GREENLAND WHITE-FRONTED GEESE IN BRITAIN; 1982/83

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Introduction

In response to concern about the current status of the Greenland White-fronted Goose (Anser albifrons flavirostris) population of Britain and Ireland, a complete census was attempted during the winter 1982/83. This was the first time that 'simultaneous' counts throughout the wintering area had been attempted, previous population estimates (Ruttledge & Ogilvie 1979) having been derived from counts over several years. The census was co-ordinated by the Greenland White-fronted Goose Study in Britain, and the Forest and Wildlife Service of the Department of Fisheries and Forestry in Ireland. In Scotland, details of wintering sites were somewhat clearer than in Ireland, so here two complete counts were made, in November and April. In Ireland, the only complete survey was made in April. The results of this and other survey work undertaken throughout the 1982/83 winter will be presented separately at a later date by the FWS. Hereafter, all census results refer to Scotland, England and Wales only.

A network of observers counted specific sites during the two census periods, and additional counts were made by the GWGS and by M.A. Ogilvie during an aerial survey of Barnacle Geese during April. Counts have also been obtained from the Wildfowl Trust National Wildfowl Count scheme, Scottish Bird Recorders, and the BTO Winter Atlas project. Financial support for the census was given by the Wildfowl Trust, the World Wildlife Fund (UK), and the Nature Conservancy Council.

Two censuses were attempted; between 1 and 16 November and between 26 March and 10 April. Within each of these periods observers were asked to count, if possible, on 10 November and 4 April. However, due to the habits of many flocks, which feed over large areas, it is often possible to miss flocks on a specific date. If this has happened, the count thought to be the most accurate nearest the census date or period has been used. In addition, an appeal for counts through the season was made to all observers, together with requests for information on changes in habits of specific flocks.

RESULTS

Arrival

Arrival dates for some sites were given the the Interim Report (Fox & Stroud 1983). The only observation to have come to hand since then was a sighting of a significant passage of geese down the west coast of Colonsay on 21 October (D. Lea in litt.). In the morning, parties of 10 - 30 Barnacle Geese were seen and also four Whitefronts, but the afternoon passage was mainly of Greenland Whitefronts with just a few Barnacle Geese. All the estimated 500 geese passed south in the direction of Islay, which agrees well with the major arrival noted there on 22 - 23 October.

The pattern of arrival indicated two phases: early arrivals - Loch Ken (7 October), Islay (8 October, probably ⅓ of the total), Dyfi (8 October, most of the flock), Loch Lomond (11 October); and later arrivals - Loch Eye (20 October), Colonsay (21 October), Islay (22/23 October, main influx), South Uist -Loch Hallan (24 October), Lewis (24 October), and possibly Coll (4 November).

Departure

Departure dates were not as well reported as arrival dates. Two complete counts of Islay on 21 and 22 April found 2,646 and 1,829 respectively thus indicating that migration had already started (by contrast the Barnacle Goose counts on Islay for the two days were essentially the same). Most Greenland Whitefronts had left Islay by 24 April, but a few were still there on the 28th.
At Stranraer, numbers fell from 300 to 10 between 18 - 25 April, a similar departure period to Islay (R.C. Dickson pers. comm.).

Counts

Virtually every British site was counted during the winter, and the results in Table 1 give the peak monthly count where available. The coverage was most encouraging since this was the first year a complete census has been attempted, and the results give a baseline against which to measure subsequent population changes.

Only four sites were not visited to our knowledge (although it is possible that counts may come to light at a later date). These were: Barr Loch - assumed deserted; Longa Island, Wester Ross - thought to have been deserted since the mid 1970s; Muck and Eigg - the estimate of 20 used by Ruttledge & Ogilvie (1979) and for the November census has been used in Table 1, although this is probably an overestimate; and Lismore Island. This last site was visited in early November and goose droppings were found on nearby Bernera Island. Ruttledge & Ogilvie (1979) indicated that the Lismore flock may mix with the nearby Eriska flock. Between November and February this winter, numbers at Eriska varied between 20 - 60, but suddenly increased to 150 - 170 in March. The geese were seen feeding in two distinct flocks of 130 and 30-45 so it is possible that this increase may have been due to the Lismore birds moving to Eriska in late winter.

