

The Greenland White-fronted Goose in Wales

A. D. Fox and D. A. Stroud

The Greenland White-fronted Goose (*Anser albifrons flavirostris*) breeds in west Greenland and winters exclusively in Ireland, Scotland and Wales (Salomonsen 1950). It is the largest and most distinct subspecies of the circum-polar Whitefront, with other races nesting in North America and arctic Russia (Ploeger 1968).

Greenland Whitefronts arrive on the wintering areas in early October and remain well into April, contrasting the later arrival and earlier departure dates of Russian Whitefronts which also winter in the British Isles (Owen *et al.* 1986). Russian Whitefronts (*A. a. albifrons*) tend to prefer short-grazed grasslands such as river meadows and intertidal saltings, while Greenland Whitefronts traditionally feed on underground over-wintering organs of peatland species such as White-beaked sedge (*Rhynchospora alba*) and Common cotton-grass (*Eriophorum angustifolium*) (Cadman 1953, 1956; Pollard & Walters-Davies 1968; Owen *et al.* 1986). Because of this unusual feeding method, the winter distribution corresponds with a mean January temperature of $>3^{\circ}\text{C}$ (i.e. areas experiencing few frosts to deny them of their buried food items), essentially restricting these geese to the northern and western fringes of the British Isles (Belman 1981).

In their exhaustive review of the winter distribution and abundance of Greenland Whitefronts, Ruttledge & Ogilvie (1979) estimated the world population in the 1950s at 17,500-23,000 birds, but by the late 1970s, numbers had fallen to 14,300-16,600. Much of the decline can be attributed to habitat loss as peatlands have been drained, cut for peat and afforested (Ruttledge & Ogilvie 1979). In Ireland, where the decline has been most dramatic, there was a drastic loss of peatland sites (Reynolds 1984; Ryan & Cross 1984), a pattern also occurring in Wales (Ratcliffe & Hattey 1982). Until its protection in Scotland under *The Wildlife and Countryside Act 1981*, shooting pressure further inhibited any recovery of this, one of the world's rarest geese. Although protected by a voluntary self-imposed ban on shooting by wildfowling on the Dyfi Estuary in mid-Wales since 1972, it is still legitimate quarry in the rest of England and Wales,

Iceland and for part of the year in Greenland. The present shooting ban in Ireland, lasting a total of three years, is about to be reconsidered (probably lifted) and the characteristically low productivity of Greenland Whitefronts gives considerable cause for concern (Ogilvie 1978; Owen 1978; Fox *et al.* 1983).

In response to this decline, two expeditions were mounted to west Greenland in 1979 and 1984 to study the breeding ecology of the geese, while regular co-ordinated international counts have been established on the wintering grounds to assess population trends (Stroud 1984; Forestry and Wildlife Service, Dublin unpublished).

The serious decline in numbers is nowhere better demonstrated than in Wales, where numbers of Greenland Whitefronts have fallen from possibly over 1100 to less than 100 during the present century. Such a catastrophic decrease at the five traditional sites in the Principality deserves more detailed treatment than that given by Ruttledge and Ogilvie (1979) or Stroud (1984). The present paper documents the past and present status in Wales. Distribution is described by ornithological recording areas for convenience.

Denbighshire and Flintshire (Clwyd)

There appear no regular records of Greenland Whitefronts from Denbigh (Jones & Roberts 1983) or Flint (Done *et al.* 1968), although there are several recent records from the Dee (Hardy *in litt.*).

Cardiganshire (Dyfed)

While a great deal of confusion prevails, it would seem that there have been two major and separate flocks in Cardiganshire, at Cors Caron (Tregaron Bog) and on the Dyfi Estuary. For the purposes of discussion the two are treated separately here. Much of the information from the latter part of the last century and the early part of this comes from the diaries of Professor J. H. Salter of the Botany Department, University College of Wales, and there are very few other accounts of the geese at that time.

Dyfi Estuary and Cors Fochno (Borth Bog).

In spite of memories of geese going back as far as can be remembered, it appears that the first

documented account of Whitefronts on the Dyfi comes from Forrest (1907), where he reports the local collector F. T. Fielden as having 'killed several' and describes the species as common. There is little doubt that in Professor Salters' day, during the early part of this century, the geese fed during the day on the hill bogs round about the estuary but it is not clear whether they flew to the estuary to roost at night. For instance, during the daytime, Salter frequently saw them on Bugeilyn on the Pumlumon massif above Staylitle (e.g. 40 there and on the adjacent Glaslyn, 6 Feb. 1936) and reported them from Llyn Craig-y-pistyll and Pond Syfydrin. By contrast, he gives virtually no records from the Dyfi Marshes where he spent considerable periods of time. There are a few records of geese from his correspondent E.H.T. Bible of Aberdyfi, but the first written account of the geese using Cors Fochno does not appear until 3 May 1940 when Salter 'saw evidence that there must have been a lot of wild geese here not long since'. The October arrival of the geese which he noted in 1938 indicates these would have been Greenland geese.

