



**GREENLAND BARNACLE GEESE *BRANTA*
LEUCOPSIS IN BRITAIN AND IRELAND:
RESULTS OF THE INTERNATIONAL
CENSUS, MARCH 2003**

WWT Report

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SUMMARY

Between 1959 and 2003, eleven full international surveys of the Greenland population of Barnacle Geese have been conducted at wintering sites in Ireland and Scotland using a combination of aerial survey and ground counts. This report presents the results of the 2003 census, conducted between 27th and 31 March 2003 surveying a total of 323 islands and mainland sites along the west and north coasts of Scotland and Ireland. In Ireland, 30 sites were found to hold 9,034 Greenland Barnacle Geese and in Scotland, 35 sites were found to hold 47,256. An additional 96 geese were present on the Dyfi estuary, giving a total wintering population of 56,386. This equates to a 4.6% increase on the 1999 census total.

Growth of numbers on Islay appears to have slowed over recent years. An increase of 3.7% has occurred since the survey of winter 1998/99 compared to a previous increase of 13.0% from 1997 to 1999. Likewise, numbers of geese throughout the remainder of Scotland have increased by 7.9% compared with 29.3% between the surveys of 1997 and 1999. Total numbers of geese on the Inishkea Islands were the lowest since 1983, while numbers at other Irish sites combined were found to be still increasing.

Several key sites hold the majority of geese. A comparison of the number of occupied sites in each of the census years indicates that the number of occupied sites in 2003 was higher than in any previous year. In Scotland, combined numbers at the key sites have undergone a continued high rate of increase, whereas numbers at outlying sites have stabilised following an initial increase up to the early 1970s. In Ireland, combined numbers at the key sites have similar rates of increase as areas elsewhere, although much of the increase is caused by expanding numbers at Ballintemple/Lissadell. Numbers on the Inishkeas Islands have remained relatively constant since the 1960s. Numbers at sites outside these two key areas have continued to increase steadily from the mid 1970s with a slowing of growth since 1999.

The 2003 census found 12 sites that exceeded nationally important numbers and eight sites exceeding internationally important numbers. The number of sites exceeding nationally (and internationally) important numbers has decreased since 1959.

The current monitoring strategy of one international census every five years is inadequate in terms of fully understanding population dynamics, distribution and use of sites throughout the wintering range. Aerial surveys are restricted to late March/early April, therefore the spring census provides only a single 'snapshot' of the distribution across the range. There is a clear need to increase both coverage and frequency of counts across the wintering range above and beyond that which is currently being achieved, to meet the international timetable for the revision of waterfowl population estimates and 1% thresholds. An additional survey of protected sites within each six-year period is required in Britain to meet the requirements for Common Standards Monitoring.

Consequently, it is recommended that two full international censuses are held every six years to enable revision of estimates in line with the established international timetable. In addition, survey of internationally and nationally important sites should be undertaken at least once more during every six-year period to meet site monitoring obligations. The feasibility of mid-winter counts, to ascertain the true midwinter distribution and identify those sites which are important at that time of year, should be explored to help improve knowledge of site use and potential impacts of changing site management.

1 INTRODUCTION

The world range of the Barnacle Goose *Branta leucopsis* comprises three distinct populations: the North Russian/Eastern Baltic breeding population which winters in the Netherlands and north Germany; the Svalbard breeding population which winters on the Solway Firth, Scotland; and a third population which breeds in north east Greenland (Ogilvie *et al* 1999). The Greenland population winters almost exclusively in north and west Scotland and west Ireland. In Scotland, the wintering range extends throughout the Inner and Outer Hebrides and north to Orkney. On the west coast of Ireland, the main concentrations occur between the Dingle peninsula, Co. Kerry and Inishowen in north Co. Donegal.

The first full survey of Scottish and Irish sites was undertaken in 1959/60 (Boyd 1968), since when there have been 11 full international censuses of the Greenland population, conducted at approximately five-yearly intervals. Some of the wintering sites can be surveyed by ground counts, but because of the inaccessible nature of most sites (many are uninhabited, comparatively remote islands), aerial survey is required to achieve complete coverage of the population. This report presents the results of the 2003 census which was co-ordinated in Scotland by The Wildfowl & Wetlands Trust (WWT) and in Ireland by the National Parks and Wildlife Service (NPWS).

2 METHODS

The methodology employed for the international census has been previously described in full (Walsh & Merne 1988). Weather conditions and length of daylight hours restrict the dates of aerial survey to late March or early April (Boyd 1968). Aerial surveys are conducted using a high-winged aircraft flying at approximately 150-200 m above ground or sea. Counts are undertaken as the geese are flushed by the approaching aircraft. One observer makes a visual estimate of flock size while the second attempts to photograph the geese. The photographs are examined later and, if of good quality, are used to derive the count for the census total. The visual count is used where the quality of the photograph is poor or where there were difficulties photographing the entire flock. All islands where Barnacle Geese have previously been recorded are surveyed, as are all other islands and adjacent mainland coast where there is suitable vegetation present.

Ground counts are made on several key sites in Scotland and Ireland where large flocks occur and where access is possible. Ground counts are used to derive the census totals for these sites, since this method provides the most accurate estimates for large flocks. The first ground-based counts on Islay were made in 1952/3 and these have continued annually since. In recent years, two or three counts have been performed on Islay each winter (in late autumn, mid winter, and early spring), undertaken by SNH as part of the Islay Goose Management Scheme, to assess numbers of Greenland White-fronted Geese *Anser albifrons flavirostris* and Greenland Barnacle Geese. The international census of Barnacle Geese is timed to coincide with the spring count. Counts are usually repeated on two consecutive days and the mean of these (the 'adopted' count), unless one is deemed inaccurate, is used as the island total. SNH and the Royal Society for the Protection of Birds (RSPB) undertake at least two counts each winter on both Tiree and Coll and sites in Southwest Argyll, co-ordinated with those on Islay. SNH also carries out monthly ground counts on South Walls, Orkney as part of the Barnacle Goose Refuge Scheme and have done so since winter 1994/95. As part of the international census, ground-based counts are also undertaken at all other known sites (where accessible), e.g. the Sutherland coast and North Uist. In Ireland, ground counts on the Inishkea Islands began in 1962 and have continued annually to the present, while regular counts have been made at mainland sites at Lissadell/Ballintemple.

The 2003 aerial survey of Scottish sites was conducted between 27th and 30 March 2003, using a twin-engined Partenavia aircraft. A total of 15 hours' flying was undertaken surveying approximately 211 islands and remote areas along the west and north coast of Scotland. Surveys were conducted only when weather conditions were suitable. The daily flight itinerary comprised:

27 March: Glasgow, Islay, west coast Argyll, Mull, Coll/Tiree, Small Isles, west Skye, Outer Hebrides from Barra Head to Benbecula.

