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The Journal of the Scottish Ornithologists' Club

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Scottish Birds, the official journal of the Scottish Ornithologists' Club, publishes original material relating to ornithology in Scotland; papers concerned with status and distribution are particularly invited. All papers are considered by an Editorial Panel and, where appropriate, are scrutinised by specialist referees. Authors are advised to invite comment from friends or colleagues, and if necessary to make amendments, before submitting their papers. Short notes on unusual observations or records are also accepted. (Advice on the submission of contributions will be found on the inside back cover.) Papers and short notes should be sent, in the first instance, to The Editor, *Scottish Birds*, 21 Regent Terrace, Edinburgh EH7 5BT.

Two numbers of *Scottish Birds* are published each year, in early June and December. The winter number contains the *Scottish Bird Report*, which includes rarity descriptions (these should be sent to the *SBR* Editor: Angus Hogg, Kirklea, Crosshill, Maybole, Ayrshire KA19 7RJ).

Scottish Birds is issued free to members of the Scottish Ornithologists' Club, who also receive a quarterly newsletter, *Scottish Bird News*, which carries items of topical interest, Club news and notices, and book reviews. Details of SOC membership rates are given below. *Scottish Birds* and *Scottish Bird News* are available to non-members at a subscription rate (1986) of £25.00. Binding arrangements are available for *Scottish Birds*; volumes cover two calendar years. For information on advertising contact the Business Editor, Jacquie Clark, at 21 Regent Terrace, Edinburgh EH7 5BT.

The Scottish Ornithologists' Club was formed in 1936 to encourage all aspects of ornithology in Scotland. It has local branches in Aberdeen, Ayr, the Borders, Dumfries, Dundee, Edinburgh, Glasgow, Inverness, New Galloway, St Andrews, Stirling, Stranraer and Thurso, each with its own programme of field meetings and winter lectures. The Club's headquarters are at 21 Regent Terrace, Edinburgh EH7 5BT. The Waterston Library (probably the best ornithological library in Scotland), is available for reference during office hours (Monday to Friday, 9am to 5pm). The SOC Bird Bookshop is one of the world's leading ornithological booksellers; it carries a large stock of English language titles and can supply any Natural History book in print. Much of the business is by mail order, but personal callers are welcomed during office hours. The current catalogue is available on request. The Bird Bookshop is run by the SOC for the benefit of ornithology in Scotland.

SOC annual membership subscription rates

Adult	£10.00		
Junior (under 18, or student under 25)	£4.00		
Family (husband & wife, & children under 18)	£14.50		
Life *Individual*	£200.00	*Family*	£300.00
Pensioner *Individual*	£6.00	*Family*	£8.50

Birds in Scotland

by VALERIE M. THOM

In the thirty-three years since Baxter & Rintoul's two volumes, *The Birds of Scotland*, were published much has happened in ornithology generally, and birdwatching in Scotland is a far more widespread and, perhaps, more earnest pursuit. More to the point, the numbers and distributions of many species have changed, in some cases very considerably, since the days of Dr Baxter and Miss Rintoul.

There can be few as well qualified as Valerie Thom to review the changes that have taken place in recent times and to report on birds in Scotland today. In preliminary chapters, among her themes are habitats, conservation, birdwatching, and the changes in species' status and distribution. Then follows the species accounts, the backbone of the book, reviewing the period 1950–83 for breeding, resident, wintering and passage birds, with brief summaries of earlier data. There are additional records of rarities and vagrants 1983–85.

The major species accounts are complemented by 173 distribution maps and many tables and diagrams of relevant data, and there are 129 species drawings by a team of artists under the editorship of Donald Watson, who also contributes chapter headpieces and other drawings. A section of photographs illustrates the varied habitats of Scotland today.

400 pages, 26.5 × 19 cm, £24.00 net

T & A D POYSER

Scottish Birds (1986) 14:1-6

The first 50 years of the SOC

W. J. EGGELING

Joe Eggeling has been a member of our Club since its foundation and was elected an Honorary President in 1971. He served as President from 1966 to 1969, after an unusually onerous Vice-presidency during which he was deeply involved with the organisation and leading of the never-to-be-forgotten Bird Islands Cruise. In this invited article Joe reminisces about the SOC's first half-century — an appropriate occupation in Golden Jubilee year!

Fifty years ago, when I was on home leave from the Colonial Forest Service in Uganda, I received an invitation sent to all persons in Scotland known to be interested in birds — over the names if I remember correctly of Miss Evelyn Baxter and George Waterston. The invitation was to attend a meeting in Edinburgh to discuss the feasibility of setting up a Scottish Ornithologists' Club. Since my home was in Upper Largo, only a field away from Miss Baxter's house, I could scarcely refuse. As it happened I had a girl friend in Edinburgh and we fixed up to have lunch together that day and then go along in my car to the meeting.

We arrived a little early and I parked my car across the road from the entrance to Poole's Synod Hall, where the meeting was to be held. We saw a few people drift in at intervals, but put off entering ourselves, being otherwise occupied. Next, people started to come out. The meeting was over; we had missed it! As I learned later, it had been a great success; everyone had agreed that a SOC should be set up, and they had elected interim office-bearers. There were at first only about 80 members — and if I was not truly a founder member (which I consider myself to be!) it was only by the width of a road. Anyway, my brother and I had the satisfaction of being among the first, if not the very first, to pay our annual subscriptions!

Not long after the Club had got off the ground came the War. Miraculously, the SOC survived though functioning at very low key. Miraculously also, almost all the founder members survived. Slowly the Club grew. By 1947 it had a printed syllabus adorned with the familiar Crested Tit emblem and in 1950 approved the design of a club tie. By the time it attained its majority there were just over 720 adult members. Last year there were some 2,700 adult members. The Club continues to grow and develop.

Scottish Birds

Once you have a Club you need a vehicle for the quick and widespread dissemination of news. In the early years almost the sole repository for Scottish ornithological notes was the *Scottish Naturalist.* Sadly this ceased to function and it was only towards its end, when it appeared very spasmodically, that, in 1950, the first number of the cyclostyled *Edinburgh Bird Bulletin* appeared. Until 1955 this was a purely private venture, but in that year responsibility for it was assumed by the Club, which continued to run the Bulletin until 1958 when, rechristened *Scottish Birds* and printed, it became the official Journal of the SOC, appearing quarterly. Apart from the introduction of an annual Scottish Bird Report, first published in 1969, the

Journal remained virtually unchanged until this year, when our new quarterly, *Scottish Bird News*, appeared for the first time. This Jubilee Number of our Journal introduces a 'new look' and half-yearly publication for *Scottish Birds*.

One of the best of the many good articles which have appeared in *Scottish Birds* is Ian Pennie's "Ornithology in Scotland; a historical review" (*SB*4:126-142), covering the period 1447 (!) to about 1966 — which leaves less than half our 50 years uncovered. I don't intend to go over any of Ian's ground in detail but simply to pick a few currants from the slice that is left and add a few observations of my own.

SOC 'clubability'

First of all should we not ask "Why has the SOC been the success it undoubtedly is?" The main reason, I suggest, is that it has remained a Club and never attempted to become a scientific society. This is no accident. I think that of its 15 presidents only one, Prof. Wynne-Edwards, has been a professional ornithologist (to call Wynne that is perhaps stretching a point; he is a professional in many other fields of natural history as well). Clubability is a word hard to define but its meaning is clear. The attribute of clubability is to be found at every level of the SOC's activities, from Branch meetings to outings and excursions, as well as at the Annual Conference. All are as much gatherings of friends sharing a common interest as scientific get-togethers. This spirit is reflected even in the friendliness of the Journal.

From time to time, but not often, there has been criticism that the Club, and especially *Scottish Birds*, is not scientific enough. The plea is for more in-depth treatment of single species or groups of species, the main findings being presented in graphs, figures, histograms and analyses. This is fine for the professional but the fear of many, often only too real, is that by this approach one may be learning more and more about less and less, obscuring the bird in the process and producing something fairly incomprehensible to the general member. There are other periodicals and societies for the presentation of learned papers, delivered or written. Perhaps a second reason why the SOC has been a success is that *Scottish Birds* has continued to be a journal of variety, containing something for everyone.

Research (in this case the finding out of facts instead of having to rely on suppositions) did not really begin in Britain on any scale until the founding of the BTO, with most of its work organised from south of the Border. Because of the paucity and uneven distribution of birdwatchers in Scotland, the SOC could at first play only a minor part in surveys, but gradually this has changed, especially since our universities began turning out wildlife observers under a variety of titles. We may not have been able to help a great deal with the early censuses, but more recently the SOC has played an essential part in the regular duck and goose counts, the Breeding and Winter Atlases and other investigations. In certain directions SOC members have led the field, for instance in the establishment of bird observatories, and in the immediate past members have been to the forefront in research on seabirds, both inshore and out at sea, and throughout the year. With more and more observers, and a much wider distribution of them, the SOC has been able to make an increasingly important contribution. This trend will continue.

Books for bird watchers

From a modest beginning in 1948 the Club's Waterston Library has expanded steadily; it is now by far the most comprehensive collection in Scotland of bird books readily available for reference purposes, and has a growing lending section. Another important facet of the Club's activities is the SOC Bird Bookshop. Started in 1963, the Bookshop ended its first trading year with about 100 titles — valued at

£154.3.10 — in stock and a sales total of £534. In the year to 30 June 1985 sales amounted to more than £120,000 and the books in stock were valued at over £16,000. Through the Bookshop the Club has contact with bird-watchers in many parts of the world — and the income derived from sales is an extremely important source of funds.

A number of abnormal, or at any rate out of the ordinary, events have enhanced the attraction of ornithology in Scotland during the last 50 years. Books have been published in which the Club has a special interest — not only in the subject but also in the author. We have seen appear *The Birds of Scotland* (Baxter & Rintoul 1953), *The Isle of May* (Eggeling 1960, reprinted 1985) and the very recent *Birds in Scotland* (Thom 1986) which gives us an up-to-the-minute picture of the status of all our birds. We have also had fine monographs on the Greenshank, the Snow Bunting, the Dotterel and the Pine Crossbill — all by Desmond Nethersole-Thompson, and on the Hen Harrier by Donald Watson, the Gannet by Bryan Nelson and the Puffin by Mike Harris. In addition there have been many books of more general coverage, like Donald Watson's *Birds of Moor and Mountain*, especially notable for its illustrations. During this period a number of exceptionally endowed bird artists have emerged, for example Keith Brockie, whose paintings are so beautifully reproduced in his *Wildlife Sketchbook* and *One Man's Island.*

Half-century highlights

Among other outstanding events which deserve mention is the very successful Bird Islands Study Cruise of July 1966. I don't suppose that anyone who was on that cruise will ever forget it. It was Scotland's contribution — the sole excursion — to the 14th International Ornithological Conference, held in Cambridge and Oxford before and after the excursion. The Cruise was planned and managed entirely by the SOC and was in every way a howling success. There were 905 passengers, about 400 from 37 countries coming from abroad; 392 of those aboard were Conference delegates and the passenger list included many of the world's leading ornithologists. All the visitors from overseas left with a new conception of what the SOC was — many had never even heard of it — and the Club gained many new friends and members as a result. As a public relations exercise it could not have been better — and the weather was obligingly perfect. There is an excellent illustrated account of the Cruise, by Nancy Gordon, in *SB* 4:272-286.

Also notable in the ornithological world, though less directly linked to the Club, have been the return of the Osprey as a breeding species, the breeding of a pair of Snowy Owls on Fetlar — an event perhaps never again to be repeated — and the reintroduction of the White-tailed Sea Eagle. Ten years' work on the latter culminated in the rearing of a chick in 1985, with the probability of many more to come. There have been several other new breeding records for Scotland in the last few years, but it is improbable that many of these will ever be more than sporadic breeders, apart from the Goldeneye and the Redwing.

It is perhaps worth noting that the return of the Osprey was the deliberate and unassisted return of a migratory species after many years absence. In the case of the Sea Eagle, a non-migratory species, any return had to be assisted and several attempts at reintroduction had been made before success could be recorded. It was an exactly similar case to that of the Capercaillie last century. With many others I hope that it will not be too long before it is a commonplace to see Sea Eagles soaring over many Scottish western cliffs — but equally I sympathise with the view of Baxter & Rintoul "we never found it possible to be as interested in birds which are the result of an introduction as we are in those which are native to the soil". Illogical? Perhaps.

Let us now praise famous men — famous in terms of Scottish ornithology — and, fittingly, let the first be a woman!

Scottish ornithologists

Evelyn Baxter's name will go down in ornithological history long after the names of most of us have been forgotten. She was a founder member of the SOC and its first President (jointly with Leonora Rintoul); there is a fine obituary of her in our Journal (*SB* 1:168-172). She is perhaps best remembered by the two-volume *The Birds of Scotland* (Baxter & Rintoul 1953). Miss Rintoul, her friend and companion, did much to help but there was never doubt in anyone's mind as to who was the chief author. My memory of Miss Baxter is of how kind she was to the boy who brought to her for identification an egg deposited one night on our lawn (it was a Starling's); of a walk with her and Miss Rintoul on Tentsmuir; of driving her in October 1954 to see, in a marsh near Rosyth Dockyard, a bird new to Scotland (a Wilson's Phalarope), which pleased her enormously; and lastly and sadly of going through some of her accumulated ornithological papers after her death. Amongst the treasures uncovered were her field notebooks, each in its linen dust cover decorated with a silk-embroidered portrait (by her) of a bird. One of the finest of these, a Goldfinch on thistle heads, mounted as a picture, hangs over my desk as I write.

Arthur Duncan and Charles Connell, who died only recently, both did much for the SOC, in their different ways. Arthur's contribution to Scottish ornithology and nature conservation generally was immense. He was founder Chairman of our Club and his keen financial brain was a great asset. Charles knew more about birds and did more for their conservation as part of the total environment than most people realised. He will be remembered for his founding of the SWT, his far-sighted purchase of the Loch of the Lowes and much of Montrose Basin, and for the arrangements he made whereby 21 Regent Terrace became the headquarters of Scottish ornithology and the home of the SOC's secretary. The Scottish Centre for Ornithology and Bird Protection was officially opened on 26 October 1959 and at first the building housed both the Club and the RSPB's Scottish office. Although the Club has always occupied most of the building it did so only as a tenant until early 1986. In February this year negotiations with the owners, the Fair Isle Bird Observatory Trust, were finally completed and the Club became owners of the property. Much of the credit for the negotiations goes to John Arnott.

G.W. — 'an ideas man'

Towering above the others of his generation was George Waterston. He was what nowadays would be termed 'an ideas man' — always one step ahead in his thinking. After their marriage one seldom referred to George alone, it was always George and Irene. They were inseparable; I have never known two people so unanimous in their views. All that Ian Pennie said about them in his obituaries (*SB* 11:121-124 & 13:125-126) is true but I have seen no mention in any account of George's life that there were two Georges: firstly the person who loved to get (or felt he had to get) people who had a common interest together in meetings, outings or what have you, and who because of some personal magnetism always managed to do so. He was always in the middle of a huddle of people. But there was quite another George (and Irene), who wanted something quite different — to be alone, or in the company of a very few close friends, to enjoy open spaces and scattered human communities all intimately known to them both. That is why they loved Fair Isle so much and for their holidays went to places like Greenland and sub-arctic eastern Canada.

Maury Meiklejohn was an individualist and one of the Club's best-loved characters. No one would ever have guessed that he was a Professor of Italian; he did not look the part. The only bachelor the Club has ever had as President, he was a very skilled birdman and an excellent Editor. It is not given to many to discover and name a totally new bird — the Hoodwink, a name which

became universally known. And we all have met sometime or other a Mrs Hamilton Strathbungo MBOU. Maury was able to sum up so much in a phrase, for example the frustration of the birdwatcher on the May, waiting day after day for a change of wind and the mass arrival of migrants.

> "Bird-watching is best when winds are easterly:
> When winds are west, it is perfectly beasterly."

It is more than time that his many famous verses and prose entries in the daily log of the Isle of May and in his weekly 'piece' in the Glasgow Herald were collected and published in a slim volume. Any offers?

Ian Pennie, another past-president of the Club, combines birdwatching and botanising with an interest in history. His contributions to *Scottish Birds* include accounts of the early naturalists Sibbald and Martin Martin as well as the historical review mentioned earlier. There are many more outstanding ornithologists requiring similar treatment — for instance Eagle-Clarke, Baxter & Rintoul, Evans, Stenhouse and the Duchess of Bedford, to name but a few. Is it too much to hope that Ian may tackle some of these?

Everyone helps

There are a lot of people besides those mentioned in this article who deserve the thanks of the Club for all they have done for it. Amongst these, at random, are Ian Pitman, Archie Bryson (Treasurer for 12 years), Dougal Andrew (Law Agent for many years) Maxwell Hamilton (Treasurer for 17 years) and Andrew Macmillan (a past president and Editor of *Scottish Birds* for 8 years). I told you the SOC was a Club; everyone helps in its running.

W. J. Eggeling, Rumbling Bridge Cottage, Trochry, Dunkeld.

Editorial note: By dint of much delving into old Minutes of Council and of Annual General Meetings, Alastair Peirse-Duncombe has prepared a record of the names and dates of service of all Office-bearers, Council Members, Honorary Members and so on, from the Club's inception in 1936 to the end of 1985. The lists which follow have been abstracted from this valuable contribution to the SOC archives, the full text of which has been lodged in the Waterston Library. We are greatly indebted to Alastair for his 'labour of love'.

Office-bearers of The Scottish Ornithologists' Club 1936-86

Honorary Presidents — year of election

Miss E. V. Baxter	1948
Miss L. J. Rintoul	1948
Rev. J. M. McWilliam	1948
Dr D. A. Bannerman	1959
Sir Charles G. Connell	1961
Dr G. Waterston	1964
Sir Arthur B. Duncan	1967
Dr W. J. Eggeling	1971
Prof. V. C. Wynne-Edwards	1980

Presidents

Miss E. V. Baxter	1936-48
Miss L. J. Rintoul	1936-48
Mr A. B. Duncan	1948-51
Dr J. Berry	1951-54
Prof. V. C. Wynne-Edwards	1954-57
Sir Charles G. Connell	1957-60
Prof. M. F. M. Meiklejohn	1960-63
Dr I. D. Pennie	1963-66
Dr W. J. Eggeling	1966-69
Mr A. D. Watson	1969-72
Dr G. Waterston	1972-75
Mr A. T. Macmillan	1975-78
Miss V. M. Thom	1978-81
Dr I. T. Draper	1981-84
Mr J. M. S. Arnott	1984-

Secretaries

Mr G. Waterston	1936-59
Mrs M. I. Waterston	1959-69
Major A. D. Peirse-Duncombe	1969-83
Mr J. C. Davies	1984-

Honorary Treasurers

Mr G. Waterston	1936-39
Mr J. H. B. Munro	1939-46
Mr A. G. S. Bryson	1946-58
Mr R. Hillcoat	1958-63
Mr M. K. Hamilton	1963-80
Mr W. G. Harper	1980-

Honorary Members — year of election

Mr Clyde Bain	1937
Mr John Bain	1937
Mr Tom Bruce Jnr.	1937
Mr Charles Inkster	1937
Mr George Stout	1937
Mr William Rennie	1955
Mr Nichol Hopkins	1955
Mr Peter Gunn	1961
Mr Henry Boase	1965
Sir Landsborough Thomson	1966
Mr Duncan Anderson	1968
Mr Seton Gordon	1974
Mrs Irene Waterston	1977
Mr William Brotherston	1979
Dr John Berry	1980
Mr Maxwell Hamilton	1980
Dr Ian Pennie	1980
Mr Donald Watson	1980
Mr Sandy Anderson	1983
Mrs Ruby Smillie	1983
Mr Charles Palmar	1984
Major Alastair Peirse-Duncombe	1984
Mrs Daphne Peirse-Duncombe	1984
Mr Dougal Andrew	1985

Editors of *Scottish Birds*

Prof. M. F. M. Meiklejohn	1958-61
Mr A. T. Macmillan	1962-70
Mr T. Delaney	1970-73
Sqdn. Leader H. Greig	1973-74
Mr D. J. Bates	1974-82
Miss V. M. Thom	1982-

Librarians

Comdr. T. Yeoman	1948-54
Mr F. D. Hamilton	1954-58
Mr K. S. Macgregor	1954-58
Mrs M. I. Waterston	1958-77
Mr W. G. Harper	1977-

Plate 1. Eight Past-presidents were among those who enjoyed the Club's Golden Jubilee reception on 21 March 1986, at which 'Birds in Scotland' was launched.

Upper, L to R: John M. S. Arnott, A. Donald Watson, Dr W. Joe Eggeling, Valerie M. Thom, Prof. Vero C. Wynne-Edwards, Dr John Berry, Andrew T. Macmillan, Dr Ivan T. Draper.

Lower: The author signing a copy of 'Birds in Scotland'.

Don Smith

Plate 2. Redshank and Lapwing are among the most abundant of the waders breeding on blackland and moorland in the Uists and Benbecula.

Upper **B. S. Turner**
Lower **W. S. Paton**

Breeding waders of blackland, moorland and agriculturally improved moorland in the Uists and Benbecula

M. W. PIENKOWSKI, R. J. FULLER, D. B. JACKSON AND S. M. PERCIVAL

In 1984 breeding waders were surveyed on four areas of blackland and moorland edge on South Uist and Benbecula. Densities on blackland were much higher than on moorland. Within the blackland, the waders were unevenly distributed. On moorland most waders were located either on those parts closest to the blackland or around lochs. Seven areas of improved moorland were surveyed on North Uist; six held densities very similar to those on surrounding moorland (i.e. very low) but one area held a far higher density of waders than the adjacent moorland.

