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Roof and ground nesting Eurasian Oystercatchers in Aberdeen

A DUNCAN, R DUNCAN, R RAE, G W REBECCA & B J STEWART

In 1993 Aberdeen had a population of at least 275 pairs of breeding Eurasian Oystercatchers of which 205 nested on roofs. This was probably the highest concentration of roof nesting Oystercatchers in Europe. Productivity for a sample of the roof nesters was 0.8 fledged young per pair. This compared favourably with other ground nesting populations inBritain. Factors possibly facilitating the increase of the population and some of the problems resulting from a wader colonising an urban environment are discussed.

Introduction

The Eurasian Oystercatcher* *Haematopus ostralegus* is a common breeding wader in Britain, with numbers and range having increased during the twentieth century (Cramp & Simmons 1983, Marchant *et al* 1990). It had a chiefly coastal distribution in Britain and Ireland but now also breeds inland in northern England and Scotland (Cramp & Simmons 1983, Dare 1993).

In the early 1990s, there was an estimated 82,500 breeding pairs in lowland Scotland (O'Brien 1996). In north east Scotland it is a widespread bird on most open habitats apart from moors and mountain tops (Buckland *et al* 1990).

Eurasian Oystercatchers normally nest on sparsely vegetated ground or on shingle, but are well known for using unusual sites such as roofs, fence post tops, tree stumps and broken walls (Paton & Willis 1973, Smith 1981, Cramp & Simmons 1983). In Scotland they have even nested in shallow hollows in trees (Smith 1989, Dougall *et al* 1989, Kirk 1991).

Eurasian Oystercatchers were first noted nesting on roofs in Aberdeen in 1966 when a pair reared 2 young on a flat school roof (RR *pers obs*). The earliest published records from Aberdeen were of 4 pairs at separate roofs between 1971 and 1974 (Paton & Willis 1973, Bourne 1975).

The early history of ground (1960s) and roof nesting (1971-75) at one of these locations was described in detail by Mills (1978). In the late 1970s, A Knox estimated about 30 roof nesting pairs in Aberdeen and reported that the population appeared to be increasing (in Marren 1982).

The first attempt to quantify the extent of roof nesting within the urban and suburban areas of Aberdeen took place in 1986, when 109 confirmed or possible breeding pairs were located, of which 74 were confirmed as roof nesters and 23 as ground nesters (Rae *et al* 1986). In 1988 BJS and F Tadhunter organised a similar census as did AD and RD in 1993. This paper presents the results from these surveys, discusses the increase of the population and compares the hatching success and productivity from a sample of the roof nesting pairs with other studies of ground nesting Eurasian Oystercatchers in Britain.

History of roof nesting

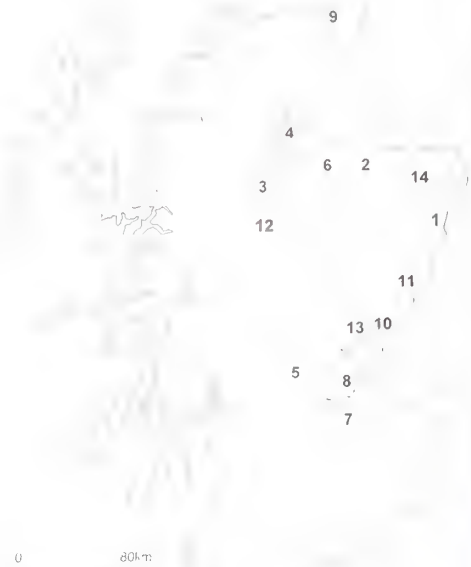
A request through the Internet in 1998 for information on roof nesting by Eurasian Oystercatchers and follow up correspondence revealed that the earliest records were from Holland, where pairs used ridged roofs in Texel in 1916 and the flat roof of a hospital in Friesland in 1936 (J Hulscher *in litt*, see also Tekke 1978). Other records from Holland included 10 to 20 pairs in The Hague (W L Janse), at least 25 pairs in Amsterdam

**Scottish Birds* has now adopted the latest BOURC English names (refer to pages 33-49 for the SBRC paper)

(M Kuiper), 4 to 6 pairs in Groningen (J Allex) and 46 pairs in south Kennemerland following a survey in 1986 (F Cottaar *in litt)*. Further records were received from Sweden: 3 towns including about 10 pairs in Stockholm (J Nillson), Norway: 5 towns, Denmark: 7 towns and Germany at least 18 towns (see also Vauk & Mathiske 1980). Single records were received from Riga in Latvia and Ordfordness in Suffolk, south east England.

In Scotland, away from the Aberdeen area, roof nesting has been reported from Elgin in the mid 1970s (Suttie 1996); Inverness, one pair in 1983 and 9 pairs in 1995 (Munro 1984, Crooke & Vittery 1997); Tain and Stirling in 1987 (Nethersole-Thompson 1988 & M V Bell *pers comm* respectively); Forres by the early 1990s (Cook 1992); South Queensferry in 1992 (A Hilton *pers comm*); Inverkeithing and Dunnet in 1993 (P Doyle & N Money *pers comm* respectively); Nethybridge and Montrose in 1995 (Crooke & Vittery 1997 & H Bell *pers comm* respectively); Monifieth in 1994 and Dundee in 1996 (Lynch 1997) and Turriff in 1997 (*per* GWR) (Figure 1). The occurrence of roof nesting would therefore appear to have been fairly widespread in north west Europe by the late 1990s.

Figure 1 ***Map of mainland Scotland and the Western Isles showing the locations of towns or villages with records of roof nesting Eurasian Oystercatchers. Names and the dates first reported are as follows: 1 Aberdeen 1966, 2 Elgin mid 1970s, 3 Inverness 1983, 4 Tain 1987, 5 Stirling 1987, 6 Forres early 1990s, 7 South Queensferry 1992, 8 Inverkeithing 1993, 9 Dunnet 1993, 10 Monifieth 1994, 11 Montrose 1995, 12 Nethybridge 1995, 13 Dundee 1996, 14 Turriff 1997.***



Methods

Prior to each survey in Aberdeen a list of known and possible breeding sites was compiled. Fieldwork began in late January to coincide with the return of Eurasian Oystercatchers to their breeding areas. All potential sites ie building complexes with flat roofs and nearby mown grass areas were checked with as many roofs as possible being viewed from vantage points. Between late January and mid April all Eurasian Oystercatchers seen feeding, roosting or displaying near potential breeding sites were noted. Further visits were made as necessary to confirm if pairs were present. As it was not possible to gain access to, or view, all roofs some pairs may have been missed.

Observations of an incubating bird, eggs, chicks, adults carrying food or alarm calling were classed as confirmed breeding. Two or more sightings separated by at least 2 weeks of a pair of Eurasian Oystercatchers present at, or near a potential breeding site was recorded as possible breeding. For the 1986 and 1993 surveys all confirmed and possible roof nesting pairs within the city boundary

and all the ground nesting pairs in the built up areas were mapped. Between 1988 and 1993 hatching and fledging success was recorded from a sample of the roof nesting pairs. Productivity was measured as the number of young fledged per breeding pair (Harris 1967, Heppleston 1972 & Briggs 1984).

Results

Numbers

The number of confirmed and possible breeding pairs located are shown in Table 1. Between 1986 and 1993 the total increased by 152% (109 to 275) with confirmed roof and ground nesting pairs increasing respectively by 177% (74 to 205) and 30% (23 to 30). In 1988 and 1993 the percentage of roof nesting pairs was the same at 87%.

Distribution and density

Figures 2 and 3 show the distribution of all confirmed and possible breeding pairs in 1986 and 1993 respectively. The highest concentrations were found around large building complexes such as Aberdeen University campus, Foresterhill hospital, large schools and the industrial estates (Figure 3). For example, one school with roofs at varying heights held 6 breeding pairs over an area of 1.03ha of roof and 8.36ha of mown grass, where birds were observed feeding. By 1993, the average density over all of the built up areas was 2.7 pairs per km^2.

Nest sites

Roof sites were generally flat and coated with bitumen, with a covering of small granite chips or other small stones or pebbles. However, in 1993 7 nests were on sloping roofs up to 15° gradient. Nests were usually a hollow shaped out in the gravel but occasionally the gravel was built up into a mound. The height and area of the roofs varied considerably.

The lowest were at 3m on a school shelter and on a small electricity sub station and the highest were approximately 40 to 45m on a university building and on a school. The smallest area of roof was 3m^2 and the largest was approximately 2000m^2. Extraordinary sites included house extensions, dormer windows, busy public houses, as well as Aberdeen fire station and a garage/car salesroom both on a dual carriageway.

Ground nests were largely located in pipe storage yards or derelict areas of stony ground in industrial estates. Other sites included the quadrangles of a hospital and a school, large flower pots, flower

Table 1 ***Minimum number of confirmed and possible breeding pairs of Eurasian Oystercatchers in Aberdeen in the late 1970s, 1986, 1988 and 1993.***

Year	Pairs confirmed breeding roof (%)	Pairs confirmed breeding ground (%)	Pairs possible breeding	Pairs total	Source
late 1970s	c30	?	?	c.30	A Knox (in Marren 1982)
1986	74 (76)	23 (24)	12	109	Rae *et al* 1986
1988	107 (87)	16 (13)	?	123	this study
1993	205 (87)	30 (13)	38	275*	this study

* Two records in 1993 were of pairs with broods which appeared near buildings but the actual nest sites were not located.

Figure 2 *Distribution of Eurasian Oystercatcher pairs in the urban and suburban areas of Aberdeen in 1986. ● = confirmed breeding, o = possible breeding, number of pairs shown when more than one. _____ _ _____ = Aberdeen City boundary, _ _ _ _ _ _ _ _ = built up areas.*

Figure 3 *Distribution of Eurasian Oystercatcher pairs in the urban and suburban areas of Aberdeen in 1993. ● = confirmed breeding, o = possible breeding, number of pairs shown when more than one. _____ _ _____ = Aberdeen City boundary, _ _ _ _ _ _ _ _ = built up areas. note : dots outside the built up areas are roof nesters.*

beds, an ornamental pedestal at drive way entrance, cricket pitch, sports stadium sand pit, centre of football pitch, a car park, under a park bench, base of headstone in cemetery, temporary roundabout (1m diameter) and the gravel edge of a pathway to the main entrance of an office block.

The location of all confirmed breeding attempts in 1993 are detailed in Table 2. The industrial estates, schools, colleges and universities combined held two thirds of the pairs.

Breeding performance of roof nesters

The outcome of 89 roof nests was monitored between 1988 and 1993. The hatching success was 69% from 223 eggs laid and 71 young were fledged giving a productivity of 0.8 fledged young per pair. The percentage of eggs hatching and the productivity were both at the higher end of the range when compared to other studies (Table 3).

Discussion

Numbers and density

There was a large increase in the number of breeding Eurasian Oystercatchers in Aberdeen's urban and suburban environment following the initial colonisation. The population rose from a few pairs in the early 1970s to at least 275 pairs in 1993, with 87% nesting on roofs. Three factors were probably instrumental. Firstly, there was a large number of flat roofs with a layer of gravel. Eurasian

Table 2 ***Nest site location of all confirmed Eurasian Oystercatcher breeding attempts in Aberdeen in 1993.***

	roof	ground	combined total (%)
Industrial Estates	76	15	91 (39)
Schools	31	1	32 (14)
Universities & Colleges	27	4	31 (13)
Hospitals & Research Institutes	18	3	21 (9)
Hotels & Public Houses	17	0	17 (7)
Offices	10	0	10 (4)
Dwelling Houses	10	0	10 (4)
Shops	8	0	8 (3)
Others*	8	7	15 (6)
Totals	**205**	**30**	**235**

* *roof: airport terminal (2), leisure centres (2), fire station, crematorium, garage/car salesroom, covered reservoir*
ground: covered reservoirs (3), market garden (2), cemetery, football stadium car park

Oystercatchers prefer open areas for nesting as an adaptation against the approach of predators (Heppleston 1972) and the gravel on the roofs is similar to the original habitat of coastal shingle. Secondly, there were extensive and frequently cut grass areas throughout the built up areas in the form of playing fields, parks, roadside verges and other ornamental and recreational areas. These provided convenient, apparently invertebrate rich, feeding areas for the birds. Thirdly, Eurasian Oystercatchers are one of the few waders which carry food to their chicks (Cramp & Simmons 1983). Birds were observed flying from the roofs to the grass areas and returning with food for their young. Therefore, it appears that a combination of suitable nesting sites, convenient feeding areas and the ability to carry food to their young made the exploitation of this nesting habitat possible.

Their subsequent colonisation led to relatively high densities in areas where there were complexes of roofs with nearby feeding areas. Interestingly, while nests were sometimes close to each other in terms of distance, no pairs shared a common roof or incubated within sight of one other, although they would have been in sight when flying. This contrasts with the situation found by some other workers, for example, Nethersole-Thompson (1988) quoted several instances where Eurasian Oystercatchers were found nesting as close as 3m apart.

The habit of roof nesting spread during the 1980s and 1990s to other small towns and villages around Aberdeen such as Inverurie (20km), Whitecairns (12km), Ellon (25km) and Stonehaven (20km). In addition, roofs in the midst of farmland, where there would appear to be no shortage of suitable ground for nest sites, have also been adopted, for example the Lairhillock Inn 12km from Aberdeen had one pair in 1993 (Gourmet 1997) and 3 in 1998 and Finzean school (35km) held a breeding pair between 1990 and 1999.

The Scottish, and hence British, population of roof nesting Eurasian Oystercatchers in 1993 was possibly around 250 pairs. In 1998 J Hulscher (*in litt*) considered that nearly every town and village in Holland, within the species breeding range, had roof nesting pairs, with the district of south Kennemerland having the largest concentration with 46 pairs (J Cottaar *in litt*). Aberdeen would therefore appear to have been unique in 1993, with at least 275 urban and suburban pairs of which 205 were roof nesters. This was probably the highest density of roof nesting Eurasian Oystercatchers in Europe.

Table 3 *The breeding success from a sample of roof nesting Eurasian Oystercatchers in Aberdeen during 1988 to 1993 and comparison with other ground nesting studies in Britain.*

locality	number of nests	% eggs hatched	% eggs producing fledged young	number of fledged young per pair	years	source
Skokholm Island (Wales)	98	64	31	0.9	1963-64	Harris 1967
north east Scotland						
coastal	52	47	13	0.4	1966-68	Heppleston 1972
inland	139	50	23	0.7	"	"
north west England						
coastal	112	19	13	0.4	1978-80	Briggs 1984
riparian	202	17	11	0.4	"	"
agrarian	34	42	32	1.0	"	"
Aberdeen, roof nesting	89	69	32	0.8	1988-93	this study

Breeding performance of roof nesters

Productivity from a sample of the roof nesters compared favourably with other ground nesting studies from Britain (Table 3). This was possibly due to a lack of ground predators, convenient food supply and minimal disturbance. Harris (1967) found a similar level of productivity on the Welsh island of Skokholm where there were no ground predators. In Aberdeenshire, Heppleston (1972) found that inland nesting birds had a higher productivity than coastal breeders and reasoned that this was because they exploited a food source nearer to their nest sites and subsequently spent less time away from the chicks and more time being vigilant for predators.

Problems of roof nesting in the city

Roof reared chicks often fall off or are blown from roofs. If they fall when small they often survive, presumably because they are so light, but when they are large this can result in injury or death. Also, once off the roofs they are sometimes killed by traffic or ground predators. Further, although chicks are largely safe from ground predators when on roofs, they have been observed being taken by crows *Corvus spp*, gulls *Larus spp*, Common Kestrels *Falco tinnunculus* and Eurasian Sparrowhawks *Accipiter nisus.*

In the 1990s, leakage at some roofs led to them being resurfaced. Replacement bitumen is laid but the gravel covering is often omitted. Without gravel, the roof is largely unsuitable for nesting, although on some roofs a build up of debris such as

dead moss has resulted in the birds nesting successfully. Some pairs have been encouraged to remain on resurfaced roofs by providing a small amount of gravel or shingle. For example, in 1985 a janitor emptied a bucket of gravel onto a resurfaced roof and it was still in use in 1993.

In 1993, at 2 sites where Eurasian Oystercatchers had previously nested on the roofs and resurfacing had taken place, nests were found nearby on the ground on small areas of gravel. Both failed due to excessive disturbance. Four other former nest sites were lost in 1993, 2 due to buildings being demolished and 2 due to resurfacing during the breeding season.

Problems of ground nesting in the built up areas

The catholic choice of nest sites by ground nesters also leads to problems. Nests on sports pitches or near busy public roads often fail due to repeated disturbance or removal of eggs. However, a nest on the Aberdeenshire Cricket Club pitch in 1986 was successful almost certainly because the groundsman moved the practice wicket.

The future

Aberdeen's population of urban nesting Eurasian Oystercatchers increased rapidly between the 1970s and the mid 1990s. Their adaptation to roof nesting and to other urban and suburban sites and their utilisation of a convenient food source allowed them to fill a previously unexploited niche. A further survey in 1998 showed a slight fall in numbers (A Duncan & R Duncan *unpublished*). Whether this indicates a decline in the population or a levelling off will be revealed by further surveys. The main threats during the 1990s were the resurfacing of roofs and the loss of mown grass feeding areas to building development. However, the provision of gravel or an open box of soil by sympathetic observers has allowed some sites to be maintained after resurfacing. It is intended to continue the study and marking of chicks and adults with coloured and individually numbered Darvic rings begun in 1997.

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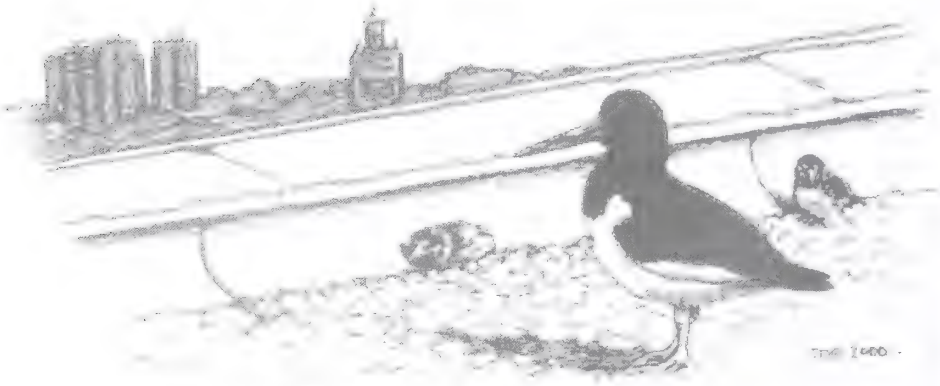

The contrasting status of the Ring Ouzel in 2 areas of upper Deeside, north east Scotland between 1991 and 1998

GRAHAM W REBECCA

In 1998, surveys on 2 areas of upper Deeside, north east Scotland confirmed the findings of a study in 1991 which showed a relatively high density of breeding Ring Ouzels in the Glen Clunie area and low numbers on part of Mar Lodge estate. The contrasting densities in the 2 study areas were probably a result of subtle habitat differences linked to geology, soils and land use. In 1998 the Glen Clunie study area held at least 59 pairs. This represented approximately 1% of the United Kingdom population as estimated in 1999 and in contrast to many other areas of Britain this population was stable or had possibly increased during the 1990s.

