernmost counties, shooting is allowed only until 1100 h for all geese from 1 October-31 December with the intention of giving the birds the opportunity to feed undisturbed and to prevent shooting on flocks returning to roost. In southern and central Sweden, shooting of Canada Geese is allowed on arable fields 1 January-31 March in order to prevent crop damage. The hunting bag in 1990 was c. 17,000 (Bergström et al. 1992) and 20,000-25,000 in 1992-1996 (official bag statistics, Swedish Hunters' Association).

4C. DENMARK

4C.1. Distribution

Range: The most important wintering grounds are situated in eastern Denmark (Fig. 16.1) where more than 90% of the geese occur (Jørgensen et al. 1994). In southern Sjælland-Møn-Falster-Lolland, more than 1000 geese have been recorded at at least five sites. During cold winters the geese concentrate in the southern part of this area. In northern Jutland approximately 500 geese winter, neckbands suggesting that these are primarily of Norwegian origin.

Habitat and feeding ecology: Canada Geese occur

at both inland waters and coasts. The most important sites are shallow coast and fjord areas where, in addition to crop plants, the geese feed on coastal meadows and submerged vegetation (Jørgensen et al. 1994). In recent years there has been a tendency of increasing numbers of geese at coastal sites.

4C.2 Abundance

Phenology: On the island of Møn, the first birds appear in late October followed by a gradual inflow during November and early December (Jørgensen et al. 1994). Numbers are relatively stable from mid December to mid February but movements between different areas in southeastern Denmark seem to be common. Departure starts in mid February and virtually all the geese have gone by March.

Trends and numbers: A maximum of 400-600 Canada Geese from Sweden wintered in Denmark in the late 1960s and early 1970s (Fog 1977). From a total of c. 2000 geese in the early 1980s (Madsen 1986) a pronounced increase took place in the mid 1980s (Jørgensen et al. 1994). In January counts during the period 1987-1994, the number increased to a peak of 19,700 in 1994 (Table 16.1). In 1995 and 1996, c. 13,000 were recorded. An all time high of 23,275 was recorded in 1997.

4C.3 Research

Census: The January counts cover most areas where Canada Geese winter. During aerial censuses of the coast, Canada Geese have been observed on shallow waters far from the coast. It is estimated that these birds, together with Canada Geese at sites which are not surveyed, number c. 1000-1500 birds (Jørgensen et al. 1994). Local studies involving repeated counts follow numerical changes during the winter season (Jørgensen et al. 1994).

Ringling: No leg-ringing or neck-banding has been carried out during winter.

Other: The effect of a recent change (1994) in shooting regulations by which geese generally are only allowed to be shot until 1000 h is being studied by the National Environmental Research Institute, including behaviour of Canada Geese.

4C.4 Protection and conservation

Hunting legislation: The Canada Goose has an open season from 1 September to 31 January (in January only in marine areas). Since 1994, geese can only be shot between 1.5 h before sunrise and 1000 h (since 1997 until 1100 h). From the mid-1960s to the early 1990s, the annual hunting bag of Canada Geese has increased from c. 100 to 1000 (Madsen et al. 1996).

Agricultural conflict: Because Canada Geese rely heavily on winter rape and winter cereals, damage to crops does occur locally, although the extent has not been quantified. Conflicts have been exacerbated by the population increase. In the severe winter of 1995/96, when shallow fjords and bays froze, Canada Geese fed solely on winter cereals and rape right

through into spring. Licences were for the first time granted by the National Forestry and Nature Agency to shoot a restricted number of geese after the closure of the hunting season and after 1000 h.

4D. GERMANY

4D.1 Distribution

Range: Canada Geese breeding in Sweden and Finland winter in large numbers in northern Germany, some 90-95% usually occurring in Mecklenburg-Vorpommern (J. Mooij pers. obs.) and, of these, the majority are concentrated to the Rügen-Stralsund-Zingst area (Fig. 16.1). Other important areas are the Wismar Bay in Mecklenburg-Vorpommern, the Fehmarn area in Schleswig-Holstein and Lower Elbe, border between Schleswig-Holstein and Niedersachsen. In cold, snowy winters, Fennoscandian geese reach Niedersachsen (Schramm 1985). Geese seen further south in Germany mainly come from introduced stocks, which are generally sedentary. As none of these sites exceeded 50 birds they do not appear in Figure 16.1.