Introduction

Recent studies have indicated that the southern isles of the Outer Hebrides hold exceptionally large populations of breeding waders (e.g. Fuller, Wilson & Coxon 1979, Fuller 1981, Etheridge 1982, Green 1983, 1984, Galbraith, Furness & Fuller 1984). These breeding waders are concentrated in the western parts of the islands, which have been strongly influenced by wind-blown calcareous shell-sand. This has created a relatively fertile sandy plain, termed the 'machair'. Much of the drier (usually western) parts of this machair plain are cultivated, whilst the wetter parts grade into damp grassland and rich fen. By contrast, the eastern parts of the Uists and Benbecula are dominated by blanket-bog, moorland and mountain, here collectively referred to as 'moorland'. Between the machair and the moorland is a transition zone, the 'blackland'. This was once moorland but has been greatly modified by removal of peat (for fuel). Cattle keeping and in many places the addition of shell-sand and seaweed has had a 'sweetening' effect. Blackland is now rocky grassland, often with permanent or seasonal marshes in hollows and mesotrophic lochs with rocky shores.

In 1983, the Wader Study Group (WSG) and the Nature Conservancy Council (NCC) jointly surveyed the breeding waders of almost all the machair in the southern isles of the Outer Hebrides and substantial samples of the adjacent blackland (Green, 1983, 1984, Galbraith, Furness & Fuller 1984). The importance of the machair to breeding populations of Oystercatcher *Haematopus ostralegus*, Lapwing *Vanellus vanellus*, Ringed Plover *Charadrius hiaticula*, Redshank *Tringa totanus*, Dunlin *Calidris alpina* and Snipe *Gallinago gallinago* was established. Survey work then included only a small sample of moorland, which was thought to hold rather low numbers of waders, despite the importance of moorland to breeding wader populations elsewhere in Britain, e.g. Caithness (Reed, Langslow & Symonds 1983). Small areas of moorland on North Uist have been "improved" to provide better quality

grazing for livestock. The improvement process may involve several techniques, including application of shell-sand and fertilizer, and reseeding with introduced grasses and clover. Moorland improvements have been taking place in North Uist for up to thirty years (Caird 1979) but the rate of improvement has recently increased on North Uist and extended to Benbecula and South Uist with the availability of finance for agricultural improvement in the EEC-supported Integrated Development Programme (IDP).

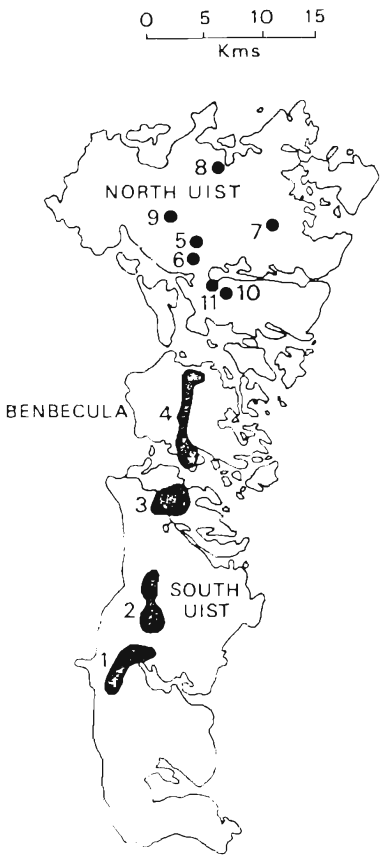

Fig. 1. Locations of the study areas. Main features of the study areas are given in Table 1.

With this background, in 1984 WSG surveyed the breeding waders of sample areas of blackland, moorland edge, unimproved moorland and agriculturally improved moorland. This paper documents the densities of waders found in these situations and provides preliminary observations on the possible effects on waders of improving moorlands in the Uists.

Methods and Study Areas

The method of assessing the numbers and distribution of waders was that described by Reed & Fuller (1983) and used by the WSG/NCC survey in 1983. Observers walked parallel transect lines, usually 200m apart in the present study. The positions of all birds seen and/or heard were plotted on 1:10,000 maps. These observations were subsequently interpreted in terms of 'breeding pairs' of waders, using the criteria given in Reed & Fuller (1983). Further details of the accuracy and reliability of the method are available in Jackson & Percival (1983), Reed *et al.* (1983), Webb *et al.* (1983), Fuller *et al.* (1983) and Fuller (1984). However, no validation work was performed specifically in moorland habitats.

Surveyors plotted habitat types on the maps. There are obvious difficulties in classifying these in an area which consists of a complex mosaic. However, to simplify analysis, the habitats have been grouped into four categories:

(i) moorland, including habitats described as blanket bog, and *Calluna* moor, often including a large proportion of grass;
(ii) agriculturally improved moorland (apportionments allocated to individual crofters and reseeded): land dominated by lush grass, sometimes with patches of *Juncus* and *Calluna*; usually clearly fenced from surrounding moorland and always strikingly greener in colour. All areas of agriculturally improved moorland surveyed had sheep present, or had recently been grazed by sheep or cattle.
(iii) transition: rough pasture, often with a large component of *Juncus* and in some cases with some *Calluna*;
(iv) blackland: grassy pasture of varying quality, sometimes with a small component of *Juncus* and even *Calluna*, and often including areas of Iris and grassy marsh.

The approximate locations of the eleven study areas are shown in Figure 1 and summary

Table 1. The features of the study areas; locations are shown in Figure 1.

Site no.	Habitat description	Altitude (m)	Approx. area (ha)	Date of survey
1	Blackland, transition and moorland habitats	5-20	516	19/20 June
2	Blackland and moorland	5-80	405	17 June
3	Moorland and loch-shore habitats NE of Loch Bee	0-10	528	18 june
4	Blackland, transition and moorland	0-25	414	21 June
5	Improved moorland containing damp gullies and adjacent blanket bog and moorland	10	20	31 May/14 June
6	Improved moorland and adjacent moorland	20-30	14	31 May
7	Recently improved moorland and adjacent moorland	20	25	14 June
8	Recently improved moorland and adjacent moorland	20	25	14 June
9	Recently improved moorland and adjacent moorland	30-50	40	14 June
10	Improved moorland and adjacent moorland	30-50	15	15 June
11	Improved moorland and adjacent moorland	10	4	15 June

Note: for Sites 5-11 approximately equal areas of improved and unimproved moorland were surveyed. The areas of improved moorland ranged from 2-20 ha.

details of their habitats and other features are given in Table 1. Sites 1 to 4 were extensive tracts of moorland edge habitats on South Uist and Benbecula, surveyed by DBJ and SMP between 17 and 21 June. Sites 5 to 11 were smaller sites on North Uist, each including an area of improved moorland. These sites were surveyed by MWP and RJF between 31 May and 15 June. The latter sites were sometimes covered by one observer because they were sufficiently small to permit thorough coverage by one person.

Results

Wader distribution on blackland and moorland (sites 1-4)

It was immediately apparent that, though the waders were distributed rather unevenly over the blackland, the overall density in this habitat was far higher than on the moorland (Figure 2). Furthermore, the waders recorded on the moorland were mainly restricted either to those parts immediately adjacent to the blackland or to the edges of lochs. Further east, few waders were recorded, even near lochs. On a 5km moorland transect along the track across Benbecula from Rueval (about 2km east of the blackland) to Rossinish (on the east coast), walked by MWP on 11 June 1984, the only waders recorded were two pairs of Golden Plovers *Pluvialis apricaria* and, at the eastern sea coast, one pair of Oystercatchers.

The distribution patterns of waders on the individual study areas are considered further below.

Table 2 gives the numbers of birds counted and densities at Site 1. The average densities on blackland and transition areas were remarkably similar, despite considerable patchiness in bird distribution in both habitats. The adjacent area of moorland also had densities of Redshank and Snipe fairly similar to those on blackland and transition, but lower ones of Lapwings and higher of Oystercatchers and Common Sandpipers *Actitis hypoleucos*, these occurring mainly along the shore of Mid Loch Ollay. The eastern block of moorland was totally devoid of waders despite being adjacent to East Loch Ollay and Loch Ceann a' Bhaigh and including several smaller lochans.

Site 2 had a rather sharp transition between blackland and moorland. It clearly demonstrated the clumped distribution of waders within the blackland (Figure 2), the much lower density on the moorland, and the restriction of moorland waders to areas

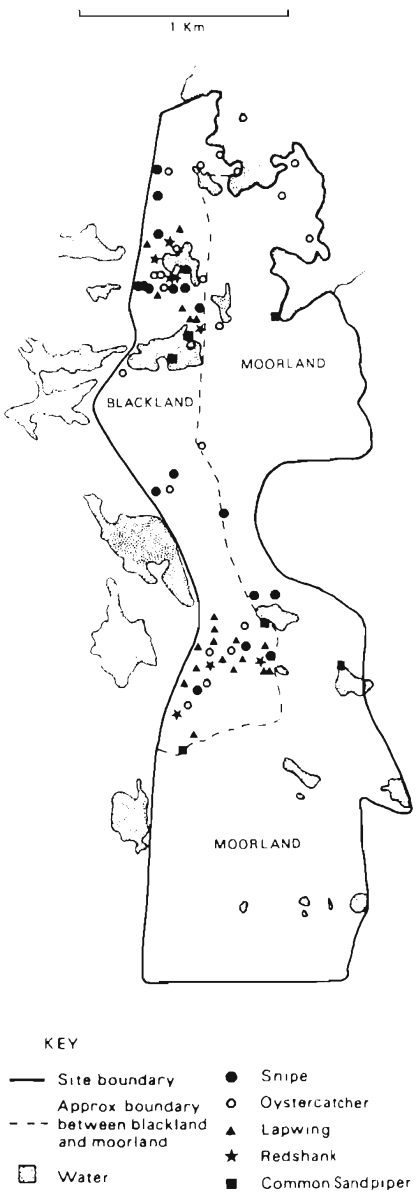

Fig. 2. Distribution of waders on Site 2. Each symbol shows the position at which an estimated pair of breeding waders was located.

adjacent to blackland or nearby lochs (Table 3).

Site 3 consisted mainly of moorland. The western edge of the central and southern parts of the study area adjoined the brackish Loch Bee in a strip of fen and grassland habitat, and a very small area of ploughland and hay-meadow. There were larger populations here (Table 4) than on the other study areas. Furthermore, the effect was more marked in the southern part of the study area adjacent to the brackish Loch Bee than in the northern part, which was adjacent to several smaller lochs. Even within this study area, most of the few waders further from the shores of the large loch were still associated with water bodies.

Adverse weather conditions limited survey work on Benbecula (Site 4) to a narrow strip including blackland, transitional land and adjacent moorland. The densities (Table 5) showed a similar pattern to the other areas, the relatively high moorland densities probably reflecting proximity to improved areas.

Wader populations on agriculturally improved moorland (sites 5-11)

The numbers of birds counted on the improved areas are given in Table 6. In six of the seven cases the bird densities on adjacent unimproved moorland were very similar to those on the improved land (i.e. they were very low). In one case, however (Site 5), the improved area was strikingly richer in waders (and possibly in passerines) than the adjacent moorland. The only species found on moorland but not on improved land was Red Grouse *Lagopus lagopus*. (The population of Red Grouse on the Uists is low; none were recorded in the large moorland survey areas 1-4).

Discussion

The present results show that most waders breeding on the moorland are confined to areas adjoining the blackland or to nearby

Table 2. Numbers and densities of pairs of waders at Site 1 (near Kildonan, South Uist).

Habitat	Area	Number of pairs (and density per km²)							
	(ha)	Oyster-catcher	Ringed Plover	Golden Plover	Lapwing	Dunlin	Snipe	Redshank	Common Sandpiper
Blackland	181	24 (13.3)	0	0	37 (20.4)	3 (1.7)	9 (5.0)	22 (12.2)	2 (1.1)
Transition	199	24 (12.1)	0	0	34 (17.1)	0	15 (7.5)	25 (12.6)	3 (1.5)
Moorland (adjacent to blackland/transition)	26	9 (34.6)	0	0	2 (7.7)	0	2 (7.7)	3 (11.5)	3 (11.5)
Moorland (E of A865 road)	110	0	0	0	0	0	0	0	0

Notes: (1) The moorland west of the A865 road was surrounded by improved land and lochs, and is therefore treated separately from that further east.
(2) Common Sandpiper densities are normally better expressed in relation to length of water courses, but the topography of the present study areas makes this impractical.

lochs. The importance of the loch edges to waders was demonstrated in related studies by A. J. Walker and D. F. Chandler who made detailed observations of the behaviour of Redshank family parties at several sites on South Uist in 1984. Part of one site was at the blackland/moorland edge within our Site 2. On the moorland, the adults nested probably on the marshy loch-edge areas and the chicks fed in these same areas. However, the majority of loch edge is rocky and unsuitable for feeding, so movement between marshy areas involves long treks over land or swimming through deep water. The heather is probably an unsuitable feeding habitat but may be suitable for concealment of the chicks from predators (Chandler & Walker 1985). One family group on the moorland was found to have moved 50m, crossing deep water (the chicks presumably swimming since the loch-shore was cut by a deep channel with steep, overgrown banks), followed by a movement of 500m through dense heather with yet another lengthy movement of 700m, back to near its original location, again through dense heather. All these journeys were from one marshy loch edge to another marshy loch edge. In contrast, pairs on the blackland moved only short distances of about 50m (Walker & Chandler 1985).

This higher density of waders around lake edges seems to be limited to the westernmost part of the moorland, up to at most 1km from the blackland edge, and in most areas rather less. The area where lake-edge effects extended furthest into the moorland was NE Loch Bee. Wind-blow from the brackish loch may have enriched this area — and the moorland vegetation did,

Table 3. Numbers and densities of pairs of waders at Site 2 (near Loch Druidibeg, South Uist).

Habitat	Area	Number of pairs (and density per km²)							
	(ha)	Oyster-catcher	Ringed Plover	Golden Plover	Lapwing	Dunlin	Snipe	Redshank	Common Sandpiper
Blackland	117	20 (17.1)	0	0	22 (18.8)	0	14 (12.0)	7 (6.0)	4 (3.0)
Moorland within 100m of blackland or of a loch >100m across	89	5 (5.6)	0	0	0	0	3 (3.4)	1 (1.1)	2 (2.2)
Other moorland	199	0	0	0	0	0	0	0	0

Table 4. Numbers and densities of pairs of waders at Site 3 (NE of Loch Bee) in relation to distance from Loch Bee (for the southern part) or Loch an Ose, Lochanan Dubha, Loch Mhic Dhonuill, Loch an Daill or the sea shore (for the northern part).

Distance from the shore (m)	Area (ha)	Number of pairs (and density per km²)							
		Oyster-catcher	Ringed Plover	Golden Plover	Lapwing	Dunlin	Snipe	Redshank	Common Sandpiper
North Area									
0-100	112	8(7.1)	3(2.7)	0	14(12.5)	3(2.7)	4(3.6)	11(9.8)	3(2.7)
100-200	31	0	0	0	1(3.2)	0	1(3.2)	0	0
200-300	18	0	0	0	0	0	0	0	0
300-400	18	0	0	0	0	0	0	0	0
400-500	15	0	0	0	0	0	1(6.7)	0	0
500-600	15	0	0	0	0	0	0	0	0
> 600	48	0	0	0	0	0	0	0	0
South Area									
0-100	80	25(31.3)	13(16.3)	0	19(23.8)	24(30.0)	4(5.0)	31(38.8)	0
100-200	48	4(8.3)	2(4.2)	0	10(20.8)	6(12.5)	2(4.2)	7(14.6)	0
200-300	41	1(2.4)	0	1(2.4)	4(9.8)	2(4.9)	0	1(2.6)	0
300-400	38	0	0	0	2(5.3)	0	1(2.6)	0	0
400-500	27	1(3.7)	0	0	1(3.7)	0	0	0	0
500-600	19	2(20.0)	0	0	0	0	1(10.5)	0	0
> 600	18	0	0	0	0	0	0	0	0

indeed, appear somewhat different from elsewhere. It is also possible that more basic rocks underlie this area. In addition, the shallow loch edges may have provided feeding areas for birds from some distance away.

Even the species most associated with the moorland environment, Common Sandpiper and Golden Plover, were rather uncommon, and the former tended to be associated with lochs near the blackland edge. It is possible that waders breeding further east on the moorland had moved westwards, to the blackland or beyond, by the time of the survey. It is, however, unlikely that any such effect, if it occurred at all, had a major influence on the distribution patterns observed, as the sparcity of waders on the moorland was noted also in May.

The most striking feature of the results on the agriculturally improved moorland is that one site (Site 5) had an exceptionally large number of birds, while the remainder had very few birds. The whole of the improved area at Site 5 was surveyed, together with an adjacent unimproved area. The improved area held an estimated 25 pairs of waders compared with a maximum of two pairs at any of the other sites. The numbers of breeding waders at Site 5 were quite remarkable, producing a very striking contrast to the surrounding moorland. Densities per km² were 30 pairs of Oystercatchers, 100 of Lapwings, 20 of Dunlins, 30 of Snipe and 70 of Redshank. These compare favourably with most other habitats in the machair-blackland complex (Reed, Fuller & Philp in prep.). Numbers of passerines were also high on this site, compared with the moorland, but were not censused. There was no obvious reason to account for the difference between Site 5 and the other six sites. It is possible, however, that there may have been some difference in management, for example the amount or type of fertilizer applied or the level of stocking, which may have affected the quantity of food available for waders.

It is clear from this limited survey that improved moorland on North Uist sometimes supports large numbers of birds, especially waders, at densities much higher

Table 5. Numbers and densities of pairs of waders at Site 4 (Benbecula).

Habitat	Area	Number of pairs (and density per km²)							
	(ha)	Oyster-catcher	Ringed Plover	Golden Plover	Lapwing	Dunlin	Snipe	Redshank	Common Sandpiper
Blackland	135	10(7.4)	0	0	21(15.6)	0	3(2.2)	3(2.2)	1(0.7)
Transition	90	1(1.1)	0	0	3(3.3)	0	1(1.1)	3(3.3)	1(1.1)
Moorland	189	2(1.1)	0	0	4(2.1)	0	2(1.1)	3(1.6)	0

Table 6. The numbers of birds counted on seven areas of improved moorland in North Uist. For waders the numbers are "pairs" which have been assessed in the same way as for the machair habitats (see above); for other species the numbers are counts of individual birds.

Site no.	Approx. area (ha)	Date of survey	O	L	D	SN	C	R	S	MP	W
5	8	31 May	3	10	2	3	0	7	nc	nc	nc
6	7	31 May	0	0	0	0	0	1	3	1	1
7	12	14 June	0	0	0	0	0	0	1	1	0
8	12	14 June	0	0	0	0	0	0	0	0	0
9	20	14 June	1	0	0	0	1	0	1	1	0
10	5	15 June	0	0	0	2	0	0	3	0	0
11	2	15 June	0	0	0	0	0	0	0	0	1

Notes: (1) The species codes are as follows:
O Oystercatcher; L Lapwing; D Dunlin; SN Snipe; C Curlew; R Redshank; S Skylark, MP Meadow Pipit; W Wheatear.

(2) In addition to the species listed above, the following were recorded on the improved plots: Short-eared Owl (2 on Site 9); Pied Wagtail (1 on Site 6); Starling (1 on Site 7, also present at Site 6); Twite (present on site 5).

(3) nc = not counted.

(4) Site 5 was visited again on 14 June, confirming the high numbers.

than the unimproved moorland. Furthermore, improved land can support species such as Redshank and Lapwing which are absent on the unimproved moorland. In general, however, the densities and range of species on improved land were low and were similar to those on the surrounding moorland. However, in other districts (e.g. Caithness, Sutherland, the Pennines) unimproved moorland supports important populations of breeding waders (e.g. Reed *et al.* 1983, Langslow 1984). The conditions giving rise to the improved areas in the Uists which are particularly favourable to birds are unknown, and research is required on the history and management of the existing improved areas and any new ones.

Acknowledgements

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References

Caird, J. B. 1979. Land use in the Uists since 1800. *Proc. Roy. Soc. Edinb.* 77B:505-526.

Chandler, D. F. & Walker, A. J. 1985. Habitat use by breeding Redshanks on South Uist. *Wader Study Group Bull.* 45:25-28.

Etheridge, B. 1982. Distribution of Dunlin *Calidris alpina* nests on areas of South Uist machair. *Bird Study* 29:239-243.

Fuller, R. J. 1981. The breeding habitats of waders on North Uist machair. *Scot. Birds* 10:38-50.

Fuller, R. J. 1982. *Bird habitats in Britain*. Poyser, Calton.

Fuller, R. J. 1984. Some differences in the ways that observers estimate numbers of waders breeding at high density. *Wader Study Group Bull.* 40:8-11.

Fuller, R. J. & Buxton, N.E. 1983. The machair of the Outer Hebrides. *Wader Study Group Bull.* 39:9-13.

Fuller, R. J., Green, G. H. & Pienkowski, M. W. 1983. Field observations on methods used to count waders breeding at high density in the Outer Hebrides, Scotland. *Wader Study Group Bull.* 39:27-29.