Introduction

In 1996 the Ring Ouzel *Turdus torquatus* was included in the Amber List of birds of conservation concern in the United Kingdom, Channel Islands and Isle of Man (Gibbons *et al* 1996[a]). This followed a 27% decline in range per 10km^2 between the 2 British breeding bird atlases covering 1968-72 and 1988-91 (Sharrock 1976, Hill 1993). The range decline was complemented by an assessment of population trends which indicated there had been a small but steady decline in Britain between 1900 and 1995 (Gibbons *et al* 1996[b]). In Scotland, Baxter and Rintoul (1953) reported a serious decrease in the population during the first half of the twentieth century. This trend continued until the early 1980s, particularly south of the Grampians (Thom 1986).

In the 1990s Ring Ouzels were poorly censused by the British Trust for Ornithology (BTO) annual Common Bird Census and Breeding Bird Survey. By 1997 concerns amongst some Royal Society for the Protection of Birds (RSPB) staff and other ornithologists over reported declines in England and Wales (Appendix 1) and south west Scotland (C J Rollie *pers comm*) led to a survey of 135 traditional nesting sites in south Scotland. The results confirmed serious declines, particularly in Galloway and Ayrshire where there were no records from 29 former sites. In total, breeding was proven or probable at 53 former sites (39%) (Sim 1997). The formation of a national Ring Ouzel study group followed and by autumn 1998 the RSPB, with the help of the group, had produced a Species Action Plan (SAP) with the priority statement indicating the need for conservation action to determine the extent and causes of the declines (RSPB 1998). One main recommendation from the SAP was that a survey was necessary to establish the current breeding population of Britain and Ireland which had previously been estimated at 5680 to 11360 pairs (Hill 1993). This was undertaken in 1999 resulting in a population estimate for the United Kingdom of 6155 probable or confirmed breeding pairs (95% confidence limits of 3586-9369) (Wotton *et al, in prep*). The SAP and the study group also encouraged local studies of this relatively poorly known species.

In north east Scotland Ring Ouzels breed in the upland moors and glens, mainly on upper Donside and on Deeside from the Cairngorms to the Glen Dye and Cairn o' Mount areas. Breeding range per 10km^2 differed little between the first British atlas covering 1968-72 (19 squares) and the north

east Scotland (NES) atlas covering 1981-84 (17 squares) (Buckland *et al* 1990). In 1991 the Joint Nature Conservation Committee (JNCC) moorland bird surveys on upper Deeside at Glen Clunie (GCsa) and Mar Lodge (MLsa) study areas (Figure 1) resulted in 45 and 4 pairs respectively of Ring Ouzels being located (Brown & Shepherd 1991). The density and maximum number of pairs per 1km^2 in the GCsa were the highest recorded when compared to similar studies in Scotland and England and the average number of pairs in occupied 1km squares was high at 2, and second only to Angus with 2.53 pairs. By contrast, the densities at the MLsa were low and similar to those found in the declining populations in south Scotland (Appendix 2). The NES atlas also showed either low density or no pairs on Mar Lodge estate and higher density in the Glen Clunie area (Buckland *et al* 1990).

This study in 1998 aimed to cover the 1km National Grid squares or part squares to the nearest 1/4, that held Ring Ouzels in 1991, and a random sample of 1km squares which held no Ring Ouzels in 1991. A comparison of distribution and numbers could then be made from the early to late 1990s, a decade in which Ring Ouzel declines were reported from widespread areas of Britain since the 1970s and 1980s (Appendix 1, Francis *et al* 1999).

Methods

In the 1991 survey breeding Ring Ouzels were located within 25 1km squares or part squares in the GCsa comprising 22.5km^2 and within 4 squares or part squares comprising 3km^2 in the MLsa (Figure 1). In 1998 the same 25.5km^2 was surveyed using the same systematic methods over the same number of visits as in 1991, except that the time

Figure 1 ***Map showing the location of the JNCC Glen Clunie and Mar Lodge moorland bird survey study areas in 1991 and 1-km squares or part squares surveyed for Ring Ouzels in 1998, ■ = squares with Ring Ouzels in 1991, □ = random squares.***

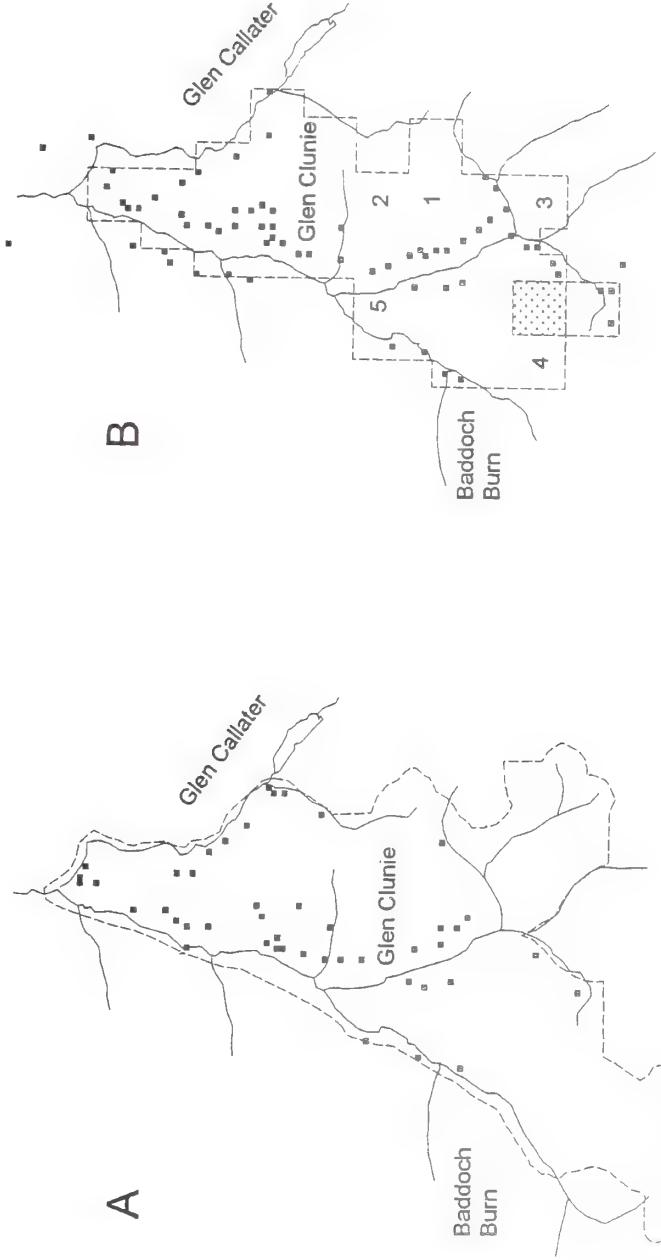

Figure 2 *Distribution of Ring Ouzel pairs in the Glen Clunie study areas from 1991 (map A) and 1998 (map B). Broken lines are the study area boundaries and continuous lines are rivers and tributaries. Numbers 1-5 are centered on the random 1km squares surveyed in 1998. The stippled 1km square was not surveyed.*

period was wider. Each 1km square or part square was divided into 500m x 500m squares (0.25km^2) and surveyed twice in the GCsa and once in the MLsa between 1 May and 14 June (the second visits to 3 1km squares were later, one on 16 June and 2 on 3 July). The JNCC study period of 11 May to 13 June was decided by factors other than biological (A F Brown *pers comm*) and most Ring Ouzels on upper Deeside should have been on territory by late April (Buckland *et al* 1990). In 1991 and 1998 each 0.25km^2 was surveyed for 25 minutes between 0830 and 1800 hours on each visit. The whole area was checked thoroughly by walking about, pausing, scanning and listening such that all parts of the square was visible and was not carried out in strong wind or precipitation more than light rain or when low cloud or fog affected visibility. The location and activities of all Ring Ouzels were recorded separately for each visit on 1:25000 maps and then combined at the end of the study period. Birds were counted as breeding if they were observed in song, courtship display, distraction display, repetitive alarm calling, territorial dispute or were carrying nest material or food or if a nest, eggs or young were found. Pairs were considered to be separate if proven in the field or if the observations listed above were at least 200m apart. To identify if there had been any increase in distribution since 1991, 5x1km squares, with no Ring Ouzels in 1991, were selected at random from each study area in 1998 and surveyed using the same methods and timing (Figures 1 and 2b).

In addition, as part of other studies all 1km squares on Mar Lodge estate were visited at least once in June 1998 to record birds and other fauna and flora (MTMBST 1999 and National Trust for Scotland [NTS] records) and the Ring Ouzel data was made available for this paper. This meant that there was considerably more fieldwork done in 8km^2 in the MLsa in 1998 than in 1991. Further, another 10 pairs were located in Glen Clunie in 1998 during a study of Ring Ouzel breeding ecology (Sim *et al* 2000), 8 were outwith and 2 were in the study area. These 10 pairs are shown in Figure 2b and the latter 2 are also included in Appendix 3.

In 1998 the different habitat types were assessed to the nearest 5 hectares for each occupied 1km square or part square using standard BTO habitat codes to levels 1 and 2 (Crick 1992).

Results

The area surveyed and number of pairs located in 1998 are given in Table 1 and the distribution of pairs in the GCsa are shown in Figure 2b.

Glen Clunie

There were 57 pairs (+2 see above) in the study area, a comparative increase of 12 (27%) since 1991. The 59 pairs were located within 22 1km squares, giving a density for occupied squares and part squares of 3 pairs per km^2 (n = 19.5 km^2). For the 16 complete 1km squares one held 6 pairs, 3 held 5, one held 4, 5 held 3, 3 held 2 and 3 held one (Appendix 3). There were no pairs located in the other 3km^2 nor in the 5 random 1km squares surveyed.

Mar Lodge

Only 2 pairs were located, one of which was in a random square, about 250m from a site occupied in 1991. This represented an overall decrease of 50% but sample sizes were too small to be meaningful.

Habitat

In the GCsa habitat was recorded for 19.5km^2 of which 57% was estimated as dry or wet heath, dominated by Heather *Calluna vulgaris* and *Erica*; 20% was a mixture of semi natural grass moor and grass moor with heather; 18% was cliff, crag, scree or boulder slopes and 5% was apparently

Table 1 ***Pairs of breeding Ring Ouzels in Glen Clunie and Mar Lodge study areas in upper Deeside in 1991 and 1998.***

	1991*			1998		
	Area surveyed (km^2)	Number of pairs	Area with Ring Ouzels to nearest $0.25km^2$	Area surveyed (km^2)	Number of pairs	Change in numbers from 1991 to 1998
Glen Clunie	46	45	22.5	22.5+5 random	57	+12
Mar Lodge	60	4	3	3+5 random	2	-2

* from Brown & Shepherd 1991

improved or unimproved grassland. Habitat on $2km^2$ of the MLsa was estimated as 70% dry or wet heath, 15% grass moor with heather and 15% cliff, crag, scree or boulder slopes (Appendix 3).

Discussion

Numbers and land use

The GCsa held a large number of breeding Ring Ouzels in the early and late 1990s with a relatively high density in comparison to other areas of Britain. There was an apparent increase of 27% between 1991 and 1998 despite birds being absent from $3km^2$ which held 3 pairs in 1991. However, some of the increase may have been a result of this survey having a longer study period and concentrating on a single species whereas the JNCC study covered all upland birds. The earlier start date may have influenced the numbers recorded on the first visits, allowing less time for failed breeding attempts to be missed than in 1991. Regardless of any potential biases between survey methods in 1991 and 1998 the numbers located in the GCsa and nearby in 1998 equate to 1.1% of the estimated breeding population for the United Kingdom in 1999.

The stability, or possibly even increase of the population in the GCsa is of interest to conservationists as there were reported declines, some serious, in many areas of England, Wales and Scotland between the 1970s and 1990s (Appendix 1, Francis *et al* 1999). Stable populations have also been found in Glen Esk, Angus, approximately 30km east of Glen Clunie (D Arthur *pers comm*) and on Dartmoor, south west England (Appendix 1). The mosaic of habitats and the land use in the Glen Esk study area were similar to that in Glen Clunie (Arthur 1994 & *pers comm*) with heather the main plant species and a large proportion of the remaining habitat comprising of grasses and crags, scree and rock debris. The management at the GCsa and Glen Esk, concentrated on producing Red Grouse *Lagopus lagopus* and Red Deer *Cervus elaphus* for sport shooting. Sheep were abundant during spring and summer and Mountain Hare *Lepus timidus* and Rabbit *Oryctolagus cuniculus* were other common herbivores. The drier heather slopes are burnt regularly in strips or patches, to provide fresh shoots for grouse, deer and sheep, resulting in a variety of different age heather stands. Many Foxes *Vulpes vulpes*, Stoats *Mustela erminea* and Carrion Crows *Corvus c. corone*,

known to be predators of Ring Ouzels (Durman 1977, Appleyard 1994) are killed each year by gamekeepers. The level of burning, grazing and gamekeeping during the 1990s (and probably for >10 years earlier judging by the densities from the NES atlas) obviously suited breeding Ring Ouzels. The overall management, land use and habitat in the GCsa appeared to change little between 1980 and 1999 (*pers obs*).

In contrast, at the MLsa Ring Ouzels were found at low density with large areas having no Ouzels. A similar scenario was shown in the NES atlas from fieldwork during 1981 to 1984. The other ornithological surveys in June 1998 covering all of Mar Lodge estate provided further evidence of low numbers of Ring Ouzels, with only another 9 pairs located, giving a total of 11 in approximately 300km^2 of non woodland habitat (MTMBST 1999 and NTS). NTS records from 1996 to 1999 add little to this cumulative total suggesting that the low numbers found in 1998 were probably genuine. The traditional management on Mar Lodge estate was for Red Deer and Red Grouse shooting using similar methods as in the GCsa but there was no sheep rearing between 1995 and 1999.

Soils, vegetation and land capability for agriculture

Glen Clunie has been described as being lime rich (Nethersole-Thompson & Watson 1981) whilst the non woodland area of Mar Lodge estate in 1997 was largely composed of blanket bog and montane plateau (NTS Ecological Zone Map provisional, 1997). Limestone outcrops occur near Glen Clunie and Glen Callater (Geological Survey 1957) and some of the soils there are richer and of better quality than at Mar Lodge estate (Walker *et al* 1982). In the GCsa soils in the valley bottoms have the potential to produce arable crops or permanent pasture (5_1 in land capability map [LCM] in Walker *et al* 1982) and this does occur. The valley slopes are dominated by dry heather moor or acid bent fescue grassland and soils are largely humus iron podzols and brown forest soils with peaty gleys (Walker *et al* 1982 & soil map).

On Mar Lodge estate agricultural potential is limited to rough grazing (6_3 & 7 in the LCM). In the lower areas the dominant vegetation is wet and dry heather moor, bog heather moor and blanket bog and soils are largely peaty podzols and peaty gleys (Walker *et al* 1982 & soil map).

The proportion of grassland and calcareous flushes on the better, less acidic soils in the GCsa is probably one reason why there were large numbers of Ring Ouzels. Less acidic soils contain more earthworms (Oligochaeta), which are one of the main spring and summer foods of the Ring Ouzel (Poxton 1986, Cramp 1988, Tyler & Green 1994, Appleyard 1994). In 1998 the birds were regularly observed foraging on grass and flushes, and earthworms appeared to be the main food item brought to chicks. It would be interesting to compare earthworm abundance from the preferred feeding areas in the GCsa and the Glen Esk study area with samples from the MLsa and those already collected from a declining population in Wales (Tyler & Green 1994).

For whatever reasons the GCsa was clearly a good environment for Ring Ouzels in the 1990s with a relatively dense, and at the least, a stable population. This was in contrast to many other areas of Britain where declines were reported between the 1970s and 1990s. With at least 1% of the estimated breeding population for the United Kingdom in 1999 in parts of Glen Clunie, Glen Callater and the Baddoch Burn the overall area can be considered important for Ring Ouzel in national terms.

Future work

To make further comparisons with other studies in Britain, for example in Angus (Arthur 1994), the Pentland Hills (Durman 1977, Poxton 1986), the

Yorkshire Dales (Appleyard 1994) and Wales (Tyler & Green 1994, Hurford 1996) a detailed study of breeding ecology and population dynamics at Glen Clunie is necessary. This began in 1998 and 1999 and is planned to continue for at least a further 2 years (Sim *et al* 2000). Information on site occupancy, nest location and habitat, egg laying date, clutch size, productivity, diet and growth rate of young, occurrence of double nesting, nest site fidelity and return rate of colour ringed chicks have been collected. It is hoped that some of the results may shed light on the birds breeding ecology relevant to other areas of Britain.

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Ring Ouzel *William Brotherston*

Appendix 1 ***Changes in Ring Ouzel numbers from comparable studies (from RSPB 1998, SAP 1186 Ring Ouzel).***

Country	Location	Year	Pairs	Change (Period)	Source
Wales	Mynydd Hiraethog,	1977	5		
	Denbighshire	1995	0	-100% (1977-95)	RSPB surveys
	Elenydd, Ceredigion	1975	13		
		1995	6	-54% (1975-95)	RSPB surveys
	Mynydd Du,	1978	17		
	Carmarthenshire	1992	8	-53% (1978-92)	RSPB & CCW surveys
		1996	12	-29% (1978-96)	RSPB & CCW surveys
	Glamorgan	1950	3		
		1980	27	-78% (1980-95)	
		1995	6	+100% (1950-95)	Hurford 1996
England	North Staffordshire	1985	61		
		1992	18		Brindley *et al* 1992
		1996	5	-92% (1985-96)	McKnight *et al* 1997
	Haweswater,	1989	21		
	Cumbria	1995	14		RSPB Nature
		1995	11	-48% (1989-97)	Reserve records
	Geltsdale, Cumbria	1975-77	28		
		1987-89	12		RSPB Nature
		1993-95	16	-43% (1975-95)	Reserve records
	Dartmoor (sample)	1979	13		
		1992	17	+31% (1979-92)	RSPB surveys
Scotland	Moorfoot, Pentland	1986	37		Poxton 1987
	& Lammermuir Hills	1997	22		Sim 1997
	Borders & Lothian			-40% (1986-97)	
	Ettrick & Moorfoot	1994	20		local records
	Hills, Borders	1997	13	-35% (1994-97)	Sim 1997
	Glen Esk, Angus	1992	25		
		1996	23	-8% (1992-96)	D Arthur *in litt*

Appendix 2 ***Regional densities in pairs per 1km² of breeding Ring Ouzel from comparable studies (from Brown & Shepherd 1991*).***

Region	Year	Overall density	Density in occupied 1km squares	Maximum number per 1km²
Glen Clunie	1991	0.96	2.00	5
Mar Lodge	1991	0.08	1.18	1
Angus	1989	0.60	2.53	5
Aberdeenshire	1989	0.14	1.33	3
Ayrshire	1989	0.02	1.20	1
South Strathclyde	1990	0.04	1.00	1
Dumfries & Galloway	1990	0.08	1.76	3
North Pennines	1989	0.15	1.14	2
South Pennines	1990	0.17	1.55	5

* Absent from Shetland (1986), Lewis (1987) and Morayshire (1989) during similar studies.

