

The 2001 Icelandic-breeding Goose Census

A Wildfowl & Wetlands Trust Report

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SUMMARY

The 42nd consecutive census of Pink-footed Geese and Icelandic Greylag Geese took place during autumn and early winter 2001. Two discrete counts, in October and November, were undertaken and coverage of sites was good and weather conditions were favourable. Counts were not available from Ireland for the first time since 1997 and some other sites in Britain were not counted due to problems with access as a result of Foot and Mouth Disease. Coverage was extended beyond Britain and Ireland for the first time, to include other countries within the wintering range of the Icelandic Greylag Goose, namely Iceland, the Faeroe Islands and Norway. Maxima of 265,817 Pink-footed Geese and 88,009 Greylag Geese were recorded in October and November, respectively. These figures were adjusted to account for major sites that were not counted and for the number of UK Greylag Geese (from the Re-established and NW Scotland populations) counted prior to this census, resulting in population estimates of 270,921 Pink-footed Geese and 89,628 Greylag Geese. Both population estimates were larger than those calculated in 2000: the Pink-footed Goose estimate represents an increase of 10.4% and is the largest for this population since monitoring began in 1960; the Greylag Goose estimate increased 11.6% on the previous year. Pink-footed Geese had a typical breeding season in 2001: autumn flocks contained 17.1% young and mean brood size was 2.4 goslings per successful pair. Greylag Geese were more successful than average and autumn flocks contained 20.0% young and mean brood size was 2.8 goslings per successful pair.

INTRODUCTION

The 42nd consecutive census of Icelandic/Greenlandic Pink-footed Geese *Anser brachyrhynchus* and Icelandic Greylag Geese *A. anser* took place during autumn and early winter 2001. The aim of this census is to estimate the size and monitor the distribution of these two goose populations. The methods used followed those of previous censuses, with two co-ordinated counts being undertaken, the first in October and the second in November. These are timed to coincide with the periods when these geese are most concentrated after their arrival from Iceland. Pink-footed Geese arrive earlier than Greylag Geese and are therefore usually best censused in October. The November count allows for the later migration of Greylag Geese to be completed. This report provides an overview of the results; more detailed data are available from WWT upon request.

METHODS

Counts were conducted by a network of largely volunteer counters over the weekends of 13/14 October and 17/18 November 2001. In a few cases, counts made just outside this period were included in the co-ordinated counts if there was no reason to suspect they duplicated other counts. Most counts were of roosting geese, made either at dusk when the birds are lighting in or at dawn as they depart to feeding areas. They were timed to coincide with the new moons, thus minimising the likelihood of geese remaining in feeding areas overnight. In a small number of areas where roost sites are poorly known, inaccessible or infrequently used, daytime counts of feeding birds were made. Experienced observers made assessments of the proportion of young (first-winter birds are separable from older birds by differences in plumage characteristics) in goose flocks and of brood size during the autumn.

Two types of adjustment were applied to the peak count totals in order to generate population estimates. For regularly monitored sites (those counted in at least three of the previous five years) that were not counted during the 2001 census, numbers were estimated from the mean of the counts

made during the relevant month (October for Pinkfeet, November for Greylag) during 1996-2000. Estimated numbers that exceeded 0.5% of the current IGC peak count total were added to this peak count to give the adjusted population estimate. In addition, counts of UK Greylag Geese (i.e. birds from the Re-established or NW Scotland populations) made during September, before the arrival of Icelandic migrants, were subtracted from the IGC count at some sites to calculate the number of Icelandic Greylag Geese present at that time.

To assess reproductive success, data collected between mid-September and mid-November were used to determine the proportion of young in flocks and the mean brood size of successful pairs.

RESULTS

Coverage and conditions

A total of 150 sites was covered during the two counts: 102 of these were counted in both months, four only in October and 44 only in November. This is the same as the number of sites covered by the 2000 survey, although no data were received for Ireland and no inland sites in Northumberland were visited because of access restrictions following the outbreak of Foot and Mouth Disease. Outside of Britain, several sites in Norway and the Faeroes were counted for the first time, and an estimate of the number of Greylag Geese remaining in Iceland at the time of the November count was included, based on ground counts and aerial surveys conducted in the weeks before and after the co-ordinated count.

In all, 33 sites counted during October in three or more of the previous five years (1996-2000) were not counted in 2001. Of these, three supported an average of more than 0.5% of the 2001 October count of Pink-footed Geese: Holburn Moss (1,860), Lake of Menteith (1,840) and Whitton Loch (1,104). Furthermore, a minimum estimate of 300 Pink-footed Geese was included for Loch Mullion, based upon comments provided by the counter there. Similarly, 26 sites counted during November in three or more of the previous five years were not counted in 2001. Five of these held, on average, more than 0.5% of the 2001 November count of Greylag Geese: Haddo Country Park (1,220), Lough Swilly (1,183), Stranraer Lochs (884), Long Loch (549) and Castron Quarry (486).

