Scottish Birds

THE JOURNAL OF THE SOC

Vol 22 No 2 December 2001

Cliff nesting seabirds in Caithness
Status of Chough
Diet of Barn Owl in East Ross and East Ness

Scottish Birds

The Journal of the Scottish Ornithologists' Club

Editor: Dr S da Prato
Assisted by: Dr I Bainbridge, Professor D Jenkins, Dr M Marquiss, Dr J B Nelson, and R Swann
Business Editor: Caroline Scott, Admin Officer, SOC, Harbour Point, Newhailes Road, Musselburgh EH21 6JS (tel 0131-653-0653, fax 0131 653 0654, email mail@the-soc.org.uk).

Scottish Birds, the official journal of the Scottish Ornithologists' Club, publishes original material relating to ornithology in Scotland. Papers and notes should be sent to The Editor, *Scottish Birds*, SOC, Harbour Point, Newhailes Road, Musselburgh EH21 6JS

Two issues of *Scottish Birds* are published each year, in June and in December. *Scottish Birds* is issued free to members of the SOC, who also receive the quarterly newsletter *Scottish Bird News*, the annual *Scottish Bird Report* and the annual *Raptor round up*. These are available to Institutions at a subscription rate (1997) of £36.

The Scottish Ornithologists' Club was formed in 1936 to encourage all aspects of ornithology in Scotland. It has local branches which meet in Aberdeen, Ayr, the Borders, Dumfries, Dundee, Edinburgh, Glasgow, Inverness, New Galloway, Orkney, St Andrews, Stirling, Stranraer and Thurso, each with its own programme of field meetings and winter lectures. The Waterston Library is the most comprehensive ornithological library in Scotland, but is presently stored at the Club's temporary office in Musselburgh and is not available for reference till further notice. Check out our website for more information about the SOC and other bird related organisations: **www.the-soc.org.uk**

SOC annual membership subscription rates

	Direct Debit	Other methods
Adult	£18.00	£20.00
Family (2 adults and any children under 18) living at one address	£27.00	£30.00
Junior (under 18, or student under 25)	£7.00	£8.00
Pensioner/unwaged	£10.00	£11.00
Pensioner Family (2 adults living at one address)	£14.50	£16.00
Life	£360.00	£400.00
Life Family	£540.00	£600.00

All subscriptions may be paid by Direct Debit and Covenanted. Subscriptions paid by Direct Debit greatly assist the Club. Please ask for a DD form by phoning the Admin Officer at the above address.

Published by SOC, Harbour Point, Newhailes Road, Musselburgh EH21 6JS
Printed by Meigle Colour Printers Ltd., Block 11, Units 1 & 2, Tweedbank Industrial Estate, Galashiels TD1 3RS

Cliff nesting seabirds in east Caithness 1980 - 1993

RJ EVANS

Numbers of cliff breeding seabirds were monitored at plots at 5 colonies in east Caithness during 1980-1993. Numbers of Northern Fulmars (+13%) and Common Guillemots (+2%) increased and numbers of European Shags (-7%, 1985-93), Black-legged Kittiwakes (-9%) and Razorbills (-11%) decreased, but no significant trends were detected for individual species when data for all colonies were combined. However significant upward and downward trends at different colonies were recorded for Kittiwake, Guillemot and Razorbill. Fulmar productivity decreased slightly and Kittiwake chick production from 1985 to 1993 declined by an average of -0.05 chicks/AON/year.

Introduction

Survey work undertaken in 1977 (Mudge 1979) showed that the seacliffs of east Caithness supported internationally important numbers of breeding seabirds, in particular European Shags *Phalocrocorax aristotelis* (1,860 apparently occupied nests, 5% British, 1% NW European populations), Black-legged Kittiwakes *Rissa tridactyla* (53,000 apparently occupied nests, 11% British, 2% NW European), Common Guillemots *Uria aalge* (126,250 individuals, 12% British, 3% NW European) and Razorbills *Alca torda* (14,200 individuals, 10% British, 1% NW European), as well as nationally important numbers of Northern Fulmars *Fulmaris glacialis* (21,700 apparently occupied sites, 4% British population). The 1977 survey was prompted by a proposal to extract oil from the Beatrice Field on Smith bank in the Moray Firth. Oil platform sites were less than 20km from the seabird colonies on the east coast of Caithness; the Smith Bank itself is an important foraging and moulting area for seabirds from the Caithness colonies (Mudge and Crooke 1986). Licences to extract oil from the Beatrice Field were granted and the field became operational in 1981.

As part of a broad range of environmental research, the field operators commissioned work to monitor seabirds and seaduck in the Moray Firth throughout the year (Mudge and Cadbury 1987, Evans 1998). This included monitoring numbers of cliff breeding seabirds at sample plots at selected colonies on the east Caithness coast; this work was carried out from 1980 onwards (Mudge 1986, Mudge and Cadbury 1987). From south to north, the colonies were Badbea, Inver Hill, An Dun, Iresgoe and Skirza. Monitoring continued until 1993, with data from additional plots for some species and productivity data for Fulmar and Kittiwake collected from 1985 onwards; a complete count of the Caithness colonies was undertaken in 1986 (Parsons 1986; Mudge and Cadbury 1987).

Methods

Methods for plot monitoring were described by Mudge (1986) and were compatible with those recommended by Walsh *et al* (1990). Each colony held a number of monitoring plots. Plot boundaries were shown on large photographs to enable plots to be identified accurately in the field. Plots at each colony were counted a minimum of 5 times during the first 3 weeks in June, to take account of fluctuating numbers of birds. Counts were carried out between 0800h and 1600h BST and each plot was counted at approximately the same time of day, to take account of regular diurnal attendance patterns of

birds. Count units were apparently occupied nests (AON) for Shag and Kittiwake, apparently occupied sites (AOS) for Fulmar and individual birds for Guillemot and Razorbill. Population totals for all species on the sample plots were derived from the mean of all counts each year, with the exception of Kittiwake, where the maximum single count made during the same period was used.

Plots counted from 1980 ('old plots') were targeted primarily at Guillemot, although all species were counted. In 1985 a number of additional plots ('new plots') for single species apart from Guillemot were introduced. 'Old plots' were selected arbitrarily, while 'new plots' were selected at random from a larger number of identified plots, which were of an appropriate size (100 - 200 count units) and which were countable safely from land.

Fulmar chick production was calculated by expressing a count of chicks in early August as a fraction of the mean number of 5 or more counts of AOS in June.

Between 1985 and 1988, Kittiwake chick production was assessed on the basis of a single count of chicks in mid July. Between 1989 and 1993, weekly visits were made, until all chicks had fledged. On each visit the number of chicks present was counted. Chick production indices were based on the total number of large young present on the visit closest to first fledging expressed as a fraction of the peak number of AON for each plot. Plots were larger (200 - 300 nests) than those recommended by Harris (1987). Between 1990 and 1993 attendance of Kittiwake nests by adults was also recorded on the weekly visits.

Results

Population trends

Overall, between 1980 and 1993, for all colonies combined, numbers of Fulmars (+13%) and Guillemots (+2%) increased and numbers of Kittiwakes (-9%) and Razorbills (-11%) decreased. There were no significant trends when data for all colonies were combined, but significant upward and downward trends were detected for some species at individual colonies. Overall and mean annual rates of change (± 95% confidence limits) and trends for species on 'old' plots for the period 1980 – 1993 are shown in Table 1.

At colony level, there were significant upward trends for Kittiwake at Badbea and An Dun, for Guillemot at Badbea, Iresgoe and Skirza and for Razorbill at Skirza. Significant downward trends were detected for Kittiwake at Inver Hill, Iresgoe and Skirza, for Guillemot at An Dun and for Razorbill at Inver Hill and An Dun. No significant trends were detected for Fulmar on 'old' plots at any colony, nor for any of the species on 'new' plots. Mean annual rates of change for 'old' and 'new' plots for each species at the relevant colonies were broadly similar (Table 2).

Productivity

Northern Fulmar

Chick production at An Dun ranged from 0.21 to 0.43 chicks/AOS and at Iresgoe from 0.21 to 0.41, slightly lower than at other North Sea sites (Walsh *et al* 1994). Productivity declined over the 9 year period (Figure 1), with an increase in 1992 corresponding to a more widespread increase in Fulmar productivity in the North Sea (Walsh *et al* 1993), but there was no trend at either colony (An Dun $r_s = -0.296$, Iresgoe $r_s = -0.588$, $n = 9$ in both cases). Variation between colonies and years was not significant (2-way logistic ANOVA: F(year) = 4.130, df = 1, $0.1>P>0.05$; F(colony) = 0.5009, df = 8, ns).

Table 1. ***Overall percentage change in numbers, mean annual rates of change (±95% confidence limits), trends of population change (r_S) and probability values for sample plots ("old plots") at 5 seabird colonies in east Caithness 1980 - 1993.***

Colony/Species	Fulmar	Kittiwake	Guillemot	Razorbill
Badbea				
Overall change (%)	+9.6	+41.0	+25.5	-9.9
Mean annual change (%)	+1.7	+3.1	+2.2	+0.6
(± 95% C.L.)	(8.0)	(5.1)	(5.3)	(10.1)
r_S	-0.081	0.746	0.675	-0.349
P	ns	<0.005	<0.01	ns
Inver Hill				
Overall change (%)	-	-25.0	-12.4	-39.7
Mean annual change (%)	-	-2.0	-0.8	-0.6
(± 95% C.L.)	-	(3.8)	(3.5)	(14.4)
r_S	-	-0.619	-0.398	-0.604
P	-	<0.05	ns	<0.05
An Dun				
Overall change (%)	-11.4	+107.1	-18.5	-24.7
Mean annual change (%)	+0.1	+6.4	-0.8	0.1
(± 95% C.L.)	(8.8)	(7.0)	(5.0)	(11.7)
r_S	-0.253	0.824	-0.538	-0.587
P	ns	<0.001	<0.05	<0.05
Iresgoe				
Overall change (%)	+43.8	-22.1	+4.0	-0.3
Mean annual change (%)	+3.7	-1.6	+0.5	+0.8
(± 95% C.L.)	(7.5)	(4.0)	(3.5)	(7.3)
r_S	0.407	-0.718	0.582	-0.068
P	ns	<0.01	<0.05	ns
Skirza				
Overall change (%)	+8.4	-28.1	+22.5	+46.9
Mean annual change (%)	+1.8	-1.9	+1.7	+4.3
(± 95% C.L.)	(9.3)	(5.0)	(2.6)	(8.6)
r_S	-0.147	-0.776	0.820	0.609
P	ns	p<0.002	p<0.001	p<0.05
All colonies combined				
Overall change (%)	+13.1	-9.0	+1.5	-10.9
Mean annual change (%)	+1.4	-0.5	+0.2	0.0
(± 95% C.L.)	(5.2)	(3.9)	(2.9)	(7.0)
r_S	-0.024	-0.051	0.486	-0.376
P	ns	ns	ns	ns

Table 2. ***Rates of non attendance of broods (sample size in brackets) by adult Black-legged Kittiwakes at study plots in east Caithness by brood size in mid July 1992 and 1993.***

Colony/Brood size	b/1	b/2	b/3	χ^2_2*	*P*
1992					
An Dun	31.5% (92)	70.1% (144)	78.6% (14)	37.01	<0.01
Iresgoe	26.7% (60)	59.9% (142)	75.0% (8)	18.49	<0.01
Skirza	3.4% (59)	47.4% (97)	100.0% (3)	33.37	<0.01
1993					
An Dun	88.2% (110)	94.4% (89)	100.0% (6)	2.55	ns
Iresgoe	65.5% (84)	90.3% (72)	100.0% (2)	10.49	<0.01
Skirza	70.5% (61)	90.0% (50)	- (0)	5.24	<0.05

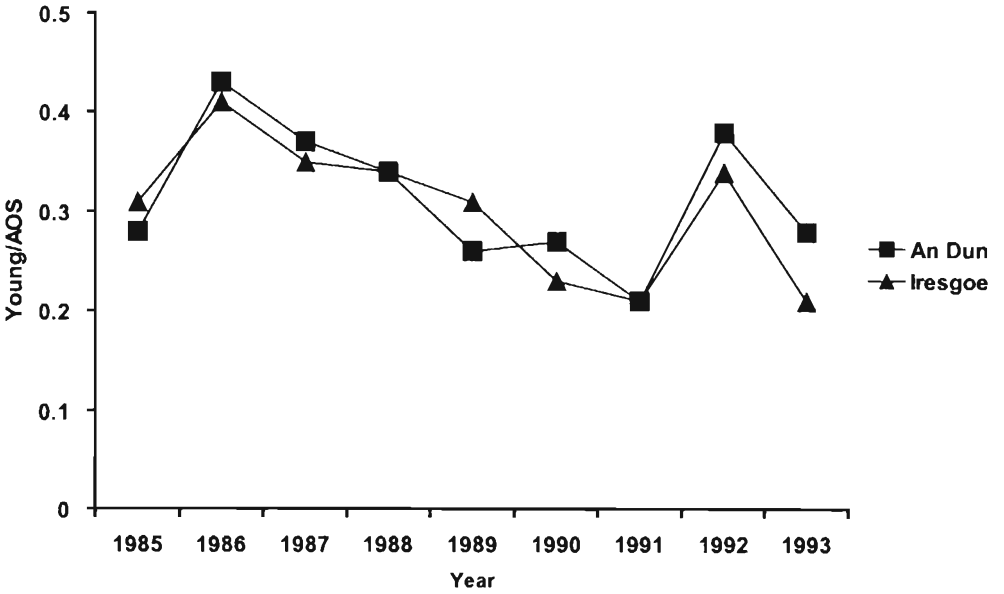
* χ^2 tests for broods of one chick and broods of more than one chick.

Black-legged Kittiwake

Chick production between 1985 and 1993 ranged from 0.43 to 1.51 chicks/AON at An Dun, 0.64 to 1.39 at Iresgoe and 0.59 to 1.28 at Skirza. For all plots combined the mean range was 0.54 to 1.38. Chick production declined at all 3 monitored colonies and at An Dun the trend was significant (r_S = -0.800, n = 9, P<0.02) (Figure 2). Chick production was particularly low in 1989 (due to late mortality of large chicks) and 1991 (due to widespread failure at the egg/small chick stage). Variation both between years and between colonies was significant (2 way logistic ANOVA: F(year) = 22.22, df = 8, P<0.0001; F(colony) = 6.739, df = 2, P<0.01)

Mean breeding success (% of nests fledging one or more chicks) for 1990 - 1993 ranged from 59% at Skirza to 68% at An Dun and failure rates were usually spread fairly evenly through the breeding season. However, in 1991 widespread nest failure occurred at the egg/small chick stage with breeding success rates for the 3 colonies ranging only from

Figure 1. *Northern Fulmar productivity (large chicks/AOS) at 2 colonies, east Caithness, 1985-93*



35% to 43% (Figure 3). Variation in the proportion of successful nests between years was significant, that between colonies was not (2-way logistic ANOVA: F(year) = 21.96, df=3, $P<0.01$; F(colony) = 0.958, df = 2, ns).

Attendance of broods by adults was recorded between 1990 and 1993. Non-attendance of broods increased as each season progressed, and in mid-July (immediately prior to fledging) ranged from 27% to 91% over the 4 years. Non attendance was more frequent in broods of 2 or 3 chicks than in broods of only one chick at all 3 monitored colonies in 1992 and at Iresgoe and Skirza (but not An Dun) in 1993 (Table 2). There was no significant relationship between the proportion of unattended broods and overall chick production at monitored colonies between 1990 and 1993 (r_S = -0.027, n = 12, ns).

Discussion

For all colonies combined, changes in numbers of target species averaged less than 2% per year and there were no significant trends when plot data were lumped to give numbers for the whole study area. This picture masks large changes in numbers and significant trends for Kittiwakes, Guillemots and Razorbills on plots at individual colonies.

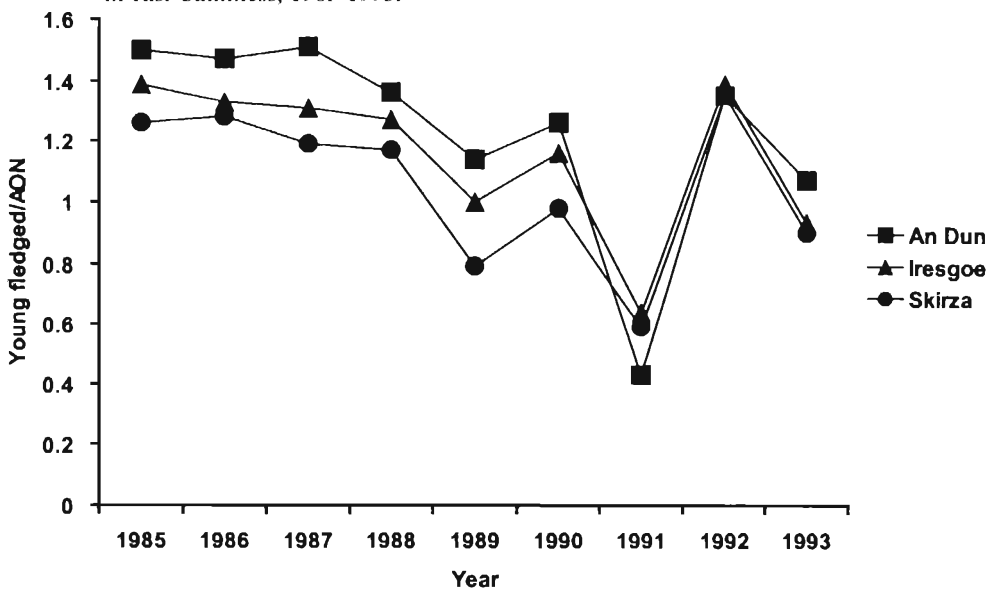
Fulmars showed a non significant increase in east Caithness; elsewhere in Scotland, increases in Shetland and south east Scotland between 1986 and 1993 were significant (Walsh *et al* 1994). Coverage of Fulmars by "old" plots was low and Fulmars on these plots tended to be distributed on cliff top sites only, whereas the "new" Fulmar plots covered large areas of cliff, from sea level to the top. Moreover, "old" plots were targeted primarily at Guillemots and tended to consist of bare rock ledges, compared with the "new" plots,

which by and large consisted of more vegetated sections of cliff, more suitable for Fulmars. The differences in rates of change recorded between "old" and "new" plots for Fulmar at Iresgoe and An Dun can probably be largely accounted for by the fact that the new plots were (a) more suitable for Fulmars and (b) gave much increased coverage. The fact that an overall increase of more than 40% in Fulmar numbers on the "old" plots at Iresgoe was not reflected by a significant trend was probably due to small the sample size of Fulmars covered by the "old" plots.