Habitat and feeding ecology: Similar to Sweden and Denmark.

4D.2 Abundance

Phenology: In northern Mecklenburg, first birds arrive in late July and during August. The main influx starts in November and includes birds from the neck-banded populations in central and northern Sweden. Peak numbers are usually recorded in January/February. Departure starts already in mid February and the last birds leave in April (Dierschke et al. 1995, Mooij 1995, M. Bräse pers. comm.).

Trends and numbers: In northern Mecklenburg, 250 Canada Geese were reported in 1957 (Bauer & Glutz von Blotzheim 1968) and almost 1500 in 1975 (Klafs & Stübs 1977). In Schleswig-Holstein, substantial numbers of wintering Canada Geese appeared for the first time during the winter 1978/79. There was an increase during the following decade (Prokosch & Rösner 1991), but recent trends are not known. The total number in Germany in January 1988 and 1989 was c. 9000 geese. Count coverage has improved considerably since the winter 1989/90 and some 12,000-17,500 birds have been counted annually since then (Mooij 1995, Fig. 16.2), except in 1996, when less than 10,000 were reported.

A number of sites seem not to be included in the national counts: 18,900 were counted in coastal Mecklenburg in January 1992 (W. Nehls unpubl. report) which is 4500 geese more than reported from the whole state (Bundesland) of Mecklenburg-Vorpommern in the national survey of the same month. There is reason to believe that up to 5000 Canada Geese escape record in the national counts. If this is true, numbers wintering in Germany may be in the order of 19,000-22,500 birds.

4D.3 Research

Census: Regular goose counts were carried out from the mid 1960s until 1989 in each of the former Federal Republic of Germany and German Democratic Republic, and from 1990 onwards counts have been coordinated. Results from the national January counts are at present available from 1987 onwards, and some regional counts carried out since the 1950s have been published (see e.g. Prokosch & Rösner 1991).

Other: A few local studies of breeding and feeding ecology of Canada Geese and competition with other species, especially the Greylag Goose, have been carried out.

4D.4 Protection and conservation

Hunting legislation: In Germany, the Canada Goose is a game species and has a maximum open season between 1 November and 15 January. The federal states can shorten or cancel this hunting season or extend it in specific regions under specific conditions. At present, there is no hunting season for the Canada Goose in the federal states Baden-Württemberg, Hessen, Niedersachsen, Nordrhein-Westfalen, Rheinland-Pfalz and Thüringen. Although the annual goose bag has increased considerably in recent decades, the proportion of Canada Geese in the annual German goose bag is low, estimated to be less than 100 birds (J. Mooij pers. obs., H. Kalchreuter pers. comm.).

Site safeguard: Most haunts of Canada Geese in Germany are protected at different levels. Some haunts are hunting free zones (usually only the roosts) but in most protected areas hunting is allowed.

Agricultural conflicts: The proportion of goose damage caused by Canada Geese is negligible compared to other goose species.

4E. THE NETHERLANDS AND BELGIUM

4E.1 Distribution

Range: In the Netherlands, local birds winter along the river Rhine and concentrate along large rivers in hard winters. Geese migrating from Sweden and Finland reach the Netherlands during hard winters, concentrating in the northeast and along the river IJssel (Lensink 1996, B. Voslamber pers. comm.). In 1994, no migratory geese seem to have been recorded during the January counts (Fig. 16.1). In Belgium, the largest concentrations are around the city of Gent and in the province of Antwerp, and there are increasing numbers near Brugge (A. Anselin & E. Kuijken pers. comm.). All these geese are local and mainly sedentary. There is little overlap between Canada Goose distribution and the coastal polder wintering grounds of White-fronted Geese *Anser albifrons* and Pink-footed Geese *Anser brachyrhynchus* (E. Kuijken pers. comm.).

4E.2 Abundance

Trends and numbers: In both countries there has been a rapid increase, bringing numbers to c. 2000

geese in the Netherlands in 1995 (B. Voslamber pers. comm.) and 2700 in Belgium in 1997 (A. Anselin pers. comm.).

4E.3 Research

Census: As a part of the Wetlands International goose census programme, synchronous nationwide counts have been carried out in January in the Netherlands, and specific Canada Goose counts in Belgium since 1996.

Other: Ringing started in Belgium in 1994 and since 1995 neck-collars have been used (A. Anselin pers. comm.).