Counts of UK Greylag Geese during September were received from 23 sites and these were used to adjust the co-ordinated November count of Greylag Geese at five sites or regions, as follows: Orkney Isles (-1,500), Shetland Isles (-155), Island of Bute (-73), Loch Fleet (-655) and Threipmuir Reservoir (-400).

Supplementary counts, made in addition to the co-ordinated IGC counts, were received from 53 sites, most notably Breydon Water, Cameron Reservoir, Carsebreck & Rhynd Lochs, Cockerham Sands, Findhorn Bay, Horsey Mere, Hule Moss, Island of Bute, Kilconquhar Loch, Loch Fleet, Loch Garten, Loch of the Lowes, Loch of Skene, Loch Spynie, the north Norfolk roosts, Solway Estuary, Southwest Lancashire, Upper Cowgill Reservoir and Westwater Reservoir.

Weather conditions and disturbance levels were generally reported by counters as good and are not considered to have appreciably affected the census results. The new moons were on 16 October and 15 November. Low counts were reported from a total of six sites during both counts (two sites during both counts), mainly due to the arrival of geese during dusk counts when it was too dark to accurately count the birds or to difficulties covering the whole of the count site. Four of these were

in October and of these, none held key concentrations of Pinkfeet. A further four low counts occurred during November, one at a site with important numbers of Greylag Geese (Island of Sanday, Orkney).

Total Numbers

Census count totals are illustrated in Figure 1 and regional count totals are shown in Table 1.

Pink-footed Goose

The October count total of 265,817 is an increase of 23,398 (9.6%) on the previous year (Hearn 2002). After the inclusion of estimated counts, the adjusted population estimate is therefore 270,921, an increase of 25,572 (10.4%) on the previous estimate (Hearn 2002). During November 2001, 234,151 Pinkfeet were counted, 88.1% of the total October count.

Greylag Goose

The November count total of 88,009 is an increase of 6,912 (8.5%) on the previous count in November 2000 (Hearn 2002). After adjustments and the inclusion of estimated counts, a population estimate of 89,628 was derived, an increase of 9,304 (11.6%) over the previous adjusted estimate.

Due to differences in coverage between this census and previous ones, the change in population size is not directly comparable. The inclusion of Iceland, Norway and the Faeroes, however, is not considered to affect the results greatly, as a total of just 1,595 birds (1.8% of the November count) was counted in these three countries.

Pre-adjusted counts in October suggest that the arrival of Greylags into Britain in autumn 2001 was a little later than usual, with 22.1% of the November count recorded during that month. Note, however, that the timing of each census is not completely synchronous with previous censuses, as it is based mostly on the phase of the moon, and fewer sites supporting Greylag Geese are counted during October than November.

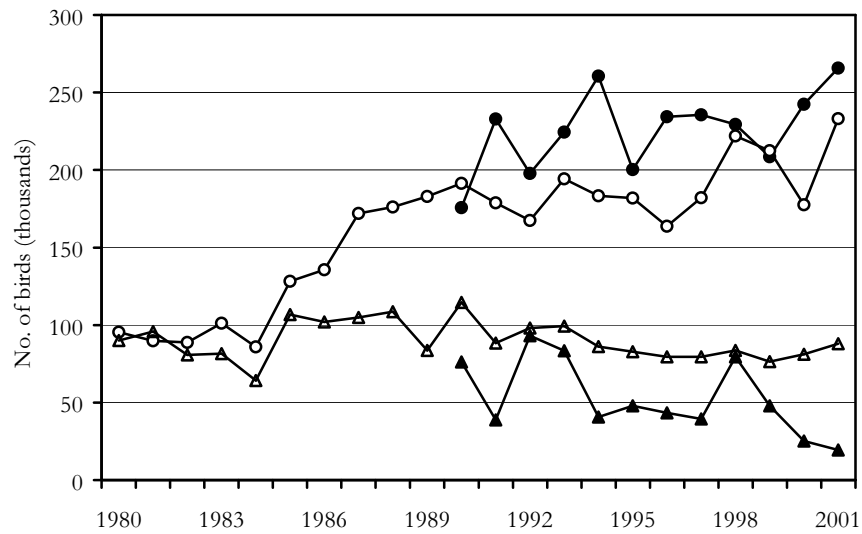


Figure 1. The numbers of Pink-footed Geese (circles) and Icelandic Greylag Geese (triangles) counted in October (filled) and November (open) as part of the Icelandic-breeding Goose Census, 1980 to 2001.

Table 1. The regional distribution of Pink-footed Geese and Icelandic Greylag Geese in October and November 2001. Figures in square brackets show adjusted or estimated totals.