Fuller, R. J., Wilson, J. R. & Coxon, P. 1979. The birds of the Outer Hebrides: the waders. *Proc. Roy. Soc. Edinb.* 77B:419-430.

Galbraith, H., Furness, R. W. & Fuller, R. J. 1984. Habitats and distribution of waders breeding on Scottish agricultural land. *Scot. Birds* 13:98-107.

Green, G. H. 1983. Wader Study Group and Nature Conservancy Council survey of waders breeding on the Hebridean machair and adjacent land, 1983. *Wader Study Group Bull.* 39:5-8.

Green, G. H. (ed.) 1984. *A survey of waders breeding on the west coast of the Uists and Benbecula (Outer Hebrides)*. Wader Study Group and Conservancy Council.

Jackson, D. B. & Percival, S. M. 1983. The breeding waders of the Hebridean machair: a validation check of the census method. *Wader Study Group Bull.* 39:20-24.

Langslow, D. R. 1984. The impacts of afforestation on breeding shorebirds and raptors in the uplands of Britain. pp. 17-25 in *Shorebirds and Large Waterbirds Conservation* (ed. by P. R. Evans, H. Hafner and P. L'Hermite). Commission of the European Communities, Brussels.

Reed, T. M. & Fuller, R. J. 1983. Methods used to assess populations of breeding waders on machair in the Outer Hebrides. *Wader Study Group Bull.* 39:14-16.

Reed, T. M., Langslow, D. R. & Symonds, F. L. 1983. Breeding waders of the Caithness flows. *Scot. Birds* 12:180-186.

Reed, T. M., Williams, T. D. & Webb, A. 1983. The Wader Study Group survey of Hebridean waders: was the timing right? *Wader Study Group Bull.* 39:17-19.

Reed, T. M., Fuller, R. J. & Philp, B. (in prep.). Habitat selection by breeding waders in the Uists, Outer Hebrides, Scotland.

Walker, A. J. & Chandler, D. F. 1985. Family groups movements by Redshanks on South Uist. *Wader Study Group Bull.* 45:29-31.

Webb, A., Reed, T. M. & Williams, T. D. 1983. The Hebridean wader survey: did the observers record in the same way? *Wader Study Group Bull.* 39:24-26.

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(ms. received 31 March 1985)

Bean Geese in South-West Scotland

A. DONALD WATSON

The decline in numbers of Bean Geese visiting SW Scotland is outlined and the history of the Kirkcudbrightshire flock detailed. In the past marshland or bogs were favoured by Bean Geese and it is suggested that land reclamation and improved drainage have made their former haunts less attractive to them. Recent changes in distribution of Bean Geese in other parts of Scotland are summarised and attention is drawn to the discovery of an important flock in Stirlingshire. This and the flocks visiting north and north-east Scotland have arrived in September-October, whereas the Kirkcudbrightshire flock did not arrive until December-January.

The Background

In the mid 19th century Bean Geese *Anser fabalis* were numerous and widespread in many parts of Scotland. They began to decrease about 1870 but were still the commonest grey geese on the Solway in 1886, after which there was a rapid decline (Baxter and Rintoul, 1953). The decline in the north and east of the country is less precisely dated but evidently occurred in the same period. Nevertheless, in a few inland districts in the west, from Loch Lomond-side south to Galloway, fairly small flocks continued to be seen regularly. There was a flock at the Endrick Mouth on Loch Lomond-side in 1938 and in 1953 this numbered 30, smaller numbers being seen in most winters up to 1971/72. A flock of 58 in Lanarkshire in March 1958 was exceptional there (Urquhart 1959). In the uplands of Ayrshire flocks of 50-80 were fairly regular at least until 1927 but they were replaced by Greylags *Anser anser* during the decade 1938-48 (Hughes-Onslow, 1949). A flock of 30-40 at Glencaple, Dumfriesshire, in January 1929 was very unusual there (Gladstone, 1929). Parties of less than 12 birds were frequent in the Machars of Wigtownshire between 1910 and 1928 (Reports on Scottish Ornithology 1914 *et seq* and Gordon, unpub. notes). Gordon (c1929) commented that large flat "flows" like Darsnag and Quhillart were favoured by Bean Geese in Wigtownshire. There was, however, one locality "in Solway" where, according to Baxter & Rintoul (1953), a flock "continued to winter regularly" and was said "to have increased considerably in recent years"; their authority was John Berry, who said the flock numbered 200-400. This was the flock based on Threave estate near Castle Douglas in Kirkcudbrightshire (J. Berry, pers. comm.) (Figure 1); for many years it was the larger of the two major flocks of Bean Geese in Britain, the other being in Norfolk. I first saw the flock in January 1953 and have followed its fortunes ever since. It has long had a fascination for bird-watchers, most of all in the 1950s when up to three Lesser White-fronted Geese *Anser erythropus* were often among the Bean Geese (Watson, 1955).

History of the Castle Douglas flock

The Threave Game Book suggests that geese of all species were scarce or absent around Castle Douglas between 1900 and 1910, though there is evidence that flocks sometimes occurred further north in the Dee-Ken valley at this time (J. B. Hough, unpub.). Flights of geese, seen occasionally

Table 1. Numbers of geese and duck shot at Threave 1900-1960

Periods	Nos. of geese shot					Nos. of duck shot
1900/01-1909/10	1 unspecified (28 Feb., 1910)					1720
1910/11-1919/20	22 unspecified					1714
1920/21-1929/30	Bean 38	Whitefront 2	Greylag	Pinkfoot	Total 41*	2318
1930/31-1939/40	64		31	1	109**	2326
1940/41-1949/50	55		190	1	241	2299
1950/51-1959/60	15	13	145		173	1466

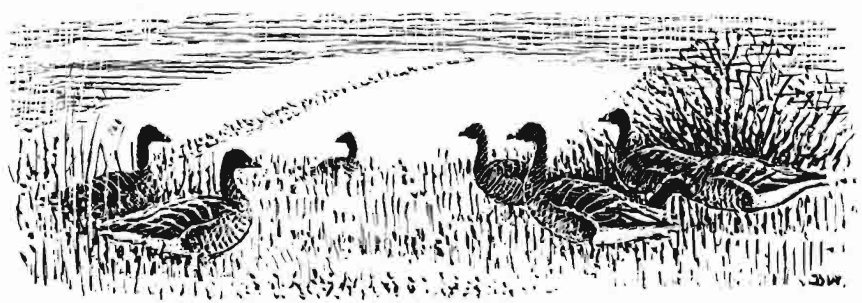
*1 unidentified **13 unidentified

Notes: (1) From about 1944 there was much less shooting pressure on Bean than Greylags. After about 1950 the policy was to shoot very few Bean or not to shoot them at all, as they were considered a rare species in Britain. After 1957 all duck and geese were much less shot.

(2) Although there was some variation in the full extent of area shot over, this was unlikely to have much effect on the numbers of geese or duck shot. These were mainly shot during flight shooting at regular sites.

by Hough between Crossmichael and New Galloway (1904-1914), were noted as "probable Bean Geese". At the upper end of Loch Ken a flock of Whitefronts *Anser albifrons* on 24 February, 1913 was considered very unusual. The first definite evidence of a substantial flock of Bean Geese was, however, on 26 and 28 December, 1920, when 200 were present "in the Dee Valley". According to Threave Game Book there were "great numbers of geese all winter 1921/22" and these were probably Bean. From 1920/21 onward nearly all the geese shot on Threave were specifically identified and up to 1930/31 nearly all of these were Bean (Table 1).

It was a notable event when the first Greylag was shot in winter 1931/32. "Large numbers" of geese were present there in 1935/36, 1936/37 and 1937/38 and in each of these winters the Game Book records suggest that most were Bean. J. McNish (pers. comm.) considers that there were 400-500 Bean Geese visiting Threave from 1936/37 to 1939/40. The number of Greylags shot exceeded Bean for the first time in 1938/39. A. F. L. Gordon (pers. comm.) said that Greylags were never seen



Bean Geese in High Tae marsh, Threave, where they were often seen in snowy weather.

at Threave before the late 1930s. R. A. H. Coombes (pers. comm.) visited Threave in January 1944, 1945 and 1946; on 29 January 1945 he saw 400 Bean and 100 Greylags coming to roost at Hightae Marsh and 9 Bean and 5 Greylags were shot that day. The Game Book records "many times the usual numbers of Greylags" that winter. From this time onward more Greylags than Bean were shot (Table 1) but here the shooting records are no guide to the relative numbers present since Gordon's policy was generally to avoid shooting Bean Geese after about 1945.

By 1952/53, when I began to count the Bean Geese, there were only about half the 1945 number. Table 2 gives details of numbers in the Castle Douglas area mainly since 1952/53. Counts for the period 1952-1961 were summarised by Boyd (1963). In all the years since Bean Geese were first recognised in the Castle Douglas area the flock has very rarely arrived before mid-late December and has reached a maximum in January, with numbers sometimes being maintained during February. Departure was usually before mid-March. Since 1945 the trend has been towards an accelerating decline in numbers, with some fluctuations.

Table 2. Numbers of Bean Geese in Castle Douglas area of Kirkcudbrightshire, 1952/53-1983/84

	Monthly maxima					First	Last	Max for
Dates	Nov	Dec	Jan	Feb	Mar	sighting	sighting	Winter
1952/53	?	?	some	200	a few	?	29 Mar	200
1953/54	0	0	100+	200	100+	21 Jan	14 Mar	200
1954/55	0	50+	160	240	194	27 Dec	13 Mar	240
1955/56	12	220+	215	200+	1	26 Nov	20 Mar	220+
1956/57	0	80	152	130	0	16 Dec	22 Feb	152
1957/58	0	70	190	150	0	1 Dec	25 Feb	190
1958/59	0	34	141	150	0	1 Dec	28 Feb	150
1959/60	0	0	95	66	0	2 Jan	22 Feb	95
1960/61	1	0	0	55	68	26 Nov	14 Mar	68
1961/62	0	150	130	115	42	19 Dec	4 Mar	150
1962/63	2	130	147	145	140+	22 Nov	16 Mar	147
1963/64	0	0	40+	0	0	5 Jan	? Jan	40+
1964/65	0	some	60	60	50	late Dec	21 Mar	60
1965/66	0	37	80	100	0	26 Dec	6 Feb	100
1966/67	0	0	50	18	14?	9 Jan	3 Mar	50
1967/68	a few	0	60	15	0	19 Nov	24 Feb	60
1968/69	0	14	17	15	15	31 Dec	2 Mar	17
1969/70	0	3	17	c70	0	4 Dec	? 22 Feb	c70
1970/71	0	0	14	0	0	5 Jan	31 Jan	14
1971/72	0	0	0	18	0	19 Feb	19 Feb	18
1972/73	0	0	0	32	1	early Feb	25 Mar	32
1973/74	7	65	60	0	0	early Nov	13 Jan	65
1974/75	0	0	65	0	0	20 Jan	25 Jan	65
1975/76	0	60	0	0	0	29 Dec	29 Dec	60
1976/77	0	0	70	2	0	2 Jan	25 Feb	70
1977/78	0	0	40	2	2	? Jan	29 Mar	40
1978/79	0	0	34	38	36	4 Jan	11 Mar	38
1979/80	0	0	3	0	0	3 Jan	? 24 Jan	3
1980/81	0	0	0	0	4	27 Jan	19 Apr	4
1981/82	0	38	30	4+	0	25 Dec	20 Feb	38
1982/83						?	?	30
1983/84						21 Jan	29 Feb	40

Local distribution, habitat and behaviour of the Castle Douglas flock

1936 to 1952. Between 1936 and 1939 the flock often fed on the grassy Threave Castle Island, and on Hightae Drum (Figure 1). The extensive marsh between Carlingwark Lane and Hightae Drum was also used for feeding (J. McNish pers. comm.) and probably also the marsh south of Carlingwark Loch — the Gelston Lane. It is not known whether the flock sometimes ranged much further afield to feed, but there is a pre-1914 specimen of a Bean Goose shot near Loch Mannoch (approx. 8.5km W). Roosting was at Hightae Marsh, Carlingwark Loch or Blackpark, near Threave Castle. The installation of a pumping plant in the Carlingwark Lane in 1938 resulted in considerable drying out of the marsh and presumably some long-term vegetation change. Prior to this a large area of low lying ground near the Lane was often underwater for much of the winter and was very attractive to roosting geese. One result of the pumping plant was a drastic reduction in the number of Snipe visiting Hightae Marsh (J. McNish pers. comm. Threave Game Book). Yet the marsh remained liable to flooding for some years and 400 Bean Geese roosted there on

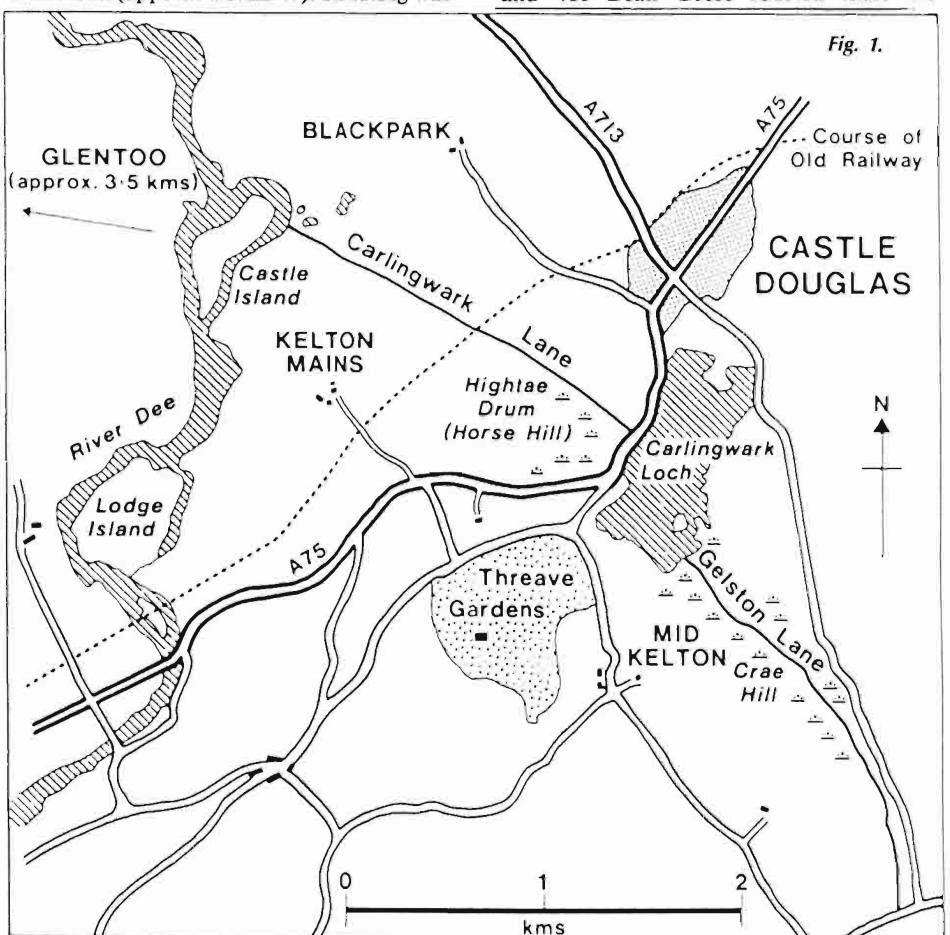
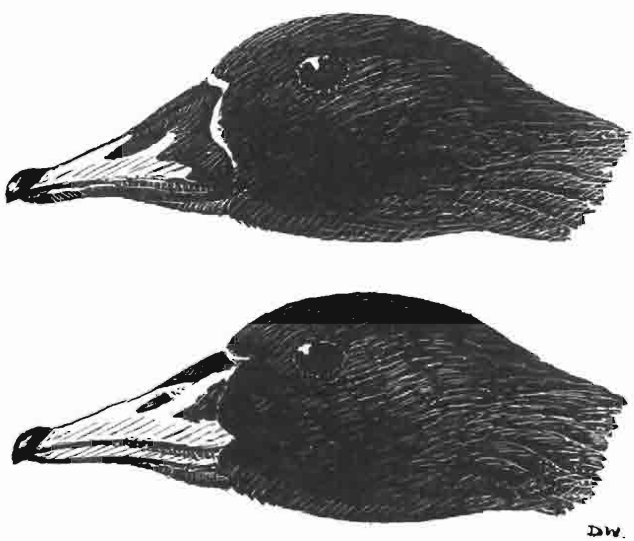


Fig. 1.

Artwork: D. Lawson

29 January, 1945 (R. A. H. Coombes, pers. comm.). It was still often used as a roost site at least up to 1948 (J. McNish, pers. comm.).

1953 to 1983. From 1953 onwards I never saw Bean Geese roosting in Hightae Marsh but it continued to be used for feeding, especially when fields were frost-bound or snow-covered. Up to 1958 the flock often fed up onto Hightae Drum when this was under grass. Turnips and oats were also grown there, in accordance with the crop rotation of the time, and occasionally the geese fed on oat stubble. After 1958 they more often fed south of Carlingwark Loch, either in the marsh bordering the Gelston Lane or on neighbouring grass fields, including Crae Hill which had been kept for a long time as pasture for cattle or sheep. Between 1959 and 1966 the flock was increasingly often in the vicinity of Glentoo Loch (approx. 4km WNW), feeding either on pasture fields or on *Eriophorum* bog, and was frequently seen flying between the two areas of Threave/Gelston and Glentoo/Bargattan lochs. The farm of Neuk, bordering Glentoo Loch, was unoccupied for a few years at this time, so the Bean Geese were generally undisturbed there. In the early 1960s roost sites varied between Bargattan and Glentoo lochs and the old favourite at Blackpark near Threave Castle. On 27 February, 1965, at Bargattan Loch, W. Brotherston and I heard Bean Geese coming to roost after dark from the west, (Loch Mannoch area) but by the late 1960s disturbance from land "improvement" operations and frequent shooting had apparently caused them to abandon this area.



Heads of Bean Geese **A.f.fabalis** ***showing variability in amount of black on the bill; some have almost wholly orange bills apart from the black nail, others have more black than either of the examples shown.***

Upper: Gelston, December 1961. A small amount of white at the base of the upper mandible and on the forehead is quite common.

Lower: Threave, January 1955.

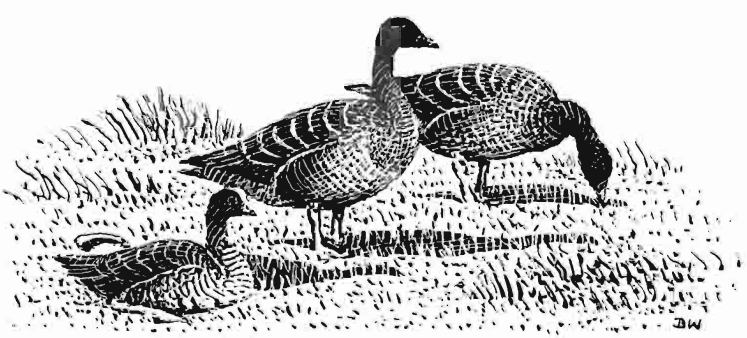
After 1966 the majority of records on the ground were from the Gelston Lane area and pasture fields nearby. The flock was often almost or quite invisible in the deep marsh — once in January 1982 I was unable to locate a flock of 38 until a low-flying helicopter raised them from the marsh. After a brief fly-round they dropped back whence they had come and were invisible again. In six winters since 1966/67 a flock of 30-60 has been seen over-flying the Threave area, usually in a NW direction but at least once flying south. On 29 December, 1975, 60 were found on a pasture at Orroland (approx. 15km S) and two near there, at Heart Moss, on 5 February 1978. A flock of nine were in the same neighbourhood in January 1984. Very small parties or odd birds have occasionally been seen more widely scattered in the district. However, many searches for a regular feeding area have proved fruitless.

Recent changes

During the last decade, even when a flock has visited the Castle Douglas area — nearly always in severe weather in January and February — it has rarely stayed as long as in the past and in some winters has only been seen once or twice on the ground. In the same period farming practices have changed radically, with grass generally improved and cut for silage, turnip growing abandoned and barley increasingly grown. Also, during the 1970s the Gelston burn (in the Gelston Lane) was "cleaned out" with some resulting reclamation of the marsh. Ornithologists must hope that this does not proceed further.

The winter of 1981/82 was the hardest since 1963. Only 38 Bean Geese appeared at Castle Douglas, with very small numbers elsewhere in the south-west, although a much larger number had earlier arrived in the north-east and west-central Scotland. There was, therefore, a strong indication that the once most favoured area no longer had much attraction. Local belief is that the increase and spread of Greylags in the old haunts of the Bean Geese has deterred them and there may be some truth in this. It is certainly true that the Bean Geese generally avoided roosting among the Greylags. More likely, however, the drying out of the marshes and re-seeding of much grassland have, over a long period, made the feeding grounds increasingly unattractive to Bean Geese. Their faithfulness to the marshes, first at Hightae and later in the Gelston Lane, has been striking and I believe that these were the features which for so long made the Castle Douglas area the premier site for Bean Geese in Scotland.

No comprehensive survey has been made of the vegetation of Hightae Marsh. However, a botanical survey of the Gelston



Two Bean Geese and an adult Lesser White-fronted Goose, from sketches made at High Tae, Threave, February 1955.

Table 3. Numbers of Bean Geese rcorded in Scotland from 1973/74 to 1982/83.

