



# GooseNews

Issue no. 6, Autumn 2007

## The Newsletter of WWT's Goose & Swan Monitoring Programme

### How important are geese as indicators of tundra health?

Leafing through the pages of this year's *GooseNews*, one thing will be apparent to most readers – the poor breeding success being shown by many Arctic-breeding populations of geese during the past 10-15 years. Whilst the reasons for this are unclear in most cases, we can be fairly confident that the factors driving this vary between populations. For example, Greenland White-fronted Geese, which bred poorly again in 2005 for the seventh successive season (see Tony Fox's report on page 15), appear to be suffering from increased levels of competition with Canada Geese. The latter are rapidly increasing in west Greenland, causing fewer Greenland Whitefronts to breed successfully. Although Svalbard Barnacle Geese had a better-than-recent-average breeding season in 2006 (see page 16 for Larry Griffin's update), they have shown a steady decrease in breeding success over the past 15-20 years, with particularly low outputs in the past seven years. This coincides with the time that the population reached approximately 25,000 individuals, and it is possible that density dependent factors could be causing the depressed productivity (i.e. there are more birds competing for the same resources, so a smaller proportion of them reproduce successfully). This is not necessarily a cause of concern to conservationists, because intrinsic in this situation is an overall increase in abundance, and the assumption that should abundance fall, breeding success will increase again. A bigger question mark concerns the brent geese – two of which also currently show clear decreases in breeding success over recent years (see Preben Clausen's report on East Atlantic Light-bellied Brent Geese on page 17, and Colette Hall's summary of Dark-bellied Brent Goose breeding success on page 13). With these brents, the cyclical nature of their breeding success appears to have been disrupted in recent years, and the cause of this is currently largely unknown. Thus, we have geese from both sides of Greenland, from Svalbard, and the Russian tundra showing similar trends in breeding success, and in two of these, it is driving an overall decline in abundance. It is therefore important that future goose research addresses this issue and elucidates the factors causing these decreases in breeding success.

Something that drives the reproductive success of many Arctic-breeding birds is the cycle in lemming abundance. It is known that the approximately three-yearly nature of this cycle has become disrupted in recent years, with, for example, a gap of six years between lemming peaks on the Taimyr peninsula between 1999 and 2005. Furthermore, in some years of peak lemming abundance, geese have failed to breed successfully, as happened for Dark-bellied Brent Geese between 1994 and 1999 when there were three years of peak lemming abundance contributing to the 30% decline in abundance over the past 15 years. The causes of this disruption in the lemming cycle remain unknown, although research by Bart Ebbing and



Light-bellied Brent Goose on nest (Kendrew Colhoun)

colleagues has demonstrated that the three-yearly abundance of lemmings only occurs if an insulating protective cover of snow persists throughout the Arctic winter, allowing lemmings to attain high population densities. If increasing global temperatures result in the occurrence of short periods of snowmelt during midwinter, followed by freezing conditions

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again, the snowcover turns into solid ice, which is detrimental to lemming survival, and has wider implications for the food-chain of which they form such an important part.

Therefore, could these longer periods without peaks in lemming abundance, and the declines in goose breeding success, be indications of ecological changes in the Arctic that are being driven by climatic factors? Understanding and monitoring this, and the possible causes, in the Arctic, particularly during the winter, is both arduous and costly. Monitoring proxy measures such as goose breeding success, as conducted in the UK by the GSMP network, could, therefore, provide a valuable and additional means of indirectly assessing the condition of Arctic ecosystems. This could also be extended to other Arctic-breeding migrants, such as Curlew Sandpiper and Red Knot, whose breeding success is also believed to be linked to the lemming cycle. For these species also, there has

been little past coordinated monitoring of annual breeding success, though current initiatives such as Committee for Holarctic Shorebird Monitoring are seeking to develop this.

Thus, the development of further collaborative research that builds upon existing initiatives, such as the Arctic Birds Breeding Conditions Survey ([www.arcticbirds.ru](http://www.arcticbirds.ru)), is needed. This will require inputs from mammalogists, climatologists, ornithologists studying other bird taxa, and others, both during the Arctic summer and winter, so we can better understand the connections between observed trends in Anatidae breeding success, the potential effects of changes on their abundance and conservation status, and the overall health of their precious Arctic breeding grounds.

**Richard Hearn**

### GSMP website

A reminder that much information on the Goose & Swan Monitoring Programme can be found on WWT's website [www.wwt.org.uk/research/monitoring/](http://www.wwt.org.uk/research/monitoring/). This includes detailed information on results of surveys reported in this issue of *GooseNews*, and various resources for GSMP fieldworkers, such as recording forms.



### Greenland Barnacle Goose Survey 2008

The next international census of Greenland Barnacle Geese will take place throughout the wintering range in spring 2008. Although this census is largely conducted by aerial survey, due to the remoteness of many sites (mainly offshore islands in western Scotland and Ireland) some key areas, such as Islay, Tiree, the Uists, Durness, and South Walls, are covered by ground counts. Additional counts from March and April from all areas supporting Greenland Barnacle Geese would be welcome.

### Retiring IGC Local Organiser

Frank Mawby, the Icelandic-breeding Goose Census Local Organiser on the Solway Estuary, has decided that, after more than 20 years, the time has come to retire. We would like to thank Frank for his unwavering support for this census and for his effort in ensuring good coverage over the past two decades. A new LO is required for this area – please contact WWT if you may be interested in taking on this important role.

### Naturalised Goose Census 2009

The next Naturalised Goose Census is due to take place during the summer of 2009. Planning will be initiated next year, and further details will be provided in *GooseNews* 7.

### Northwest Scotland Greylag Goose Survey 2008

The next census of the Northwest Scotland (NWS) Greylag Goose population is planned for August 2008. The precise methods will be finalised in the next few months, and we will then be seeking volunteer counters and, probably, Local Organisers, though this will depend on the final remit of this census. This census presents an ideal opportunity to thoroughly examine the extent to which the population has increased in abundance and distribution not only for the NWS but also for the Re-established population, particularly in areas adjacent to the range of the NWS population. It should then be possible to assess whether it remains possible to treat these two populations as discrete, or whether it is now better to regard them as a single British population.

Further information will be made available in due course on the GSMP web pages. If you are interested in taking part in this survey and would like to receive further updates as they become available, please contact Carl Mitchell.

## Staff changes at WWT

Since the last issue of *GooseNews*, there have been some changes in the Waterbird Monitoring Unit. In March, Jenny Worden, with whom many of you will have corresponded regarding the IGC and other GSMP activities, left WWT. The main contact for GSMP activities is therefore now Carl Mitchell (see back page for contact details). Many of you will already know Carl from his time at WWT in the 1980s and 1990s. He will be based at his home in Kingussie, Highland, which will greatly facilitate engagement with much of the GSMP network, and

greater support for fieldwork and other activities. Please, however, continue to use the WWT Slimbridge address for mailing forms and other items. Colette Hall will continue to provide the lead for some GSMP projects (primarily Dark-bellied Brent Goose monitoring).

## Survey dates for 2007/08

### Icelandic-breeding Goose Census

Count forms for the 2007/08 IGC have been mailed to all counters or Local Organisers with this issue of *GooseNews*. If you have not received your forms, or would like to participate for the first time, please contact the Waterbird Monitoring Unit at WWT Slimbridge. The coordinated count dates for this year are:

**13/14 October, 10/11 November and 8/9 December**

If you are unable to count on any of these dates, please contact either your Local Organiser if you have one, or Carl Mitchell, so that we may try to arrange for cover of your site by another counter. As usual, we would like to encourage all counters also to carry out a count during September, particularly at those sites where Re-established or Northwest Scotland Greylag Geese occur. September counts are not strictly coordinated but should be carried out as close as possible to the end of the third week of September, although any counts made during the month will be of value (see page 8 of *GooseNews* 2 for further details).

Please remember that, ideally, all sites should be covered during the October, November and December counts. In some years early arrivals of Greylag Geese or late arrivals of Pink-footed Geese mean that the best month for estimating their population size (traditionally November for Greylag Geese and October for Pink-footed Geese) may differ. This is particularly important during 2007/08 as we collect additional data for the final time that will allow us to reassess whether the ideal month for counting these geese needs to be changed.

### International Dark-bellied Brent Goose Census

The next flyway-wide coordinated count will be held on 3/4 May 2008. If you monitor a site where Dark-bellied Brent Geese may be found in May but have not been contacted regarding this survey in the past two years, we would be pleased to hear from you.

### Colour-mark Reading

All sightings of colour-marked wildfowl, not just geese and swans, can be sent either direct to the relevant project coordinator or to 'Colour-marked Wildfowl' at WWT Slimbridge, or by email to [colourmarkedwildfowl@wwt.org.uk](mailto:colourmarkedwildfowl@wwt.org.uk).

Further details of colour-marking projects can be found on the EURING colour-marking website:  
<http://www.cr-birding.be>

### Age Assessments

Age assessments will continue during 2007/08 as usual. The survey periods vary between species and are shown below.

Population	Period	Notes
Whooper Swan	Oct - Jan	
Bewick's Swan	Nov - Feb	
Iceland Greylag Goose	Oct - mid Nov	care needed with age identification
Northwest Scotland Greylag Goose	Aug - Sep	
Re-established Greylag Goose	Aug - Sep	
Pink-footed Goose	mid Sep - mid Nov	
Bean Goose	Oct - Nov	
European White-fronted Goose	Oct - Jan	focus on Jan
Greenland White-fronted Goose	Oct - Jan	focus on Dec
Dark-bellied Brent Goose	Sep - Mar	focus on Oct - Nov
Light-bellied Brent Goose (both populations)	Sep - Mar	focus on Oct - Nov
Barnacle Goose	Oct - Dec	
Canada Goose	Jun - Jul	care needed with age identification of fledged birds



## Goose management and conservation in Scotland

In 2000, the Scottish Executive published its *Policy Report and Recommendations of the National Goose Forum*. This document set out the principles behind a more proactive approach to goose management and conservation in Scotland, and has subsequently resulted in the development of seven local goose management schemes now managed by local goose management groups within the Scottish Executive's national goose policy framework. These are overseen by the National Goose Management Review Group (NGMRG) and supported by the Goose Science Advisory Group (GSAG). The schemes aim to protect key goose populations by providing disturbance-free feeding and encouraging active scaring from non-feeding areas to other areas, while minimising the economic loss to farmers and maximising value for money of public expenditure. The seven schemes are located across Scotland, with five winter/spring schemes, four of which support migratory geese throughout the winter and reduce agricultural damage, and a further scheme where significant agricultural damage occurs as a consequence of heavy concentrations of geese immediately around a managed reserve during the spring. There are also two summer schemes to protect nationally important natural heritage interests and reduce agricultural damage.

The Solway Barnacle Goose Management Scheme, launched in winter 2000, assists farmers who support around 26,000 over-wintering Svalbard Barnacle Geese on their land. The geese primarily roost on the Scottish side of Solway Estuary and their principal roost is designated as a Site of Special Scientific Interest (SSSI) and a Special Protected Area (SPA). The WWT Caerlaverock and RSPB Mersehead reserves also support feeding geese. Since the start of the scheme, uptake has been consistently high and currently stands at 94% of eligible farmers. Geese also make some use of merse areas which are covered by a separate Merse Management Scheme.



Greenland White-fronted Geese and Barnacle Geese on Islay (Paul Marshall)

The Islay Local Goose Management Scheme (LGMS), also launched in 2000, manages approximately 70% of the global Greenland Barnacle Goose and 50% of the global Greenland White-fronted Goose populations. There are five SPAs on Islay classified for geese and the scheme covers around 90% of available productive agricultural land on the island. Membership has remained stable, with an 85% uptake of eligible farmers and crofters. The Kintyre LGMS, also launched in winter 2000,

supports a further 10% of the Greenland White-fronted Goose population. In Kintyre, their hill loch roosts are designated as an SPA. The area also has small populations of Greylag Goose and Greenland Barnacle Goose, but neither are included in the scheme because Greylags can be scared and shot to prevent agricultural damage, and Barnacle Geese are too few in number. Scheme membership has gradually increased and there is now a 74% uptake of eligible farmers and crofters.

The South Walls Goose Management Scheme, on Orkney, launched in 2000, manages approximately 4% of the global Greenland Barnacle Goose population. The roost is located on the island of Switha, next to South Walls, and is designated as an SPA and a SSSI. During the winter, South Walls also supports a small number of Iceland Greylag Geese, but again, as they can be scared and shot, they are not included in the scheme. The scheme covers around 90% of available productive agricultural land and membership has remained stable with around a 75% uptake of eligible farmers and crofters.

The Loch of Strathbeg LGMS, launched in 2000, is primarily a spring scheme. The site supports large numbers of Pink-footed Geese, as well as a number of Svalbard Barnacle Geese and Iceland Greylag Geese, which use the Loch of Strathbeg roost as a final staging post prior to migration. The roost is located within the RSPB reserve and is a designated SSSI, SPA and Ramsar site. The scheme currently supports between 10,664 and 12,850 Pink-footed Geese and last season there was a 26% uptake of eligible farmers.

