

Section 1.3.2 Biological

The race is a typical wintering bird of western 'Celtic' Britain and Ireland i.e. generally those areas with an oceanic/hyperoceanic climate with Lusitanian flora and fauna. It is often associated with an assemblage of other birds either showing similar habitat requirements, or with similar geographic range. These include species such as Corncrake *Crex crex*, Chough *Pyrrhocorax pyrrhocorax*, Barnacle Geese *Branta leucopsis*, and several species of waders.

In Greenland and Iceland, Greenland Whitefronts are one of a group of migratory birds breeding either in west Greenland or further west in the Nearctic and using a similar, trans-icecap, migratory flyway.

The geese provide a biological link between the Celtic countries of Ireland, Wales and Scotland. They typically occur in landscapes that are farmed in a relatively low-intensity fashion (compared to elsewhere in Europe); a feature that is of significant nature conservation importance (Bignal et al. 1989; see also section 2.2.1.7).

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Section 1.3.3 Cultural

This section identifies the impact of man, both past and present, upon the population. Note is made of archeological interest, previous land-uses and conservation management and their effect upon the geese, together with a note of current public interest for research, education, recreation, landscape and other land-uses if these are relevant to the management of the population.

Section 1.3.3.1 Archeology

Archeological records of Greenland White-fronted Geese occur principally in Greenland where goose bones have occasionally been found within middens within the present day range. These are summarised as follows:

Undated remains	Egalummiut nunaat (67° 30'N) Stroud (1981)
c. 1400 A.D.	Norse Western Settlement (65° N) McGovern et al. (1983)

The infrequency of remains indicates that White-fronted Geese do not seem to have been a historically important component of the diet of early Greenlandic cultures.

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Section 1.3.3.2 Land use

Section 1.3.3.2.1 Past land use

Interpretation of the effects of previous land uses on Greenland White-fronted Geese is complicated by the almost complete lack of information on their historical abundance. With the exception of the pioneering Scottish regional accounts of natural history of Harvie-Brown & Buckley (1887, 1888, 1892) and some other authors (e.g. Gray 1871; Berry 1936; Baxter & Rintoul 1953; Kennedy et al. 1954; Rutledge & Watt 1958), the first wide-scale compilation of information from the wintering grounds was that of Rutledge & Ogilvie (1979). There still remains little information from Iceland (section 1.2.3).

Scotland

Generally, Greenland White-fronted Geese occur in those parts of Scotland which still retain a 'low-intensity' or more traditional form of agriculture, compared with much of Europe. In this context, the intensity of agricultural management relates to features such as mechanisation and the widespread use of inorganic fertilisers and other chemical treatments. Many of the areas used by geese will have been formerly farmed in a labour intensive fashion, albeit not a capital intensive one (the human resource for labouring would have been widely available).

Clarke (1991) outlined agricultural trends in the southern Inner Hebrides (Colonsay, Oronsay, Islay, Jura and Gigha) going back to the earliest collection of regular agricultural statistics in 1866. This study and other information (e.g. Wormell 1989; Harrison 1989) shows that the type of farming undertaken has been far from static.

Whilst Clarke (1991) gives further information, the following summarises the changes for the four islands concerned between 1870 and 1989.

- a 33% reduction (by 3,440 ha) in the area 'farmed';
- the loss of 84% of cornfields, 90% of root fields, and 13% of grass fields resulting in greater uniformity of farming and loss of small-scale habitat mosaics;
- a reduction in the number of farm units;
- significant changes in populations of sheep and cattle, although variable between parishes and islands. Overall a 44% increase in cattle and a 16% decrease in sheep (but variable over time also - see Figure 1.3.3.2.1);
- major declines in root and grain production since the 1950s (Figure 1.3.3.2.2);
- in 1870 approximately 27% of farmed land was given over to arable crops and 73% to grass production. By 1963 the ratio had changed to 21% and 79% respectively, and by 1989 has changed to 5% and 95% (Clarke 1991).

Some of these changes are also known from elsewhere in the range of the geese (e.g. Tiree and Coll - Harrison 1989).