	1973/74-1977/78		1978/79-1982/83	
	No. of years in which recorded	Count range	No. of years in which recorded	Count range
Dumfries	3	0- 3	1	0- 5
Kirkcudbright	5	40-70	5	3-38
Wigtown	0	-	2	0- 8
Ayr	0	-	2	0-13
Lanark	0	-	4	0-14
Stirling	0	-	2	0-73
Argyll	0	-	1	0-13
Outer Hebrides	0	-	1	0-12
Midlothian	1	0- 7	0	-
Kinross	2	0- 1	2	0- 5
Perth	2	0- 3	1	0- 1
Aberdeen	4	0-13	3	0- 4
Banff	0	-	2	0-10
Ross	1	0- 4	2	0-25
Caithness	1	0- 1	1	0-15
Orkney	0	-	2	0- 9
Shetland (inc. Fair Isle)	5	1- 7	4	0-24

Single birds were also recorded in Renfrew (1980/81), Roxburgh (1980/81), East Lothian (1977/78, 1978/79 & 1979/80), Angus (1976/77 & 1981/82), Moray (1976/77) and Sutherland (1976/77).

marsh was made in 1976 (Stubbs, 1976). It showed that the dominant plants in the areas where Bean Geese have been known to feed were then *Deschampsia caespitosa*, *Phragmites communis*, *Glyceria maxima*, *Phalaris arundinacea*, *Juncus effusus*, *Juncus acutiflora* and *Equisetum fluviatile*. *D caespitosa*, *Glyceria sp* and *Equisetum* sp are recorded as important food of Bean Geese elsewhere (Cramp, 1977) but it is not known what plants were taken in the Gelston or Hightae marshes. Although there is no quantitative evidence of changes in abundance of likely food plants, marshland species have almost certainly declined both at Hightae and Gelston. At Gelston some areas which were mainly dominated by *D caespitosa* and *G maxima* in 1976 are now dry pasture.

Numbers and distribution of Bean Geese elsewhere in Scotland

Table 3 summarises by counties the approximate numbers of Bean Geese seen in Scotland from 1973/74 to 1982/83 (Scottish Bird Reports). The most striking features are the recent increase in records from the north and north-east and the re-appearance of a notable flock in West Stirling, larger than any recorded there in the past. In the north and north-east numbers have generally been small, apart from one flock of over 100 in Aberdeenshire as long ago as 1968 (Scottish Birds 5:316). Arrival dates in the north and north-east are generally early, often in October and sometimes even in late September. In October-November 1981 small numbers were exceptionally widespread in the north and north-east, and flocks of 12 and 13 penetrated as far west as Lewis and Islay respectively.

When 73 Bean Geese were found in the Carron Valley, West Stirling, in February 1981, this was the first sighting for that part of Scotland since 16 were seen at the old haunt near the Endrick Mouth, Dunbartonshire, in January 1972. None had previously been reported from the Carron Valley, but since 1982 the largest flock in Scotland

has appeared there regularly in the early autumn, with maxima of 52 in October 1982, 46 in October 1983 and 160 in September 1984 (B. Zonfrillo pers. comm.). The arrival period in recent years has therefore been similar for central, north and north-east Scotland. The geese apparently leave the Carron Valley about late October and it is not known where they go. It is possible that the flocks of 30-40 which have appeared in Kirkcudbrightshire in December-February (1981-1984) consist of birds which had earlier been in the Carron Valley.

Acknowledgements

In compiling the history of the Castle Douglas flock I am particularly indebted to R. A. H. Coombes, Dr. J. Berry, the late Major A. F. L. Gordon and J. McNish, Warden at Threave, who kindly allowed me to make use of the Threave Game Books. I am also grateful to the many bird-watchers who have supplied records over the past 30 years. I thank Mrs Olga Stewart for advice on the vegetation of the marshes. M. A. Ogilvie and B. Zonfrillo have kindly given me their data on numbers of Bean Geese. Finally I am especially grateful to Jeff Watson for commenting on a draft of this paper and to my wife for assistance in many ways.

References

Baxter E. V. & Rintoul L. J. 1953. *The Birds of Scotland.* Edinburgh.

Boyd H. 1963. Numbers of Wild Geese in Great Britain. *The Wildfowl Trust 14th Annual Report* 1961-62:87-87.

Cramp S. *et. al.* 1977. *The Birds of the Western Palearctic.* Vol 1:394.

Game Books of Threave Estate, 1900-1960.

Gladstone H. S. 1929. Bean Geese in Dumfries-shire. *Scot. Nat.* 177:93.

Gordon J. G. (c1929). Unpublished notes on Wigtownshire Birds.

Hough J. B. Unpublished Diary, 1902-1915.

Hughes-Onslow G. 1949. Grey Geese in Ayrshire. *Scot Nat.* 61:123.

Meiklejohn M. F. M. & Palmar C. E. 1954, 1955, 1956. Reports on Birds of the Clyde Area. *Scot. Nat.* 66:67; 67:68 and *Scot. Birds* 1:6.

Ogilvie M. A. 1978. *Wild Geese.* Calton.

Paton E. R. & Pike O. G. 1929. *The Birds of Ayrshire.* London.

Reports on Scottish Ornithology. *Scot. Nat.* 1915-1919.

Scottish Bird Reports. 1968-1983: *Scottish Birds* 5-13.

Stubbs H. J. 1976. Wetland Vegetation of the Gelston Burn and Carlingwark Loch. Nature Conservancy Council.

Urquhart L. A. 1959. Note on Bean Geese in Lanarkshire. *Scot. Birds* 1:99.

Watson D. 1955. Lesser White-fronted Geese in Kirkcudbrightshire. *Brit. Birds* 48:323-325.

Watson D. 1972. *Birds of Moore and Mountain.* Edinburgh.

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(Ms. received 19 March 1985)

Drawings by the author

Breeding seabirds of Noss, Shetland

N. A. WILLCOX, M. G. RICHARDSON AND C. P. DORE

Around 100,000 seabirds, of twelve species, breed regularly on Noss and the colony of Guillemots is the largest in Shetland. A review of Noss' seabirds indicates the considerable changes that have occurred this century. Fulmar, Gannet and Great Skua colonised between 1898 and 1914 and all three have expanded to a point where nesting site availability now appears to be limited. Conversely, the numbers of Common, Lesser Black-backed and Herring Gulls have declined over many years. Monitoring counts since 1975 indicate no detectable adverse effects amongst cliff-nesting species from either oil pollution or the inshore industrial fishery for sandeels (see footnote).

Introduction

The Isle of Noss (313ha) lies midway along east Mainland Shetland and is separated from the larger island of Bressay by a narrow channel (Figure 1). Improved grasslands occupy the low-lying western section of Noss, peat moorland much of the remainder. The island rises eastwards to a height of 181m at the Noup and the eastern vertical sandstone cliffs are weathered into horizontally cut ledges with crevices and alcoves. 100,000 cliff-nesting seabirds make Noss one of Britain's most spectacular seabird colonies and the island's ornithological importance was recognised early on by the RSPB, who in 1905 assumed responsibility for bird protection, successive tenant farmers acting as 'bird watchers'. Fifty years later Noss was declared a National Nature Reserve.

Early descriptions of the breeding seabirds were given by Raeburn (1888) and Evans & Buckley (1899), whilst the first detailed counts documented the arrival and spread of the Fulmar, *Fulmarus glacialis* (Fisher, 1952), Gannet *Sula bassana* (Fisher & Venables, 1938) and Great Skua *Stercorarius skua* (Pitt, 1922; Venables, 1934). In the summer of 1946 Perry (1948) made a detailed study of the Gannet and Great Skua on Noss, and his book contains useful general information on the numbers and distributions of seabirds as well as a summary of past knowledge.

'Operation Seafarer' in 1969 provided the first overall survey of cliff-nesting seabirds. Since 1970 there has been a warden resident on Noss every summer apart from 1979; this has enabled more accurate survey of the seabirds than was possible previously, including, since 1975, a detailed monitoring programme for selected cliff-nesting species.

Methods

Many different count units have been used in past estimates of seabird numbers on Noss and the methods are often unknown. For example, Gannets have been counted as

Footnote: A major decline in the breeding performance of Kittiwakes on Noss and elsewhere in Shetland was noted in 1985 (see Heubeck & Ellis, BTO News *143:10).*

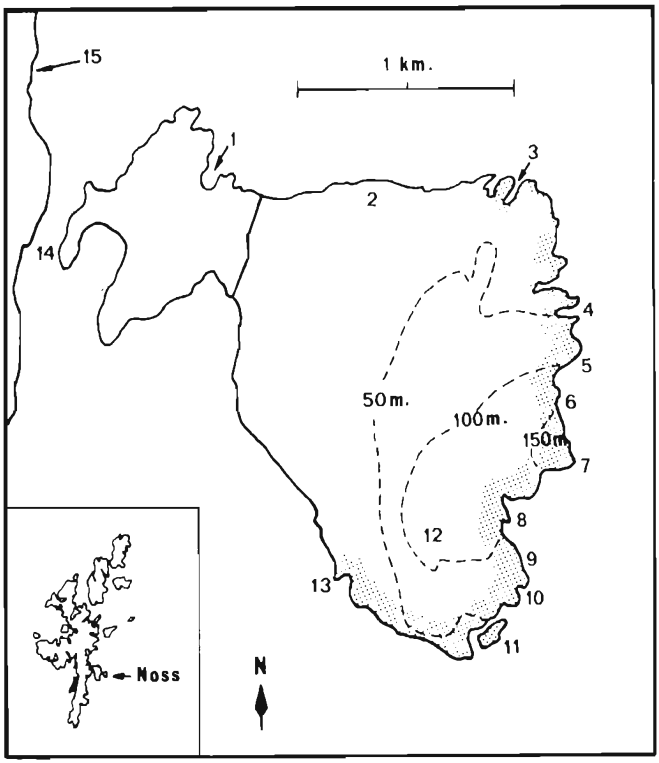


Fig. 1. The Isle of Noss.
1 Papil Geo, 2 North Croo, 3 Pundsgeo, 4 Big Pund, 5 Heogatoug, 6 The Rump, 7 The Noup, 8 Rumble Wick, 9 Hangcliff, 10 Holmoless, 11 Cradle Holm, 12 Hill of Setter, 13 Point of Hovie, 14 Big Ness, 15 Bressay.
Stippled area indicates cliffs > 30m high.

'adults', incubating pairs, pairs (breeding and non-breeding), nests and 'apparently occupied nests' (A.O.N.'s). To avoid confusing and often impossible conversions, original count units are given in the text with their methods where relevant.

Recent count units have largely followed Harris (1976a) and Furness (1981) and have included boat surveys, since a significant proportion of the cliffs is invisible from the land.

Results

Fulmar. First recorded breeding on Noss in 1898 (Godfrey, 1899) and very much in evidence ten years later (Harvie-Brown, 1912). Thereafter, J. W. Jamieson, the RSPB 'watcher' documented a 'rapidly increasing Fulmar population' between 1923-1929. By 1946 Perry (1948) considered there were more than 1,000 breeding pairs distributed around all but the SW coast. The increase continued with 1,200, 1,500 and 2,000 A.O.N.'s estimated by interpolation in 1949, 1954 and 1964 respectively (Fisher, 1966).

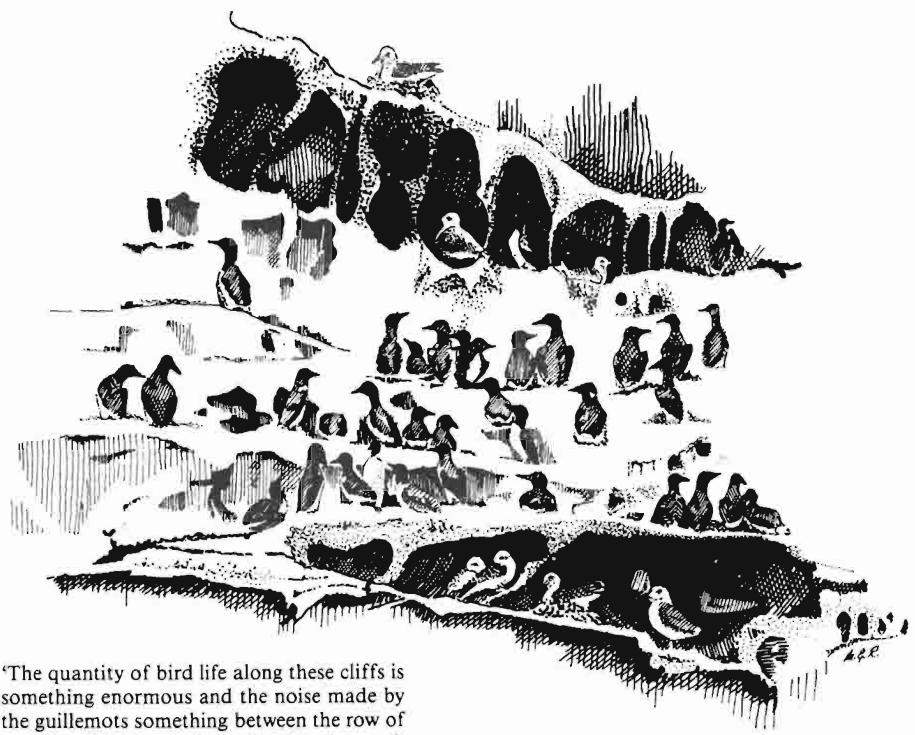
Four surveys since 1969 indicate that Fulmars are continuing to increase though considerable fluctuations or discrepancies between censuses, due probably to observer or count-time variations, are clearly apparent. Count totals (A.O.N.'s) are: 1969, 2,080;

1970, 4,839; 1976, 3,320; 1982, 6,085. 90% of the Fulmars are on the steep cliffs between the Point of Hovie and Pundsgeo though pairs have recently colonised nesting sites well inland. Here, 4 pairs bred in 1973, 6 in 1974, 14 in 1976, 44 in both 1982/83 and 51 in 1984. The indications are that Fulmars have been increasing recently at ca. 3% per annum.

Cormorant *Phalacrocorax carbo* and **Shag** *P. aristotelis*. Breeding Comorants have been recorded only once, by Raeburn (1888). Shag numbers have remained relatively stable with 100 pairs in 1946 (Perry, 1948), 141 in 1969, 130 in 1970, and 148 (nests) in 1983 declining to 132 nests in 1984.

Gannet. Prospecting on Noss began in 1911/12 with the first pair breeding on the Noup in 1914 (MacPherson, 1933). By 1920 numbers had risen to 10 pairs (Meade-Waldo, 1920), 200 pairs in 1930/31 (Fisher & Venables, 1938) and 800 pairs in 1934 (Wynne Edwards *et al.*, 1936). Accurate counts in May 1938 and June 1939 produced 1,518 nests and 1,830 pairs respectively (Fisher & Venables, 1938; Fisher & Vevers, 1943) and the former indicated that, even given that Gannets were immortal and perpetually fertile, immigration must have occurred up to this point to account for the high rate of increase. Colony expansion then continued with Tewnion (1956) 'guestimating' 4,000 pairs in 1955.

No further surveys were made until 1969, 1970 and 1974, when 4,300, 8,181 and 8,093 adults were counted (Cramp *et al.*, 1974; Harris, 1976a). From the last two



'The quantity of bird life along these cliffs is something enormous and the noise made by the guillemots something between the row of scolding fish fags and the shrieks of a stuck pig'

— (Tudor, 1883).

figures Nelson (1978) calculated approximately 6,700 'site occupying' pairs assuming that 20% of nests at any one time were attended by both birds of a pair. The most recent counts indicate a decline in the rate of increase of Gannets on Noss, with a land-based count of 4,863 nests in 1982 and a complete census in 1984 producing 5,231 nests and 9,767 adults. Overall the distribution of Gannets has changed little since 1938 with only two further areas colonised.

Arctic Skua *Stercorarius parasiticus*. A number of authors during the last century commented on the considerable numbers of Arctic Skuas present on the island, with Evans & Buckley (1899) describing this as the largest colony in Shetland, numbering as many as 300 birds. Raeburn (1888) in contrast considered there to be only 50 pairs in 1887. 1931 saw the peak count this century with 60 pairs present (Venables, 1934) whilst numbers reached their lowest in the 1950's (12 pairs, 1955 — Tewnion, 1956).

Recent counts put the numbers as little different now from those in the 1940's. Arctic Skua distribution has, however, altered in response to pressure from the increasing number of Great Skuas (Figure 2) and birds which once occupied low heathland on the west of the hill land are now largely restricted to a confined area of exposed maritime heath. A second small colony was ill-defined and even by 1946 had become almost surrounded by Great Skuas (Perry, 1948). This satellite colony finally disappeared in 1984 when breeding pairs overall dropped to 24. Since 1946, Great Skuas have increased by 350% and the density of Arctic Skua territories has risen from approximately 80/km^2 to 200/km^2.

Great Skua. Breeding was first recorded in 1910 when two pairs nested on the Hill of Setter. Subsequently, numbers have increased steadily at c3% per annum with the most recent census indicating colony growth at over 6% p.a. Between 1946 and 1983 Great Skuas increased from 113 to 388 pairs, colony area from 0.87km^2 to 1.6km^2, density of nests from 130/km^2 to over 240/km^2, and the number of non-breeder 'club sites' from one to two or in some years three (Figure 2). The largest concentration has remained on the Hill of Setter where in 1983 the average territory size, of 40 pairs, was only 275 sq m.

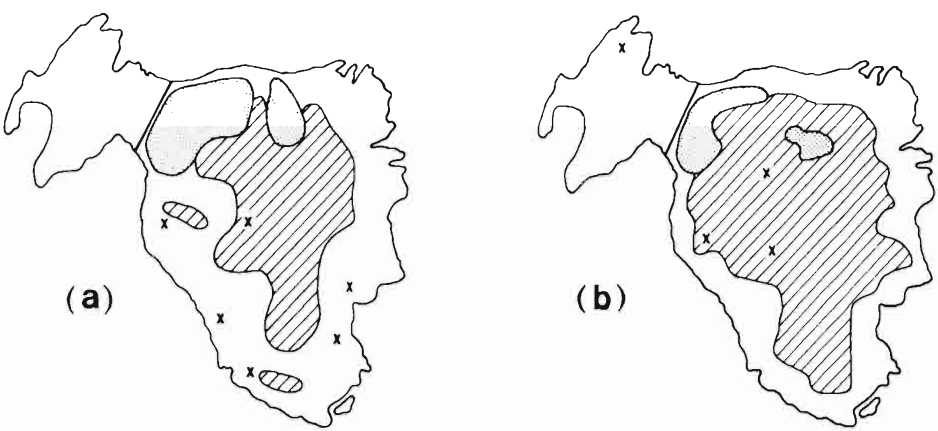


Fig. 2. Distributions of Great and Arctic Skuas in (a) 1946 (pairs=113 & 31, after Perry, 1948) and (b) 1982/83 (pairs=388 & 34).
Hatched area=Great Skuas, stippled area=Arctic Skuas, x=isolated territories.
The smaller eastern pocket of Arctic Skuas disappeared in 1984.

Common Gull *Larus canus*. A colony of 30-40 pairs on North Croo had been reduced to 13 pairs on Big Ness by 1946 (Perry, 1948). Numbers since the 1970's have declined to extinction, with 15 pairs 1973, 20 pairs 1975, 8 pairs in 1976 and in 1977, the last breeding record, 2 pairs.

Lesser Black-backed Gull *Larus fuscus*. This gull, which formerly bred along the cliffs, on Cradle Holm and amongst peat hags on the moorland, had by 1923 been evicted from the island's interior by the increasing Great Skuas. Since 1946 these gulls have declined from 100 pairs (estimated) in 1972, to 6 in 1973, 7 in 1975, 2 in 1980, a single pair in 1983 and none in 1984.

Herring Gull *Larus argentatus*. In 1887 Raeburn (1888) estimated more than 1,000 pairs of Herring Gull, the majority nesting on cliff ledges. By 1946 these gulls had been restricted to the coastal fringes by the colonisation of the cliffs by Fulmars and of the moorland interior by Great Skuas. Recent surveys indicate a continuing decline from 500 pairs in 1969, to 162 in 1980 and 128 in 1984.

Great Black-backed Gull *Larus marinus*. In 1887 and 1898 Cradle Holm was considered to be the largest colony in Shetland with numbers estimated at 250 and 100 pairs respectively (Raeburn, 1888; Evans & Buckley, 1899). Perry (1948) considered there to be 137-150 pairs in 1946 though subsequently the colony has been variously estimated at 200-304 pairs (e.g. Tewnion, 1956; Harris, 1976a). In 1984 only 125 incubating birds were present on the Holm with 11 pairs distributed elsewhere around the island's coastline.

Kittiwake *Rissa tridactyla*. Raeburn (1888) and Evans & Buckley (1899) considered Noss one of the main Kittiwake breeding stations in Shetland, as large as those on Unst and Foula. Perry (1948) estimated that, in the height of the breeding season, 36,000 birds were flying daily between the Noss cliffs and the lochs of Bressay, and that 30,000-40,000 birds were collecting nesting material every hour. Perry believed that Kittiwakes on Noss were declining owing to heavy predation by Great Skuas and to a lesser extent to expulsion from the larger breeding ledges by Gannets. There have been three recent counts: 10,510 nests in 1969, 10,515 nests in 1970 and 10,767-11,082 A.O.N.'s in 1980 (Richardson, 1983).