The Uist LGMS, launched in 2002, is a summer scheme aimed at addressing damage caused by Northwest Scotland Greylag Geese. Crofters and farmers can scare and shoot these geese during the open season and apply for licenses to address agricultural damage during the closed season. The Greylag population of approximately 5,500 birds breeds in the hills and moves down onto machair and agricultural areas to feed during summer. The principal agricultural impact is prior to and during the harvest. The damage can cause the loss of replacement seed and reduced crop yields. Crofters and farmers may need to purchase additional winter feed and store extra harvest seed, as soil deficiencies on the Uists require certain seed strains to be used to grow crops with any success. The scheme aims to prevent cropping abandonment, as this could result in the loss of habitat of conservation interest for species such as Corncrake, and a potential reduction in biodiversity from the loss of traditional cereal varieties, which could negatively impact the fragile ecosystem. As over-wintering Greenland Barnacle Geese roost primarily on offshore island SPAs around North Uist and do not impact on machair crops in the summer and harvest period, they are excluded from the scheme. Every croft and township across the islands can ask for scaring assistance from the local goose officer, and it is thought that the majority of crofts have had geese recorded on their land at some point.

The Tiree and Coll Goose Management Scheme is the other summer scheme, and became operational on Coll in winter

2003 and on Tiree in late spring 2004. It was established to manage agricultural damage caused by the resident population of Northwest Scotland Greylag Geese, and localised agricultural impacts from over-wintering populations of Greenland Barnacle and Greenland White-fronted Geese. The scheme supports approximately 5,000 Greylag Geese, up to 4,000 Greenland Barnacle Geese and 1,900 Greenland White-fronted Geese. The Greylag roosts on both Tiree and Coll are protected within designated SPAs. As in the Uists, the damage caused by the Greylags is to arable crops on the machair and other areas prior to harvesting, and there is also the same risk of cropping abandonment which could result in the loss of Corncrake habitat. The scheme covers the majority of productive land across both islands and there is currently a 72% uptake of eligible farmers/crofters on Tiree and a 57% uptake on Coll. The scheme is



Is it a bird, is it a plane? Goose-scaring the Tiree way! (Peter Isaacson)

particularly active and, as can be seen in the photo, uses novel ways such as scarecrow competitions to encourage a community approach to scaring geese!

All of the schemes are funded under Scottish Natural Heritage's (SNH's) Natural Care programme. However, from the end of 2007, the Natural Care programme will be integrated into the Scotland Rural Development Programme 2007-2013 (SRDP). The SRDP will become the primary source of funding for land management in Scotland, including funding for management on SSSIs and Natura 2000 sites. SNH will continue to administer existing Natural Care schemes until they expire. Decisions have yet to be made on the future of Scottish goose management schemes, and whether they will transfer to the SRDP, when existing arrangements come to an end in 2010.

Through this national and local partnership approach, the Scottish Executive believes that Scotland has successfully managed the integration of the needs of both goose conservation and agriculture. Part of the basis of this is the availability of sound science on which to judge and manage schemes. As part of the original management review, population viability analyses (PVAs) were undertaken on the common species of geese in Scotland. These were revised in 2004-05 when new PVAs were commissioned to cover the five main wintering populations of Scottish geese: Iceland/Greenland Pink-footed; Greenland White-fronted; Iceland Greylag; Greenland Barnacle; and Svalbard Barnacle. The PVAs were commissioned by SNH, and their progress was monitored and managed through GSAG. This helped to inform the five-year review of the goose schemes that took place in 2005, and the reports can be found at [www.snh.org.uk/pdfs/publications/commissioned\\_reports/F03AC302.pdf](http://www.snh.org.uk/pdfs/publications/commissioned_reports/F03AC302.pdf).

In 2005, GSAG also proposed work to examine the long-running datasets on goose numbers and goose schemes on Islay, to provide an initial assessment of whether these would inform us about the relative effectiveness of different methods of scaring. Some interesting results were obtained from the preliminary analyses, and this will be developed further in 2007 by analysing a further three years' data on the Islay geese. GSAG continues to develop ideas for a range of research and monitoring which we hope will be undertaken between now and 2010, and as part of that we have identified a priority need for a better understanding of Greylag Goose populations in Scotland. As populations of Northwest Scotland Greylags and Re-established Greylags grow, it is increasingly difficult to separate these from each other, and from the over-wintering Iceland population, at least on the basis of winter counts. We have also seen substantial shifts in the winter distribution of Iceland Greylags in recent years, with increased numbers wintering on Orkney, for example. We are therefore discussing with JNCC and other parties the best way to gain a fuller understanding of the distributions, numbers and movements within and between these Greylag populations. New or revised surveys may well be needed, in late summer as well as winter, so watch this space...

**Ian Bainbridge & Fiona Leslie**

## Overcrowding forces exodus?

Since the mid 1980s, I have watched Barnacle Geese colonise Bedfordshire. For twenty years, they struggled to remain in double figures at the Marston Vale brick pits where they were regularly predated by foxes. Another pair also regularly failed to produce viable young at a second site in north the north of the county. It looked like numbers were to remain low, that is until autumn 1998 when twenty or so young birds were released, free-winged, at Roxton gravel pits, on the River Great Ouse. This site consists of three small-medium sized lakes with nine islands and lies close to the A1 trunk road, south of St. Neots. Four years later and they started breeding successfully, with 28 goslings fledging. Counts in the following spring totalled 106 birds and in the autumn, 164 birds; considerably more than was expected. This could only be accounted for by immigration from other sources, as both of the older sites had been abandoned at the turn of the century.

In 2003, ringing was initiated – 40 birds were captured and marked during the moult, including 18 of that year's 40 young. In 2004, another 58 adults, eleven of which were retraps from 2003, and three young from one brood, were rounded-up. In 2005, the ringers were prepared with another tool – red darvic rings! Sixteen fully grown birds were retrapped from previous years and 117 new birds were marked – 68 adults and all of that year's 49 young. All except 16 small youngsters were fitted with darvic rings. During the autumn, a single flock of 360 Barnacle Geese was counted in the area – nearly three times the size of the known breeding colony. Some of these birds, I suggest, may not have been from the Roxton group originally.



Barnacle Geese (Nicholas Cottrell)

In 2006, nothing happened. No ringing, no sightings, no recoveries – except at Roxton and adjacent pits. Until Christmas, that is! An e-mail came in saying that 51 Barnacle Geese had been seen near Needingworth, in Cambridgeshire, and five of them bore red darvics. Unfortunately, only one could be read and this happened to be one of the 33 youngsters from 2005. The flock was 28 km northeast of Roxton, which did not strike us as particularly unusual since groups of 40-100 birds had been reported flying both upstream and downstream along the Great Ouse in previous winters, destinations unknown. Nevertheless, we were getting answers to the 'yo-yo counts' being made at their main grazing fields at Willington, 5 km upstream of Roxton.

In early April 2007, an email came through that reported a flock of 15 Barnacle Geese at Tring reservoirs, on the Herts-Bucks border, some 46 km SSW of Roxton. Among these were seven with colour rings. They were subsequently seen later the same day over Puckeridge, Herts. The marked birds comprised four adults and three juveniles from 2005. Perhaps those small groups that headed up the Ouse did a circuit now and then before returning 'home'.

Then another e-mail...and another! This time it concerned nine birds, and seven of them were ringed! The location was 123 km west of Roxton at Kinsham pits, on the Worcs-Gloucesters border near Tewkesbury. The identifiable birds were five adults and two juveniles from 2005. The other reporter relayed a message that, on the same day, 2nd April, two marked birds were present with 17 others at Coate Water, Swindon, 121 km southwest of Roxton. These two birds, along with two unmarked birds, were still there at the beginning of May. Wow! These were a real surprise! But then from the 6th to 12th April, another marked bird, a 2005 juvenile, was recorded at Corsham Park, Wilts, 151 km WSW of Roxton. A day after the last sighting, on the 13th, it was 'back home' at Toft golf course, a mere 22 km E of Roxton. Then between 14th and 18th April, two pairs were seen in the water meadows west of Oxford, in the Stanton Harcourt to Dorchester-on-Thames area, 84 km southwest of Roxton.

By now the grass was getting long and it was becoming nigh impossible to read any leg rings at Roxton. Marked birds were returning to nest and 21 pairs were counted on the main island in mid-May. And then, on the 21st May, came a report from the Abbotsbury Swanherd of a lone bird. The following day a pair arrived with some Canada Geese, and one of them, the male, was the proud possessor of "Red H bar B", that was gifted to him 231 km away to the northeast.

I should point out that none of the above birds has been seen at another location and several were in paired relationships. The future? Who knows? Next stop – across the channel?

**Errol Newman**

PS: A request – when the grass gets shorter, please look out for those red rings for us. We'll put some more on this year, weather and helpers permitting. (They did! See *Recent successes with capture and marking* on page 19. Ed.)

*Errol's article raises some interesting questions about the provenance of the Barnacle Geese breeding in England. Clearly some (probably the majority) have come directly from released birds, but with the rapidly increasing population in the Netherlands, that is believed to be a mixture of naturalised birds and over-summering individuals from the Russian breeding population that winters there, there is every likelihood that some birds from this population have dispersed to settle in England. Further ringing should help to explain the levels of exchange between these two 'populations'. (Ed.)*



## Staging Light-bellied Brent Geese in western Iceland

East Canadian High Arctic (ECHA) Light-bellied Brent Geese utilise parts of western Iceland for 3-8 weeks each spring (April-May) on their way to their Canadian breeding grounds from Ireland, and for 3-6 weeks on the return journey each September to mid-October. All available evidence shows that the entire population stages during spring migration, and that most, but not all, do so in autumn. The familiarity of the species in at least parts of Iceland is evident in the incorporation of *broti* in the scientific name – an Icelandic name for the species derived from its call.

Since 2001, our interest in the species has been increasing and with our partners from WWT and the Irish Brent Goose Research Group we have undertaken a number of joint studies into the staging ecology of this species, especially in spring. Our knowledge of the distribution of the species has improved following increased spring and autumn surveys and the primary haunts are in the bays of Breiðafjörður and Faxaflói on the west coast. Outwith the 14 or so main sites (Figure 1), ECHA Light-bellied Brent Geese frequently occur in smaller numbers at other sites, primarily on the south coast during passage. Continued monitoring of key sites has been increasing our knowledge of the importance of these sites and how their importance varies within and between seasons.

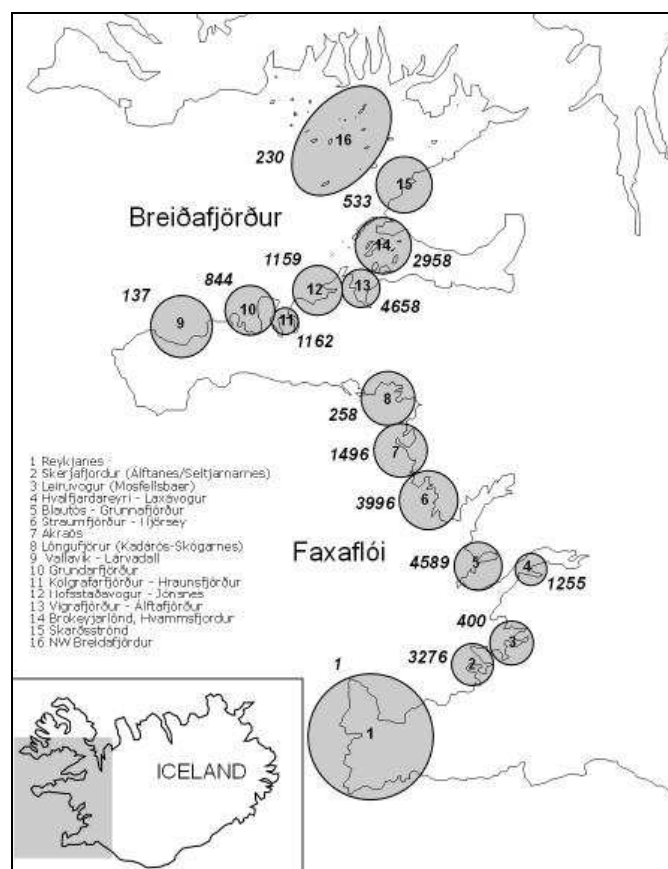


Figure 1. Spring distribution of ECHA Light-bellied Brent Geese in western Iceland.



Light-bellied Brent Geese (Daniel Bergmann)

The initiation of colour-marking has involved an increased amount of time in bird capture and ring-reading, especially at the key spring staging study site, Alftanes, but increasingly at sites further north. These efforts, assisted by a solid 'home-grown' cannon-netting team and supplemented every spring by migratory goose-catchers from more southerly latitudes, have complemented the great work now being conducted in respect to marking and ring-reading elsewhere. To date, we have marked 818 individuals, all but 65 at Alftanes and Seltjarnarnes. More marked individuals, and more ring-readers, have resulted in a steady growth in observations, now numbering around 17,000 (including over 5,000 in spring 2007 alone).