Islay was counted several times during the course of the winter as part of the Nature Conservancy Councils continuing programme of monitoring the goose populations on the island. The island was counted on 16 - 19 November by DAS, and on 2 - 3 February and 1 - 2 April by T.D. Dick and DAS. The counts on 14 and 15 February, and 21 and 22 April were undertaken by the NCC Scottish Field Unit, Dr E.M. Bignal, P. Ellis and DAS. In each of these latter counts, exactly the same route was taken on successive days by the same counters in an attempt to assess the repeatibility of the island count.

To compare counts the island was divided into several areas (Figure 1). Whilst it is impossible to draw lines about discrete sub-populations on the island, it is thought that there is little short-term movement between these areas. Observations of both Darvic ringed birds, and geese with distinctive breast markings indicate that there is little movement between areas (DAS in prep.).

The areas in Figure 1 are the same as used in the Interim Report, but it should be noted that the Rhinns area refered to in that Table 1 (site no. 21) has now been split into two areas: Gorm and (S) Rhinns.

Breeding success

The Interim Report gave details of agings made in the autumn. This indicated a moderate to poor breeding year in 1982, with only 12.9% young on Islay, 13.8% elsewhere in Scotland, and an overall British value of 13.5%. In spring, young are more difficult to determine, and thus smaller numbers were aged. The results from the spring were, however, essentially the same as in autumn: 14.6% young on Islay, 11.5% elsewhere in Scotland, and an overall value of 13.5% for Britain (Table 2).

At Wexford, three agings were undertaken betwen November and March and gave proportions of young between 17.8% - 19.2% with an overall mean of 18.8% young. Brood sizes were also higher than Islay (range of means 3.31 - 4.09, overall mean 3.64). As mentioned in the Interim Report, these figures are significantly higher than Islay as seems to be regular (Ogilvie 1978).

It was previously noted that there was a wide range in the proportions of young in flocks aged in autumn (Fox & Stroud 1983; Table 3). These proportions were not consistent through the winter, and Table 3 gives proportions for flocks aged in both autumn and spring (where sample size was greater than 70 birds). No particular pattern emerges, but it will be interesting to see if the ranking of sites is similar in future years.

It should be emphasised again how low these productivity figures, considered normal for Greenland Whitefronts, really are. On the basis of the autumn aging there were only 971 young in Britain in 329 families. When it is considered that Britain may hold up to half the world population of this race, these figures must give serious cause for concern.

Count totals

Numbers on Islay increased through the winter from 3,250 in November to 3,879 in mid-February (Table 4). The count of 3,441 on 1 - 2 April (spring census count) was felt to underestimate numbers actually present, since the birds were restless and it is quite possible that some were missed. Counts made on 14 and 15 February were made by the same teams covering the same areas of the island. Although the weather conditions were similar on both days, the total on 15 February was 379 less than the previous day; an error of 9.0%. This is indicative of the problems in counting the island accurately. However, the 16% increase in numbers between November and mid-February is felt to be real and not a counting error.

In order to compare distribution between different areas of the island, the counts are also expressed as a percentage of the total island count in Table 4. This gives some idea of the relative importance of different areas, irrespective of the total numbers present. It will be interesting to see if this pattern of movement repeats itself in future years.

The total for Britain in the spring was 7,282 (7,300) which compares well with the November total of 7,189 (7,200) (Table 5). However, whilst the overall totals are broadly similar, the regional distribution within Scotland slightly changed between autumn and spring. The flocks in the Western Isles and on Skye (Skeabost) apparently left with a corresponding increase in North Argyll. Numbers at the main haunts in South Argyll and Galloway stayed substantially the same, although there may have been some movement away from South Argyll. It is clear, however, that there seems to have been no major movement (such that could have been picked up by the accuracy of this survey), into Scotland from Ireland.