Mike Innes

Appendix 3 ***An estimate of habitat types to the nearest 5 hectares for each one km square or part square in the Glen Clunie (A) and Mar Lodge (B) study areas which held Ring Ouzels in 1998 and the number of pairs in 1991 and 1998.***

A													
1km²	**number of pairs**		**area surveyed**				**habitat (ha) in 1998**						
number	**1991**	**1998**	**km²**	C2	C3	D1	D2	D3	E1	E2	I1	I2	F2
1	4	5	1		5	40			15		40		
2	1	1	0.5	5	20	25							
3	3	3	1		10	70	10				10		
4	3	5	1		10	75			10			5	
5	1	2	1		15	80						5	
6	2	1	0.5					45				5	
7	4	6	1	10		50			10	20	10		
8	2	3	1			80						20	
9	1	1	1					90				10	
10	3	1	0.5					50					
11	4	3	1	5	10	25						60	
12	1	1	0.5	10		30						10	
13	1	2	1		10	55					5	30	
14	1	2	0.75	30						15		30	
15	2	2	1	25	50	20					5		
16	3	5	1			70		10				20	
17	1	1	1	80			5			10		5	
18	1	1	1			65		10			5	20	
19	1	3	1		15	60					15	10	
20	1	4	1	20	45	20				10	5		
21	1	4	0.75			30		15			15	15	
22	1	3	1		10	80						5	5
Totals	**42**	**59**	**19.5**	**185**	**200**	**875**	**15**	**220**	**35**	**55**	**120**	**240**	**5**
				385		**1110**			**90**		**360**		**5**
B													
23	1	1	1		20	50		20				10	
24	-	1	1		10	70					5	15	
Totals	**1**	**2**	**2**		**30**	**120**		**20**			**5**	**25**	
					30		**140**				**30**		

Habitats from BTO codes to levels 1 and 2 (Crick 1992) as follows : C2 semi natural grass moor, C3 grass moor mixed with heather, D1 dry heath and D2 wet heath, both dominated by Heather *Calluna and Erica*, D3 mixed wet and dry heath, E1 apparently improved grassland, E2 apparently unimproved grassland, I1 cliff and crag, I2 scree and boulder slope, F2 ski centre buildings.

The distribution of Crested Tits in Scotland during the 1990s

R W SUMMERS & M CANHAM

The distribution of the Crested Tit was reviewed using records collected during 1992-99. Records were obtained from 114 woods or sites and 79 10km squares. Individual woods were listed, thereby identifying those for potential conservation management. Inspection of the data from the 2 breeding atlas projects, the winter atlas and a previous survey of Crested Tits, compared with the current survey, showed that the distribution has changed little. The differences between numbers of recorded 10km squares in this survey compared with the atlas surveys are probably due to differences in observer effort.

Introduction

Within Britain, the Crested Tit *Parus cristatus scoticus* is restricted to parts of the Highlands of Scotland where it inhabits ancient native Scots Pine *Pinus sylvestris* forests and Scots Pine plantations (Cook 1982, Summers *et al* 1999). It is amber listed in the Birds of Conservation Concern because 50% or more of the breeding population is in 10 or fewer sites (Gibbons *et al* 1996). Crested Tits are resident in Scotland, with pairs occupying territories throughout the year (Summers 1998). Young leave parental territories to join other pairs and form social groups through to the next breeding season (Ekman 1979). The movements of the young birds tend to be only a few kms (Deadman 1973). Therefore, any long term shifts in distribution are likely to be due to modification of their habitat or changes in population size.

The Crested Tit's distribution in Scotland is broadly known from the 2 breeding season atlas projects (Sharrock 1976, Gibbons *et al* 1993). The main areas are Strathspey, the coastal plain of Moray and East Ross, the Great Glen and the Beauly catchment. Crested Tits were recorded as being present in 46 10km squares during the first survey (1968-72), and in 51 during the second (1988-91) (Sharrock 1976, Gibbons *et al* 1993). As well as the 11% increase in the number of 10km squares occupied, there were some changes in distribution, including losses from Ross and Sutherland and from around Loch Laggan, and gains in Glen Garry and down the Great Glen towards Fort William (Cook, in Gibbons *et al* 1993).

In addition to the breeding surveys, its winter distribution was mapped by Lack (1986) during 1981/2-1983/4. Forty six 10km squares were recorded as being occupied. When compared with the first breeding atlas, there were 9 10km squares in lower Speyside which had breeding records but no winter records. Cook (in Lack 1986) suggested that poorer coverage during the winter survey explained this gap.

In a single species survey of Crested Tits, Cook (1982) reduced the recording unit to a 5km square. Records were received from 78 5km squares during the breeding season. This comprised 45 10km squares.

Thus, all previous surveys of Crested Tits have

shown a similar distribution and a similar number of occupied 10km squares (46, 51, 46 and 45 respectively).

None of the surveys to date involved recording which woods were occupied by Crested Tits. The aim of the present survey was, therefore, to describe their distribution at the level of different woods, as this is more valuable for the conservation of the species. We also collated information at the 10km scale in order to allow comparisons with the earlier atlases.

Methods

The presence of Crested Tits in woods was obtained from Forest Enterprise and RSPB staff, other birdwatchers and annual *Scottish Bird Reports* (Murray 1992-1999). We used all records made during 1992-99 regardless of season, so did not use records obtained during the latter phase of the second breeding atlas (1990-91).

Specific searches were made of the 10km squares which previously had records. A tape recording of the trill call of the Crested Tit was broadcast with a mini loudspeaker when searching woods.

Results

Crested Tits were recorded from 114 woods or sites and 79 10km squares (Figs 1 and 2, Table 1). If a Crested Tit was recorded in a wood, then the whole wood was marked in Figure 1, even if only part of the wood was suitable for Crested Tits.

Occupied areas included the woodlands of upper Strathspey, particularly the ancient native pinewoods of Rothiemurchus, Inshriach, Glenmore Forest, Glen Feshie and Abernethy Forest. Plantations in lower Strathspey and coastal and inland woods along the south side of the Moray Firth were also occupied. The Bin of Cullen was the furthest east site. In East Ross, many of the woods on the coastal plain were occupied. The most northerly woods were Clynelish Moss on the coast and Shin Forest inland. The other main area was the Great Glen and the glens that run off to the west: Glen Urquhart, Glen Moriston and Glen Garry. Crested Tits were present in most of the glens of the Beauly catchment: Strathfarrar, Glen Cannich and Glen Affric.

The record from the Doire Darach native pinewood in Argyll is exceptional since it is 45 km south of the next occupied wood at Gairlochy. Similarly, the record on the northwest coast of West Ross, from the winter atlas (Lack 1986) is well away (50 km) from the next occupied wood.

Three birds were recorded at Morrone, near Braemar in 1996 and there was a single bird at the Linn of Dee during 1998 and 1999. These locations in upper Deeside suggested that Crested Tits had moved round the southern part of the Cairngorms. The nearest occupied wood in Glen Feshie was 20 km away.

Not all records were from woodland. Three birds were mist netted in Reed *Phragmites australis* beds. Two were trapped at Loch Eye, East Ross-shire, on 8 April and 25 June 1996, and one juvenile was caught at Loch Spynie, Moray on 22 July 1989. Also, 2 were seen at a garden feeder at Stripside, Mulben west of Keith in July 1996 (I Francis *pers comm*).

Discussion

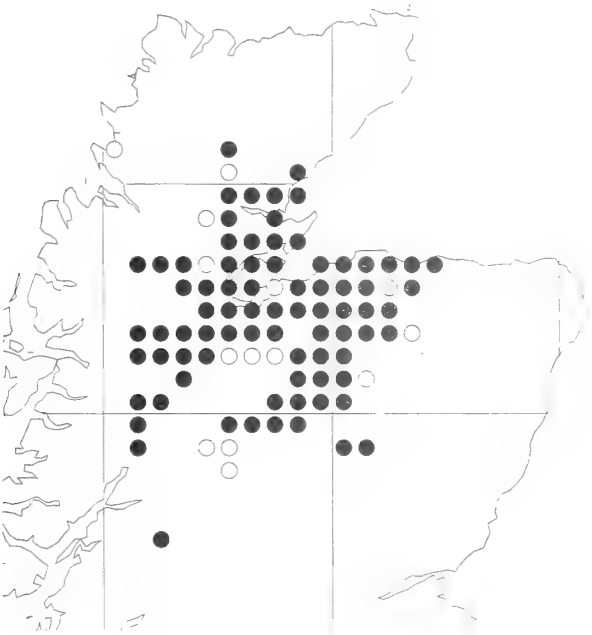
It is likely that the Crested Tit distribution once matched that of the Caledonian forest which extended over much of Highland Scotland 5000 years ago (Bennett 1988), and its range shrunk as this natural forest was cleared and/or receded naturally when the climate became wetter (Steven & Carlisle 1959, Tipping 1994). Planting of pinewoods, during the twentieth century has allowed the birds to regain some of their former

Figure 1 ***The distribution of Crested Tits in Scotland. The outlines are the boundaries of woods in the Highlands. Black indicates woods which had Crested Tits during 1992-99. The records from Deeside and Doire Darach were not included.***

range, and also spread to areas previously unoccupied by pine forests, eg on the dunes where Culbin, Roseisle and Lossie Forests now grow.

The absence of the Crested Tit as a breeding bird in Deeside is one of the noticeable features of the distribution. There have been records during the 1930's, 1950's and 1970s (Knox 1983, Grant 1984) and a few birds in the 1990s, but these colonists have not become established as breeders despite apparently suitable habitat. Presumably the Cairngorms present too great a barrier for sufficient numbers of Crested Tits to cross to become established in Deeside. Another possibility is that Crested Tits could colonise Deeside from the populations currently present in Banffshire. However, the plantations between the coastal forests of Banffshire and Donside are mainly of Sitka Spruce *Picea sitchensis* which are unsuitable for Crested Tits (Summers *et al* 1999). Also, the

Figure 2 ***The distribution of Crested Tits in Scotland. Filled circles indicated occupied 10km squares during 1992-99. Open circles refer to records from any of the previous surveys, but unrecorded in the present survey.***



tits seem to be at a low density in the woods that are occupied in Banffshire (Francis 1996), so the potential for expansion is not great.

Inspection of the data from the 3 atlas surveys shows that although Crested Tits were recorded in a total of 75 10km squares, only 22 were common to all 3 atlases (Table 1). This suggests that the atlases did not provide a complete assessment of the distribution. Our increased effort in searching revealed that Crested Tits were still present in squares which had no records during one or more of the atlas surveys. We failed to find Crested Tits in 14 10km squares where at least one of the past surveys had located birds. We searched all of these except NC01 in West Ross. The only area that appears to have lost Crested Tits since the first atlas survey is the forests around Loch Laggan and Glen Spean (Fig 2).

Table 1 *10km squares with records of Crested Tits during the 2 breeding atlas projects, the winter atlas, the survey by Cook (1982), and the present survey. Records away from woodland were not included.*

10km square	First Breeding Atlas	Second Breeding Atlas	Winter Atlas	Cook	Woods and sites occupied during 1992-99
NC01			3		
NC50			3	1	
NH12	1	1	1	1	Glen Affric
NH13	1		3		Glen Cannich
NH20	3	1			Glen Garry
NH22	1	1	1	1	Glen Affric, Guisachan Forest
NH23	1	2		1	Glen Cannich, Strathfarrar
NH26		2			Strath Bran
NH32		1	3		Fasnakyle, Tomich
NH33	3	1		1	Strathglass, Strathfarrar, Glen Cannich
NH43		1			Boblainy Forest, Polmaily
NH44	3			1	Aigas
NH45				1	Rogie, Kinellan
NH46	1		3		
NH48		2			
NH52		2			
NH53	3	1			Abriachan, Loch Battan
NH54			3		Rheindown Wood, The Aird
NH55	1	1	2	1	Monadh Mor
NH56	1		3	1	Blackrock Gorge
NH57			3		Ardross Forest
NH58	1				Clas a' Bhaid Choille
NH59		1		1	Carbisdale, Shin Forest
NH62	3				
NH63		2	3		Drummossie Muir
NH64		1	3	1	Ord Hill, Craig Phadrig
NH65	3	2	2		Millbuie
NH66	1	1		1	Millbuie
NH67	1			1	Kinrive Wood
NH70	2		2	1	Craigbui Wood
NH72		2			
NH73		2			Meall Mor
NH75		2			
NH76		1			Millbuie
NH77	1	1	2	1	Kinrive Wood, Scotsburn Wood, Lamington Park, Pitmaduthy Moss, Morangie Forest

NH78		2		1	Morangie Forest, Tarlogie Wood, Camore Wood
NH79			3		The Alders
NH80	1	1	2	1	Alvie, Kincraig, Inshriach Forest
NH81	1	1	2	1	Kinveachy Forest
NH82	1	2	1	1	Baddengorm Woods, Inverlaidnan Hill, Beananach Wood
NH84	3				Kirkton of Barevan
NH85	3		2		Carse Wood
NH90	1	1	1	1	Rothiemurchus, Glenmore Forest
NH91	1	1	1	1	Glenmore Forest, Abernethy Forest, Loch Vaa
NH92	1	1	2	1	Carrbridge, Lochanhully, Curr Wood, Lochgorm
NH93			3		Lochindorb
NH94	1	2	2	1	Airdire, Ballindore, Kronyhillock, Dulsie Wood
NH95	2	1	3		Darnaway Forest
NH96	1	1	1	1	Culbin Forest
NJ00		2	3		Glenmore Forest
NJ01	1	1	1	1	Abernethy Forest
NJ02	3	1	2	1	Craigmore Wood, Cromdale, Corriechullie, Grantown Wood
NJ03		1	2	1	Carn Luig, Upper Tomvaich Wood
NJ04		1	3		Feakirk, Glenernie, Braemoray Lodge
NJ05	1	1	3	1	Darnaway Forest, Altyre Woods
NJ06	1	1	3	1	Culbin Forest
NJ11		1			
NJ13		2	3	1	Hill of Dalnapot/ ScootMore
NJ14				1	Elchies Forest
NJ15	2	2		1	Hill of the Wangie, Monaughty Wood
NJ16	2	2	2	1	Burghead, Roseisle
NJ23	3			1	Morinsh
NJ24		2	3	1	Daugh of Edinville, Elchies Forest
NJ25	1			1	
NJ26	1	1	3	1	Lossie Forest
NJ33		1			
NJ35	3	2	3	1	Wood of Ordiequish, Whiteash Hill Wood
NJ36	2		3	1	Bogmoor
NJ46		2	2	1	Bin of Cullen
NN18		1			Gairlochy

NN48	3			1	
NN57	3				
NN58	1		2	1	
NN59	3		3		Black Wood
NN69	1			1	StrathMashie, Carn a' Bhadain
NN79		1	3	1	Drumguish
NN89	1	2	2	1	Glen Feshie, Badan Mosach, Coille an Torr
New 10km squares identified during the 1990s					
NC51					West Shinness, North Dalchork
NC80					Clynelish Moss
NH10					Glen Garry
NH16					Strathbran Plantation
NH31					Inchnacardoch Forest, Inverwick Forest
NH35					Little Scatwell
NH36					Loch Luichart
NH42					Glen Urquhart, Glen Coiltie
NH69					Maikle Wood
NH74					Daviot Wood, Culloden Forest
NH87					Loch Eye (Bogbain Moor)
NH89					Ferry Links
NN19					Glen Garry
NN24					Doire Darach
NO08					Linn of Dee
NO18					Morrone

Notes: First Breeding Atlas: 1, confirmed breeding; 2, probable breeding; 3, possible breeding. Second Breeding Atlas: 1, evidence of breeding; 2, present. Winter Atlas. 1, 9+ birds; 2, 3-8; 3, 1-2. Cook's (1982) survey: 1, present

We cannot be certain that woods with no records of Crested Tits do not contain them. If they are at a low density it is quite possible not to see or hear any during a full day's search in a wood. Therefore, the number of woods known to have Crested Tits is likely to be an underestimate. The total number of 10km squares which have had records in the last 30 years is now 93.

By identifying many of the woods where Crested Tits occur, conservation action can be directed at those sites. Plantations have densities of Crested Tits about 10 times lower than that found in ancient native pinewoods (Summers *et al* 1999), so there is clearly scope to increase densities in plantations through suitable management (Summers 2000).

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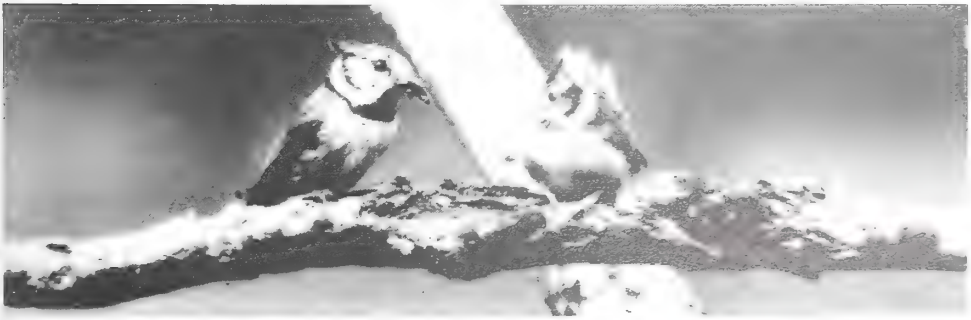

Crested Tit and fledgling *Ernest Ruxton*

Western Capercaillie captures in snares

P COSGROVE & J OSWALD

Details of 17 incidents involving the deaths of 46 birds are recorded. The true figure is likely to be considerably higher. It is recomended that snares are not set under the canopy in areas used by Western Capercaillie.

The snare is a widely used tool in the farmlands, woodlands and uplands of Scotland for controlling a number of pest species, but especially Foxes *Vulpes vulpes*. Snaring is subject to domestic legal restrictions under the Wildlife and Countryside Act 1981. Recently, concern has been expressed about the impact of accidental captures of Western Capercaillie *Tetrao urogallus* in woodland snares (K Kortland *pers comm*). The purpose of this short paper is to detail known instances of Western Capercaillie captures in snares and raise awareness of the potential threat posed by woodland snares to remnant populations of Western Capercaillie.

The Western Capercaillie is a threatened and declining species in Scotland (*UK Biodiversity Steering Group 1995*). Fieldwork carried out in Scotland in 1992-94 suggested a population estimate of c2200birds (Catt *et al* 1998), which declined by 51% to an estimate of 1073 birds in 1998-99 (Wilkinson *et al* 1999). This dramatic decline, which began long before 1992, has been attributed to a number of factors, the most important of which include: loss of native pinewood, collisions with fences, over shooting and human disturbance, inappropriate grazing regimes in woodlands, predation and an increase in adverse weather conditions during the spring. The relative importance of these factors probably varies between forests and even between years (D Baines *pers comm*)

The Fox is a major predator of several species of game bird. However, there are no reliable data from studies of Western Capercaillie in Scotland that permit adequate quantification of their impact. Foxes are managed by a variety of methods, which include snaring, shooting at night, bolting from earths using terriers and hunting with dogs (D Baines *pers comm*). Most Foxes are killed in snares and snares set for Foxes can inadvertently catch and kill Western Capercaillie. For example, Moss (1987) investigated the demography of Western Capercaillie in Northeast Scotland and reported on approximately a dozen birds, most of which had been killed by snaring. No formal recording of snaring incidents is known to have taken place, but we have received a number of anecdotal reports from members of the public, estate workers, and gamekeepers in confidence and would like to thank all those who provided this information.