The overall small decline in numbers of breeding Kittiwakes included 2 periods of decline (1980-1985 and 1990-1993) separated by a large increase in numbers between 1985 and 1990. Moreover, there were both declines and increases at individual colonies: changes in numbers on plots during 1980-1993 ranged from -28% at Skirza to +107% (or +6.4%/year) at An Dun. Changes in numbers and trends for old and new plots at both An Dun and Iresgoe during 1985-1993 were similar, suggesting that coverage by the smaller old plots reflected changes in the colony as a whole just as well as did the larger new plots. The "old" plots gave much better coverage and were more suitable for Kittiwakes than for Fulmars (above).

Kittiwake chick production each year was similar to values recorded elsewhere in northern Scotland when allowance is made for the effects of differences in methodology (*cf* Harris and Wanless 1990, Walsh *et al* 1993, but *cf* Danchin 1992). Chick production declined during 1985-1993 at all 3 monitored colonies: the overall chick production index in 1993 was only 70% of the 1985 value, equivalent to a reduction in chick production each year of 0.05 chicks/AON. Declining Kittiwake chick production was described by Harris and Wanless (1990) for a number of colonies in the North Sea for the years 1986-1988. Although the Caithness colonies did not exhibit the poor breeding success recorded at

Figure 2. ***Black-legged Kittiwake productivity (chicks fledged/AOS) at 3 colonies in east Caithness, 1985-1993.***

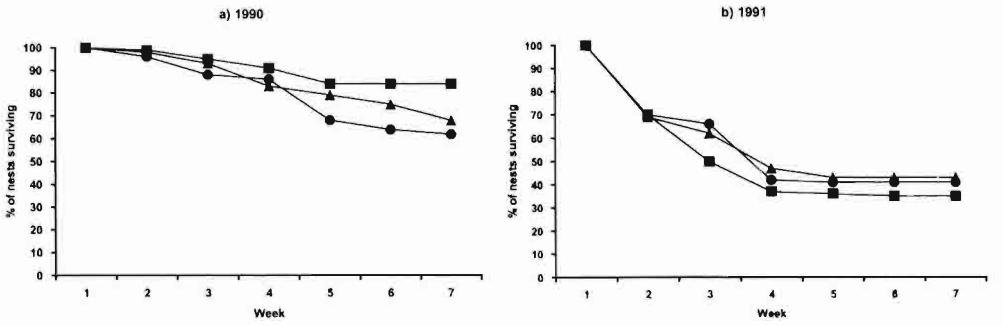


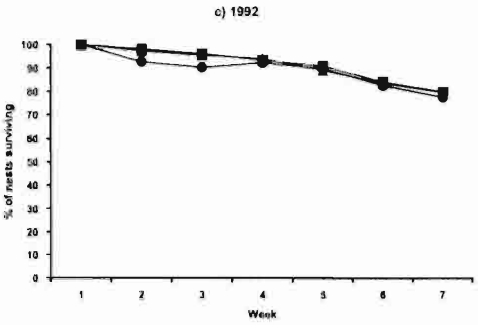
other North Sea colonies in 1988, there has been a decline in the productivity of the Caithness colonies since 1989. Chick production between 1988 and 1993 fluctuated dramatically compared with the period 1985-1988, though in keeping with other North Sea colonies, the fluctuations were not as dramatic as those recorded at some colonies in Alaska (*eg* Murphy *et al* 1991).

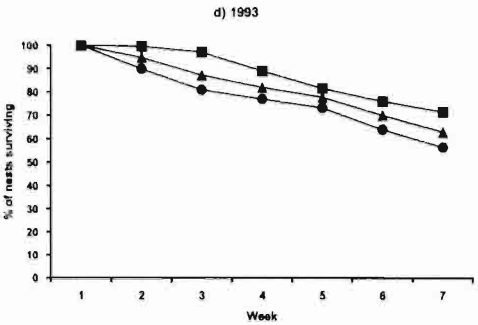
Harris and Wanless (1990) suggested that shortage of food might be responsible for the widespread breeding failure of Kittiwakes in the North Sea in 1988 and that this might be indicated by increased non-attendance of broods by adults observed at the Isle of May (Wanless and Harris 1989); similar conclusions have been reached by other authors working elsewhere (eg Cadiou and Monnat 1996 in Brittany). Rates of non-attendance of broods by adult Kittiwakes in Caithness between 1990 and 1993 were as high or higher than those observed by Wanless and Harris (1989) and in Alaska by Roberts and Hatch (1993); however, there was apparently no relationship between rates of non attendance of broods by adults in mid July and chick production for the Caithness plots for these years (cf Roberts and Hatch 1993). This may partly be explained by the fact that, in 1991, widespread nest failure in Caithness occurred at the egg or small chick stage, and that although chick production was poor, the percentage of adults attending the few remaining nests was higher than in other years when chick production was higher. Generally, non attendance each season increased as the fledging period progressed and was more frequent in large broods than in small broods, presumably reflecting relatively greater food requirements of larger broods (cf Wanless and Harris 1989, Roberts and Hatch 1993).

The overall increase of +1.5% for Guillemot numbers for 1980-1993 masks periods of decline (1980-1985 - Mudge 1986) and increase (1986 - 1993). The latter was broadly in line with an increase of 2.2%/year for colonies in the North Sea (based on data in Walsh *et al* 1994). There were also changes in numbers and significant trends at individual colonies. Mean annual rates of change on monitored plots during 1980-1993 ranged from -0.8%/year at An Dun and Inver Hill to +2.2%/year at Badbea. This variation in trends between colonies contrasts with the situation observed in Shetland between the early 1970s and 1990, where numbers at all but one of 7 monitored colonies increased up to 1982 and all declined rapidly and at broadly similar rates between 1982

Figure 3. ***Percentage of Black-legged Kittiwake nests containing eggs or young each week (week 7 = week of fledging) at 3 colonies in east Caithness (square = An Dun, triangle = Iresgoe; circle = Skirza) in each of 4 years 1990 - 1993.***







and 1990 (Heubeck *et al* 1991). Guillemot breeding success at Iresgoe in 1993 (0.70 ± 0.03 chicks fledged/pair) was similar to that recorded at other North Sea colonies in 1993 (Walsh et al 1994); breeding success for Fulmars and Kittiwakes in east Caithness varied more by year than by colony, so variations in Guillemot breeding success are unlikely to explain differing rates of population change between colonies. At least 2 Guillemots ringed as chicks in east Caithness have been recruited as breeding birds into the colony at North Sutor, in Easter Ross (Swann 1992). Further afield, Halley and Harris (1993) recorded Caithness ringed immature Guillemots attending colonies on the Isle of May, where they also recorded a Shetland ringed bird recruited into the colony as a breeding bird. In spite of relatively high degrees of philopatry (the tendency for birds to be recruited as breeders to their natal colony or sub colony) exhibited by Guillemots at the Isle of May (Halley *et al.* 1995, Harris *et al.* 1996) and elsewhere (*eg* Swann and Ramsay 1983), it is possible that inter colony recruitment on a large scale within Caithness might explain, at least in part, the large differences between rates of change at individual colonies, in conjunction with the very small overall changes in Guillemot numbers observed through east Caithness as a whole. Between 1986 and 1989 over 8000 Guillemot chicks were ringed in east Caithness; records of even a small number of these birds breeding at colonies in Caithness, or further afield, might shed more light on this question.

Numbers of Razorbills on the "old plots" were small; small sample sizes might account in part for the wide variation in direction and scale of population change on these plots (-39.7% to +46.9%). The "new" plot for Razorbills at An Dun, first counted in 1984, showed an increase of +18.6%, compared with a decrease of -8.6% on the "old" plots for the same period; however, mean annual rates of change were +2.3% (±6.0) for the "new" plot and +1.8% (±16.2) for the "old" plots, more in line with an overall rate of change of +1%/year for North Sea colonies between 1986 and 1993 (based on data in Walsh *et al* 1994). Within the study area the only colony to show an increase in numbers between 1980 and 1993 ("old plots") was Skirza, the most northerly colony. The largest decline in numbers was at Inver Hill, closely followed by An Dun; both these colonies also showed reductions in Guillemot numbers over the same period. Guillemot numbers at Skirza increased, as they did to a lesser degree at Iresgoe and Badbea (the most southerly colony), which showed more modest declines in Razorbill numbers.

Acknowledgements

The work was carried out by the Research Department and the North Scotland Regional Office of the RSPB as part of the Beatrice Field Environmental Monitoring Programme funded by Britoil plc and their partners in the Beatrice Field, and BP Petroleum Development Ltd.

The work was supervised by Len Campbell, Tim Stowe, Greg Mudge, Roy Dennis and Colin Crooke. Pre 1988 data were gathered by Simon Aspinal, Ian Bullock, Colin Crooke and Sue Parsons. Comments from Rhys Green, Stan da Prato, Norman Ratcliffe, Ron Summers, Paul Walton and an anonymous referee greatly improved earlier versions of this paper.

References

Cadiou B and Monnat J-Y 1996. Parental attendance and squatting in the Kittiwake *Rissa tridactyla* during the rearing period. *Bird Study* 43: 164-171.

Danchin É 1992. Food shortage as a factor in the 1988 Kittiwake *Rissa tridactyla* breeding failure in Shetland. *Ardea* 80: 93-98.

Halley D J and Harris M P 1993. Intercolony movement and behaviour of immature Guillemots *Uria aalge*. *Ibis* 135: 264-270.

Halley D J, Harris M P and Wanless S 1995. Colony attendance patterns and recruitment in immature Common Murres (*Uria aalge*) *Auk* 112: 947-957.

Harris M P 1987. A low input method of monitoring Kittiwake *Rissa tridactyla* breeding success. *Biological Conservation* 41: 1-10.

Harris M P, Halley D J and Wanless S 1996. Philopatry in the Common Guillemot *Uria aalge*. *Bird Study* 43: 134-137.

Harris M P and Wanless S 1990. Breeding success of British Kittiwakes *Rissa tridactyla* in 1986-88: evidence for changing conditions in the North Sea. *Journal of Applied Ecology* 27: 172-187.

Heubeck M, Harvey P V and Okill J D 1991. Changes in the Shetland Guillemot *Uria aalge* population and the pattern of recoveries of ringed birds. *Seabird* 13: 3-21.

Mudge G P 1979. The cliff breeding seabirds of east Caithness in 1977. *Scottish Birds* 10: 247-261.

Mudge G P 1986. Trends of population change at colonies of cliff nesting seabirds in the Moray Firth. *Proceedings of the Royal Society of Edinburgh* 91B: 73-80.

Mudge G P and Cadbury C J 1987. The Moray Firth: its importance for seabirds and seaducks. *RSPB Conservation Review* 1: 51-55.

Mudge G P and Crooke C H 1986. Seasonal changes in the numbers and distribution of seabirds in the Moray Firth, NE Scotland. *Proceedings of the Royal Society of Edinburgh* 91B: 81-104.

Murphy E C, Springer A M and Rosneau D G 1991. High annual variability in reproductive success of Kittiwakes (*Rissa tridactyla*) at a colony in western Alaska. *Journal of Animal Ecology* 60: 515-534.

Roberts B A and Hatch S A 1993. Behavioural ecology of Black-legged Kittiwakes during chick rearing at a failing colony. *Condor* 95: 330-342.

Swann R L 1992. Counts of seabirds in Easter Ross in 1969-91. *Scottish Birds* 16: 200-204.

Swann R L and Ramsay A D K 1983. Movements from and age of return to an expanding Scottish Guillemot colony. *Bird Study* 30: 207-214.

Walsh P M, Brindley E and Heubeck M 1994. *Seabird numbers and breeding success in Britain and Ireland, 1993* JNCC.

Wanless S and Harris M P 1989. Kittiwake attendance patterns during chick rearing on the Isle of May. *Scottish Birds* 15: 156-161.

Richard Evans, Royal Society for the Protection of Birds, 25, Ravelston Terrace, Edinburgh EH4 3TP

Revised manuscript accepted March 2001

Status, distribution and breeding success of the Red-billed Chough in Scotland in 1998

AS COOK, MC GRANT, CR McKAY & MA PEACOCK

A survey of Red-billed Choughs in Scotland in 1998 estimated a total of 58 – 66 breeding pairs, with at least 52 non breeding birds present. Islay held 44 - 49 breeding pairs, with 11 - 14 breeding pairs on Colonsay, and single pairs on Jura, Mull and in Galloway. This represents a substantial decline since 1986, with the number of breeding pairs in Scotland having decreased by 37%. The decline is due almost entirely to changes on Islay where the number of breeding pairs has decreased by 48% since 1986. In contrast to Islay, the small population on Colonsay has increased from 7 to 14 breeding pairs since 1986. On Islay the chance of a nest site having continued occupation or new occupation between 1986 and 1998 was related to nest site type, with a similar number of pairs using nest sites in buildings in both years but with fewer pairs at natural nest sites in 1998. The factors causing this association between nest site type and the chance of occupation are unknown but could be related to the tendency for natural nest sites to be on the coast or to other attributes of the sites at which the different nest types tend to occur. The average fledging success on Islay in 1998, at 2.07 fledglings per pair, did not differ between regions or between pairs nesting in buildings or natural sites and was similar to the levels recorded between 1983 and 1985 when numbers on Islay were increasing. On Colonsay an average of 2.78 fledglings were produced per pair in 1998 which, if typical of other years, could lead to the observed differences in population trends between Islay and Colonsay.

Introduction

Having declined throughout the eighteenth and nineteenth centuries, the Red-billed Chough *Pyrrhocorax pyrrhocorax* now has a highly localised distribution in Britain and Ireland, being restricted largely to the western coasts and islands (Gibbons *et al* 1993). Thus, within the UK Choughs are confined to Wales, the Inner Hebrides and a few isolated locations on the mainland of south west Scotland and the north coast of Northern Ireland. This concentration of the UK population in such a small number of localities, together with the species' unfavourable conservation status in Europe (eg Bignal & Curtis 1989, Tucker & Heath 1994), means that it is on the UK's amber list of birds of conservation concern (Gibbons *et al* 1996). The numbers of Choughs in Scotland represent approximately 24% of those in the UK and Isle of Man, and 6% of those in Britain and Ireland, and have tended to fluctuate over the last 20 years (Berrow *et al* 1993, Bignal *et al* 1997). Thus, the numbers of recorded breeding pairs increased from 72 to 105 between 1982 and 1986 but subsequently declined to 88 in 1992 (Table 1). The increase between 1982 and 1986 may have been partly attributable to increased survey coverage in 1986 but there appears to be little doubt that a genuine increase did occur (Monaghan *et al* 1989), whilst coverage and effort were thought to be similar during the 1986 and 1992 surveys (R Green, pers comm).

Within Scotland the Isle of Islay has been the major stronghold of Choughs for many years, holding 85 - 90% of the breeding pairs in Scotland

between 1982 and 1992 (Table 1, Bignal *et al* 1997). Thus, the recent fluctuations recorded in the numbers of Choughs in Scotland have been due almost solely to changes in the numbers on Islay. Following the decline in numbers on Islay between 1986 and 1992, anecdotal observations, together with surveys over a limited part of the island, suggested that this decline had continued up to 1997 (Madders *et al* 1998). As a result of these concerns the present study was undertaken in 1998 with the aims of establishing the number of Choughs breeding in Scotland, determining their level of breeding success in 1998 and investigating factors that may be associated with population change.

Methods

Survey area

Surveys were undertaken throughout the breeding range of Choughs in Scotland, though coverage varied between areas (Fig 1). Thus, on Islay and Colonsay, where most of the Scottish population breeds, virtually all the coastline was checked, and all potentially suitable inland sites (ie mainly ruined buildings) were checked. The eastern coast of Islay was not covered fully since just two nesting sites have been recorded on this stretch of coast previously. Here the previously known nest sites were checked, whilst for the remaining area 1km stretches of coast where at least 50% of the coast comprised cliffs of 3m or more in height were identified and a random selection of 30% of these 1km stretches were surveyed. On Jura all historically known nesting areas on the west coast were covered, whilst the east coast was covered as for the east coast of Islay. Additionally, inland areas of Jura known to have been frequented by Choughs in the past were searched for evidence of Chough activity (Fig 1). The west and south west coast of the Mull of Kintyre, from Machrihanish (NR6200) to Caskey (NR6507), was surveyed, as were historically known nest sites on Mull and in Galloway.

Estimating population size and fledging success

Numbers of breeding pairs were assessed following the same methods used in the 1986 and 1992 Chough surveys and detailed by Monaghan *et al* (1989). On Islay and Colonsay all of the coastal areas specified above and all known inland sites were searched twice, as were all historically known nest sites elsewhere. Periods for the first and second searches were 4 April to 7 May and 8 May to 15 June. Other stretches of coastline (Fig 1) were searched once only during this period, unless evidence of nesting was found. Searches of coastal areas were conducted by slowly walking along the relevant stretch of coast and stopping at vantage points and known nesting areas. Observations at vantage points were undertaken for 10 - 15 mins or longer if Choughs were located. Any birds located were observed to determine breeding status. During these searches solitary birds or pairs which were found feeding were also observed until they left the feeding area, at which point they were followed to determine whether or not they were returning to a nest site. Thorough searching of potentially suitable sea caves, gullies and ruined buildings was conducted throughout the survey area.

Assessment of breeding status followed the criteria of Monaghan *et al* (1989) closely, with the following categories used:

- *Confirmed breeding*. Sites where nests with eggs or young were observed, where adult birds were observed incubating, feeding young, leaving the nest with egg shell or faecal sac, where nestlings were heard or where dependent young were observed with parents.
- *Probable breeding*. Sites where Choughs were present and were suspected of breeding (eg observed repeatedly visiting a potential nest site) but where this was not confirmed, largely because of inaccessibility of the site.

- *Pair present.* Sites known to be visited by Choughs but where nest building was never completed or where egg laying was not believed to have occurred.

Fledging success at most nests was estimated between 16 June and 15 July, although at some nests where fledging was early such estimates were possible during the previous search period. To estimate fledging success observations were undertaken at known occupied sites to count nearly fledged chicks still in the nest or dependent young which were present near the nest site. Nests that were known to have failed were included in assessments of overall fledging success.