It is now only possible to speculate what affect these changes would have had on the Greenland Whitefront population at that time. The geese would, of course, also have been affected by other factors such as hunting, again a subject about which virtually nothing is known prior to the 1960s.

Ireland

The geese occur through a wide range of Ireland, which has been subject to differing land-use pressures. Many of the smaller, western flocks are especially associated with marginal farmland which will have been subject to the changing fortunes of farming in these areas. Elsewhere, the most significant land-use change has been the wide-scale destruction of Irish peatlands. This has directly affected the geese both through loss of feeding areas, roosting sites and of disturbance free refuges (Ruttledge & Ogilvie 1979).

"From a study of the information available for the last century it is clear that this goose was numerous and widespread throughout the boglands and marshes of Ireland (Ussher & Warren 1990). Extensive drainage of their habitat commenced between 1845-55 which resulted in the geese being forced to leave many of their habitual haunts." At about this time "the Wexford Slobs were reclaimed from Wexford Harbour, and by the beginning of the present century the Whitefronts began to use this area. By 1925 numbers were rapidly increasing there and it quickly became the most important haunt for them. It seems reasonable to postulate that with the loss of so much habitat through the country as a result of drainage the geese discovered and moved to the Wexford Slobs, and so produced the gradual buildup in numbers there. This left the rest of the population in scattered haunts throughout the country plus a few more densely populated areas." (Ruttledge & Ogilvie 1979).

Iceland

An historic perspective on changing Icelandic agriculture is given by Fridriksson (1972). There have been two major trends that are likely to have been significant for the geese, both of which have been probably adverse.

Since the settlement of Iceland, grasslands have not been managed sustainably, leading to their erosion and loss. Of an estimated 40,000 sq.km of Iceland with vegetation in 874 A.D., only 20,000 sq.km remained in the early 1970s. As documented by Fridriksson (1972), the reduction of grassland carrying capacity led to falling yields of fodder, resulting in a declining human population and associated famine. This century, there has been more intensive management of remaining grassland, such that increased yields have offset the reduced grassland area in agricultural terms.

In part to compensate, in agricultural terms, for the erosion of

grassland areas, this century has seen the widespread drainage of natural marshlands. In particular, the traditional wet meadows dominated by *Carex lyngbeii* have been widely drained and converted to dry grasslands. The ecological consequences of the loss of these wetlands for the geese is unknown, but potentially this could have had adverse impacts as they were particularly common in the extensive southern lowlands used by geese on migration. Loss of these wetlands may have resulted in reduced feeding potential and loss of secure roosting areas. It has certainly had adverse consequences for other wetland birds (Summers & Nicholl 1983).

Icelandic agriculture is also highly sensitive to climatic changes, both of a long- and short-term nature. The growth of grass depends very much on climate, particularly on temperature, and winter temperatures are especially important (Bergthorsson 1985). Although it is possible to compute the effects of former climatic effects on grass growing and livestock carrying capacity from observations made this century, the effects of these changes on the geese are obviously unknown.

Greenland

There have been no significant land use changes within the Greenland breeding areas.