Although there are few documented accounts of snaring and Western Capercaillie, the information summarised in Table 1 suggests that Western Capercaillie captures in Fox and Rabbit snares may be a widespread and largely under recorded problem. Indeed, some gamekeepers suggested that the data presented in Table 1 was likely to represent the 'tip of the iceberg', as many people would be reticent about supplying information on their accidental snare captures. The most recent incidences were reported after gamekeepers changed pest management practices to include snaring in woodlands. In most examples, the birds were trapped within a very short period of the snares being laid, often within 24 hours. In many of these instances, the gamekeepers immediately stopped snaring in the woodlands and turned to

Table 1 *Reported records of Western Capercaillie captures in snares in Scotland.*

Location, method and date	Number of birds killed
Strathspey. 1960s. Several Rabbit/Fox snares laid in old Caledonian forest.	7 birds killed. Snares left operating.
Deeside. 1968. 5 Fox snares placed around a midden in Commercial pine plantation.	2 cocks killed on first morning. Snares removed.
Deeside. 1968. 5 Fox snares placed around a midden in old Caledonian forest.	3 cocks killed in a week.Snares removed.
Deeside. 1968. Several Fox snares placed along Fox track in two thicket stage commercial plantations.	1 cock killed on first morning in one wood. 1 cock and 1 hen killed on first morning in other woodland. Snares removed.
Deeside. 1976. Snares set throughout commercial plantation.	1 cock killed. Snares left operating.
Strathspey. 1975-2000. Many Fox snares set throughout commercial plantations and old Caledonian woodland on estate.	At least 6 Capercaillie reported killed in snares.
Deeside. March 1980. 30 Hare snares placed in old Caledonian forest.	3 hens killed on first morning. Snares removed.
Badenoch. 1982. Rabbit snare.	1 cock killed.
Deeside. October 1989. Snares set parallel to a deer fence c400m uphill from a lek site.	1 cock killed.
Deeside. 1992. Several Rabbit snares placed on the edge of commercial plantation.	1 cock killed. Snares left operating.
Deeside. 1990s. No further details.	5 birds killed
Donside. March 1993. Snares set along a deer fence between 2 estates 150m from a lek site.	1 cock killed.
Strathspey. 1993. Several Fox snares set in gaps along a fence by a commercial plantation.	2 cocks killed. Snares left operating.
Deeside. 1996. Snares set in parallel to deer fence c550m from a lek site.	1 cock killed.
Donside. 1997. No further details, 2 cocks killed one spring,	1 cock killed following spring.
Deeside. 1998. Fox snares set along a fence line near to Capercaillie lek in old Caledonian forest.	5 cocks killed and lek wiped out.
Strathspey. 1999. Several Fox snares set in commercial plantation.	1 cock killed.

alternative pest control methods. This suggests that snaring in Western Capercaillie woodlands, even for relatively short periods, may have dramatic, detrimental and unforeseen impacts on local Western Capercaillie populations.

Interestingly, during the research for this short note, the accidental capture of Black Grouse *Tetrao tetrix* in woodlands was reported only once, in Ayrshire. It is not known why Western Capercaillie appear to be particularly susceptible to capture in woodland snares, but it seems likely that their inquisitive nature and extensive use of forest tracks and animal trails has led them into areas where snares have been used. It is difficult to quantify the impact of snaring on Western Capercaillie populations, but even with the relatively small number of incidents reported here (17 known incidents Table 1) it is clear that snaring can be a very effective and quick method of killing birds (46 birds Table 1). The ease at which Western Capercaillie can be snared was used in Strathspey during the 1960-70s when locals caught dozens of birds annually in snares specifically set to catch Western Capercaillie around stooks in oat fields for eating. As Western Capercaillie populations continue to dwindle and become more isolated from one another, the role of chance events, such as dying in snares, may become important in small populations.

In a recent report to the Scottish Executive, Forestry Commission and Scottish Natural Heritage, Petty (2000) recommended extending crow and Fox control to some key Western Capercaillie sites in Scotland. Although this review made passing reference to the impact on non target species, including Western Capercaillie, it suggested that snaring appeared to be one of the most effective Fox control methods available. We consider it very important that this recent guidance does not encourage Fox snaring within Western Capercaillie woodlands. Where Fox control is considered necessary, target specific control methods should be used to avoid the potential problems associated with the accidental snaring of Western Capercaillie. The recent announcement by the British Association for Shooting and Conservation to review the guidance given in their '*Fox snaring: a code of conduct*' BASC 2000 for Western Capercaillie woodlands is good news. It is hoped that other estate and forestry managers will take the lead and eliminate fox snaring inside the remaining Scottish Capercaillie woodlands.

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Amendments to the Scottish List

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The Scottish List of species was first published in Scottish Birds 1994, with subsequent amendments in 1996, 1998 and 2000.

The 27th Report of the British Ornithologists' Union's Records Committee *(BOURC)* (*Ibis* 143:171-175) includes the following decisions relating to the British List.

Common Teal *Anas crecca* to be treated as 2 species.
Eurasian Teal *A crecca*
Green-winged Teal *A carolinensis*

Common Redpoll *Carduelis flammea* to be treated as 2 species.
Lesser Redpoll *C cabaret* (monotypic)
Common Redpoll *C flammea* (including
Mealy Redpoll *C f flammea*
Greater Redpoll *C f rostrata*
Icelandic Redpoll *C f islandica)*

Mediterranean Shearwater *Puffinus yelkouan* to be treated as 2 species
Balearic Shearwater *P mauritanicus*
Yelkouan Shearwater *P yelkouan*

Resulting changes to the Scottish List are:
The English name of Common Teal to be changed to Eurasian Teal.
Green-winged Teal to be added to Category A.
Lesser Redpoll to be added to Category A.
The English name of Mediterranean Shearwater to be changed to Balearic Shearwater
Yelkouan Shearwater has not occurred in Scotland.

The British Birds Rarities Committee's *Report on rare birds in Great Britain in 1999*, published in *British Birds* 93:512-567, included the following accepted records:

Royal Tern *Sterna maxima*
Thorntonloch, Lothian, adult, 9 August 1999; and Musselburgh, Lothian later the same day (*British Birds* 93:538)
1st Scottish Record add to Category A

Mourning Dove *Zenaida macroura*
Carinish, North Uist, Outer Hebrides, first winter, 13-15 November 1999 (*British Birds* 93:539)
1st Scottish Record add to Category A

Eurasian Crag Martin *Ptyonoprogne rupestris*
Finstown, Orkney 3 May 1999 (*British Birds* 93:544)
1st Scottish Record add to Category A

The following additional changes also apply:

Short-billed Dowitcher *Limnodromus griseus*
Roseharty, near Fraserburgh, Aberdeenshire, juvenile, 11-24 September 1999 (*Birding World* 12:364-370 and 12:385). Race undetermined. Acceptance of this record appeared as a press release on BOURCs website (www.bou.org.uk) dated 22 December 2000 and will be included within their 28th Report expected to be published in January 2002.
1st Scottish Record add to Category A

Smew has been moved from genus *Mergus* to *Mergellus* and Great Skua from *Stercorarius* to *Catharacta*. BOURC 23rd Report 1996 (*Ibis* 139:197-201).

The category for Pink-footed Goose, Snow Goose, Barnacle Goose, Red-crested Pochard and White-tailed Eagle was previously dual A, D4. The definition for Category D has changed and they are now no longer in this category, although they remain in Category A. They are likely to also feature in Category E once this has been produced for Scotland.

As a result of the above changes, new totals for Scotland are:

Category A	473
Category B	9
Category C	6
	488
Category D	10

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Arctic Redpoll (left) and Common (Mealy) Redpoll *Dennis Coutts*

Scottish List - species and subspecies

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on behalf of the SCOTTISH BIRDS RECORDS COMMITTEE

The Scottish Birds Records Committee (SBRC) is responsible for maintaining the Scottish List, first published in Scottish Birds in 1994. Until now, the list has been based on the species level of classification. This is the first attempt by SBRC to tabulate all subspecies recorded in Scotland and also introduces status symbols. It is envisaged that this expanded list will form a baseline for future studies, will be of use as a conservation tool and could be used in courts of law.

The species sequence is based on the original Scottish List of species as it appeared when published in 1994, but incorporates amendments contained in subsequent reports, *Scottish Birds* 18:129-131, 19:259-261 and 21:1-5 plus a few additional changes published in a separate paper within this issue of *Scottish Birds*.

In recent years there has been an increasing divergence of opinion on taxonomical matters. We established several principles for the original version of the Scottish List, which we still follow. The British Ornithologists' Union's Records Committee (BOURC) has maintained the official British List since 1883. We decided at the outset to follow their taxonomy, sequence and scientific names for the Scottish List. This approach has now been extended to subspecies and as a result, if for instance BOURC consider a species to be monotypic but some other authorities show 2 or more races, we have followed BOURC. We also use identical categories to BOURC and in no instance is a species placed in a higher category on the Scottish List than it appears on the British List. This principle now also applies to subspecies and therefore we do not include a subspecies on the Scottish List unless BOURC have accepted it for Britain.

One of the advantages in basing the Scottish List on that used by BOURC is that it is compiled in a consistent manner. A consequence of this approach is that conservation agencies can use the list, in the knowledge that a rigorous process is undertaken during its compilation. This may be especially important in advising on legal issues where the status of an individual bird may be discussed in court.

In 1998, BOURC introduced a revised categorisation (*British Birds* 91:2-11). The changes included a new category (Category E) for escapes and a redefining of the existing categories (A-D). We adopted the new categories in our 2000 Report (*Scottish Birds* 21: 1-5), although a list of Category E species is not yet available. We have recently formed a sub-committee, with the intention of publishing a list of Scottish Category E species to supplement the existing Categories A-D. A provisional list will appear on the website once it is available .

When the Scottish List was first published BOURC had recently altered the English names of a large number of species on the British List. Many of these new names were at that time considered controversial and it was decided that the Scottish List should adopt a more traditional

approach. In the intervening period there has been considerable debate and, whilst a few of the names remain disliked by many, most of the English names adopted by BOURC now appear to be accepted by the majority of birders, many of whom are widely travelled, preferring unambiguous and unique English names. We have always followed BOURC in all other respects and adopting their English names is therefore appropriate. Members of SBRC unanimously agreed to use the English names as they appear in the British List for this and all future versions of the Scottish List.

Scotland has 9 endemic subspecies in addition to one endemic species, the Scottish Crossbill. When working on this list we were surprised to note that many of Scotland's endemic races have been almost completely ignored during the last 50 years. It is our intention in the near future to outline known information on status, distribution and identification for our endemic races in an attempt to encourage more study.

The work involved in preparing this list has been undertaken by a sub committee comprising Dave Clugston (Chairman, SBRC), Bob McGowan (SBRC's Museum Consultant), Bernie Zonfrillo (coopted; Chairman, SBRC 1984-1994) and Ron Forrester (Secretary, SBRC).

The SOC website includes the Scottish List and lists of recent decisions. The website is for information purposes only and is not an official document, or part of the permanent record. Any announcements of changes to the Scottish List do not come into effect until published in *Scottish Birds* or the *Scottish Bird Report*, under the authorship of the Scottish Birds Records Committee.

Whilst we now have a robust species list, subspecies and status symbols are appearing in print for the first time and we anticipate that there will inevitably be errors. An appendix at the end of the systematic list shows species and subspecies under consideration for inclusion on the list. We would be grateful for comments, particularly in respect of errors or omissions.

Categories

A Species which have been recorded in an apparently natural state at least once since 1 January 1950.

B Species which were recorded in an apparently natural state at least once up to 31 December 1949, but have not been recorded subsequently.

C Species that although originally introduced by man, either deliberately or accidentally, have established breeding populations derived from introduced stock, that maintain themselves without necessary recourse to further introduction. Category C has been further subdivided by BOURC to differentiate between various groups of naturalised species (C1 naturalised introduction, C2 naturalised establishments, C3 naturalised re establishments, C4 naturalised feral species, C5 vagrant naturalised species.), although we await the allocation of these additional codes.

D Species that would otherwise appear in Category A or B except that there is reasonable doubt that they ever occurred in a natural state. Category D species do not form any part of the species totals and are not regarded as members of the Scottish List.

E Species that have been recorded as introductions, transportees or escapees from captivity and whose breeding populations, if any, are thought not to be self sustaining. Category E species form no part of the Scottish List. A list of Category E species has not yet been produced for Scotland.

RB	Resident breeder	FB	Former breeder
MB	Migrant breeder	WV	Winter visitor
IB	Introduced breeder	PV	Passage visitor
CB	Casual breeder	SV	Scarce visitor

Abbreviated codes are provided for status of each race on the list. We have followed the standard set of codes used by BOURC in *The Status of Birds in Britain and Ireland* 1971, which they also used in *Checklist of Birds of Britain and Ireland,* 6th edition, published in 1992.

Where species are monotypic ie BOURC do not recognise any subspecies, nothing is shown in the subspecies column. If a subspecies has an established English name this is shown in brackets. Species appearing in Category D, all of which have occurred in Scotland on less than an annual basis, are tabulated separately, following the main list, without any further details on subspecies or status.

Subspecies appearing in **bold** are endemic to Scotland.

SYSTEMATIC LIST

Category	& Species	Binomen	Subspecies	Status
A	Red-throated Diver	*Gavia stellata*	*stellata*	MB RB WV PV
A	Black-throated Diver	*Gavia arctica*	*arctica*	MB RB WV
A	Great Northern Diver	*Gavia immer*		CB WV
A	Yellow-billed Diver	*Gavia adamsii*		SV
A	Pied-billed Grebe	*Podilymbus podiceps*	*podiceps* (presumed)	SV
A	Little Grebe	*Tachybaptus ruficollis*	*ruficollis*	RB MB WV
A	Great Crested Grebe	*Podiceps cristatus*	*cristatus*	RB WV
A	Red-necked Grebe	*Podiceps grisegena*	*grisegena*	CB WV
	(American)		*holboellii*	SV
A	Slavonian Grebe	*Podiceps auritus*	*auritus*	RB WV
A	Black-necked Grebe	*Podiceps nigricollis*	*nigricollis*	MB/RB WV PV
A	Black-browed Albatross	*Diomedea melanophris*	*melanophris*	SV
A	Northern Fulmar	*Fulmarus glacialis*	*glacialis*	RB MB PV
A	Cory's Shearwater	*Calonectris diomedea*	*borealis*	PV
A	Great Shearwater	*Puffinus gravis*		PV
A	Sooty Shearwater	*Puffinus griseus*		PV
A	Manx Shearwater	*Puffinus puffinus*		MB PV
A	Balearic Shearwater	*Puffinus mauretanicus*		PV
A	Little Shearwater	*Puffinus assimilis*	*baroli* (presumed)	SV
A	Wilson's Storm-petrel	*Oceanites oceanicus*	*exasperatus* (presumed)	SV
B	White-faced Storm-petrel	*Pelagodroma marina*	*hypoleuca*	SV
A	European Storm-petrel	*Hydrobates pelagicus*		MB PV
A	Leach's Storm-petrel	*Oceanodroma leucorhoa*	*leucorhoa*	MB PV
A	Northern Gannet	*Morus bassanus*		MB RB PV
A	Great Cormorant	*Phalacrocorax carbo*	*carbo*	RB MB
			sinensis	SV

A	European Shag	*Phalacrocorax aristotelis*	*aristotelis*	RB
A	Magnificent Frigatebird	*Fregata magnificens*		SV
A	Great Bittern	*Botaurus stellaris*	*stellaris*	FB PV
A	American Bittern	*Botaurus lentiginosus*		SV
A	Little Bittern	*Ixobrychus minutus*	*minutus*	SV
A	Black-crowned Night Heron	*Nycticorax nycticorax*	*nycticorax*	SV
A	Green Heron	*Butorides virescens*		SV
B	Squacco Heron	*Ardeola ralloides*		SV
A	Cattle Egret	*Bubulcus ibis*	*ibis*	SV
A	Little Egret	*Egretta garzetta*	*garzetta*	PV
A	Great Egret	*Ardea alba*	*alba*	SV
A	Grey Heron	*Ardea cinerea*	*cinerea*	RB WV
A	Purple Heron	*Ardea purpurea*	*purpurea*	SV
A	Black Stork	*Ciconia nigra*		SV
A	White Stork	*Ciconia ciconia*	*ciconia*	FB PV
A	Glossy Ibis	*Plegadis falcinellus*	*falcinellus*	SV
A	Eurasian Spoonbill	*Platalea leucorodia*	*leucorodia*	PV
A,C	Mute Swan	*Cygnus olor*		RB
A	Tundra Swan (Bewick's)	*Cygnus columbianus*	*bewickii*	WV
A	Whooper Swan	*Cygnus cygnus*		CB WV
A	Bean Goose			
	(Taiga)	*Anser fabalis*	*fabalis*	WV
	(Tundra)		*rossicus*	PV
A	Pink-footed Goose	*Anser brachyrhynchus*		WV
A	Greater White-fronted Goose			
	(European)	*Anser albifrons*	*albifrons*	PV
	(Greenland)		*flavirostris*	WV
A	Lesser White-fronted Goose	*Anser erythropus*		SV
A,C	Greylag Goose	*Anser anser*	*anser*	RB IB WV
A	Snow Goose			
	(Lesser)	*Anser caerulescens*	*caerulescens*	SV
	(Greater)		*atlanticus*	SV
A,C	Canada Goose	*Branta canadensis*	*canadensis*	IB
			plus race or races	
			undetermined	SV
A	Barnacle Goose	*Branta leucopsis*		WV
A	Brent Goose			
	(Dark-bellied)	*Branta bernicla*	*bernicla*	PV WV
	(Pale-bellied)		*hrota*	PV WV
	(Black Brant)		*nigricans*	SV
A	Red-breasted Goose	*Branta ruficollis*		SV
B	Ruddy Shelduck	*Tadorna ferruginea*		SV
A	Common Shelduck	*Tadorna tadorna*		MB RB WV
C	Mandarin Duck	*Aix galericulata*		IB
A	Eurasian Wigeon	*Anas penelope*		RB WV PV
A	American Wigeon	*Anas americana*		SV
A,C	Gadwall	*Anas strepera*		IB RB MB WV
A	Eurasian Teal	*Anas crecca*		RB WV PV
A	Green-winged Teal	*Anas carolinensis*	*carolinensis*	SV
A,C	Mallard	*Anas platyrhynchos*	*platyrhynchos*	RB WV