29 March: Benbecula, Monachs, North Uist/Sound of Harris, west coast Skye.

30 March: Shiant, Skye, Wester Ross, Sutherland, Caithness, Inverness.

Aerial survey in Ireland was undertaken using a Rheims Rocket Cessna and was carried out on one day, 31 March 2003 (see Merne & Walsh (2003) for full details). Approximately 6 hours' flying were undertaken, surveying sites in a south to north direction along the west coast of Ireland from the Blasket Islands, Co. Kerry to Inishtrahull, Co. Donegal. Weather conditions were good, with good light and visibility and generally light winds.

Ground counts at the following sites were used to calculate the total population estimate: Islay (31 March 2003), Coll (31 March 2003), Tiree (31 March 2003), Oronsay (1 April 2003), Summer Isles (16 March 2003), Aird Mhic Caoilt, Grenitote, Goula/Balranald, Balemor and Kirkibost, North Uist (29th and 30 March 2003), South Walls (27 March 2003), Inishkea Islands (31 March 2003), Ballintemple/Lissadell, Rosturk (Clew Bay), Termoncarragh Lake, Glebe and Fallmore (The Mullet) and Trawbreaga Bay (on or close to date of census, see Merne & Walsh (2003) for full details).

3 RESULTS

During the 2003 census, a total of 323 islands and mainland sites was visited. Thirty of the 110 sites surveyed in Ireland were found to hold Greenland Barnacle Geese and 35 of 213 in Scotland were found to have birds present. Counts at all sites holding Greenland Barnacle Geese during the 2003 census are given in Table 1 and their locations are shown in Figs. 1 & 2. Sites visited but where no geese were found are listed in Appendix 1.

The Scottish total was calculated to be 47,256 while that of Ireland was 9,034. A flock of Greenland Barnacle Geese was also recorded at the Dyfi estuary, Wales in winter 2002/03 (R. Jones pers. comm.). In March 2003, 96 geese were present and, since these birds were absent in summer, arriving and departing within a few days of the Greenland White-fronted Geese at the site, they are thought to be part of the Greenland stock. Inclusion of this small Welsh flock adjusts the total wintering population to 56,386.

Overall, 96% of the census total was comprised of estimates from ground counts (86%) and from photographs obtained during aerial survey (10%). In Scotland, only three small flocks were counted by visual estimation during aerial survey. In Ireland, 25% of counts were derived from visual estimates, although flock size was relatively small minimising potential errors. The accuracy of visual counts has been shown to be acceptable when numbers have been compared to those derived from photographic verification of individual flocks (Delany & Ogilvie 1994, Cranswick *et al* 2000). Likewise in 2003, although only 4% of the count total was derived using visual estimates, a comparison of counts where both estimates and photographs were available gave reasonable correlation (Fig. 3).

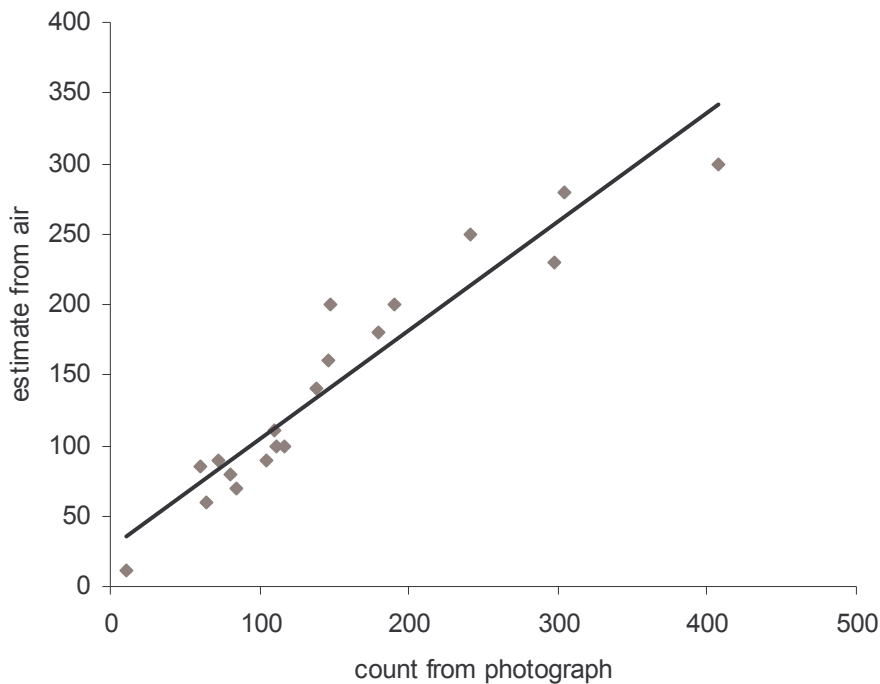


Figure 1. Accuracy of visual estimates compared to photographic counts of individual flocks during the 2003 aerial survey

Table 1. Irish sites holding Barnacle Geese in March 2003 (unless indicated, counts were derived from estimates during aerial survey; G denotes ground count, P denotes photographic verification)

County	Site	Grid reference	Number of geese	Method	
Ireland					
Donegal	1	Rathlin O'Birne	G4680	475	
	2	Inishbarnog	G6496	18	
	3	Inishkeel	B7000	210	
	4	Roaninish	B6502	255	
	5	Inishkeeragh (Donegal) group	B6812	235	
	6	Inshmeane	B7828	320	
	7	Inishdoeey	B8938	150	
	8	Inishbeg	B8939	140	
	9	Trawbreaga Bay	C4549	254	G
Sligo	10	Ballintemple	G5843	2,300	G
	11	Inishmurray	G5754	138	
Mayo	12	Frehill Island	L7070	26	
	13	Rosturk, Clew Bay	L8090	149	G
	14	Duvillaun More	F5816	105	
	15	Fallmore	F6118	52	G
	16	Kid Island	F7843	105	
	17	Inishglora	F6131	30	
	18	Termoncarragh	F6435	210	G
	19	Inishkea north	F5723	1,052	G
	20	Inishkea south	F5521	1,000	G
	21	Glebe, The Mullet	F6020	114	G
	Galway	22	Birmore Island	L8026	412
23		Duck Island	L7627	7	
24		Croaghnaakeela Island	L6832	4	
25		Illaunacroagh	L6934	456	P
26		Cruagh	L5355	23	
27		Inishshark	L4865	470	P
28		Inishbofin	L5366	9	
29		Davillaun	L5866	161	P
Clare		30	Mutton Island	Q9774	154
Irish Total			9,034		
Scotland					
Islay	31	Islay mainland	NR2865	36,478	G
Inner Hebrides	32	Nave Island	NR2875	45	P
	33	Island of Danna	NR6978	400	G
	34	Eilean na Cille	NR7597	30	
	35	Oronsay	NR3588	510	G
	36	Bac Mor	NM2438	20	
	37	Coll	NM1655	994	G
	38	Tiree	NM0548	2,613	G
	Skye	39	Isay	NG2157	190
40		En Creagach	NG2965	74	P
41		En Trodday	NG4479	102	P