Common Tern *Sterna hirundo*. In 1915 one pair and in 1948 two pairs nested within the Arctic Tern *S. paradisaea* colony (Perry, 1948). There have been only two further nesting records; in 1969 there were 20 pairs on North Croo and in 1980 a single pair (Bullock & Gomersall, 1981).

Arctic Tern. Less than 20 pairs bred regularly in the first half of the century, and in the early 1960's 30-50 pairs were present. None bred by 1970, but numbers increased thereafter to a peak of 200 pairs at North Croo in 1977. The following year breeding failed, and by 1980 numbers were again reduced to 24 pairs (Bullock & Gomersall, 1981). Subsequently the North Croo colony has been deserted; only 6 pairs bred in 1981, 2 in 1982 and none in 1983.

Guillemot *Uria aalge*. The Guillemot colony is undoubtedly old and well established, with Saxby (1874), Raeburn (1888) and Evans & Buckley (1899) all commenting that only Foula and Unst rivalled Noss in the number of Guillemots. Both the 1969 and 1970 counts of 24,155 and 22,811 individuals respectively were almost certainly underestimates. In a detailed survey Butler (1981, NCC Rep.) counted 63,837 individuals which, based on monitoring data, he corrected to 65,517.

Razorbill *Alca torda*. Perry (1948) recorded Razorbills between the Point of Hovie and Pundsgeo and considered that they were few in number and probably decreasing. Three recent counts indicate a similar distribution. In 1969 there were 3,120 individuals, in 1970 1,471 and in 1981 1,417. Applying a

correction factor from monitoring sites in the last figure a total of 1,432 Razorbills was derived.

Black Guillemot *Cepphus grylle*. Perry counted at least 65 pairs of Black Guillemots on Noss. These nest mainly amongst the boulders on the low cliffed-shores of the north, north-east and south coasts; high cliffs on the east are avoided. In late May 1984 118 adults (or potential breeders) associated with possible nesting sites were counted, early in the morning, from the sea. No attempt is made here to convert this number into actual breeding pairs.

Puffin *Fratercula arctica*. Raeburn (1888), Evans & Buckley (1899) and Venables & Venables (1955) all considered Noss as one of the largest Puffin stations in Shetland. Recent counts suggest that Noss is unlikely, however, to hold more than 3,000 pairs. The 1969 and 1970 single counts of 1,100 and 1,565 individuals respectively are probably underestimates since counts were only made once. In 1983 counts made throughout the season produced a total of 2,090 individuals.

Discussion

In the 18th and 19th centuries 12 species of seabird nested on Noss, all of which had probably been breeding regularly for many hundreds of years. Kittiwakes and Guillemots dominated the cliffs; inland there were colonies of Arctic Skuas and gulls. This picture altered substantially when, in the space of 16 years at the beginning of this century, the Fulmar, Gannet and Great Skua colonised the island. The increasing Great Skuas have since confined Arctic Skuas to a small area of exposed heathland and largely banished gulls to the coastal fringes, whilst the expanding colonies of Gannets and Fulmars on the cliffs have expelled Kittiwakes and Guillemots, at least from the larger ledges.

The continued growth of these species may well be limited more by nesting availability than food (A. Hudson, pers. comm.; Nelson, 1978). Thus, Fulmars have begun to nest inland, suggesting that optimal cliff-sites may now be fully occupied. Gannets have colonised few new areas in the past 50 years and their rate of increase has recently diminished, whilst Great Skuas now occupy most of the island's interior at a maximum density of almost 250 nests/km^2.

Table 1. Breeding seabird numbers on Noss compared with their totals for Shetland and the largest colony of each in Shetland. For count units see text.

Name	Noss total	Shetland total	Largest Shetland Colony	
Fulmar	6085	c150,000	38,555	Foula
Gannet	5231	16,066	10,986	Hermaness, Unst
Great Skua	388	c6,500	2,670	Foula
Arctic Skua	24	c1,700	298	Fetlar
Great Black-backed Gull	136	2,750	500+	Papa Stour Stacks
Kittiwake	11,082	54,264	17,000+	Fair Isle
Guillemot	65,518	c194,000	65,518	Noss
Razorbill	1,432	19,500	10,373	Foula
Puffin	2,090	250,000	50,000	Hermaness, Unst

Sources: Berry & Johnston, 1980; Bourne & Dixon, 1974; Cramp *et al.*, 1974; J. N. Dymond, pers. comm.; Everett, 1981; FIBO, 1982; Furness, 1981, 1983; Harris 1976a and 1976b; Heubeck, 1981; Okill *et al.*, 1982; Richardson, 1983.

In 1984 seabird species breeding on Noss remained at twelve, though recent years have seen the decline to extinction of Arctic Tern, Common Gull and Lesser Black-backed Gull. In Table 1 the major seabirds on Noss are presented in the context of the Shetland population and the largest colony. The numbers of breeding Gannets, Great Skuas and Kittiwakes on Noss are clearly large even by Shetland standards, whilst the Guillemot numbers are amongst the largest in any British colony.

However, Noss is situated near two potentially major threats to its seabird populations. First, oil pollution from tanker traffic to and from the Sullom Voe Oil Terminal and, secondly, a fishery for sandeel (*Ammodytes* spp.) close to the south coast of Noss. In 1983, 37,000 tonnes of sandeels were taken from inshore Shetland waters and a total of 151 boat-fishing days was recorded between 10 May and 6 September, immediately around Noss. The relationships between this industrial fishery and seabird ecology, its benefits in terms of scavenging and its threats in terms of depletion of stocks of sandeels, remain poorly understood. A current study into the feeding biology of Fulmars, gulls and Great Skuas on Noss may provide some of the answers.

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We would like to thank these and others acknowledged in the text for allowing us to use their results. We are also grateful to P. Kinnear and Miss A. Hudson for their constructive criticisms on the manuscript.

References

Berry, R. J. and Johnston, J. L. 1980. *The Natural History of Shetland.* London: Collins.

Bourne, W. R. P., and Dixon, T. J. 1974. The Seabirds of the Shetlands. *In.* Goodier, R. (ed.). *The Natural Environment of Shetland.* Edinburgh, NCC, 130-144.

Bullock, I. D., and Gomersall, C. K. 1981. Breeding Terns in Orkney and Shetland. Upubl. Rep. to the RSPB.

Cramp, S., Bourne, W. R. P., and Saunders, D. 1974. *The Seabirds of Britain and Ireland.* London: Collins.

Evans, A. H., and Buckley, T. E. 1899. *A Vertebrate Fauna of the Shetland Islands.* Edinburgh: Douglas.

Everett, M. J. 1981. Breeding Great and Arctic Skuas in Scotland in 1974-75. *Seabird Rep.* No. 6, 1977-1981: 50-58.

Fair Isle Bird Observatory. 1982. Report for 1982, Riddiford, N. (ed.). Edinburgh, Fibot.

Fisher, J. 1952. *The Fulmar.* London: Collins.

Fisher, J. 1966. The Fulmar population of Britain and Ireland, 1959. *Bird Study* 13:5-76.

Fisher, J., and Venables, L. S. V. 1938. Gannets (*Sula bassana*) on Noss, Shetland with an analysis of the rate of increase of this species. *J. Anim. Ecol.* 7:305-313.

Fisher, J., and Vevers, H. G. 1943. The breeding distribution, history and population of the North Atlantic Gannet (*Sula bassana*). Part 1. A history of the Gannet's colonies, and the census in 1939. *J. Anim. Ecol.* 12:173-213.

Furness, R. W. 1981. Seabird poulations on Foula. *Scot. Birds* 11:237-253.

Furness, R. W. 1983. Foula, Shetland. Vol. 4. *The Birds of Foula.* Ambleside, Brathay.

Godfrey, R. 1899. Fulmar Petrel breeding on Noss, Shetland. *Ann. Scot. Nat. Hist.* 1899:53.

Harris, M. P. 1976a. The seabirds of Shetland in 1974. *Scot. Birds* 9:37-68.

Harris, M. P. 1976b. The present status of the Puffin in Britain and Ireland. *Brit. Birds* 69:239-264.

Harvie-Brown, J. A. 1912. The Fulmar: Its past and present distribution as a breeding species in the British Isles. *Scot. Nat.* 1912:97-102, 121-32.

Heubeck, M. 1981. On a survey of the Hermaness Gannetry, July 1980. Unpubl. Rep. to the SOTEAG.

MacPherson, A. H. 1933. Gannets in Shetland. *Scot. Nat.* 1933:118.

Meade-Waldo, E. G. B. 1920. A new nesting place of the Gannet. *Brit. Birds* 14:93-4.

Nelson, J. B. 1978. *The Gannet*. Berkhamstead: Poyser.
Okill, J. D., Sandison, I., and Dymond, J. N. 1982. *Shetland Bird Report, 1981*. Shetland Bird Club.
Perry, R. 1948. *Shetland Sanctuary*. London: Faber.
Pitt, F. 1922. The Great and Arctic Skuas in the Shetlands. *Brit. Birds* 16:174-181, 198-202.
Raeburn, H. 1888. The summer birds of Shetland. *Proc. Roy. phys. Soc. Edin.* 9:542-562.
Richardson, M. G. 1983. The Kittiwake in Shetland. *Shetland Bird Club Rep. 1982*: 54-64.
Saxby, H. L. 1874. *The Birds of Shetland*. Edinburgh: Maclaren & Stewart.
Tewnion, A. 1956. The wild birds of Noss. *Scotlands Magazine*, 30-32.
Tudor, J. R. 1883. *The Orkneys and Shetland*. Their past and present state. London, Stanford.
Venables, L. S. V. 1934. Census of breeding Skuas on Noss. *Brit. Birds* 28:87.
Venables, L. S. V., and Venables, U. M. 1955. *Birds and Mammals of Shetland*. Edinburgh: Oliver & Boyd.
Wynne-Edwards, V. C., Lockley, R. M., and Salmon, H. M. 1936. The distribution and numbers of breeding Gannets (*Sula bassana* L.) *Brit. Birds* 29:262-76.

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Drawing by M. G Richardson

Plate 3. The spectacular gannetry on the vertical Noup of Noss (181m). **M. G. Richardson**

The distribution and abundance of Sand Martins breeding in central Scotland

GARETH JONES

The distribution and abundance of Sand Martins in the Stirling area was investigated between 1982 and 1984 using a method which estimated the maximum number of pairs attempting first broods. Colony sizes ranged from a single burrow to about 920 pairs. Colony site distribution was examined using 1982 data, when peak numbers were recorded over the study period. Of about 3,750-4,000 pairs of Sand Martins assessed as attempting first broods in the study area in 1982, 84% nested in sand and gravel quarries. The use by Sand Martins of artificial sites for breeding is likely to be a relatively recent event, since sand and gravel quarrying has only been substantial for the past 50 years. Sand Martins appear to have made increasing use of artificial areas over the last half-century, and may reach breeding densities in central Scotland which exceed any documented so far in continental Europe.

Introduction

In the past, Sand Martins *Riparia riparia* in Scotland nested mainly in river banks (Rintoul and Baxter 1935, Baxter and Rintoul 1953). The substantial increase in the amount of sand and gravel quarried in Britain, especially over the past fifty years (British Geological Survey 1985), has made many artificial sites available and large colonies of Sand Martins have recently been reported from quarry sites (Morgan 1979).

The aim of the study reported here was to survey Sand Martin colonies in the Stirling area in 1982-84 inclusive, with the goals of

(a) estimating the breeding population size as a baseline for any future studies of population changes

(b) assessing the use made of sand and gravel quarries by Sand Martins breeding in central Scotland.

Study Area and Methods

The study was carried out in the Stirling area (Figure 1) which includes part of the Highland boundary fault and contains a diverse range of habitats (Timms 1974). The area is rich in glacial sands and gravels so there are many opportunities for quarrying.

Sand Martins often construct new burrows each year (pers. obs.), and birds usually rear two broods in a summer (pers. obs., Morgan 1979), often digging new holes for second broods. Care must therefore be taken in counting burrows at Sand Martin colonies to minimise errors associated with counting unoccupied burrows from previous breeding attempts. Sites were surveyed in late June and early July, corresponding to the period when most Martins had constructed burrows for the first broods at the main study colony, Barbush sand quarry, Dunblane (grid reference NN 787026). Burrow counts were

therefore likely to estimate the maximum number of pairs attempting first broods at the sites surveyed. Colonies were located by following river courses and through contacts with local ornithologists, and it is likely that all the major colonies (of over 50 pairs) in the Stirling area were covered at some stage during the three summers of the study.

Criteria for assessing burrow occupancy were the presence of chicks, fledglings or adults at the burrow entrance, claw marks outside of the burrow, or lines of faeces below the burrow. Unused burrows often had vegetation growing out of them, or had cobwebs across their entrances (Harwood and Harrison 1977). Such burrows were excluded from the counts, as were burrows which were visibly blind-ended. Burrows which were not obviously out of use, but whose occupancy could not be confirmed were included in the counts. Hence errors of over-estimation of population size are possible, and the burrow counts are therefore only of use in detecting large scale population changes.

Results

Burrow counts from the 1982-84 Stirling area colony censuses are presented in the Appendix. Counts were obtained from 27 colonies over the three years, with 15 sites covered in all three years. The splitting of the River Devon sites into three sections was arbitrary, since the nests were scattered along the river, and did not lie in discrete colonies.

The largest colony recorded was at Barbush (Site 5 in the Appendix), where an estimated 920 pairs of Sand Martins attempted first broods in 1982. The smallest 'colony' was of one burrow, at Northfield quarry, Denny (Site 20). Suitable sites for

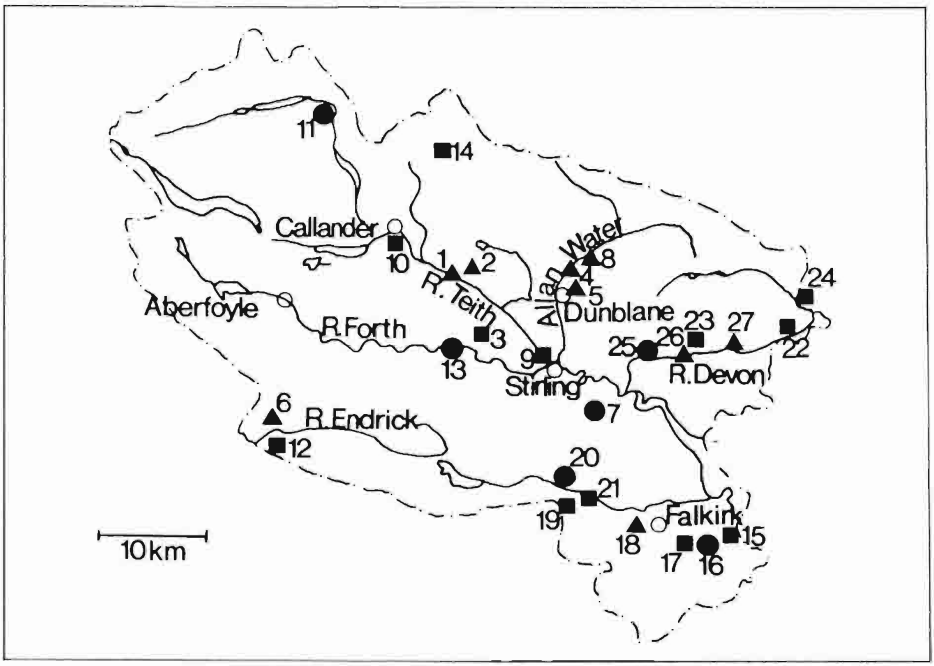

Fig. 1. Sand Martin colonies surveyed in the Stirling area, 1982-84.
Numbers refer to sites listed in the Appendix, and counts are the maximum recorded 1982-1984 (see text).
Solid circles: 1-10 burrows; squares: 11-100 burrows; triangles: 101-1,000 burrows.

Sand Martin colonies can be short-lived, and the birds must be opportunistic in colony selection. For example, Roughmute sand quarry (Site 18) held about 370 pairs in 1982, was largely reclaimed as grassland in 1982-83, and the colony had disappeared by 1984. Sand quarries are frequently disturbed, and river banks may collapse or be flooded, so sites may vary considerably in distribution and size from year to year. The distribution of the surveyed colonies in the Stirling area is shown in Figure 1. There were few colonies in the north-west of the area, which is mainly high ground and includes few rivers with sandy banks. Most sites were concentrated in the south and east, especially along river courses where glacial sand and gravel deposits have been quarried, leaving large cliffs suitable for colonisation. Most river bank nests were found along the Allan Water, the River Devon, and the River Endrick. The Rivers Forth and Teith have few high sandy banks which are safe from flooding.

In Figure 2 a frequency distribution of colony sizes is plotted for each of the three years of the study. In each year, most colonies were in the 1-100 burrow class. The number of colonies containing more than 500 burrows declined from five in 1982 to one in 1983, whilst no colony exceeded 200 burrows in 1984. The disappearance of large colonies over the study period coincided with a population crash of Sand Martins in the Stirling area (pers. obs.) and nationally (Mead 1984), seemingly because of severe drought conditions in the wintering grounds, the Sahel zone of Africa.

The information presented below on colony distribution is for 1982, when Sand Martin numbers were at their highest during the study period. In 1982, 18 sites were surveyed in the Stirling area, and it was estimated that a maximum of about 3,750 pairs of Martins attempted first broods at these sites. Of these, 3,144 (84%) nested in sand or gravel quarries, about 16% in river banks.

The seven sites not surveyed in 1982 contained 131 burrows in 1983, 113 in 1984, so a population estimate of between 3,750 and 4,000 pairs of Sand Martins attempting first broods in the Stirling area during 1982 seems reasonable.

Discussion

The British Trust for Ornithology (B.T.O.) Breeding Bird Survey of the 1970's recorded Sand Martins in 75% of 10km squares in Britain, with confirmed breeding in 84% of these (Sharrock 1976). This survey covered 19 complete or almost complete (>75% of square area) 10km squares in central Scotland, with confirmed breeding of Sand Martins in 11 (58%) of squares, close to the British average of 63%.

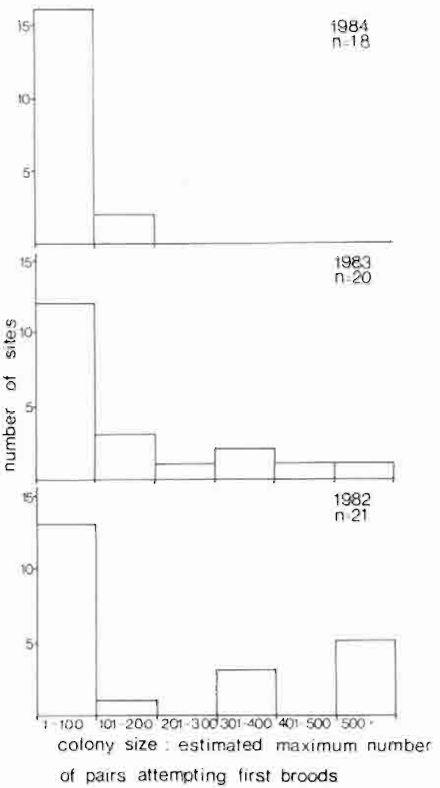

Fig. 2. Frequency distribution of Sand Martin colony sizes in the Stirling area, 1982-84.

From an examination of Sand Martin B.T.O. nest record cards, Morgan (1979) found that 44.2% of colonies in southern Britain were in sand or gravel quarries, compared with 32.8% in northern Britain. Forty-two percent of sand and gravel pits surveyed in the B.T.O. Register of Ornithological Sites contained breeding Sand Martins (Fuller 1982), and 97% of colonies documented at Lower Saxony and Bremen in Germany were found in gravel pits (Oelke 1968). In 1982, when Sand Martin numbers were high in the Stirling area, 67% of colonies and 84% of burrows surveyed were in sand or gravel quarries.

Colonies in sand or gravel quarries can be considerably larger than many natural colonies: in 1982 the four sites with over 500 burrows were all in sand quarries. Hence sand pits in the Stirling area were not only the most frequently used sites for breeding by Sand Martins, they also held the largest colonies. The compactness of sand in quarries will also probably influence the density of Sand Martins settling there: Sieber (1980) found higher burrow densities in less compact sand cliffs.

The Sand Martin's use of sand quarries over much of Britain has probably led to a change in the distribution and possibly a change in the abundance of the species over the past century. Sand and gravel output increased rapidly between the turn of the century and 1970, although the amount quarried annually since 1973 has decreased slightly (British Geological Survey 1985).

Clearly the increased levels of quarrying of sand and gravel will have resulted in

Plate 4. Sand Martin digging its burrow. **E. C. Fellowes**

more artificial sites being available for Sand Martins, especially within the last 50 years. Parslow (1973) believes that the growth in the number of gravel pits in central and eastern England has led to an increase in the Sand Martin population there. Some Sand Martin colonies in natural sites in Scotland decreased in size, however, at least until the 1950's (Baxter and Rintoul 1953). Hence the change in available Sand Martin nesting habitat over the past century may simply have resulted in a redistribution of nest sites rather than an increase in the overall population. Nevertheless, the largest colony recorded in the Forth area by Rintoul and Baxter (1935) was 300 burrows in a river bank on the River Almond. The Barbush colony is probably the largest to have existed in Scotland in recent years (up to 920 pairs in 1982), whilst Drumbeg sand pit at Drymen has had up to 600 burrows recorded.