The increase on Islay over the winter (November to mid-February peak: 629) seems to have been due to some extent to a corresponding fall in numbers at the two Kintyre sites (decline of 301). Past observations of birds flying high from the south-east into Islay suggest there is flux between these sites (C.G. Booth pers. comm.). This is contrary to the suggestion of Ruttledge & Ogilvie (1979) who suggest that there might be a regular spring movement from Islay to Kintyre.

Ruttledge & Ogilvie (1979) estimated the total British population of Greenland White-fronts to range between 6,500 - 7,300. When this total is adjusted for flocks discovered since that paper was written, the total mid-1970s British population is increased to 6,630 - 7,590. This years census results fall more or less in the middle of this estimated range and suggest no major change in status in Britain since that time. However, depending on the results of the Irish census, Britain may be found to hold a greater proportion of the total population.

It has been suggested by Coffey (1983a, 1983b) that the increase in Scotland is due to emigration of Irish birds. He also states that "even on Islay where the average percentage young for the last ten years is stated to be 13% to 14% there has been an 80% increase in the population, yet a further indication of the move to Scotland". Hutchinson (1979) originally suggested that the increase in numbers on Islay possibly corresponded to the Irish decrease. The only evidence for this seems to have been the coincidence of the trends. There are, however, several reasons to suggest that this is not the case and that there has been no emigration to Scotland.

Coffey's evidence (1983b) for the 80% increase on Islay, "from 2,000 to 3,600" seems to be a misunderstanding of the published counts for Islay. Ruttledge & Ogilvie (1979) stated that "until about 1967-68 few of the counters covered all the now-known White-front haunts on the island, so it is difficult to measure the recent apparent increase in numbers". Ogilvie (1983) also states that "discarding the first four years' counts (1962/3 to 1965/6) as being very probably incomplete, there seems to have been no long-term change in numbers, either up or down".

Thus there seems no grounds to suppose either that there has been a recent massive increase in numbers on Islay, or that this was due to emigration from Ireland. Given the site fidelity of the race (below), any Scottish increase is better explained in terms of lower winter mortality of this population segment.

Darvic ringed geese

A large number of Darvic ringed geese were seen this winter (Tables 6 & 7). Six of these (A12,A13,A70,A72,A82,A93) had not been previously seen and this brings the total shot or seen in winter or on autumn passage to 59 of the 96 originally ringed in Greenland during the 1979 Greenland White-fronted Goose Study expedition. Two new sightings were on Coll, an island not previously searched, the other four on Islay. It is not possible to say with confidence that these birds were not present prior to this winter.

A preliminary analysis of the four winters of Darvic sightings emphasises the extreme site faithfulness of the Greenland Whitefront (Table 7). Only five of the 59 birds for which there are records were shot without having first been detected. Since there is no evidence of these birds movements they are excluded from this analysis. Of the other 54 geese there have been 266 sightings or recoveries (taking shooting as equivalent to a visual sighting since both are site records). These sightings are broken down into different categories in Table 7. There are two ways of looking at the data; either the probability of a ringed goose moving between sites between two sightings (irrespective of date), or the chance of moving between sites from one winter to the next.

Expressed as a proportion of all sightings, over 93% of sightings were made at the same locality as the previous sighting. (In this sense, sightings made at different sites within the known home range of a flock have been regarded as coming from the same locality). These gross figures underestimate the site faithfulness of ringed geese. Included in the figures for geese seen only once are birds seen at sites which have been searched only once (eg Coll 1982/83). Also where Darvic ringed geese have been seen on more than one occasion,but the ring has only been read once.

Only on four occasions (1.5% of sightings) has a bird changed flocks within the wintering range (one record derives from a vagrant seen in Holland). Even if it is assumed that all the birds seen once only subsequently moved to flocks not searched for rings, this would give a movement rate of 6.4% and, as stated above, this is considered an unrealistically high figure.