During survey work to assess breeding numbers and fledging success, the size of any non breeding flocks encountered was recorded to provide an indication of the likely total population size.

Results

Population size and fledging success

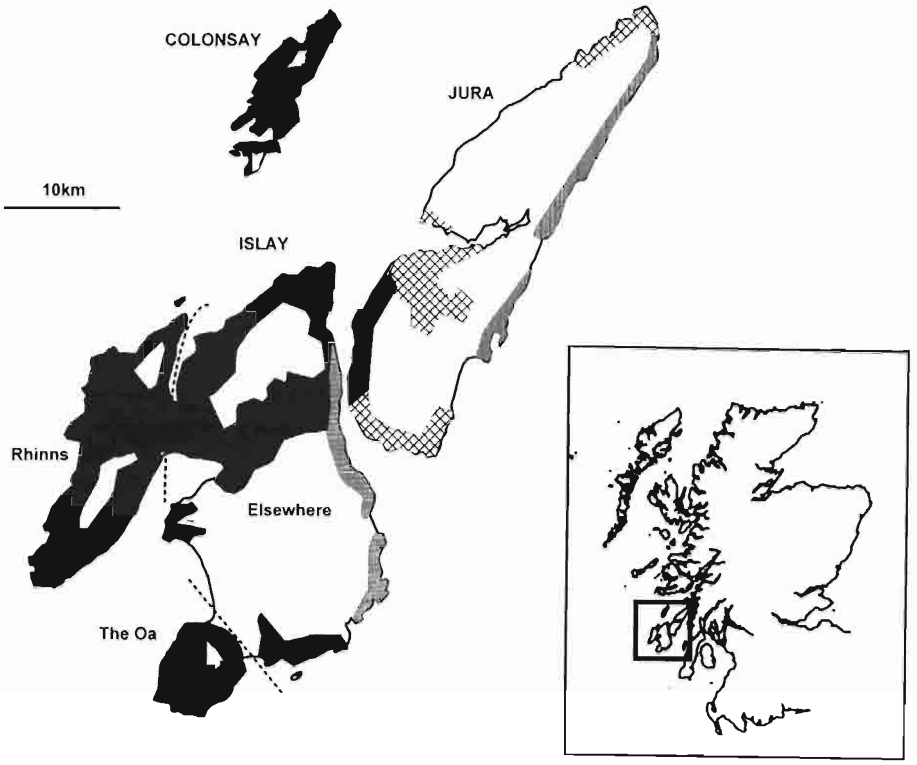
A total of 55 pairs of Red-billed Choughs were confirmed breeding in Scotland in 1998, with a further 3 probable breeding pairs and 8 pairs recorded as present. Approximately 75% of the breeding population was found on Islay and 20% on Colonsay, with single breeding pairs on Jura, Mull and in Galloway (Table 2). On Islay, most pairs were found in the Rhinns (Fig 1 and Table 2) and 23 of the 49 recorded pairs used natural nest sites, such as coastal cliffs and caves, as opposed to nesting in buildings (Table 3). Elsewhere, Choughs used natural nest sites except for one pair on Colonsay which nested in a building. Counts of non breeding flocks suggested that there were approximately 35 non breeding Choughs on Islay and a further 17 on Colonsay, with no evidence of non breeders elsewhere.

Table 1. ***Changes in the numbers and distribution of breeding Red-billed Choughs in Scotland, 1982 – 1998. Total estimates of breeding pairs (combining confirmed, probable and present categories – see Methods) are presented. Data after Warnes 1983, Monaghan et al 1989, Bignal et al 1997 and current study.***

Area	1982: Pairs	Non Br	1986: Pairs	Non Br	1992: pairs	Non Br	1998: Pairs	Non Br
Islay	61	35 - 53**	95	105 - 120			49	35
Colonsay	1	0	7	10			14	17
Jura	8*	≤7	3	0			1	0
Mull	-	-	-	-			1	0
Mull of Kintyre	2	≤7	0	0			0	0
Galloway	-	-	0	0			1	0
Total Scotland	72	49 - 67	105	115 - 130	88	62	66	52

* based on an approximate assessment, not on systematic counts.
** includes three birds recorded as 'helpers' at the nests of other pairs.
Full breakdown of 1992 survey data not yet published.

Figure 1. ***The areas surveyed for breeding Red-billed Choughs on Islay, Colonsay and Jura in 1998 and the intensity of survey effort. Black - whole area visited twice; horizontal hatch - 30% of suitable nesting habitat visited twice; cross hatch - whole area visited once; vertical hatch - 30% of suitable nesting habitat visited once; white - area not included in survey. Regions of Islay used in subsequent analyses are also shown (see text).***



Thus, in 1998 there were an estimated 184 Choughs in Scotland (excluding young from 1998), of which 72% were on Islay.

Fledging success data were obtained from all confirmed breeding pairs except for one pair on Colonsay. An average of 2.07 (± 0.19 se, n=43) fledglings per breeding pair were produced on Islay and 2.78 (± 0.40 se, n=9) on Colonsay, while the single pairs on Jura, Mull and in Galloway produced 2 , zero and 4 fledglings, respectively.

Fledging success did not differ significantly between Islay and Colonsay (t_{50}=1.52, P=0.13), and within Islay there were no significant differences in fledging success between pairs which nested in buildings and natural sites ($F_{1,39}$=0.03, *P*=0.87) or between pairs nesting in the 3 regions shown in Fig 1 ($F_{3,40}$=0.55, *P*=0.58).

Factors influencing the occupancy of nest sites on Islay

Locations of Chough nests on Islay in 1998 were compared with those found during the 1986 survey (P. Monaghan, unpubl data) to identify factors associated with changes in the use of nest sites (Table 3). Forty nine nest sites with continued occupation or new occupation between 1986 and 1998 were identified and compared to the 68 that were occupied in 1986 but not in 1998 (subsequently referred to as 'deserted' sites). Whether a nest site had continued or new occupation as opposed to becoming 'deserted' was examined in relation to the following variables: nest site type (ie building or natural), coastal or inland location, region (as defined in Fig 1) and proximity to the nearest occupied Peregrine Falcon *Falco peregrinus* eyrie (as assessed from data collected on Islay for the 1991 National Peregrine Survey - RSPB, unpubl data). Coastal location was defined in 2 ways, namely within 1km of the coast and immediately adjacent to the coast. Distance to Peregrine eyries was included in this analysis because Peregrines are predators of juvenile and adult Choughs (Bignal *et al* 1997) and their numbers on Islay have increased in recent years (Crick & Ratcliffe 1995).

When considered in a single analysis nest site type was the only variable significantly related to the likelihood of continued or new occupation of nest sites, with the number of pairs using natural nest sites decreasing from 69 to 23, but the number using building nest sites increasing from 25 to 26, between 1986 and 1998 (see Appendix). However, the independent variables considered in this analysis tended to be highly intercorrelated (Table 3), so that there was a high chance of obtaining a spuriously significant relationship when

Table 2. ***Detailed breakdown of the number and distribution of breeding pairs of Choughs recorded in Scotland in 1998.***

Area	Confirmed	Probable	Present	Total
Islay				
Rhinns	28	1	4	33
Oa	6	0	0	6
elsewhere	9	0	1	10
Total Islay	43	1	5	49
Colonsay	9	2	3	14
Jura	1	0	0	1
Mull	1	0	0	1
Mull of Kintyre	0	0	0	0
Galloway	1	0	0	1
Total Scotland	55	3	8	66

conducting multivariate analyses. When the effect of each of these variables on nest site occupation was considered separately, whether or not a nest site was immediately adjacent to the coast also had a significant effect (see Appendix). Coastal nesting was particularly closely linked to nest site type, with none of the building nest sites being immediately adjacent to the coast and only 12 of the natural nest sites being 'inland'. Thus, between 1986 and 1998 the number of pairs nesting on the coast declined from 58 to 19, whilst the number nesting away from the coast declined from 36 to 30.

Discussion

The current study has demonstrated that the Scottish Red-billed Chough population continued to decline between 1992 and 1998, with the rate of decline since 1992 being higher than that recorded between 1986 and 1992 (Fig 2). This is due almost entirely to the decline in numbers on Islay, which held 90% of the Scottish breeding population in 1986 but only 75% in 1998 (Table 1). Thus, both the Islay and overall Scottish breeding populations are now smaller than in 1982 and represent 52% and 63%, respectively, of the 1986 estimates. Additionally, the numbers of birds counted in non-breeding flocks on Islay during the 1998 breeding season was approximately 30% of the numbers reported in 1986 (Table 1). In contrast to Islay, the small population on Colonsay has increased from seven to 14 breeding pairs since 1986, with the numbers of birds counted in non breeding flocks also increasing from 10 to 17.

Previous studies have identified a wide range of factors which may influence the abundance and distribution of Choughs in Britain and Ireland, with the occurrence of a relatively wet and mild climate, along with low intensity pastoral and mixed agricultural systems appearing to be particularly important (Bullock *et al* 1983, McKay

Table 3. Differences in the location of Red-billed Chough nest sites on Islay in relation to whether they were of continued or new occupation between 1986 and 1998, or had become 'deserted' between 1986 and 1998.

	% Nest-sites						
	In natural locations	**≤1km from coast**	**Immediately adjacent to coast**	**In Rhinns region**	**In Oa region**	**Elsewhere on Islay**	**Mean (±1 SE) distance distance (km) to nearest occupied Peregrine nest**
Continued/new occupation (n=49)	47	67	39	67	12	20	3.19 (±0.38)
No longer occupied (n=68)	76	82	65	59	26	15	2.50 (±0.26)

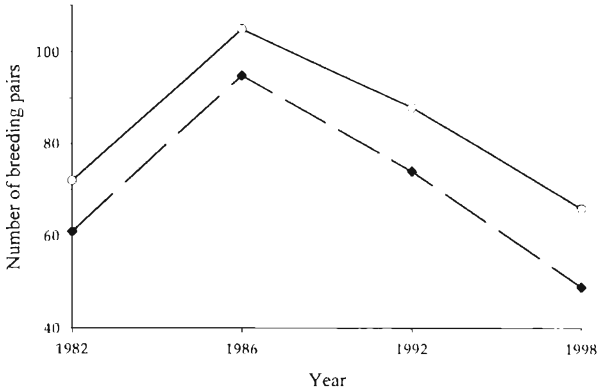
1996, Bignal & Curtis 1989). Other factors such as predation and interspecific competition for nest sites have also been suggested as important in limiting abundance and distribution (Bignal *et al* 1997). The current decline of Choughs on Islay has coincided with a period of relatively mild winters which, together with the fact that numbers on the nearby island of Colonsay have increased over this same period, suggests that climatic factors are an unlikely cause. Analyses performed in the present study suggest that the factors causing the decline on Islay are linked to nest site type, or perhaps to location in relation to the coast. Nest sites in buildings were more likely to have continued occupation or new occupation since 1986 than were natural nest sites, but nest site type was so closely linked to coastal location that it was impossible to disentangle these confounding effects. Given that fledging success on Islay did not differ between pairs using building and natural nest sites during the present study (as was also the case in earlier studies - Bignal *et al* 1987) then it is difficult to envisage ways in which the association with continued occupation or new occupation is directly attributable to the nest site type *per se*. However, it is possible that coastal nesting has become disadvantageous in terms of the survival of recently fledged juvenile or adult Choughs, or else certain types of land management which benefit juvenile or adult survival (eg cattle grazing) may be more strongly associated with sites where old buildings are present. Whatever the cause of the observed association, it indicates the importance of ensuring that an adequate supply of suitable 'artificial' nest sites remains available to Choughs on Islay.

In terms of land management which affects Choughs, much attention has previously focused on livestock husbandry practices since these determine the availability of short sward pastures upon which Choughs can forage for invertebrates (Bignal *et al* 1996), while livestock, particularly cattle, provide sources of dung living invertebrates which are an important food of first winter Choughs on Islay (McKay 1996). Perhaps surprisingly, the period of population decline of Choughs on Islay has coincided with an increase in the total numbers of both cattle and sheep on the island but other, more subtle, changes in livestock husbandry which could be detrimental to Choughs appear to have occurred (Cook *et al* 1999, McKay & Cook 1999). Thus, on 2 potentially important foraging habitats (dune systems and hill grazings) there is evidence of widespread reductions in the extent of permanent, year round cattle grazing (McKay & Cook 1999). It is not known if such changes could have had a disproportionate effect on pairs breeding at natural (or coastal) nest sites, either because of the distributional pattern of such changes or because of differences in the availability of alternative foraging habitats around the different nest site types, but interestingly such changes do not appear to have occurred on Colonsay where Chough numbers have increased.

Between 1983 and 1985 annual fledging success of Choughs on Islay averaged 2.02 fledglings per breeding pair, with little variation between years, whilst the annual survival rates of Choughs from fledging to one year and from two to three years were estimated as 71% and 74%, respectively (Bignal *et al* 1987). Thus, fledging success on Islay in 1998 was similar to that recorded during a period of population increase and, if typical of recent years, suggests that changes to fledging success are not involved in causing the current population decline. Instead, adult and/or juvenile mortality rates or the net emigration rate must have increased.

If the main demographic change has been to mortality rates, then the extent of change required to account for the observed population decline can be calculated using the productivity and survival estimates produced by Bignal *et al* (1983), and by assuming that the average age of first breeding for Choughs is in their third year (Bullock

Figure 2. ***Changes in numbers of breeding Red-billed Choughs recorded in Scotland (—O—) and on Islay (- -← -), 1982 - 98 (data after Warnes 1983, Monaghan et al 1989, Bignal et al 1997, E Bignal, unpubl data, after Madders et al 1998 and current study).***



et al 1983) and that annual survival rates remain constant after their second year. Such calculations indicate that the population decline on Islay can be explained by either; (i) an annual survival rate of juveniles of 40% between 1986 and 1991 and of 35% between 1992 and 1997; (ii) an annual survival rate of adults of 65% between 1986 and 1991 and of 64% between 1992 and 1997; or (iii) a combination of reduced juvenile and adult survival rates within the levels indicated. Performing similar calculations, under the same set of assumptions, using the fledging success estimate from Colonsay in 1998 indicates that the observed increase in numbers of breeding pairs on Colonsay between 1986 and 1998 could be sustained with either an annual survival rate of 40% for juveniles, assuming an adult survival rate of 74%, or of 65% for adults, assuming a juvenile survival rate of 71%.

As yet, current survival rates of juvenile and adult Choughs on Islay are unknown but work on resighting rates of colour ringed birds is underway to determine whether or not they are lower than those recorded during the period of population increase. While decreased juvenile and/or adult survival rates (or increased emigration rates) seem more likely to be involved in causing the current decline on Islay than are reductions in fledging success, the calculations performed using the fledging success estimates from Colonsay illustrate that even a moderate change in fledging success can have a marked effect on the population trend. Thus, further monitoring of fledging success on Islay is also required to determine whether the levels recorded in 1998 are typical of the present. Clearly, little credence can yet be given to the indications from the above calculations that the contrasting population trends on Islay and Colonsay are attributable to differences in fledging success since the respective estimates are available from one year only and do not differ significantly. Establishing whether such levels of fledging success are typical on Colonsay would be of considerable value and would help to determine the extent to which the contrasting population trends on the two islands are associated with conditions during the breeding season, if at all.

Acknowledgements

Thanks are due to the many farmers and other landowners who allowed us access for the purposes of this survey. Roger Broad, Richard Evans,

Douglas Gilbert, James Howe, David Jardine, Chris Rollie and Julie Stoneman all assisted with survey work. Ian Bainbridge, Tricia Bradley, Douglas Gilbert and Rhys Green helped in instigating and designing the survey. Professor Pat Monaghan provided access to unpublished information, Jean Burns sorted complicated financial arrangements and Alix Middleton assisted with data sorting. Ian Bainbridge, Nigel Buxton, David Gibbons, Roger Broad and an anonymous referee commented on an earlier unpublished report of this work, or on earlier drafts of this paper. Many thanks to all of the above. The project was funded jointly by SNH and RSPB.

References

Berrow S D, Mackie K L, O'Sullivan O, Shepherd K B, Mellon C & Coveney J A 1993. The second international Chough survey in Ireland, 1992. *Irish Birds* 5: 1-10.

Bignal E, Bignal S & McCracken D 1997. The social life of the Chough. *British Wildlife* 8: 373-383.

Bignal E M & Curtis D J (eds) 1989. *Choughs and Land-Use in Europe*. Scottish Cough Study Group, Argyll.

Bignal E M, McCracken D I, Stillman R A & Ovenden G N 1996. Feeding behaviour of nesting Choughs in the Scottish Hebrides. *Journal of Field Ornithology* 67: 25-43.

Bignal E, Monaghan P, Benn S, Bignal S, Still E & Thompson PM 1987. Breeding success and post-fledging survival in the Chough *Pyrrhocorax pyrrhocorax*. *Bird Study* 34: 39-42.

Bullock I D, Drewett D R & Mickleburgh S P 1983. The Chough in Britain and Ireland. *British Birds* 76: 377-401.

Cook A S, McKay, C R, Peacock, M A & Grant, M C 1999. *Scottish Chough Survey 1998 - 99*. Unpublished report. RSPB.

Crick, H Q P & Ratcliffe, D A 1995. The Peregrine *Falco peregrinus* breeding population of the United Kingdom in 1991. *Bird Study* 42, 1-19.

Gibbons D W, Avery M I, Baillie S R, Gregory R D, Kirby J, Porter R F, Tucker G M & Williams G 1996. Bird species of conservation concern in the United Kingdom, Channel Islands and Isle of Man: revising the Red Data List. *RSPB Conservation Review* 10: 7-18.

Gibbons D W, Reid J B & Chapman R A 1993. *The New Atlas of Breeding Birds In Britain and Ireland: 1988-1991*. T & A D Poyser, London.

Madders M, Leckie F M, Watson J & McKay C R 1998. Distribution and foraging habitat preferences of Choughs on The Oa peninsula, Islay. *Scottish Birds* 19: 280-289.

McKay C R 1996. *The ecology and conservation of the Red-billed Chough*. Unpublished Ph D thesis. University of Glasgow.

McKay C R & Cook A S 1999. *1999 RSPB/SNH Islay and Colonsay Choughs and farming project report*. Unpublished report. RSPB.

Monaghan P, Bignal E, Bignal S, Easterbee N & McKay C R 1989. The distribution and status of the Chough in Scotland in 1986. *Scottish Birds* 15: 114-118.

Tucker, G M & Heath, M F 1994. *Birds in Europe: Their Conservation Status*. Cambridge, UK: BirdLife International.