Thus larger breeding colonies of Sand Martins have been recorded in central Scotland in recent years, probably associated with an increase in available nesting habitat resulting from increased levels of sand quarrying. Whether these large, recent colonies represent a recent increase in the population of Martins in central Scotland, or whether they consist of birds which have moved from many natural colonies remains unanswered however. Either way, central Scotland now supports a relatively high density of breeding Sand Martins: the density of 1.97-2.11 pairs per square km recorded in 1,900km^2 during 1982 exceeds any density documented from 30 areas of continental Europe by Kuhnen (1975).

Acknowledgements

This study was carried out during tenure of a N.E.R.C. studentship. My supervisor, Dr. D. M. Bryant, provided valuable comments and encouragement. Thanks are due to the landowners who allowed me access to their land, especially Messrs. Fleming of Barbush sand quarry, Dunblane. Stirling S.O.C. members provided information on the location of Sand Martin colonies in the area, and Iain MacGowan's field assistance was appreciated.

References

Baxter, E. V. and Rintoul, L. J. 1953. *The Birds of Scotland.* Oliver and Boyd, Edinburgh.

British Geological Survey. 1985. *United Kingdom Mineral Statistics 1984.* HMSO, London.

Fuller, R. J. 1982. *Bird Habitats in Britain.* Calton.

Harwood, J. and Harrison, J. 1977. A study of an expanding Sand Martin colony. *Bird Study* 24:47-53.

Kuhnen, K. 1975. Bestandsentwicklung, Verbreitung, Biotop und Siedlungsdichte der Uferschwalbe (*Riparia riparia*) 1966-1973 am Niederrhein. *Charadrius* 11:1-24.

Mead, C. J. 1984. Sand Martins slump. *BTO News* 133: July 1984.

Morgan, R. A. 1979. Sand Martin nest record cards. *Bird Study* 26:129-132.

Oelke, H. 1968. Die Uferschwalbe (*Riparia riparia*) Bundesländen Niedersachen und Bremen. *Vogelwelt, Biehelte* 2:39-46.

Parslow, J. 1973. *Breeding Birds of Britain and Ireland: A Historical Survey.* Calton.

Rintoul, L. J. and Baxter, E. V. 1935. *A Vertebrate Fauna of the Forth.* Oliver and Boyd, Edinburgh.

Sharrock, J. T. R. 1976. *The Atlas of Breeding Birds in Britain and Ireland.* Calton.

Sieber, O. V. 1980. Kausale und funktionale Aspekte der Vertilung von Uferschwalbruten (*Riparia riparia* L.). *Z. Tierpsychol.* 52:19-56.

Timms, D. 1974. (Ed.). *The Stirling Region.* British Association.

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APPENDIX. Estimated maximum number of pairs of Sand Martins attempting first broods at colonies in the Stirling area, 1982-84 inclusive. Site numbers refer to Figure 1.

Site no.	DISTRICT/Nature of Site	Name of Site	Grid Reference	Estimated number of pairs 1982	1983	1984
	STIRLING					
1	artificial, gravel pit	Cambusmore GP, nr. Callander	NN 649062	34	322*	70
2	artificial, sand pit/gravel pit	Cambusbeg S+GP, nr. Callander	NN 665052	530	423	75
3	artificial, sand/gravel pit	Blair Drummond sand+gravel pit	NS 732003	40	5	0
4	artificial, sand/gravel pit	Kinbuck sand+gravel pit	NN 795048	501	207	55
5	artificial, sand/gravel pit	Barbush, nr. Dunblane, sand+gravel pit	NN 787026	918	577	115
6	artificial, sand/gravel pit	Drumbeg, S+GP, Drymen	NS 478881	600[1]	334	197
7	artificial, gravel pit	Cowie GP	NS 822899	NC	2●	0
8	natural, river bank	Allan Water, Kinbuck-Greenloaning	NN 805060	356	185	15
9	natural, river bank	River Teith, Greenocks, Lecropt	NS 765964	15	NC	0
10	natural, river bank	River Teith, Callander	NN 623075	46	18	8
11	natural, river bank	River Balvag, Strathyre	NN 562192	10	NC	0
12	natural, river bank	River Endrick, county boundary below Catterburn	NS 470873	NC	61	58★
13	natural, river bank	River Forth, Gargunnock-Kippen	NS 695968	NC	NC	10
14	natural, glacial esker	Stratth 'a Ghlinne, Glen Artney	NS 680170	NC	50	35
	FALKIRK					
15	artificial, sand/gravel pit	Scottish Aggregates, nr. Linlithgow	NS 969784	72	0	0
16	artificial, gravel extraction	Whitecross	NS 964778	6	0[y]	0
17	artificial, sand/gravel quarry	Avon Glen S+GP	NS 955784	25	91[z]	53[z]
18	artificial, sand/gravel quarry	Roughmute S+GP	NS 832810	366	10[y]	0
19	artificial, sand/gravel quarry	Castle Rankine Glen, nr. Denny	NS 792823	48	48	3
20	artificial, sand pile	Northfield quarry, nr. Denny	NS 800854	NC	1	0
21	artificial	Dunipace Cemetry	NS 840820	NC	15●	7
	CLACKMANNAN					
22	golf course	Muckhart golf course	NN 002002	4+[2]	NC	50[2]
23	sand bank	Tillicoultry quarry	NS 912978		19●	19
24	natural, river bank	Dunning Glen	NN 005030	15[2]	NC	3[2]
25	natural, river bank	River Devon, Menstrie-Alva	NS 874963	6	2	1
26	natural, river bank	River Devon, Alva-Tillicoultry	NS 903965	106	123	84
27	natural, river bank	River Devon, Tillicoultry-Dollar	NS 940974	52	103	50

KEY: * probably some movement here from Cambusbeg
● probably first year of use
★ more thorough survey in 1984
y decline probably attributable to poorer quality sand faces being available

KEY: z better quality sand faces probably available
1 Count from J. Mitchell, N.C.C.
2 Count from D. M. Bryant
GP: gravel pit
S+GP: sand and gravel pit

Breeding wildfowl of Loch Leven National Nature Reserve

G. A WRIGHT

Information on Loch Leven's waterfowl obtained during the period 1980-84 is compared with data for 1966-71, and shows that present populations are at least as large as in the earlier years. The distribution around the loch shore and the territorial requirements of breeding pairs of some species are discussed. The distribution of Mallard and Tufted Duck broods is examined and shows a heavy concentration on the west shore, over 2km from the principal nesting areas. Proposals for future research are discussed.

Introduction

Loch Leven, a shallow freshwater loch of 1,597ha in east-central Scotland, has been a National Nature Reserve since 1964. From 1966 to 1971 it was the subject of intensive study which established it as holding the largest breeding population of duck in Britain (Newton & Campbell, 1975). The researchers concluded that disturbance during their work resulted in the failure of between 9% and 32% of the nests on St Serfs Island, and as a result they recommended that management of the reserve should keep disturbance of nesting areas to a minimum. This principle was accepted and no further work involving repeated disturbance of nesting ducks was carried out. As a result, the figures available for the size of the breeding population were becoming increasingly out-of-date. Furthermore, there was little or no information on the importance of parts of the reserve other than St Serfs for breeding birds. This situation was emphasised in 1981 during a Public Inquiry, when the Nature Conservancy Council were called upon to defend a particular part of the reserve against the threat of disturbance by helicopters, and the scarcity of detailed information became apparent.

The present paper summarises surveys since carried out, with particular reference to the distribution and territorial requirements of breeding wildfowl and their young on Loch Leven.

Methods

Each spring since 1980, the number and distribution of pairs and males of the less numerous breeding species have been recorded by surveying the loch shore and islands from a slow-moving boat on a calm, clear, day. This technique could not be used for Mallard *Anas platyrhynchos* or Tufted Duck *Aythya fuligula* because of the number of birds involved. In 1981 an intensive search of the duck nesting areas on St Serfs Island over a 3-day period in April and a 3-day period in June produced updated estimates for the numbers of Mallard and Tufted Duck nesting on the island. Each summer since 1981 the species, age, size and location of individual duckling broods were recorded during routine duckling counts, also made from a slow-moving boat on a calm, clear, day.

Results and discussion on individual species

Mallard. A conservative analysis of the 1981

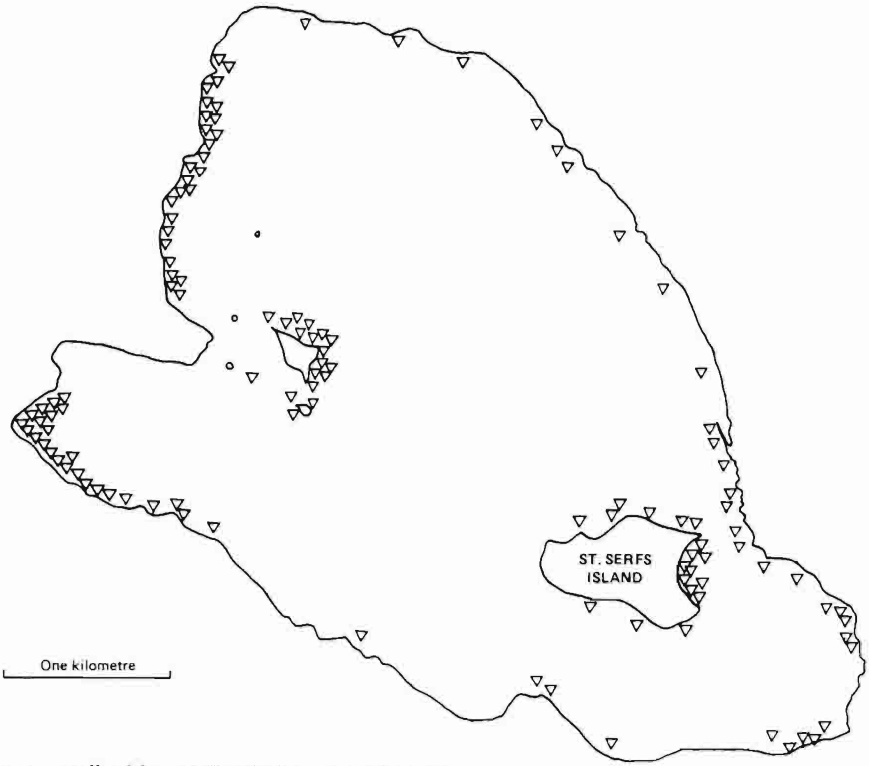


Fig. 1. Mallard brood distribution on Loch Leven.

survey indicated a population of 420-450 pairs, a figure similar to that obtained in 1966-71 (400-450 pairs), showing that the Mallard population has not changed much over the years. Figure 1 shows the distribution of 119 Mallard broods containing 530 ducklings recorded on 7 duckling counts during the period 1981-84. The most notable feature is the concentration of broods well away from the nesting areas on St Serfs Island. The western shore and small islands support 58% of the broods, yet they are between 2km and 3.5km from the nesting areas. The Grahamstone lagoon shore, which traditionally has been considered ideal duckling rearing habitat, was found to hold only 6% of broods, yet the reed-beds and lagoons are only 0.5km from St Serfs Island. It may be that only a proportion of the broods using this area are actually being recorded, with many others skulking behind the marginal vegetation. However, the duckling counts are invariably carried out on calm, quiet days when the broods might be expected to be visible, feeding on the invertebrates in the shallow water around the loch shore.

The concentration of ducklings on the west shore some distance from St Serfs Island raises questions about their origin. A journey across 2km or 3km of open water must be a hazardous undertaking, with losses due to predation or separation reflected in a smaller brood size. However, the brood size in the 3 distant areas, with a mean of 4.45, is exactly the same as that from the rest of the loch. The ages of the broods in these distant areas (mean 3.30 weeks) is similar to that from elsewhere (3.16 weeks), so there is no evidence of any reduced survival rate. It is possible that these broods did not, in fact, originate on St Serfs Island but were hatched on the small western islands or the adjacent loch shore. Evidence from other sites suggests that broods do not normally undertake long journeys; distances between nest site and rearing areas recorded by Hill and Wright (unpub.) on an area of gravel pits in England were 150, 200, 375 and 550 metres.

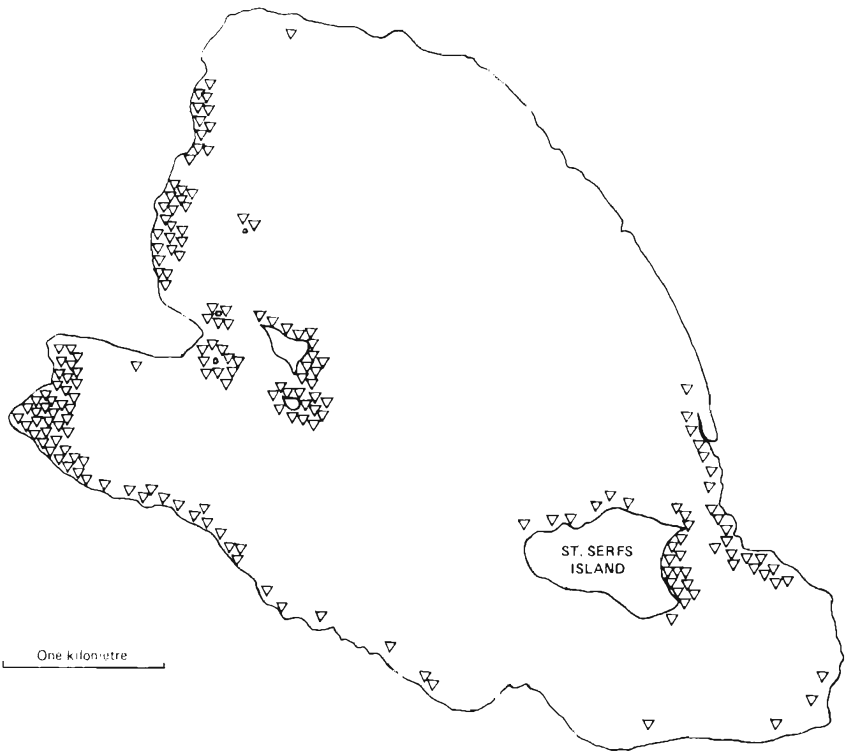


Fig. 2. Tufted Duck brood distribution on Loch Leven.

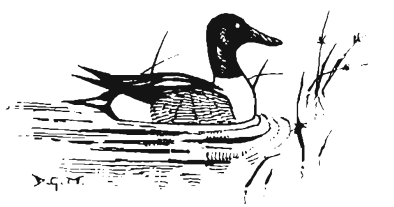
Tufted Duck. The 1981 survey indicated 520-650 nests on St Serf's Island, slightly more than the 500-600 pairs recorded in 1966-71 (Newton & Campbell, 1975). Figure 2 shows the Tufted duckling brood distribution since 1981 and summarises 181 brood groups containing 226 females and a total of 926 ducklings. The duckling distribution bears a marked similarity to that of the Mallard, apart from the few broods of Mallard scattered along the north and south shores. There is an even greater bias towards distant brood rearing areas than that shown by the Mallard, with 66% of Tufted broods in the area of the west shore and small islands. Similar arguments may be applied to the Tufted distribution as will apply to the Mallard.

Gadwall *Anas strepera.* The 1966-71 study indicated that the Gadwall population numbered 25-30 pairs while the surveys for 1980-84 produced estimates of 30, 47, 40, 25 and 45 pairs, respectively. In recording the distribution of these birds in consecutive years, it became apparent that some locations were regularly occupied and were, in effect, traditional Gadwall territories. An analysis of the 31 sites occupied in three or more of the five breeding seasons showed that 18 sites were occupied in three seasons, nine were occupied in four, and four were occupied in all five season. These regularly occupied territories were distributed around the loch shore and the islands in habitats ranging from open grazed pasture through low-lying marshland to wooded shoreline and reed-bed.

There are too few Gadwall broods recorded to permit any worthwhile analysis of their distribution, which coincided more or less with that of Mallard. The production of ducklings appears to have increased over the period, with a peak of 76 ducklings in 11 broods recorded in 1984.

Wigeon *Anas penelope.* The annual surveys for 1980-84 estimated 46, 35, 38, 43 and 34 breeding pairs, respectively, compared with the Newton and Campbell (1975) estimate of the Wigeon population as 25-30 pairs. Of the 28 territories occupied for three or more of the five years, 15 were occupied for three seasons, 12 for four, and one for all five seasons. The Wigeon appears to be rather particular in its choice of habitat, showing a preference for the open, grazed, shoreline. Wigeon ducklings are rarely seen and there is no information about breeding success.

Shoveler *Anas clypeata.* Annual surveys from 1980-84 produced estimates of 10, 18, 16, 9 and 30 pairs, respectively, slightly above the earlier estimates of up to 10 pairs (Newton and Campbell, 1975). Of the 11 regularly occupied territories, five were occupied for three seasons, three for four, and three for all five seasons. These were concentrated in specific areas around Levenmouth Pool and on the north side of St Serfs Island. Shoveler ducklings are very rarely seen and there is no information on breeding success.



Teal *Anas crecca.* Newton and Campbell (1975) estimated the Teal population as up to 10 pairs, but the number of nests found each year fell from eight in 1966 to nil in 1970, and this may be attributed to the disturbance caused by the survey work. Since 1970, no nests have been found on St Serfs Island. In 1980, five pairs and two males were recorded and two broods were seen later in the summer, and in 1981 there were three pairs and three males but no sign of young. In 1982, only one male was present, and in 1983 and 1984 no Teal were recorded during the breeding surveys.

Shelduck *Tadorna tadorna.* From around 10 pairs up to 1970, the Shelduck population has grown steadily and the annual surveys from 1980-84 gave estimates of 46, 56, 54, 39 and 47 pairs, respectively. Of 46 regularly occupied sites, 20 were occupied for three of the five seasons, 14 for four, and 12 for all five seasons. The largest concentration was around Levenmouth Pool with secondary concentrations on St Serf's Island, around the Powmouth and Orwell Marsh, and along the Gairney Marsh. Shelduck seem very particular in choosing a territory, opting almost always for the short-grazed, open shoreline. The distribution of Shelduck broods recorded over the five-year period showed a main concentration around St Serfs Island with a secondary concentration on Carden Point. This may not, however, be entirely representative, in that pairs are regularly seen in other sites with large broods of ducklings, but by the time the duckling count is carried out they have usually moved elsewhere.

Whilst the Shelduck population was fairly stable at around 10 pairs, the duckling production was increasing considerably and continued to do so until the population reached about 25 breeding pairs. Thereafter, although the population continued to increase, duckling production decreased markedly. Pienkowski & Evans (1982) compared the breeding productivity of Shelduck in colonial territories and in isolated territories, and showed that isolated pairs produced far more ducklings than those in colonies. The changes in the Shelduck population over the past 18 years probably represent the change from a collection of isolated territories around the loch shore to one major colony encompassing the whole of the loch, with the large increase in breeding pairs accompanied by a marked decline in production of young.

Mute Swan *Cygnus olor.* The early studies recorded three to five breeding pairs with very few cygnets fledging. Annual surveys from 1980-84 produced counts of three, six, six, 10 and 10 pairs, respectively. One site was occupied for all five seasons and two were occupied for four seasons. Cygnet production during the same period has been fairly good, with an annual production of 17, 17, 11, 17 and 12 fledged, respectively.

Greylag Goose *Anser anser.* Although Greylags bred occasionally in the 1960s, the sighting of a pair with five goslings in May 1982 was the first confirmed breeding for several years. Two pairs attempted to nest in 1983 and 1984, and each year one pair succeeded, raising six and eight young, respectively.

Great Crested Grebe *Podiceps cristatus.* Grebes were reported breeding in small numbers during the intensive study period, but on a waterbody the size of Loch Leven they are extremely difficult to census accurately, They may nest anywhere around the shore in reed-beds, lagoons, under overhanging willows or in short emergent vegetation along an open shore. The same technique as used for the less numerous breeding ducks has been employed since 1980 for censusing the grebes, with the distribution of pairs and singles being plotted during May or early June. Annual estimates for the period 1980-84 are 17, 36, 46, 30 and 51 pairs, respectively. Of the 18 regularly used sites 14 were occupied in three of the five seasons, three in four, and one in all five seasons. Production of young is difficult to monitor but it is apparent that very few are produced during the spring and summer, and they are seen only occasionally in the late summer and early autumn.

General discussion

The survey work carried out in recent years indicates that the wildfowl breeding on Loch Leven are at least as numerous as they were 15 years ago. Most species have increased in number with the exception of Teal, which struggle on, only occasionally managing to breed. A study of the distribution of ducklings has shown that the main concentration of broods is a considerable distance from the main nesting area, and has raised the possibility that most of the ducklings produced originate from nests in other parts of the reserve. Regarding duckling survival, although there are relatively few broods produced on Loch Leven, it is notable that the number of ducklings per brood surviving beyond two weeks of age (Mallard — 4.3, Tufted — 3.6) compares favourably with other sites. The accuracy with which the duckling counts reflect the actual number of ducklings on the loch depends upon the proportion of broods concealed by the fringe of emergent vegetation; resolving this problem presents a task which must be tackled in the future. However, it is apparent that although the loch holds vast numbers of breeding ducks it is still a relatively poor place to rear ducklings.

Proposals for future research and survey work include the continuance of the census system established over the past years, with a major re-survey of St Serfs Island carried out at five-yearly intervals. Further investigations into the habitat and territorial requirements of ducklings are planned using radio tracking techniques, which should also demonstrate the dispersal of broods from the nesting area on St Serfs, and the survival rates of individual broods.