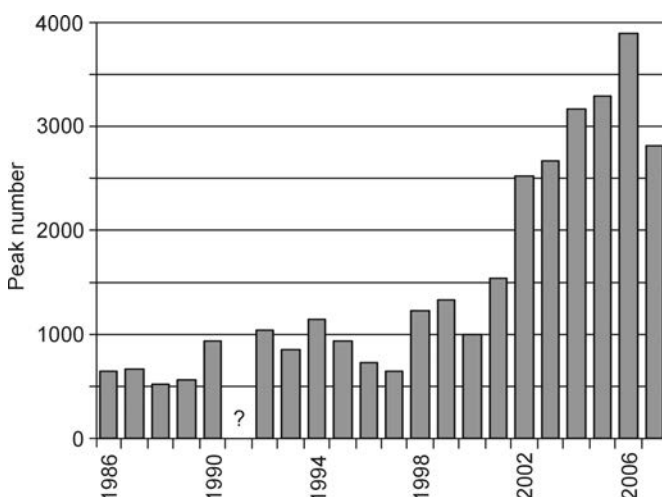


Figure 2. Peak numbers of ECHA Light-bellied Brent Geese at Alftanes during spring, 1986-2007.

The importance of western Iceland staging sites, especially in spring seems clear, providing a crucial refuelling stopover for the onward migration and probably subsequent breeding investment. The first geese arrive at the end of March and regular monitoring of numbers since 2001 shows that the first arrival dates seem to have become earlier by two weeks since the 1990s, although peak numbers are reached at similar dates as before. In the last decade, peak numbers at Alftanes have increased by 300% (Figure 2); measured in goosedays the increase is even greater, due to prolonged stopover. The focus

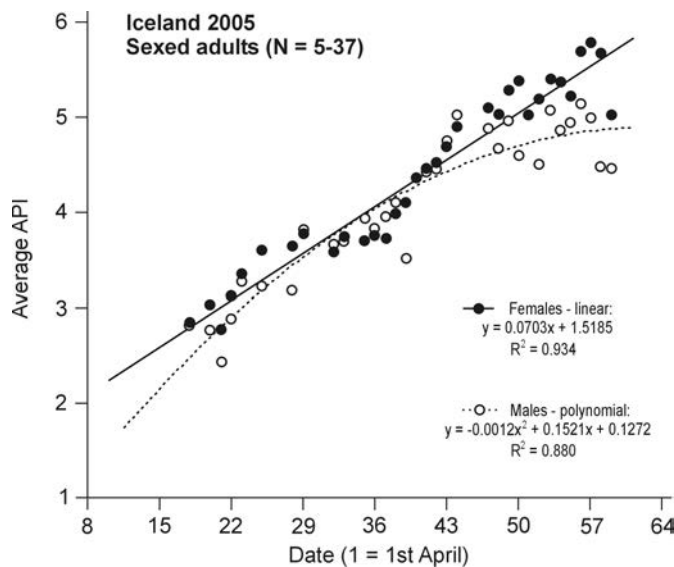


Figure 3. Abdominal profile scores of male and female ECHA Light-bellied Brent Geese during spring 2005 in Iceland.

of our studies relates to the timing and duration of staging, the determinants of body condition changes and its role in reproductive success. Recent work has focussed on the relationships between mass/body condition and diet. Our intensive scoring of indices of body condition (in the last three spring seasons, up to half of the observed colour-ringed individuals have had their abdominal profile scored) reveals interesting rates of growth and sex-related differences (Figure 3). Ongoing work is examining dietary choice and behaviour, in an attempt to understand individual variation in rates of mass gain.

Come the end of May, the vast majority of geese head west across the Greenland ice-cap bound for the breeding grounds in the archipelago of the Queen Elizabeth Islands. The first birds (probably non- or failed-breeders) return in late August and numbers peak at the two main *Zostera* resorts of Alftarós/Myrar and Alftafjörður/Snaefellsnes in mid-September, heading south to Ireland from late September onwards.

Gudmundur Gudmundsson

## Light-bellied Brent Geese crossing 'borders' – but how many?

As readers of *GooseNews* will be aware, more than 1,000 Light-bellied Brent Geese from the so-called East Canadian High Arctic population (hereafter ECHA Brent Geese) have been captured and colour-ringed in recent years. In addition, from 1991 to 1998 Steve Percival caught and ringed 332 Light-bellied Brent Geese from the East Atlantic population (hereafter EA Brent Geese) at Lindisfarne, Northumberland, while another 150 birds from this population have been ringed by Danish researchers in Denmark and Svalbard from 1989 to 2006.

The common understanding of these birds' movements and population delimitation is shown in Figure 4. ECHA Brent Geese breed in high Arctic Canada and migrate via west Greenland and Iceland to wintering areas mainly in Ireland. Small flocks are also seen on passage on the Hebrides, and some small flocks continue further south to winter in Wales, on the Channel Islands, in Normandy in France, and in Galicia, northwest Spain. The EA Brent Geese breed in Northeast Greenland, on Svalbard and in small numbers on Franz Josefs Land, and migrate non-stop to wintering areas at Lindisfarne and in Denmark. Small flocks may be seen on passage in eastern Scotland, and during severe continental winters flocks flee from Denmark to the Netherlands, eastern England and eastern Scotland. This general picture has been confirmed by matching counts of Light-bellied Brent Goose flocks and resightings of marked individuals.

But how many birds cross these apparent borders between two populations of look-alikes? This intriguing question has arisen the past few years, due to the fact that two different birds caught in Iceland were resighted in Denmark in springs 2006 and 2007, respectively; two birds ringed in Lindisfarne have been observed in Ireland, one of them also on Iceland; three

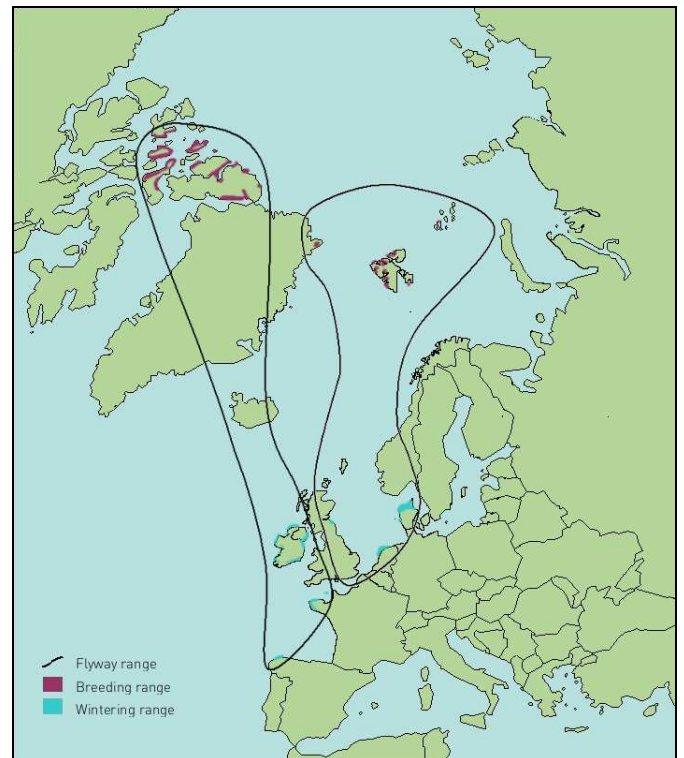


Figure 4. Current understanding of flyway delimitation of the two populations of Light-bellied Brent Goose wintering in Europe.

birds caught in Denmark in 2001 and 2006 have been observed in Ireland; and two birds ringed in the Canadian Arctic have been observed at Lindisfarne in 1975 and 1990-91. One might think – only a few birds and so what? The interesting thing is that with a tiny resighting effort in the East Atlantic flyway during the past two years, two out of 77 resighted birds were



from the other population! – and one must also remember that for every marked bird moving across borders several unringed ones must have moved as well. Both populations have held somewhere between 1% and 5% marked individuals for several years now and, assuming survival rates for EA Brent Geese are comparable for the ECHA population, one ringed bird might therefore have represented somewhere between 25 and 75 unringed birds in those seasons when we have seen individuals moving from one population to the other.

The magnitude of these movements can only be properly quantified by using sophisticated capture-recapture analysis in combination with DNA studies. A prerequisite for the first part is that captures are undertaken and intensive resighting work takes place in both populations at the same time. Unfortunately, this has not been the case so far (Figure 5). Mich  l O'Bri  n and co-workers worked intensively with ECHA Brent Geese in the Canadian Arctic and Irish wintering range during the mid-late 1980s. Steve Percival, Preben Clausen, Jesper Madsen and their co-workers worked intensively with EA Brent Geese in Lindisfarne, Denmark and Svalbard, respectively, during 1989-2001. Then since 2000, Kendrew Colhoun, Gudmundur Gudmundsson, Kerry Mackie, Graham McElwaine and James Robinson, assisted by Robin Ward and Alyn Walsh behind the cannon nets, and lots of volunteer observers behind telescopes, revived work on ECHA Brent Geese in Ireland, Iceland and the Canadian Arctic.

With this note we hope to have opened eyes for a challenging nut to crack – the Irish/Icelandic ECHA team intend to

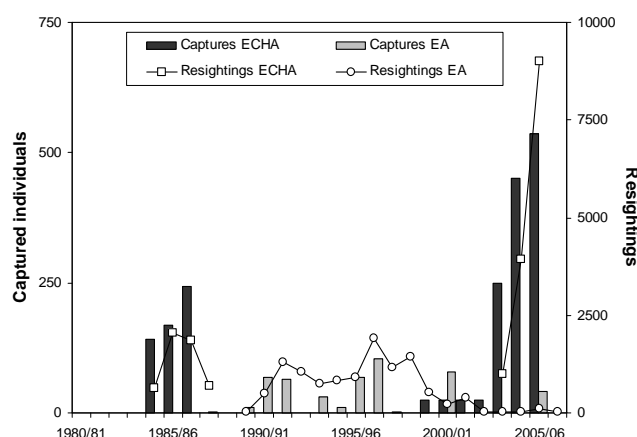


Figure 5. Illustration of the mis-matching capture-resighting efforts in the ECHA and EA flyway populations of Light-bellied Brent Geese. Columns show the number of newly captured individuals and lines show the total number of resightings of these individuals, compiled per wintering season for each flyway. Data for 2006/07 not included.

continue working for a number of years yet, and hopefully the English/Danish team can use this little appetizer and other arguments to revive work at Lindisfarne and in Denmark. And of course, we hope all those volunteers running around counting Light-bellied Brent Geese will remember that nowadays they can hardly avoid finding a ringed bird or two whenever they see a flock of just 50+ birds. So, keep your eyes open and let us know of your findings. With thanks to co-workers Kendrew Colhoun, Gudmundur A. Gudmundsson, Graham McElwaine and Steve M. Percival.

Preben Clausen

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## Identifying the winter roosting sites and feeding habits of the Svalbard Barnacle Goose on the Solway Firth, UK, through the use of GPS telemetry

Following the success of the pilot satellite-tracking project in spring 2006 in helping to identify the sites used by Barnacle Geese during the pre-breeding period, a larger and more ambitious study was undertaken on the Solway Firth in winter 2006/07. The focus of this study was to define the roost sites used by the birds whilst on their wintering grounds and to 'roll-out' the model developed during the initial project, by involving as many school pupils as possible, from both the English and Scottish sides of the Solway, in championing and naming the geese and taking an active interest in their fate. Due to grants from the Heritage Lottery Fund's 'Awards for All', Solway Coast Area of Outstanding Natural Beauty Sustainable Development Fund and Scottish Natural Heritage, and a

generous donation from J & J R Wilson Trust, we were able to deploy nine solar-powered ARGOS GPS transmitters onto the geese. This meant that during the course of the winter we were able to map the detailed positions of the roosts used by these birds, as well as the fields and saltmarshes they visited for feeding at two-hourly intervals from dawn to dusk throughout the entire winter. The transmitter on 'Sir Peter' from the previous study (see *GooseNews* 5:16) was still functioning, giving a tenth individual to follow, but 'Magnar's' tag ceased to function during the winter, although the bird was seen fit and well with his mate and tag in place throughout the winter and during migration on Helgeland, Norway, in May. The technology of the solar-powered tags was plainly being pushed

to its limits at the latitude of the Solway, and during the bad mid-winter weather in December and January the two 30 g and 45 g tags deployed at the beginning of November struggled to get enough charge to provide good quality GPS fixes. The 45 g tag had been used as an insurance against such a problem, but even that vanished from our screens for a period. With the increasing light levels of February and March the remainder of the tags were deployed, spread across three sites on the north side of the Solway.

Over the course of the winter, the birds behaved very differently and their individual characters became very apparent. For a start, as was known from the huge numbers of rings that have been read in the past, birds caught in the Caerlaverock area remained separate from those in the Southernness area and vice versa, even though some of the Caerlaverock birds made brief visits to Cumbrian saltmarshes and we were thus able to identify the roost sites used in those areas. Also, as was suspected from the limited number of rings collected at the very western fringe of the distribution, the bird caught and tracked from the area to the west of RSPB Mersehead nearer Auchencairn was actually a Mersehead bird. After the catch, he continued to feed for the rest of the winter alongside the two geese caught and tagged at Mersehead, the geese probably only spread westwards as food resources were depleted in mid-winter. These three birds had noticeably smaller home ranges than the Caerlaverock birds, which utilised pastures and merseland up the river Nith towards Dumfries and in areas further east along the coast towards Annan. The winter movements of the Caerlaverock birds to different areas of the Solway meant that the project probably identified and delineated over 90% of the mudbanks and sandflats used for roosting. Preliminary analysis of the data showed that almost all of the roosts tend to be within one or two kilometres of the shore and revealed the hitherto unknown behaviour of birds making intention movements the night before they move to a new feeding area, a new area of the Solway or before beginning their migration. The geese tend to shift their roost in the direction of where they will be feeding the next day or in the direction of where they will be migrating to.