A	American Black Duck	*Anas rubripes*		SV
A	Northern Pintail	*Anas acuta*	*acuta*	RB or MB WV
A	Garganey	*Anas querquedula*		MB PV
A	Blue-winged Teal	*Anas discors*		SV
A	Northern Shoveler	*Anas clypeata*		MB WV PV
A	Red-crested Pochard	*Netta rufina*		SV
A	Common Pochard	*Aythya ferina*		MB/RB WV PV
A	Ring-necked Duck	*Aythya collaris*		SV
A	Ferruginous Duck	*Aythya nyroca*		SV
A	Tufted Duck	*Aythya fuligula*		RB WV PV
A	Greater Scaup	*Aythya marila*		CB WV PV
A	Lesser Scaup	*Aythya affinis*		SV
A	Common Eider	*Somateria mollissima*	*mollissima*	RB WV
D			*borealis*	SV
A	King Eider	*Somateria spectabilis*		SV
A	Steller's Eider	*Polysticta stelleri*		SV
A	Harlequin Duck	*Histrionicus histrionicus*		SV
A	Long-tailed Duck	*Clangula hyemalis*		CB WV
A	Black Scoter			
	(Common)	*Melanitta nigra*	*nigra*	RB/MB WV PV
	(American)		*americana*	SV
A	Surf Scoter	*Melanitta perspicillata*		WV PV
A	Velvet Scoter	*Melanitta fusca*	*fusca*	WV PV
A	Bufflehead	*Bucephala albeola*		SV
A	Barrow's Goldeneye	*Bucephala islandica*		SV
A	Common Goldeneye	*Bucephala clangula*	*clangula*	RB WV PV
A	Smew	*Mergellus albellus*		WV
A	Red-breasted Merganser	*Mergus serrator*		RB WV
A	Goosander	*Mergus merganser*	*merganser*	RB WV
C	Ruddy Duck	*Oxyura jamaicensis*	*jamaicensis*	IB
A	European Honey-buzzard	*Pernis apivorus*		MB PV
A	Black Kite	*Milvus migrans*	*migrans*	SV
A.C	Red Kite	*Milvus milvus*	*milvus*	FB IB SV
A	White-tailed Eagle	*Haliaeetus albicilla*		FB IB SV
A	Eurasian Marsh Harrier	*Circus aeruginosus*	*aeruginosus*	MB PV
A	Hen Harrier	*Circus cyaneus*	*cyaneus*	RB MB PV WV
A	Pallid Harrier	*Circus macrourus*		SV
A	Montagu's Harrier	*Circus pygargus*		MB PV
A.C	Northern Goshawk	*Accipiter gentilis*	*gentilis*	FB IB PV
A	Eurasian Sparrowhawk	*Accipiter nisus*	*nisus*	RB PV WV
A	Common Buzzard	*Buteo buteo*	*buteo*	RB
A	Rough-legged Buzzard	*Buteo lagopus*	*lagopus*	WV PV
A	Golden Eagle	*Aquila chrysaetos*	*chrysaetos*	RB
A	Osprey	*Pandion haliaetus*	*haliaetus*	MB PV
A	Lesser Kestrel	*Falco naumanni*		SV
A	Common Kestrel	*Falco tinnunculus*	*tinnunculus*	RB MB PV WV
A	American Kestrel	*Falco sparverius*	*sparverius*	SV
A	Red-footed Falcon	*Falco vespertinus*		SV
A	Merlin	*Falco columbarius*	*aesalon*	RB/MB PV WV
			subaesalon	PV WV

A	Eurasian Hobby	*Falco subbuteo*	*subbuteo*	CB PV
A	Eleonora's Falcon	*Falco eleonorae*		SV
A	Gyr Falcon	*Falco rusticolus*		SV
A	Peregrine Falcon	*Falco peregrinus*	*peregrinus*	RB WV PV
A	Willow Ptarmigan (Red Grouse)	*Lagopus lagopus*	*scoticus*	RB
A	Rock Ptarmigan (Scottish Ptarmigan)	*Lagopus mutus*	***millaisi***	**RB ENDEMIC**
A	Black Grouse	*Tetrao tetrix*	*britannicus*	RB
B,C	Western Capercaillie	*Tetrao urogallus*	*urogallus*	FB IB
C	Red-legged Partridge	*Alectoris rufa*	*rufa*	IB
A,C	Grey Partridge	*Perdix perdix*	*perdix*	FB
			intraspecific hybrids as result of introductions	IB
A	Common Quail	*Coturnix coturnix*	*coturnix*	MB PV
C	Common Pheasant	*Phasianus colchicus*	*colchicus*	IB
			torquatus	FIB
			intraspecific hybrids	IB
C	Golden Pheasant	*Chrysolophus pictus*		IB
A	Water Rail	*Rallus aquaticus*	*aquaticus*	RB PV WV
A	Spotted Crake	*Porzana porzana*		CB PV
A	Sora	*Porzana carolina*		SV
A	Little Crake	*Porzana parva*		SV
A	Baillon's Crake	*Porzana pusilla*	*intermedia*	SV
A	Corn Crake	*Crex crex*		MB PV
A	Common Moorhen	*Gallinula chloropus*	*chloropus*	RB WV
A	Common Coot	*Fulica atra*	*atra*	RB WV
A	Common Crane	*Grus grus*	*grus*	PV
A	Sandhill Crane	*Grus canadensis*	*canadensis*	SV
A	Little Bustard	*Tetrax tetrax*		SV
B	Houbara Bustard	*Chlamydotis undulata*	*macqueenii*	SV
A	Great Bustard	*Otis tarda*	*tarda*	SV
A	Eurasian Oystercatcher	*Haematopus ostralegus*	*ostralegus*	RB MB PV WV
A	Black-winged Stilt	*Himantopus himantopus*	*himantopus*	SV
A	Pied Avocet	*Recurvirostra avosetta*		SV
A	Stone-curlew	*Burhinus oedicnemus*	*oedicnemus*	SV
A	Cream-coloured Courser	*Cursorius cursor*	*cursor*	SV
A	Collared Pratincole	*Glareola pratincola*	*pratincola*	SV
A	Black-winged Pratincole	*Glareola nordmanni*		SV
A	Little Plover	*Charadrius dubius*	*curonicus*	CB PV
A	Ringed Plover	*Charadrius hiaticula*	*hiaticula*	RB MB PV WV
			tundrae	PV WV
A	Killdeer	*Charadrius vociferus*	*vociferus*	SV
A	Kentish Plover	*Charadrius alexandrinus*	*alexandrinus*	SV
A	Greater Sand Plover	*Charadrius leschenaultii*	race undetermined	SV
A	Caspian Plover	*Charadrius asiaticus*		SV
A	Eurasian Dotterel	*Charadrius morinellus*		MB PV
A	American Golden Plover	*Pluvialis dominica*		SV
A	Pacific Golden Plover	*Pluvialis fulva*		SV
A	European Golden Plover	*Pluvialis apricaria*		RB MB WV PV

A	Grey Plover	*Pluvialis squatarola*		PV WV
A	Sociable Lapwing	*Vanellus gregarius*		SV
A	Northern Lapwing	*Vanellus vanellus*		RB MB PV WV
A	Great Knot	*Calidris tenuirostris*		SV
A	Red Knot	*Calidris canutus*	*canutus*	PV
			islandica	PV WV
A	Sanderling	*Calidris alba*		PV WV
A	Semipalmated Sandpiper	*Calidris pusilla*		SV
A	Western Sandpiper	*Calidris mauri*		SV
A	Red-necked Stint	*Calidris ruficollis*		SV
A	Little Stint	*Calidris minuta*		PV
A	Temminck's Stint	*Calidris temminckii*		CB PV
A	Least Sandpiper	*Calidris minutilla*		SV
A	White-rumped Sandpiper	*Calidris fuscicollis*		SV
A	Baird's Sandpiper	*Calidris bairdii*		SV
A	Pectoral Sandpiper	*Calidris melanotos*		PV
A	Sharp-tailed Sandpiper	*Calidris acuminata*		SV
A	Curlew Sandpiper	*Calidris ferruginea*		PV
A	Purple Sandpiper	*Calidris maritima*		CB PV WV
A	Dunlin	*Calidris alpina*	*alpina*	PV WV
			schinzii	MB PV WV
			arctica	PV
A	Broad-billed Sandpiper	*Limicola falcinellus*	*falcinellus*	SV
A	Stilt Sandpiper	*Micropalama himantopus*		SV
A	Buff-breasted Sandpiper	*Tryngites subruficollis*		PV
A	Ruff	*Philomachus pugnax*		PV
A	Jack Snipe	*Lymnocryptes minimus*		PV WV
A	Common Snipe	*Gallinago gallinago*	*gallinago*	RB MB PV WV
			faeroeensis	RB MB PV WV
A	Great Snipe	*Gallinago media*		SV
A	Short-billed Dowitcher	*Limnodromus griseus*	race undetermined	SV
A	Long-billed Dowitcher	*Limnodromus scolopaceus*	SV	
A	Eurasian Woodcock	*Scolopax rusticola*		RB MB PV WV
A	Black-tailed Godwit	*Limosa limosa*	*limosa*	MB
			islandica	MB PV WV
A	Hudsonian Godwit	*Limosa haemastica*		SV
A	Bar-tailed Godwit	*Limosa lapponica*	*lapponica*	PV WV
B	Eskimo Curlew	*Numenius borealis*		SV
A	Whimbrel	*Numenius phaeopus*	*phaeopus*	MB PV
			hudsonicus	SV
A	Eurasian Curlew	*Numenius arquata*	*arquata*	RB MB PV WV
A	Upland Sandpiper	*Bartramia longicauda*		SV
A	Spotted Redshank	*Tringa erythropus*		PV WV
A	Common Redshank	*Tringa totanus*	*totanus*	RB MB PV WV
			robusta	PV WV
A	Marsh Sandpiper	*Tringa stagnatilis*		SV
A	Common Greenshank	*Tringa nebularia*		RB MB PV WV
A	Greater Yellowlegs	*Tringa melanoleuca*		SV
A	Lesser Yellowlegs	*Tringa flavipes*		SV
A	Solitary Sandpiper	*Tringa solitaria*	*solitaria* (presumed)	SV

A	Green Sandpiper	*Tringa ochropus*		CB PV
A	Wood Sandpiper	*Tringa glareola*		CB PV
A	Terek Sandpiper	*Xenus cinereus*		SV
A	Common Sandpiper	*Actitis hypoleucos*		MB PV
A	Spotted Sandpiper	*Actitis macularia*		CB SV
A	Grey-tailed Tattler	*Heteroscelus brevipes*		SV
A	Ruddy Turnstone	*Arenaria interpres*	*interpres*	PV WV
A	Wilson's Phalarope	*Phalaropus tricolor*		SV
A	Red-necked Phalarope	*Phalaropus lobatus*		MB PV
A	Grey Phalarope	*Phalaropus fulicarius*		PV
A	Pomarine Skua	*Stercorarius pomarinus*		PV
A	Arctic Skua	*Stercorarius parasiticus*		MB PV
A	Long-tailed Skua	*Stercorarius longicaudus*		PV
A	Great Skua	*Catharacta skua*	*skua*	MB PV
A	Mediterranean Gull	*Larus melanocephalus*		PV
A	Laughing Gull	*Larus atricilla*		SV
A	Franklin's Gull	*Larus pipixcan*		SV
A	Little Gull	*Larus minutus*		PV WV
A	Sabine's Gull	*Larus sabini*		PV
A	Bonaparte's Gull	*Larus philadelphia*		SV
A	Black-headed Gull	*Larus ridibundus*		RB MB PV WV
A	Ring-billed Gull	*Larus delawarensis*		PV WV
A	Mew Gull	*Larus canus*	*canus*	RB MB WV PV
A	Lesser-Black-backed Gull	*Larus fuscus*	*fuscus*	PV?
			graellsii	MB PV
			intermedius	PV
A	Herring Gull	*Larus argentatus*	*argentatus*	PV WV
			argenteus	RB
			smithsonianus	SV
	(Yellow-legged)		*michahellis*	SV
A	Iceland Gull	*Larus glaucoides*	*glaucoides*	WV
	(Kumlien's)		*kumlieni*	SV
A	Glaucous Gull	*Larus hyperboreus*	*hyperboreus*	WV
A	Great Black-backed Gull	*Larus marinus*		RB WV
A	Ross's Gull	*Rhodostethia rosea*		SV
A	Black-legged Kittiwake	*Rissa tridactyla*		RB MB PV WV
A	Ivory Gull	*Pagophila eburnea*		SV
A	Gull-billed Tern	*Sterna nilotica*	*nilotica*	SV
A	Caspian Tern	*Sterna caspia*		SV
A	Royal Tern	*Sterna maxima*	race undetermined	SV
A	Lesser Crested Tern	*Sterna bengalensis*	*torresii*	SV
A	Sandwich Tern	*Sterna sandvicensis*	*sandvicensis*	MB PV
A	Roseate Tern	*Sterna dougallii*	*dougallii*	MB PV
A	Common Tern	*Sterna hirundo*	*hirundo*	MB PV
A	Arctic Tern	*Sterna paradisaea*		MB PV
A	Forster's Tern	*Sterna forsteri*		SV
A	Bridled Tern	*Sterna anaethetus*	*antarctica* (presumed)	SV
A	Sooty Tern	*Sterna fuscata*	*fuscata*	SV
A	Little Tern	*Sterna albifrons*	*albifrons*	MB PV
B	Whiskered Tern	*Chlidonias hybridus*	*hybridus*	SV

A	Black Tern	*Chlidonias niger*	*niger*	PV
A	White-winged Tern	*Chlidonias leucopterus*		SV
A	Common Guillemot	*Uria aalge*	*aalge*	RB MB WV
			albionis	RB MB WV
A	Brünnich's Guillemot	*Uria lomvia*	*lomvia* (presumed)	SV
A	Razorbill	*Alca torda*	*islandica*	RB MB WV
			torda	WV
B	Great Auk	*Pinguinus impennis*		Extinct FB
A	Black Guillemot	*Cepphus grylle*	*grylle*	RB
A	Little Auk	*Alle alle*	*alle*	PV WV
D			*polaris*	SV
A	Atlantic Puffin	*Fratercula arctica*	*arctica*	PV
			grabae	RB MB PV WV
A	Pallas's Sandgrouse	*Syrrhaptes paradoxus*		CB SV
A,C	Rock Pigeon	*Columba livia*	*livia*	RB
A	Stock Pigeon	*Columba oenas*	*oenas*	RB PV WV
A	Common Wood Pigeon	*Columba palumbus*	*palumbus*	RB WV
A	Eurasian Collared Dove	*Streptopelia decaocto*	*decaocto*	RB
A	European Turtle Dove	*Streptopelia turtur*	*turtur*	FB PV
A	Oriental Turtle Dove	*Streptopelia orientalis*	*orientalis* (presumed)	SV
A	Mourning Dove	*Zenaida macroura*	*carolinensis* (presumed)	SV
A	Great Spotted Cuckoo	*Clamator glandarius*		SV
A	Common Cuckoo	*Cuculus canorus*	*canorus*	MB PV
A	Black-billed Cuckoo	*Coccyzus erythrophthalmus*		SV
A	Yellow-billed Cuckoo	*Coccyzus americanus*		SV
A	Barn Owl	*Tyto alba*	*alba*	RB
	(Dark-breasted)		*guttata*	SV
A	Eurasian Scops Owl	*Otus scops*	*scops*	SV
A	Snowy Owl	*Nyctea scandiaca*		CB SV
A	Northern Hawk Owl			
	(European)	*Surnia ulula*	*ulula*	SV
	(American)		*caparoch*	SV
C	Little Owl	*Athene noctua*	*vidalii*	IB
A	Tawny Owl	*Strix aluco*	*sylvatica*	RB
A	Long-eared Owl	*Asio otus*	*otus*	RB PV WV
A	Short-eared Owl	*Asio flammeus*	*flammeus*	RB MB PV WV
A	Tengmalm's Owl	*Aegolius funereus*	*funereus*	SV
A	European Nightjar	*Caprimulgus europaeus*	*europaeus*	MB PV
A	Common Nighthawk	*Chordeiles minor*	*minor* (presumed)	SV
A	Chimney Swift	*Chaetura pelagica*		SV
A	White-throated Needletail	*Hirundapus caudacutus*	*caudacutus*	SV
A	Common Swift	*Apus apus*	*apus*	MB PV
A	Pallid Swift	*Apus pallidus*	race undetermined	SV
A	Alpine Swift	*Apus melba*	*melba*	SV
A	Little Swift	*Apus affinis*	*galilejensis* (presumed)	SV
A	Common Kingfisher	*Alcedo atthis*	*ispida*	RB MB
A	Blue-cheeked Bee-eater	*Merops superciliosus*	*persicus* (presumed)	SV
A	European Bee-eater	*Merops apiaster*		CB SV
A	European Roller	*Coracias garrulus*	*garrulus*	SV
A	Hoopoe	*Upupa epops*	*epops*	PV

A	Eurasian Wryneck	*Jynx torquilla*	*torquilla*	CB PV
A	Green Woodpecker	*Picus viridis*	*viridis*	RB
A	Great Spotted Woodpecker	*Dendrocopos major*	*major*	PV WV
			anglicus	RB
A	Lesser Spotted Woodpecker	*Dendrocopos minor*	*comminutus* (presumed)	SV
A	Calandra Lark	*Melanocorypha calandra*	race undetermined	SV
A	Bimaculated Lark	*Melanocorypha bimaculata*	race undetermined	SV
A	Greater Short-toed Lark	*Calandrella brachydactyla*	race undetermined	SV
A	Crested Lark	*Galerida cristata*	*cristata*	SV
A	Wood Lark	*Lullula arborea*	*arborea*	SV
A	Sky Lark	*Alauda arvensis*	*arvensis*	RB MB PV WV
A	Horned Lark	*Eremophila alpestris*	*flava*	CB WV
A	Sand Martin	*Riparia riparia*	*riparia*	MB PV
A	Eurasian Crag Martin	*Ptyonoprogne rupestris*		SV
A	Barn Swallow	*Hirundo rustica*	*rustica*	MB PV
A	Red-rumped Swallow	*Hirundo daurica*	*rufula*	SV
A	House Martin	*Delichon urbica*	*urbica*	MB PV
A	Richard's Pipit	*Anthus novaeseelandiae*	*richardi*	PV
A	Blyth's Pipit	*Anthus godlewskii*		SV
A	Tawny Pipit	*Anthus campestris*	*campestris*	SV
A	Olive-backed Pipit	*Anthus hodgsoni*	*yunnanensis*	SV
A	Tree Pipit	*Anthus trivialis*	*trivialis*	MB PV
A	Pechora Pipit	*Anthus gustavi*	*gustavi*	SV
A	Meadow Pipit	*Anthus pratensis*	*pratensis*	MB RB PV WV
			whistleri	MB or RB
A	Red-throated Pipit	*Anthus cervinus*		SV
A	Rock Pipit	*Anthus petrosus*	*petrosus*	RB
	(Scandinavian)		*littoralis*	PV WV
A	Water Pipit	*Anthus spinoletta*	*spinoletta*	PV WV
A	Buff-bellied Pipit	*Anthus rubescens*	*rubescens*	SV
A	Yellow Wagtail			
	(Blue-headed Wagtail)	*Motacilla flava*	*flava*	CB PV
	(Yellow)		*flavissima*	MB PV
	(Ashy-headed)		*cinereocapilla*	SV
	(Sykes's)		*beema*	SV
	(Grey-headed)		*thunbergi*	SV
	(Black-headed)		*feldegg*	SV
	(Eastern Blue-headed)		*simillima*	SV
A	Citrine Wagtail	*Motacilla citreola*	race undetermined	SV
A	Grey Wagtail	*Motacilla cinerea*	*cinerea*	RB MB PV
A	White / Pied Wagtail			
	(White)	*Motacilla alba*	*alba*	CB PV
	(Pied)		*yarrellii*	MB RB
A	Cedar Waxwing	*Bombycilla cedrorum*		SV
A	Bohemian Waxwing	*Bombycilla garrulus*	*garrulus*	WV
A	White-throated Dipper			
	(Black-bellied)	*Cinclus cinclus*	*cinclus*	SV
	(British)		*gularis*	RB
	(Irish)		*hibernicus*	RB
A	Winter Wren	*Troglodytes troglodytes*	*troglodytes*	WV PV