Acknowledgements

I wish to thank D. Hill and V. Thom for their comments on earlier drafts.

References

Newton, I., & Campbell, C. R. G. 1975. Breeding ducks at Loch Leven, Kinross. *Wildfowl* 26:83-102.

Pienkowski, M. W., & Evans, P. R. 1982. Breeding behaviour, productivity and survival of colonial and non-colonial Shelducks. *Ornis Scand.*, 13:101-116;

Wright, G. A. 1981. Breeding ducks of Loch Leven National Nature Reserve, 1966-1981. *Internal NCC Report.*

G. A. Wright, Nature Conservancy Council, Benarty, Vane Farm, Kinross.

(Revised ms. received 2 April 1985)

Drawing by D. G. Mitchell

Scottish Birds (1986) 14:44-48

Breeding Ring Ouzels in the Pentland Hills

IAN R. POXTON

Between 1979 and 1984, 52 Ring Ouzel nests were found in a study area in the Pentland Hills. Territory sizes and occupancy were estimated. Nest sites and behaviour during the nesting period are described and details of clutch size and fledging success, and recoveries of ringed nestlings are given.

Introduction

The Ring Ouzel *Turdus torquatus* is found in most of upland Britain but very little published information on its breeding biology exists (Simms 1978). It is a difficult species to study; a "chacking" blackbird disappearing around a bend in a valley is all that most people see of it. Flegg and Glue (1975) summarised Ring Ouzel nesting data from an analysis of 408 Nest Record Cards submitted from all over Britain, but only 15 of these cards were from Southern Scotland. Durman (1977) reported the results of a study of Ring Ouzels in the Pentlands, a traditional breeding locality, in the mid 1970s. This paper continues the study and reports on the nesting of the species from 1979 to 1984.

Study area and methods

The Pentland Hills run southwest from Edinburgh for approximately 37km (23 miles) to Carnwath, reaching a maximum height of 579m (1900ft). The terrain is typically grouse moor and sheep walk with little tree cover. Within the Pentlands the Ring Ouzel has a rather patchy distribution; the study area was chosen because of the high density of breeding Ring Ouzels present. It lies in the middle of the hill range and is bisected by a series of valleys running from Bavelaw Castle in the west via the tumbling Logan Burn and Loganlea Reservoir to Glencorse Reservoir in the east. The sides of the valleys are predominantly heather covered, often with steep scree slopes, rocky outcrops and the occasional Rowan tree. The valley floors open out into areas of lush sheep pasture. Between late March and mid July visits were made one to three times a week, either in the evening or for whole days. In the early part of the breeding season territories were located by observing either singing males or birds displaying aggressive behaviour. Nests were found by following either of the pair back to the nest at the building, laying or incubation stages, or in the later years of the study, once the favourite nesting sites were known, by flushing the incubating female from the nest. During the nestling period it was relatively easy to find the nest by watching the parents returning with food. Once the nest was found visits were made as frequently as practicable and observations entered onto BTO Nest Record Cards. Young were ringed at between 5 and 10 days old.

Results.

Territories. Birds arrived back in the breeding area from late March onward. By careful observation it was possible to find the vast majority of Ring Ouzel nests in the study area during the six year period. Figure 1 maps all of the nests found. It is apparent that nest sites were clustered, indicating that there were favourite nesting locations. The territories marked are centred on the nest sites. Traditional song posts tended to be at the centres of these territories and proven second brood nests were always within the same territory.

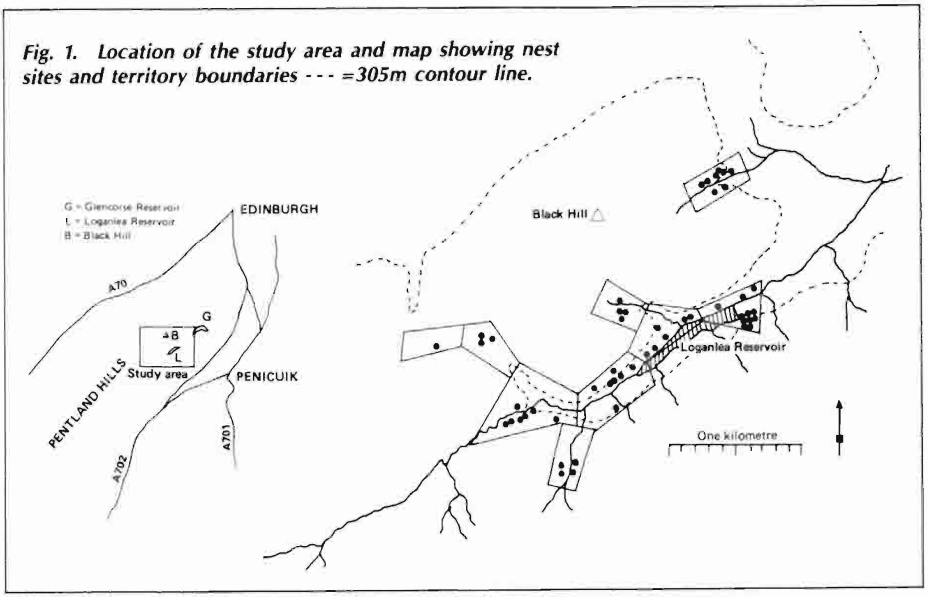


Fig. 1. Location of the study area and map showing nest sites and territory boundaries --- =305m contour line.

There are approximately 9 territories in the study area (Figure 1), but over the six years the maximum number of occupied territories in one season was seven (Table 1). The mean distance between nest sites was 500m (range 300-750m).

Nests. All the nests found were composed of a bulky cup of grass and heather similar to that described by Harrison (1975). They were built by both sexes beginning in early April. The nest-sites used are shown in Table 2. Of the 52 nests found all but four were on the bank of a stream or reservoir at an altitude of between 260 and 350 metres (850 and 1150ft.). Most were under heather on a steep slope, often directly above a scree slope or rocky ledge. A few were at the base of a tree or post. Only two, both of which failed at the egg stage, were on exposed rocky ledges. At one of these the hen "missed" the nest and laid three eggs on the ledge about 0.3m outside a new nest! Although Figure 1 shows a clustering of nest sites, no nest was re-used during the six-year period.

Ten of the nests were found during egg laying and three of these were revisited at the point of hatching, allowing accurate timing of the incubation period. Assuming incubation began when the last egg was laid, the incubation period was 14 days for two of the nests and 15 for the third. Of the nests not revisited until after hatching, it was possible to estimate the age of the young to within two or three days and so to confirm that the incubation period was between 13 and 15 days. Figure 2 shows the approximate dates

Table 1. Number of territories occupied during six year period.

Year	Number of occupied territories	Number of nests found	Proven or suspected second broods
1979	5	8	3
1980	7	8	1
1981	7	8	3
1982	5	9	4
1983	6	9	3
1984	7	10	3

Table 2. Nest Sites.

Description of Site	Number	% of Total
Under heather above scree slope	19	36.5
Under heather on steep heather slope	16	30.9
Under heather on steep grassy slope	5	9.6
Under heather on rock ledge	4	7.7
Under heather at base of tree or post on slope	3	5.8
Under heather among large boulders	1	1.9
Under bracken on steep grassy slope	1	1.9
In fern clump on top of dead fern vegetation	1	1.9
On exposed rocky ledge	2	3.8

when the first eggs were laid. The breeding season was relatively prolonged, with the main laying period from the second week of April to mid May, and second clutches found from mid May to the first week in July.

Details of clutch size and fledging success are summarised in Table 3. The usual number was four eggs. On one occasion only three eggs were laid, but in three of the study years, several clutches of five eggs were found. In 1983, an exceptionally wet year, three of the five nests found at the egg stage had clutches of five.

Of the 13 nests known to have failed, 11 were lost at the egg stage (six predated, five deserted), whilst only two were lost (both by predation) at the nestling stage. More than half of the nests found (52%) were confirmed to be successful and a further 12 (23%) had an inconclusive outcome, mainly because they were late nests and visits were not continued after the young had been ringed.

Territorial behaviour. Singing was usually confined to locations relatively near to the nest site. Song posts varied from featureless clumps of heather to trees, telegraph wires, large boulders and grouse butts if these were nearby. The song post usually overlooked the nest site, either from further up the slope or from the opposite side of the valley, sometimes across the reservoir. Song and aggression at territorial boundaries were uncommon. Except early in the season very little aggression was observed between adjacent pairs of Ring Ouzels. No aggression was seen between Ring Ouzels and other species.

At communal feeding areas, eg. a pasture in the bottom of a valley between two territories, Ring Ouzel pairs could be seen feeding within 100m of each other. Aggression was usually apparent only if birds flew near to each other on approaching or leaving the feeding area.

Three Mistle Thrush *Turdus viscivorus* nests were found in each of the first two years, but only one or two in the last four years. On one occasion in 1979 Ring Ouzels and Mistle Thrushes nested within 10-15m of each other, and on two other occasions nests were within 100m or less. No aggression was seen between the two species and even at feeding sites little aggression was apparent. Blackbirds *Turdus merula* were rarely seen in the study area away from the plantations: there was no overlap between this species and Ring Ouzels.

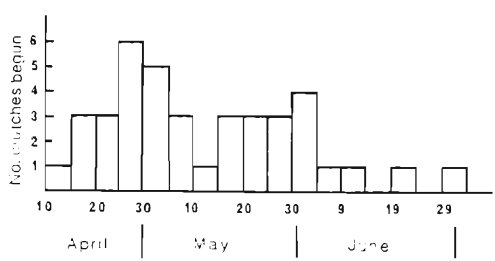


Fig. 2. The laying dates of the first egg in a clutch. The months are divided into five day periods.

Table 3 Clutch size and fledging success.

Year	Number of nests found	Number[1] with clutch size of			Number failing at eggs		at young		Number fledging successfully	Inconclusive[2]
		3	4	5	P[3]	D	P	D		
1979	8	0	7	2	1		1		4	2
1980	8	0	5	0		1			4	3
1981	8	1	6	0	1	1	1		4	1
1982	9	0	4	0	1	1			4	3
1983	9	0	2	3	1	1			5	2
1984	10	0	6	2	2	1			6	1
Total	52	1	30	7	6	5	2	0	27	12

[1] Only nests found at egg stage included.
[2] Because of inconclusive signs or no further visits made.
[3] P = predated, D = deserted.

Cuckoos *Cuculus canorus* were common in the area but the only competition recorded between them and Ring Ouzels was an occasion when a Cuckoo was seen to be waiting to rob a Ring Ouzel as soon as it pulled up a worm.

Feeding. During the nesting period the sole food item appeared to be earthworms. In extremely wet weather the female spent much of the time brooding the young, even when almost fledging, leaving the male to do the feeding: earthworms could then readily be picked from the surface of water-logged ground. In drier periods the habitat retained a number of wet pasture areas where both parents gathered worms.

Ringing. During the six years 36 broods of young (137 individuals) were ringed. To date only two have been recovered, and one adult, ringed as a nestling by Roger Durman in 1976, has been retrapped in the study area. Details are as follows:

(i) Ringed 15 May 1976 — retrapped as breeding male on 25 May 1981, in study area.
(ii) Ringed 16 June 1982 — found dead, possibly killed by raptor, on 9 April 1983 near Heriot, Borders (25km from the ringing site).
(iii) Ringed 28 June 1982 — found dying with injury on 21 November 1982 in Amouguer, Morocco.

Discussion

It is difficult to define Ring Ouzel territories by censusing singing males and observing display at territorial boundaries. It is often only when all the available territories are occupied that territorial display becomes obvious. In this study territories tended to be long and narrow, following the valleys and effectively separated by geographical features. The clustering of nest sites was used to define the centres of the territories. During the study period the population of Ring Ouzels remained remarkably constant, but was perhaps not at its potential maximum.

It was unusual to find a nest not associated with a heather slope. Over 60% of the nests were near to a feature; either the edge of a patch of heather above scree or rocks, a clump of vegetation, a post or a tree. The clutch size was usually four, but in agreement with the observations (Durman, 1977) clutches of five were associated with extremely wet weather and a good supply of earthworms during the laying period.

Nest failure was most often at the egg stage. This is more closely in agreement with the analysis of Flegg and Glue (1975) than with the observations of Durman (1977); the latter study showing a high rate of predation of nestlings. This may reflect a change in gamekeepering practice.

There is little evidence of competition with other species, especially with Mistle Thrushes, during the study period. Durman (1977) suggested that Mistle Thrushes may compete with Ring Ouzels for territories in upland areas. During the six years of my

study the Mistle Thrush was apparently not as common as in the period of Durman's study, and may be in decline.

Though a detailed feeding study is lacking, the predominant food of the Ring Ouzel during the nesting period in the Pentlands appears to be earthworms. This differs from Simms (1978) who states that molluscs and other invertebrates (excluding earthworms) were the major food source in the nesting period.

Acknowledgements.

I am most grateful to all who helped me during the six year period: to Roger Durman for introducing me to the area, to Lance Vick for instruction in the art of nest finding, to John Hickerton and Tom Dougall for help in 1980 and 1984 respectively and especial thanks to Andrew Barker for stalwart assistance in the last three seasons of the project.

I am indebted to Mr. J. I. McC. Salvesen of the Loganhouse Estates for much cooperation and encouragement, and to Lothian Regional Council Water Supply Services for permitting me to use their access roads.

References

Durman, R. F. 1977. Ring Ouzels in the Pentlands. *Edinburgh Ringing Group Report* 5:24-27.

Flegg, J. J. M. and Glue, D. E. 1975. The nesting of the Ring Ouzel. *Bird Study* 22:1-8.

Harrison, C. 1975. *A field guide to the nests, eggs and nestlings of British and European Birds.* Collins: London.

Simms, E. 1978. *British Thrushes.* Collins: London.

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(Revised ms. received 26 July 1985)

Plate 5. Ring Ouzels at the nest. **B. S. Turner**

Short Notes

Dipper feeding on fish carrion

On 7 August 1985 I visited a pool on the Water of Minnoch, Dumfries & Galloway, where a suspected river-poaching incident had occurred on the previous day. A large number of dead fish were visible, lying on the river-bed downstream of the pool. The fish were immature individuals of the Salmon *Salmo salar* and the Brown Trout *S. trutta*, 4-8cm in length, with a few trout up to 20cm. Laboratory examination of a sample of carcases later showed that they had died from "Cymag" poisoning.

The smaller carcases had been carried furthest from the pool, and had come to rest in the shallows at the water's edge. A Dipper *Cinclus cinclus* was seen to enter the shallow water and retrieve a single fish, 4-5cm long, which it beat vigorously against a rock, before swallowing whole. The behaviour was repeated immediately with a second carcase, after which the bird became aware of the human presence and flew off. Fish-eating by Dippers, and the circumstances in which these fish might be captured, was discussed in some detail by Creutz (*Die Wasseramsel*. 1967. Wittenberg Lutherstadt), but no mention was made of opportunistic carrion-feeding of this nature.

Deryk N. Shaw, Andrew Stewart Hall, University of Stirling.

Norman Atkinson comments: This observation is significant because, although we know that Cymag incidents tend to clear rivers of Dippers, it has always been assumed that the birds eat poisoned, but live, fish or invertebrates Although carrion-feeding has not previously been noted for the European Dipper, the American Dipper *Cinclus mexicanus* has been observed eating fish offal thrown into the edge of a river (Bent, A. B. 1948. Life Histories of North American Nuthatches, Wrens, Thrashers and their Allies. Bulletin 195, Smithsonian Institute, Washington.)

Movement of unfledged Red-throated Diver to the sea

On 17 July 1985 a pair of Red-throated Divers with a single chick was observed on a small peat-bog tarn on Graveland Peninsula, Yell, Shetland (O.S. reference HU 462956). It was remarked that the chick was "too small to ring". Divers have occupied the tarn regularly during the preceding eight breeding seasons, at least, but in each of the preceding three seasons (1982-1984) the chick(s) moved before fledging to another freshwater tarn 100m away. A burn flows from the tarn 450m Eastwards into North Rivirs Geo and thence into the sea in Whaal Firth. On 21 July a Red-throated Diver chick, ½-⅔ full size, clearly unfledged and lacking any white on the foreneck or breast, was observed with a pair of adults on the sea off the geo and a visit to the tarn confirmed the absence of divers there. The family group was seen on the sea in the vicinity of the geo several times thereafter until 29 July when observations ceased.

Movements of Red-throated Diver chicks between bodies of freshwater are well documented. The longest appears to be 350m in Sweden (Braun *et al.*, 1968), whilst the longest reported in Shetland is 340m (C. Gomersall, pers.comm.) We can, however, trace no records of movements of unfledged chicks to the sea, and the phenomenon is certainly unreported in Shetland (R. J. Tulloch, pers. comm.).

J. A. Fowler and Roger Hicks, School of Life Sciences, Leicester Polytechnic.

Reference

Braun, C. von, Hessie, A-C and Sjölander, S. 1968 Smålommens (*Gavia stellata*) betende under ungvårdnadstidan. *Zool. Revy.* 30:94-95.

Herring Gull attacks on Grey Herons

In May 1985 several instances of Grey Herons *Ardea cinerea* being killed by small flocks of Herring Gulls *Larus argentatus* were recorded on the Isle of Arran. The attacks took place at Corrie, Merkland and Brodick and in each case were observed by a number of people who then reported to me independently. All the attacks followed the pattern described below.

The Herons were fishing in deep water, ie chest-depth, and were persistently dive-bombed by a group of about six Herring Gulls until forced to abandon fishing and fly out to sea. At sea the gulls drove the Herons into the water, where they killed them. Once a Heron was dead the gulls continued to pick at the carcase, appearing to eat as much as they wanted.

It would be interesting to hear of any similar cases elsewhere.

D. Warner, Brodick Castle, Isle of Arran.

Mick Marquiss comments: I have not heard of this before. Herons frequently interact with gulls, often to the disadvantage of the gull as Herons can monopolise carrion fish at a feeding site (eg Hewson, *SB* 13:179-182). It may be that the Herons involved in the Arran incidents were young, or emaciated, or sickly individuals, but this seems unlikely. It could be that a certain group of gulls has found that harassment by the group can lead to "easy meat". If so we must hope that the habit does not spread to other areas or other species; if a group of gulls can handle a Heron easily, they can obviously handle other species. This may, of course, be an event initiated by "gull mobbing of predatory animals" behaviour, which would only lead to the demise of predatory species ill-adapted to defend themselves on the water.

Aberrant nesting behaviour of a male Wood Warbler

On 11 June 1985, in a mixed wood of oak and birch near Clunes in Inverness-shire, I was attempting to locate a Tree Pipit's *Anthus trivialis* nest when I saw a Wood Warbler *Phylloscopus sibilatrix* land on the ground and disappear into the vegetation. A second warbler followed carrying food. I was surprised to find that it was feeding large, well-feathered chicks; other Wood Warbler nests in the wood contained only eggs or very small young. The nest, among vegetation on a rockface near the edge of a clearing, resembled a typical Wood Warbler nest, though larger, and contained five young Tree Pipits about 10 days old.

From 1915hrs BST to 1945hrs, as I watched from a hide, the nestlings were fed by their parents and also, more frequently, by a Wood Warbler. Next day I timed visits over a 50 minute period from 0950hrs; 10 visits were made by the pipits and 15 by the warbler; the routine was similar on subsequent watches. Though the pipits visited less frequently they appeared to take in more prey items, mostly winged insects and a few caterpillars. The Wood Warbler took in mostly caterpillars, in ones and twos. At no time did I see both species at the nest together. When the warbler fed the young the pipits waited a metre or so away until it left; the warbler hovered just above the nest while awaiting its turn.

On 13 June two of the chicks left the nest; as neither returned I assumed they were now being fed away from the nest. To test whether the Wood Warbler's fixation was on the nest or the young, I made a tape recording of the young birds food calling and played it through a loudspeaker placed a few metres from the nest. The pipits were attracted to the recording but soon lost interest when no young were found. The Wood Warbler paid no heed to the calls but when a snatch of Wood Warbler song was played it reacted by hovering just above the speaker. A second bird also alarmed nearby.

After each feeding visit the Wood Warbler, as well as the parent pipits, waited for faecal sacs, the warbler removing the bulk of the faeces produced, sometimes doing so without first feeding the young. The plumage on the warbler's throat became stained, presumably because it was moving

larger faeces than those produced by its own kind. On occasions when no faeces were forthcoming the warbler grubbed about at the front of the nest until it found a substitute; it was seen to remove bits of bark, grass and other debris.

On one of my later visits to the hide I was met by a pair of Wood Warblers, both alarming at my presence, and subsequent search revealed a nest containing seven eggs, slightly above and about 4.0m from the pipit's nest.

By 0800hrs on 14 June the rest of the young Tree Pipits had left their nest. At 1600hrs on the same day I checked the Wood Warbler's nest and found it contained only three eggs, which the female was still incubating. By 0930hrs the following day it was empty. The only sign of disturbance was that a little of the lining had been pulled to the front of the nest.

I do not know at what stage the young pipits' begging calls triggered off this aberrant feeding behaviour in the male Wood Warbler. This type of behaviour is, however, known for many other species. Perrins (1979) quotes examples of Blue Tits *Parus caeruleus* feeding Blackbirds *Turdus merula* (and vice versa) and Wren *Troglodytes troglodytes* feeding Coal Tits *Parus ater*, and Simms (1978) also mentions several examples of inter-specific feeding of nestlings. It is often thought that such cases occur only when one bird has lost its brood, but this is not exclusively so. In the case described here the male Wood Warbler was clearly mated to a brooding female.