It would seem therefore, that the geese were seen occasionally on the estuary in the early half of the century, but fed exclusively on the upland lakes and bogs of north Cardiganshire. These feeding sites included the extensive peatland area of Cors Fochno to the south of the estuary. This pattern continued after the last war, with rather better documentation. In 1951, Arthur Cadman (who first reported the presence of geese to Salter in January 1940) saw 110 Whitefronts (29 Jan), later counting c.220 on 3 March, remarking that this was about 100 more than his previous highest count. That autumn, Bill Condry first recorded them on 2 October (Condry 1951), further evidence that at least some of these were indeed Greenland birds.

In early 1954, following reports of '600' geese on Cors Fochno, Condry, D. G. Sansbury and Cadman flushed 155 birds from the bog, flying 'as usual for the estuary, and dropped near the Clettwr' (Condry *in litt.*). All were adults, and he continues: 'A remarkable thing was that more than half showed the yellow beaks of Greenlands, although the Dyfi geese are usually Russians, says Arthur Cadman'. Although never counted systematically, and rarely separated into Russian and Greenland races, there are a number of counts from the estuary area over following years (Fig. 1). However, both Condry and Cadman assert that at least some Russian Whitefronts regularly wintered in post-war years on

the Dyfi (Ingram *et al.* 1966). In recent years, these have been no more than sporadic vagrants and it seems from habitat use, behaviour and arrival/ departure dates that Greenland White-fronted Geese have been constantly present throughout this century, albeit having declined in recent years.

From 1968, regular wildfowl counts were carried out on the estuary by Peter Davis, giving an accurate picture of goose numbers from that time. Initially, no Whitefronts were seen during the counts, except in small parties over the fields and bogs to the south of the estuary. The highest numbers were 140 reported in the winter of 1969/70 when Roger Lovegrove saw them on Bugeilyn in early April, dropping to 130 the following season. By this time, it was known that the geese regularly used the intertidal mud in an area of the estuary

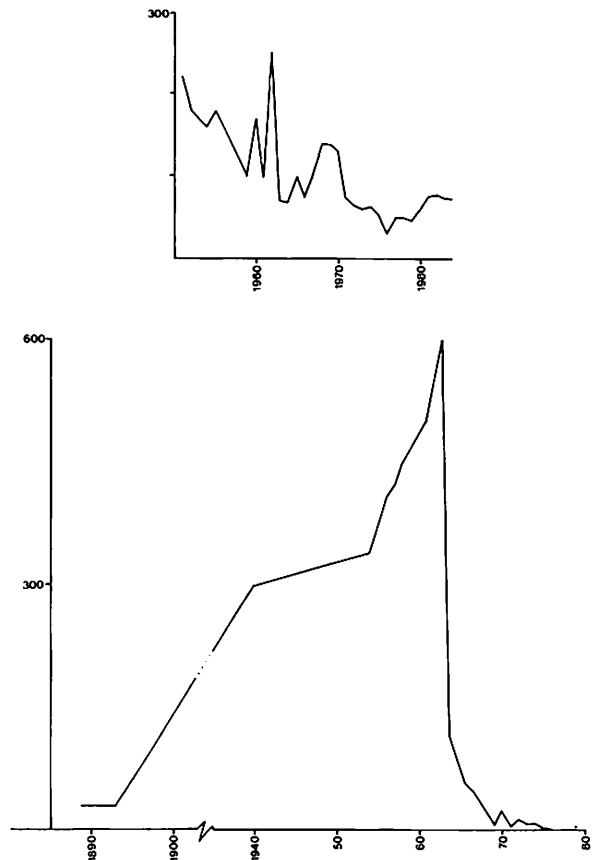


Fig. 1. Counts of Greenland White-fronted Geese at their two regular Cardiganshire wintering sites. Upper figure shows modal counts from Dyfi Estuary 1950-1984; lower figure shows maximum counts from Cors Caron 1887-1980.

known as 'Wader Bay' to which they flighted every evening (Fig. 2). In the 1971/2 season, Davis noted 'we were extremely surprised to find most of the local population in the estuary on four successive counts in November and December. They were feeding on the saltings in the vicinity of the Ynyshir breakwater and Wader Bay and close to the normal roost. Some of them were definitely eating *Spartina townsendii* stems in April, there were 55 birds still going to roost' (NCC files). It is presumably no accident that the Wildfowl Refuge established in 1968 includes the area adopted by the geese at this time.