Region	October			November		
	Sites	Pinkfoot	Greylag	Sites	Pinkfoot	Greylag
Iceland+	0	nc	nc	1	nc	175
Norway	0	nc	nc	8	0	1,098
Faeroe Islands	7	23	686	4	1	322
Ireland	0	nc	nc	0	nc	nc
				[1]		[+1,183]
Shetland	0	nc	nc	7	0	1,238
						[-155]
Orkney	10	83	6,810	15	384	23,065
			[-1,500]			[-1,500]
Caithness+	1	120	460	1	10	5,812
Sutherland	2	60	1,310	2	0	1,110
			[-655]			[-655]
Ross & Cromarty	10	281	2,480	12	671	16,326
Inverness/Nairn	0	nc	nc	2	400	154
Badenoch & Strathspey	1	4	47	1	4	2,800
Moray	2	14,000	15	2	17,600	7,250
Banff & Buchan	1	46,898	30	1	27,769	1,744
Gordon/Aberdeen	2	15,120	1,260	2	16,700	2,255
				[1]		[+1,220]
Kincardine & Deeside	0	nc	nc	1	0	5,277
Angus/Dundee	3	40,962	1,123	3	14,139	730
				[1]		[+549]

Perth & Kinross	10 [1]	39,944 [+300]	1,761	17	17,637	5,368
Stirling/Falkirk/ Clackmannan	3 [1]	5,550 [+1,840]	0	3	2,105	425
Fife	20	6,876	1,021	23	25,833	6,398
Argyll & Bute	3	6	158	4	0	1,409 [-73]
Glasgow area*	3	0	348	3	0	230
Clydesdale	1	400	0	1	0	0
Stewartry/Wigtown	2	0	490	2 [1]	1,252	728 [+884]
Annandale & Eskdale/Nithsdale**	1	840	336	1	979	145
East/Midlothian	6	20,265	87	9	6,086	653
Edinburgh/West Lothian	3	2	530 [-400]	3	1	320 [-400] ¹
West Borders/ Tweeddale/East Borders***	8 [1]	32,799 [+1,104]	219	10	14,835	2,102
NE England	1 [1]	6,450 [+1,860]	290	1 [1]	3,800	875 [+486]
Humberside	1	1,704	0	1	4,300	0
Cumbria**	1	0	0	1	0	0
Lancashire & Merseyside+	1	22,600	0	1	28,240	0
Lincolnshire	0	nc	nc	0	Nc	nc
Norfolk	3	10,830	0	4	51,405	0
Total	106 [110]	265,817 [270,921]	19,461 [16,906]	146 [151]	234,151	88,009 [89,628]

* includes Bearsden & Milngavie, Clydebank, Cumbernauld & Kilsyth, Cumnock & Doon Valley, Cunninghame, Dumbarton, East Kilbride, Eastwood, Glasgow City, Hamilton, Inverclyde, Kilmarnock & Loudoun, Kyle & Carrick, Monklands, Motherwell, Renfrew and Strathkelvin

** counts from the Solway Firth are included in the Annandale & Eskdale/Nithsdale total even though some birds roost and feed on the Cumbrian side of the estuary

*** includes Ettrick & Lauderdale, Roxburgh and Berwickshire

+ several feeding sites consolidated

nc no count received

¹ estimate of Re-established birds greater than November count, therefore adjusted count taken as zero

Regional Distribution

The regional distribution of geese during the two counts is summarised in Table 2 and illustrated in Figures 2 and 3.

Table 2. Gross regional distribution of Pink-footed Geese and Icelandic Greylag Geese in Britain during October and November 2001, expressed as a percentage of the maximum count for each species.

Area*	Pink-footed Goose		Greylag Goose	
	October	November	October	November
North Scotland	0.2	0.5	12.6	57.4
Northeast Scotland	28.6	23.4	1.5	18.8
East Central Scotland	35.1	22.5	4.4	14.7
Southeast Scotland/ Northeast England	22.4	9.3	1.3	4.5
Southwest Scotland/ Northwest England	0.5	0.8	1.5	2.8
West England	8.5	10.6	0	0
East England	4.7	21.0	0	0
Total	100.0	88.1	21.3	98.2

- * areas defined as follows:
 North Scotland: Shetland, Orkney, Western Isles and Highland
 Northeast Scotland: Grampian (Aberdeenshire & Moray)
 East Central Scotland: Tayside (Perth & Kinross), Central (Stirling) and Fife
 Southeast Scotland/Northeast England: Lothian, Borders and Northumberland
 Southwest Scotland/Northwest England: Strathclyde, Dumfries & Galloway and Cumbria
 West England: Lancashire and Merseyside
 East England: Humberside, Lincolnshire and Norfolk

Pink-footed Goose

The regional distribution of Pink-footed Geese during autumn 2001 was typical, with key concentrations during October in Northeast, East Central and Southeast Scotland. A relatively high proportion was also present at the southern end of the winter range, in East England, at this time. By November, the proportion in East England had increased to over one fifth, with numbers in East Central and Southeast Scotland showing the greatest declines in this time.

Greylag Goose

The autumn distribution of Greylag Geese was also typical, with a low proportion present in Britain during October. By November, more than half of the population was in North Scotland, with most of the remainder in Northeast and East Central Scotland.