This rough analysis indicates the extreme site loyalty of this race, and, resulting from this, the risk of severe depletion of flocks from shooting mortality or of desertion of sites following agricultural or other disturbance.

Table 7.
Movements of Darvic ringed Greenland White-fronted Geese

Moves as a proportion of all sightings

Number of sightings at the same location as previous sighting	248	93.2%
Number of geese which have been sighted only once	13	4.9%
Number of sightings at different locality to previous sighting	5	1.9%
Total number of sightings	266	

Moves between winters

Number shot prior to being seen	5		
Number seen in only one winter	22		
Number seen in more than one winter	32		
At same site as the previous winter		46	(92.0%)
At a different site to previous winter		4	(8.0%)

Habitat usage

Observers were asked to record the presence of a number of habitat types in order to guage habitat selection and usage. A detailed analysis was not possible, but Table 8 indicates the main habitats used in autumn and spring. These figures suggest that there was a move away from habitats with poorer quality feeding (eg boglands) during the spring, and an increase in usage of improved pasture. These results are typical of the habitat usage on Isaly, which will be presented in greater detail at a later date.

Table 8. Habitat usage by Greenland White-fronted Geese, winter 1982/83.

	Autumn	Spring	Change
Rough pasture with rushes	30.5%	30.9%	=
Improved pasture without rushes	19.2%	25.5%	+
Stubble	12.3%	0	-
Loch margins	9.2%	10.0%	=
Freshwater lochs	8.6%	7.6%	=
Bogs with open water	7.8%	0.7%	-
Bogs without open water	5.2%	0.7%	-
Moorland	3.7%	4.5%	+
Sea lochs and saltmarshes	2.0%	2.6%	=
Rivers	0.8%	4.5%	+
Mudflats	0.5%	3.6%	+
Sandy pasture	0.1%	0	-
Ploughed fields	0	1.3%	+
Wet machair pasture	0	4.7%	+
Sandflats	0	3.3%	+

Flock size

The Greenland White-fronted Goose is one of the least gregarious of geese, feeding in small flocks throughout the winter. Information on flock sizes from Islay was obtained through the winter. Mean flock size (± se) fell from 68 (± 7.6) in November to 33 (± 3.5) in mid-February, before rising again to 55 (± 4.6) later in the spring as flocks aggregated prior to migration.

In November, mean flock size for all flocks in Britain was 79 (± 6.2; range 5 - 280; total number 5,218). The last March/April mean flock size for all flocks was 61 (± 4.0; range 1 - 475; total number 17,832).

Threats to sites

As mentioned in the Interim report (Fox & Stroud 1983), there were few reported changes in drainage or agriculture of feeding and roosting sites other than on Tiree.
The information collected over the last two years is currently being collated for a complete site inventory. This will contain all available information on Greenland Whitefront wintering areas, both past and present.

There has been continued shooting of the race at several sites in Scotland despite protection given under the Wildlife and Countryside Act 1981. Of several incidents on Islay, one resulted in the first successful prosecution under the Act in Scotland. The wildfowler concerned was fined £20 at Campbeltown Sherrifs court in June. Continued shooting and harrassment of the small flock at Barvas, Lewis continues, but it is to be hoped that this may be reduced following Police investigation of an incident last winter.
In several other areas (eg Coll, Galloway sites etc) Whitefronts are suffering disturbance and may be accidentally shot through association with Greylags. With such low productivity (above), it is of great importance that the protected status of the race is as widely known and respected as possible.

Acknowledgements

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July 1983

Table 1. Peak monthly counts of Greenland White-fronted Geese at British wintering sites, 1982/83.