The following year, little was seen of the Whitefronts during the counts and indeed numerous accounts of the geese feeding on the lakes to the south and east of the estuary were received. The geese subsequently appeared more and more and by the winter of 1975/6, they were spending a good deal of their time in the vicinity of Wader Bay, eating *Spartina* and grazing the *Festuca rubra* saltings along the southern side of the estuary from Wader Bay to Glandyfi. Even as late as 1975/6 geese were reported from the hill mires and from the source of the Severn on Pumlumon, but since then, there have been only occasional flights by geese away from the intertidal areas of the estuary. These include a break-away family of six geese which frequented the Llangynfelyn Common area of peat cuttings on Cors Fochno in 1979, and the entire flock frequented the unfrozen mire during the

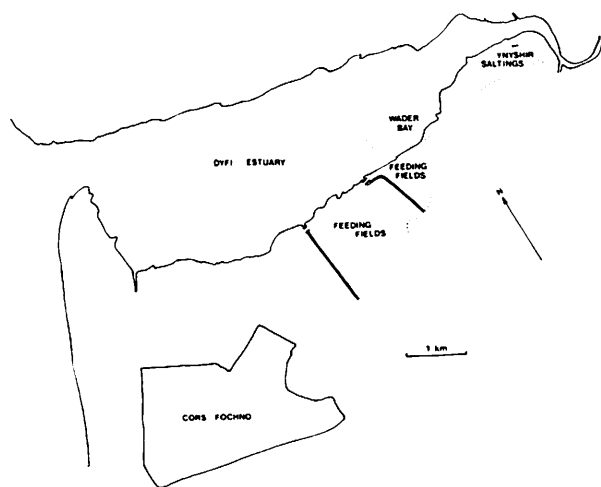


Fig. 2. Diagrammatic representation of feeding sites and roosting areas used by Greenland White-fronted Geese on and around the Dyfi Estuary, central west Wales.

severest part of the 1981/2 winter. Most recently, the entire flock settled on the bog to feed on their traditional food items in December 1984.

Faecal analysis showed that the geese exhibited a preference for eating the bulbils of white-beaked sedge, although common cotton-grass was frequently taken (Cadman 1953, 1956; pers. obs. Llangynfelyn 1979, 1982). In the years of the early 1970s, the geese resorted to reseeded pasture south of the estuary increasingly through the winter, presumably benefitting from the spring bite and feeding almost entirely on pasture before departure. With the cessation of bog feeding in the 1970s, birds spent more time grazing *Festuca rubra* swards on the saltings. Now, in the early part of the season, birds graze the lower stems and shoots of *Spartina*, choosing by preference those isolated patches of the grass colonising bare mud which have the greatest density of lateral shoot initiation. Later they move to the creeks and eroding edges of the *Spartina* beds as well as grazing extensively on the *Festuca* saltings. At high tide, the geese continue to forage for *Spartina* by up-ending while the younger birds frequently browse the seeds of *Spartina* still attached to the plants.

Quite why this change of diet and habit occurred will never be known, but it is presumably no coincidence that the change happened as numbers reached their lowest levels. As to the future, it is encouraging to report the recent recovery of numbers on the Dyfi (Fig. 1), due in no small measure to the voluntary ban by local shooting clubs at the site since 1972. The ban on over-flying of military aircraft imposed in November 1975 would undoubtedly have had an effect but for the fact that modern aircraft cause the geese to put to flight at ranges of 4-10 miles, rendering the current 1 mile no-flying area ineffective. On bad days, aircraft often remain in the immediate area for some time, and if the geese are badly disturbed, they can be on the wing for up to three hours out of a daylight feeding period of less than ten hours. Such a loss of feeding time in addition to the energy burden and the trauma of disturbance clearly has a severe effect on the geese and may provide a clue to the desertion of Cors Caron (see below). However, the geese are now almost completely confined to within the Dyfi NNR boundary and so their habitat is at least protected.

Cors Caron. A flock of Whitefronts has wintered on Cors Caron for as long as anyone can remember.