County	Site	Grid reference	Number of geese	Method
Outer Hebrides	42	Muldoanich, south of Barra	271	P
	43	Fiaray, Sound of Barra	384	P
	44	Ceann Iar, Monach Isles	40	P
	45	Ceann Ear, Monach Isles	132	P
	46	Kirkibost, North Uist	158	G
	47	Balemore, North Uist	312	G
	48	Goula	189	G
	49	Vallay	272	P
	50	Grenitote	77	G
	51	Ensay	216	P
	52	Killegary, Sound of Harris	102	P
	53	Opsay, Sound of Harris	90	
	54	Aird Mhic Caoilt	23	G
	55	Berneray, Sound of Harris	119	P
	56	Boreray, Sound of Harris	706	P
	57	Shillay, Sound of Harris	252	P
	58	Coppay, Sound of Harris	3	P
	59	En Mhuire, Shiantas	351	P
	60	Garbh En, Shiantas	84	P
	West Sutherland Coast	61	Summer Isles	53
62		Soyea Island	40	P
63		En an Roin Mor	57	P
North Sutherland Coast	64	Eilean Hoan	669	P
Orkney	65	South Walls	1,200	G
Scottish total			47,256	
Wales				
Dyfed	Dyfi Estuary	SN6090	96	G
Total population			56,386	

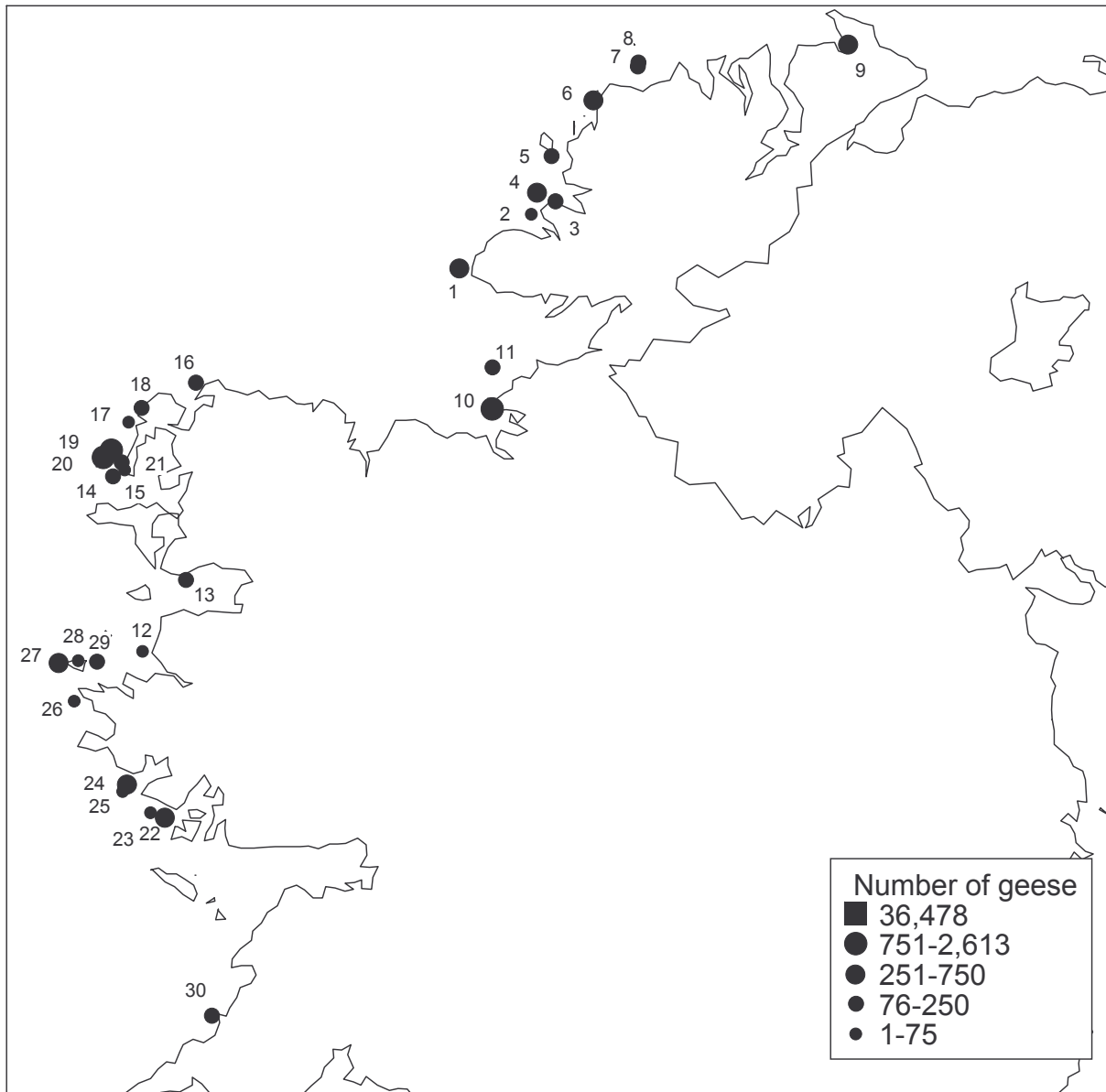


Figure 2. Sites holding Barnacle Geese in Ireland in March 2003 (see Table 1 for key to site numbers)