SITE	October	November	December	January	February	March 1-25	March 26-10	April 10-30
NORTH-EAST SCOTLAND								
Orkney								
Tankerness Loch/ Holm							34	
The Loons/ Loch of Ibister	23	28	44			46	46	
Brocken		6						
Caithness								
Stemster Hill		224						
Westfield	246							
Loch of Webster							47	
Brubster Marsh							180+	170+
Loch Heilen		5						
Loch Scarmclate		4	22	0	0	73	77	
Loch of Mey							160	c120
Loch Toftingall		160						
Ross & Cromarty								
Loch Eye	15	c30	42		42	32		
NORTH-WEST SCOTLAND								
Lewis								
Shawbost/ Barvas	14		23	32	27	23+	27	
Benbecula								
Nunton/ Griminish		0	0				0	
South Uist								
Lochs Hallan & Kilpheder	10	20	18	17	18		0	
Loch Bee (NW end)		55	c60				0	
Skye								
Loch Snizort		69		47	62		7	
Broadford		7		22		26		22
Longa Island, Gairloch		nc 0*					nc 0*	
Muck & Eigg		nc 20*					nc 20*	
NORTH ARGYLL								
Tiree								
Loch Riaghain	80	88					17	
The Reef	270	221					340	
Loch Bhasapoll							72	
Loch an Eilein		16						
Loch a' Phuill	110	47					4	

Coll								
	Caoles		56				0	
	Uig/ Ballard		90				128	
	Cliad/ Arnabost		197				202	
Lismore Island			nc*				nc*	
Benderloch								
	Eriska		60	40+	50	165		
	Port Appin					17		
Loch Shiel			0				45	35
Mull								
	Loch Poit na h-I		52				51	
	Loch Assapoll		46		40		27	
	Iona					12		
SOUTH ARGYLL								
Colonsay		50	40*				58	
Jura								
	Lowlandsmans Bay		20			16	24	
	Loch a' Chnuic Bhric		44			55	55	
Islay			3250			3872	3441	2710
Isle of Danna			95				90	
Moine Mhor		c30	60			52	35	32
Rhunahaorine			856				475	
Machrihanish			420				500	387
Isle of Bute			64	70		62	63	66
Loch Lomond, Endrick Mouth		108	118			104	105	110
Barr Loch, Renfrew			nc*				nc*	
GALLOWAY								
Stranraer		270	280		330	350	380	300
Loch Grannoch			0			0		0
Bladnoch Valley & Clugston Loch			0			0	18	19
Creetown, Cree Valley & Moss of Cree		15	0			11	7	
Loch Ken		200	c300	320	200	246	250	305
Ayrshire (several sites)			0				0	

ENGLAND								
Lancashire								
Martin Mere		5						
Banks Marsh			33					
Cumbria								
Walney Bird Observatory			14					
Cheshire								
Upper Dee Estuary			17					
WALES								
Dyfi Estuary, Dyfed	64	69	73	73	75-80	77	73	77

Notes: sites refered to by an * above- Longa Island, Gairloch - see text.
Muck & Eigg - the estimate of 20 used by Ruttledge & Ogilvie (1979) has been used here in the absence of more recent counts. No Whitefronts were seen when the islands were overflown during the April Barnacle Goose census (M.A. Ogilvie pers comm.), and there were no Whitefront records from BTO Atlas cards for Muck, but this is not necessarily indicative of the desertion of the islands.
Lismore Island - see text.
Colonsay - the estimate of 40 used by Ruttledge & Ogilvie (1979) has been retained for the November census since it is not clear if the 50 observed in October were wintering birds, or were just staging.
Barr Loch - see text.

The underlining of a count indicates that it has been used in the calculation of either the November or April total.

RODNEY DAWSON MEMORIAL WILDFOWL COLLECTION

ELLISTER RIDING CENTRE AND SADDLERY SHOP

Easter Ellister
Port Charlotte
Isle of Islay
Argyll

Portnahaven 209
STD 049 686

Table 2. Details of proportions of young in Greenland Whitefront flocks, March & April, 1983.