	(Shetland)		***zetlandicus***	**RB ENDEMIC**
	(Fair Isle)		***fridariensis***	**RB ENDEMIC**
	(Hebridean)		***hebridensis***	**RB ENDEMIC**
	(St Kilda)		***hirtensis***	**RB ENDEMIC**
			indigenus	RB
A	Hedge Accentor (Continental)	*Prunella modularis*	*modularis*	PV WV
	(Hebridean)		*hebridium*	RB
	(British)		*occidentalis*	RB
A	Alpine Accentor	*Prunella collaris*	*collaris*	SV
A	European Robin	*Erithacus rubecula*	*rubecula*	PV WV
			melophilus	RB MB
A	Thrush Nightingale	*Luscinia luscinia*		SV
A	Common Nightingale	*Luscinia megarhynchos*	*megarhynchos*	SV
			hafizi	SV
A	Siberian Rubythroat	*Luscinia calliope*		SV
A	Bluethroat			
	(Red-spotted)	*Luscinia svecica*	*svecica*	CB PV
	(White-spotted)	*cyanecula*	SV	
A	Red-flanked Bluetail	*Tarsiger cyanurus*	*cyanurus*	SV
A	Black Redstart	*Phoenicurus ochruros*	*gibraltariensis*	PV WV
A	Common Redstart	*Phoenicurus phoenicurus*	*phoenicurus*	MB PV
A	Whinchat	*Saxicola rubetra*		MB PV
A	Stonechat	*Saxicola torquata*	*hibernans*	RB MB
	(Siberian)		*maura*	SV
			maura or stejnegeri	SV
A	Isabelline Wheatear	*Oenanthe isabellina*		SV
A	Northern Wheatear	*Oenanthe oenanthe*	*oenanthe*	MB PV
	(Greenland)		*leucorhoa*	PV
A	Pied Wheatear	*Oenanthe pleschanka*	*pleschanka*	SV
A	Black-eared Wheatear	*Oenanthe hispanica*	*hispanica*	SV
A	Desert Wheatear	*Oenanthe deserti*	*deserti*	SV
			homochroa	SV
			atrogularis	SV
A	Rufous-tailed Rock Thrush	*Monticola saxatilis*		SV
A	Blue Rock Thrush	*Monticola solitarius*	race undetermined	SV
A	White's Thrush	*Zoothera dauma*	*aurea*	SV
A	Siberian Thrush	*Zoothera sibirica*	race undetermined	SV
A	Hermit Thrush	*Catharus guttatus*	race undetermined	SV
A	Swainson's Thrush	*Catharus ustulatus*	*swainsonii*	SV
A	Grey-cheeked Thrush	*Catharus minimus*	*aliciae* (presumed)	SV
A	Veery	*Catharus fuscescens*	race undetermined	SV
A	Ring Ouzel	*Turdus torquatus*	*torquatus*	MB PV
A	Common Blackbird	*Turdus merula*	*merula*	RB MB PV WV
A	Eyebrowed Thrush	*Turdus obscurus*		SV
A	Dusky Thrush	*Turdus naumanni*	*eunomus*	SV
A	Dark-throated Thrush	*Turdus ruficollis*	*atrogularis*	SV
A	Fieldfare	*Turdus pilaris*		CB WV PV
A	Song Thrush	*Turdus philomelos*	*philomelos*	PV WV
			clarkei	RB MB PV WV
	(Hebridean)		***hebridensis***	**RB MB ENDEMIC**

A	Redwing	*Turdus iliacus*	*iliacus*	MB/RB WV PV
			coburni	WV PV
A	Mistle Thrush	*Turdus viscivorus*	*viscivorus*	RB MB PV WV
A	American Robin	*Turdus migratorius*	*migratorius*	SV
A	Cetti's Warbler	*Cettia cetti*	*cetti*	SV
A	Pallas's Grasshopper Warbler	*Locustella certhiola*	*rubescens*	SV
A	Lanceolated Warbler	*Locustella lanceolata*		SV
A	Common Grasshopper Warbler	*Locustella naevia*	*naevia*	MB PV
A	River Warbler	*Locustella fluviatilis*		SV
A	Savi's Warbler	*Locustella luscinioides*	*luscinioides*	SV
A	Aquatic Warbler	*Acrocephalus paludicola*		SV
A	Sedge Warbler	*Acrocephalus schoenobaenus*		MB PV
A	Paddyfield Warbler	*Acrocephalus agricola*	*brevipennis* (presumed)	SV
A	Blyth's Reed Warbler	*Acrocephalus dumetorum*		SV
A	Marsh Warbler	*Acrocephalus palustris*		CB PV
A	Eurasian Reed Warbler	*Acrocephalus scirpaceus*	*scirpaceus*	MB PV
A	Great Reed Warbler	*Acrocephalus arundinaceus*		
			arundinaceus	SV
A	Thick-billed Warbler	*Acrocephalus aedon*	*aedon* (presumed)	SV
A	Olivaceous Warbler	*Hippolais pallida*	*elaeica*	SV
A	Booted Warbler	*Hippolais caligata*	*caligata*	SV
	(Sykes's)		*rama*	SV
A	Icterine Warbler	*Hippolais icterina*		CB PV
A	Melodious Warbler	*Hippolais polyglotta*		PV
A	Marmora's Warbler	*Sylvia sarda*	*sarda* (presumed)	SV
A	Dartford Warbler	*Sylvia undata*	*dartfordiensis*	SV
A	Subalpine Warbler	*Sylvia cantillans*	*cantillans*	SV
			albistriata	SV
A	Sardinian Warbler	*Sylvia melanocephala*	*melanocephala*	SV
A	Ruppell's Warbler	*Sylvia rueppelli*		SV
A	Orphean Warbler	*Sylvia hortensis*	race undetermined	SV
A	Barred Warbler	*Sylvia nisoria*	*nisoria*	PV
A	Lesser Whitethroat	*Sylvia curruca*	*curruca*	MB PV
	(Siberian)		*blythi*	SV
A	Common Whitethroat	*Sylvia communis*	*communis*	MB PV
A	Garden Warbler	*Sylvia borin*	*borin*	MB PV
A	Blackcap	*Sylvia atricapilla*	*atricapilla*	MB PV WV
A	Greenish Warbler	*Phylloscopus trochiloides*	*viridanus*	SV
A	Arctic Warbler	*Phylloscopus borealis*	*talovka* (presumed)	SV
A	Pallas's Leaf Warbler	*Phylloscopus proregulus*	*proregulus*	PV
A	Yellow-browed Warbler	*Phylloscopus inornatus*	*inornatus*	PV
A	Hume's Leaf Warbler	*Phylloscopus humei*	*humei* (presumed)	SV
A	Radde's Warbler	*Phylloscopus schwarzi*		SV
A	Dusky Warbler	*Phylloscopus fuscatus*	*fuscatus*	SV
A	Western Bonelli's Warbler	*Phylloscopus bonelli*		SV
A	Eastern Bonelli's Warbler	*Phylloscopus orientalis*		SV
A	Wood Warbler	*Phylloscopus sibilatrix*		MB PV
A	Common Chiffchaff	*Phylloscopus collybita*	*collybita*	MB PV WV
			abietinus	PV WV
	(Siberian)		*tristis*	PV WV

			fulvescens	PV WV
A	Willow Warbler	*Phylloscopus trochilus*	*trochilus*	MB PV
			acredula	MB? PV
A	Goldcrest	*Regulus regulus*	*regulus*	RB PV WV
A	Firecrest	*Regulus ignicapillus*	*ignicapillus*	PV
A	Spotted Flycatcher	*Muscicapa striata*	*striata*	MB PV
A	Red-breasted Flycatcher	*Ficedula parva*	*parva*	PV
A	Collared Flycatcher	*Ficedula albicollis*		SV
A	Pied Flycatcher	*Ficedula hypoleuca*	*hypoleuca*	MB PV
A	Bearded Tit	*Panurus biarmicus*	*biarmicus*	RB? PV
A	Long-tailed Tit	*Aegithalos caudatus*	*rosaceus*	RB
			caudatus	SV
A	Marsh Tit	*Parus palustris*	*dresseri*	RB
A	Willow Tit	*Parus montanus*	*kleinschmidti*	RB
			borealis	SV
A	Crested Tit			
	(Scottish)	*Parus cristatus*	***scoticus***	**RB ENDEMIC**
A	Coal Tit	*Parus ater*	*ater*	PV
			britannicus	RB
A	Blue Tit	*Parus caeruleus*	*caeruleus*	SV
			obscurus	RB
A	Great Tit	*Parus major*	*major*	SV WV
			newtoni	RB
A	Wood Nuthatch	*Sitta europaea*	*caesia*	RB
A	Eurasian Treecreeper	*Certhia familiaris*	*familiaris*	SV
			britannica	RB
A	Eurasian Golden Oriole	*Oriolus oriolus*	*oriolus*	CB PV
A	Brown Shrike	*Lanius cristatus*	race undetermined	SV
A	Isabelline Shrike	*Lanius isabellinus*	*phoenicuroides*	
			(presumed)	SV
A	Red-backed Shrike	*Lanius collurio*	*collurio*	CB PV
A	Lesser Grey Shrike	*Lanius minor*	*minor*	SV
A	Great Grey Shrike	*Lanius excubitor*	*excubitor*	WV PV
A	Southern Grey Shrike	*Lanius meridionalis*	*pallidirostris*	SV
A	Woodchat Shrike	*Lanius senator*	*senator*	PV
A	Eurasian Jay	*Garrulus glandarius*	*rufitergum*	RB
A	Black-billed Magpie	*Pica pica*	*pica*	RB
A	Spotted Nutcracker	*Nucifraga caryocatactes*	*macrorhynchos*	SV
A	Red-billed Chough	*Pyrrhocorax pyrrhocorax*	*pyrrhocorax*	RB
A	Eurasian Jackdaw	*Corvus monedula*	*monedula*	WV
			spermologus	RB WV
A	Rook	*Corvus frugilegus*	*frugilegus*	RB WV
A	Carrion / Hooded Crow			
	(Carrion)	*Corvus corone*	*corone*	RB WV
	(Hooded)		*cornix*	RB WV
A	Common Raven	*Corvus corax*	*corax*	RB
A	Common Starling	*Sturnus vulgaris*	*vulgaris*	RB WV PV
	(Shetland)		***zetlandicus***	**RB ENDEMIC**
A	Rosy Starling	*Sturnus roseus*		SV
A	House Sparrow	*Passer domesticus*	*domesticus*	RB

A	Spanish Sparrow	*Passer hispaniolensis*	*hispaniolensis* (presumed)	SV
A	Eurasian Tree Sparrow	*Passer montanus*	*montanus*	RB PV
A	Red-eyed Vireo	*Vireo olivaceus*		SV
A	Chaffinch	*Fringilla coelebs*	*coelebs*	WV PV
			gengleri	RB
A	Brambling	*Fringilla montifringilla*		CB WV PV
A	European Serin	*Serinus serinus*		SV
A	European Greenfinch	*Carduelis chloris*	*chloris*	RB WV
A	European Goldfinch	*Carduelis carduelis*	*britannica*	RB MB
A	Eurasian Siskin	*Carduelis spinus*		RB MB WV PV
A	Common Linnet	*Carduelis cannabina*	*cannabina*	WV
	(Scottish)		***autochthona***	**RB MB ENDEMIC**
A	Twite	*Carduelis flavirostris*	*pipilans*	RB MB
A	Lesser Redpoll	*Carduelis cabaret*		RB MB
A	Common Redpoll			
	(Mealy)	*Carduelis flammea*	*flammea*	WV PV
	(Greater)		*rostrata*	SV
A	Arctic Redpoll	*Carduelis hornemanni*	*hornemanni*	SV
			exilipes	SV
A	Two-barred Crossbill	*Loxia leucoptera*	*bifasciata*	SV
A	Common Crossbill	*Loxia curvirostra*	*curvirostra*	RB MB WV PV
A	Scottish Crossbill	*Loxia scotica*		**RB ENDEMIC**
A	Parrot Crossbill	*Loxia pytyopsittacus*		[RB?] SV
A	Trumpeter Finch	*Bucanetes githagineus*	race undetermined	SV
A	Common Rosefinch	*Carpodacus erythrinus*	*erythrinus*	CB PV
A	Pine Grosbeak	*Pinicola enucleator*	*enucleator*	SV
A	Common Bullfinch	*Pyrrhula pyrrhula*	*pyrrhula*	SV
			pileata	RB
A	Hawfinch	*Coccothraustes*	*coccothraustes*	RB PV
A	Evening Grosbeak	*Hesperiphona vespertina*	*vespertina* (presumed)	SV
B	Black-and-white Warbler	*Mniotilta varia*		SV
A	Tennessee Warbler	*Vermivora peregrina*		SV
A	Yellow Warbler	*Dendroica petechia*	*aestiva*	SV
A	Chestnut-sided Warbler	*Dendroica pensylvanica*		SV
A	Blackburnian Warbler	*Dendroica fusca*		SV
A	Cape May Warbler	*Dendroica tigrina*		SV
A	Yellow-rumped Warbler	*Dendroica coronata*	*coronata* (presumed)	SV
A	Blackpoll Warbler	*Dendroica striata*		SV
A	American Redstart	*Setophaga ruticilla*		SV
A	Ovenbird	*Seiurus aurocapillus*	*aurocapillus*	SV
A	Common Yellowthroat	*Geothlypis trichas*	race undetermined	SV
A	Hooded Warbler	*Wilsonia citrina*		SV
A	Savannah Sparrow	*Passerculussandwichensis*	race undetermined	SV
A	Song Sparrow	*Melospiza melodia*	race undetermined	SV
A	White-crowned Sparrow	*Zonotrichia leucophrys*	race undetermined	SV
A	White-throated Sparrow	*Zonotrichia albicollis*		SV
A	Dark-eyed Junco	*Junco hyemalis*	*hyemalis*	SV
A	Lapland Longspur	*Calcarius lapponicus*	*lapponicus*	CB PV WV
A	Snow Bunting	*Plectrophenax nivalis*	*nivalis*	RB PV WV
			insulae	RB PV WV

A	Pine Bunting	*Emberiza leucocephalos*	*leucocephalos*	SV
A	Yellowhammer	*Emberiza citrinella*	*citrinella*	SV
			caliginosa	RB
A	Cirl Bunting	*Emberiza cirlus*	*cirlus*	SV
A	Ortolan Bunting	*Emberiza hortulana*		PV
A	Cretzschmar's Bunting	*Emberiza caesia*		SV
A	Yellow-browed Bunting	*Emberiza chrysophrys*		SV
A	Rustic Bunting	*Emberiza rustica*	*rustica*	SV
A	Little Bunting	*Emberiza pusilla*		SV
A	Yellow-breasted Bunting	*Emberiza aureola*	*aureola*	SV
A	Reed Bunting	*Emberiza schoeniclus*	*schoeniclus*	RB PV WV
A	Pallas's Bunting	*Emberiza pallasi*	*polaris* (presumed)	SV
A	Black-headed Bunting	*Emberiza melanocephala*		SV
A	Corn Bunting	*Miliaria calandra*	*calandra*	RB PV WV
A	Rose-breasted Grosbeak	*Pheucticus ludovicianus*		SV
A	Bobolink	*Dolichonyx oryzivorus*		SV
A	Brown-headed Cowbird	*Molothrus ater*	race undetermined	SV
A	Baltimore Oriole	*Icterus galbula*	*galbula*	SV

CATEGORY D

D	Greater Flamingo	*Phoenicopterus ruber*
D	Falcated Duck	*Anas falcata*
D	Baikal Teal	*Anas formosa*
D	Saker Falcon	*Falco cherrug*
D	Asian Brown Flycatcher	*Muscicapa dauurica*
D	Daurian Starling	*Sturnus sturninus*
D	Chestnut Bunting	*Emberiza rutila*
D	Red-headed Bunting	*Emberiza bruniceps*
D	Blue Grosbeak	*Guiraca caerulea*
D	Indigo Bunting	*Passerina cyanea*

Category A	473
Category B	9
Category C	6
Total	488
Category D	10

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Appendix

Species under consideration, but not yet accepted include:

Yellow-legged Gull	There are now approaching 20 accepted records of *michahellis* in Scotland, but BOURC still treats this as a subspecies of Herring Gull.
Caspian Gull	There are 7 Scottish records under consideration. BOURC still treat this as a subspecies (*cachinnans*) of Herring Gull.
Booted Eagle	*Hieraaetus pennatus* North Ronaldsay, Orkney 22 May 2000
Canvasback	*Aythya valisineria* Loch of Rummie, Sanday, Orkney 21-23 June 2000
Swinhoe's Storm-petrel	*Oceanodroma monorhis* Cove, Aberdeenshire 5 August 2000 and from Larne-Stranraer ferry (off Galloway) September 2000
Semipalmated Plover	*Charadrius semipalmatus* Uisaed Point, Argyll 6 July 2000
Hooded Merganser	*Lophodytes cucullatus* North Uist, Outer Hebrides 23-31 October 2000
Long-tailed Shrike	*Lanius schach* South Uist, Outer Hebrides 3-4 November 2000

Subspecies claimed in Scotland, but not yet accepted for Britain by BOURC include:

Little Shearwater	*elegans*	Musselburgh Lagoons 9 December 1990 (specimen found above tide line)
Canada Goose	*hutchinsii*, *minima* and *parvipes* - many claimed records, but none yet accepted	
Solitary Sandpiper	*solitaria*	Fair Isle 1992 (photographic evidence points to this race)
Mew Gull	*brachyrhynchus*	Lerwick, Shetland 25 January 1994 – 19 March 1994
Atlantic Puffin	*naumanni*	Sule Skerry (date?)

Greater Short-toed Lark	*brachydactyla*	Flannan Isles 1904 (specimen at NMS)
	longipennis	Fair Isle 1907 (specimen at NMS) – BOU say 'race undetermined, 2 types'.
Sky Lark	*cinerea* synonym for *dulcivox*	
		Flannan Is 1906 (specimen at NMS)
Eurasian Reed Warbler	*fuscus*	Fair Isle 15 – 16 June 2000, Fife Ness 2000 (Caspian Reed Warbler)
Lesser Whitethroat	*minula* or *margelanica*	
		Fair Isle 25-27 June 1999 (Desert Lesser Whitethroat)
Common Whitethroat	*icterops*	Fife Ness 2000
Garden Warbler	*woodwardi*	Isle of May 15 May 1998
Jackdaw	*soemmerringii*	Veensgarth, Shetland 27 January 1998 – 17 March 1998, with 2 on 28 January and 8 February. BOURC have said in their 25th Report that owing to 'plumage characters of Jackdaws (being) so variable (the race) can be accepted as new to Britain only if a breeding bird or pullus ringed within its normal breeding range is recovered in Britain and shows the characters of the race.'