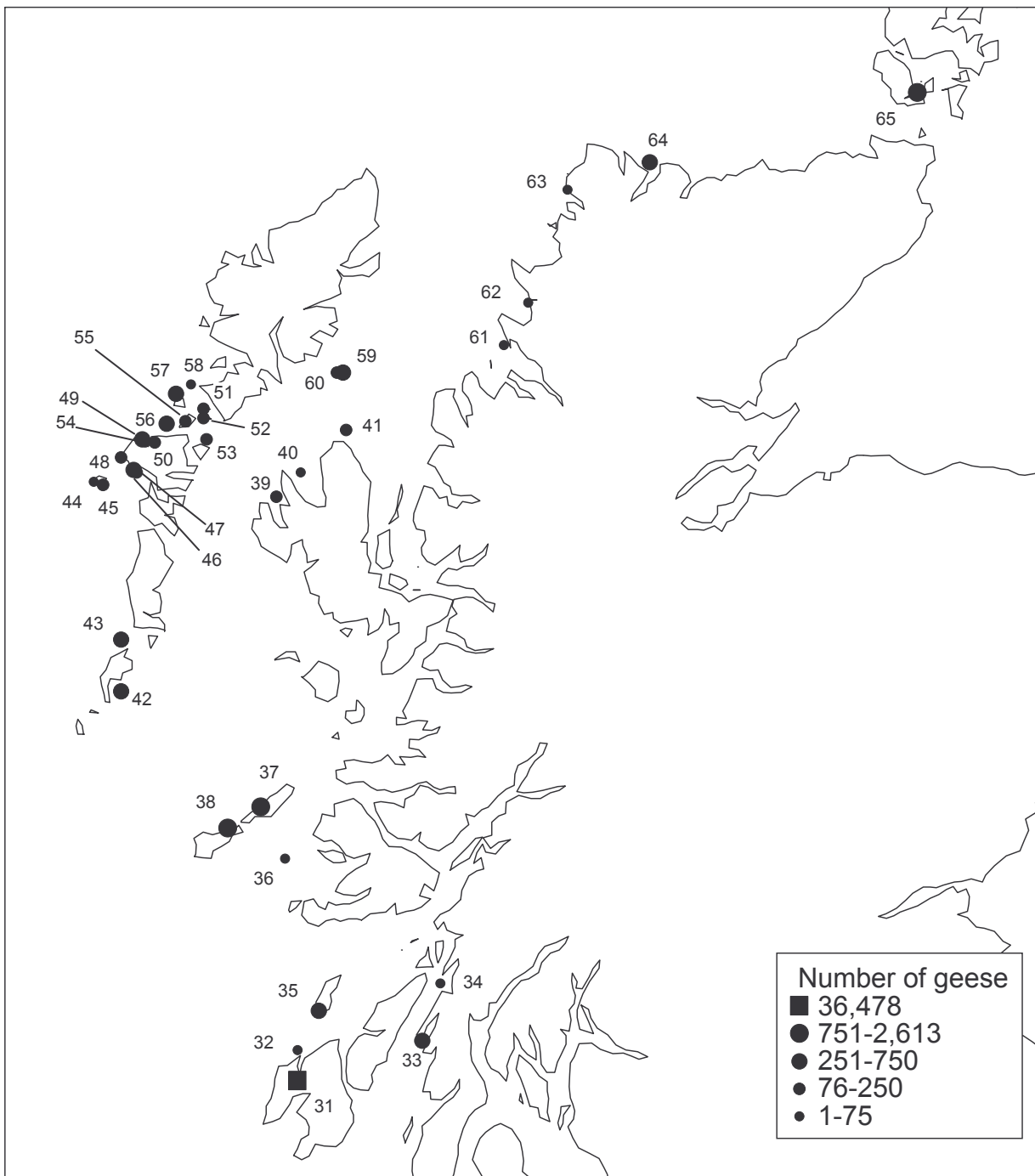


Figure 3. Sites holding Barnacle Geese in Scotland in March 2003 (see Table 1 for key to site numbers)

4 DISCUSSION

4.1 Census total and accuracy

The population of Greenland Barnacle Geese, as surveyed in Britain and Ireland in March 2003, was 56,386, the highest total to date having surpassed the previous peak count of 53,823 in March 1999. Count conditions during the census were good, and ground and aerial counts were made over the course of just a few days, minimising the risk of geese having moved between sites and resulting in them being missed or double-counted. Estimates derived from visual estimates during aerial survey – a potential area of inaccuracy – comprised only 4% of the census total. Consequently, it is recommended that the population estimate for Greenland Barnacle Geese is revised, following standard rounding conventions (see Kershaw & Cranswick 2003), to 56,400.

4.2 Long-term trend and distribution

Total numbers of Greenland Barnacle Geese have continued to follow an upward trend (Fig. 4). The increase on Islay since the 1960s (except for a drop in numbers in the 1980s) has been maintained. Although overall numbers elsewhere in Scotland remained relatively constant throughout the 1970s and 1980s, numbers have increased markedly since 1994. Numbers on the Inishkea Islands have remained comparatively steady while numbers at other Irish sites are still following a long-term upward trend.

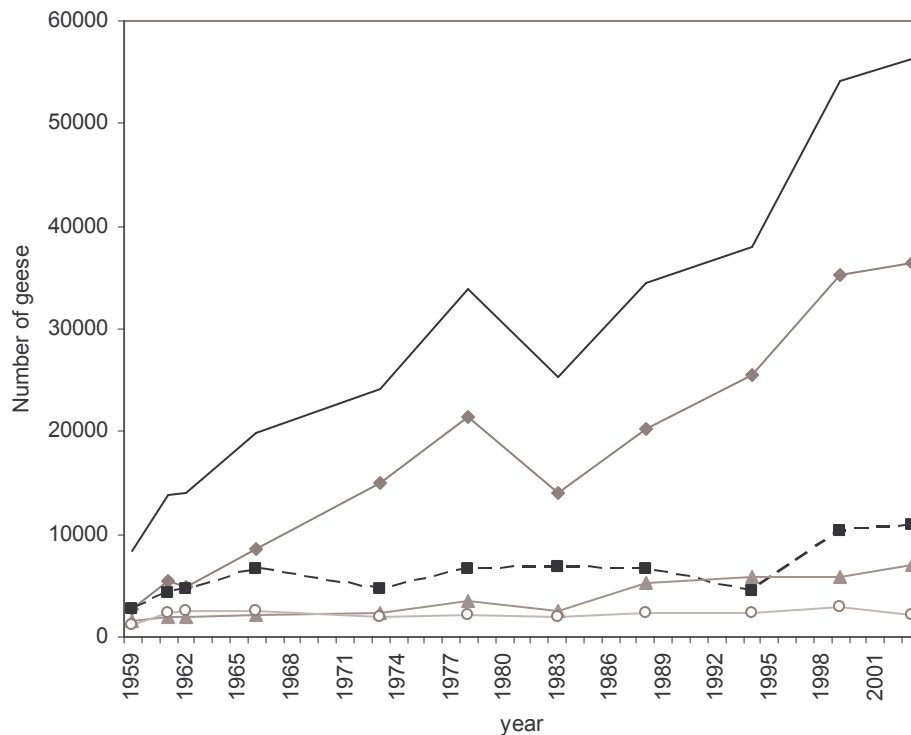


Figure 4. Census totals for the Greenland population of Barnacle Geese (— Total population, ◆ Islay, - -■- - Scotland excluding Islay, ○ Inishkea Islands, ▲ Ireland excluding Inishkea Islands)

It has been previously suggested that the population is becoming concentrated at a small number of sites while outlying sites away from these key areas have seen a decline in numbers (Delany & Ogilvie 1994, Cranswick *et al* 2000). Changes in distribution and use of individual islands have occurred since 1959, although a comparison of the number of occupied sites in each of the census years does not indicate any clear trend and, overall, the number of occupied sites in 2003 was higher than in any previous year (Fig 5).