Site	Total aged	Total juvs	% juvs	mean brood size	number of broods
Orkney (Holm)	34	0			
Orkney (Loons)	46	0			
Lewis (Feb.)	27	5			
Tiree	163	33	20.2%		
				3.90	11
Coll	197	11	5.6%		
Colonsay	44	7	15.9%		3
Jura	55	4	7.3%		3
Fidden, Mull	51	11	21.6%		
Islay	1143	167	14.6%	2.96	48

Comparison between autumn and spring agings, 1982/83. No Whitefronts were aged in England or Wales during March or April.

NOVEMBER 1982					
Islay	1309	169	12.9%	2.71	49
Rest of Scotland	1546	214	13.8%	3.16	54
Total Scotland	2855	383	13.4%	2.95	103
England & Wales	78	13	16.6%	3.25	4
BRITAIN	2933	396	13.5%	2.95	107
MARCH/ APRIL 1983					
Islay	1143	167	14.6%	2.96	48
Rest of Scotland	617	71	11.5%	3.17	17
SCOTLAND	1760	238	13.5%	3.01	65

Table 3. Changes in proportion of young in flocks aged in both autumn and spring.

Site	Autumn 1982		Spring 1983	
	% juvs	Total aged	% juvs	Total aged
Islay (Laggan area)	9.6%	425	20.4%	142
Islay (Kilmeny area)	11.3%	229	14.9%	497
Islay (Oa area)	14.1%	234	15.4%	91
Total Islay	12.9%	1309	14.6%	1143
Coll (Arnabost)	17.0%	158	5.6%	197

Table 4. Distribution of Greenland Whitefronts on Islay, 1982/83.
Peak counts for each area are underlined.

AREA	16-19 Nov	2-3 Feb	14 Feb	15 Feb	1-2 April	21 April	22 April
Oa	544	569	758	934	558	333	140
Ardtalla	0	146	0	0	0	0	0
Gruinart	237	235	114	244	109	142	146
Gorm	484	296	197	274	655	275	264
Rhinns	272	341	657	331	373	170	47
Laggan	480	287	444	495	379	339	226
Glen	226	308	174	138	165	264	185
Kilmeny	1007	644	1535	1084	1202	1123	821
TOTAL	3250	2826	3879	3500	3441	2646	1829
	Proportional allocation of each census by area (%).						
Oa	16.7	20.1	19.5	26.7	16.2	12.6	7.6
Ardtalla	0	5.2	0	0	0	0	0
Gruinart	7.3	8.3	2.9	7.0	3.1	5.4	8.0
Gorm	14.9	10.5	5.1	7.8	19.0	10.4	14.4
Rhinns	8.4	12.0	16.9	9.4	10.8	6.4	2.6
Laggan	14.8	10.1	11.4	14.1	11.0	12.8	12.4
Glen	6.9	10.9	4.5	3.9	4.8	10.0	10.1
Kilmeny	31.0	22.8	39.6	31.0	34.9	42.4	44.9

Table 5. Regional totals of Greenland Whitefronts seen 1982/83.

	November 1982	March/ April 1983
North-east Scotland	457	576
North-west Scotland	185	80
North Argyll	873	1068
South Argyll: Islay	3250	3441
other sites	1723	1413
Galloway	595	631
England	33	0
Wales	73	73
TOTAL BRITAIN	7189	7,282

Table 6. Sightings of Darvic ringed Greenland White-fronts, 1982/83

Ring Number	Location	Date	Details
A09	Loch, Ken	11.12.82	Paired to unringed bird, no young
A12	Arnabost, Isle of Coll	7.04.83	Paired unringed female;
A13	Arnabost, Isle of Coll	7.04.83	Paired unringed male.
A14	Avenvogie Barn, Islay	23.02.83	Party of 5 Darvics
	Avenvogie Barn, Islay	25.02.83	Party of 5 Darvics
A16	Caithness	14.11.82	
A18	Avenvogie Farm, Islay	26.10.82	Paird unread Darvic (A32?)
	Cluanach, Islay	3.01.83	Paired A32, no young
A19	Avenvogie Barn, Islay	23.02.83	Party of 5 Darvics
	Avenvogie Barn, Islay	25.02.83	Party of 4 Darvics