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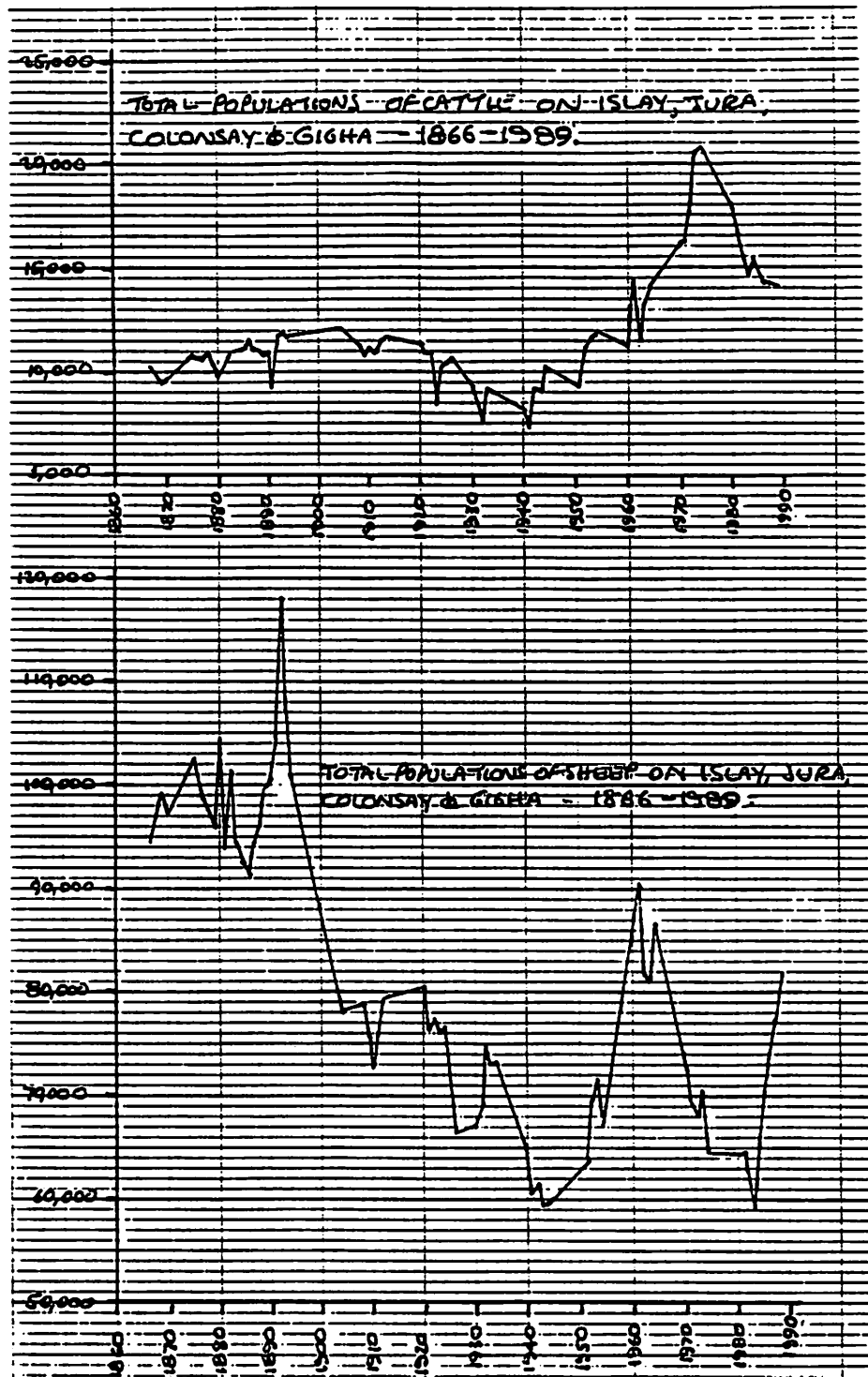


Figure 1.3.3.2.1. Changing agricultural trends on Islay, Jura, Colonsay and Gigha as reflected by changes in numbers of livestock (from Clarke 1991).