Its origin was demonstrated on 30 January 1947 when a bird ringed in Ikamiut (68°38'N, 51°51'W), west Greenland on 21 July 1946 was shot there (Salomonsen 1947). It appears that at this site, numbers have always fluctuated considerably. In spite of regular shoots on the bog, geese were hardly ever shot in the 1890s (Table 1), and Salter considered only c.30 birds were wintering here at that time. Habitat use and the fact that birds arrived in October and left in mid-April (some remained until early May in 1892) suggest constant presence of Greenland birds.

This flock traditionally fed on white-beaked sedge and common cotton-grass (Pollard & Walters-Davies 1968), moving to the springs and flushes on the bog which were the last areas to freeze or onto fields adjacent to the bog during hard weather. They also exploited the spring bite on nearby farmland as on the Dyfi (P.E. Davis *in litt.*). They roosted on the Teifi flashes along the river, subject to flooding conditions. When geese were numerous, occasional fox kills were found chiefly on the western bog margins. Geese also roosted on the upper parts of the west and sometimes south

Table 1. Numbers of White-fronted Geese shot at Cors Caron in the late 19th Century (Crosswood Game Books)

1889	0	1894	0
1890	0	1895	0
1891	0	1896	3
1892	5	1897	1
1893	4	1898	8

After this time, little is known of numbers, but Salter reported small numbers up to 1939, including many scattered parties around the edge of the bog. At this time, Cadman also reported geese from sites around Tregaron (Cadman 1957). Regular sites used to include Llyn Eiddwen on Mynydd Bach, where Cadman states 'they roosted on the ice in hard weather rather than return to the main centre' (i.e. Cors Caron). Hence, it would seem likely that the immediate area of Tregaron (including Mynydd Bach and the upland flank of Mynydd Elenydd to the east) probably held considerable numbers of birds over a substantial area. Salters' record of 250-300 in January 1940 is probably a reasonable estimate of the entire population of that time. Numbers had risen to 400 by the winter of 1957/8 and reached an apparent maximum in autumn 1962 when 550-600 were present. There was a similar increase in numbers shot at this time (Table 2).

Table 2. Numbers of White-fronted Geese shot at Cors Caron in recent years (Lisburne Estates records)

1958/9	12	1963/4	0
1959/60	8	1964/5	2
1960/1	5	1965/6	1
1961/2	6	1966/7	1
1962/3	0	1967/8	0

(voluntary ban imposed in subsequent years)

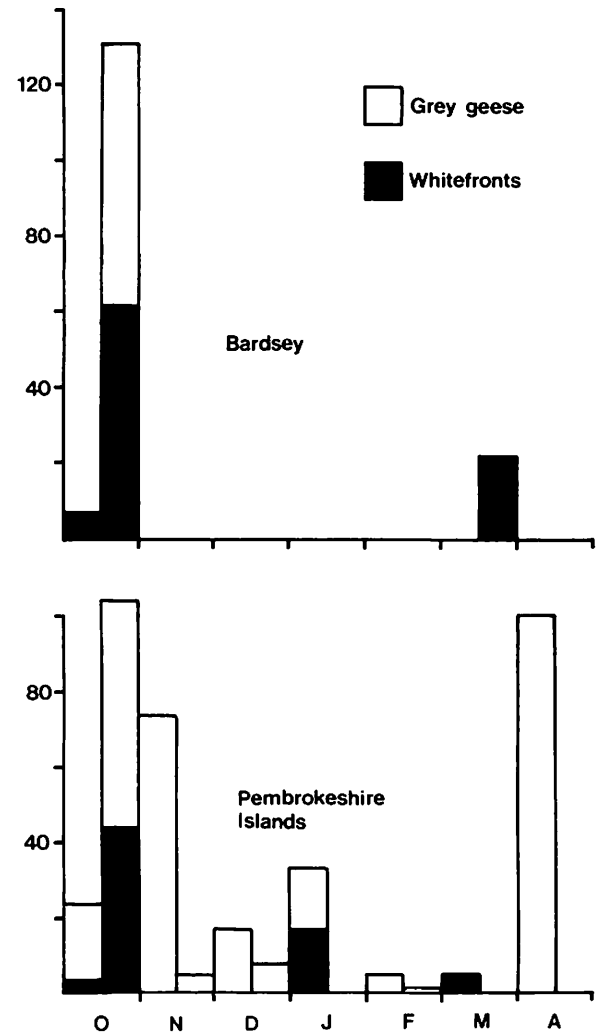


Fig. 3. Patterns of occurrence of geese from the offshore islands of Bardsey (Gwynedd) and Skomer/Skokholm (Dyfed). Unidentified grey geese (*Anser* spp.) are separated from confirmed sightings of Whitefronts.

and north-east bogs. Disturbance from these areas at night by fox, man or fires often caused them to flight to roost on the upland lakes, while they often flew to roost on Teifi Pools when not disturbed.