All geese visited Rockcliffe Marsh at the eastern end of the Solway prior to final departure, except for one that chose instead to depart directly from the saltmarsh at the eastern end of WWT Caerlaverock and take a more northerly route out of the UK.

The first of the tagged birds to begin the spring migration to Norway left the Solway earlier than expected with a wave of migrants on the evening of 18th April. The final tagged bird (plus three others) left Rockcliffe exactly one month later, on the evening of 18th May, during a very stormy period (in which one of the three was lost), only to return (from Kielder Water, Northumberland) to leave again on the evening of 21st May having aborted this initial attempt. The geese stopped between two and 26 days at the traditional staging grounds of Helgeland, with one first stopping on islands further south nearer Trondheim for 15 days before moving on to Helgeland. Only one of the tagged birds visited the other well known stopover site in the Lofoten Islands and Vesterålen area, where it remained for three days. The birds left on the final leg of their

migration to Svalbard on dates ranging from 14th-26th May. During migration, speeds of between 50-80 kph (~30-50 mph) were commonly recorded, with three birds achieving speeds greater than 127 kph (~80 mph), one apparently sustaining this for at least six hours, thus possibly crossing the North Sea in just five hours. Migration heights were generally just above sea level and less than 200 m, although one bird reached 680 m (~2,200 feet) when crossing to Norway.

Although the routes taken north by the birds along the coast of Norway were very similar, they soon diverged on encountering the cross-winds when moving out across the Barents/Norwegian Sea. On arrival in Spitsbergen, the tracks of the remaining eight birds again converged on the site just to the north of Hornsund, on the coastal plain just to the east of Dunøyane, thus highlighting, as in the previous study, the importance of this area to pre-breeding geese, regardless of their final destination within Svalbard.



Barnacle Geese (including bird fitted with satellite transmitter top left) (Keith Kirk)

By the end of May, six of the eight geese had settled down to breed – the long-running ‘Sir Peter’ choosing exactly the same cliff as before, and stopping off at very similar sites *en route* on the same dates as last year. Another bird chose a cliff site, while four settled on offshore islands. The two birds which, from observations, appeared to be unpaired in the run-up to the breeding season, continued to move over larger areas. At the beginning of July, some of the birds thought to have made a nesting attempt were showing signs of breeding success, with the tags again registering significant movement after a month of stasis.

The detailed stories of the spring migration, often well covered in the media for the likes of ‘Godzilla’ and ‘Barbow’, can be read online at [www.wwt.org.uk/barnacle](http://www.wwt.org.uk/barnacle), and we hope that these continue throughout the summer and into the autumn migratory period.

**Larry Griffin**

## Breeding success of Whooper and Bewick's Swans in 2006

Annual age assessments conducted by a network of observers in Britain and Ireland have shown that 2006 was a poor breeding year for both the Iceland population of Whooper Swan and the Northwest European population of Bewick's Swan.

Assessments of Whooper Swan flocks during the 2006/07 winter found an overall proportion of young of 12.5%, and a mean brood size of 2.4 cygnets per successful pair (Table 1). This poor breeding success may perhaps be partly attributed to there being a higher proportion of non-breeding sub-adults in the population, following the relatively successful breeding season in 2004. Moreover, unseasonably cold temperatures and snow on Icelandic breeding grounds during May are likely to have reduced the swans' breeding success in 2006, particularly in eastern locations which suffered the worst weather.

The distribution of families was more consistent between regions in winter 2006/07 than in the three preceding winters. Regional variation was still evident however, with higher proportions of young recorded in regions in the Northwest (17.3 % in Northwest England, 14.1 % in Southwest Scotland and 14.0 % in Northern Ireland) than in the Southeast (11.8 % in East Central England), reflecting the likely preference of Whooper Swan families for sites closest to their Icelandic breeding grounds. Such regional variation confirms the need for comprehensive collection of data across the wintering range for providing an accurate estimate of the population's breeding success.

The percentage of juveniles in the wintering flocks was particularly low in the Republic of Ireland (10.6%). It should be noted, however, that counts were conducted in October, and since non-breeding birds and failed breeders tend to migrate earlier than family parties, the low proportion of young recorded in the Republic of Ireland may be due to the data

being collected relatively early. Nevertheless, breeding success was still lower than average overall when data from the Republic of Ireland were excluded (13.9% young).

Breeding success for Bewick's Swan was also low in 2006, with 10.3% young and a mean brood size per successful pair of 1.9 cygnets (Table 1). A similar level of breeding success was recorded by counters in the Netherlands, where 10.2% of 5,473 birds aged in November were cygnets. The low proportion of young in both countries (10.3%) suggests that 2006 was a poor breeding year for the Northwest European population as a whole, as well as those wintering in Britain. However, exceptionally mild temperatures in Northwest Europe during the 2006/07 winter may have resulted in reduced movement of families from Germany (from where productivity data were not collected) to Britain and the Netherlands.

There was some regional variation in the distribution of Bewick's Swan families recorded in different parts of England. A particularly low proportion of young (9.5%) was recorded in East Central England, on the Ouse Washes, where a large proportion of the population occurs. The highest proportion of young was found in the Southwest (14.7% at WWT Slimbridge), but this was also lower than usual at the site. Higher breeding success by Bewick's Swans wintering at Slimbridge may perhaps be partly attributable to the regular supplies of grain received by the birds, and the relative protection from disturbance at the site. However, research has shown that smaller flocks, such as those recorded at Slimbridge, comprise higher proportions of young than do larger flocks, which may also explain this trend.

More information is available from <http://www.wwt.org.uk/research/monitoring>

**Julia Newth & Eileen Rees**

Table 1. The proportion of young and mean brood size of Whooper and Bewick's Swans recorded during the 2005/06 winter.

Region	Whooper Swan		Bewick's Swan	
	% young	Mean brood size	% young	Mean brood size
Northwest England	17.3	2.9	14.3	2.8
East Central England	11.8	2.3	9.5	1.7
Southwest England			14.7	2.1
Southwest Scotland	14.1	2.9		
North & Central Scotland	13.2	2.6		
Northern Ireland	14.0	1.8		
Republic of Ireland	10.6	2.3		
Total	12.5	2.4	10.3	1.9



## The Icelandic-breeding Goose Census 2006

The abundance, distribution and breeding success of Greenland/Iceland Pink-footed Geese and Iceland Greylag Geese were monitored during autumn/winter 2006. Many thanks go to everyone in the IGC network for their ongoing support. In addition to the two usual counts undertaken in October and November, a third count was also successfully conducted as the second of a three year trial to re-assess the most suitable time for a complete census of Iceland Greylag Goose. After the final count in December 2007 we will undertake this assessment so that two coordinated counts are carried out from 2008. Coverage in Britain and Ireland was 32.1% lower than in previous years, and data were not received for a number of key sites in Britain. Estimates in Iceland were determined by an aerial survey of the south and coordinated ground counts throughout the rest of the country in November 2006. Weather conditions were generally considered favourable during the counts.

The 2006 census saw low numbers of both species recorded, with peak counts of 203,168 Pink-footed Geese and 80,042 Greylag Geese in November. Once adjustments for the presence of birds from the Re-established or Northwest Scotland Greylag Goose populations were made, as well as the inclusion of estimated counts for key sites not counted, population estimates of 229,123 Pink-footed Geese and 82,339 Greylag Geese were derived (Figure 6).

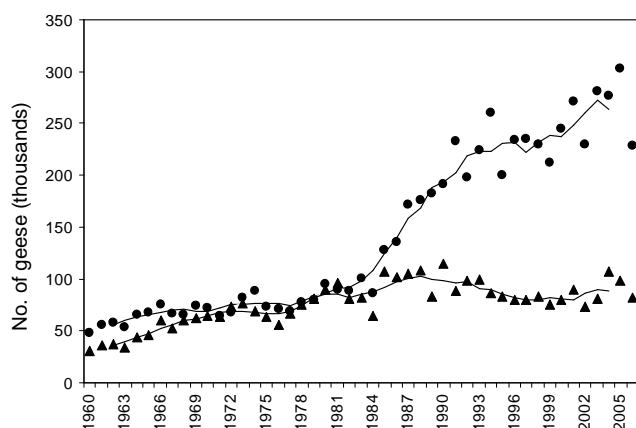


Figure 6. Population estimates for Pink-footed Goose (circles) and Iceland Greylag Goose (triangles), 1960 to 2006. The 5-year running means (e.g. mean for 2004 is from population estimates for 2002-06) are shown as lines.

Both estimates were lower than those calculated for 2005, representing decreases of 24.3% for Pink-footed Goose and 16.2% for Greylag Goose. The population estimate of Pink-footed Goose was the lowest recorded since 1999 (212,493). Following the high numbers of Greylag Geese found in 2004 and 2005, the estimate returned to a similar level as that recorded in the years prior to 2004 (mean 1999-2003: 80,013,  $\pm$  2815.8 s.e.). However, it is highly likely that both of these counts, particularly that for Pink-footed Goose, are underestimates of true population size. The arrival of Pinkfeet into Britain during the autumn was delayed by unfavourable weather conditions (strong to gale force northerly winds were

recorded for a prolonged period in late October, explaining the low October count, and extensive flooding in many areas is likely to have resulted in greater than usual dispersal of geese during November and December. Of particular note were the low counts made at the key arrival site, Loch of Strathbeg (c.10% of the typical number), and whilst some of these birds were located elsewhere (at nearby roosts not often used), this only accounted for less than half of the typical autumn count at Loch of Strathbeg. The importance of North Scotland for Greylag Geese is also apparent from the 2006 census, although there were noticeably lower numbers at key sites such as Loch of Skene and Loch Eye, and it would appear that the redistribution northwards is now affecting numbers key sites in the Moray Basin.

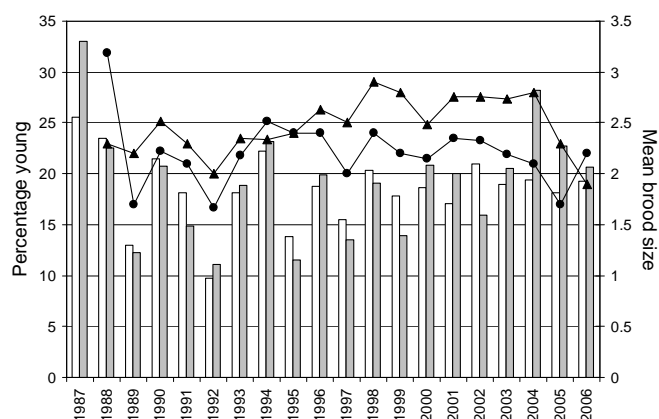


Figure 7. The percentage of young (columns: white = Pink-footed Goose, grey = Greylag Goose) and mean brood size (lines: dots = Pink-footed Goose, triangles = Greylag Goose) of Icelandic-breeding geese recorded in the UK, 1987/88 – 2006/07.

The breeding success of both Pink-footed Goose and Iceland Greylag Goose was higher than average in 2006 (Figure 7). The proportion of young in the Greylag Goose population has remained above 20.0% for the past four years. Compared with the previous year, the proportions of young were higher for both species in 2006, with increases of 12.3% for Greylag Goose and 6.2% for Pink-footed Goose. However, the mean brood size of successful pairs of Greylag Goose was low (1.9 goslings) and below that of the recent ten-year mean and the lowest recorded since 1975 (1.5 goslings). It should be noted, however, that the sample size was small at 12 families. Conversely, the mean brood size for Pink-footed Geese equalled that of the preceding ten year mean (2.2 goslings).

A future priority of the IGC is to address the few remaining gaps in coverage, including the development of regular coordinated counts in Iceland and Norway to ensure that estimates of population size are as accurate as possible, taking into account the increasingly later departures from Iceland.

The full report of the 2006 Icelandic-breeding Goose Census can be downloaded at [www.wwt.org.uk/research/monitoring/reports.asp](http://www.wwt.org.uk/research/monitoring/reports.asp).

Julia Newth

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## Breeding success of Dark-bellied Brent Geese in 2006

Following a successful breeding season in 2005, productivity data received from wintering sites in the UK indicate that 2006 was a poor breeding year for Dark-bellied Brent Geese. A total of 86,581 geese was aged at 23 different estuaries or coastal sites along the English east and south coasts, from Northumberland to Devon. The highest numbers were aged at the North Norfolk Coast, the Thames Estuary and Chichester Harbour.

The overall proportion of young was 2.1%, varying only slightly throughout the winter between a peak of 2.5% in October and 1.9% in March, with the lowest in December (1.6%). Intertidal habitats supported the highest proportion of young (2.38%), followed by grass (2.23%) and cereals (1.90%). Notably fewer broods were observed compared with 2005, reflecting the poor breeding success, with nearly 30% of flocks containing no young. The mean brood size per successful pair was 1.62 ( $\pm$  0.04 s.e.). Over 60% of the flocks assessed held less than 2% young, with 27% containing 2-5% and considerably fewer flocks holding over 5% juveniles. Preliminary information from other wintering areas in western Europe also suggest a poor breeding year, indicating that the whole population experienced low productivity, with approximately 1% first-winter birds.