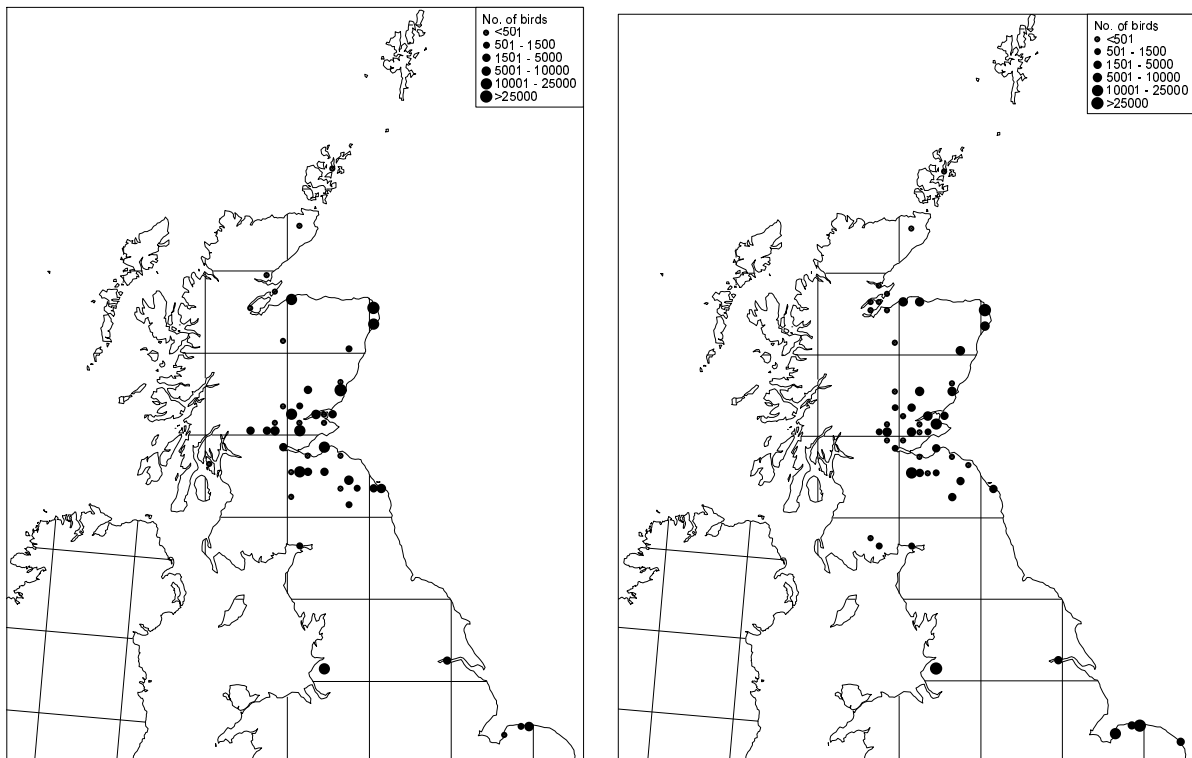


Figure 2. The distribution of Pink-footed Geese counted in October (left) and November (right) 2001.