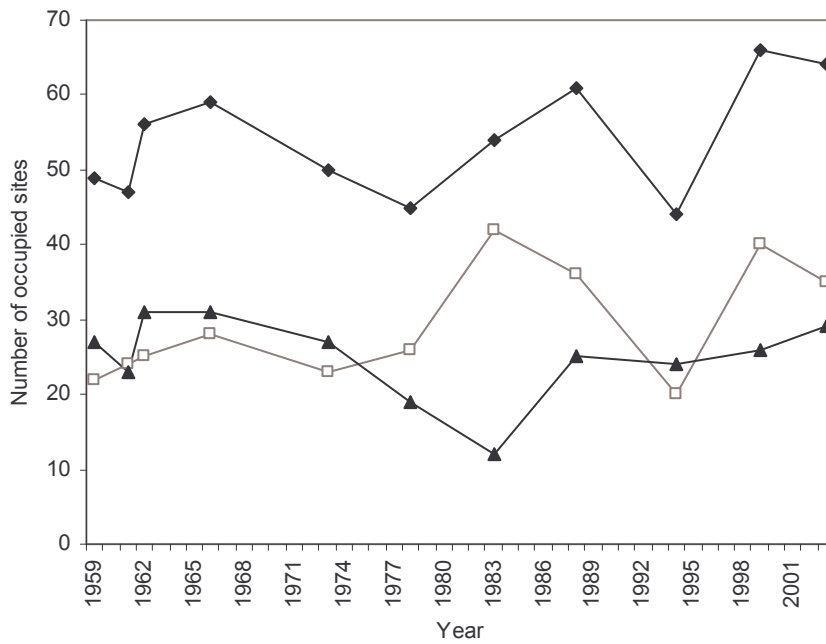


Figure 5. Number of sites occupied by Greenland Barnacle Geese in spring censuses 1959-2003 (♦ Scotland and Ireland, □ Scotland, ▲ Ireland)

Results of recent censuses have indicated that the increase in the population as a whole is largely dictated by increases at a small number of key sites. Currently, Islay, Tiree, South Walls, Inishkea Islands and Ballintemple/Lissadell hold the majority of geese, while smaller numbers are found outside these key areas. Overall numbers at these key sites have increased more than six-fold since 1959 (Fig. 6a), while total numbers outside these areas are still increasing, albeit at a lower rate (less than a three-fold increase).

In Scotland, combined numbers at the key sites have undergone a continued high rate of increase, whereas numbers at outlying sites have stabilised following an initial increase up to the early 1970s (Fig. 6b). Census data indicate that some sites such as the Treshnish Isles may have fallen out of favour since the late 1970s/early 1980s. This has been coincident with an increase in use of sites such as Boreray, Eilean Hoan and South Walls. Delany & Ogilvie (1994) suggested that many uninhabited islands have seen decreases in numbers of geese owing to habitat deterioration brought about by the cessation of grazing. In contrast, habitat changes caused by movement towards more intensive farming methods, and the establishment of goose management schemes, have attracted geese to alternative sites.

In Ireland, combined numbers at the key sites show similar rates of increase as areas elsewhere, although much of the increase is caused by expanding numbers at Ballintemple/Lissadell. Numbers on the Inishkeas Islands have remained relatively constant since the 1960s (Fig. 6c). Numbers at sites outside these two key areas have continued to increase steadily from the mid 1970s with a slowing of growth since 1999.

