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Birds, bogs and forestry

**The peatlands of  
Caithness and Sutherland**

David A Stroud, T.M. Reed  
M.W. Pienkowski and R.A. Lindsay  
Edited by D.A. Ratcliffe and P.H. Oswald

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## **The blanket bogs of Caithness and Sutherland**

The cool, wet and windy climate of northern Scotland has led to the development of extensive tracts of peatland which cover the landscape of most of Caithness and Sutherland. This is possibly the largest single expanse of blanket bog in the world and the largest

single area of habitat in the United Kingdom that is of major importance on the world scale, because of its global scarcity. According to evidence from within the peat, the current treeless condition over most of the deep peat area is not due to historical clearance of natural forests by man. The peat bogs are a natural Post-glacial climax



Blanket bog is now under intense threat, mainly from afforestation. The area of the Caithness and Sutherland peatlands already lost to forestry represents perhaps the most massive single loss of important wildlife habitat since the Second World War

vegetation type (section 2.2). They represent the largest area of actively growing acid bog in Britain, and their vegetation is composed of plant communities which have no counterparts elsewhere, except in Ireland, where very significant losses have already occurred. The high degree of surface 'patterning' or pool formation on the flatter areas of peatland ('flows') is of particular conservation significance. The pools support a specialised range of mosses (especially species of *Sphagnum*) and vascular plants, and they provide essential feeding habitats for wetland birds.

These blanket bogs support a particularly varied northern type of bird fauna not found in identical composition elsewhere in the world. They hold important breeding populations of golden plover, dunlin, greenshank and arctic skua. The lochs and smaller dubh lochans support breeding red-throated and black-throated divers, greylag geese, wigeon, teal, common scoters and red-breasted mergansers. Rare breeding waders include Temminck's stint, ruff, wood sandpiper and red-necked phalarope. Raptors such as hen harrier, golden eagle, merlin, peregrine and short-eared owl also use the bogs as breeding or feeding areas (Chapter 3). Many of these species have their main distribution in subarctic and arctic areas, and the peatlands of Caithness and Sutherland have considerable ecological affinities with the arctic tundra (sections 2.5 and 3.3).

Considerable bird populations are present (section 4.2 and Table 0.1), although densities of individual species are often low. We have estimated that some 4,000 pairs of golden plover, 3,800 pairs of dunlin and 630 pairs of greenshank breed on these peatlands. They hold considerable proportions of the European Communities' breeding populations of several wader, waterfowl and raptor species, including 66% of greenshank, 35% of dunlin and 17% of golden plover (Table 8.1).

The United Kingdom has accepted international commitments for the

conservation of wetland habitats and bird species (Chapter 7). Many of the breeding bird species on these peatlands are listed in Annex 1 of the European Economic Community's Directive on the Conservation of Wild Birds. Under this Directive Member States have entered into an obligation to take special steps to protect the habitat of such species and other migratory birds. The 'Bern' Convention requires conservation of threatened bird habitats, while the peatlands meet the agreed criteria of internationally important wetlands and hence qualify for designation under the 'Ramsar' Convention. The World Heritage Convention requires the conservation of natural features of outstanding universal value for the heritage of mankind.

Of all terrestrial habitats in Britain, these blanket bogs are the largest example of a primaevial ecosystem. They are of global significance, with both structural and biological features peculiar to this country. However, their continued survival is now under threat.

### **The threat**

Coniferous afforestation is destroying these peatlands. Both the state forestry enterprise and a private sector company have obtained extensive land holdings on the open market and now own or manage extensive areas of Caithness and Sutherland. Whilst two decades ago threats to these peatlands on this scale would have seemed inconceivable, land-use change unprecedented in its speed and scope is now in progress (section 2.6). The total area of blanket bog in Caithness and Sutherland is estimated to have covered 401,375 ha before afforestation. Since then, at least 79,350 ha have been planted or are programmed for planting, about 67,000 on peat.

Successful afforestation requires deep-ploughing and draining, which disrupt water-tables and surface flow patterns and lead to longer-term erosion, shrinkage, deep cracking and oxidation of peat (Chapter 6). As the trees become established, higher evapo-transpiration rates lower the



water-table further and change the soil structure. Ground vegetation is eliminated when the forest closes into thicket after 10-15 years.