Subspecies accepted for Britain by BOURC with Scottish records under consideration by SBRC/ BBRC include:

Common Redstart	*samamisicus*	Grutness, Shetland 24-26 September 2000

Subspecies which have probably occurred in Scotland, but for which SBRC can find no acceptable records, include:

Common Guillemot	*hyperborea*	(tideline specimens for Britain Category D)
Coal Tit	*hibernicus*	
Eurasian Jay	*hibernicus* and *glandarius*	
Twite	*flavirostris*	

Subspecies recorded in Scotland but which we have been unable to fully substantiate:

Northern Goshawk	*atricapillus*	The only Scottish record is Schiehallion 1869, origin doubtful, meanwhile placed in Category E

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Numbers, distribution and breeding biology of Ring Ouzels in upper Glen Esk, 1992-98

D S C ARTHUR & S A WHITE

Breeding Ring Ouzels were studied during 1992-98 in upper Glen Esk, Angus. The number of confirmed breeding pairs was similar at the beginning and end of the study period with 53 in 1992 and 56 in 1998. Mean inter nest distance was 406m. Of 144 nest sites described, the mean height above ground was 4.9m and mean altitude was 420m. Nests were built almost exclusively on, under or against rock, usually associated with Heather and usually on crags or steeply sloping ground. The annual earliest egg laying date varied between 12 and 23 April. The peak 2 day period of first egg laying date for first clutches was 29-30 April and for second clutches was 27-28 May. The mean clutch size was 4.01 (n 75), while the mean brood size was 3.37 (n 140) with a mean of 3.31 (n 140) chicks fledged. Annual nest success rates varied from 0.50 to 0.77 with most losses at the nestling stage.

Introduction

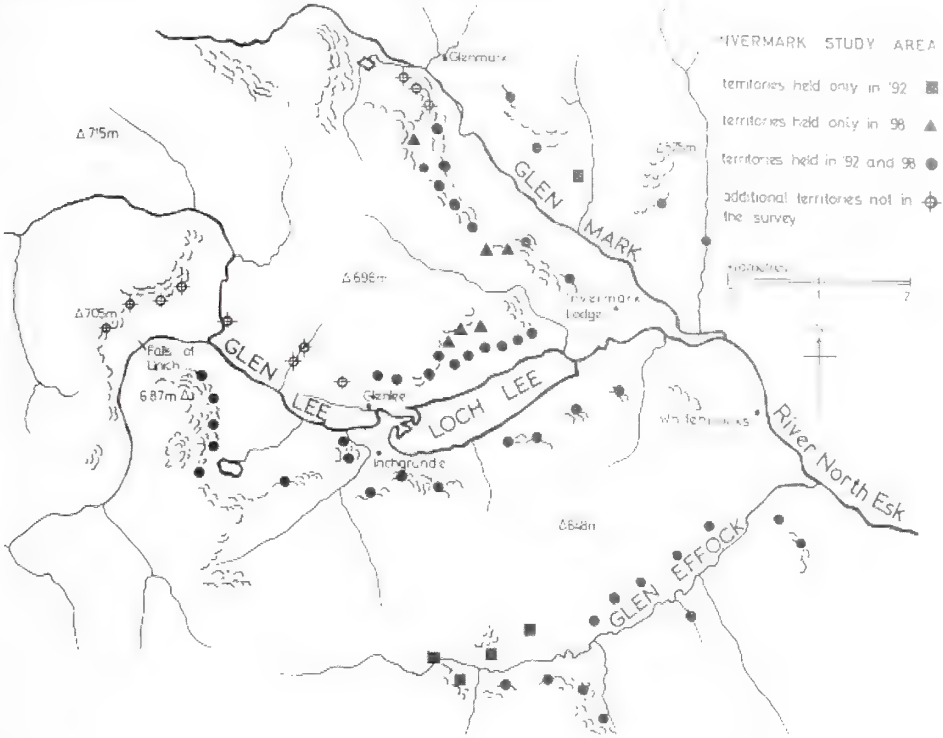
The Ring Ouzel *Turdus torquatus*, has long thought to have been in decline in the British Isles, and apart from the recent study in Glen Clunie (Rebecca 2001), about 30km west of Invermark, there is little knowledge of the status of Ring Ouzels in north Scotland. South of Angus there have been studies in the Pentland Hills (Durman 1977 Poxton 1986,1987), the Yorkshire Dales (Appleyard 1994), Wales (Tyler and Green 1994, Hope Jones 1979) and Dartmoor (Jones 1996). In Angus, our intentions were to quantify the numbers of Ring Ouzels, map the distribution of their territories and describe aspects of their breeding biology and habitat in parts of upper Glen Esk.

Study area

Glen Esk is situated in north east Angus, north of the Highland Boundary fault. The study area on Invermark Estate includes Glens Effock, Lee and Mark (Figure 1). Steep sided slopes with cliffs, crags, boulder fields and scree slopes are the predominant features of these glaciated valleys and corries. The glens are drained by numerous small burns of the River North Esk. Native woodland is sparse in the glens due to the grazing pressure of Red Deer *Cervus elaphus*, Roe Deer *Capreolus capreolus*, Mountain Hare *Lepus timidus*, Rabbit *Oryctolagus cuniculus* and Sheep *Ovis sp*. However, small areas of Birch *Betula sp*, and Rowan *Sorbus aucuparia* occur, the latter providing important food in early autumn. Aspen *Populus tremula*, Scots Pine *Pinus sylvestris* and occasional Juniper *Juniperus communis*, all remnants of ancient woodland, occur on inaccessible ledges of cliffs and crags. A number of small shelter belt coniferous plantations occur. The glen floor and lower slopes are a mosaic of Heather and upland pasture, before they merge with the Heather (*Calluna vulgaris*) line and are used as feeding areas by Ring Ouzels.

Heather communities predominate with *Calluna vulgaris - Erica cinerea* heath and *Calluna vulgaris - Vaccinium myrtillus* heath providing most of the ground cover. Woodland succession is generally prevented by grazing and burning. Grasses are the next most important plants with

Figure 1 Map of the study area in upper Glen Esk 1992-98.



Bent (*Agrostis*) and Fescue (*Festuca*) species widespread with Bracken *Pterydium aquilinum* also common. Other low level shrubs covering large areas of the glen sides are Crowberry *Empetrum nigrum*, Cowberry *Vaccinium vitis-idaea*, and Blaeberry *Vaccinium myrtillus*, the berries of the latter providing an important food source for Ring Ouzels in late summer. Areas of Bog Myrtle *Myrica gale* grow in the lower wetlands. (Ingram and Noltie 1981).

Methods

Fieldwork was carried out from mid March to July in the years 1992-98. Annual coverage varied, as days with poor visibility due to rain or mist were avoided.

Territories were first located by traversing the glen sides using sheep and deer tracks where possible, at an altitude of approximately 350-450m. The altitude range of 250-550m includes 82% of nests on BTO nest record cards covering 1944-70 (Flegg & Glue, 1975). Some slopes were terraced and required 2 observers, although other slopes could be easily surveyed from lower down. In the early years a hand held micro cassette recorder playing Ring Ouzel song was used at 150-200m intervals to locate birds (Arthur 1994).

The criteria used for determining confirmed breeding (A-C) and probable breeding (D) pairs were coded as follows and mapped.

A Nest, eggs or young located.
B Adult or adults carrying nesting materials or food.
C Adult bird or pair alarming, territorial dispute.
D Singing male.

As males generally do not incubate, nest finding involved locating feeding females and then watching their return to the nest, usually within 15 to 20 minutes.

The following nest details were recorded: position, altitude, height above ground, habitat immediately around the nest and whether it was well hidden, partly hidden or exposed. Nest site classification fell into 4 main categories: cliff, crag, boulder field and moorland. Nests were visited regularly at intervals to record contents and to take measurements of eggs or chicks.

The date of laying of the first egg in incomplete clutches was recorded; this could be done to an accuracy of one day. For full clutches the first egg dates were calculated by presuming an incubation period of 14 days and that one egg was laid per day.

In nests that were discovered with chicks, an estimate of their age was made using photographs of known age chicks found in earlier years. In addition, weights gathered by a study of *Turdus torquatus alpestris* in the Carpathian Mountains in the Ukraine by Marisova & Vladyshevsky (1961) were also used and calculated to an accuracy of 3 days.

Known or suspected nest sites were marked on a map and the inter nest distances (IND) calculated using Scion Image computer software.

Nest success rates for each year were calculated using the Mayfield Maximum Likelihood Estimate (Mayfield, 1975). In this method the proportion of nests successful at each of the 3 stages (egg, hatchling and nestling) is multiplied together to give an overall success rate.

Results

Distribution of territories

Figure 1 shows confirmed and probable breeding sites in Glens Lee, Mark and Effock in 1992 and 1998. Inter nest distances were measured and associated standard deviations calculated for the whole study area in an attempt to measure densities of Ring Ouzel breeding territories. In Glen Effock the mean inter nest distance (IND) was 489m ± 144, range 318-750m; in Glen Mark mean IND was 389m ± 239, range 182-954m and in Glen Lee 376m ± 218, range 159-909m. ANOVA showed no significant difference between INDs in the 3 glens ($F=1.58$, $p=0.214$, df 2,63). In the core study area around Loch Lee nests were spaced at a mean distance of 207m ± 57.0, range 159-363m along the north side of the loch. Nest sites were found to be significantly further apart on the south side (2 sample T-test, $t=3.43$, $p=0.011$, $df=7$), where the IND was 463m ± 206, range 182-886m (Fig 1). In Glen Mark on the north east side of the glen, nests were spaced at a mean distance of 750m ± 188, range 568-954m. Nest sites were found to be significantly closer together on the south west side (2 sample t-test, $t=4.79$, $p=0.017$, $df=3$) where the IND was 278m ± 104, range 182-591m.

Nest site characteristics

Out of 144 nests located 122 were built on rock and 22 in Heather. The vegetation immediately surrounding nests was usually Heather, (123 nests), 2 were surrounded by grass and one was in the lower reaches of a tree. Fourteen nests had no vegetation around them (Table 1).

Table 1 *Nest site details of Ring Ouzels in Glen Esk.*

Situation of nest	**Rock or crag**		**Heather**		
Total number of nests	122		22		
Vegetation surrounding nests	**None**	**Heather**	**Grass**	**Tree**	**Dead**
0-5m up crag	9	93	2	1	4
5-60m up crag	5	30	0	0	0

A total of 73 nests were on crags or ledges, 64 on steeply sloping ground and 7 on flat or gently sloping ground and 18 were well hidden, 106 were partly hidden and 20 were in the open. Fifteen nests were measured with mean and standard deviation for the outside diameter of 110mm ± 9.9 and for the depth from top to base of 62mm ± 6.2.

Of 12 nests dissected, the materials used were identified as the following: Heather, Bracken, grasses and moss. All nests were bound together with mud with an inner lining of fine grasses similar to those in nests in Yorkshire (Appleyard 1994). Nest dimensions and materials were also similar to those recorded for the subspecies *Turdus torquatus alpestris* from Romania (Korodi Gál 1970).

Figure 2 shows the frequency distribution of nest heights up crags, with the vast majority of nests between 0 and 5 metres off the ground, with a mean of 4.90m and a range of 0 to 60m. Figure 3 shows the frequency distribution of nest altitude in 25m bands. This shows a mean of 420m with nests ranging from 310 to 550m.

Figure 2 ***Frequency distribution of Ring Ouzel nest heights up crag 1992-98.***

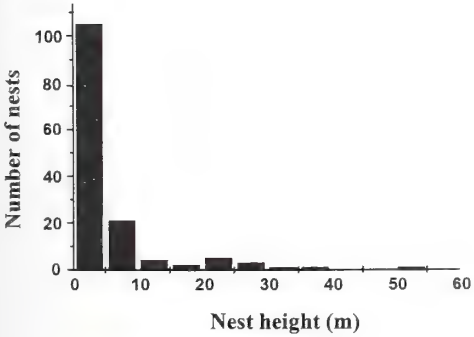
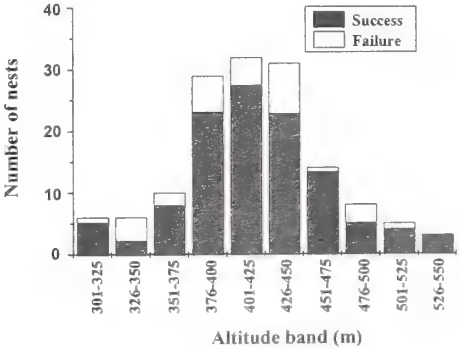


Figure 3 ***Frequency distribution of Ring Ouzel nest altitudes 1992-98. The open section of each column shows the proportion of nests unsuccessful in each band.***



Re use of nest sites

Evidence so far from colour ringed birds returning to the study area seems to indicate low nest site fidelity as several territories were used in subsequent years by different individual pairs. Although the sample was small, no colour ringed bird has been found to occupy a territory for consecutive years. There seems to be a strong, natal site fidelity. Out of 24 sightings of colour ringed birds, 21 birds returned for their first summer, 2 for their second summer and one for its third summer.

Egg laying dates

Figure 4 shows the distribution of first egg laying dates for all clutches over the study period. From inspection of Figure 4, a cut off point was drawn at 14 May and all nests after that were taken to be second broods. The peak 2 day period for first clutches was 29-30 April and for second clutches 27-28 May.

Table 2 lists the mean dates of laying of the first egg of first and second clutches for the 6 years of the study, where known. The overall mean for first clutches was 27 April, ranging between 24 and 29 April. The mean for second clutches showed more variation, ranging between 18 May and 5 June. The laying dates for first clutches were taken and compared with nest altitude. No significant relationship was found between altitude and laying date (r = 0.103).

Figure 4 ***Frequency distribution of egg laying dates 1992-98 combined in 2 day intervals.***

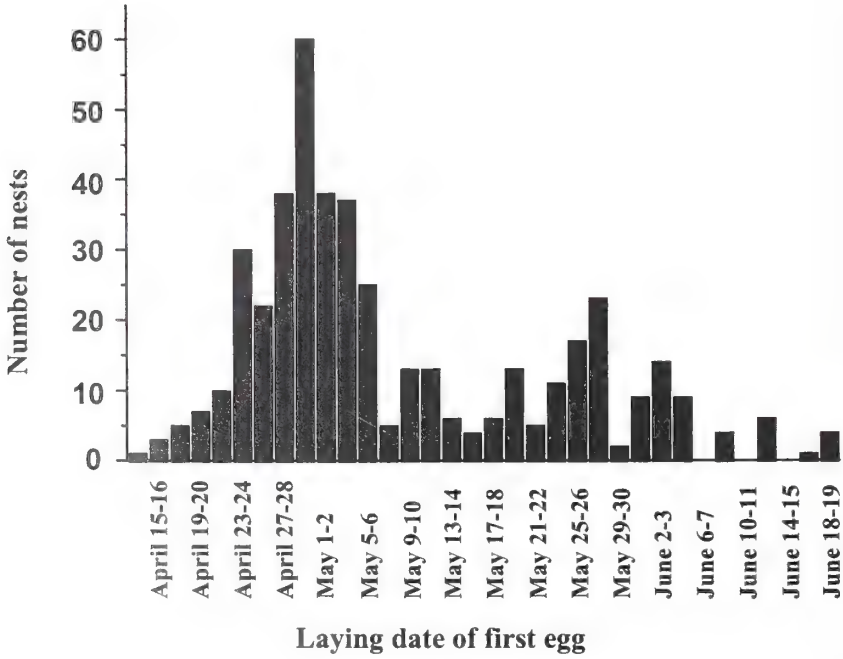


Table 2 *Mean dates of laying of first egg of first and second clutches.*

Year of clutches	Mean first	Number of clutches	Mean second clutches	Number clutches
1993	27 April	9	31 May	8
1994	29 April	9	27 May	8
1995	26 April	21	-	-
1996	24 April	9	18 May	5
1997	27 April	13	20 May	9
1998	29 April	25	5 June	10

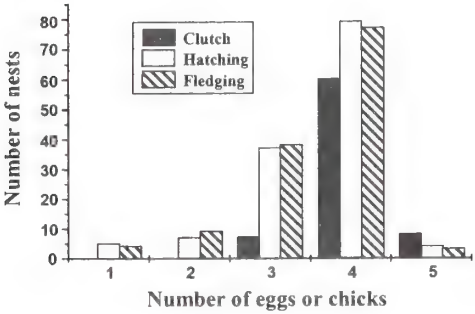
Clutch and brood sizes

Table 3 shows the annual means for clutch size and brood size at both hatching and fledging. Clutch size may have been underestimated as not all nests could be monitored at the start of laying and any losses prior to this would not be recorded. Mean hatchling and fledgling numbers are less likely to be biased in this way. Figure 5 shows the frequency distribution over the whole study period of clutch size and brood size at both hatching and fledging.

Table 3 *Mean dates of laying of first and second clutches.*

Year	Mean clutch Size ± SD(n)	Mean number of chicks hatching ± SD (n)	Mean number of chicks fledging ± SD (n)
1992	4.00 ± 0.76 (7)	3.30 ± 1.27 (10)	3.20 ± 1.17 (10)
1993	4.14 ± 0.64 (7)	3.18 ± 1.29 (17)	3.12 ± 1.32 (17)
1994	3.90 ± 0.30 (7)	3.29 ± 0.82 (17)	3.18 ± 0.98 (17)
1995	4.00 ± 0.00 (12)	3.45 ± 1.03 (22)	3.41 ± 1.03 (22)
1996	4.00 ± 0.58 (6)	3.54 ± 0.63 (13)	3.54 ± 0.63 (13)
1997	4.00 ± 0.67 (9)	3.41 ± 1.07 (22)	3.41 ± 1.07 (22)
1998	4.00± 0.29 (24)	3.39± 1.08 (39)	3.34 ± 1.10 (39)
All years	4.01± 0.46 (75)	3.37 ± 1.06 (140)	3.31 ± 1.08 (140)

Figure 5 ***Frequency distribution of clutch size and brood size at hatching and fledging 1992-98.***



Nest success rates

Table 4 shows nest success rates for each year calculated using the Mayfield Maximum Likelihood Estimate (Mayfield, 1975). This method was designed to enable success rates to be calculated from incomplete data, as in the present study when not all nests were found at the beginning, or could not be followed to a conclusion. Losses of complete nests and losses of individual eggs or young nestlings are taken into account and success rates can be calculated for each stage. The proportion of successful nests at each stage is multiplied together to give the overall success rate. Most losses were at the nestling stage with losses at the egg stage occurring in only 1995. Over the course of the study the annual success rate varied from 0.50 to 0.77 with a mean of 0.61.

Discussion

Although numbers of Ring Ouzels are thought to be stable throughout most of its breeding range in western Europe (Tucker and Heath, 1994) the species has undergone a long term decline in Britain.

Baxter and Rintoul (1953) reported large decreases in Scotland for the first half of the twentieth century, a trend confirmed up to the 1980s by Thom (1986). Sharrock (1976), using data from 1968-72, estimated that there were 8-16,000 breeding pairs in Britain and Ireland and Gibbons et al, (1993) calculated 5,680-11,360 breeding pairs in 1988-1991. The more recent 1999 Ring Ouzel survey estimates there are between 6155 to 7550 territories for the UK, a reduction of around 40% (Wotton *in prep*). Suggested reasons for regional declines are climate change (Gibbons 1993), overgrazing, increased predation and interspecific competition with Common Blackbirds *Turdus merula* (Williamson 1975, Simms 1978) or Mistle Thrushes *Turdus viscivorus* (Durman

Table 4 ***Nest success rates for Ring Ouzels during the current study.***

Year	Egg stage	Hatching stage	Nestling stage	Overall
1992	1.00	0.80	0.66	0.53
1993	1.00	0.80	0.65	0.52
1994	1.00	1.00	0.50	0.50
1995	0.73	0.98	0.94	0.67
1996	1.00	0.81	0.92	0.75
1997	1.00	0.87	0.68	0.59
1998	1.00	0.95	0.78	0.77

1977) although no interspecific interaction with the above species was observed in our study area.