Warnes, J M 1983. The status of the Chough in Scotland. *Scottish Birds* 12: 238-246.

Appendix: Logistic regression analyses of nest site occupancy in relation to site characteristics

Locations of Chough nests on Islay in 1998 were compared with those in 1986 (P. Monaghan, unpubl old data). Whether the nest site was of continued occupation or new occupation since 1986 or whether it had become 'deserted' since 1986 was made the binary dependent variable, using logistic regression analyses to test for associations between the dependent variable and the following independent variables:

(i) Nest site type (ie building or natural).
(ii) Coastal or inland. Coastal being defined, first, as within 1 km of the coast and also as immediately adjacent to the coast.
(iii) Region, defined as The Rhinns, The Oa and elsewhere (see Fig 1).
(iv) Distance to the nearest Peregrine eyrie (as assessed from data collected during the 1991 National Peregrine Survey).

A multivariate approach was initially adopted, using a step down procedure to determine significant effects (at P =or< 0.05). Thus, all independent variables were entered, deleting the one with the lowest significance level and then repeating the process until only the significant effects remained. Significance testing was undertaken by treating the deviance (-2 x log likelihood) of the models which did, and did not, include the effect as X^2 , with the appropriate degrees of freedom (ie equivalent to the number of parameters removed from the model). Two separate multivariate analyses were performed, using the two different definitions of coastal nesting.

Only nest site type was found to be significantly related to the likelihood of occupation in the multivariate analyses (change in deviance (*DD*) = 11.46, df=1, *P*=0.001), irrespective of which definition of coastal nesting was used. This was due to a higher proportion of building nest sites having continued occupation or new occupation. Since the various independent variables used in this analysis tended to be highly intercorrelated, separate univariate logistic regression analyses were also performed for each of these. In addition to nest site type, the univariate analyses found a significant effect of coastal vs inland, defined as immediately adjacent to the coast (*DD*=7.77, df=1, *P*=0.005). This was due to a higher proportion of 'inland' nest sites having continued occupation or new occupation. No other significant effects were found (i.e. for coastal vs inland, defined as =or<1km from the coast, *DD*=3.49, df=1, *P*=0.06; distance to peregrine eyrie, *DD*=2.32, df=1, *P*=0.13; region, *DD*=3.85, df=2, *P*=0.15).

A S Cook, Murray C Grant, Clive R McKay & M A Peacock
RSPB Scotland, Dunedin House, 25 Ravelston Terrace, Edinburgh EH4 3TP

Revised manuscript accepted June 2001

Chough nest, Islay *M B Withers ARPS*

Diet of Barn Owls in East Ross and East Ness

H McGHIE

The diet of Barn Owls was studied between 1993-99; seasonal variation in diet was studied at 2 sites in 1999. Field Voles were found to form a greater proportion of the diet than in other parts of Britain, with Common Shrew and Wood Mouse as the main alternative prey species. Field Voles decreased in the diet through the summer at which time the proportion of Common Shrews increased; the proportion of Wood Mice increased through the year. Field Voles formed a greater proportion of the diet in agriculturally less intensive areas with small areas of rough grassland than in agriculturally intensive areas with large amounts of rough grassland. This was taken to indicate that less intensively farmed areas provided better hunting for Barn Owls, even where these held smaller areas of rough grassland. Barn Owls fed at a higher rate in winter than found in previous studies and this was considered to be due to recent mild winters, which may have been responsible for increases in the numbers of Barn Owls in the present study area. At one site, the male owl was found to eat fewer and smaller Field Voles than the female and young, and to eat more Common Shrews.

Introduction

The Barn Owl *Tyto alba* population in the Inner Moray Firth (East Sutherland, Ross and Ness) is of special interest as it represents the most northerly population in the world of this cosmopolitan species (Glue 1976). In spite of the population's marginal nature, Barn Owls occur at high density locally in Mid Ross and adjacent East Ness (McGhie 2000). Barn Owl diet has been well studied in Britain (eg Glue 1974, Love *et al* 2000), although fewer studies have been concerned with seasonal variation in diet (Glue 1967, Webster 1973, Brown 1981, Taylor 1994, Love *et al* 2000) or differences in the diet of the sexes (Taylor 1994). Pellets from only one Highland site were included by Glue (1974) and none were included by Love *et al* (2000); there is no published information that deals separately with the diet of Barn Owls in north Scotland. This paper contains the results of analyses of pellets that I collected between 1993-99 in Mid Ross and adjacent East Ness.

Methods

Variable numbers of pellets were collected from 26 roosts and nest sites in 20 Barn Owl territories in Mid Ross and East Ness between 1993-99. A total of 66 batches were collected of which 33 batches were from below nest sites (13 sites), 28 were from roosts (11 sites), 3 were batches of nest debris from natural cavities (2 sites) and 2 were nest debris from nest boxes (2 sites). Roosts and nest sites were in low altitude areas, mainly less than 100m above sea level, in mixed farmland with abundant wood edges and areas of rough grassland. The collections were made during searches for, and checks of, sites used by Barn Owls between 1993-99 (see McGhie 2000). Disturbance was kept to a minimum and birds were not flushed from nest or roost sites; collections were not made in wet weather in case birds were inadvertently flushed.

Each batch of pellets was dried and the pellets dissected individually for the remains of prey in the form of vertebrate bones and invertebrate exoskeletons.

For each batch of pellets, the numbers of each species of mammalian prey were counted on the basis of the minimum number of individuals required to contribute the numbers of any of the main cranial elements (skull, left and right mandibles). Numbers of each species of bird prey were counted on the basis of the minimum number of individuals required to contribute the numbers of long bones, sterna, skulls and pelvic girdles to each batch of pellets. The remaining material was checked for other bones such as Mole *Talpa europaea* humeri and for those of amphibians and reptiles. Invertebrate prey remains were also collected but the matrix was not searched for earthworm chaetae. The absence of sand and grit in pellets indicated that earthworms did not form a significant part of the diet, as found in previous studies. Mammalian remains were identified with reference to published keys (Lawrence and Brown 1974; Yalden 1977, 1985); bird remains were identified as far as possible by referring to my own reference collection, now in Inverness Museum & Art Gallery.

The prey list was based on all batches, representing 4246 prey items. Studies of diet were based on 35 batches from 10 sites, all in separate Barn Owl territories, which contained more than 40 items (see Glue 1964, Love *et al.* 2000). For each site, all batches were grouped irrespective of season or year of collection (mean prey items per batch= 108.3, SD= 76.0; median prey items per site= 189, min= 40, max= 1529, see Love *et al* 2000). Habitat data existed for 8 of these 10 sites (McGhie 2000), where habitat features were noted onto 1:25,000 OS maps. The relative importance of different prey species was related to the amount of rough grassland (ha), wood edge (km) and burn and drain (km) within 400m of each site; Barn Owls obtain much of their food within this area (Cramp 1985, Taylor 1994). The numbers of prey were converted to prey weights using the weights provided by Yalden (1977) in order to analyse the relative importance of prey of varying size (Table 1); invertebrates were not assigned weights.

Pellets were collected on a systematic basis from 2 sites in separate Barn Owl territories between January and November 1999 to investigate seasonal changes in diet. All pellets were removed from these 2 sites as close to the end of each month as other commitments permitted; all monthly collections were made between the 25th and 5th of the next month. One site, site A, consisted of a disused outbuilding which had held breeding Barn Owls since at least 1994. Barn Owls failed to breed in 1998 as a result of structural changes to the building but remained in the area. A nest box was erected in April 1999 and this was taken up almost immediately. The building was divided internally into 6 small compartments that were linked above the level of the ceiling, at least by owl gaps at the gable. The male owl, as determined by direct observation and the extent of barring on moulted feathers, roosted in the compartment adjacent to that containing the nest box. The female owl was only seen to use this compartment on 2 occasions over a period of several years. Pellets were collected from this compartment at the end of each month. These owls had been under observation since 1994 and were not considered to have been subjected to excessive disturbance; on entering the roost compartment the male would flit through into the adjacent compartment via the owl gap with what appeared to be little stress eg little or no calling. Observations on this site were begun in 1994 and the owls were known to have bred successfully in every year except 1998, so this level of disturbance did not appear to have any deleterious effects on the owls (see also Taylor 1991). The compartment containing the nest box, hereafter referred to as the nest compartment, was checked in June to establish whether or not breeding was occurring. On finding that it was, the compartment was not entered again until September, by which time breeding had concluded; the debris in the nest box and on the floor of the nesting compartment were collected at this time.

Table 1 *Prey contained within pellets*

Species	Prey weight (g)	No of sites at which recorded (n=26)	Total no (n=4246)
Field Vole	21	25	2348
Common Shrew	8	22	939
Wood Mouse	18	21	567
Pigmy Shrew	4	14	169
Water Shrew	12	14	92
Bank Vole	16	13	72
bird (all species)	20	11	21
Brown Rat	60	3	9
House Mouse	12	3	6
Natterer's Bat	8	1	4
Mole	70	1	3
Water Vole	100	2	2
Weasel	100	1	1
Pipistrelle	5	1	1
Earwig	-	1	3
Dor Beetle	-	2	2
Carabid beetle	-	1	2
Click Beetle	-	1	2
Rhinoceros Beetle	-	1	2
Cream-striped Ladybird	-	1	1

Pellets in the compartment adjacent to that which contained the nest box were assigned to the male owl. In the nest compartment, those in the box itself were assigned to the female and young whilst in the nest, and those on the floor to the female, and to the young once they were old enough to leave the nest. The second site, site B, consisted of a hole in a Beech *Fagus sylvatica* tree that was thought to have been in use for a considerable period (10 years?). Pellets were collected from beneath the tree and the birds were not disturbed in any instance. Breeding was known to have been successful in 1999 from the presence of hatched eggshells beneath the nest in June and sightings of newly fledged young in September. Pellets at site B could not be separated into those produced by the adults and young.

Seasonal variation in the size of Field Voles *Microtus agrestis* in the diet was investigated by studying seasonal variation in the length of the lower jaw, as this was the cranial element most frequently recovered in a complete condition. The incisor was removed and the length from the posterior edge of the tooth socket to the hindmost point of the articulating surface was measured with callipers (see Lockie 1955). Prey content per pellet was calculated on the basis of the number of left jaws in each pellet for rodents and the number of skulls for shrews; rodent skulls were frequently fragmentary and therefore parts of the same skull could be found in more than one pellet, while shrew skulls were usually found to be complete. Only complete pellets were used for this analysis.

Results

Prey species

Thirteen species of small mammal were recorded in pellets; these included all rodent and shrew species, and 2 of the 4 bat species, known to occur in the area (Highland Biological Records Centre, Table 1); invertebrates constituted a negligible proportion of the diet. The remains of a Cream-striped Ladybird *Mysia oblongoguttata* were recovered with nest debris although the distasteful nature of ladybirds may render them distasteful to owls. Excepting Dor Beetles *Geotrupes stercorarius*, all of the invertebrate species encountered were associated with buildings (Ground Beetles *Carabidae* and Earwigs *Forficula*) or with old wood (Click Beetles *Elateridae*, Rhinoceros Beetle *Sinodendron cylindricum*) and these were probably taken at nest and roost sites. Other features of special interest were the widespread distribution of Water Shrews *Neomys fodiens* and the discovery of a roost of Natterer's Bats *Myotis nattereri*. This species was formerly considered to be rare in north Scotland, but it may have been overlooked (Highland Biological Records Centre); its inclusion in the diet is of interest as this species tends to occur in the same areas as Barn Owls and it has previously been recorded as one of the main species of bat prey of Barn Owls in Poland (eg Ruprecht 1979). A Weasel *Mustela nivalis* formed an unusual prey item.

Table 2 ***Relative importance of different prey species*** [1]

Species	No. of sites (n=10)	% of batches where present (n=35)	Mean (& SD) % no at each site (n=10)[2,3]	Mean (& SD) % weight at each site (n=10) [2,4]
Field Vole	10	100	54.4 (16.2)	67.9 (13.6)
Common Shrew	10	100	22.4 (9.2)	11.6 (6.2)
Wood Mouse	10	94	13.1 (7.6)	14.5 (9.1)
Bank Vole	9	66	10.0 (7.1)	6.0 (3.3)
Water Shrew	8	83		
Pigmy Shrew	10	57		
Brown Rat	3	14		
Birds (all species)	6	26		
Mole	1	9		
Water Vole	2	6		
Weasel	1	3		
House Mouse	2	9		
Natterer's Bat	1	6		
Invertebrates	3	17		

1. Based on analyses of batches containing at least 40 prey items
2. Figures for all species except Field Vole, Common Shrew and Wood Mouse combined
3. Includes invertebrates
4. Excludes invertebrates

Overall diet

Field Voles dominated the diet at all sites, contributing approximately 2/3 to the total prey weight at each site (mean 67.9% of prey weight, SD=13.6, range= 44.4- 87.5, n=10; Table 2). Common Shrews *Sorex araneus* and Wood Mice *Apodemus sylvaticus* were also important dietary constituents, each being present in at least 90% of batches and contributing in excess of 10% to the prey weight. Bank Voles *Clethrionomys glareolus*, Pigmy Shrews *Sorex minutus* and Water Shrews were recorded at most sites and in most batches but made a relatively small contribution to diet; Water Shrews were found at a surprisingly high proportion of sites. The remaining prey species, including birds, were even less important. Bird prey species included Wren *Troglodytes troglodytes*, Dunnock *Prunella modularis*, Robin *Erithacus rubecula*, Song Thrush *Turdus philomelos*, Jackdaw *Corvus monedula*, Starling *Sturnus vulgaris*, House Sparrow *Passer domesticus* and finch *Fringilla/Carduelis* sp. Pellets which mainly consisted of bird prey (starlings and sparrows) were found at 2 roosts in farms in separate territories in January 1995, when heavy snow would have made mammal prey unavailable; Barn Owls were probably preying opportunistically on roosting birds. A predated large nestling Jackdaw was recovered from below site B at the same time as a headless Wood Mouse and Common Shrew were found beneath the tree. The headless mammals were probably owl prey brought back for chicks; Barn Owls will decapitate prey when feeding young (eg Pikula *et al* 1984). The dead Jackdaw chick and the mammals below the tree were thought to indicate some animosity between the Jackdaws and owls which nested in adjacent cavities.

There was significant variation in the proportions of Field Vole, Common Shrew and prey items other than the main 3 prey species between different sites, but no significant variation in the proportion of Wood Mouse (univariate 2-way ANOVA, $F_{9,10}$=7.16, P<0.05; $F_{9,10}$= 7.92, P=0.01; $F_{9,10}$=7.16, P<0.05; $F_{9,10}$=1.20, NS respectively); significant variations with month were found for Common Shrew but not for Field Vole, Wood Mouse or other species ($F_{9,10}$=6.46, P<0.05; $F_{9,10}$=1.29, 2.42, 1.29, NS, respectively). One batch of pellets, removed from a nest box at the extreme western limit of Barn Owl distribution in 1999, contained an unusual variety of prey. Whilst the proportion by weight of Field Vole and Common Shrew did not differ greatly from that found elsewhere (61.8% and 22.1% respectively), there was a low contribution made by Wood Mouse (3.2%) and a high contribution made by Pigmy Shrew (8.6% of prey weight, 26.0% of prey number). The deficit in Wood Mouse had evidently been made up by turning to Pigmy Shrew. The debris was probably mainly from the previous breeding season (1998), and the owls did not return in 1999.

Relationships between diet and habitat

The proportion by number of Wood Mice in the diet increased significantly with increasing rough grassland; there was a concomitant decrease in the proportion made up by Field Voles, although this was not statistically significant (Table 3). The proportion made up by Field Voles increased significantly with increasing wood edge and this was matched by significant decreases in both Common Shrews and Wood Mice. The proportion made up of Field Voles decreased significantly with increasing length of drain and stream with concomitant significant increases in the frequencies of both Common Shrews and Wood Mice. There were no statistically significant relationships between habitat and dietary proportions of Water Shrews, Pigmy Shrews, Bank Voles, or for all prey other than the main 3 species combined; these typically formed a small proportion of the diet and different species had different habitat associations.

Seasonal changes in diet

There was no correlation between the numbers of pellets collected each month from sites A and B in 1999 (r=0.12, t= 0.33, 8 degrees of freedom, NS; Figs 1,2). The number of pellets collected from site B dropped in April and many other pellets were found to have been broken up between April and July (Fig 2). Jackdaws nested in the same tree during these months and were presumed to have been responsible for removing and breaking up pellets, probably in search of White-shouldered Moth *Endrosis sarcitrella* larvae with which pellets were infested.

Field Voles formed a significantly higher proportion of the diet in terms of prey number at site B throughout the year whilst Common Shrews formed a significantly lower proportion (one tailed paired t tests, 8 degrees of freedom, t= 3.26, P<0.01 and t= 3.82, P<0.01 respectively); there was no significant difference in the proportion of Wood Mice in the diet (t=0.15, NS). At site A, other prey, such as Bank Voles, Pigmy Shrews and Moles, formed a significantly higher proportion of the diet (t= 3.96, P<0.01).

The contribution made by Field Voles to the diet of the male owl at site A was significantly lower during the breeding season (June-August) than during the pre breeding or post breeding periods (chi squared= 23.64, 2 degrees of freedom, P<0.01). Similarly, the proportion made up of Common Shrews was significantly higher during the breeding season (chi squared= 38.30, P<0.01). There were no significant differences in the proportions of Field Voles and Common Shrews at site B through the year (chi squared= 5.61 and 2.84 respectively, NS), perhaps because prey remains of adults and young could not be separated (see below). The proportion of Wood Mice increased significantly through the year at both sites A and B (chi squared= 8.45, P<0.05 and chi squared= 12.76, P<0.01 respectively). The proportion of other species in the diet fell through the year at both sites A and B, but neither trend was significant (chi squared= 3.39, NS and chi squared= 1.60, NS, respectively); the contribution made by other species was small, typically less than 10% by weight in each month, although there was a very distinct peak in August at site A, when prey of other species (Water Shrew, Bank Vole, Brown Rat *Rattus norvegicus* and Moles) contributed 16% to the prey weight. There was a significant correlation in the proportions of Common Shrew at sites A and B (r=0.69, t=2.55, 7 degrees of freedom, P<0.05) but not between the proportions of Field Voles, Wood Mice or other prey (r= 0.27, 0.03, 0.31, t= 0.75, 0.08, 0.87 respectively, NS), possibly because prey remains from adults and young could not be separated at site B (see below).