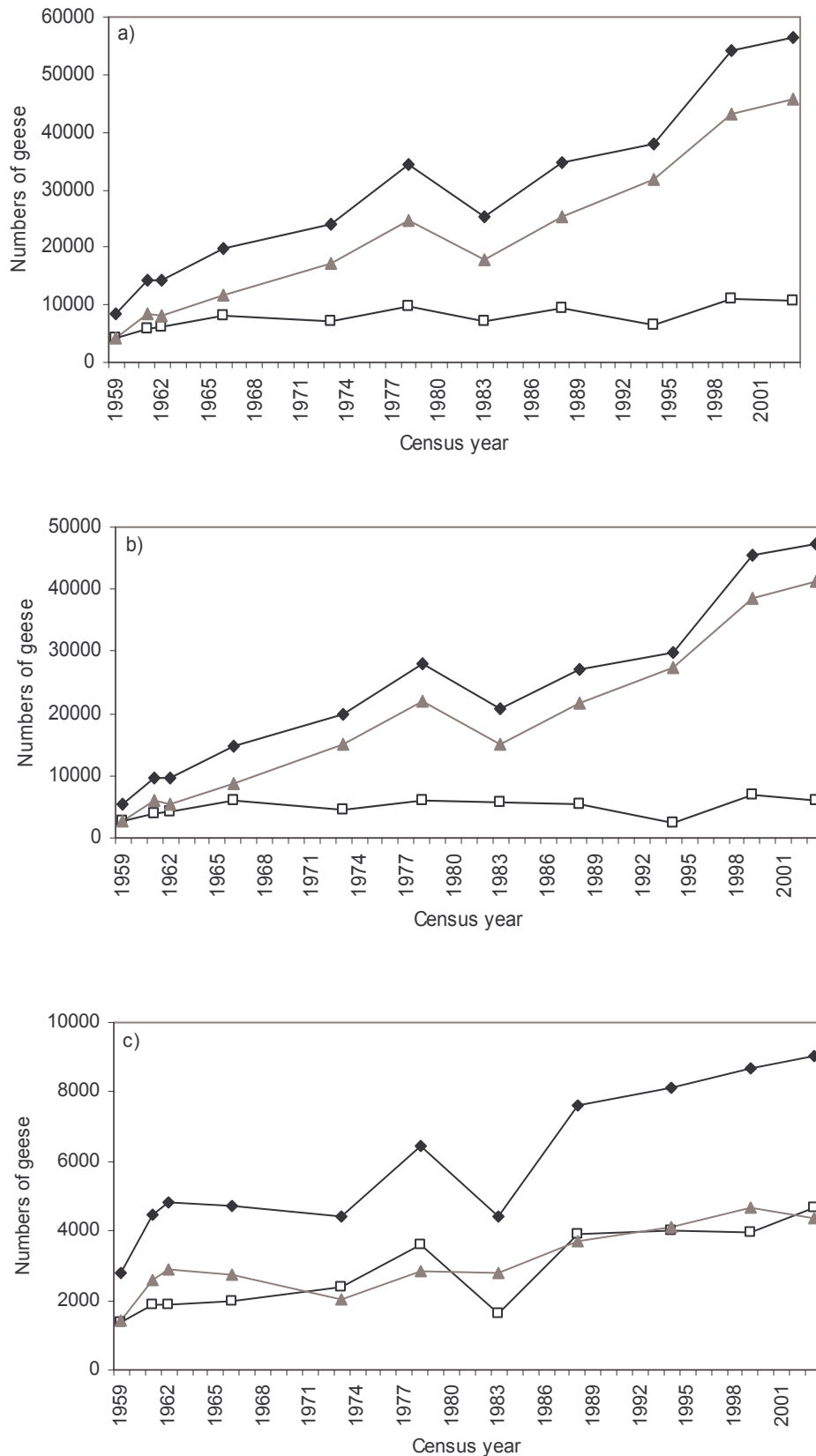


Figure 6. Trend in the number of geese found within and outside key sites: a) Scotland and Ireland combined - **◆** All sites, **▲** Key sites, **□** other sites; b) Scotland only - **■** All sites, **▲** Key sites, **□** other sites; and c) Ireland only - **■** All sites, **▲** Key sites, **□** other sites (key sites are Islay, Coll, Tiree and South Walls in Scotland; Inishkea Islands and Balintemple/Lissadell in Ireland).

There has been a 4.6% total increase in Greenland Barnacle Goose numbers between 1999 and 2003. The percentage change at the key sites of Islay, and the Inishkea Islands, and in Ireland and Scotland are given in Table 2. Growth of numbers on Islay appears to have slowed over recent years. An increase of 3.7% has occurred since the survey of winter 1998/99 compared to previous increases of 13.0% between 1997 and 1999, and 16.3% from 1994 to 1997. Likewise, numbers of geese throughout the remainder of Scotland have increased by 7.9% compared with 29.3% between the surveys of 1997 and 1999, and 37.2% between 1994 and 1997. By comparison, total numbers of geese on the Inishkea Islands during the March census were the lowest since 1983.

Table 2. Percentage change in Barnacle Goose numbers in Scotland and Ireland between March 1999 and March 2003

	March 1999	March 2003	Change (%)
Scotland total	45,159	47,256	4.6
Islay	35,172	36,478	3.7
Scotland excluding Islay	9,987	10,778	7.9
Ireland total	8,664	9,034	4.1
Inishkea Islands	2,841	2,052	-38.5
Ireland excluding Inishkea Islands	5,823	6,982	16.6
Population total	53,823	56,386	4.6

This apparent slowing in growth may be influenced by changes in survival and productivity within the population. The mean percentage of first-winter birds on Islay between 1994-1998 (9.22%) and 1999-2003 (8.84%) were, however, both lower than the long-term average for 1961-2003 (11.76%) (MA Ogilvie unpubl. data). Likewise, the five-year mean for first-winter birds on the Inishkea Islands between 1999-2003 (6.04%) was below that of the long term average (7.16%) (D. Cabot unpubl. data). Consecutive five-year means for the percentage of young on Islay have decreased since the mid-late 1980s, although numbers on Islay have continued to undergo substantial increases throughout this period (Fig 7). Furthermore, a large increase in the population was recorded between 1994-1998 when the five-year mean was little different to that of 1999-2003. Potential decreases in mortality owing to the decrease in shooting over recent years and the introduction of goose management schemes, aimed in part to benefit geese, may have supported the continued population growth within this period. Indeed, Pettifor *et al* (1999) have shown that the population is more susceptible to changes in mortality rather than productivity.

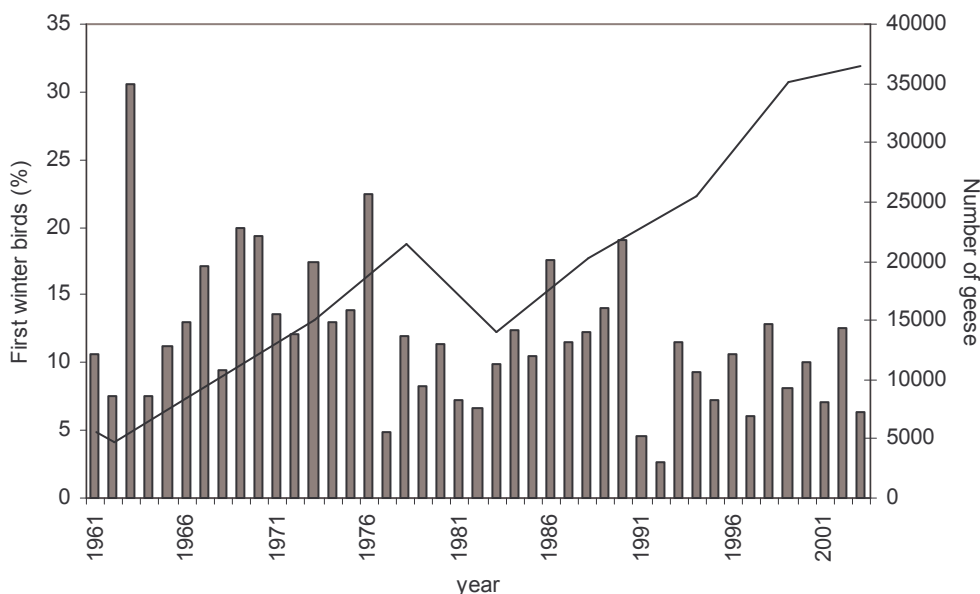


Figure 7. Population size (—) and percentage of first-winter birds (columns) of Greenland Barnacle Geese on Islay 1961-2003

4.3 Internationally and nationally important sites

A site is internationally important if it regularly supports 1% of the individuals in the population (following criterion 5 of the Ramsar Convention). In Britain, a site is considered nationally important if it regularly holds 1% or more of the British estimate, and in Ireland if it holds 1% or more of the All-Ireland total. Assessments of site importance are usually made on the basis of a minimum of three years' data, but in the absence of regular counts at many of these sites, we have here assessed the 2003 count against 1% of the international, British and all-Ireland estimates obtained during this census. Based on these totals, the 1% threshold for international importance is 564, for national importance in Britain is 473 and for All-Ireland importance is 90.

The 2003 census found 12 sites that exceeded the British or All-Ireland threshold, and eight sites that exceeded internationally important numbers. The number of sites exceeding nationally (and internationally) important numbers (based on the published 1% threshold at that time) has decreased since 1959. The number of sites exceeding internationally important numbers in particular seems to following a long-term downward trend (Fig.8).