The winter of 1962/3 proved disastrous. With the freezing of the bog surface and their food plants denied them, geese left for fields nearer the coast, where starvation, indiscriminate shooting and predation resulted in high mortality. Geese on fields behind Llanon were so weak that men were killing them with sticks, even though there was nothing to eat on them. Of the 550-600 geese which arrived in autumn, less than 200 returned after the thaw, and the maximum count the following winter was 117 (20 Nov. 1963). Very low levels of juveniles appeared in the flocks after the catastrophic winter which contributed to the subsequent decline throughout the following decade, until the geese ceased to winter regularly after 1967/8 (Davis 1972).

Intriguingly, c.39 Whitefronts were present in the Llanfair Clydogau/Cors Caron/Teifi Pools area in December 1982 and a few parties have been seen occasionally in other winters. Indeed, nine wintered in November-March 1973/4, but there seems no current prospect of the resident flock returning. In spite of this, the reasons for the complete extinction remain obscure. The food resource remains unimpaired, although the absence of recent fires on the site may have had some effect. Graham Green, Keeper of the Lisburne Estate, frequently found them feeding on burned areas of mire by preference and this has also been stated of the Borth flock and at the Redwood Bog in County Offaly, Ireland. However, it does seem that the increase in low-flying aircraft in the late 1960s and other sources of disturbance at Cors Caron may have contributed to the desertion (Davis 1971).

Carmarthenshire (Dyfed)

In the absence of extensive peatlands and suitable feeding habitat the county seems unlikely to have supported a regular *flavirostris* wintering population. During the period when birds wintered on Cors Caron, there were numerous reports of small parties of grey geese in the Teifi Valley along the Carmarthen/Cardiganshire boundary (D.H.V. Roberts, *in litt.*). However, Greenland birds have also frequently been identified associating with the large (but declining) European Whitefront flock at Dryslwyn (e.g. 6 on 31 Jan. 1971), and occasionally elsewhere. Unidentified grey geese predominantly seen in October and April at Coed, Ferryside, were also probably of this race.

Pembrokeshire (Dyfed)

There were no regular sightings of Greenland Whitefronts in the past (Mathew 1894) or to the present day, although there are frequent records from the offshore islands, probably involving overshooting Irish birds, or Welsh birds en route to their wintering grounds (Fig. 2). The latter seems likely in view of the fact that Cadman regularly witnessed the arrival of the Tregaron flock in October from the south-west.

Many Greenland Whitefronts appeared in Pembrokeshire in the severe winter of 1962/3. They were almost certainly displaced Cors Caron birds, although Dutch-ringed Russian Whitefronts were recovered in west Wales at this time. Some 130 birds were at Mernon, 99 at Marloes (flying to and from Skomer), up to 30 at Newgale and similar numbers at Goodwick Marsh in January 1963. In addition, there were 40-50 on Ramsey in February/March 1963. Many geese were shot here also.

In other years, timing of records from the islands are similar with records particularly numerous in mid-October as the geese arrive. Maximum numbers since the 1962/3 winter were 22 at Llysyfran Reservoir, February 1976 (Davis 1978).

Glamorgan

There are no regular records for the county, and despite the arrival dates of the now extinct Margam Moors flock of Whitefronts being mid-October in most years, there is no doubt that these birds were indeed European Whitefronts (Heathcote *et al.* 1967). In fact, the first Greenland Whitefront record confirmed from Glamorgan was at Whiteford on 23 February 1977 (Jones & Davis 1979).

Monmouthshire

No regular flocks have ever been recorded from Gwent, and indeed the first confirmed record for the county was March 1974 when a bird was seen at Llandegfedd Reservoir (Ferns *et al.* 1977).