The poor breeding success in 2006 was to be expected – reports from monitoring stations in the Arctic indicated that lemmings were rare or absent from the breeding grounds, which is consistent with the three-year cycle of abundance that causes good, poor and variable breeding success in geese. Since

the mid 1990s, however, the pattern of breeding success has shifted away from a predictable three-year cycle and, although the last two years have seen a poor breeding season follow a notable peak in breeding success, it is still unclear whether this indicates a return to a regular cycle in Dark-bellied Brent Goose breeding success.

The population of Dark-bellied Brent Geese has declined, both nationally and internationally, by approximately 30% since the early 1990s, mostly due to poor breeding success. This has led to the species being listed as 'Vulnerable', according to European Red List criteria, by BirdLife International. Whilst the excellent breeding season in 2005 is very encouraging, it is unlikely that this alone will have any significant effect on the population trend or status. An increase in the frequency of good breeding seasons, where the percentage of young birds is greater than mortality (approximately 15%), is needed for this to occur.

As always, our thanks go to the network of experienced fieldworkers who undertook the age assessments of Dark-bellied Brent Geese for the twenty-second consecutive winter. We are extremely grateful for their help, advice and continuing support.

The full report can be downloaded from [www.wwt.org.uk/research/monitoring/reports.asp](http://www.wwt.org.uk/research/monitoring/reports.asp).

**Colette Hall**

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## International Dark-bellied Brent Goose Census

A coordinated census of Dark-bellied Brent Geese takes place each year in late April/early May in the Netherlands, Germany and Denmark. At this time of year the majority of the population is gathered in localised areas, mainly around the Wadden Sea (the main spring staging area), making it easier to undertake a more accurate assessment of numbers than when the geese are more widely distributed throughout their wintering range.

Although only a small number of Dark-bellied Brent Geese remain in Britain in spring, it is important to include these birds when undertaking an assessment of population size in order to gain the best possible understanding of overall numbers and distribution. Furthermore, spring numbers in Britain have increased in recent years, meaning that a greater, and thus more important, proportion of the population is now present here at that time. WWT has, therefore, for the last three years, organised a spring census of Dark-bellied Brent Geese in Britain that is coordinated with the counts elsewhere.

In 2005, counts were received from three estuaries: a total of 828 geese was counted with the Stour Estuary holding the highest number (813). This does not, however, include counts

from the Wash, where the largest number of Dark-bellied Brent Geese is found in the spring. Counts were received from 10 sites in 2006: a total of 10,864 birds was recorded with the highest numbers at the Wash (8,921) and the Stour Estuary (1,488). At the time of writing, data have been received from eight sites for the 2007 census, totalling 3,194 geese.

Results from the continent have not yet been collated and therefore we are unable to show what proportion of the census total was within Britain. However, the British total in 2006 was 5% of the current population estimate for Dark-bellied Brent Goose, highlighting the importance of including Britain in the International Census and the need for coordinated counts in spring to continue so that as complete a picture as possible is gained of the spring distribution and abundance of this declining population.

We would like to take this opportunity to thank all those who contributed to the census in the past three years, and inform you that a more comprehensive report will be available later in the year.

**Colette Hall**

## Latest monitoring of Northwest Scotland Greylag Geese

Annual monitoring of Northwest Scotland Greylag Geese is not possible in many areas due to the remoteness of much of its range. However, annual counts and productivity assessments are conducted in some key areas, namely the Outer Hebrides and on the Inner Hebridean islands of Coll and Tiree. Counts in late August or early September show that the number of birds in these locations has steadily increased since the mid-1980s (Outer Hebrides) and mid-1990s (Tiree), although in recent years there has been a pronounced decrease in the number counted in the Outer Hebrides.

In 2006, a total of 4,166 Greylag Geese was counted on the Uists, a decrease of 10.3% on the previous year (Figure 8). On Tiree, an island-wide census on 28/29 August 2006 produced the highest ever count of 4,005 birds, including goslings. This represents an increase of 14.1% on the August census in 2005 and continues the steady increase (at an average annual rate of 7.5% p.a.) in number over the past ten years.

A total of 3,427 Northwest Scotland Greylag Geese was aged on Coll and Tiree on 28/29 August 2006, and brood sizes were collected for 296 broods on Tiree. The percentage of young birds in the post-breeding August count was 31.2% – just above the average for the previous five years (mean 2001-2005: 27.4  $\pm$  4.63 s.e.) (Figure 9). The mean brood size was also just above average for the previous five years at 2.8 goslings per successful pair (mean 2001-2005: 2.6  $\pm$  0.16 s.e.).

Productivity data were also collected from the Outer Hebrides in 2006, the first such data from there for a number of years. A total of 769 birds in 10 flocks was aged between 23rd and 31 August 2006 (four flocks totalling 423 birds on North Uist, five flocks totalling 226 birds on South Uist, and one flock of 120 birds on Benbecula), with the overall proportion of young being 32.8%.

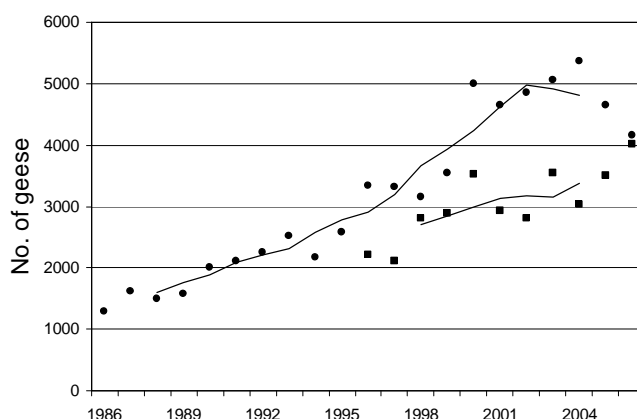


Figure 8. Peak counts of Northwest Scotland Greylag Geese recorded in late August/early September on the Uists, Outer Hebrides (circles) and on Tiree, Inner Hebrides (squares), 1986/87 to 2006/07. The five-year running means (e.g. mean for August 2002 is from counts for August 2000-2004) are shown as lines.

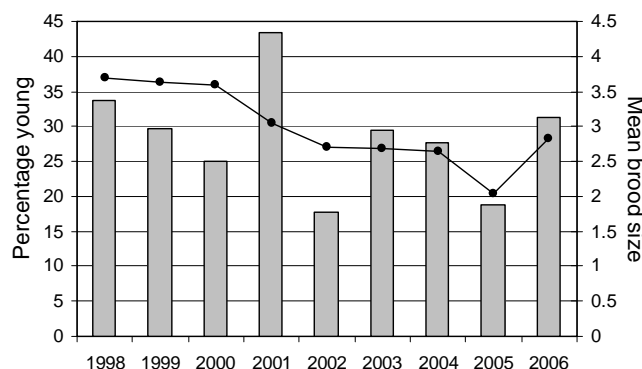


Figure 9. The mean percentage of young (columns) and mean brood size (dots) of Northwest Scotland Greylag Geese on Coll and Tiree, 1998 to 2006. Data for 1998 to 2000 from Bowler *et al.* (2005).

Roderick MacDonald & John Bowler

## Breeding success of European White-fronted Geese in 2006

Following an exceptionally good breeding season in 2005, the breeding success of European White-fronted Geese in 2006 was among the lowest recorded in the preceding ten years, although it should be noted that prior to 2004/05, estimates of annual productivity were only routinely conducted at WWT Slimbridge, Gloucestershire. However, this was to be expected in a year of low lemming abundance in the Arctic breeding areas (see <http://www.arcticbirds.ru/>). Overall, the percentage of young in winter flocks was 16.3% ( $n=1,072$ ), and the mean

brood size per successful pair was 1.9 goslings ( $n=49$ ), with brood sizes ranging from 1-5 goslings (Table 2).

Data from WWT Slimbridge allow trends in breeding parameters to be assessed. During the previous 10-year period (1996/97-2005/06), the mean proportion of young birds recorded there was 21.1% ( $\pm 2.3$  s.e.), and the mean brood size was 2.7 ( $\pm 0.2$  s.e.).

Julia Newth

Table 2. The proportion of young and mean brood size of European White-fronted Geese in the UK during winter 2006/07.

Region	No. sites	Total aged	% young	No. broods	Mean brood size
Gloucestershire	1	313	14.7	15	2.2
Norfolk	2	474	17.9	34	1.7
Suffolk	1	285	15.4	0	-
Total	4	1,210	16.7	49	1.9



## Latest Greenland White-fronted Goose census results

The winter of 2005/06 saw the 24th complete census of all known Greenland White-fronted Goose wintering haunts in Britain and, pleasingly, the result was a very modest increase in the total numbers, with 14,287 found in spring 2006 compared with 14,030 in the previous season (Figure 10). After the dramatic 26% fall in numbers on Islay last spring, it was at least cheering to report that the counts showed little change there over the previous year. However, in contrast, the spring counts from Wexford (7,892) and elsewhere in Ireland (2,716) coordinated by National Parks and Wildlife (courtesy of Alyn Walsh) showed continued reductions and together these provided a global population estimate for spring 2006 of 24,895, the lowest spring count since 1988.

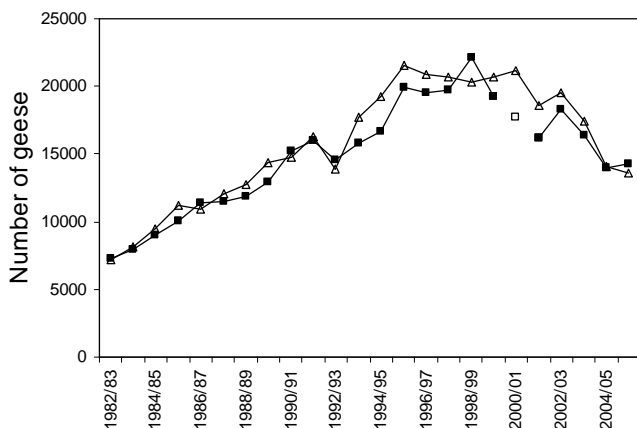


Figure 10. Counts of Greenland White-fronted Geese in Britain, 1982/1983 to 2005/2006, showing autumn (open triangles) and spring (filled squares) counts for each season. Note: the value for spring 2001 (open square) is an estimate based on the average of the adjacent years, on account of the outbreak of Foot and Mouth Disease that year.

The continued overall decrease was again due to breeding success that was well below the average for the last 15 years – 8.6% young were found in a sample of 8,120 aged birds (Figure 11), which is half of the long-term average since 1960 (although very slightly up on 7.8% last year). Such consistently low production over the last five years is having a serious effect, as numbers of young birds fall well below those needed to replace annual losses. The majority of wintering sites again failed to reach 10% young in the flocks, with 8.9% young on Islay (compared with 13.5% average during 1982-2004, and 8.1% last year) and 8.2% in the rest of Britain (compared with 13.3%

average during 1982-2004, and 7.5% last year). Mean brood size was 3.1 young per successful pair, based on 114 families sampled from a restricted number of sites. The average values were 3.6 on Islay (little change from last year, but again higher than the 1982-2002 average, 3.3) and 2.6 elsewhere (slightly down from last season).

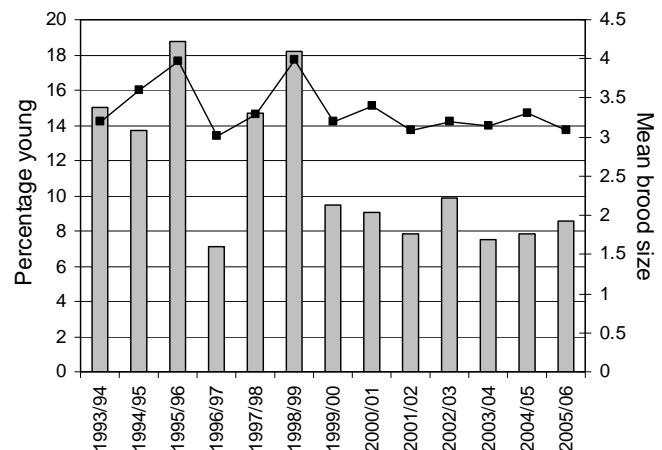


Figure 11. The mean percentage of young (columns) and mean brood size (squares) of Greenland White-fronted Geese in Britain, 1993/94 to 2005/06.

The overall trend for poor reproductive performance in recent years therefore continued in 2005, but despite this there was generally little change in the overall numbers in 2005/06 compared with the previous winter. This last winter (2006/07) marked the quarter century of coordinated counts of the population, and will have followed the first autumn when hunting in Iceland did not occur under the change in legislation there. The counts are currently (as of mid June 2007) coming in from the count network, and disappointingly it would appear that despite the fact that we would expect an additional 3000+ in the population after the cessation of shooting in Iceland, there is no clear sign of such a recovery in numbers. Reproductive success was again low, but of course we must await the final results from around the resorts before we start to draw any conclusions.

Tony Fox

## Low numbers of Taiga Bean Geese in 2006/07

The numbers of Taiga Bean Geese at the two key sites in the UK were low during 2006/07. This is perhaps a reflection of the particularly mild temperatures, and which also apparently affected the numbers of other migratory waterbirds from the east that were present in the UK, e.g. European White-fronted Geese and Bewick's Swans. A peak count of 255 was recorded at the Slamannan Plateau, Falkirk, a decrease of 45 on the record count of 300 in 2005/06, and the first large decrease

there since 1991/92. The peak of 111 at the Yare Valley, Norfolk, is also a decrease on the previous year, and the lowest recorded there since 1977/78, reflecting the steady decline in numbers at the site since the mid-1990s.