Table 3 ***Variation in proportions of prey numbers in relation to habitat within 400m of sites***

Habitat	Spearman rank correlation coefficients (n=8)		
	Field Vole	Common Shrew	Wood Mouse
Rough grassland (ha)	-0.55	0.16	0.65x
Wood edge (km)	0.81*	-0.76*	-0.62
Burn and drain (km)	-0.88**	0.82*	0.80*

x P=0.05
* P<0.05
** P<0.01

The mean prey content of pellets at the male owl's roost at site A, when converted to prey weights, increased sharply in June then fell in July and August and increased again from September onwards (Fig 3). At site B, the mean prey weight content of pellets peaked in August to October but pellets from these sites could not be separated into those produced by the adults or young. This was at odds with Glue (1967), who found that pellets produced during the breeding season contained greater prey weights: prey weight contents were similar to Glue's figures for January to April and July to August, but lower than his figure of 100g per pellet for May to June and higher than his figures of 55g and 50g for September to October and November to December respectively.

The number of items per pellet was not as high as the figure of 4.6 items per pellet given by Love *et al* (2000) for southern Scotland, peaking at 4.2 items at site A in July and 3.4 items at site B in August.

At site A, the mean size of Field Voles in pellets collected from the male's roost increased in April and fell again until August and increased again from September (Fig 4); differences were not statistically significant however. Juvenile Field Voles were recorded from May.

Differences in diet between the sexes and young at site A

Barn Owls at site A were found to have a clutch of 5 eggs in June 1999; 4 of these hatched and all 4 chicks were thought to have fledged when the box was again checked in September. There was significant variation between the proportions which the main prey items formed in remains from the male's roost between June and August, the nest box and the nest compartment (chi squared $P<0.01$, Fig 1, Table 4). Pellets collected from the male's roost contained a lower proportion of Field Voles than did those from the nest box and a higher proportion of Common Shrews than those from the nest box and the nest compartment. Other species were found at their highest proportion in pellets from the male's roost in August. The mean length of Field Vole jaws from the nest box was significantly longer than that for jaws collected from the male's roost during the breeding season (2 sample t test, $t=3.31$, 122 degrees of freedom, $P<0.01$) and equal to that of jaws collected from the male's roost in April; the mean length of jaws from beneath the nest box was intermediate between that for jaws from pellets from the male's roost and from the nest box. This was due, firstly, to the greater presence in June to August of Field Voles of the lowest size classes in the collections from the male's roost. Secondly, Field Voles of the largest size classes dominated the collections from beneath the nest box and, especially, the nest box itself; Field Voles of the lower size classes were infrequent in collections from the nest box and the nest compartment (Fig 5).

Discussion

Barn Owls ate a wide variety of prey items but the most important were Field Voles, Wood Mice and Common Shrews. These 3 species comprised a mean 94.0% of the prey weight at each site (SD= 3.2, n= 10), a higher proportion than that found by Love *et al* (2000) for southern Scotland in 1997 (79.8%). The percentages of prey numbers made up by Field Voles, Common Shrews and Wood Mice at each site differed from those of Love *et al* (2000) for southern Scotland (medians= 45.2, 35.4 and 11.4 respectively, n= 21), showing that a greater proportion of the diet was made up by Field Voles and considerably less was made up of Common Shrew (Table 2). This indicates that Field Voles figure more heavily in the diet of Barn Owls in north Scotland than in any other area of Britain while Common Shrews are less frequent. The proportions of these 2 species in Barn Owl diet were considered to be reciprocally related by

Figure 1. *Seasonal variation in diet at Site A.*

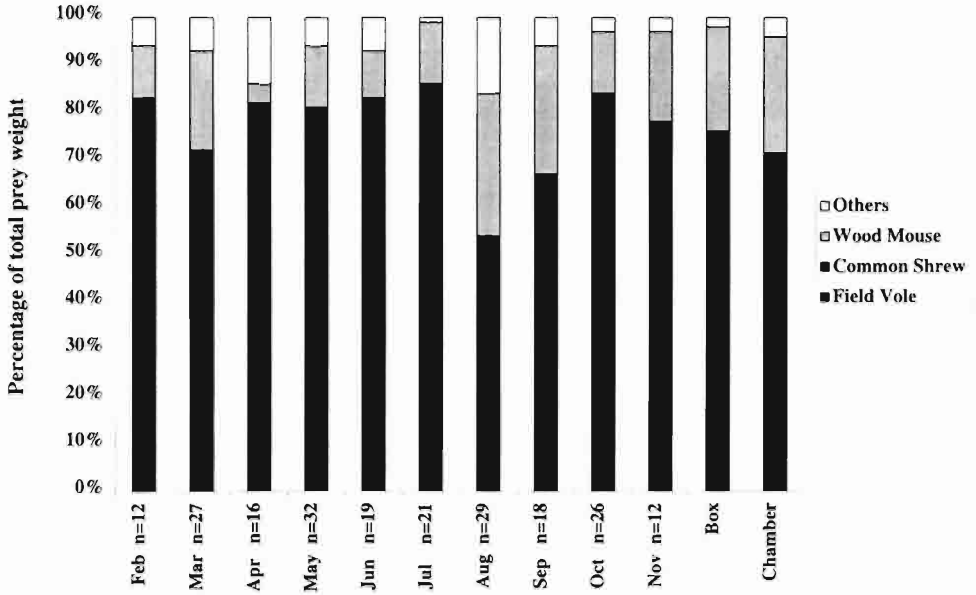
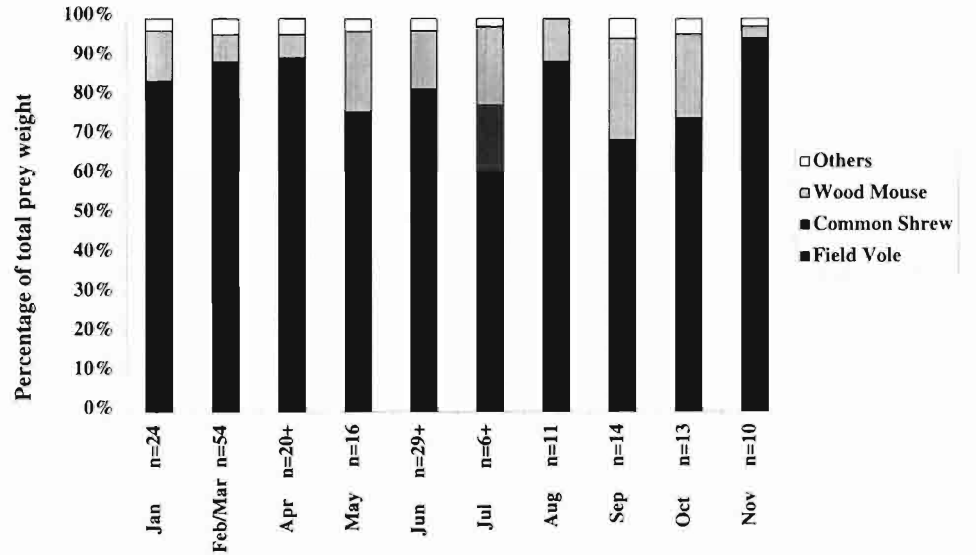


Figure 2. *Seasonal variation in diet at Site B.*



Love *et al* (2000), and Common Shrew has been found to be the main alternative prey to Field Vole in previous studies (Webster 1973, Brown 1981, Taylor 1994). The seasonal pattern of Field Vole abundance in pellets reflected the documented seasonal trend in abundance of Field Voles, which decrease through spring to a low in summer and increase again in autumn (Tapper 1979, Richards 1985, Taylor 1994) and was similar to that found in previous studies of Barn Owl diet (Webster 1979, Brown 1981, Taylor 1994, Love *et al* 2000).

The relationships between diet and habitat were unexpected, with the proportion of Field Voles decreasing with increasing amounts of rough grassland, which is the species' main habitat (eg Taylor 1994). High proportions of Field Voles were found in areas with the highest amounts of woodland edge, which were along the less intensively farmed slopes of river valleys towards the west of the study area. Areas with large amounts of rough grassland and drains were among intensive farmland along valley floors towards the east of the study area, where there are fewer small woods. It was previously suggested that Barn Owls in the present study area were restricted in distribution by suitable nest and roost sites rather than by feeding habitat, but that within each territory they selected nest sites close to patches of rough grassland (McGhie 2000). Barn Owls in territories with the highest amounts of woodland edge, and the highest proportions of Field Voles in their diet, hunted over relatively small patches of rough grassland close to their nest sites, while those owls in more intensive areas hunted over larger areas of marshy grassland. As Field Vole is the largest of the 3 main prey species, and therefore the most profitable in terms of prey weight per successful capture, Barn Owls which hunted in areas of lower agricultural intensity hunted more successfully in terms of prey weight per capture.

Figure 3. ***Seasonal variation in mean prey weight content of pellets at Site A male roost in1999***

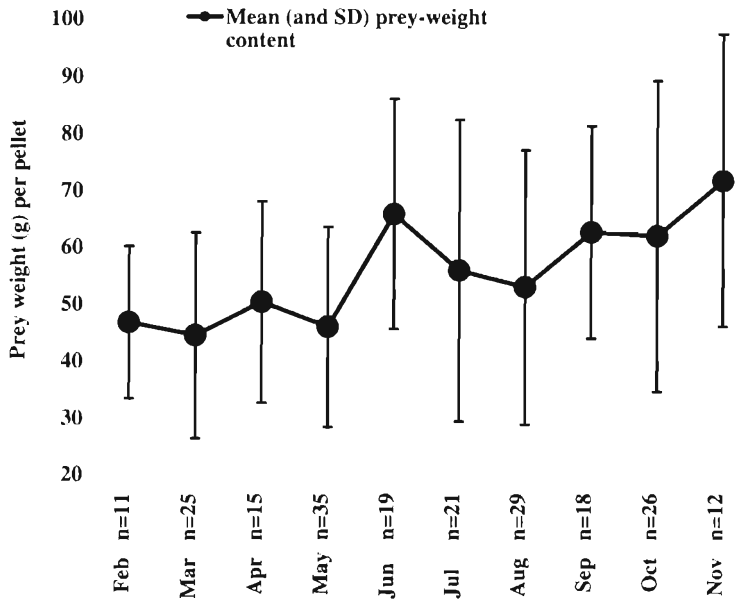
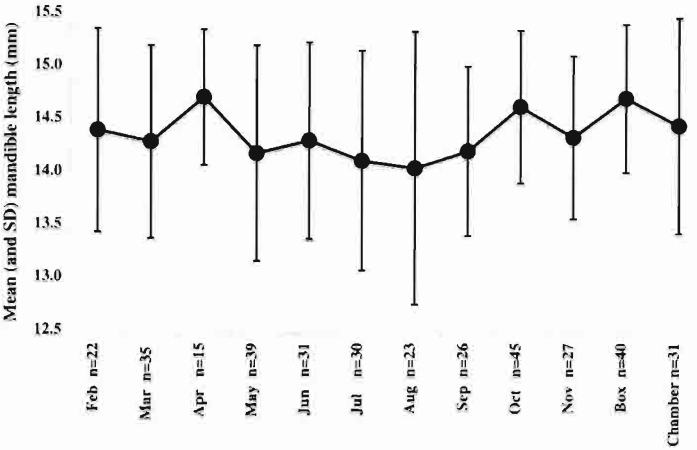


Figure 4. ***Seasonal variation in the size of Field Vole prey at site A.***



Barn Owls in more intensively farmed areas preyed more on Common Shrew and Wood Mouse, which are smaller and therefore less profitable. Thus areas which would have been expected to have contained more Field Voles within intensive farmland were actually less suitable for Barn Owls than areas with less intensive agriculture but smaller areas of rough grassland.

The large increase in the size of Field Voles in pellets in April was attributed to increased predation on large male voles, which behave aggressively at this time and thereby raise their apparency to hunting owls, thus becoming easier for hunting owls to locate (Taylor 1994). The smaller proportion of Field Voles in the diet of the male owl at site A, and the smaller jaw sizes of Field Voles in pellets from that bird, were taken to indicate that it was providing the female and young with the largest prey items and eating the smaller items. Shawyer (1998) also found that the diet of a male Barn Owl included more Common Shrews than that of its partner and young, but Taylor (1994) found that there was no difference in the size of Field Vole lower jaws in pellets produced by the male and female. Variation in

Table 4 ***Variation in prey remains collected from the male roost June-August, nest compartment and nest box at site A in 1999***

Site	Number of items	Percentage of prey number			
		Field Vole	Common Shrew	Wood Mouse	Other
Nest box	**106**	**55.7**	18.9	21.7	3.8
Nest compartment	**92**	**50.0**	19.6	22.8	7.6
Male roost (June-August)	**379**	**38.0**	36.9	17.9	7.1

Chi squared on prey numbers= 23.31, 6 degrees of freedom, P<0.001
Figures emboldened where ((observed – expected)^2/ expected) > 2.0

dietary differences between the sexes in these studies may be due to differences in absolute density and proportions of the main prey species present, although this explanation may be questioned as the owls in the present study were found to have a higher proportion of Field Voles in their diet than those in southern Scotland which did not show any sex based dietary differences during the breeding season.

Prey weight content of pellets during winter months was significantly higher than found by Glue (1967). Barn Owls are known to be especially sensitive to hard winters and to have increased over winter survival since the 1970s (Percival 1991). Increases in survival may be partly linked to increases in feeding in addition to reduced energy requirements in higher winter temperatures. Barn Owls are known to have increased in the Inner Moray Firth area since the 1990s (McGhie 2000) and this may be partly attributable to chnages in the availability of food and higher winter temperatures.

Acknowledgements

I am grateful to all of the landowners who kindly granted me access to their land and to S Moran and the late W Sinclair for help and encouragement. I am also grateful to Dr D Yalden (University of Manchester) for verifying the Natterer's Bat identification, to Dr G Goussarova (University of Manchester) for help with statistical analyses, to Highland Biological Records Centre for information, and to an anonymous referee for comments.

References

Brown D J 1981. Seasonal variations in the prey of some barn owls in Gwynedd. *Bird Study* 28: 139-146.

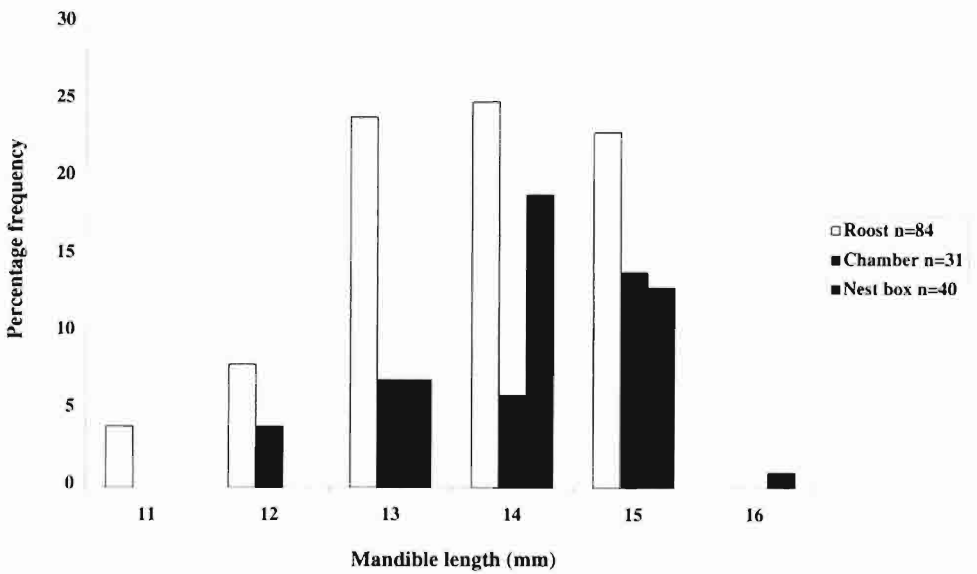
Cramp S (ed) 1985. *The Birds of the Western Palaearctic*, Vol 4. Oxford University Press, Oxford.

Glue D E 1967. Food of the Barn Owl in England and Wales. *Bird Study* 14: 169-183.

Glue D E 1974. Food of the Barn Owl in Britain and Ireland. *Bird Study* 21: 200-210.

Glue D E 1976: Barn Owl. In Sharrock J T R (ed) *The*

Figure 5. ***Field Vole jaw sizes in pellets from the male roost, nest chamber and nest box at site A in 1999***



Atlas of Breeding Birds in Britain and Ireland 1967-72. Poyser, Berkhamsted.

Lawrence M J and Brown R W 1974. *Mammals of Britain: Their Tracks, Trails and Signs*. Blandford, London.

Lockie J D 1955. The breeding habits and food of Short-eared Owls after a vole plague. *Bird Study* 2: 53-69.

Love R A, Webbon C, Glue D E & Harris S 2000. Changes in the food of British Barn Owls (*Tyto alba*) between 1974 and 1997. *Mammal Review* 30: 107-129.

McGhie H A 2000. Density and habitat associations of Barn Owls in East Ross. *Scottish Birds* 21: 88-97.

Percival S M 1991. Population trends in British Barn Owls- a review of some possible causes. *British Wildlife* 2:131-140.

Pilkula J, Beklova A, Kubik V 1984. The breeding biology of *Tyto alba*. *Acta Scientarum Naturalium, Academie Scientarium Bohemoslovaceae Brno* 18: 1-53.

Richards C G J 1985. The population dynamics of small mammals living in set-aside and surrounding semi natural and crop land. *Journal of Zoology, London* 236: 451-464.

Ruprecht A L 1979. Bats *Chiroptera* as constituents of the food of Barn Owls *Tyto alba* in Poland. *Ibis* 121: 489-494.

Shawyer C 1998. *The Barn Owl*. Arlequin Press, Chelmsford.

Tapper S 1979. The effect of fluctuating vole numbers (*Microtus agrestis*) on a population of weasels (*Mustela nivalis*) on farmland. *Journal of Animal Ecology* 48: 603-617.

Taylor I 1991. Effects of nest inspections and radio tagging on barn owl breeding success. *Journal of Wildlife Management* 55: 312-315.

Taylor I 1994. *Barn Owls: predator-prey relationships and conservation*. Cambridge University Press, Cambridge.

Webster J A 1973. Seasonal variation in mammal contents of barn owl castings. *Bird Study* 20: 185-196.

Yalden D W 1977. *A key to the identification of mammal remains in owl pellets*. Mammal Society, Reading.