Anglesey (Gwynedd)

There is no good evidence of regular wintering Greenland Whitefronts in Anglesey at present, although Atkinson-Willes (1963) reported small numbers distributed throughout the island. Prater (1981), however, also asserts that up to 200 wintered in Anglesey up until the early 1970s, to be replaced in that decade by European birds. Recent examination of the Llyn Bodgylched (Bulkeley Lake) flock, together with the view of many

correspondents confirm these are of Russian origin. They are not present in October or April (extreme dates from the UCNW Bird Club Bangor are 16 November 1977 and 13 March 1973), although two returning birds on 12 October 1971 (COSBR 1972) suggests these may have been of the Greenland race. Since that time, nine *A. a. flavirostris* were identified with 24 European birds during 5-10 December 1980 (COSBR 1981) at Llyn Bodgylched. The European Whitefronts mainly feed on grass ley adjacent to the lake, sometimes flying further afield. Recent numbers have rarely exceeded c.40 (e.g. maxima of 45 on 16 Feb. 1977 and 48 on 28 Feb. 1982). Recent records of Greenland birds are sporadic and scattered throughout the island from such sites as Llyn Coron, Llyn Alaw and Llyn Padrig.

Caernarfonshire and Merioneth (Gwynedd)

Forrest (1907) reported Whitefronts at Ystumllyn and North *et al.* (1947) described the species as regular there. There is no mention of this flock in Atkinson-Willes (1963), but it would appear that between at least 1958 and 1960 and during 1965-68, up to 30 Greenland Whitefronts frequented the marsh feeding on the fields above the marsh and towards Black Rock Halt Station. There are no records since this time (R. Homfrey and M.C. Wainwright *in litt.*).

Forrest (1907) also described the Whitefront as the most common species of geese from the Porthmadog area, but these have apparently ceased to occur on Traeth Mawr and so their identity remains obscure (Jones & Dare 1976).

Birds undoubtedly occur on Bardsey on passage after the pattern of the Pembrokeshire islands (Fig. 3), occasionally numbering up to 39 birds (Jones & Dare 1976).

The birds using the Dyfi Estuary on the Cardigan/Merioneth border are described under Cardiganshire; however, E.H.T. Bible frequently reported geese on the Aber Dysynni near Tywyn which were probably wandering Dyfi birds. Similarly, Gooders (1967) reports Whitefronts as being regular visitors there.

Breconshire (Powys)

While there are no regular records from the county according to E. C. Phillips (1899), W. N. Phillips (1948) later stated Whitefronts were 'observed in various parts of Breconshire, but not in very great

numbers it shows a marked preference to bogs where it feeds and is rarely observed settling in fields'. This must surely refer to Greenland birds, but there are, alas, no further details. The first confirmed record of *A. a. flavirostris* came from Llangorse Lake, 19-26 November 1968, although two birds shot out of 20 at Bwlch in the winter of 1907/8 were probably of this race (Massey 1976).

Herefordshire and Radnorshire (Powys)

There is no certain evidence of Greenland White-fronted Geese visiting Radnor. Several geese seen at Llan Bwlch-llyn on 26 April 1904, c.70 passing over Gwadestry in early April 1954 and seven over Burl Hill on 18 April 1954 were probably Whitefronts (Ingram & Salmon 1955), while the dates may suggest Greenland birds. Generally, however, white-fronted geese are few and far between in the area.

Montgomeryshire (Powys)

A small flock of Whitefronts frequenting the lakes and hills above Caersws has been known for some 16 years (Lovegrove 1968; Saunders 1974), 57 here in October 1976 (Lovegrove 1977) suggested that they might be of Greenlandic origin, but it was only during the 1980/81 season that the flock was confirmed to be of Greenland birds (R. R. Lovegrove *in litt.*). The flock was previously considered to be part of the Siberian flock from Welshpool which is known to visit several of the hill lakes, as at Llyn Mawr, where as many as 200 have been seen. However, it now appears that up to 40 Greenland Whitefronts winter in the uplands and their presence may well explain anomalous influxes at the Dyfi and Cors Caron sites during cold weather. Birds feed on common cotton-grass in peat cuttings occasionally taking bottle sedge (*Carex rostrata*), but spend most time on reseeded grassland in the vicinity of Llyn Mawr and other lakes in the district which are used as roost sites. However, they range widely, are often absent from the area in the middle part of the winter and more information is required about these birds in order to achieve adequate protection. They may be the same flock as has been seen on the now afforested Llanbrynmair block of uplands in recent years (Lovegrove 1980). The flock numbered 22-24 in March 1984 and as such are clearly in need of conservation measures. If the Llanbrynmair area was an important feeding resource, the future of this flock looks doomed indeed.

With details of these geese (in a relatively well-watched area) so scant and only recently determined as being of Greenlandic stock, it is tempting to speculate whether there remain small flocks of this race of geese in scattered corners of the Cambrian Mountains, as yet undiscovered.