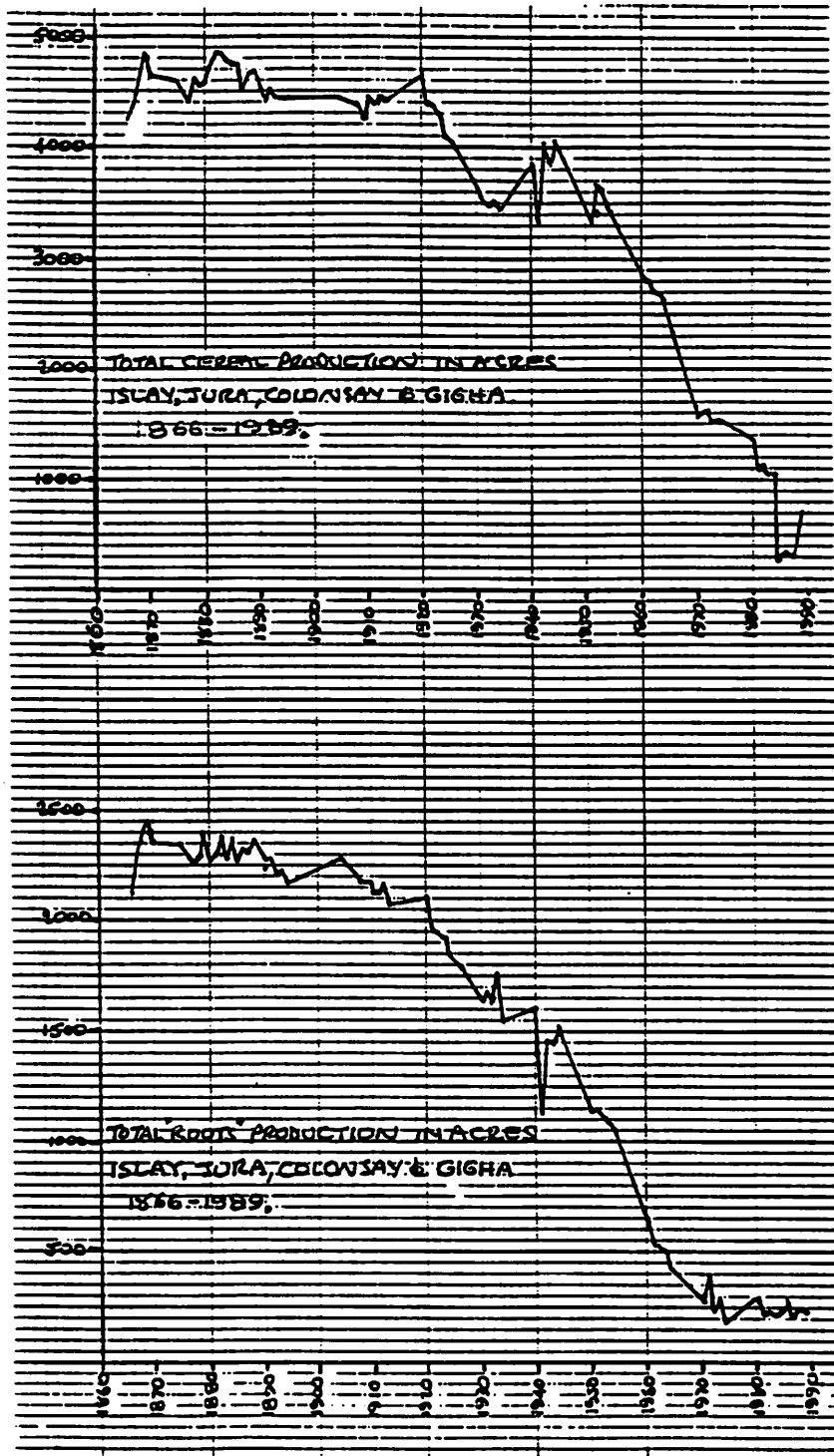


Figure 1.3.3.2.2. Changing agricultural trends on Islay, Jura, Colonsay and Gigha as reflected by crop production (from Clarke 1991).

Section 1.3.3.2.3 Land tenure systems

Greenland

Areas of the breeding grounds frequented by the geese are under the effective ownership of the state (Greenland Home Rule Authorities).

Iceland

Much farmland used by the geese is in private ownership, but some important areas (e.g. the Hvanneri Agricultural College) are state owned - albeit leased to farmers on a short-term basis. The full extent of the state ownership of lands used by geese is at present unclear, but could be determined from the central Land Register.

United Kingdom

Nearly all land used by the geese is in private ownership. Throughout much of Scotland an estate system is in operation. These large estates are managed as a unit for shooting and other practises by an estate manager (factor). While farming of smaller units of the estate is undertaken by tenant farmers. In parts of Scotland, the crofting system pertains, with small land-holdings being managed as crofts. Some residual rights of mineral extraction etc. remain with the landowner. Elsewhere land is in freehold ownership, sometimes by conservation organisations. Designation of Sites of Special Scientific Interest (SSSIs) in Great Britain, Areas of Special Scientific Interest (ASSIs) in Northern Ireland, Ramsar sites or EEC Special Protection Areas (SPAs) do not affect land-ownership.