Yalden D W 1985. *The identification of British bats*. Mammal Society, Bristol.

Henry A McGhie, c/o Nurse's House, West Road, Muir of Ord, Ross-shire IV6 7TD

Revised manuscript accepted July 2001

Young Barn Owls *B S Turner*

SHORT NOTES

Female Eurasian Sparrowhawk caching prey

On 19 December 2000 at about 1045 GMT, a female Eurasian Sparrowhawk *Accipiter nisus* killed a Feral Pigeon *Columbia livia* in a garden in central Edinburgh. The hawk was watched by KN for some time from a window at a distance of 2.5 - 3.0 m. After mantling the prey, she plucked at the breast for about 5 minutes then, half lifting and dragging the pigeon, the hawk moved it 3-4m further away and recommenced plucking and feeding from it.

After about an hour, KN, who by this time had been joined by KH, obseved the hawk flying with the carcase, rising about 3m to the top of a wall, on which were some angle iron posts, around which platforms of Bindweed *Calystegia* sp or similar had formed. The hawk placed the carcase on one of these platforms, and then flew off.

The next day, at around 1100 GMT, what was presumably the same female hawk was seen feeding from what was left of the pigeon's breast and legs on the lawn. These remains had still been on the wall earlier that morning. The hawk fed from the remains for about 45 minutes. At the end of this period, the carcase, by this stage little more than a pair of wings, was taken by the hawk to a different part of the same wall, where it was placed between a post and a creeper. The hawk did not feed, but loafed and preened in a nearby tree before flying off after about 20 minutes. She was not seen again. Two days later the carcase had gone.

There is no mention of caching of prey by Eurasian Sparrowhawks in *BWP Vol2* (1980), but Newton (*The Sparrowhawk* 1986) mentions that the species is known to subdue prey larger than it can carry or eat in one meal, and in such cases will try to carry the prey to a safe caching site for later consumption. He also mentions that Eurasian Sparrowhawks are regularly robbed of their prey while they are with it, or have it removed by avian or mammalian scavengers. M Marquiss *Scottish Birds 11*, 263-4 reported seeing a Eurasian Sparrowhawk kill a pigeon, feed on it and stand on it for about 20 minutes before feeding again. This carcase was removed overnight probably by a mammal.

We thank Dr M Marquiss for constructive comments on an earlier draft of this note.

K Needle & K Hintjens, 5 Brown's Place, Edinburgh EH1 2HX*
T W Dougall, 62 Leamington Terrace, Edinburgh EH10 4JL
(* correspondence address)

Revised manuscript accepted April 2001

Grey Heron predating White-throated Dipper

On 14 May 1999 at 1315hrs GMT, in the Moorfoot Hills (280m asl) in the Scottish Borders, AM's attention was drawn to an adult Grey Heron *Ardea cinerea* standing in the shallows of the Blackhope Water, where it flows beside a steep grassy bank with extensive patches of rushes *Juncus* sp. When first seen, the Heron was in the process of swallowing a White-throated Dipper *Cinclus cinclus* which was wearing a metal ring. The heron took less than one minute to swallow the Dipper, remaining in the shallows during this time.

Some 5-10 minutes earlier AM had seen a ringed juvenile Dipper perched openly by the water's

edge some 5m away from the site of the above incident. The Dipper was occasionally quite vocal and appeared to be attempting to solicit food by wing shivering, although no adults were seen in the vicinity. It seems that the juvenile Dipper unwittingly attracted the attention of the heron by its behaviour. This juvenile was almost certainly one of a brood of 4 Dippers that had been reared in a nest about 10m from where the heron stood. This brood had been ringed by TD on 27 April 1999 when the chicks were about 8 days old.

Neither *Birds of the Western Palaearctic* nor Tyler & Ormerod (1994) *The Dippers* mention Grey Herons preying on White-throated Dippers, although *BWP* does state that birds are occasionally eaten by Grey Herons. Dr M Marquiss (*pers comm*), who has analysed the diet of Grey Herons in the River Tay catchment, found remains of 2 Dippers in hundreds of pellets analysed for prey contents, and the remains of 2 more Dippers in hundreds of pellets analysed for prey content and the remains of 2 more Dippers in hundreds of chicks regurgitates. Two of these 4 Dippers were juveniles and 2 were of undetermined age. A White-throated Dipper c25 days old, if in good condition, would weigh around 50-55g (Dougall unpublished, Tyler & Ormerod 1994).

We are grateful to Mr Ralph Smith, shepherd at Blackhopebyre, for his tolerance of, and interest in, our activities and Dr M Marquiss for contructive comments on an earlier draft of this note.

Allan Mee & Tom Dougall c/o
62 Leamington Terrace, Edinburgh EH10 4LJ

Revised manuscript accepted May 2001

Eurasian Oystercatcher chick killed by sibling

Roof nesting by Eurasian Oystercatchers *Haematopus ostralegus* is now well established in Aberdeen (Duncan *et al Scottish Birds* 22:1-10). On 5 June 2000 I was called to a primary school in the city where 2 Oystercatcher chicks had fallen from the roof into an enclosed space within the buildings. The space measured c6 x 4m. The parents were still feeding the chicks, and as previous experience indicated that they should be safe there until they could fly, I decided to leave them. Both were ringed and their biometrics taken, one chick being larger than the other, which is usual.

I returned 2 weeks later to check on the birds to be told that one of the chicks had been found dead on 8 June. Staff at the school told me that the larger chick had denied its smaller sibling any of the food brought by the parents and had also repeatedly atacked it. The chick was dead 3 days after it was ringed and staff removed it and put the larger chick into a garden area where it continued to be fed by the parents and fledged successfully. It would appear that the smaller chick had died of lack of food and from wounds inflicted by the other chick. I was told that 'it was covered in blood'. In broods of more than one chick a hierarchy is established based on age and size and the dominant chick will demand food first and will attack siblings (Cramp S and Simmons KEL 1983. *The Birds of the Western Palaearctic* Volume 3:pp24 & 29); hand reared chicks have killed siblings (Heinroth and Heinroth in Cramp and Simmons 1983). Presumably in the open field situation subordinate chicks can avoid or escape attacks but in the situation reported here the smaller chick was unable to escape.

I wish to thank Eric Meek for comments on an earlier draft of this note.

Alistair Duncan, 12 Cairncry Avenue,
Aberdeen, AB16 5DS

Revised manuscipt accepted May 2001

Table 1. ***Eurasian Oystercatcher chick measurements***

	Weight(g)	Wing(g)	Tarsus(cm)	Bill(mm)	Bill+Head(mm)
ChickA	229	105	85	39	74.9
ChickB	169	too small	84	32.9	68.4

Frequency of prey transfer by Hen Harriers during the breeding season

Despite extensive literature on Hen Harriers *Circus cyaneus* in Britain there are no published observations on the frequency of prey transfer between males and females during the breeding season. Male Hen Harriers act primarily as food providers by delivering food to females by an aerial transfer or 'food pass' and later both sexes pass their prey to their young. Although Balfour (1962-3, *Bird Notes 30*: 145-153) and Watson (1977, *The Hen Harrier*, Berkhamsted) described the transfer of food in Orkney and Galloway, they did not mention how often it occurred.

Between 1965-1998 in west Galloway I recorded 204 prey transfers by Hen Harriers of which 40 (20%) were ground passes. In 164 aerial food passes, only 2 (n = 146) were dropped by adult adult passes (Table 1) and only one (n = 18) was dropped in an adult juvenile pass. Of 3 prey items that were dropped, one was retrieved by the female; after 2 prey were dropped together, one was retrieved by the male and one by the female; and one was retrieved by a juvenile. On 3 other ocasions it was not passed to the female; once the incubating female refused to accept it; once the female continued nest building; and once the male landed the prey at a 'cock's nest' and 'bowed' 7 times to the female (see also Dickson 1985, *British Birds 75*: 329-330).

In comparison, Simmons (*2000, Harriers of the World*, Oxford) recorded prey transfers by North American Northern Harriers *Circus cyaneus hudsonius* on 320 occasions of which 22% were ground passes during a study in Canada; 246 aerial food transfers were seen of which 10 prey items were missed by the female, about the same efficiency as Scottish Hen Hariers (Table 1). On 4 occasions it was not passed to their mate beecause it was stolen by another female before they could reach the intended female. Hamerstrom (1986, *Harrier, hawk of the marshes*, Washington) also recorded robber females snatching food from males in Wisconsin but found no evidence that any robber females had any nests. No evidence for this behaviour was obtained during the studies of Hen Harriers in west Galloway.

Table 1. ***Comparison of efficiency of aerial adult to adult food passing of Hen Harrier in Galloway and Northern Harrier in Canada***

Species	Hen	Northern
Female mass	527	546
Aerial Transfers	146	246
Number missed	2	10
Efficiency %	98	96
Source	This study	Simmons 2000

RC Dickson, Lismore. New Luce, Newton Stewart, Wigtownshire, DG8 0AJ

Revised manuscript accepted April2001

Herring Gull predating chick of Red throated Diver

Cramp & Simmons (1997, *The Birds of the Western Palearctic*, vol 1, Oxford) do not mention that the young of Red throated Divers *Gavai stellata* suffer direct predation from aerial predators. Bundy (1976 *Bird Study* 23: 249-256; 1978 *British Birds*

71: 199-208) in a study of breeding Red-throated Divers in Shetland found that most chicks which failed to fledge perished in the first weeks of life but the causes of these failures were unknown.

On 24 July 1980 at 1030 hrs at a lochan about 15 kms from the coast in Strathconon, Highland, I watched a Herring Gull *Larus argentatus* circling above an adult Red-throated Diver and its chick which I reckoned to be less than 7 days old. The gull hovered and swooped down, easily scooping the chick up in its bill from the water surface. It landed out of sight behind some heather and presumably devoured the chick there. Meanwhile, the adult diver swam around, diving repeatedly, until the gull flew away. I returned to the lochan 10 hours later; it was deserted and apparently abandoned by the divers.

Bundy thought that skuas and gulls could have been responsible for some chick losses but added that few observers have actually witnessed predation on divers. Predation by Great Skuas *Catharacta skua* was later confirmed by Furness (1981 Ibis 123:534-535) when he found the remains of 6 chicks in skua pellets at one Shetland colony between 1969-1976. The above gives some direct evidence to indicate that Herring Gulls too will predate the chicks of Red-throated Divers.

RC Dickson, Lismore, New Luce, Newton Stewart, Wigtownshire DG8 0AJ

Revised manuscript accepted April 2001

Little Gulls feeding in association with auks

Over the last 10 years Little Gulls *Larus minutus* have occurred at Brora, Sutherland with increasingly regularity and for more protracted periods. In 2000/01 several over wintered there for the first time. No unusual feeding habits were noted until the morning of 22 March at high tide, when 2 first year birds were seen about 200m offshore and 100m apart. They were holding station in typical fashion, hovering into the moderate, onshore easterly breeze and occasionally dipping onto the surface of the choppy sea.

Having often seen Little Gulls tracking back and forth over an area of sea, I was puzzled to see, a few minutes later, that the 2 birds were in more or less the same positions and only then noticed that both were a few metres downwind of a swimming Common Guillemot *Uria aalge*. I watched them more closely over the next half an hour, during which time neither auk was seen to dive. As the auks drifted on the current, the gulls kept station with them, always just downwind. They were frequently dipping to the surface in typical feeding fashion and their periods of rest on the surface were very brief. After about 15 minutes the more distant Little Gull left 'its' Guillemot, flew past the nearer bird and took up a new station directly opposite my vantage point. To my surprise, there was yet another Guillemot just upwind of it, suggesting a deliberate strategy. The behaviour continued until my departure 15 minutes later.

Other species on the sea in the general vicinity were Red-throated Diver *Gavia stellata*, Great Cormorant *Phalacrocorax carbo*, European Shag *Phalacrocorax aristotelis*, Common Eider *Somateria mollissima* and Common Goldeneye *Bucephala clangula* but the Little Gulls showed no interest in these species.

I have often seen larger gulls settling on the sea close to feeding auks but it is hard to see what advantage the Little Gulls could have gained from this rather energy intensive association with resting Guillemots. Perhaps the auks' feet were stirring up tiny sub surface food particles which then drifted downwind. However, this would not explain why Guillemots alone were targetted.

No similar behaviour was noted until the morning of 9 April when, in much calmer conditions, what were almost certainly the same 2 immature Little

Gulls attached themselves to a party of 3 feeding Razorbills *Alca torda*, just off the rivermouth. Whilst the Razorbills were on the surface the gulls settled close to them but, as soon as the auks dived, the gulls took off and tracked their underwater movements, dipping down to the surface occasionally, presumably to pick up morsels of food disturbed by the auks' passage beneath them. The auks were travelling up to 30m underwater but, on each occasion, they surfaced right next to the hovering gulls, so there was no possibility of coincidence. The Little Gulls' behaviour eventually attracted the attention of several Mew Gulls *Larus canus*, which disrupted proceedings for a while, but as soon as the larger gulls moved away, the Little Gulls again kept close to the Razorbills, both on and below the surface.

Two days later, in even calmer conditions, there was a single immature Little Gull on the sea close to a resting Razorbill. The auk commenced feeding after about 15 minutes, whereupon the gull at first tracked its underwater progress, as on the previous occasion. On most of the auk's subsequent dives, however, the Little Gull waited for it to resurface before flying across to settle beside it. An adult Kittiwake *Rissa tridactyla* joined the pair but did not seem to distract the Little Gull in the way the Mew Gulls had.

On 15 April, in a fresh, north-westerly offshore wind, both immature Little Gulls were persistently feeding in similar fashion, one with a Razorbill and the other with a Guillemot, some 200m apart. On this occasion an adult Little Gull was also present, but this was feeding 'normally' with Kittiwakes further offshore. There is no reference in *Birds of the Western Palearctic* to Little Gulls feeding in association with auks, or with any other swimming or diving seabirds, other than terns.

Alan Vittery 164 West Clyne Brora Sutherland KW9 6NH

Revised manuscript accepted May 2001

Feeding rates of Scottish Crossbills on Sitka Spruce

On 17 March 2001, I found a group of 4 male crossbills feeding on ripe cones on an isolated Sitka Spruce in Boblainy Forest, Invernessshire. The birds were identified as Scottish Crossbills *Loxia scotica* by their diagnostic excitement calls (Summers *et al*, in press). Also within this group was a single juvenile crossbill with a crossed bill in streaked plumage. It was not possible to identify the species of this bird as it only gave juvenile "chitoo" calls. Parties of males at this time of year are usually feeding incubating females.

Conditions for viewing were excellent and I was able to watch the birds against a cloudless sky at distances up to 40 metres; this meant that the wings of individual seeds could be seen falling after the seeds had been removed by the Crossbills. I used this opportunity to gain some information on the feeding rate of Scottish Crossbills.

The adult males used a different feeding technique to the juvenile bird. The adult birds hung in an upside down position and fed on one or 2 seeds from a cone before removing the cones from the tree by cutting through the cone stalk. They then carried the cone in their bill and landed on one of the lateral branches of the tree. This flight was normally less than one metre. They held the cone with one foot and then fed on it. The birds removed seeds along the length of the cone and then turned the cone before removing seeds from a different axis. The juvenile bird, however, fed in an upside down position on the cones *in situ*. The juvenile bird also fed from 2 or 3 cones that were hanging side by side from the same position; the adult males fed from a single cone at a time. Only very occasionally did a male feed continually in an inverted position.

A foraging bird was selected arbitrarily and the time for a number of wings to be discarded was

recorded on a stop watch to the nearest second.

The feeding rate was calculated by dividing the time by the number of seeds consumed. The adult males fed at a faster rate (1.84 seconds/seed, n = 12, se = 0.08) than that of the juvenile (2.80 seconds/seed, n = 7, se = 0.17) (t=5.73, P>0.001). On the one occasion when a male was timed feeding in an inverted position he recovered 9 seeds in 15 seconds (1.67 seconds/seed). The dimensions of a sample of 34 cones removed by the males were: length 61.9 mm (se = 0.76) and stalk width (at point of severance) 4.07 mm (se = 0.08).

As the Sitka Spruce cones were ripe some cones will have already dropped some seed naturally. The preliminary feeding by the males of a few seeds before they removed the cones from the tree is therefore believed to be a sampling process by the males to establish whether the cones held sufficient seed to make it worthwhile feeding on it.

The different feeding mechanisms allowed a significantly greater intake of seeds by the adult birds over that of the juvenile. The bills of juvenile crossbills do not become fully crossed until between the ages of 6 to 10 weeks (Nethersole-Thompson, *Crossbills* 1975) and it is likely that this bird was still learning to feed. Also it may be that the juvenile bird had not yet learnt to remove cones or its bill was not sufficiently strong to cut through the cone stalks.

It is not possible to be certain of the species of the juvenile bird, if it was a Scottish Crossbill like the adult birds, it would indicate that very early breeding had taken place, as Scottish Crossbills usually breed from February to May (Nethersole-Thompson, 1975).

D C Jardine, 49 Bellfield Road, North Kessock, Inverness, IV1 3XX

Revised manuscript accepted June 2001

Abernethy *© 2002 Chris Rose*

This limited edition colour print may be ordered from the SOC Office

Peregrine Falcon predation at hirundine roosts

The significance of the Tay Estuary for the westward autumn passage of hirundines was first observed by Boase (1918 *The Scottish Naturalist:* 109-112). Later, the importance of the Tay reedbeds for roosting hirundines was noted by McMillan (1979 University of Dundee Honours Dissertation) and Lynch (1984 *Tay Ringing Group Report* 1982-83:28-44). These huge beds of *Phragmites australis* form the largest continuous reedbed in the United Kingdom and dominate the north shore of the Inner Tay Estuary from Kingoodie to Cairnie Pier on the north side, as well as Mugdrum Island on the south side. Smaller beds are located at intervals on the north bank and linear stands extend a short distance along the tidal part of the River Earn.

Small roosts are present when migrating birds arrive in early April and continue throughout the breeding season and well into October. Numbers at the roosts peak between late July and mid September. They consist of Sand Martins *Riparia riparia* and Barn Swallows *Hirundo rustica*. Large roosts occur, and through counting roosting hirundines is extremely challenging, at peak times numbers certainly reach 50,000 and may even exceed 100,000.