Acknowledgements: Such a review article could not have been written without the help and assistance of many people who have cheerfully contributed a great amount in written documentation and it is a great pleasure to thank all who have helped. An enormous debt is owed to all who answered requests for information with special thanks to: Peter Davis, Ceredigion bird recorder, for making available all records known to him and supplying and suggesting further sources of information; Bill Condry, who was a major source of assistance and Arthur Cadman, who took great interest in the geese at both Corsydd Caron and Fochno (both also went to considerable trouble to extract data from their records); Dick Squires, Ynyshir RSPB Warden, for kindly supplying all reserve records; Peter Hope Jones, for extracting all Bardsey goose records; Adrian Fowles, for passing on all references to geese extracted from the J. H. Salter diaries (now at the National Library of Wales); Francis Peach, who extracted records from his own and his father's (W. S. Peach) ornithological record card index. Thanks go to them and the many others assisting in the compilation of records and discussion of past habits of the geese over the years.

In particular, thanks to: Ron Birch, Paul Blackburn, Robin Bovey, Dr Roger Bray, Dr Bruce Campbell, Arthur Chater, Mark Cole, Les Colley, Bill Condry, Dr Peter Dare, John Davis, Peter Davis, Peter Walters-Davies, Brian Dolan, Flo Evans, Adrian Fowles, Ian Francis, Graham Green, Harold Grenfell, Eric Hardy, Richard Homfrey, Dr D. Glyn Jones, Peter Hope Jones, Tony Laws, Roger Lovegrove, Dr Malcolm Newson, Dr Malcolm Ogilvie, Dr Myrfyn Owen, Robin Payne, Nicola Penford, Nick Preston, Dilwyn Roberts, David Salmon, Allan Smith, Dick Squires, Keith Vinicombe, Mr M. C. Wainwright, Dr Robin Whatley, Graham Williams and Frank Wrigley who all gave kind assistance. All the Welsh County Bird Recorders kindly read the earlier drafts of this paper.

References

- Atkinson-Willes, G.L. (ed.). 1963. *Wildfowl in Great Britain* Nature Conservancy Monograph No. 3. HMSO, London.
- Belman, P.J. 1981. Ringing and recoveries of Greenland White-fronted Geese. In Fox, A.D. and Stroud, D.A. (eds) *Report of the 1979 Greenland White-fronted Goose Study Expedition to Eqalungmiut Nunaat, west Greenland*. 319 pp., GWGS, Aberystwyth.
- Cadman, W.A. 1953. Winter foods and ecological distribution of the Greenland White-front. *British Birds* 46, 374, 375.
- Cadman, W.A. 1956. The Wildfowler Naturalist. *Nature Wales* 2, 348, 349.
- Cadman, W.A. 1957. *Tales of a Wildfowler*. Collins, London.
- Cambrian Ornithological Society. 1972. *Cambrian Bird Report 1971*.
- Cambrian Ornithological Society. 1981. *Cambrian Bird Report 1980*.
- Condry, W.M. 1951. Bird Notes. *West Wales Field Soc. Field Notes* 9, 3.
- Davis, P.E. 1971. *The Cardiganshire White-fronts*. 3 pp., Dyfi National Nature Reserve Wildlife Management Advisory Panel. (Information Leaflet.)
- Davis, P.E. 1972. *Dyfed Bird Report 1967-71*. 27 pp., West Wales Naturalists' Trust, Haverfordwest.
- Davis, P.E. 1978. *Dyfed Bird Report 1972-76*. 27 pp., West Wales Naturalists' Trust, Haverfordwest.
- Done, C., Birch, J.E., Birch, R.R., Birkwell, J.M., Stokes, E.J. and Walton, G.G. 1968. *The birds of Flintshire*. 38 pp., Flintshire Ornithological Society, Rhyl.
- Ferns, P.N., Hammar, H.W., Humphreys, P.N., Kelsey, F.D., Sarson, E.T., Venables, W.A. & Walker, I.R. 1977. *The birds of Gwent*. 152 pp., Gwent Ornithological Society, Pontypool.
- Forrest, H.E. 1907. *The vertebrate fauna of North Wales*. 537 pp., Witherby, London.
- Fox, A.D., Madsen, J. & Stroud, D.A. 1983. A review of the summer ecology of the Greenland White-fronted Goose, *Anser albifrons flavirostris*. *Dansk Orn. Forens. Tidsskr.* 77, 43-55.
- Gooders, J. 1968. *Where to watch birds*. 313 pp., Deutsche, London.
- Heathcote, A., Griffin, D. & Salmon, H. Morrey. 1967. *Birds of Glamorgan*. Cardiff Naturalists' Society, Cardiff.
- Ingram, C.S.G. & Salmon, H. Morrey. 1955. *Hand list to the Birds of Radnorshire*.
- Ingram, C.S.G., Salmon, H. Morrey, & Condry, W.M. 1966. *Birds of Cardiganshire*. 88 pp., West Wales Naturalists' Trust Haverfordwest.
- Jones, P.H. & Dare, P.J. 1976. *Birds of Caernarvonshire*. 87 pp., Cambrian Ornithological Society.
- Jones, P.H. & Davis, P.E. 1979. *Welsh Bird Report for 1977*. *Nature Wales* 16, 180-194.
- Jones, P.H. & Roberts, J.L. 1983. *Birds of Denbighshire*. *Nature Wales* n.s. 1(2), 56-65.
- Lovegrove, R.R. 1968. Bird Notes. *Mont. Field Soc. Ann. Rep. Notes*, 10.
- Lovegrove, R.R. 1971. Bird Notes. *Mont. Field Soc. Ann. Rep. Notes*, 9.
- Lovegrove, R.R. 1977. Bird Notes. *Mont. Field Soc. Ann. Rep. Notes*, 6.
- Lovegrove, R.R. 1980. Upland Forestry—threat or opportunity. *Nature Wales* 17, 48-51.
- Massey, M.E. 1976. *Birds of Breconshire: a review of the status and distribution*. 72 pp., Brecknock Naturalists' Trust, Brecon.
- Mathew, M.A. 1894. *The Birds of Pembrokehire and its islands*. Porter, London.
- North, F.J. Campbell, B. & Scott, R. 1947. *Snowdonia*. 469 pp., Collins, London. (New Naturalist Series)