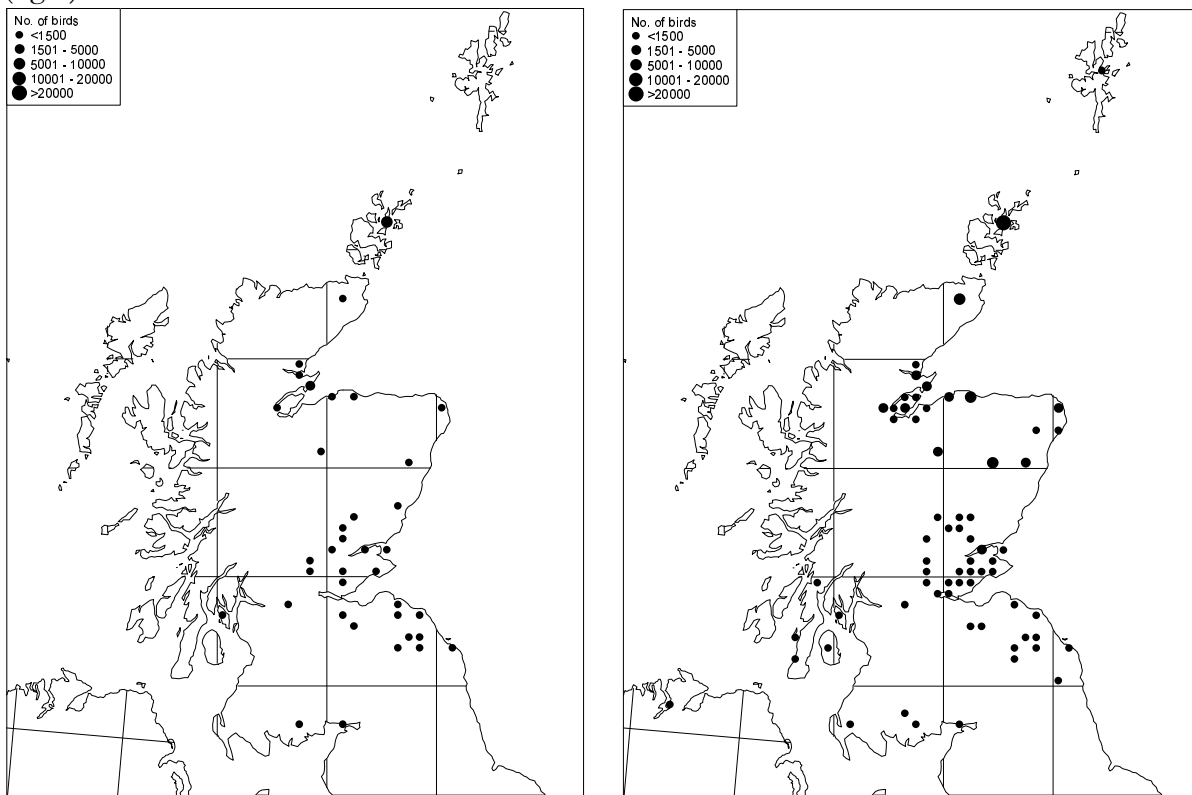


Figure 3. The distribution of Icelandic Greylag Geese counted in Scotland and northern England during October (left) and November (right) 2001.

Principal Concentrations

All sites that supported more than 1% of the Pink-footed Goose or Greylag Goose population estimate during the relevant month in 2001 are shown in Table 3.

Pink-footed Goose

During October, Pinkfeet were reported from a total of 48 sites, of which 40 held more than ten birds. Sixteen of these held more than 1% (2,709) of the population estimate and ten supported 10,000 or more birds (Table 3). More than 48% of the population estimate was recorded at the top four sites during October. In November, Pinkfeet were typically found at slightly more sites, 55 in total, of which 43 held ten or more birds. Twenty held more than 1% of the population estimate, with 10,000 or more counted at six of these. The top three sites held 30% of the population estimate. In total, Pinkfeet were recorded at 66 sites during both counts.

The top two sites in October both held greater than average numbers of Pinkfeet (Table 3, column C). Other atypically large counts were reported from Findhorn Bay, Lindisfarne and the River Forth at Skinflats.

Greylag Goose

During October 2001, Greylag Geese were found at typical arrival sites in north and central Scotland, although the proportion of the population estimate present in Britain (21.3%) was below average (mean 1997-2001: 52.2%). In all, they were reported from a total of 52 sites (including nine in Orkney), of which 43 held more than ten birds.

By November, Greylags were found at 99 sites (including 15 in Orkney and 7 in Shetland), of which 94 held ten or more birds. Taking Orkney and Shetland as consolidated sites, 19 of these held more than 1% (896) of the population estimate and four held more than 5,000 (Table 3), comprising 42.4% of the total. In all, Greylags were recorded at a total of 107 sites during both counts, 12 more than the previous year. Much of this increase is due to the inclusion of areas outside Britain in the census.

A larger than average count was recorded from a number of sites, most notably Loch of Strathbeg, where numbers of Greylags tend to be small (although this site was formerly much more important up until the 1980s). Other large counts were recorded at Rossie Bog, Loch Clunie, Barons Folly and Munloch Bay. The number on Orkney also continued to increase after the low peak count in 2000, with a record count for the sixth time in seven years.

Table 3. Principal Pink-footed Goose and Icelandic Greylag Goose resorts in autumn 2001. Columns show: (A) counts (from October for Pink-footed Geese and November for Greylag Geese) exceeding 1% of the 2001 population estimate; (B) the site count as a percentage of the population estimate; (C) the site count as a percentage of the mean 5-year peak count; (D) the 5-year peak mean count. Five-year peak mean counts are calculated using all available data, thus may appear larger than counts recorded by this census if higher counts are made at other times of the year.

PINK-FOOTED GOOSE

2001 population estimate	270,921			
	A	B	C	D
Loch of Strathbeg	46,898	17.3	123	38,236
Montrose Basin	38,669	14.3	125	31,017
Westwater Reservoir	23,270	8.6	84	27,628
Southwest Lancashire	22,600	8.3	78	29,048
Dupplin Loch	17,500	6.5	68	25,636
Loch Leven	16,200	6.0	114	14,256
Findhorn Bay	14,000	5.2	342	4,095
Meikle Loch, Slains	13,900	5.1	85	16,300
Aberlady Bay	13,740	5.1	125	11,026
Holkham/Wells Bay	10,000	3.7	28	35,548
Hule Moss	8,600	3.2	59	14,666
Lindisfarne	6,450	2.4	200	3,228
Carsebreck and Rhynd Lochs	5,450	2.0	35	15,692
Inner Firth of Tay	5,070	1.9	94	5,373
Fala Flow	4,645	1.7	79	5,912
River Forth at Skinflats	3,800	1.4	168	2,264