Afforestation is inimical to the survival of moorland breeding birds. Whilst some species may persist within young plantations for a short period, they disappear once the forest canopy closes into dense thicket. From this stage until the mainly unthinned forests are clear-felled, the transformed habitat excludes all the species of open moorland except the few which may be able to nest in trees, but even these will depend for feeding on the extent of open ground remaining unplanted. The peatland bird assemblage is replaced by one of woodland which, as well as being almost entirely different, is of much lower conservation value because most of its species are so widespread and common. Neither the vegetation nor the bird assemblage show more than insignificant recovery to the previous peatland types during subsequent clearance phases in the forest rotation.

Afforestation can cause non-breeding and territory desertion by wide-ranging predatory and scavenging birds, such as golden eagle and raven, even when only part of the open hunting range is

planted. Moorland bird densities thin out over a perimeter zone beyond the forest edge, and suggestive indications that this is partly an effect of increased predation from crows and foxes are under investigation. Evidence for marked changes in vegetation on unplanted ground adjoining new plantations already exists and is consistent with a surface drying effect. Small enclaves of unplanted 'flow' and other habitats left unplanted within the forests are of doubtful value, especially in the longer term, either as examples of peatland vegetation and structure or for their bird assemblages.

The physical and chemical effects of coniferous plantations also extend far more widely than the plantations themselves. After ploughing and draining there are increased sediment loads in streams and lochs, faster run-off, and other alterations to the hydrology of catchments. During the early stages of plantation growth there can be short-term eutrophication owing to fertiliser application and run-off. This can affect nearby acid bogs by wind-drift and cause profound nutrient pollution of streams, with growth of algal blooms (section 6.5). All these factors reduce the quality of breeding habitat for water birds such as dippers and

divers as well as affecting commercial freshwater fisheries, which are of major economic importance in Caithness and Sutherland (section 5.1).

The impact of afforestation of the blanket bogs in Caithness and Sutherland causes a serious net loss of nature conservation interest which may extend beyond the areas actually planted.

### **The surveys**

The Nature Conservancy Council (NCC) has undertaken extensive survey work concerned with both the breeding birds and the vegetation of the peatlands. The methodology of NCC's Upland Bird Survey and Moorland Bird Study is presented in the Appendix. The Royal Society for the Protection of Birds (RSPB) has also conducted surveys of breeding birds, some of them using this methodology (section 3.1). Between 1979 and 1986 a sample of some 19% of moorland in Caithness and Sutherland was surveyed quantitatively for its breeding bird populations. The surveys were used to assess the nature conservation significance of the moorland bird populations throughout the two districts of Caithness and Sutherland.

The principal species of breeding waders — golden plover, dunlin and greenshank — all exhibit a considerable range of breeding densities, which can be related to variations in vegetation and its structure (Chapter 4). Associations between breeding waders and habitat features allow the interpolation of results over unsurveyed areas, using map evidence alone. This method has been tested, and the results used to obtain population estimates (Table 0.1). By examining map evidence from areas that have been afforested it is possible to estimate the numbers of the main wader species previously occupying them and thus the loss of populations through afforestation. There have been losses of up to 19% of golden plover, dunlin and greenshank (section 6.2). A disproportionate amount of prime habitat for waders has been ploughed and planted: foresters and these birds

are in direct competition for the same areas of peat bog.

The results of NCC's Peatland Survey of Northern Scotland are briefly summarised (Chapter 2) and will be published in detail elsewhere (Lindsay *et al.* in prep.).

### **Conservation aims and the future**

The future of these peatlands is uncertain since afforestation continues unabated. This report is not concerned with the questions that have been raised elsewhere concerning the economic and social justifications of such upland forestry (National Audit Office 1986), but rather seeks to present the conservation case for the protection of the peatlands (Chapter 8).

Previous conservation measures consisted of identifying exemplary sites to represent the range of interest in the peatland ecosystem, with the intention of conferring special protection on these as National Nature Reserves (NNRs) or Sites of Special Scientific Interest (SSSIs). Not only is this an extremely arbitrary approach in the particular situation, but reassessment in the light of fuller surveys and international evaluation has shown it to be quite inadequate in meeting the conservation need. The Caithness and Sutherland peatlands are now regarded as having a national and international importance which lies in their total extent, continuity and diversity as mire forms and vegetation complexes and in the total size and species composition of their bird populations.

Forestry interests regard all plantable land outside specially protected areas as potentially available for afforestation and have already planted up to the precise boundary of some SSSIs. Most of the remaining peatland area is plantable, and under present government policy and financial rules there is little to prevent the whole of this becoming afforested, outside the present limited area of SSSIs and NNRs. The nature conservation case is that the losses of habitat and birds already sustained on these internationally important peatlands are

so heavy that any further afforestation is unjustifiable. These losses are compounded by the parallel losses to moorland habitats (including blanket bog) and birds which continue apace through further afforestation in other parts of Britain and abroad. Maintenance of nature conservation interest could be achieved simply by retaining the existing pattern of land-use. Such an approach is compatible with existing agricultural and sporting interests. Indeed, an integrated conservation policy for these areas could be of advantage to these other land-use interests.