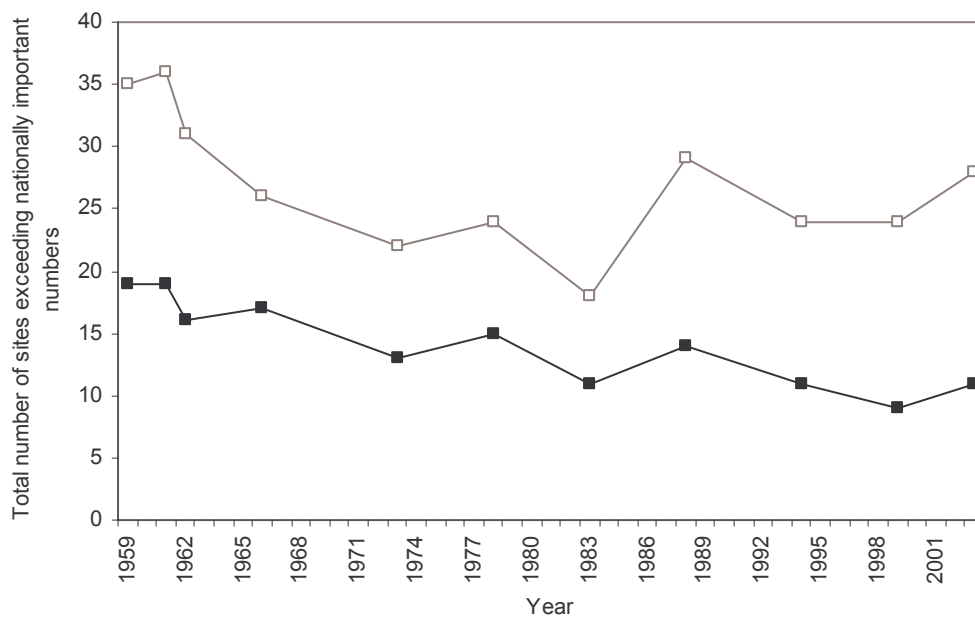


Figure 8. Number of sites in Britain and Ireland holding nationally or internationally important numbers of Greenland Barnacle Geese in census years 1959-2003 (□ nationally important sites, ■ Internationally important sites)

Those sites exceeding the threshold for national importance in the 2003 census are listed in Table 3. Many of these sites are protected wholly or in part by classification as Special Protection Areas (SPAs) under the EC Birds Directive. Oronsay and South Walls, both of which held more than 1% of the international total in 2003, are not classified as SPAs. The latter is omitted from the current SPA boundary (despite consistently exceeding internationally important numbers since the 1980s), on the basis that it is an area of largely agricultural rather than natural or semi-natural habitat.

Table 3. Sites holding more than 1% of international, British or Irish totals of Greenland Barnacle Geese in 2003 and their conservation status

Site name	SPA classification (<i>italics denote those sites where Barnacle Geese are a qualifying feature of the SPA</i>)
Sites holding >564 birds in March 2003:	
Islay	<i>Gruinart Flats, Laggan, Bridgend Flats, Rhinns of Islay, Eilean na Muice Duibhe</i>
South Walls	
Tiree	<i>Sleibhtean agus Cladach Thiriodh</i>
Coll	<i>Coll</i>
Oronsay	
Boreray	<i>North Uist Machair and Islands</i>
Eilean Hoan	<i>North Sutherland Coastal Islands</i>
Inishkea Islands	Inishkea Islands
Ballintemple/Lissadell	Cummeen Strand & Drumcliffe Bay
Sites in Britain holding >473 birds:	
Islay	<i>Gruinart Flats, Laggan, Bridgend Flats, Rhinns of Islay, Eilean na Muice Duibhe</i>
South Walls	
Tiree	<i>Sleibhtean agus Cladach Thiriodh</i>
Coll	<i>Coll</i>
Oronsay	
Boreray	<i>North Uist Machair and Islands</i>
Eilean Hoan	<i>North Sutherland Coastal Islands</i>
Sites in Ireland holding >90 birds:	
Rathlin O'Birne	Rathlin O'Birne Island
Inishshark	
Duvillaun More, Mayo	
Kid Island	Stags of Broadhaven
Glebe, The Mullet	Mullet & Black Sodbay/Broadhaven complex
Inishmurray, Sligo	Inishmurray
Inishbeg, Donegal	Inishbofin, Inishdooyey & Inishbeg
Rosturk, Clew Bay	
Inishdooyey, Donegal	Inishbofin, Inishdooyey & Inishbeg
Mutton Island	Mutton Island
Davillaun, Galway	
Inishkeel, Donegal	Inishkeel
Termoncarragh	Termoncarragh lake, Mullet & Black Sodbay/Broadhaven complex
Inishkeeragh (Donegal) group	
Trawbreaga Bay	Trawbreaga Bay
Roaninish, Donegal	Roanish
Inshmeane	Inishsirer & Inshmeane
Birmore Island	

4.4 Recommendations

Although numbers of Barnacle Geese at several of the key sites are surveyed annually, there are limited data available for those sites outside these areas. Aerial surveys have traditionally been undertaken in late March/early April, and therefore provide only a single 'snapshot' of the distribution across the non-breeding range and give little information on within-winter use of individual haunts. Further, surveys of the more remote sites are only made once every five years and thus provide little information on between-year variation in site use. Indeed, given the departure of the geese on their northward spring migration, typically in mid April, it is likely the distribution of geese at the time of the census is related to pre-migration requirements and may not be representative of winter distribution. Past surveys have typically been made in a single-engined aircraft, which are generally slower, have shorter endurance, and are less able to fly through inclement weather to reach areas where survey might be made than the twin-engined aircraft employed in Scotland in more recent censuses, and this to some extent dictated the timing of the census.

The current monitoring programme of one international census every five years is inadequate in terms of fully understanding population dynamics, distribution and use of sites throughout the wintering range. The generally accepted international timetable is for waterbird population estimates to be revised every three years and the 1% thresholds revised once every nine years (Rose & Stroud 1994). Therefore, the frequency of the international census should be increased to once every three years to fulfil these objectives.

Under the Environmental Protection Act 1990 (section 133(d)), one of the functions to be undertaken through the Joint Nature Conservation Committee (JNCC) is the establishment of Common Standards Monitoring (CSM) of designated sites in Britain to allow reliable assessment of the conservation status of key interest features and to identify priorities for action at a local and national scale (JNCC 2004). For those protected sites where birds are a notified or qualifying interest feature, the minimum requirement for CSM is one survey per cycle of six years. If, however, the feature is based on site numbers, it is recommended that surveys are conducted in at least three different relevant seasons within the six-year cycle. An average of three or more counts should then be used to assess the feature condition against pre-set targets and allow confident judgement of the trend in condition of the interest feature. Following these recommendations, there is a clear need to increase both coverage and frequency of counts across the wintering range above and beyond that which is currently being achieved.