The breeding success again appeared typical for an *Anser* goose. Approximately half of the Slamannan flock was aged in late October, and the proportion of first-winter birds was estimated

at 18.2% (n=121). The size of six broods was also recorded, with a mean of 2.2 ( $\pm 0.47$  s.e.) young per successful pair. No productivity data were again collected at the Yare Valley as too few birds had arrived within the period when it is possible to confidently identify first-winter geese.

Many thanks to Angus Maciver (Slamannan/Bean Goose Action Group) and Chris Hudson (Yare Marshes/RSPB Strumpshaw) for the information presented in this article.

**Richard Hearn**

## Svalbard Barnacle Goose monitoring

Unlike last winter, Barnacle Goose arrival on the Solway in autumn 2006 was more typical, with 22,680 recorded on 11 October 2006 and almost the whole population present by the end of that month (Figure 12). A total of 20 coordinated counts were carried out across the whole of the Inner Solway Estuary between 4 October and 15 May 2007, producing a population estimate of 25,000. This is an increase of almost 5% on the adopted population estimate for 2005/06 (23,900).

Between 25 September 2006 and 8 March 2007, a total of 7,043 Barnacle Geese was aged by a single observer at WWT Caerlaverock. The overall proportion of young present in these flocks was 14.6% (Figure 12), ranging from 5.7% to 25.0% within individual flocks. This is the highest percentage of young since 1998, and is well above the current 10-year mean (8.9%  $\pm 1.78$  s.e.), thus representing a good breeding season. Brood size was recorded for a total of 111 families, and the mean brood size per successful pair was 2.2 goslings, with brood sizes ranging from 1-5 goslings. This is slightly lower than in the previous year, but still higher than the mean for the most recent 10-year period (1997-2006; 1.81,  $\pm 0.11$  s.e.).

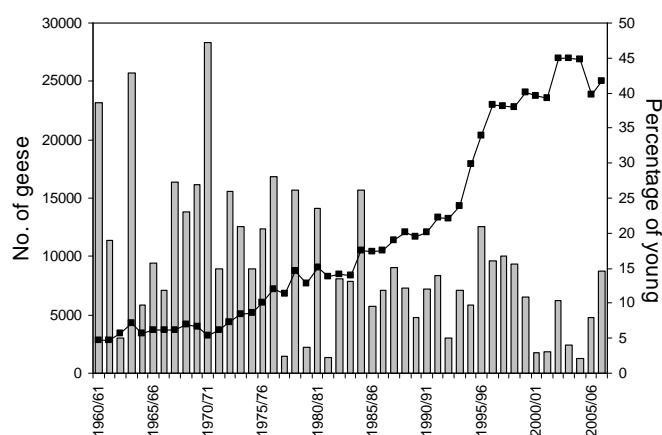


Figure 12. The population size (dots) and proportion of young (columns) of Svalbard Barnacle Geese, 1960/61 – 2006/07.

**Larry Griffin**

## Continued increases in Greenland Barnacle Geese

Monitoring of Greenland Barnacle Geese at key sites in Argyll, Western Isles and Orkney during 2006/07 indicates a continued increase in the size of Scottish wintering numbers. Although not coordinated, combined counts from February and March on Islay and at other sites in Argyll, on the Uists, and at South Walls, Orkney, totalled 66,087 (Figure 13). This exceeds the current population estimate (56,400, based on the last complete census in spring 2003) by 17%, and strongly suggests that the next coordinated international census in spring 2008 will reveal another large increase has occurred over the past five years. In particular, numbers on Islay continue to undergo sustained increase, with a 63% rise since the last complete census in 2003.

No productivity data are yet available for 2006/07, but the results from 2005/06, which have yet to be reported, indicate that 2005 was a poor breeding season. Data were collected on Islay and Tiree, where the greatest numbers occur during the winter months (during the last complete census of the population in spring 2003, 82.5% of the Scottish total occurred at these two sites – 77% on Islay and 5.5% on Tiree).

In total, 15,852 birds were aged on Islay (approximately 37% of the early winter total) and 1,850 were aged on Tiree (approximately 34% of the early winter total). The percentage of young in flocks on Islay varied between 3.0% and 9.7%, with

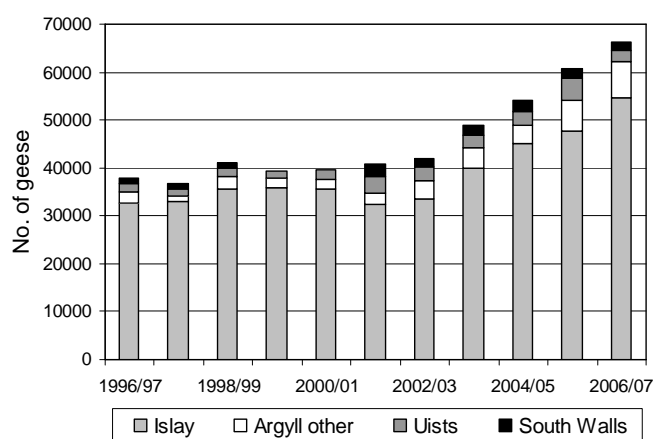


Figure 13. Numbers of Greenland Barnacle Geese counted in Scotland, 1996/97-2006/07. (SNH and Uist Greylag Goose Management Committee data). Note: no data are available for South Walls in 1999/2000 and 2000/01.

a mean of 6.62%. On Tiree, the percentage of young birds was 5.07%, giving an overall estimate for the population of 6.56%. Although this is the third time in the last five years that the percentage of young has not exceeded 7%, it is below the most

recent 10-year mean (9.6%,  $\pm 1.1$  s.e.), and is also lower than any of the decadal means since monitoring began: 1961-70 14.7%  $\pm 2.3$  s.e., 1971-80 12.9%  $\pm 1.5$  s.e., 1981-90 12.1%  $\pm 1.3$  s.e., 1991-2000 8.3%  $\pm 1.0$  s.e. Brood size was assessed for a total of 389 families (367 on Islay and 22 on Tiree) and the overall mean was 1.75 goslings per successful pair. This is also below the current 10-year mean ( $2.1 \pm 0.08$  s.e.).

Further information on the International Greenland Barnacle Goose Census can be found on page 2. With thanks to Scottish Natural Heritage, the Uist Greylag Goose Management Committee, Malcolm Ogilvie and John Bowler for the data summarised here.

Richard Hearn

## Increases in East Canadian High Arctic Light-bellied Brent Geese may be slowing...

For the fifth consecutive year, comprehensive coverage of sites in Iceland, Ireland, and the UK that support this population was undertaken in October. Irish sites were counted from the ground, whilst Icelandic sites were covered using a combination of ground and aerial survey. Results were received from 14 sites in Ireland, as well as those in Iceland, and, with some data awaited, the total minimum number of birds counted was 28,940. The census count at the main autumn site, Strangford Lough, was 23,200, with a peak of 25,236 there later in the month. Other significant concentrations were at Lough Foyle (1,778), and Tralee Bay/Castlemaine Harbour (482). In Iceland, 3,269 birds were counted. With predicted numbers at sites where data remain outstanding it is likely that the population total was similar to the previous year at just over 30,000 individuals (Figure 14).

Breeding success was low in 2006. A total of 12,820 birds was aged at Strangford Lough and Lough Foyle during the international census, yielding an estimate of 1.96% juveniles. No brood size data were available at the time of writing.

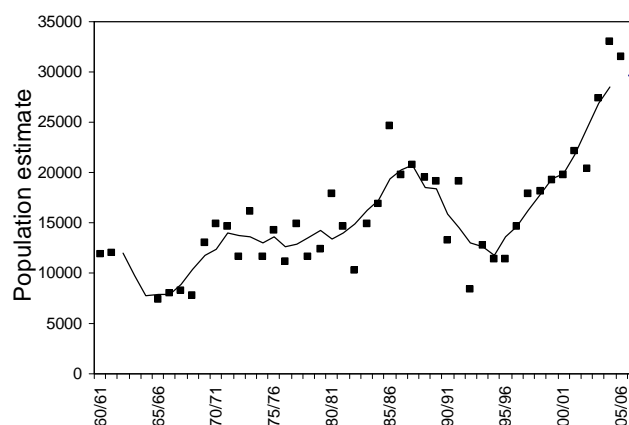


Figure 14. Population estimates of East Canadian High Arctic Light-bellied Brent Goose, 1960/61-2006/07. The five-year running mean (e.g. mean for 2002 is from population estimates for 2000-04) is shown as a line. The triangle indicates the provisional estimate for 2006/07.

Kendrew Colhoun

## Summer 2006 – worst ever breeding season for East Atlantic Light-bellied Brent Geese

Two different populations of the Light-bellied Brent Goose winter in the UK and Ireland. The least abundant of these is the so-called East Atlantic population, composed of birds breeding in northeast Greenland, on Svalbard, and in small numbers on Franz Josefs Land. After breeding, they fly non-stop to wintering sites on both sides of the North Sea – Lindisfarne in Northumberland and several sites in Jutland, Denmark. The population has been monitored regularly since the mid 1950s and annually since 1980. After a decline to 1,600-2,000 birds around 1970, the population has slowly but steadily recovered, and numbered around 6,600 at the turn of the Millennium.

In this note we give an update of the current status and recent productivity of the population. The population is – as are all European goose populations – subject to internationally coordinated counts each January. In addition, the population is counted together with Dark-bellied Brent Geese during another internationally coordinated count in May – but for the Light-bellied Brent Geese this count is only undertaken by Danish observers, as the whole population is to be found in northern Jutland at this time. Dedicated counts being carried out under WeBS and by the wardens at Lindisfarne National Nature

Reserve, in combination with counts from Denmark most years, also gives an opportunity to estimate the population size in October.

Breeding success is assessed in November-December in most years, when coordinated counts at Lindisfarne and in Denmark attempt to count and age as many birds as possible within one to two weeks. Ideally, these should exclude repetition, i.e. counting the same birds and families twice. In some years we can not fulfil the goal of covering both sides at the same time, especially if flocks decide to feed at sites too distant to view from the shore, but most years we are highly successful in ageing independent flocks, including somewhere between 1,000 and 3,000 birds – quite a nice sample from a population of only 6,000 birds!

Last winter, Steve Percival aged almost 600 birds on both of two occasions on Lindisfarne, in October and December 2006 – arriving at very different productivity estimates. This suggests that one sample was dominated by non-breeders and the other sample included some (albeit a few) successful breeding pairs. A weighted average of the two samples arrives at only 1.3%



goslings in a combined sample of 1,146 aged birds. Exactly the same proportion was estimated in a sample of 1,058 birds aged at two main wintering sites in Denmark in mid-January 2007. Hence, we found quite strong evidence that the Light-bellied Brent Geese had a very bad breeding season in the summer of 2006 – in fact the worst since monitoring started in autumn 1980 (Figure 15).

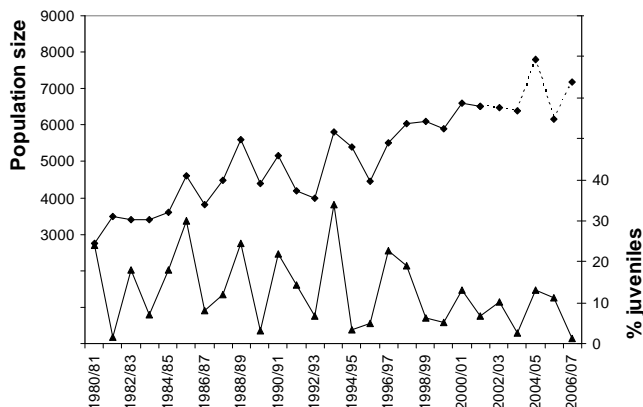


Figure 15. Population development and productivity of East Atlantic Light-bellied Brent Geese. Population counts for the past four years are stippled because results are still subject to further analysis (October counts have not yet been analysed), so these must be taken as preliminary results.

Had this poor breeding season just been a one-off there would be no reason to think further about it, but it is somewhat worrying that, in the past ten years, this small goose population has rarely produced sufficient goslings to replace adults dying in the course of the year. We know from previous crude survival estimates based on count data, as well as capture-recapture

analysis of ringed individuals, that on average 13% of the adults/yearlings die each year. Preliminary analysis of more recent data suggests that mortality has been even lower in more recent years, probably because we have experienced a run of very mild winters, but the population counts also suggest that mortality and recruitment have just balanced each other in recent years, and caused the population increase from the past to level off to near stability (Figure 15).

We know precisely why the Greenland segment failed to breed in 2006 because a Danish team of researchers visited Kilen, by far the most (if not the only) important breeding site in Greenland. Summer, literally, never came! When the team arrived on 11 July we found 90% snow cover and a covering of between 30 and 70 cm of snow in those areas known to be the main breeding and moulting areas from previous expeditions to the site in 1985 and 1998. The geese had arrived and been around in the area, and some had even tried to breed, but all nests discovered had been taken by Arctic Foxes and the geese that had arrived had abandoned the site by the time we got there. Such an experience, of course, explains why a part of the breeding population failed to reproduce in 2006, but gives no answer as to why the population overall, just as is the case with the Dark-bellied Brent Goose, has experienced a run of poor to bad breeding seasons in recent years without any real 'boom' years in between, as was the case before 2000. An obvious subject for future research!