Mist netting by the Tay Ringing Group has shown that emigrating Swallows from north and north east Scotland use the roosts and confirmed that many birds subsequently moved south along the east coast of England. Lynch (1984 *Tay Ringing Group Report* 1982-83:28-44) also found that c90% of the Swallows were juveniles. Further analysis led Moyes (1989 *Tay Ringing Group Report* 1987-88:16-25) to speculate that the Tay reedbeds are important for almost the entire population of juvenile Sand Martins from north of the Forth.

Large numbers of both species often gather in conspicuous pre roost assemblies some distance from the roost sites. The birds then gather noisily above the roost site, forming a wheeling mass before descending steeply, flying low over the reeds, before perching on a reed stem. Once in the roost the birds twitter noisily until silence sudenly descends sa darkness approaches.

In 20 years of observations at roosts the only avian predators regularly noted have been Eurasian Sparrowhawks *Accipiter nisus* and Tawny Owls *Strix aluco*. Although the Eurasian Hobby *Falco subbuteo* is a hirundine predator, it is a scarce summer visitor to Scotland, but has been observed at the Tay roosts on at least 3 occasions in the last 10 years.

On the north bank of the River Earn at Easter Rhynd, Bridge of Earn, there is a linear reedbed consisting predominately of *Phragmites australis*, approximately 1km long and not more than 30m in width. Roosting hirundines have used this site sporadically for several years but numbers rarely exceeded 500 until 5 September 2000 when c3000 hirundines, mainly Sand Martins, gathered in a pre roost assembly about 3km from the roost site. The following evening the site was checked and over 10,000 birds seen. Also in attendance was a first year male Peregrine Falcon *Falco peregrinus*. The hirundines were high above the roost in a noisy pre roost communal display, generally oblivious of the Peregine apart from a small group of birds which pursued and mobbed it. It flew back and forward, slowly generating speed until, with wings folded, it went into short acrobatic and undulating stoops, seemingly directed at tight groups of birds rather than individuals. The tactic deployed was a combination of speed and sudden directional change. Though the Peregrine made several attempted strikes, it was successful at least twice, landing on a nearby pylon to quickly consume its prey.

On 11 and 13 September 15,000 Swallows and Sand Martins in approximately equal numbers were at the roost. On each occasion 3 Peregrines were present, 2 males and a female, all thought to be young birds. The female did not attempt to catch prey, spending much of the time sitting on nearby pylons. One of the males was more proficient than the other, taking at least 4 hirundines over a 15 minute period. On each evening there was an aggressive interaction between the 2 males. The more successful hunter was the aggressor. He chased the other male from the vicinity before returning for a further foray over the area.

Despite the presence of up to 3 predators there was relatively little alaming by the hirundines, implying that a Peregrine was not perceived as a threat. The hirundines' response was therefore quite different from when a Hobby or Sparrowhawk is present, when there tends to be widespread alarming and dispersal from the immediate vicinity. Although other suitable roosts were available the hirundines continued to use the roost until early October.

D Robertson (*pers comm*) has observed a Peregrine at the hirundine roost at St Margaret's Marsh, Rosyth, Fife in each of the last 3 years. However, although the Peregrine took an interest in the pre roost assembly of birds and made several half hearted passes, none were successful.

In an analysis of prey taken by British Peregrines, Ratcliffe (1993 *The Peregrine*, London) includes Sand Martin and Swallow as well as House Martin *Delicon urbica* in a large range of passerine prey species. Ratcliffe acknowledges that considerable agility is required to catch hirundines and that only the smaller males are likely to be successful. However, it appears that this is the first occasion that the systematic predation of a large hirundine roost by Peregrines has been recorded.

R L McMillan
Feltmarn, Bridge of Earn, Perth PH2 9AN
Revised manuscript accepted June 2001

Large winter gathering of auks in the Firth of Forth

On 2 January 2001 I was walking on the north shoreline of the Forth to the east of Rosyth. I noticed auks out in the middle of the estuary with more birds in the river off Rosyth harbour. Previously I had found that any significant number of auks west of the Forth bridges is usually linked to birds starving due to adverse weather at sea. About halfway to Rosyth harbour, I saw a huge number of auks stretching from mid river into the harbour. All were very active diving, swimming, chasing and occasionally flying off down the estuary towards the bridges. All looked in good health and seemed to be feeding vigorously. I counted in blocks of 100 as far sa I could see with my telescope into the area of greatest density within Rosyth dock and found over 5000 birds. I then assessed the total flock in relation to the section I had been able to block count and reckoned it must be at least twice as many. I then recounted and reached an estimate of over 9000 birds, probably over 10,000.

The vast majority were Common Guillemots *Uria aalge*, though a few small parties of Razorbills *Alca torda* were identified among the closer birds, and a number of Great Cormorants *Phalacrocorax carbo* were feeding among the auks. My impression was of a feeeding flock concentrating on a very confined food source, recalling the days when Sprats *Clupea sprattus* were plentiful in the Forth. A closer approach at Rosyth Docks was prevented by the security measures in force there. A security guard had seen 'far more birds a week or 10 days ago' and 'gulls so thick on the water inside the harbour that it was quite white with them'. I was able to get access briefly to the harbour edge and confirm that in the very densely packed area within the harbour 99% of the birds were Guillemots with only one party of 3 Razorbills identified. No birds were seen swallowing prey at the surface, but diving activity was continuous

which suggested to me that the prey was small and swallowed underwater. It is unfortunate that close observation of this kind is so restricted and that watching from the more accessible south shore of the estuary is too distant for accurate counting.

I was able to visit Rosyth again on 14 January when the situation was much the same but with much reduced numbers. RSPB staff from Vane Farm were given a guided tour of the dock area in a dockyard police launch on 11 January when they estimated the total population of auks as around 60,000 - though accurate counting from a moving boat was impossible. There were newspaper reports in the summer of 2001 of thousands of dead Sprats washed up in the Rosyth Dock area causing a nuisance from the smell of rotting fish. Nobody yet seems clear why the fish in summer or their predators in winter should have been so concentrated into the man made environment of the docks.

Christopher Mylne
Mains House,MainRoad,Linlithgow EH49 6QA

Revised manuscript accepted October 2001

Common Quail heard on north east Scottish farmland in 1988-2001

I heard the 3 syllable song of many Common Quail *Coturnix coturnix* in daylight while studying Corn Buntings *Miliaria calandra* in the shires of Angus, Kincardine, Aberdeen and Banff.

My effort was similar each year, save in 1988 when I began only in August. I heard calls from Lunan Bay to Duncanstone at 200 m and 39 km inland near Insch (areas 1, 2, 5, 7, 9, 12, 13 and 16 in Fig 1 of A Watson & S Rae 1997, in *The Ecology and Conservation of Corn Buntings* Miliaria calandra, JNCC), and at Crathes, Craigston near Turriff, and Rothmaise near Insch. Most were at Barras near Stonehaven, Duncanstone and Rothmaise.

I heard calling at each site for over a month, except at Kinellar in 2 years when I heard it only 2 nights running, and in 2001 when I heard it near Rothmaise on only one day. A Barras man while harvesting saw one fly out on 19 September.

Spring barley was the main crop used (Table 1), as in the 1989 Quail influx (R D Murray, 1991, *Scottish Bird Report* 22, 47). Some sang in an autum sown crop, but after cutting of it I heard song in a spring crop in the next field, where I had heard none before the cutting. This suggested movement after cutting.

In areas where I heard more than one bird in a day, song sites tended to be clustered, as noted elsewhere (D Gill 1992, *NE Scotland Bird Report* 19-22, and R D Murray *et al* 1998, *SE Scotland Tetrad Atlas*). Avoiding bare ground or crops under 30 cm high, most birds sang in crops with many weeds. Where weeds abounded only in patches, birds usually sang there, from as small a patch as 10 x 10 m. I noted an association with soil wetness, where the Soil Survey of Scotland mapped gley soils. Prone to waterlogging, they supported many weeds and sparse crops.

I thank I Francis and R D Murray for useful comments.

Adam Watson,
Centre for Ecology & Hydrology,
Banchory, AB31 4BW

Revised manuscript accepted June 2001

Table 1 *Percentages of Quail heard in different crops in 1989-2001. Blanks are zeros. Dates are earliest and latest in days after 22 May. Rightmost 2 columns show total including Angus, and total excluding Angus (NE Scotland Bird Report area). I heard 22 in 1990, not 19 as in NEBR.*

Year	Dates	Spring barley	Winter wheat	Winter barley	Set aside	Oats	Spring oilseed rape	Winter oilseed rape	Grass (hay)	Grass (reseed)	Grass (silage)	Potato	Turnip	Grazed grass	Pea	*n*	*n* NE*
1988		100														1	1
1989	10-86	65	12	4		12		4	4							26	23
1990	57-89	36	27	5	9	5		5	5			5	5	5		22	22
1991	-															0	0
1992	23-35	50	25					25								4	4
1993	1-52	17	33	17	17	17										6	5
1994	11-69	45		18		9	9	9	9							11	11
1995	54-85	43	14				28								14	7	7
1996	32-72			50						50						2	2
1997	47-89	46	4	8	17	4	4	4	4	4	4					24	24
1998	29-98	43		17		13	13	4	4							23	22
1999	30-94	50	30		20											10	9
2000	16-72	67		11	22											9	8
2001	59-80	2														2	1
Total	1-98	70	17	13	11	10	7	6	5	2	1	1	1	1	1	147	139

* My annual totals were related to those in North East Scotland Bird Report with my data subtracted (n = 13 years 1988-2000, r_s = 0.63, P = 0.024).

OBITUARIES

Dick Roxburgh
1920 - 2001

On 8 June 1920 Richard Folley Roxburgh was born into the small mining and mill community of Catrine, in Ayrshire. There he grew up and developed his great love of the outdoors and its wildlife in Catrine's woods, the braes of Ballochmyle and Airds Moss, amongst other hallowed places. Given this background and Dick's keen desire and capacity for learning, it was perhaps natural that he should extend his interest to Scots poetry, covenanting and other regional history. Regarding communal celebration of these interests, however, Dick laconically remarked that he could have 'a nicht wi Burns any time', here referring to the fact that in 1944 he had married Martha Burns, an Auchinleck lass and eventual mother of their 2 sons, Brian and Eric.

Although they set up home at first in Auchinleck, Dick served his time as a bricklayer, later taking his trade into the mines at Sorn. He took early retirement from mining and for many years he and Matt kept the paper shop and general store in Catrine, where they were much valued and respected by the local community.

However, it was Dick's passion for ornithology that endeared him to a much wider community, comprising birdwatchers, ecologists, landowners, farmers, herds and, yes, even a very few gamekeepers. His knowledge of birds, initially kindled at home, flourished on Islay during the war and finally blossomed in the hills of Muirkirk, New Cumnock, Nithsdale and his beloved Galloway. From the 1970s onwards, Dick came to know these hills better than anyone else alive. In this respect his knowledge was encyclopaedic, his spring and summer excursions being augmented by endless winter hours of pouring over maps and old books of the region. It is no exaggeration to say that he knew just about every hill and burn by name, repute and experience; but moreover, he also knew their birds. Hill birds, especially raptors, were his passion and in association with Charles Park, Derek Ratcliffe, Donald Watson and others, he charted the pesticide 'crashes' in their populations of the 1960s and early '70s, making a great contribution to our knowledge of distribution, abundance and productivity of Peregrines in particular. In 1971, 1981 and 1991, he was regional coordinator for the south west in the respective national Peregrine surveys, which confirmed that these birds were well and truly on their way back, despite their continuing persecution on grouse moors.

Throughout the 1980s and early '90s, Dick was indefatigable in his relentless pursuit of breeding information on Peregrine, Golden Eagle, Merlin and Hen Harrier. His field craft was self taught and he developed an uncanny intuition regarding the behaviour of Peregrines. During the breeding season he would spend virtually every half decent day (and many stinkers) on the hill and he demonstrated incredible persistence in tracking down elusive breeding pairs. This regularity allowed him to become widely known to hill folk as Dick the birdman, often bearing rare confectionary treats for the weans. Essentially a very quiet and private man, he was also good natured and excellent company on the hill, if a bit difficult to keep up with at times! He never used a word when a look would suffice, and his subtle, old school humour, derived from his years in and around the mines, brought smiles to many – often long after the event!

On a visit to an apparently unoccupied eagle site with a student from Glasgow University, the young man asked him if he thought that the eagle would have seen them. 'See you' replied Dick, 'it would see you leaving Anderston Cross!' On another occasion he was met by a peer who introduced himself simply by his family title.

Without a hint of cheek or irony, Dick replied: 'pleased to meet you, Roxburgh.' Of Galloway's many and treacherous peaty sheughs or lanes, he would urge caution and perceptively point out that they were 'deep enough to droon ye 3 times ower.' One of my earliest and favourite 'Dickisms', and they were legion, emerged as Dick watched me as I rather self consciously removed a tiny something from my boot, which had been giving me added difficulty in keeping up with the great man. Through a savoured mouthful of his piece (doubtless containing Matt's celebrated rhubarb and ginger jam) Dick observed 'aye, it's jist like yer e'e, there's only room fur it.' However, he was only half joking when he christened a close friend 'Philby' for doing some work on waders when there were raptor nests to be found.

And so it was that Dick's humour, gentle passion, love for and knowledge of his subject won him admiration throughout the 'bird world'. Although many would be followers fell short of his demanding standards, a band of dedicated raptor fieldworkers were inspired and developed under and eventually beyond his guidance to become the raptor study groups of south west Scotland, of which he was to become Honorary President. Indeed, in partnership with Dave Dick of the RSPB, Dick was instrumental in creating the Scottish Raptor Study Group movement.

A long standing member of the SOC, his outstanding contribution to ornithology was recognised by the RSPB in 1992, when he made a rare visit to London to receive their President's Award. On a golden autumn day in the hills behind Loch Doon, Dick remarked 'sit me here wi' a soda scone, a flask o' tea, a pair o' binoculars and I widnae ca' the queen ma auntie.' For many, Dick's spirit will live long in these and other such places, along with the birds that he loved so dearly. He died on 12 April 2001 and is survived by Martha and their 2 sons.

Chris Rollie

A W Colling

1917 - 2001

There are probably few conservationists today who appreciate the debt owed to Tony Colling for the relative security which our countryside and wildlife, particularly birds, presently enjoy.

After graduating in zoology from Newcastle, Tony worked for 15 years as an entomologist in a number of academic and advisory capacities before taking up the post of Conservation Officer with the then Nature Conservancy in Bangor in 1956 where his major task, among many, was the administration and management of NNRs. This dramatic switch from aphids and carrot flies to conservation was to occupy the rest of his working life and these early years provided him with the skills and experience which served him and the Conservancy so well later on - liaising with local and central government on rural issues, formulating conservation policy and setting up SSSIs.

In 1962 he moved to NC's London HQ to fill a new post providing scientific and technical advice on conservation to the director, Max Nicholson. For a number of years he was a major player in the series of conferences, chaired by the Duke of Edinburgh and which culminated in *The Countryside in 1970*. In this major document on countryside management, Tony was perhaps one of the first to address the concepts and processes which are so familiar in conservation today, notably the procedure of Environmental Impact Analysis. This was not a high profile or particularly glamorous job, being in the engine room of conservation rather than on the bridge, but it required not only an in depth knowledge of wildlife and its diverse needs, but considerable expertise regarding the legal and political frameworks in which legislation was to be structured and, not least, a patient reserve when dealing with conflicting interests. Bridging the gulfs of suspicion and distrust which so often

divided those with seemingly irreconcilable differences - conservationists *vs* wildfowlers, farmers and the like, was something at which he quietly excelled.

A move to the NC's Edinburgh office in Hope Terrace in 1966 brought him onto the Scottish scene as head of the Ornithological Advisory Service and Licensing Section. Amongst many other responsibilities, this involved the provision, in house and for outside bodies, of scientific and legal advice on bird protection under the Protection of Birds Acts 1954-67, the formulation of bylaws for the conservation of birds and their habitats, and methods of safeguarding rare birds. Those who were granted permission to photograph or ring Schedule I birds at the nest in those days will remember his signature at the bottom of their licence. He also maintained close liaison with other governmental departments and NGOs on matters of joint interest affecting birds, deer, Badgers and predators. His activities also extended into Europe where he advised on the drafting of legislation concerning wetlands (IUCN) and birds of prey (ICBP as was) and, most importantly, worked in Brussels for the drafting of the EEC Directive on Bird Conservation.

In all his work, Tony was dedicated, industrious, fair and always meticulously prepared. His dealings with BASC (WAGBI as was) were so valued that he was awarded an honorary life membership, although he was not a shooter himself. He served on over 20 committees, including the Rare Breeding Birds Panel, the Secretary of State's Advisory Committee on the Protection of Birds for Scotland, MAFF's Land Pests and Birds Committee, and Northern Ireland's Wild Birds Advisory Committee.

Tony's was a refreshingly pragmatic approach to conservation. He appreciated, probably well before his time, that the "preservationist's" ideal world was at best unrealistic and at worst undesirable, and that many disparate parties had an equally defensible stake in and claim to the countryside and its wildlife. He welcomed the rise in public interest in and support for conservation which blossomed in the 1960s, but remained concerned that the scientific objectivity essential for appropriate and effective conservation measures was being overshadowed by, as he put it, "a trend...towards a more subjective and emotional attitude in arguing the practical, political and biological issues where confrontation arises." He noted how the enthusiasm of unaccountable individuals often outran objectivity, and antagonism with farmers, foresters and other landowners was the unfortunate conclusion which ultimately benefited no one, and certainly not wildlife, and often led to embarrassing and counter productive affrays between established, representative conservation organisations and their perceived antagonists.

My own memories of Tony are as a patient, helpful and friendly boss at Hope Terrace and, years later when both of us were older and at least one of us wiser, of visits during his happy retirement to his cottage in the countryside near Dunbar. Here he delighted in his surroundings and local wildlife, particularly birds. His encyclopaedic knowledge of the birds of his "patch" was probably matched only by their understanding of him - they knew when the food was going to be put out, which of the numerous nestboxes and other artificial nest sites was tailored for their needs, and that any cat which came within their and Tony's territory would be at the receiving end of a well directed clay pellet from his catapult! Tony eagerly awaited the spring arrival of the Grey Wagtails back to their nest site on his garage, and many other birds, from Tawny Owls to Treecreepers, benefited from his imaginative construction and siting of nestboxes.