Republic of Ireland

Most land used by the geese is in private ownership. Designation of Areas of Scientific Interest (ASIs) does not affect land ownership, but for effective protection as Ramsar sites or SPAs, land has to be in State ownership.

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PART 2

EVALUATION

PART 2. EVALUATION

The second part of the plan is an evaluation of the information collected together in Part 1, for the purpose of specifying achievable objectives. This leads to the prescriptions given in Part 3.

Chapter 2.1 Conservation status of the Greenland White-fronted Goose population and its habitats

This chapter reviews previous recognition of the population's conservation interest and the past and present status of the population and its habitats. It provides the basis on which the evaluation process (Chapter 2.2) proceeds.

Section 2.1.1 Habitats

Section 2.1.1.1. Historic interest

This section traces the history of the interest shown in the habitats of the geese, with references to any significant statements affecting them made in policy, scientific or other documents.

Section 2.1.1.2. Present status of habitats

Section 2.1.2 Population

Section 2.1.2.1 Historic interest

This section traces the history of the interest shown in the population, with references to any significant statements affecting the geese made in policy, scientific or other documents.

There has been generally little historic (i.e. pre-1970s) interest in Greenland White-fronted Geese. This most probably reflects their remote wintering and breeding areas away from centres of population density. The race was only described taxonomically in 1948, and the first thorough review of the status and distribution was undertaken as recently as 1979.

The race was listed for special protection under Annex 1 of the EEC Birds Directive in 1979 and given protection in Scotland under the Wildlife and Countryside Act in 1981. It was subject to a shooting moratorium in the Republic of Ireland in 1983 (which has continued substantially to the present). It received protection in Northern Ireland in 1985.

Section 2.1.2.2 Present day

For some years, those involved in Greenland White-fronted Goose *Anser albifrons flavirostris* conservation have been promoting a conservation plan for the population as a whole. This would address the various problems and opportunities facing the population at an international scale and would facilitate co-operation between the four nations (Greenland/Denmark, Iceland, Ireland and the United Kingdom) responsible for the well-being of this small population.

The first steps in this direction were taken at the 1990 Montreux meeting of the parties to the Ramsar Convention. A meeting of representatives of the four Range States was held to discuss co-operation under Article 5 of the Ramsar Convention (which encourages international co-ordination in the conservation of wetlands and their fauna).

An outcome of this meeting was that the Republic of Ireland agreed to be host to a further meeting of Range States at Wexford, Ireland in March 1992. Ireland further agreed to sponsor this international conservation plan. The proposed plan provides a significant opportunity to make real progress in international co-operation concerning Greenland Whitefront conservation.

Chapter 2.2 Evaluation

The conservation importance of the population is now appraised by the systematic consideration of eight standard criteria.

Section 2.2.1 Criteria for evaluation

The process of evaluation may appear complex but, by applying the criteria systematically, a proper appreciation of the population can be made as a prerequisite to defining the objectives of management.

Section 2.2.1.1 Naturalness

The Greenland Whitefront is unusual amongst geese in still frequenting traditional haunts throughout much of its winter range (e.g. peatland roost sites or refuge areas). Even where using man-modified agricultural habitats, in some areas it is especially associated with grasslands of a semi-natural, traditionally managed character (i.e. areas of extensive pastoralism). At a few resorts, often those holding large numbers, more intensively managed grassland is used in winter and in spring (Iceland).

Section 2.2.1.2 Rarity (population size)

The size of the world population (c. 30,000) is small in comparison with most other goose populations and races. In a western European context, it is the smallest after the Svalbard Light-bellied Brent Goose *Branta bernicla hrota*. In global terms, only a few other races (e.g. Aleutian Canada Geese *B. canadensis leucopareia*, Nene *Branta sandvichensis*, Thule White-fronted Geese *A. a. gambelli*) are smaller. The population is geographically discrete and has suffered a historical decline, but has since recovered to a level corresponding to, or slightly exceeding, that estimated for the 1950s.