GREYLAG GOOSE

2001 population estimate	89,628			
	A	B	C	D
Orkney (all sites)	21,565	24.1	123	17,585
Caithness	5,812	6.5	66	8,817
Loch Spynie	5,300	5.9	114	4,660
Dinnet Lochs	5,277	5.9	54	9,717
Loch Eye	4,870	5.4	88	5,556
Munlochy Bay	3,500	3.9	177	1,974
Loch Garten	2,800	3.1	142	1,971
Dornoch Firth	2,386	2.7	87	2,737
Loch of Skene	2,100	2.3	27	7,792
Findhorn Bay	1,950	2.2	105	1,856
Inner Firth of Tay	1,900	2.1	93	2,047
Loch of Strathbeg	1,744	1.9	247	706
Loch Clunie	1,500	1.7	178	843
Kilconquhar Loch	1,380	1.5	147	942
Rossie Bog	1,250	1.4	189	660
Island of Bute	1,127	1.3	130	1,767
Shetland (all sites)	1,083	1.2	109	995
Barons Folly	1,050	1.2	177	594
Sites in Upper Tay	1,022	1.1	99	1,029

Breeding Success

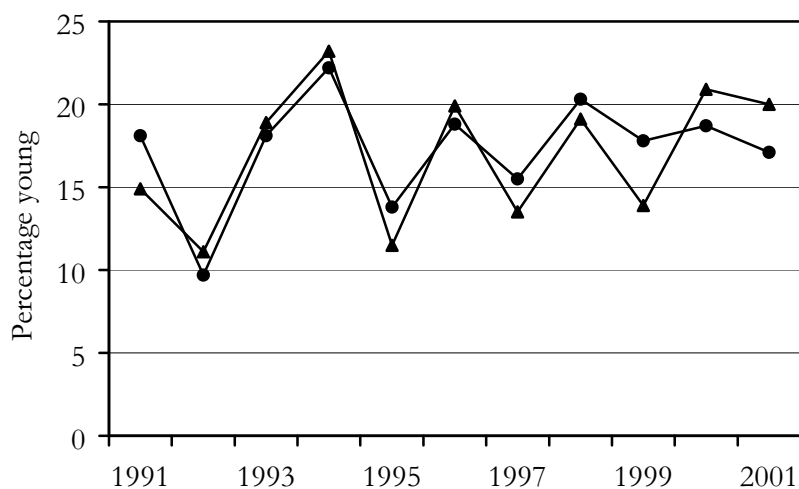
Totals of 21,700 Pink-footed Geese and 2,128 Greylag Geese were aged at various localities throughout Scotland and England between 16 September and 18 November. In addition, brood sizes were collected for 314 broods of Pinkfeet and 30 broods of Greylag Goose.

Pink-footed Goose flocks contained 17.1% young and the average brood size of successful pairs was 2.4 goslings. Greylag Goose flocks contained 20.0% young and the average brood size was 2.8 goslings per successful pair (Table 4). The estimate for Pink-footed Goose is within the typical range shown during the previous decade (mean proportion of young during the period 1991-2000 was 17.3%, 1.12 s.e.), although the estimate for Icelandic Greylag Goose is a little higher than average (mean for 1991-2000 16.7%, 1.34 s.e.) (Figure 4a). Average brood sizes during the same period were 2.20 (0.08 s.e.) and 2.47 (0.08 s.e.), respectively (Figure 4b).

Table 4. The proportion of young and mean brood size of Pink-footed and Greylag Goose flocks in autumn 2001 (regions defined in Table 2).

	Region	Total aged	% young	No. of broods	Mean brood size
Pink-footed Goose	North Scotland	0	-	1	3.0
	Northeast Scotland	14,414	17.0	268	2.4
	East Central Scotland	3,956	15.2	22	2.2
	Southeast Scotland	1,463	18.4	23	2.1
	West England	1,867	21.4	0	-
	Total	21,700	17.1	314	2.4
Greylag Goose	North Scotland	1,471	18.4	8	2.6
	Northeast Scotland	262	16.4	14	2.9
	East Central Scotland	293	29.7	8	2.6
	Southeast Scotland	102	24.5	0	-
	Total	2,128	20.0	30	2.8

(a)



(b)

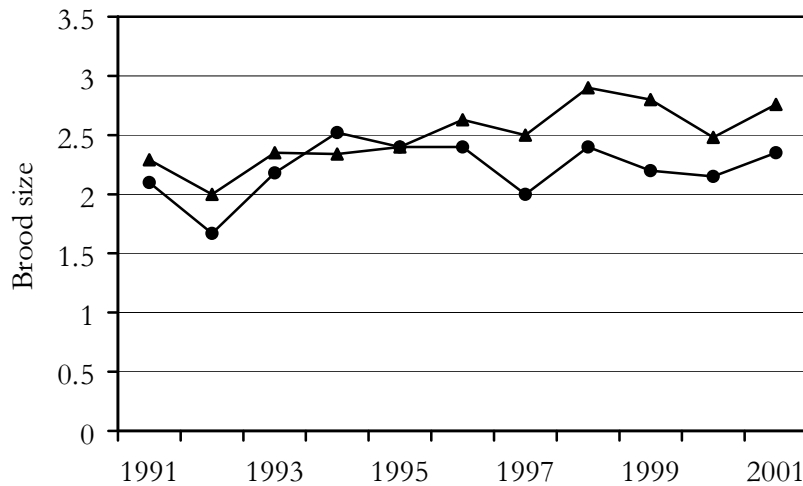


Figure 4. (a) The average percentage of young Pink-footed Geese (●) and Icelandic Greylag Geese (▲) in Britain, 1991-2001, (b) The average brood size of successful pairs of Pink-footed Geese (●) and Icelandic Greylag Geese (▲) in Britain, 1991-2001.