- Ogilvie, M.A. 1978. *Wild Geese*. Poyser, Berkhamstead.
- Owen, M. 1978. *The Greenland White-fronted Goose—the case for protection*. 3 pp., Unpubl. ms. Wildfowl Trust.
- Owen, M., Atkinson-Willes, G.L. & Salmon, D.G. 1986. *Wildfowl in Great Britain*. 2nd Ed. CUP, Cambridge.
- Phillips, E.C. 1890. *The Birds of Breconshire*. Brecon.
- Phillips, W.N. 1948. *The Birds of Breconshire*. Brecon.
- Ploeger, P.L. 1968. *Geographical differentiation of Arctic Anatidae as a result of isolation following the last Glacial*. 159 pp., E.J. Brill, Leiden.
- Pollard, D.F.W. & Walters-Davies, P. 1968. A preliminary study of the feeding of Greenland White-fronted Geese in Cardiganshire. *Wildfowl*, 19, 108-116.
- Prater, A.J. 1981. *Estuary birds of Britain*. Poyser, Carlton.
- Ratcliffe, J. & Hattey, R. 1982. *Welsh Lowland Peat Survey*. Internal Report to NCC, Bangor.
- Reynolds, J. 1984. Vanishing Irish Boglands. *World Wildlife Fund News*, Spring 1984, 10-16.
- Ruttledge, R.F. & Ogilvie, M.A. 1979. The past and current status of the Greenland White-fronted Goose in Ireland and Britain. *Irish Birds* 1(3), 293-363.
- Ryan, J.B. & Cross, J.R. 1984. The conservation of peatlands in Ireland. *Proc. Int. Peat Congr., Dublin 1984*.
- Salomonsen, F. 1947. Forste forelobige Liste over genfundne grønlandske Ringfugle. *Dansk Orn. Forens, Tidsskr.* 41, 141-143.
- Salomonsen, F. 1950. *Grønlands Fugle—the birds of Greenland*, 609 pp., Munksgaard, København.
- Saunders, D. 1974. *A Guide to the Birds of Wales*. Constable, London.
- Stroud, D.A. 1984. Status of Greenland White-fronted Geese in Britain, 1982/3. *Bird Study* 31, 111-116.

A.D. Fox, Greenland White-fronted Goose Study, School of Biological Sciences, University College of Wales, Penglais, Aberystwyth, Dyfed. SY23 3DA
 D.A. Stroud, Greenland White-fronted Goose Study, School of Biological Sciences, University College of Wales, Penglais, Aberystwyth, Dyfed. SY23 3DA