D. S. Whitaker, Clunes, Achnacarry, Spean Bridge, Inverness-shire.

References

Perrins, C. 1979. *British Tits*, p160. Collins, London.

Simms, E. 1978. *British Thrushes*, pp146-147. Collins, London.

Raven breeding for the first time at 6 years old

In December 1983, on the island of Mainland Orkney, a pair of Ravens *Corvus corax* was found holding territory on a stretch of cliff that had not been occupied for at least 14 years. One of the Ravens had been wing-tagged as a pullus, at a quarry nest site, 6.7kms away on 7th May 1978. On 25 February 1984 both Ravens were seen carrying nesting material to a partially built nest, while 400m further along the cliff, at a traditional nest site, another pair of Ravens had almost completed their nest. Both pairs were successful in rearing young to the fledging stage.

The tagged Raven had been observed on a number of occasions during the previous five years in several parts of Mainland, often in the company of another bird and on 7th April 1983 it was seen at a roost of non-breeding birds. As I check all suitable nesting habitats on the island each year I am certain that this was the first time that this bird had attempted to breed. On watching the behaviour of the tagged bird at the nest it was found that it did not take part in the incubation of the eggs and was therefore a male (Goodwin, 1976). In 1985 the same nest sites were again occupied but the pair with the tagged bird failed to rear young.

Coombs (1978) stated that Ravens would normally start to breed in the spring of their third calendar year but did not give the source of his information or whether it referred to captive or wild birds.

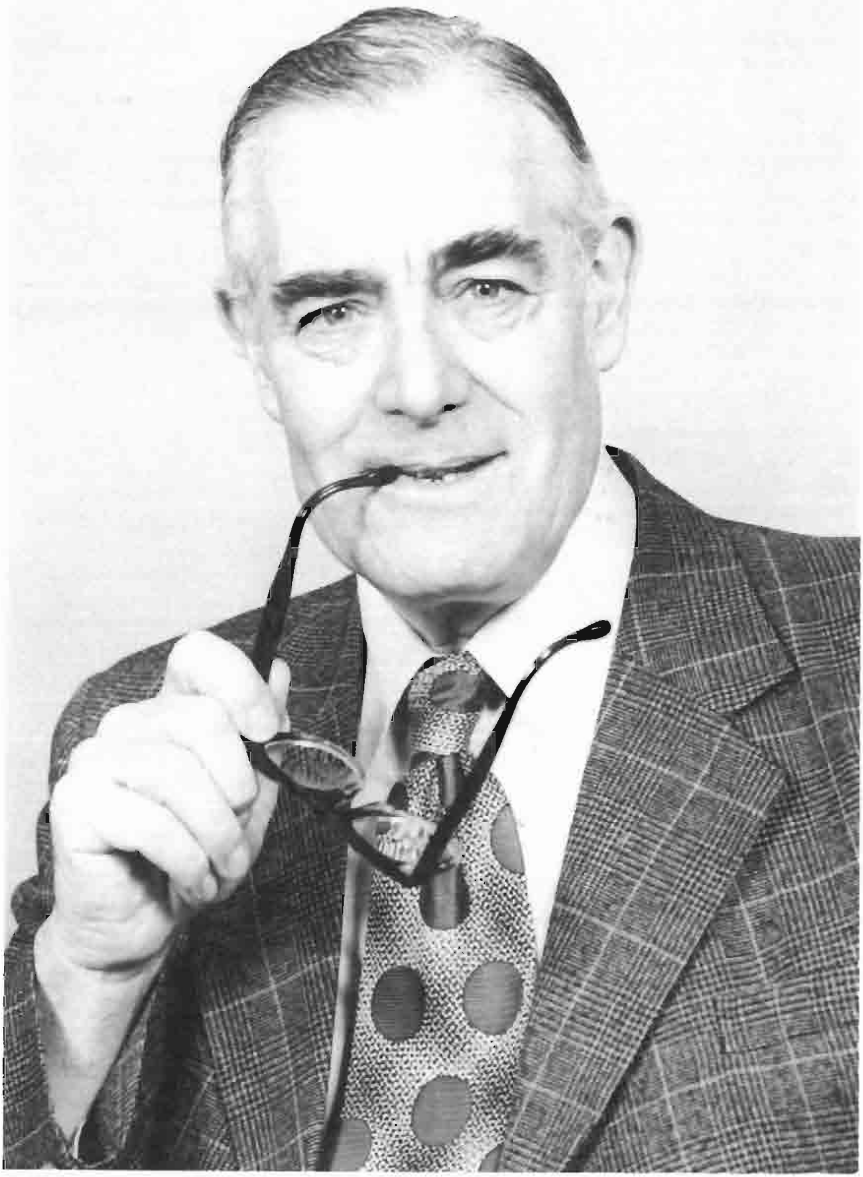
It is not often that there is an opportunity to establish the age of first breeding of a species like the Raven and it is also unusual for two pairs of Ravens to be nesting so close to one another.

Chris. J. Booth, 34 High Street, Kirkwall, Orkney.

References

Coombs, F. 1978. *The Crows.* Batsford Ltd., London.

Goodwin, D. 1976. *Crows of the World*, London.



Charles Eric Palmar 1919-1986

After the last war there was a great surge of interest in the countryside; in victory, we had discovered anew the pleasure of mountain, glen and coast. Among the returning servicemen there were those who wished to translate this feeling for nature into a way of life, into a personal odyssey. Charlie Palmar was one of these. From his boyhood days with a camera, ranging the byeways of Kent and Sussex in search of birds, he had carried with him the resolve to become a professional naturalist and nature photographer. During his RAF service he was stationed at Oban and made acquaintance with the Golden Eagle, the study of which was to become a passion of his life.

In 1947 Charlie found a job as a photographer at Yorkhill Hospital, Glasgow. His warmth and charm, as well as his knowledge of natural history and photography, soon won him respect and friendship in Scotland. In 1949 he was appointed Keeper of Natural History in the Museums and Art Galleries of Glasgow, a post which he held with great acceptance until his retiral in 1984. Charlie became an admired and kenspeckle figure. His popularity stemmed from his congenial personality, his great good humour, his exactness in technology and his creative skill with the camera. He was a natural communicator; his films on birds, his broadcasts, illustrated lectures and articles, and his exhibits at Kelvingrove awakened and sustained the interest of a wide public in wildlife and conservation.

Nothing delighted Charlie more than escaping to his Golden Eagle study area in Argyll. There, his research on the eagle placed him in a small, confidential conclave of ornithologists, including the late Dr Leslie Brown, P. W. Sandeman, the late Dr George Waterston and Dr Adam Watson, whose pooled records constituted the total assay of information on the status of Scottish eagles in the fifties and sixties. His film "Scenes from the Life of the Golden Eagle", in 1948, was the first of its kind in colour. A few months before his death he was able to visit his happy eagle-ground in Argyll, the joy of which stayed in his mind to his life's end.

Charlie served on Council and as Chairman of the Glasgow Branch of the Scottish Ornithologists' Club, of which he was elected an Honorary Member in 1984. He was also a Member of Council of the Glasgow Natural History Society and the Scottish Wildlife Trust. His success in professional life was a reflection of happy family life, firstly with Molly, a botanist with first class Honours, and their sons David, Colin and Michael; secondly, after Molly's untimely death in 1970, with Patricia, Molly's cousin and friend. With the passing of Charlie Palmar, we who go forth in search of birds have lost a friend, but we will remember him when we see the eagle upon the mountain, for it is there that his spirit reposes.

Morton Boyd

Review

Birds in Scotland by Valerie M. Thom; T. & A. D. Poyser; 1986; 382pp; 32 b & w photos, many maps and line drawings; £24.

In the early 1950's Dr Evelyn V. Baxter and Miss Leonora J. Rintoul wrote *The Birds of Scotland* (1953); they also inspired a successor, Miss Valerie M. Thom whose interest in and love of birds was stimulated by her contact with Dr Baxter. This stimulus carried Valerie forward to great service to ornithology in Scotland, as President of the Scottish Ornithologists' Club, editor of *Scottish Birds*, member of council of the Scottish Wildlife Trust and of the Advisory Committee for Scotland of the Nature Conservancy Council, and now author of *Birds in Scotland*. I endorse the words of Dr W. J. Eggeling in his pithy foreword that "the publication of this book would have pleased the two 'good ladies of Scottish Ornithology' beyond words".

Little can be gained by comparing as whole works *Birds in Scotland* and its predecessor; they are books of a different age. The volume of information handled by Valerie Thom is the harvest of the new age of information and communications. Binoculars/telescope and note book are still indispensible basic tools, but they have increased greatly in numbers and efficiency in the hands of the amateur and professional alike, and have been supplemented by other more sophisticated tools including computers. Great drifts of data have been generated and sorted by the activities of ornithological bodies and the main thrusts of research. *Birds in Scotland*, in its structure, systematic treatments, topicality (updatedness), references and graphics is at once a statement of audit in Scottish ornithology for the use of all and a base-line for the professional.

The work covers the period since 1950 and opens with a geographical frame for the succeeding six chapters describing, from an ornithological viewpoint, the Scottish ecosystem, its habitats and birds. Having thus drawn the picture of Scotland, there follows three chapters describing, firstly, how bird study has developed with many national and international co-operative studies possessing substantial Scottish elements. Secondly, the nature protection and conservation movements with Scotland having its own legislative idiosyncracies, problems of law enforcement, and causes of accidental death of birds. Thirdly, since 1950 there have been 84 species recorded for the first time, 21 breeding for the first time and significant changes in the "establishment" of both breeders and winter visitors.

All the foregoing is contained in about one-sixth of the book. The remainder is devoted to the Species Accounts in which the information is well organised and presented with distribution maps, tables and histograms, and sources assiduously specified, with the back-up of Appendices and Bibliography. The decision to summarise changes 1950-84 and to limit reference in each to its last audit point in the literature, has resulted in a well-dressed text, well sign-posted for the student of either records or past work. Thus the follow-up to *Birds of Scotland* has been very amply achieved. I have tested the Accounts by successfully finding and following the pathways to my own now-outdated endeavours; even the Buff-breasted Sandpiper and Rock Thrush of 1962 are not missed! The accounts avoid the repetitive retracing of steps through 'milestone' works back to MacGillivray, Harvie-Brown and Eagle Clarke; they are crisp, topical and accurate. As regards accuracy, the cataloguing of such a geat number of facts is bound to have its errors but the magnitude of Valerie Thom's work overrides criticism on small detail.

The book is illustrated by a team of artists led by Donald Watson. While some drawings are more accomplished than others the standard is high. They lend charm to the book as well as conveying accurate, if sometimes overdramatic and sculptured, likenesses of the birds in their native habitats, often in familiar places.

Today there is a greater concern than ever for the environment within which birds feature largely. Miss Thom deals quietly but firmly with the main concerns about direct persecution and disturbance of birds, landuse and habitat change and pollution. The moral issue of environmental care through interest in and care for birds is enshrined in her introductory poem and radiates from between the lines of the entire text. The book is likely to aid environmental planning in Scotland as well as servicing the widely varying needs of an interested public for many years to come. The author, illustrators and publishers are to be warmly congratulated.

J. Morton Boyd

Items of Scottish Interest

Articles and reports on birds in Scotland, mainly on status and distribution. References from the widely available journals *British Birds, Bird Study* and *Ringing and Migration* are excluded. Most of the items listed are available in the Waterston Library for reference. The librarian is glad to receive reprints or copies of papers on any aspect of ornithology or general natural history.

Scottish Bird Report 1984 (51 pp). Angus Hogg (ed) 1985. Available from the SOC Bird Bookshop, £2.50 post free to SOC members.

Arran Bird Report 1984 (15 pp). Margaret Dunn (ed) 1985. Available from the SOC Bird Bookshop, 75p post free to SOC members. Includes an updated check list.

Borders Bird Report 1984 (64 pp). Ray Murray (ed) 1985. Available from the SOC Bird Bookshop, £2 post free to SOC members. Includes short articles on exceptional seabird passages at St. Abb's Head, on goosander and wood warbler surveys, etc.

Fair Isle Bird Observatory Report for 1984 (77 pp). Nick Riddiford (comp) 1985. Available from the SOC Bird Bookshop, £2.50 post free to SOC members. The 37th annual report from Fair Isle.

Lothian Bird Report 1984 (89 pp). Michael Leven (ed) 1985. Available from the SOC Bird Bookshop, £3 post free to SOC members. Includes short articles on ringing, the mute swan census, ringed plover survey, winter shorebird counts etc.

North-East Scotland Bird Report 1984 (64 pp). M. V. Bell (ed) 1985. Available from the SOC Bird Bookshop, £2 post free to SOC members. Includes articles on wintering geese, the goosander survey, and on breeding merlins in North-East Scotland.

Orkney Bird Report 1984 (78 pp). Chris Booth, Mildred Cuthbert and Peter Reynolds (eds) 1985. Available from the SOC Bird Bookshop, £1.80 post free to SOC members. Includes short articles on the mute swan survey, ringed plover survey, swallows and rarities.

Shetland Bird Report 1984 (56 pp). Iain Robertson (ed) 1985. Available from the SOC Bird Bookshop, £2 post free to SOC members. Includes a short article on bird ringing, and an 8-page paper on "Tystie Distribution in Shetland" by Peter J. Ewins.

Spacing and foraging behaviour of Black-headed Gulls in an estuary. D. J. Curtis & D. B. A. Thompson 1985. *Orn. Scand.* 16:245-252. A study on the tidal flats of the Clyde estuary.

Morphology and breeding of Puffins at Isle of May and St. Kilda, Scotland. M. P. Harris 1985. *Biol. Conserv.* 32:81-97.

Fish fed to young Guillemots and used in display on the Isle of May, Scotland. M. P. Harris & S. Wanless 1985. *J. Zool., Lond. A.* 1985:441-458.

The hunting ranges of two female Peregrines towards the end of a breeding season. R. Mearns 1985. *Raptor Res.* 19:20-26. A study in South Scotland of Peregrines fitted with radio transmitters.

Population dynamics of Capercaillie in a North-east Scottish glen. R. Moss & J. Oswald 1985. *Orn. Scand.* 16:229-238. Based on a 9-year study in Glen Tanar forest, near Aboyne.

Great Northern Divers, Shetland 1979. M. G. Richardson, M. Heubeck, I. Lyster and R. McGowan undated (1985). Joint Report by the Nature Conservancy Council, the Shetland Oil Terminal Environmental Advisory Group, and the Royal Scottish Museum (50 pp). A report on the wintering Great Northern Divers killed in the "Esso Bernicia" oil spill in northern Shetland. This report is not to be cited without prior approval of the authors.

Counts of shorebirds in the Orkney Islands, Scotland 1983-1984. R. W. Summers & L. G. Underhill 1985. *Tay Ringing Group, Dundee*: 138 pp of computer output.

Spring arrival times and assortative mating of Kestrels in South Scotland. A. Village 1985. *J. Anim. Ecol.* 54:857-868. Part of a 4-year study in the Southern Uplands of Scotland.

Turnover, age and sex ratios of Kestrels in South Scotland. A. Village 1985. *J. Zool., Lond. A.* 206:175-189. Further aspects of the study of marked European Kestrels.

Social class, socially-induced loss, recruitment and breeding of Red Grouse. A. Watson 1985. *Oecologia, Berlin* 67:493-498.

Raptor predation on wintering waders in southeast Scotland. D. P. Whitfield 1985. *Ibis* 127:544-558. A two-winter study on the coast of East Lothian.

Wildfowl and Wader counts 1984-85. D. G. Salmon & M. E. Moser 1985 (50 pp). Published by the Wildfowl Trust, Slimbridge. Contains the results of the National Wildfowl Counts and of the Birds of Estuaries Enquiry, including much Scottish data.

Birds in some medieval manuscripts at Aberdeen. Brunsdon Yapp 1983. *Aberdeen Univ. Review* no. 170.

Orkney Ringing Group Report 1984 (37 pp). C. J. Corse & E. R. Meek (eds). This 2nd annual report contains selected ringing recoveries for 1984, and a series of short papers on individual species, including a detailed study of a wintering Blackbird roost.

The shore-birds of the Shetland Islands . . . during winter 1984-85 (26 pp). Tay Ringing Group and Shetland Bird Club 1985.

North Sea Bird Club Report for 1984 (77 pp). A. Anderson (ed) 1985. Includes a 32-page systematic list for 1984, and a checklist of birds seen at or near offshore installations 1979-84.

Wild Geese in the Eastern Borders — an assessment with special reference to agricultural impact. C. O. Badenoch 1985. *Hist. Berwickshire Naturalists' Club* 42:124-134.

Wader Study Group Bulletin no. 45: December 1985. Includes two short papers by D. F. Chandler & A. J. Walker on habitat use and family group movements by breeding Redshanks on South Uist.

Natural History of Colonsay and Oransay — report from the Milbuie Log for 1985. John Clarke & Pamela Clarke 1986 (11 pp). Includes a systematic list of birds seen in 1985, and additions to the flora of the islands.

Barn Owls in the Cree Valley in 1985. A. Dowell 1985. A breeding and winter survey presented in tabular form.

The numbers, breeding success and diet of Golden Eagles in Southern Scotland in relation to changes in land use. M. Marquiss, D. A. Ratcliffe & R. Roxburgh 1985. *Biol. Conserv.* 34:121-140.

Rain, breeding success and distribution of Capercaillie and Black Grouse in Scotland. R. Moss 1986. *Ibis* 128:65-72.

Post-fledging survival of Sparrowhawks in relation to mass, brood size and brood composition at fledging. I Newton & D. Moss 1986. *Ibis* 128:73-80.

Forth Island bird counts 1985. R. W. J. Smith 1986. *J. Edin. Nat. Hist. Soc.* for 1985:25-26. The latest in a long-running series of counts.

Central/South-West Perthshire Peregrines in 1985. P. Stirling-Aird 1986 (5 pp).

The status of the Corncrake on Islay in 1985 (10 pp). J. Stroud 1985.

Early warning and mixed species association — the "Plover's Page" revisited. D. B. A. Thompson & M. L. P. Thompson 1985. *Ibis* 127: 559-562. A study of the interaction of Dunlin and Golden Plover in northwest Scotland.

W. G. Harper

Erratum. In Hugh Clark's paper on 'Storm Petrel Ringing in Caithness' (*SB* 13:250-257) the last two columns of Table 3, p. 254, were unfortunately transposed. The correct version of the Table is given below. We regret that this mistake occurred.

Table 3. Biometrics of Storm Petrels which regurgitated oil on being handled compared with those which did not regurgitate.

	Wing Length (mm) (mean ± S.D.)	No. measured	Weight (g) (mean ± S.D.)	No. weighed
Regurgitated	123.0 ± 2.42	56	24.08 ± 1.59	55
Did not regurgitate	122.80 ± 2.53	841	24.56 ± 1.61	829

Scottish Bird Report 1986

All records should be sent directly to the appropriate local recorder, to arrive not later than the end of January 1987. They should be in Voous order, well spaced and on one side of the sheet only. For further details see the introdctory section to SBR 1984 or contact the **Editor, Angus Hogg, Kirklea, Crosshill, Maybole, Ayrshire KA19 7RJ.**

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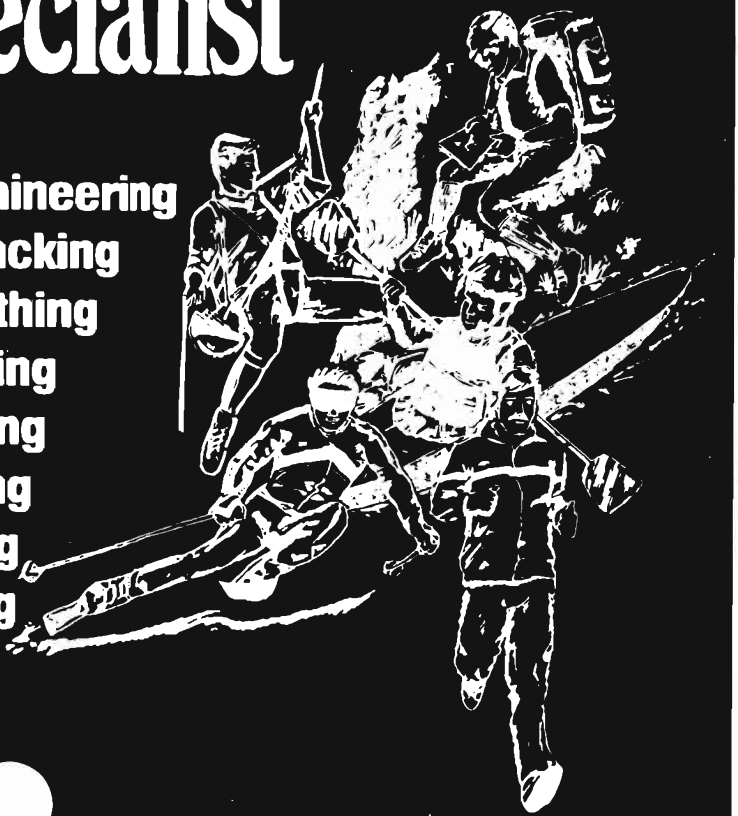

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