Most Pinkfeet were aged in Northeast and East Central Scotland and only in the former region was the sample spread throughout the autumn period. The temporal range in other regions was limited and varied between them (Figure 5).

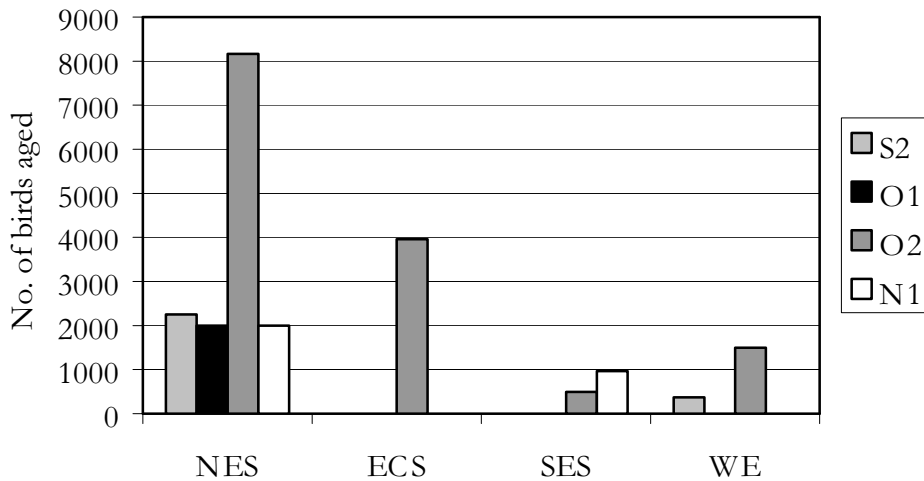


Figure 5. The temporal distribution of Pink-footed Goose age samples in each region during autumn 2001. Periods: S2 = late September, O1 = early October, O2 = late October, N1 = early November (regions defined in Table 2).

Due to their later migration and more limited range, the temporal and spatial distribution of Greylag Goose age samples was more limited. Samples were collected in four regions between late October and late November, the vast majority in North Scotland during late October (Figure 6).

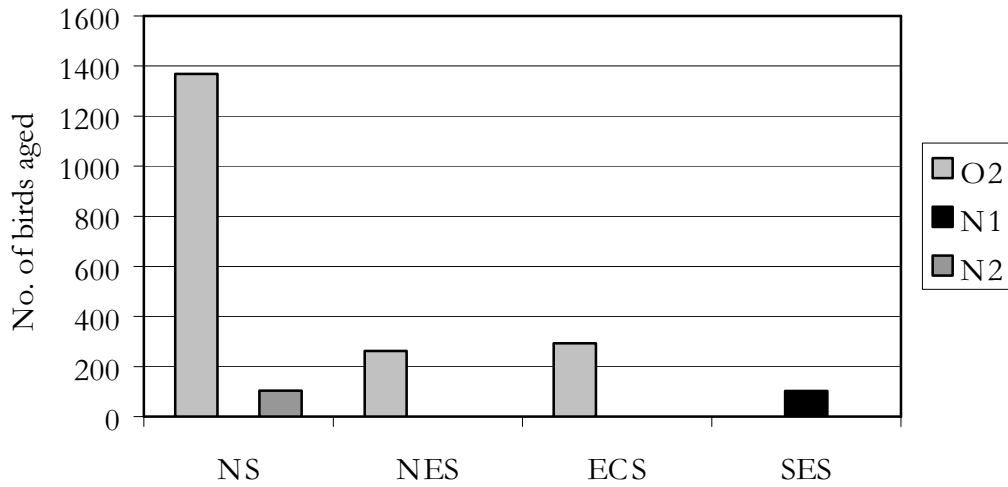


Figure 6. The temporal distribution of Greylag Goose age samples in each region during autumn 2001. Periods: O2 = late October, N1 = early November, N2 = late November (regions defined in Table 2).

DISCUSSION

The 2001 Icelandic-breeding Goose Census revealed large increases since the previous year in the populations of both Icelandic-breeding grey geese (Figure 7). The October count for Pink-footed Goose is the largest recorded since monitoring began and the November count of Greylag Goose is the largest since 1993. Both counts were carried out under favourable weather conditions and coverage was generally good, although two large areas (Ireland and inland Northumberland) were not counted. This may have affected both of these peak counts, although estimated counts for the main sites in these two regions were included in the respective population estimates.