NCC's surveys enable the extent of the nature conservation interest of these peat bogs to be quantified, but they have

also revealed the rapid and continuing losses caused by afforestation. Already, habitat supporting nearly 19% of the three principal breeding waders has been destroyed or programmed for planting, and only eight of 41 hydrological systems in Caithness and eastern Sutherland have been left free from afforestation. The area lost to forestry — most of it since the passing of the Wildlife and Countryside Act 1981 — represents perhaps the most massive single loss of important wildlife habitat in Britain since the Second World War. Decisions to promote appropriate conservation measures are needed promptly if the losses already sustained are not to increase.



**Table 0.1** Estimated proportions of national and European Communities' populations of selected bird species breeding in the Caithness and Sutherland peatlands

	Estimated Caithness and Sutherland breeding population (pairs) <sup>1</sup>	Estimated British breeding population (pairs) <sup>1</sup>	Proportion of British population on Sutherland and Caithness peatlands	Proportion of European Communities' population on peatlands and Sutherland	Source <sup>7</sup>
Red-throated diver	150	1,000-1,200	14%	14%	Gomersall, Morton & Wynde (1984)
Black-throated diver*	30	150	20%	20%	Campbell & Talbot (1987)
Greylag goose	c. 300	600-800	43%	— <sup>2</sup>	Owen, Atkinson-Willes & Salmon (1986) Sharrock (1976)
Wigeon	80	300-500	20%	20%	Sharrock (1976)
Common scoter	30+	75-80	39%	16%	Thom (1986) RSPB and NCC (unpublished data)
Hen harrier*	30	600	5%	1%	Newton (1984)
Golden eagle*	30	510	6%	<1% <sup>3</sup>	Dennis <i>et al.</i> (1984) Watson, Langslow & Rae (1987)
Merlin*	30	600	5%	4%	RSPB (unpublished data) Bibby & Nattrass (1986)
Peregrine*	35 <sup>4</sup>	730	5%	<1% <sup>4</sup>	Ratcliffe (1984)
Golden plover*	3,980	22,600	18%	17%	Piersma (1986); this report
Temminck's stint <sup>5</sup>	<10	<10	—	—	Rare Breeding Birds Panel (1986)
Dunlin	3,830	9,900	39%	35%	Piersma (1986); this report
Ruff* <sup>6</sup>	<10	10-12	—	—	Piersma (1986); this report
Greenshank	630	960	66%	66%	Piersma (1986); this report
Wood sandpiper* <sup>6</sup>	<10	1-12	—	—	Rare Breeding Birds Panel (1986)
Red-necked phalarope* <sup>6</sup>	<10	19-24	—	—	Rare Breeding Birds Panel (1986)
Arctic skua	60+	2,800+	2%	2%	Furness (1986)
Short-eared owl*	50	1,000+	5%	4%	Sharrock (1976)

\* This indicates species listed on Annex 1 of the European Economic Community's Directive on the Conservation of Wild Birds (79/409) as requiring special protection measures, particularly as regards their habitat under Article 4(1). Other listed species are migratory and require similar habitat protection measures under Article 4(2).

1 This excludes the whole of Ireland.

2 EC population uncertain owing to unknown proportion of feral birds in other populations. The population in north-west Scotland is the only one thought to be natural, owing to separation from others.

3 Most of the EC population is of the south European race *homeyeri*; Britain holds all of the EC population of the nominate race, 6% of which occur on the Caithness and Sutherland peatlands.

4 The total Caithness and Sutherland population has increased to c. 60 pairs since the 1981 survey (Dennis pers. comm.), but no corresponding national total is available.

5 Most of the EC population consists of the Mediterranean race *brookei*; Caithness and Sutherland peatlands hold 5% of the EC population of the nominate race.

6 For reasons of confidentiality it is not possible to indicate precise numbers and distributions of these species breeding in Sutherland and Caithness. The Scottish populations of Temminck's stint and red-necked phalarope are the only representatives of these species breeding within the EC. Wood sandpipers breed in one other region of the EC but the Scottish population is important in EC terms.

7 Data for all species were also taken from Cramp & Simmons (1977, 1980, 1983, 1985).