Section 2.2.1.3 Fragility

Many waterfowl have relatively high adult survivorship and relatively low, unpredictable reproductive rates compared to other birds. These characteristics mean that their populations are more sensitive to changes that affect their adult survivorship, than to short-term variations in breeding output. Characteristics of Greenland Whitefront population dynamics and ecology indicate fragility or lack of adaptability compared to other geese. Generally, population productivity is low (although possibly showing the start of a medium-term increase), with only a small proportion of potentially breeding adults successfully bringing young back to the wintering grounds. There is an extended family structure with young either staying with parents, or with

siblings, for many years - much longer than other geese. Strong winter and staging site fidelity and generally little dispersal between sites especially predisposes Greenland Whitefronts to potentially adverse consequences of land-use change.

The population is also geographically restricted, not only to a small world range, but to a limited number of traditional sites within that range. Further, a very high proportion of the total population (c. 60%) occur in just two areas - Wexford and Islay. On an international scale, these factors make the population vulnerable to adverse circumstances affecting these few sites.

Section 2.2.1.4 Typicalness

The race is a typical wintering bird of western 'Celtic' Britain and Ireland i.e. generally those areas with an oceanic/hyperoceanic climate with Lusitanian flora and fauna. It is often associated with an assemblage of other birds either showing similar habitat requirements, or with similar geographic range. In Greenland and Iceland, Greenland Whitefronts are one of a group of migratory birds breeding either in west Greenland or further west in the Nearctic and using a similar, trans-icecap, migratory flyway.

The geese provide a biological link between the Celtic countries of Ireland, Wales and Scotland. They typically occur in landscapes that are farmed in a relatively low-intensity fashion (compared to elsewhere in Europe); a feature that is of significant nature conservation importance (see also Section 2.2.1.7 below).

Section 2.2.1.5 Recorded history

There is a poor historic written record relating to the population. The race was only described taxonomically in 1948, although geographic discreteness of its range allows pre-1948 records of *Anser albifrons* within that range to be confidentially ascribed to *A. a. flavirostris*. The first systematic collation on status on the wintering grounds was published as recently as 1979. Since then there has been intense research activity with publication of extensive recent literature (see Chapter 1.5 for comprehensive bibliography). It is now one of the best studied goose populations at least in the British Isles.

Section 2.2.1.6 Relationship to national/international populations

The race is one subspecies of the circumpolar *Anser albifrons*. Only in Britain does another race, the morphologically separate *A. a. albifrons*, occur, although the two subspecies are geographically separated. The relative size of the single population of *A. a. flavirostris* is small in comparison with most other *A. albifrons* populations (except for the highly restricted

Tule White-fronted Goose *A. a. gambelli*).

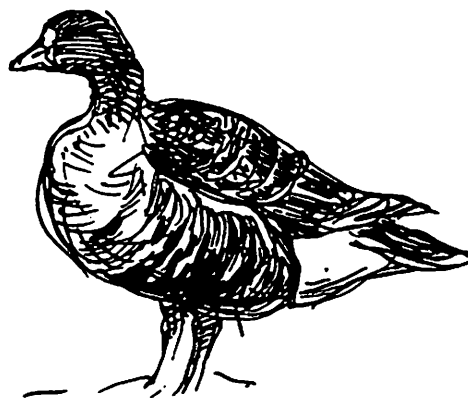
Section 2.2.1.7 Potential value

Although the geese occur in some wintering areas associated with intensively managed farmland, in much of the winter range the Greenland Whitefront is one of an assemblage of species associated with traditional forms of low-intensity agriculture. In particular, it occurs in crofting areas, regions with extensive pastoralism and on other traditionally managed areas (e.g. callows). Through the features noted in Section 2.2.1.3 above, the geese are a good potential indicator of the 'ecological health' of these biotopes. Although detailed understanding of the interaction between land-use change and population dynamics is poor, these geese are potentially valuable indicators of wider conservation values.