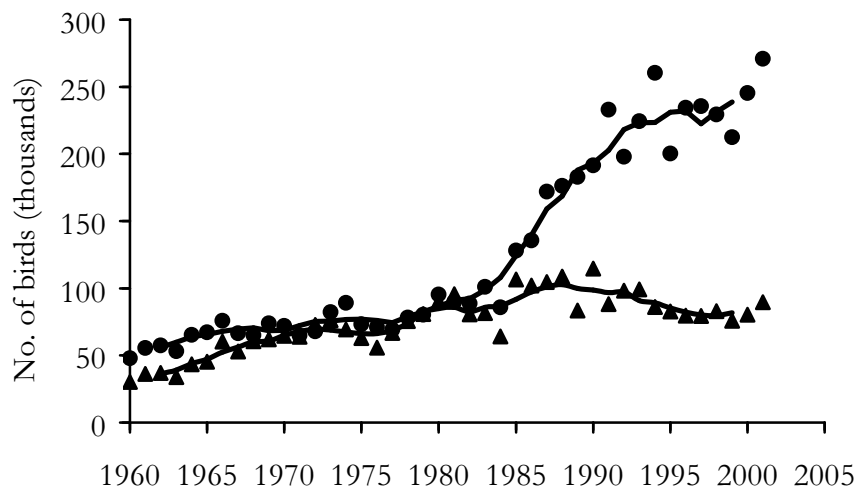


Figure 7. Population estimates of Pink-footed Goose (●) and Icelandic Greylag Goose (▲), 1960 to 2001. The 5-year running means (i.e. mean for 1999 is from population estimates for 1997-2001) are shown as lines.

The numbers of Pink-footed and Greylag Geese recorded as shot in Iceland during 2001/02 (of which almost all are taken before migration and therefore before the IGC) were 12,512 and 32,490, respectively (Figure 8).

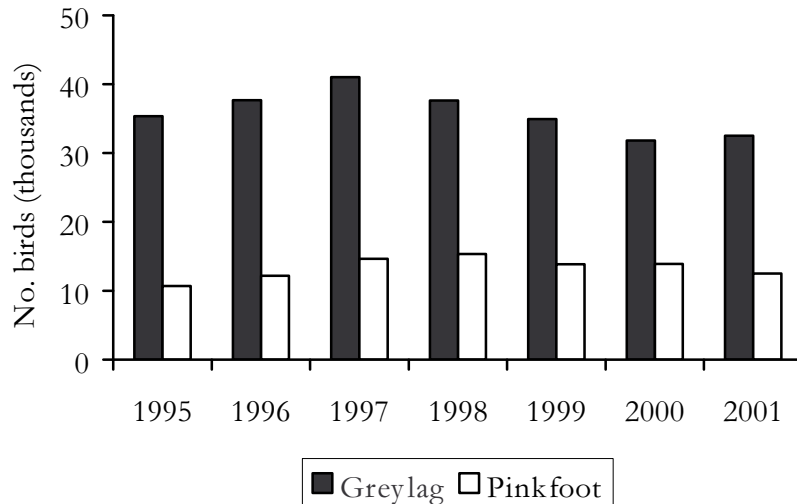


Figure 8. Numbers of Pink-footed Geese and Icelandic Greylag Geese shot in Iceland, 1995-2001. Source: Icelandic Wildlife Management Institute (<http://www.ni.is/veidi/>).

Although these are not the final estimates, they are unlikely to change significantly, however, as less than 1% of hunters have still to submit their returns for 2001 (A. A. Jónsson pers. comm.). Both of these estimates are slightly below the long-term average (mean since 1995: 13,309 0.60 s.e. and 35,839 1.21 s.e., respectively).

Following the methods of Ogilvie & Boyd (1976), crude estimates of survival can be calculated from count and productivity data. These suggest that between the censuses in 2000 and 2001, survival in Pink-footed Geese was 0.92 and in Greylag Geese was 0.89. In other words, some 20,755 Pinkfeet and 8,622 Greylag Geese died in this time. Given the rates of hunting mortality in Iceland alone, it is likely that both of these estimates are too low, particularly that for Greylag Goose, and therefore either counts in 2000 or the estimate of productivity in 2001 are too low, or the count in 2001 is too high, or a combination of these factors. Of course, hunting bag estimates may also be incorrect to some degree, particularly in Britain where they have only been estimated indirectly (Frederiksen 2003).

For Pink-footed Geese, this degree of error is slight, however: a smaller population estimate in 2001 by approximately 5,000 birds or an increase of approximately 2% in the estimate of productivity is enough to 'balance' the population parameters. For Greylag Geese, the degree of error is greater and larger changes to population parameters are needed. This problem has recently been discussed in greater detail elsewhere (Frederiksen et al. in prep., Hearn & Frederiksen 2002) and highlights the need for independent verification of these parameters. An important step towards this will be the development of improved count methodologies, including ideally a stratified sampling element to the IGC and annual counts of Greylag Geese in Britain prior to the arrival of Icelandic migrants. Counters are therefore encouraged to contribute to this process by counting their IGC site during September, in addition to the traditional October and November counts. Further information about this can be obtained from the Waterbird Monitoring Unit at WWT.

ACKNOWLEDGEMENTS

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