With thanks to co-workers Tony Fox, Johnny Kahlert, Jens Peder Hounisen, Stefan Pihl, Steve M. Percival and Phil Davey.

**Preben Clausen**

## Recent successes with capture and marking

The capture and marking of geese and swans continued well during summer 2006 and winter 2006/07.

Trips to Arctic breeding grounds during summer 2006 were undertaken for a number of studies. A team from WWT and the Nenetskiy State Nature Reserve marked 125 Bewick's Swans in the Pechora Gulf, Russia, along with 20 Mute Swans and one Whooper Swan. Mute Swans have only recently started frequenting this area to moult, and these were the first to be caught there. WWT, in partnership with the Icelandic Institute of Natural History, Oli Einarsson and Sverrir Thorstensen, also marked 444 Whooper Swans at various locations in Iceland.

Large numbers of Whooper Swans were also captured in the UK during winter 2006/07 – a total of 397 (158 at WWT Caerlaverock and 239 at WWT Martin Mere). Seventeen Bewick's Swans were also caught at WWT Slimbridge.

During winter 2006/07, greater effort was expended trying to catch Svalbard Barnacle Geese from distinct parts of the Solway wintering range in order to fit satellite tags to different cohorts within the population, and thus map out their different roosting locations. Larry Griffin picks up the story: "Early attempts to

attract geese to grain were hampered by the relatively warm autumnal conditions and the abundant grass growth, followed by substantial flooding in mid winter. Even so, five successful catches were carried out in collaboration with the North Solway Ringing Group. The first was on 3 November 2006, when 24 geese were caught at Newfield Farm, immediately west of WWT Caerlaverock. Of these, two were controls and ten were juveniles, a feature of many of the catches this winter due to the better than average breeding season. One of the controls was ringed as a gosling in Spitsbergen in 1991. With the solar powered tags struggling to gain enough charge during the darkest midwinter period, the next catch was not carried out until 13 February 2007 at a new site being utilised by the geese – Gutcher's Isle, south of Dalbeattie and five miles west of Southernness. Unfortunately, due to a misfire, only two birds were caught and ringed. Luckily the male was the target weight for tag attachment and the female proved to be his mate. On 19 February, a catch of 29 was made at RSPB Mersehead, including one control and three juveniles. On 23 March, another catch of 73 was made at Newfield Farm, of which 26 were juveniles and five were controls, including three that had been caught previously on that farm. One of the other birds was an individual that had had a data logger fitted in Ny

Aalesund the previous summer. On 4 April 2007, the final catch of the season was again made at Newfield and of the 30 geese caught, 14 were juveniles and two were controls, including another fitted with a data logger. In total, 158 geese were caught in winter 2006/07, including 53 newly ringed goslings. Nine large males from these three distinct wintering areas on the north side of the Solway were fitted with either 30 g or 45 g solar powered ARGOS GPS tags and the progress of these birds can be followed at [www.wwt.org.uk/barnacle](http://www.wwt.org.uk/barnacle). One final catch of 17 birds was made on 5 May 2007 by Paul Shimmings and colleagues on the spring stopover site of Sør-Herøy, in Helgeland, northern Norway.

Two catches of Greenland Barnacle Geese were also made during 2006/07 – Steve Percival caught 65 on Islay in October, and Highland Ringing Group made a successful catch of 52 at Durness, Sutherland, in January 2007. Finally, Ivel Ringing Group, coordinated by Errol Newman, made another catch of feral Barnacle Geese at Roxton, Bedfordshire, on 15 July 2007. A total of 43 new birds and 66 retraps were caught.

Graham McElwaine reported that the marking of ECHA Light-bellied Brent Geese continued well during 2006/07. Four successful catches were made in Ireland, and four catches in Iceland during the spring, giving an excellent total of 390 newly marked birds (Table 3).

Following a lot of persistence, amongst the final catch was 'Howard', one of last winter's satellite transmitter birds. Whilst the transmitter was no longer working, this was great news for both the bird and us – the bird because he will be feeling a bit lighter for the arduous journey ahead, and us because the transmitter can be reprocessed for later use, saving some money!

Many thanks go to all who assisted with these catches, particularly to the licensed cannon netters Robin Ward from WWT (Co. Down), Alyn Walsh from National Parks and Wildlife Service (Co. Kerry) and Gudmundur Gudmundsson from the Icelandic Institute for Natural History (Iceland).

Equally successful was the resighting of ECHA Brents, with just over 10,000 observations made of 1,153 individuals. This included a good number of records from the southern end of the flyway, including the first records from Jersey (these staged at Dundrum Bay on the northern migration), and France, where



Icelandic team members with 'Howard'! (Gudmundur Gudmundsson)

74 observations of 11 individuals were made at internationally important site at Regnéville. Many thanks go to all the observers that covered these and other sites so well in 2006/07.

Catches of Icelandic grey geese were not so numerous, following the excellent numbers caught in winter 2005/06, but good samples were still obtained. Tay Ringing Group, coordinated by Les Hatton and Alan Leitch, made another good catch of 99 Pinkfeet at Loch of Lintrathen, Angus, in October 2006. Grampian Ringing Group, coordinated by Raymie Duncan, also caught another extremely useful spring sample of 51 Pinkfeet at North Meiklemoss and Blackburn, Aberdeenshire in April 2007. Highland Ringing Group, coordinated by Bob Swann and Ivan Brockway, marked 38 Iceland Greylag Geese at their usual site, Loch Eye, in November 2006. Unfortunately, access to this site is once again restricted, although the number of Greylags using the site as a roost has dramatically decreased in the past two winters, and it seems as if the redistribution northwards is now affecting the birds in the Moray Basin. A Greenland White-fronted Goose Study team caught 35 Greenland Whitefronts at Hvanneyri, west Iceland, during April 2007.

Finally, Dartford RG, coordinated by Roger Taylor, held another successful round-up of moulting Greylag Geese on 24 June 2007, with a total catch of 136 birds, comprising 57 adults, 12 goslings, and 67 retraps. The retraps were from the following years: 1993 – 1, 1995 – 1, 1996 – 1, 1997 – 1, 1998 – 2, 1999 – 1, 2000 – 2, 2001 – 1, 2002 – 1, 2003 – 5, 2005 – 16, 2006 – 35.

Table 3 Numbers of ECHA Light-bellied Brent Geese caught and ringed in Ireland and Iceland, 2006/07.

Location	Month	Newly ringed		Retrap	Total
		Adults	Juveniles		
Strangford Lough, Co. Down	November	35	0	1	36
Strangford Lough, Co. Down	January	29	0	13	42
Dundrum Bay, Co. Down	January	58	0	17	75
Tralee Bay (Kilshannig), Co. Kerry	February	26	2	0	28
Alftanes, S of Reykjavik (3 sites)	May	179	5	10	194
Laxárvogur, 25km NE of Reykjavik	May	56	0	1	57
Totals		383	7	42	432

### GWGS expedition to Iceland, spring 2007

The Agricultural University of Iceland at Hvanneyri has been recognised for many years for its importance as a spring and autumn staging area for Greenland White-fronted Geese, holding up to 1,400 birds in spring and even more in autumn. There have been many study tours to the site since the early 1990s, and much research work has been carried out there in collaboration with the University staff. Since 2005, there have been considerable developments on the site, which has been designated as a refuge for the geese by the University authorities. These include upgrading of student facilities and building of new accommodation blocks, offices and other housing, some of which have been constructed on fields formerly used by geese. For this reason, it was decided to undertake a study of the effects of these developments and a Greenland White-fronted Goose Study (GWGS) team from the National Environmental Research Institute at the University of Aarhus, Denmark, joined with others to travel to Hvanneyri for two weeks in spring 2007. A masters student, Anne Würtz Petersen, first assessed the degree of habitat loss caused to the geese by the physical loss of the areas now under buildings, based on detailed observations from 1997, 1998 and 1999. During those years, the numbers of geese in all fields were assessed at least twice every day during the entire spring staging period. The same procedure was repeated in 2007, and Anne also studied the way that human disturbance from roads and buildings affected the distribution of geese in fields adjacent to such features, in an attempt to measure the additional 'effective' habitat loss caused by human activities on the site. Anne is presently working up her data and the results will be forthcoming later. Alyn Walsh, from National Parks and Wildlife of the Irish Heritage Service, with the able help of John Turner and Roy King, coordinated the cannon-netting of a sample of geese which were fitted with neck collars and given a health check by Ruth Cromie from Wildfowl & Wetlands Trust and David Stroud of the Joint Nature Conservation Committee. The most remarkable feature of the study was the finding that in 2007 the geese arrived to Iceland almost ten days earlier than usual, with a marked departure from most winter resorts around 5th to 7th April. Alyn reported from Wexford, in southeast Ireland, that birds had attained sufficient fat stores ready for migration by late March and birds were showing migratory restlessness as early as 18th March, almost a month earlier than usual! Although the winter was mild in 2006/07, the spring was not unduly so, so quite why the geese were in condition and ready to go so early remains obscure. Whatever, we could see that the geese were fattening up in Iceland ahead of schedule, since both the weights and our field scores of abdominal profiles (an index of the fat deposits stored under the tail) were almost exactly ten days ahead of those observed in 1997-1999 for the same date, but were virtually identical for the same time they had spent in Iceland since arrival from the wintering grounds. Quite what the consequences of this might be for the reproductive success of the geese in the coming season will be fascinating to see when the geese return in autumn.

Tony Fox

### Migration speed and breeding strategy of Bewick's Swans

Using migration speed as a proxy for the degree of capital-breeding (i.e. whether the individual bird stores body reserves for the breeding season from stopover sites visited during spring migration, or whether it acquires these reserves once it reaches the breeding area and is a so-called income-breeder), Bart Nolet (*Ardea* 94: 579-591) compared the migration speeds of Bewick's Swans fitted with satellite transmitters in all four main flyways. The average overall speed was 52 km/h, which is similar to that predicted for a capital-breeding strategy (approximately sufficient reserves for a clutch of eggs and eight days of starvation), and it would seem that most of these reserves are acquired at the final stopover location. The migration speed was also in accordance with the retreat of ice, which tends to be slow in the Western Palearctic. In contrast, Tundra Swans in North America are more likely to adopt an income-breeding strategy as they are able to capitalise upon the rapid advancement of spring that is typical in these flyways, and accelerate their migration speed accordingly.

### Moult patterns of European Whitefronts

Kees Koffijberg, from SOVON (Dutch Centre for Field Ornithology), has recently published his work on the timing of moult of first-winter European White-fronted Geese (*Limosa* 79: 163-168). This short paper quantifies when first-winter geese acquire various adult-like plumage characteristics (white forehead, pale bill nail (tip), adult flank pattern, and belly bars) and neatly demonstrates which plumage characteristics can be used reliably at different times of the year to collect productivity data. Kees shows that the majority of first-winter birds have a small white forehead patch by December, and that more than half have a large adult-like patch by March. Similarly, most have begun to lose their juvenile flank pattern by December, and by March more than 60% have an adult-like pattern. However, the other two features remain juvenile-like for longer. The dark nail is retained by more than 90% of first-winter birds in February, and around 50% in April. Signs of belly bars were first recorded in January, with about 10% of first-winter birds showing them in March, and 30% by April.

Although entirely in Dutch, there is an English summary, and much can also be gleaned from the graphs as they are also shown with English text. WWT and SOVON are currently working together to produce better information on the collection of productivity data for a range of goose and swan species that overwinter in Europe, including protocols for the methods used to collect these data, and further information on this work will be available from the WWT website in due course. A copy of this paper can be obtained by contacting Kees on [Kees.Koffijberg@sovon.nl](mailto:Kees.Koffijberg@sovon.nl).

## Diet switching by brent geese

Brent geese are the most maritime of all goose species, with wintering flocks foraging preferentially on the intertidal *Zostera* and green algae *Enteromorpha* and *Ulva*. The East Canadian High Arctic (ECHA) Light-bellied Brent Geese that winter predominantly in Ireland are no exception, although during the last two decades these geese have increasingly fed on agricultural grassland, particularly in the latter part of the season. This change in habitat use and hence diet is generally considered to be due to the depletion of intertidal resources. Whilst this habitat switch has been described for a number of brent goose populations, previous studies have been unable to determine diet in a truly quantitative manner. We therefore took a novel approach based on stable isotopes to determine dietary choice in ECHA Light-bellied Brent Geese.

All biologically active elements are found in two or more stable isotopic forms, the ratio of which is altered by biological and geophysical processes; for example isotopic ratios of Carbon and Nitrogen differ significantly between the marine and terrestrial biomes. The old adage 'you are what you eat' happens to be correct, as the tissues of consumers are made up of atoms derived from the food it eats, so reflecting its diet. So, utilising these two facts we can, by measuring the isotopic ratios of a consumer's tissue, determine its diet in the recent past.

The plan was to catch geese in and around Strangford Lough at different points throughout the winter, to find out how dietary choice of individuals changed temporally, and how demographic and social factors affected dietary choice. Birds were caught using cannon nets between October 2003 and October 2005. In all, 406 were caught, of which we were able to obtain stable isotope data from 276. The results show how the birds move from total reliance on marine *Zostera* at the beginning of the winter, to foraging almost exclusively on terrestrial grasses before the spring migration (Figure 16).