Section 2.2.1.8 Intrinsic appeal

While science may view all creatures as equal, pragmatism dictates that in nature conservation it is realistic to give more weight to the greater popular appeal of some species over others. In this respect Greenland White-fronted Geese have high potential appeal to some elements of society. In Britain and Ireland they are currently being used as 'flagships' in a campaign relating to peatland conservation. The requirement of this large and attractive peatland bird are being used to highlight the wider needs of peatland conservation. There is the potential in Iceland and Greenland for their use in this way to highlight wider wetland or international conservation issues.

These geese have always been perceived as one of the 'wildest' of populations, in terms of both habits and habitats. Hunters in Ireland, U.K., Iceland and Greenland all comment on and value the 'wild' nature of these birds, as and when they have been quarry.



Section 2.2.2 Identification/confirmation of important features

The purpose of this Section is to review earlier assessments and to identify from the mass of information, especially that recorded in Chapters 2.1. and 2.2, the most important features.

The successful conservation of Greenland White-fronted Geese is the joint and equal responsibility of the governments of Greenland (Denmark), Iceland, Ireland and the United Kingdom.

The population of Greenland White-fronted Geese is small in global terms and geographically restricted to these four countries. Geese are highly dispersed in summer but much more restricted to a few traditionally used sites or areas in winter, and on the staging areas where large aggregations can form. Both on the wintering and staging areas, geese are highly site-faithful, and this has been suggested also for the breeding grounds.

Population productivity is generally low with only a small proportion of pairs breeding successfully each year. Both in terms of population dynamics and social behaviour, Greenland White-fronted Geese differ from other races of Whitefront (and other geese). The family structure is unusually cohesive with a tight social group lasting for some years.

The geese traditionally occurred on natural and semi-natural habitats, especially peatlands. Throughout much of the winter range these areas are still used as roosts, although feeding also occurs on a range of both intensive and low-intensity farmland. The features of site-fidelity and sociality underlie a sensitivity to radical land-use change. This results in an ecological fragility which provides both problems and opportunities for conservation.

The goose is currently protected in much of its world range but subject to high, and probably increasing mortality from shooting on migration in Iceland. The limited information available suggests that shooting mortality is additive rather than compensatory.

The occurrence of this goose with a range of other species and habitats of high conservation priority allows its use as an indicator of wider conservation, and especially wetland, values.

Section 2.2.3 The population in wider perspective and
implications for conservation

For some populations or sections of them, the unit under evaluation should be considered as part of wider groupings or species, in terms of both its intrinsic importance and potential. This may affect conservation decisions in relation to regional, national and international considerations.

In this plan, the unit considered is the entire population of a subspecies. There is thus no relevant wider context and this section is not included in this plan.

Section 2.2.4 Specified limits

It is important to identify points beyond which negative change in the population automatically stimulates review action under this plan. Such measures are best established through the adoption of objective criteria, as elaborated in this section.

The population is subject to variable breeding success but this has generally occurred within a limited range. Medium term changes in breeding success, and more directly population size, can indicate changing conditions faced by the geese and alert Range States to the need for a review of conservation actions. Variation in mortality (as reflected by rapid changes of population size) and breeding success (proportion of young in autumn flocks) are both of importance.

Three criteria are proposed: the first reflects mortality, whilst the second reflects natality. The third criterion covers unexpected events which cannot be foreseen.

Trend criteria

- a) If total population size has declined by more 15% in any period of three years or less; or
- b) if the proportion of young at main wintering sites is below the long-term average for three consecutive years; or
- c) if any other major environmental changes occur within the range of the Greenland White-fronted Goose liable to affect the population.

In the event of any of these criteria being exceeded, an immediate review meeting of the plan should be convened by the Range States (see section 3.3.3).

Interactions with other species

Site management for Greenland White-fronted Geese should not be at the expense of other species of greater conservation importance in global or national terms. Generally the ecological conditions favoured by Greenland Whitefronts are also favoured by an assemblage of other birds such are Corncrake *Crex crex* and Barnacle Geese *B. leucopsis*. However there may be protected sites, or parts of sites, used by Whitefronts where conservation priorities may need to be targeted for other fauna or flora. These situations will need to be determined on an individual basis, but the need to avoid conflicting conservation priorities should be considered at all times by site managers.