When not watching birds or building nestboxes, Tony was a highly accomplished classical and

jazz guitarist. He also ran a rest home for old radios, which he would rescue from junk shops, or even rubbish dumps, and then painstakingly restore to working order, was a voracious reader of science (fact and fiction), and worked hard in his beautiful and productive garden. He was a very keen angler and served on the Scottish Committee of the Salmon and Trout Association. His favourite holiday, twice a year, was a fishing trip to the Deveron during the Sea Trout run. All these activities were shared with and enjoyed by his devoted partner Nancy Gordon, herself a prominent conservationist and member of the Hope Terrace team, for 35 years. To her and his daughters Margaret and Jane, we extend our sympathy. Conservation, too, has lost a stalwart friend and innovator.

Mike Fraser

Robert Wood Jackson Smith 1922-2001

It was on 11 December 1949 that Bob Smith's name first appears in my diary. We had evidently met shortly before, but this was the day on which we found ourselves, quite by chance, on the same bus bound for Peebles on a day of glorious winter weather. We went on to spend it together, walking up from the Peebles road to Portmore Loch and then up to and round Gladhouse Reservoir and back down again to the Peebles road, by which time we were in total darkness. We saw many good birds, and Bob left me with the indelible memory of his field skills; his enthusiasm, his inexhaustible good humour, and his striding prowess - from which it took me several days to recover.

It turned out that we had both decided, quite separately, that Gladhouse, with its unspoilt remoteness, made it the ideal patch for us to adopt for weekly visits. Moreover, we would have it more or less to ourselves, for no one else seemed to want it - perhaps influenced by the dismissive comments by the 'Good Ladies' 'Gladhouse, on which a certain number of birds nest, although we do not consider it one of the best'. *A Vertebrate Fauna of Forth, 1935: xviii*

Bob and I quickly got onto a totally harmonious working relationship, which developed into our doing complete weekly counts of all 4 Moorfoot Reservoirs, each of us taking alternate weekends. With characteristic devotion, Bob continued making these counts, latterly in association with Lance Vick, for more than 20 years after I pulled out in 1970.

And we had our rewards. I still have a letter from Miss Evelyn Baxter, dated 8 September 1955 in which she says, 'I tender a profound apology to Gladhouse for calling it - not one of the best for birds - please notify this to the loch. It was ages since I had been at Gladhouse and I had forgotten how very attractive it is.' This was after she had been taken up to Gladhouse, at the age of 76, to see Scotland's first White-rumped Sandpiper!

For about 40 years Bob also maintained regular visits to the Tyninghame estuary. Unlike most of his contemporaries emerging from the Second World War, in which he saw active service with the Royal Engineers in Europe, India and Japan, his interest was not confined to birds. He remained a very active member of the Edinburgh Natural History Society, and it was from that base that some 40 years ago he initiated a series of annual counts of the seabirds breeding on the inner islands of the Firth of Forth. These are still being continued today under a different organisation. He seldom missed the regular meetings of the Discussion Group of the local branch of the Scottish Ornithologists' Club - the forum where field workers discuss and arrange volunteer coverage in their area for the many surveys organised by the various national bodies. He early became a ringer and a trainer in bird ringing, and at the SOC headquarters both he and Betty were for many

Bob Smith *Dougal Andrew*

years members of the invaluable team that could always be relied on to provide volunteer help in matters of mundane administration.

Bob was also an adventurous foreign traveller. He was with Ian Pennie's party in Spitsbergen in 1955, and was one of those fortunate enough to get out to St Kilda in 1956 - the last year before the Army arrived to reoccupy the island for the first time since its evacuation in 1930. In later years he found his way to the Galapagos Islands, a dream come true for one steeped in Darwinism since his childhood, and also to many other foreign parts, including the rain forests of Ecuador and Gambia, where his expertise in catching dragonflies enabled him to bring back much material welcomed by the Royal Museum of Scotland.

It was his future wife, Betty Gall, who had introduced Bob to the potential of dragonflies as a field of study where there was still scope for the amateur to make a real professional contribution. In recent years this occupied more and more of their attention, and they came to be recognised as the leading authorities on Scottish dragonflies. He took immense pleasure in doing productive work for conservation and, especially in his years of retirement, he devoted much time to planning and physically carrying out work on the reserves of the Scottish Wildlife Trust. A joiner by trade, and in every respect a craftsman, his expertise was invaluable and was given with characteristic enthusiasm. Most appropriately, his fellow workers at the Woodhall Dean Reserve in East Lothian have installed a seat there in recognition of his outstanding contribution to the restoration and extension of the old oak woodland at the reserve.

Bob was born at Shotts in Lanarkshire. From early childhood he had been a keen bird watcher. When he was about 20, his parents moved to the Edinburgh area and settled in the house at Loanhead where Bob was still living at the time of his death. He was a man to remember. He was tall, with a big rugged face which, in repose, gave little indication of the quality of personality behind it. But it was never long before the face broke into a grin of total enjoyment. He was blessed with a very clear mind, based upon massive common sense. He was very widely read. He was deeply into classical music: in 1949 he was already enthusing about a Russian composer by the name of Shostakovich! And when, on a crossing of the North Sea I rashly challenged him to a game of chess, I was swiftly put in my place! He was always the most excellent company, with an irrepressible sense of humour, and never better than when conditions were at their worst.

In our early years at Gladhouse, when we were plainly unwelcome to the somewhat morose reservoir keeper and at a time when the water level

was low, I caused great offence by walking down to the water's edge. I seriously feared that our permit might be rescinded. My morale was instantly restored when Bob's next letter started, "Oh dear, I hear you've been messing up the gentleman's nice clean mud!'

Others, I am sure, will have similar cherished memories - most especially Betty, ever supportive at home and in the field, and their daughter Mandy.

Dougal G Andrew

L A Urquart
1910-2001

Louis Urquart grew up in Glasgow and remained all his life a West of Scotland man. Until his retirement in 1970, he worked in the Royal Bank of Scotland, except for his war service in the RAOC, which took him to Italy. In his young days he was a keen and good golfer. He did not enjoy city life and escaped to the countryside whenever possible, becoming an expert trout fisherman. Long before I first met him and his wife, Kathleen, in Dalry in 1953, he had published short notes on birds, mostly in the Clyde area. Louis and Kathleen started to spend holidays in Kirkcudbrightshire soon after the war. We achieved a rapport on our first meeting. His name may not be a household one among birdwatchers throughout the land, but I quickly discovered that he was among the most dedicated and perceptive ornithologists I had met. He was a reserved man but his quiet sense of humour was never far from the surface to those of us who came to know him well. Our friendship led to countless memorable days in the field where he proved the ideal companion. On retirement in 1970 Louis and Kathleen came to live in a bungalow just across the street from us. He had long been an admirer of Professor Meiklejohn's (MFMM's) Saturday articles in the *Glasgow Herald* and had a courteous reply when he wrote to him about discovering the first Scottish Buff-breasted Sandpiper near Glasgow. MFMM acknowledged that his directions on where to find the bird were perfect.

Louis' knowledge of the natural world went beyond birds. Fish and amphibians were special; every year he would come to find out if there was frogspawn in our pond before the end of February. In March, he usually found his first Northern Wheatear a mile from the village before the end of the month. In the autumn he would pick up the first Redwings from hearing their calls as they passed above his house at night. He drove down to Loch Ken in search of geese, especially the flock of Greenland White-fronts. Everything was noted in his voluminous diaries, neatly written in copper plate hand. After his death, I was able to read some of these, including a full page on his discovery of an American Bittern at Loch Ken. Sadly, his record was not accepted by the pundits but I didn't doubt that he was right. He had consulted every book to check against the details of what he had seen.

It might seem surprising, for a keen fisherman, that his favourite bird was the Goosander. He identified with it as a competitor, deploring the persecution it received from many fishermen. As the nesting season approached Louis visited all the sites he knew and followed their success or failure. In his special Goosander diaries there is a history of all the nests he visited in the Glenkens. I sometimes went with him and it was always rewarding to see a nest in which the ducklings had just hatched or later to see them following the duck on the water, often climbing on to her back as she forged ahead. Most of the nests were in hollow trees and as long as he was able Louis visited sites in the winter to clean them up or repair them when necessary.

Until Kathleen died in 1978, the Urquarts spent many holidays on Scottish islands, including Shetland, Skye, Islay, Mull and Arran. At least once they went to Cley in Norfolk. Living on his own for over 20 years he became remarkably self

sufficient, priding himself on his cooking. In 1980 he came with my wife Joan and myself to Andalusia and, in 1982, to Mallorca. He much enjoyed these trips but would not go abroad again, fearing he would be too far from home if he became ill. Twice he joined a party on the Isle of May but he did not enjoy it as much as I hoped.

Probably the most memorable days I spent with Louis were following the fortunes of nesting Hen Harriers and Merlins in the Galloway hills, and once finding a Eurasian Dotterel with chicks on a high top.

For many years he was my companion at roost watches of Hen Harriers in lonely places where weather conditions on winter evenings could be almost insufferable. He was a great reader. No author could quite compete with Dickens for him, but he read widely, including such naturalists as Abel Chapman and Seton Gordon.

His remarkable set of diaries have been lodged in the SOC archives.

Donald Watson

Major Alastair Peirse-Duncombe 1923-2001

In the year 1969 the SOC was faced with the first major problem in its history - the replacement of the Waterstons. George had been the moving spirit behind the founding of the Club in 1936, and had been its Secretary from then until 1959, when Irene naturally and seamlessly took over his place. But now it was Irene's turn to retire. Both had been pioneering ornithologists of their generation. This was the end of an era. How could they be adequately replaced?

Of the candidates interviewed for the post, one was clearly outstanding in terms of personality and evident ability. But he confessed to the fact that, although he had been interested in birds, he could claim no expertise in that subject. The decision to overlook this defect proved to be one of the wisest ever made on behalf of the Club. In no time at all Major Alastair Wilson (he was then in the process of adopting the maternal family surname of Peirse-Duncombe) had taken over the Club as his own very personal concern, and the members quickly came to regard him as a very real personal friend. In this respect it was enormously important that he and his wife Daphne instantly established a close rapport with the outgoing Waterstons.

Alastair was born in Perth, the son of a Regular Army officer in the Black Watch, and he was educated locally at Glenalmond. In 1942 he enrolled with the Royal Artillery; was duly commissioned; saw active service in France and Germany in 1944-45; served thereafter briefly in India; established a wholly happy marriage with Daphne in 1953; and in 1961 suffered the fate of so many Army officers in having to find a second career while still in middle age. For the next 8 years he filled a business post in Glasgow, and no doubt filled it very well. But he found it uncongenial, and so it most happily came about that he responded to the advertisement for the post of Secretary of the SOC.

When the Waterstons moved out to Humbie in 1973, the Peirse -Duncombes replaced them in the "house above the shop" at 21 Regent Terrace, where their easy hospitality epitomised their total integration with the Club. This will be remembered by many as the golden period in the Club's history of good companionship. For one of Alastair's greatest assets was a genuine and spontaneous interest in people, and it was impossible not to respond to his enthusiasm.

By nature conscientious and efficient, these qualities had been sharpened by his Army training,

and the SOC enjoyed real quality control while he was at the helm.

In his 50s Alastair had received warnings of heart problems, and he elected to retire in 1983, when he and Daphne moved down to Gattonside, near Melrose. Most deservedly, they were then both elected Life Members of the Club. Characteristically, he responded to an emergency situation and came back as Acting Secretary of the Club in 1988/89, and he continued to serve as a Council member for the next 5 years. For 6 years from 1977 he had also taken on board the responsibility for running the Fair Isle Bird Observatory Trust.

Also characteristically, he became fully involved in local affairs at Gattonside, and it was in just such a cause that, disregarding medical advice to take things easy, he set off on his last walk up the steep slope above his house and suffered a fatal heart attack. The crowd that packed the large local church where his funeral service was held testified to the esteem in which he was held in this last phase of his varied, but unvaryingly constructive, life.

Alastair is survived by his wife Daphne, who members will remember as having been so totally supportive of her husband during those years with the SOC, and by their children : Sue, Peter and Richard. Happily, Alastair has left behind his own personal *envoi* to the SOC (*Scottish Birds* 13:1)

Happier still for us is what Daphne wrote to me after his death, 'But you know when talking of the SOC it works both ways. How fortunate Alastair was to be taken on as Secretary by George and Irene. He loved the job and he met and made friends with birdwatchers all over Scotland. Friendships that continued- we were the lucky ones!' Well, we won't argue over who were the luckier ones. But we can agree that we have all lost one of the very best of companions.

Dougal G Andrew

John Berry 1907-2002

John Berry was a naturalist who made a difference. When he was born in 1907, there was no electricity in Tayfield House, where his family were local landowners. There were no pine trees on Tentsmuir, where he roamed as boy and accompanied his father on shooting and natural history trips. There were no votes for women, Miss Baxter and Miss Rintoul, friends of the family, were laying the foundations of the modern knowledge of birds in Scotland, and persuaded the Berrys to shoot any bird for them on Tentsmuir that they could not otherwise identify.

John Berry's love of natural history was evident even when he was young. After his father found him carrying horse droppings up to his bedroom to feed his pet dung beetles, he built him a little "bug house" in the garden at Tayfield, and in due course he graduated from keeping insects to keeping wildfowl. Hampered by brittle bones and dyslexia, he nevertheless prospered at Eton and at Cambridge, where he shared digs and an enthusiasm for geese with Peter Scott, correcting the paintings of his friend from his own greater knowledge of the anatomy of wildfowl. "Gooseberry" they called him in those days. At Cambridge he met another young birdwatcher, Bride Freemantle. Together they went off to study the waders on Fulbourne Fen, fell in love, married and eventually had three children.

When John left Cambridge, his career began to prosper as a researcher into fish biology. In 1936 he was elected to a Fellowship of the Royal Society of Edinburgh, at the age of 29. He was a Fellow for 66 years: elected the youngest, he died the oldest, a tenure of Scotland's premier learned society of extraordinary length. From this period, too, comes his only book. In collaboration with Misses Baxter and Rintoul, he amassed the data for the *Wild Geese and Wild Duck of Scotland* (1939), which for the first time of any region of the world,

described the distribution of wildfowl and gave a scientifically based estimate of their numbers. It was an account on which all further work of the group in Scotland came to be based.

During the Second World War, his health precluded him from active service, and he was appointed press censor, apparently as cover for counter intelligence. There is a story of the visit to Tayfield of a Spanish gentleman known to be a German spy, who was plied with food and information, while Spitfires screamed overhead and warships steamed into the Tay.

After the war came to an end John was appointed to the new Hydro Board, designing the fish ladder at Pitlochry so that people could enjoy the sight of salmon moving up river. By then, however there were exciting initiatives in nature conservation. In 1948 he was sent to Fontainbleau for the founding meeting of the International Union for the Preservation (later Conservation) of Nature. At much the same time he was approached to become Director of the new Nature Conservancy in Scotland, a post he held for 18 years, in which the character of the organisation was formed and its operations became part of the fabric of Scottish Government and life.

His greatest achievement was to establish the great series of Scottish National Nature Reserves, beginning with Beinn Eighe in 1951, when he was sent to buy a pine wood for £4000 and returned with the whole mountain. He added to Beinn Eighe a whole stream of other nature reserves, including Tentsmuir and Morton Lochs, Loch Leven, the Cairngorms (by agreement), and Rum, purchased from its wealthy lady owner over the horses at Newmarket. He achieved wonders, and the award of a CBE was some recognition of this. 'I am not a Scottish Nationalist' he was wont to say, 'I am a Scottish Naturalist', and we owe him a debt for his stewardship of Scottish nature that is hard to calculate.

When he retired from the Nature Conservancy, he threw himself into the activities of nature conservation worldwide. He received Honorary Degrees from both Dundee and St. Andrews and he was busy everywhere with societies that were involved in wildlife, the Zoological Society, the SOC and the SWT especially.

When the time came for him to leave Tayfield for a home in the grounds with fewer stairs, he built himself a new bug house and bred tropical butterflies. There I remember him in his last years, so friendly, so talkative, so amusing, surrounded by books, so rightly proud of what he had done yet so unassuming in other ways, always willing to help a student, or pass the time of day with a naturalist of any description. We have much to be thankful for in the life of John Berry.

T C Smout

Advice to contributors

Authors should bear in mind that only a small proportion of the *Scottish Birds* readership are scientists and should aim to present their material concisely, interestingly and clearly. Unfamiliar technical terms and symbols should be avoided wherever possible and, if deemed essential, should be explained. Supporting statistics should be kept to a minimum. All papers and short notes are accepted on the understanding that they have not been offered for publication elsewhere and that they will be subject to editing. Papers will be acknowledged on receipt and are normally reviewed by at least 2 members of the editorial panel and, in most cases, also by an independent referee. They will normally be published in order of acceptance of fully revised manuscripts. The editor will be happy to advise authors on the preparation of papers.

Reference should be made to the most recent issues of *Scottish Birds* for guidance on style of presentation, use of capitals, form of references, etc. Papers should be typed on one side of the paper only, double spaced and with wide margins and of good quality; 2 copies are required and the author should also retain one. We are also happy to accept papers on disk or by email at: mail@the-soc.org.uk, stating the type of word processing package used. If at all possible please use Microsoft Word 97. Contact the Admin Officer on 0131 653 0653 for further information.

Headings should not be underlined, nor typed entirely in capitals. Scientific names in italics should normally follow the first text reference to each species unless all can be incorporated into a table. Names of birds should follow the official Scottish List (*Scottish Birds* 2001 Vol 22:33-49). Only single quotation marks should be used throughout. Numbers should be written as numerals except for one and the start of sentences. Avoid hyphens except where essential eg in bird names. Dates should be written: ...on 5 August 1991...but not ...on the 5th... (if the name of the month does not follow). Please **do not** use headers, footers and page numbers. Please note that papers shorter than c700 words will normally be treated as short notes, where all references should be incorporated into the text, and not listed at the end, as in full papers.

Tables, maps and diagrams should be designed to fit either a single column or the full page width. Tables should be self explanatory and headings should be kept as simple as possible, with footnotes used to provide extra details where necessary. Each table, graph or map should be on a separate sheet, and if on disc each table, graph, map etc should be on a separate document. Please **do not** insert tables, graphs and maps in the same document as the text. Maps and diagrams should be either good quality computer print out and in black and white (please **do not** use greyscale shading) or drawn in black ink, but suitable for reduction from their original size. Contact the Admin Officer on 0131 653 0653 for further details of how best to lay out tables, graphs, maps etc.

Scottish Birds

Volume 22 **Part 2** **December 2001**

Contents

Published by the Scottish Ornithologists' Club,
Harbour Point, Newhailes Road, Musselburgh, EH21 6JS.