4E.4 Protection and conservation

Hunting legislation: There is no open season for the Canada Goose in either country.

5. DISCUSSION

Population status and conservation issues: After a phase of rapid expansion with an annual increase of 15-30% in Sweden in the 1960s and 1970s, in Finland in the 1980s and early 1990s and in Norway in the late 1970s and 1980s, the growth rate for the migratory part of the population slowed during the early 1990s. January counts from recent years indicate a tendency towards stabilisation. A similar pattern of population increase has been recorded for the introduced population in the British Isles between 1953 and 1991 (see Kirby this volume), although the rate of increase seems to have been faster in the Fennoscandian population. In Fennoscandia, the Canada Geese had access to an almost unlimited resource of suitable freshwater and coastal wetlands while the British population largely developed in parallel with the creation of reservoirs and gravel pits.

The Canada Goose has not yet colonised all suitable areas and habitats in Fennoscandia. Assuming that neither the resources in the breeding areas nor the staging and wintering areas are limiting further growth, which seems unlikely at present, there is reason to focus on breeding frequency and mortality rate in explanation of the recent population development. Research and monitoring efforts for this species are limited and do not allow any conclusions about breeding performance so far. The available bag statistics indicate a surprisingly high harvest in recent years, totalling 22,000-27,000 geese, of which 20,000-25,000 are shot in Sweden (official bag statistics, Swedish Hunters' Association), 800-1000 in Finland (P. Vikberg pers. comm.), 1100 in Denmark (Madsen et al. 1996) and less than 100 in Germany (J. Mooij pers. obs.). While the Danish and Finnish harvest numbers are thought to be relatively reliable, the sampling methods used in Sweden and Germany give highly unreliable estimates. Furthermore, an unknown proportion of the 3500 Canada Geese shot in Norway should also be included (Direktoratet for naturforvaltning 1996). These data give a post-fledging population of at least 70,000 geese (c. 25,000 geese reported shot plus 45,000 counted during the January

counts). The harvest, which is mainly taken before the January counts, thus comprises about 35% of the post-fledging population. Thus, population numbers are stabilising, the harvest rate appears to be high but nevertheless sustainable at current levels.

The breeding populations of Canada Geese in western European countries (especially Germany, the Netherlands and Belgium) are still local and relatively small but are currently growing rapidly, suggesting that they may have entered the phase of rapid increase earlier exhibited by both the Fennoscandian and the British populations.

Possible competition between Canada Geese and the native bird fauna has been a justified concern during the population increase (see Madsen & Andersson 1990). Interspecific aggression and territorialism has frequently been observed between Canada Geese and other goose species and swans. Studies of the relationship between Canada and Greylag Geese when both species were increasing in numbers did not reveal any negative consequences during the breeding period (Fabricius et al. 1974). Furthermore, food competition between goose species may occur in staging and wintering areas influencing, for example, distances flown by different species from roost to feeding area (e.g. Nilsson & Persson 1991).

Problems do occur in parklands and lakes used for human recreation as well as by geese. Fouling of grounds and beaches is locally a nuisance for people walking, sunbathing, swimming and golfing. In Sweden, this problem was first solved by translocation, but now usually by shooting.

Agricultural conflict: Crop damage is a problem on the wintering grounds in the southern Baltic. Canada Geese make extensive use of winter cereal fields and, during periods of thaw, uproot plants and damage the fields by trampling. In late summer the geese can devastate unharvested crops (J. Madsen & Å. Andersson pers. obs.). When problems are local, personal licences to kill geese in the closed season are used as a management tool for individual farmers. In areas where serious damage is widespread, as in southern Sweden, shooting on fields where damage occurs is permitted during special extensions before and after the regular open season. With a stable or decreasing population the need for large-scale solutions is decreasing. Effective scaring methods usable by the individual farmer or landowner seem to be in increasing demand.

Future research needs: There is an urgent need to confirm the trend in the migratory population and understand the underlying population processes. Besides the internationally coordinated mid winter counts, local or regional counts in breeding areas are recommended. While the Netherlands and Belgium seem to have an adequate census programme of their breeding populations, improvements in coverage would be worthwhile in Denmark and especially Germany. Monitoring productivity by recording the proportion of juveniles in autumn flocks as well as more reliable bag statistics are essential steps towards better knowledge.

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