A24		Cluanach, Islay	3.01.83	Paired to unringed bird
		Avenvogie Barn, Islay	23.02.83	Party of 5 Darvics
		Avenvogie Barn, Islay	25.02.83	Party of 4 Darvics
A26		Avenvogie Barn, Islay	23.02.83	Party of 5 Darvics
A31		Avenvogie Barn, Islay	23.02.83	Party of 5 Darvics
A32		Cluanach, Islay	3.01.83	Paired A18, no young
A33		Caithness	14.11.83	
A38		Avenvogie Farm, Islay	25.02.83	Party of 4 Darvics
A61		Loch Ken	11.12.83	Paired to unringed bird, no young; (1979/80, 80/81 & 81/82 on Islay).
A70		Blackpark, Islay	19.11.82	Paired A72; 1st sighting
		Uisgeantsuidhe, Islay	3.01.83	Paired A72
		Uisgeantsuidhe, Islay	1.02.83	Paired A72
A72		Blackpark, Islay	19.11.82	Paired A70; 1st sighting.
		Uisgeantsuidhe, Islay	3.01.83	Paired A70 (no young)
		Uisgeantsuidhe, Islay	1.02.83	Paired A70
A82		Ballachlavin, Islay	2.02.83	Assoc. with A93; 1st sighting
A86		Loch Ken	11.12.82	Paired unringed bird, no young
A93		Ballachlavin, Islay	2.02.83	Assoc. with A82; 1st sighting
	x	Ballachlavin, Islay	28.02.83	Found dead, shot??

APPENDIX 1. Distribution of Greenland Whitefronts by 10 km squares, 1982/83

Site	Square number	November 1982	March/ April 1983
Orkney	HY22	22	46
	HY41	6	
	HY50		34
Caithness	ND06	246	180+
	ND15	160	
	ND16		77
	ND26	5	
	ND27		160
	ND35		47
Lewis	NB24	14	27
Uists	NF72	20	
	NF74	55	
Loch Eye	NH88	42	32
Skye	NG44	69	7
	NG62	7	26
Coll	NM15	146	128
	NM25		202
	NM26	197	
Loch Sheil	NM76		45
Tiree	NM04	309	357
	NL94	63	76
Benderloch	NM84	60	165
	NM94		17
Mull	NM32	52	51
	NM42	46	27
Jura	NR57	20	24
	NR44	44	55
Colonsay	NR39		58
Danna	NR77	95	90
Islay: see appendix 2			
Moine Mhor	NR89	60	35
Rhunahaorine	NR74	856	475
Macrihanish	NR61	440	450
	NR62		50
Bute	NS06	70	66
Loch Lomond	NS48	118	110
Loch Ken	NX76	300	305
Stranraer	NX15	280	300
Cree	NX45	15	7
Dyfi	SN69	73	73
Bladnoch Valley	NX35		19
Muck & Eigg	NM48	20*	20*

* estimated value.

Appendix 2. Distribution of Greenland Whitefronts on Islay by 10 km squares, 1982/83.

	November	February	14 March	15 March	1-2 April	21 April	22 April
NR15	218	145	213	102	121	0	47
NR16	0	0	0	0	0	0	0
NR24	56	202	300	308	226	97	0
NR25	265	256	311	155	219	91	44
NR26	725	529	454	575	823	452	410
NR27	0	12	0	0	0	19	0
NR34	488	513	458	626	332	296	140
NR35	380	499	450	440	358	436	317
NR36	1042	666	1532	1126	1116	1068	769
NR37	0	0	0	0	0	0	0
NR44	0	0	0	0	0	0	0
NR45	0	0	0	0	0	0	0
NR46	76	4	161	168	246	187	102

Figure 2. Regions used in sub-division of census total.