The results also demonstrate the importance of green algae as a food source during the midwinter. Of note is the fact that generally we see a gradual decrease in the amount of *Zostera* in the diet and subsequent increase in consumption of other food sources, firstly green algae, followed by terrestrial grasses. So, clearly we don't find an sudden habitat switch as has been reported for other populations of brent geese; rather we find that for much of midwinter the birds are utilising both intertidal and terrestrial habitats to differing extents depending on the time of the year.

As well as taking blood samples at capture, birds were also aged, sexed, measured and fitted with leg rings. These data were coupled with the stable isotope data to identify other factors which might influence diet choice. We expected family groups, being the dominant social group in goose flocks, to have access to the best quality marine resources for the longest time. What we found was the opposite, with non-breeding pairs and singletons having a higher proportion of marine derived food in the diet. As a result of this, the parental adults actually lost body condition to a greater extent than the other birds, and ended the winter in worse condition – a hefty cost to raising a family.

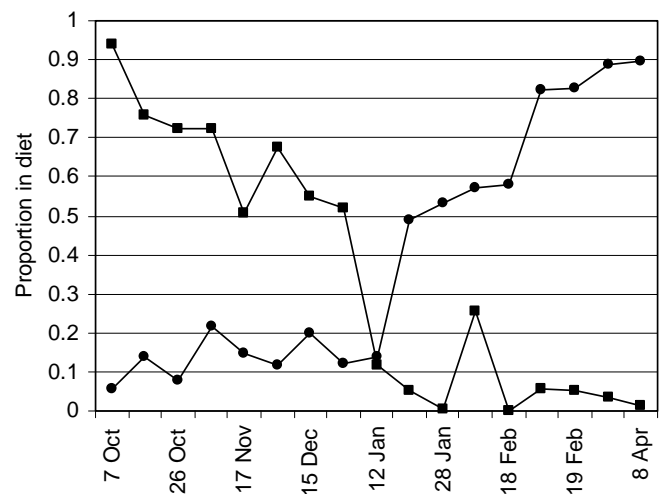


Figure 16. Mean changes throughout the year in the proportion of *Zostera* (squares) and terrestrial grasses (circles) in the diet. Adapted from Inger *et al.* (2006) *Journal of Animal Ecology* 75: 1190-1200.

We also found that this cost increased with brood size, such that parents of large families had less marine food in their diet than non-parental birds. How and why this occurs remains speculative – maybe the inexperienced juveniles are unable to efficiently seek out blades of *Zostera* as it becomes depleted, and are forced by hunger to move inland to feed, and the parents follow? This has yet to be confirmed. Maybe one of the most important findings from this study was the extent to which ECHA Light-bellied Brent Geese rely on intertidal marine foods, and the importance of conserving these often threatened areas. For further details see Inger *et al.* (2006) *Animal Behaviour* 71: 1335-1341; Inger *et al.* (2006) *Journal of Animal Ecology* 75: 1190-1200; Inger *et al.* (2006) *Journal of Applied Ecology* 43: 1022-1030.

Richard Inger

## Improving estimates of Pink-footed Goose breeding success

Using data from detailed studies of Pinkfeet at the Loch of Strathbeg, and data collected elsewhere in the UK by WWT and GSMP volunteer counters and ring readers, Ian Patterson and Richard Hearn (*Ardea* 94: 175-183) examined the changes in the proportion of first-winter Pinkfeet over the course of the autumn, both nationally and at the Loch of Strathbeg. They found that between September and November both datasets showed a significant decrease in the proportion of first-winters in the population, by 41%. It was suggested that only about a quarter of this decrease could be accounted for by the differential shooting mortality of juveniles, which is known to occur, and it is believed that the later arrival of sections of the population with fewer young might be involved.

This has important implications for the timing of productivity assessments, and the authors conclude that estimates of productivity should therefore be carried out in October, with samples from each region being proportional to the number of birds normally found there at that time. By then, the whole

population should have arrived in the UK and should have mixed thoroughly, but the percentage of juveniles would not have decreased sufficiently to produce an underestimate of productivity.

*This paper highlights what may become an increasing problem for monitoring Pinkfeet, and what has been a problem for Iceland Greylags for some time. Although until recently it was usual for the entire population to have arrived by mid-October, later arrivals are increasing, such that some birds are not reaching the UK until November, as can be seen in Julia Newth's report on the 2006 IGC on page 12. Whether these birds arriving later have a different age structure to earlier migrants is unknown, but the data examined by Patterson & Hearn suggest that there is a consistent difference. More information on the timing of migration by successful and unsuccessful breeders is therefore needed and one way in which people observing marked birds can help is to determine whether marked individuals have a mate and/or goslings. In this way we can start to understand more about the movements made by different sections of the population.*

## The State of the UK's Birds 2006

The most recent edition of *State of the UK's Birds* reports declining trends for five goose or swan populations over the short-term (1993/94 to 2003/04) (Table 4). This is an increase of one over the previous report – the well known decrease in Greenland White-fronted Geese now means that there are fewer than there were ten years previously (actually, numbers in spring 2006 were the lowest since 1988 – see page 15). The other populations listed all show similar rates of decline to the previous report, although all have improved slightly. All other goose and swan populations continue to increase, many rapidly (e.g. Greenland Barnacle Goose has increased by 550% over the short-term). The only population that has declined over the long-term period (1978/79 to 2003/04) remains the European White-fronted Goose, although at a flyway level this population remains healthy. Alert readers will notice that the long-term increases in Dark-bellied Brent Goose and Bewick's Swan have considerably reduced since the 2005 report. This is simply because the period used for long-term trends has been shortened in order to standardise it with other species.

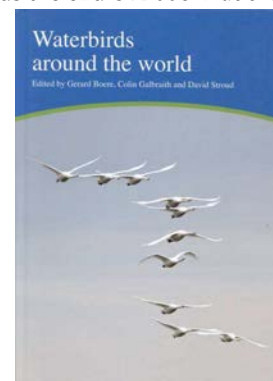
A complimentary copy of *State of the UK's Birds 2006* is enclosed for all GSMP fieldworkers with this issue of *GooseNews*. It is also available to download from WWT's website [www.wwt.org.uk/research/monitoring/reports.asp](http://www.wwt.org.uk/research/monitoring/reports.asp).

Table 4. Percentage change in abundance of those goose and swan populations showing a decline in the period 1993/94–2003/04.

Species	Long-term trend (25 year)	Short-term trend (10year)
Bewick's Swan	+38%	-12%
European White-fronted Goose	-63%	-45%
Greenland White-fronted Goose	n/a	-3%
Iceland Greylag Goose	+19%	-6%
Dark-bellied Brent Goose	+21%	-29%

## Waterbirds around the world

Following the highly successful conference, *Waterbirds around the world*, organised by Wetlands International in Edinburgh in April 2004 and attended by 456 delegates from 90 countries, the proceedings were published towards the end of 2006. But these are not just any proceedings – this doorstop of a book is a true heavyweight in every sense of the word. It contains 940 pages that summarise every presentation and poster given at the conference. Collectively, a huge proportion of the world's waterbirds are covered, along with all the major conservation issues they face, and the experiences of the conservationists that are working hard to safeguard their futures. In short, this book provides the most comprehensive synopsis of the state of waterbird populations, and their conservation.



All of the goose and swan populations that are found in the UK, all are mentioned at least once in the proceedings, and some feature as many as nine times. In addition, many other papers on these species in other flyways, or more generally, are also presented.

These papers cover aspects such as breeding studies in the Arctic, migration and changing migratory patterns, satellite telemetry, flyway delimitation, site networks, site designation in wintering and breeding areas, monitoring of site status, long-term trends, monitoring methodologies, feeding distribution, flyway management plans, sustainable hunting, agricultural conflict, climate change, disease, disturbance, behavioural studies, and education and public awareness. In other words, just about every conceivable subject related to goose and swan conservation. This makes it, quite simply, the essential reference for anyone interested in this subject, or other issues related to waterbird conservation.

*Waterbirds around the world – a global overview of the conservation, management and research of the world's waterbird flyways* is available for £50 from The Stationary Office [www.tsoshop.co.uk/bookstore.asp?FO=1159966&Action=Book&ProductID=0114973334](http://www.tsoshop.co.uk/bookstore.asp?FO=1159966&Action=Book&ProductID=0114973334), or you can download individual papers from [www.jncc.gov.uk/page-3891](http://www.jncc.gov.uk/page-3891)

## Icelandic goose hunting update

After a period of delay and uncertainty due to compliance problems caused by a temporary ban on Ptarmigan hunting, the monitoring of quarry harvest rates in Iceland is again up and running. The latest estimates show that following 2003, when no reliable data were available, the number of Greylag Geese harvested rose to around 37,000 (Figure 17). Although this indicates that the steady decrease in numbers harvested



between 1998 and 2002 has ceased – a decrease largely due to efforts to persuade hunters to harvest fewer Greylags because of the decline in overall abundance – it is important to note that 2004 was a year of very high breeding success, and this is highly likely to have caused the larger harvest also seen that year. The number of Pink-footed Geese harvested in 2004 and 2005 was similar to the long-term average at just over 13,000 (Figure 17).

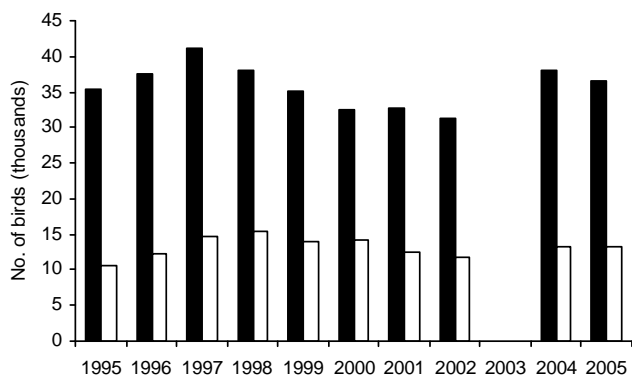


Figure 17. The number of Greylag Geese (black columns) and Pink-footed Geese (white columns) harvested in Iceland, 1995-2005. Note: no data were collected in 2003. Data from Icelandic Institute of Wildlife Management.

## News from the Goose Specialist Group

The latest and tenth meeting of the GSG was held in Xanten, Germany, in January 2007. It was organised by Johan Mooij and colleagues from Biological Station Wesel, and was a great success – in fact the largest meeting for some years, being attended by 113 people from 21 countries. A total of 55 oral presentations and 29 poster presentations were given around the following key themes:

- tracking migratory geese by voluntary observers using marked geese
- tracking migratory geese by satellite transmitters and geolocators
- Avian Influenza and migratory geese
- the impact of hunting on geese
- how can wintering geese be integrated in modern farming practice
- changes in migratory strategies in expanding Barnacle Geese
- restructuring the Goose Specialist Group
- improving the Wetlands International database on goose numbers

In addition, a series of detailed workshops covered many of the individual populations in more detail. More information, including summaries of the species workshops, can be found on the GSG website [www.geese.nl/gsg/](http://www.geese.nl/gsg/), and the proceedings will eventually be published in *Die Vogelswelt*. The next meeting will be held in Ladakh, India in May 2008 – bookings are now being taken!

## Scotland's Species Action Framework

In January 2007, Scottish Natural Heritage launched their Species Action Framework. The report outlines 32 species of Scottish wildlife, including the Greenland White-fronted Goose, that have been prioritised for management action, identifies where focused effort and resources over the next five years will have the greatest benefits for biodiversity in Scotland, and summarises what SNH and its partners will be doing over the next five years.

Greenland White-fronted Geese qualify as a species for conservation action because of their significant decline, and because it is the focus of conflicts where coexistence is difficult to achieve. The aims and objectives of the five year implementation plan are:

- To halt the decline in the Greenland White-fronted Goose population by 2010;
- To maintain and, where possible, enhance the wintering range of the Greenland White-fronted Goose in Scotland.

The types of actions over the next five years have been identified as:

- Contribute to the updating and implementation of a management plan ('Flyway Plan') which covers the range countries of Ireland, UK, Iceland, and Greenland (this was first drawn-up in 1992 but never ratified);
- Continue to develop and implement local goose management schemes;
- Continue the comprehensive census programme across Scotland, and ensure that results are properly disseminated.

Further information, including a full copy of the report, can be found at [www.snh.org.uk/strategy/saf.asp](http://www.snh.org.uk/strategy/saf.asp).

## Many thanks for all your help

The greatest strength of the GSMP lies in the tremendous volunteer input from you, the counters, ring-readers and other participants. We hope that you will continue to support the GSMP and, through it, the conservation of swans, geese and wetlands throughout the UK and beyond.

*GooseNews* is the newsletter of WWT's Goose & Swan Monitoring Programme. It is sent to participants each autumn and is available either as a printed copy or a pdf file that can be sent via e-mail. If you would prefer to receive *GooseNews* in an alternative format, please contact WWT [monitoring@wwt.org.uk](mailto:monitoring@wwt.org.uk).

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Participants at the 10<sup>th</sup> Goose Specialist Group meeting in Xanten [GSG]

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## Goose & Swan Monitoring