Consequently, it is recommended that two full international censuses are held every six years to enable revision of estimates in line with the established international timetable. In addition, survey of internationally and nationally important sites should be undertaken at least once more during every six-year period to meet site monitoring obligations. Further, survey should be made of the entire wintering range in mid winter (using aerial survey where necessary) to ascertain the true midwinter distribution and identify those sites which are important at that time of year. Ideally, this should be co-ordinated with the midwinter count on Islay and adjacent haunts, although the precise synchronisation of survey at this time may not be as critical as in spring since birds are likely to be more sedentary in mid winter. Site monitoring requirements should be reassessed following such a survey to determine whether more frequent survey of sites that support internationally or nationally important numbers in mid winter is necessary. A similar survey should be made in early winter, shortly after the arrival of birds in Britain and Ireland following their autumn migration, since, as with many other goose populations, it is likely that site use may differ at this time of year also.

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County	Site	Grid reference	County	Site	Grid reference	
	Reisa an t-Sruith	NR7399	Islands south of Barra	Berneray	NL5680	
	Reisa Mhic Phaidean	NM7501		Mingulay	NL5683	
	Eileach an Naoimh	NM6409		Geirum More	NL5581	
	A'Chuli	NM6511		Solon Mor	NL5784	
	Garbh Eileach	NM6611		Solon Beg	NL5784	
	Dun Chonnuill	NM6812		Outer Heisker	NL5786	
	En Dubh Mor	NM6910		Pabbay	NL6087	
	En Dubh Beg	NM6911		Lingay	NL6089	
	Lunga	NM7008		Greanamul	NL6289	
	Fiolan Meadhonach	NM7109		Flodday	NL6192	
	Rubha Fiola	NM7110		Sandray	NL6491	
	Ormsa	NM7111		Biruaslum	NL6096	
	En Mhic Chiarain	NM7211		Vatersay	NL6395	
	Belnahua	NM7112		Sound of Barra	Fuday	NF7308
	Insh Island	NM7319			Orosay	NF7106
	Bach	NM7726			Lingay-fhada	NF7303
	En nan Gamhna	NM8338			Garbh Lingay	NF7403
	En na Cloiche	NM8338			Gighay	NF7604
	En Dubh	NM8339			Hellisay	NF7503
	En Dubh	NM8742	Lamalum		NF7503	
	Bernera	NM7939	Flodday	NF7502		
	En Muisdale	NM7835	Fuiay	NF7402		
Mull	Eilean Mor	NM3416	Stack Islands	NF7807		
	En a Chalmain	NM3017	Lingay	NF7511		
	En Dubh	NM3018	Monach Isles	Shillay	NF5962	
	En nam Muc	NM2819		North Uist	Baleshare	NF7861
	En Dubh	NM2820	Beinn Bhaile	NF7168		
	En Ghomain	NM2820	re-seeds	NF7371		
	Soa	NM2419	Balmartin	NF7273		
	Iona	NM2723	Ben Scolpaig	NF7376		
	Inchkenneth	NM4335	Colonsay and Oronsay	Oronsay	NF8475	
	Little Colonsay	NM3736		North Uist	Trumisgarry	NF8675
Treshnish Islands	Bac Beag	NM2437	Newton	NF8877		
	Lunga	NM2441	Sound of Harris	Gumersam Mhor	NG0282	
	Fladda	NM2943		Gumersam Bheag	NG0381	
	Burgh More	NM3044		Langay	NG0182	
	Burgh Beg	NM3044		Gilsay	NG0280	
		Lingay		NG0179		
Small Isles	Muck/Eilean nan Each	NM4279	Groay	NG0079		
	Eigg	NM3971	Scaravay	NG0178		
	Canna/Sanday	NG2505	Narstay	NF9777		
Wester Ross	Longa	NG7377	Sarstay	NF9776		
	En Furadh	NG7993	Hermetray	NF9874		
	Gruinard	NG9494	Hulmetray	NF9875		
Skye	Wiay	NG2936	Vaccasay	NF9775		
	Tarner	NG2939	Groatay	NF9873		
	Harlosh	NG2739	Tahay	NF9775		
	Mingay	NG2257	Sursay	NF9676		
	South Ascrib	NG3063	Votersay	NF9575		
	En Garave	NG2964	Stromay	NF9475		
	En Iosal	NG2865	Torogay	NF9278		
	Staffin	NG4969	Lingay	NF8778		
	En Flodigarry	NG4871	Pabbay	NF8988		
	Sgeirna Eireann	NG4872	West Coast Harris	Gasker	NA8711	
	Fladda-chuain	NG3861				

County	Site	Grid reference	County	Site	Grid reference
	Soay Mor	NB0605		Eilean Iosa	NC6365
	Soay Beag	NB0505		Eilean nan Ron	NC6365
	Fladday	NA9915		Coomb Island	NC6664
	Kearstay	NA9617			
	Greine Sgeir	NB0116			
	Liongam	NA9919			
	En Mealastadh	NA9821			
	Greineim	NA9825			
	En Molach	NA9932			
Loch Roag Lewis	Old Hill	NB1143			
	Bereasay	NB1242			
	Floday	NB1241			
	Campay	NB1442			
	Kealasay	NB1441			
	Little Bernera	NB1440			
	Pabay Mor	NB1038			
	Vacsay	NB1137			
	Vuia Mor	NB1335			
	Floday	NB1033			
	Vuia Beg	NB1233			
Loch Eristort Lewis	Tabhaidh Mhor	NB4222			
	Tabhaidh Bheag	NB4122			
	Tarnt Braigh	NB4023			
Shiantas	En an Tighe	NG4297			
Wester Ross	Priest Island	NB9202			
	Glas-leac Beag	NB9205			
	Bottle Island	NB9501			
	Carn Iar	NB9602			
	Carn Deas	NB9602			
	En Dubh	NB9703			
	Horse Island	NC0204			
	Meall nan Gabhar	NC0205			
	Tanera More	NB9807			
	Tanera Beg	NB9607			
	En Fada Mor	NB9707			
	En a'Char	NB9608			
	Glas-leac Mor	NB9509			
	En Mullagrach	NB9511			
	En Mor	NC0517			
	Froachlan	NC0518			
West Sutherland coast	A'Chleit	NC0220			
	En Chrona	NC0633			
	Meall Mor	NC1237			
	Badcall Bay	NC1540			
	Handa	NC1348			
	Loch Laxford	NC2050			
	Coney	NC2057			
	Am Balg	NC1866			
North Sutherland Coast	An Garbh-eilean	NC3373			
	En Cluimhrig	NC4665			
	Rabbit Island	NC6063			
	Sgeir an Oir	NC6164			