During the study period and set against the situation of decline elsewhere, the similarity in the numbers of breeding territories within the study area, suggests a stable breeding population. A comparable study in nearby Glen Clunie also found evidence of a stable population (Rebecca, 2001).

Distribution of territories

After the first 2 seasons' work it became clear that territories were generally traditional and occupied annually, although not necessarily by the same birds. How boundaries between territories were defined was difficult to assess due to the terrain. The main features were the crags and cliffs. Territory boundaries were vigorously defended at the pair bonding, nest building and incubation stages, especially by the male. A much smaller area around the nest was defended once the eggs hatched, probably because of the demands of feeding the chicks.

Because of the difficulties and time required to delineate territories accurately, inter nest distances (IND) were used as a means of defining the densities of birds.

Figure 1 clearly shows that Ring Ouzel nest sites were fairly regularly spaced throughout the study area, although this spacing varies according to site (mean IND for the whole study was 406m). The core study area around Loch Lee shows marked contrast in the spacing. Birds on the north side had a mean IND of 207m compared with 463m on the south side. The higher density on the north side may be due to the availability of nest sites adjacent to large areas of good pasture. This south facing grassland has a base rich soil which is likely to support a higher earthworm population than the surrounding more acid soils (Tyler and Green 1994) and therefore provides the best feeding areas. The south side had very few grassy areas which were of poor quality and hence supported fewer pairs. Glen Mark also shows great contrast, with the north east facing slopes supporting more birds, with an IND of 278m as against 750m on the opposite side of the glen. As in the Loch Lee area, the densest parts had large areas of more base rich grassland and this, allied to aspect, provided better feeding areas able to support more birds.

Immediately north and south of the Falls of Unich are 2 other areas of high density where there are extensive areas of good pasture. In Glen Effock the density of birds is moderate, with an IND of 489m. Although the pasture is fairly extensive it is of poor quality, due to more acidic soils.

Nest characteristics

The study found that nests were built on crags, cliffs, boulder fields or in Heather, with the associated vegetation generally Heather. This agrees with the work of both Flegg and Glue (1975) and Appleyard (1994) who found the vast majority of nests to be on crags, in gorges or associated with Heather and grass. In a study area in the Pentland Hills, 95 nests were located with 88 in or under Heather, 4 were in Bracken and three were on exposed ledges (Durman 1977, Poxton 1986). In Glen Esk the vast majority of nests were found on steep slopes, cliffs or crags with only a few on more accessible ground. Most nests were at least partially hidden. All the studies noted so far and those of Tyler and Green (1994) in Wales and Jones (1996) on Dartmoor have found nest sites to be on steep slopes, crags and gullies, particularly if there is good coverage of Heather.

Flegg and Glue (1975) found that 82% of nests from all over Britain were between an altitude of 230 and 530m; 74% the of nests in this study area were within 375-475m.

Laying dates

In the 6 years where it was possible to calculate the mean date for first clutches there was little variation (Table 2). The earliest date was 12 April 1995, and the latest 23 April 1998. The earliest eggs recorded in Yorkshire (Appleyard 1994) were on 13 April. It is possible that first laying date is correlated with arrival date. When the birds first arrive back they feed for a few days before breeding commences. Arrival date itself may be affected by a number of factors including the weather and overwintering conditions in North Africa. Data of temperature and rainfall collected from Whitehillocks in the east of the study area, were analysed but no correlation with first egg laying was found. Day length may also be a factor in first laying date, as may be the availability of insects, which itself can be affected by the weather. From the regularity of mean laying dates it would appear that day length is the most reliable indicator of when laying will occur.

Egg laying reached a peak at the end of April, followed by a smaller peak of second clutches on 27-28 May. Appleyard (1994) found the peak of first clutches in Yorkshire to be around a week earlier on 22 April. He identified a second peak due to replacement clutches from the 11-15 May and a third peak due to second clutches from the 26-30 May. Flegg and Glue (1975) and Poxton (1986) similarly found peaks in late April/early May and mid May/early June.

Clutch sizes

The mean clutch size of 4.01 eggs is similar to that of Appleyard (1994) who found a mean clutch size of 3.93 eggs from a total of 85 clutches. Similarly Flegg and Glue (1975) had an overall mean of 4.1 from 79 clutches and Durman (1977) 4.05 from 19 clutches. Clutches of 4 eggs were the commonest, with a few of 3 or 5 eggs. Durman (1977) noted that clutches of 5 were more common in wet years, perhaps linked to the greater ease of catching earthworms, a favoured prey of the Ring Ouzels. The frequency of clutches with 5 eggs in this study was too low for any effect of weather to be noticed. Korodi Gál (1970) found a clutch size of 5 to be commonest in the subspecies *Turdus torquatus alpestris*, breeding in Romania.

Nest success rates

The figures of between 50-77% for nesting success are comparable with those quoted by Appleyard (1994) who found between 38 and 80% of nests were successful in the Yorkshire Dales. Losses were higher in the nestling stage than the egg stage which agrees with the findings of Durman (1977). However Flegg and Glue (1975) found losses to be higher at the egg stage. We compared the nest success rates of open, partly hidden and hidden nests but no significant differences were found. We also compared nest success rates for different slopes and vegetation types but again there were no significant differences.

The reduced number of mammal predators ie Stoat *Mustela erminea*, Weasel *Mustela nivalis*, Fox *Vulpes vulpes* and corvids due to game control may have increased nesting success in our study area. Once the young have fledged, they are vulnerable to predation. Colour rings from a few Ring Ouzel chicks have been found in the eyries of Peregrine Falcons *Falco peregrinus*; recently fledged Ring Ouzels may be easy prey for these raptors.

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SHORT NOTES

Late nineteenth century breeding records of Osprey and White-tailed Eagle

The Major William Stirling of Fairburn egg collection has been previously referred to as it contains the first British breeding records for Slavonian Grebe *Podiceps auritus* (McGhie 1994, *Scottish Birds* 17:166-167) and Brambling *Fringilla montifringilla* (McGhie & Moran 1998, *Scottish Birds* 19:300-301). The collection is also outstanding on account of its series of Greenshank *Tringa nebularia,* Eurasian Siskin *Cardeulis spinus* and crossbill *Loxia curvirostra/ scotica.*

In the course of work on the collection HM and SM came across 2 clutches of eggs of Osprey *Pandion haliaetus*, each containing 2 eggs, and 2 clutches of eggs of White-tailed (Sea) Eagle *Haliaetus albicilla*, each containing 3 eggs. The eggs are typical of each species and there is no question about identification. We are inclined to accept the provenance of the eggs as the collection is of high quality and there is no evidence of the forgery of information elsewhere. The Osprey eggs were marked in the manuscript catalogue as having been collected in Sutherland on 4 May 1896 and Ross on 7 May 1897. The White-tailed Eagle eggs were marked as having been collected from Sutherland on 11 May 1896 and Ross on 16 May 1899.

There may have been 10-20 pairs of Osprey in Scotland at the turn of the twentieth century, but after 1860 information is only available for several sites in Speyside, Loch Arkaig and Loch Loyne in Invernessshire and for Loch Luichart in Rossshire (Brown P 1976. *The Scottish Ospreys*. Heinemann, London). There is little information available from Luichart, which is strange considering the ease of access from the Inverness to Kyle railway line. Ospreys are known to have returned annually to Luichart for '*several generations*' until 1892 and they '*always brought out young*' (Harvie-Brown J A & Buckley T E 1895. *A vertebrate fauna of the Moray Basin*. David Douglas, Edinburgh). Ospreys possibly bred at Luichart sometime between 1902 and 1940 but there is no firm evidence. (Witherby H F, Jourdain F C R, Ticehurst N F & Tucker B W 1940. *The Handbook of British Birds*. Witherby, London). The clutch in the Stirling Collection constitutes the last confirmed breeding record for Ross shire and may well have originated from Luichart as this was the only known Rossshire site for the species in the 1890s. Cameron of Lochiel (1943, *British Birds* 36:184) recorded that at Luichart '*the nest was regularly robbed every year*', and this would have been sometime around the 1890s . Another source, writing in 1902, considered the Luichart Ospreys to have been '*welcome visitors*', but noted that the nest had been robbed on a few occasions in the mid 1890s and that this may have been responsible for the birds deserting the site (Harvie-Brown manuscripts). The Sutherland clutch would represent the first known breeding record of Osprey in that county since St John famously slaughtered the last birds in Assynt in 1848.

There is likewise little information available on White-tailed Eagle in north Scotland for the end of the nineteenth century (Love J A 1983. *The Return of the Sea Eagle*. CUP, Cambridge). The only Ross shire eyrie know to be in use after 1890 was that on Beinn Gobhlach on the south side of Loch Broom. An immature bird sent to Macleay, the Inverness taxidermist, from Ullapool in 1893 (Buckley T E 1893. ASNH 3:179) and an adult trapped at Lochinver in 1899 may have come from this eyrie (Harvie-Brown J A & Macpherson H A 1904. *A vertebrate fauna of the North-west Highlands and Skye*. David Douglas, Edinburgh). The Ross shire clutch represents the last known breeding record for the county. In Sutherland it

was certainly very rare by the 1880s but there is a late unconfirmed record for 1901 (Harvie-Brown J A & Buckley T E 1887. *A vertebrate fauna of Sutherland, Caithness and West Cromarty*. David Douglas, Edinburgh; Bannerman D A 1956. *The Birds of the British Isles*. Oliver & Boyd, Edinburgh). Eagle Clarke (in Bannerman 1956 *op cit*) considered that White-tailed Eagles ceased to breed on the Scottish mainland in 1899 but did not give a last locality. The Sutherland clutches were both collected by someone with the initials HM and the Ross shire clutches by someone called JM; both of these people supplied other clutches from East Ross to the collection and they may been tenants of Major Stirling.

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Rook persecution in Orkney in the 1950s and the establishment of the first colony in Shetland

In *The Birds of Orkney*, 1984 Orkney Press, Stromness Booth, Cuthbert & Reynolds give an account of the early history of the Rooks *Corvus frugilegus* nesting and mention that changes in distribution were probably due to persecution. They quote Baxter and Rintoul's *Birds of Scotland* 1950 Oliver & Boyd, Edinburgh figure of 583 nests in 1945 and a count of 720 pairs in 1950 from Venables's *Birds and Mammals and Shetland* 1955 Oliver & Boyd, Edinburgh with a comment '*Unfortunately it has not been possible to obtain further details of these counts*' apparently as G T Arthur's notes are no longer available.

While transcribing some papers which the late Pat Venables passed on to me, I came across a letter from George Arthur dated 1 May 1952 sent in response to Pat's request for information on the status of Rooks in Orkney. Rooks had been unusually abundant in Shetland between February and April of that year, and on 27 April the Venables found 9 nests in plantations at Kergord, Weisdale, the first recorded breeding for the country. In his letter Arthur says '*Orkney possessed at Berstane a main rookery with one outlying small one on Hoy and several odd ones here and there. Six hundred pairs used to nest at Berstane with 65 in the north end of Hoy and perhaps 40 or so elsewhere. New proprietors came at Berstane several years ago and immediately started a blitz, aided and abetted by agricultural interested (parties) down south prepared to do anything to keep their jobs and salaries. I managed to put a spoke in their wheel but not in the proprietors*'. After this Rooks began to move elsewhere, '*300 arrived in Hoy and every tree in Kirkwall had 2 or 3 pairs, which were persecuted in their turn. Their attempts at nesting have been difficult so I suppose they decided to look elsewhere hence Shetland.*'

I wondered why Venables gave an Orkney total of 720 pairs, when Arthur's figures only add up to 705 pairs. Subsequently I found a list of birds seen in Orkney by Venables in April 1949. The first entry is: '*Rooks: 28 occupied nests around cathedral and Earl's Palace. George Arthur says 720 breeding pairs in Orkney. Numbers going to be reduced.*'

George Arthur's original letter will be deposited in the Shetland Archive, Lerwick.

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Pilot Whale apparently playing with moulting Common Eiders

Leitch's account of Bottle-nosed Dolphins *Tursiops truncatus* chasing birds (*Scottish Birds* 21:51-52), and his statement that he had not heard of cetaceans '*playing with birds apparently just for fun*', made me recall an incident on 27 August 1978. I was trying to count a fairly tight flock of 1,200 moulting Common Eiders *Somateria mollissima* off the south east side of Skelda Ness in the West Mainland of Shetland when the flock suddenly split into 2 halves; a lone Pilot Whale *Globicephala mela* had surfaced in the middle of the flock. The Common Eiders quickly reformed into one flock but then the same thing happened again, the whale surfacing in the middle of the birds causing them to scatter in panic. This went on for about 30 minutes with the Pilot Whale surfacing perhaps 6 or 7 times before the ducks began to swim into the wind around the tip of Skelda Ness and the whale vanished. I cannot be sure why the whale did this, but, given the reaction of the Common Eiders and the fact the whale waited until the flock reformed before resurfacing, I think it was simply having fun. Flocks of moulting Common Eiders are certainly very nervous of the approach of pods of Killer Whales *Orcinus orca*, although I have not seen Killer Whales or any other cetaceans show any active interest in them.

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Prey species attacked and captured by Eurasian Sparrowhawks outside the breeding season

During studies of the winter diet of Merlins *Falco columbarius*, Hen Harriers *Circus cyaneus* and Peregrine Falcons *Falco peregrinus* in west Galloway (Dickson 1992, *Scottish Birds* 16:282-284; 2000, *Scottish Birds* 21:116-117; 1994, *Transactions Dumfries and Galloway Natural History Society* 69:3-6; 1997, *British Birds* 90:359-360), I also saw Eurasian Sparrowhawks *Accipiter nisus* attacking and killing prey in winter in these same open habitats. The following is based on observed Eurasian Sparrowhawk attacks between August-March, 1970-2000.

Table 1 gives the number of attacks by adults and juveniles in winter in west Galloway. Most hunting techniques used by both classes were the same as those described in Newton (1986, *The Sparrowhawk*, Calton) but the most common technique in open country was the 'short stay hunting perch'. Of the 21 species attacked, most were birds normally associated with low ground and open country in winter but attacks occurred in many habitats from the coast to the uplands (see Dickson 1992. *The Birds of Wigtownshire*. Wigtown). Finches *Fringillidae* (41%), were the most frequent targets followed by Sky Larks *Alauda arvensis* (13%) but if all passerines are combined they constitute about 88% of all species (Table 1). Only 4 species formed more than 5% of kills: Sky Larks, Common Starlings *Sturnus vulgaris* and Chaffinches *Fringilla coelebs*, Common Linnets *Carduelis cannabina*. Expressed by weight finches emerged as the most important (23%) with Common Starlings providing 16% of kills by weight and Sky Larks 6%.

Little information is available on Eurasian Sparrowhawks' attack success (Newton 1986). In this study, however, the overall success rate of all hunts in winter was 14% (19.6% by adults, 4.6% by juveniles), which is not significantly

different from the 12% of kills on passage migrants recorded by Rudebech (1950, *Oikos* 2:64-88), or of the 21% and 12% on winter wader populations on the East Lothian coast (Whitfield 1985, *Ibis* 127:544-558; Cresswall 1996, *Ibis* 138:684-692), or the 21% by an adult female Eurasian Sparrowhawk in a winter woodland garden (Wilson & Weir 1989, *Scottish Birds* 15:126-130). In winter, too, Eurasian Sparrowhawks regularly and often attacked birds at their winter roosts, mostly Starlings. These attacks are not included in Table 1 but of the 60 attempts to catch Common Starlings there, 54, (90%) were unsuccessful (Dickson 1979, *British Birds* 72:186-187). Although most studies of winter diet of Eurasian Sparrowhawks have been made in continental Europe (eg see Opdam 1978, *Ardea* 66:137-155), the only other quantitative study of winter diet in Britain seems to be that of Newton (1986). He noted prey remains found at nest sites in his study area in Dumfriesshire between September and March where he recorded 36 bird species of which passerines constituted about 87% of all items, the same as the percentage of small passerine species attacked and killed in winter in this study.

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Table 1 ***Percentage frequency of prey species attacked and killed by Eurasian Sparrowhawks in winter in west Galloway, 1970-2000. Success of juveniles shown in brackets in last column.***

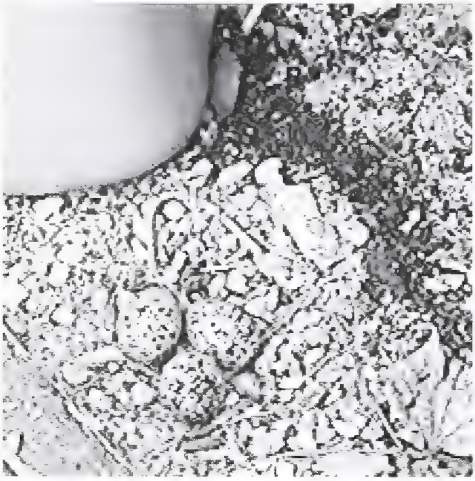
	Number of attacks			
	Adults	**Juveniles**	**% frequency**	**Success (j)**
Pigeons (1)	2	-	1.3	1
Waders (2)	11	-	6.9	-
Black-headed Gull	1	-	0.6	-
Eurasian Teal	1	-	0.6	-
Gamebirds (3)	-	4	2.5	-
Sky Lark	15	6	13.1	2 (1)
Barn Swallow	1	1	1.3	-
Meadow Pipits	5	2	4.4	-
Thrushes (4)	6	-	3.7	2
Common Starling	11	1	7.5	3
Finches (5)	42	24	41.3	8
Other passerines (6)	7	2	5.6	2 (1)
Unidentified passerines	14	3	10.6	5
Rabbit	1	-	0.6	-
Totals	117	43		25

(1) includes Common Wood Pigeon, Eurasian Collared Dove; (2) includes Eurasian Golden Plover, Northern Lapwing, Dunlin, Common Snipe; (3) includes Common Pheasant, Grey Partridge; (4) includes Redwing, Eurasian Blackbird, Northern Fieldfare; (5) includes Common Chaffinch, European Greenfinch, Common Crossbill, Common Linnet, Twite; (6) includes Pied Wagtail, House Sparrow, Reed Bunting. - *Scientific names omitted for reasons of space.*

Eurasian Oystercatcher nesting in a greenhouse

Roof nesting Eurasian Oystercatchers *Haematopus ostralegus* have bred at Monifieth High School, Angus for over 10 years. Initially only one pair attempted breeding but over the last 3 years, 3 pairs have regularly bred on the school's flat roofs. During May 2000 essential roof repair work had to be carried out and this was completed during the last few days of May. About a week later the roofs were then cleaned and the personnel involved in this work reported 2 nests containing clutches of 2 and 3 eggs on the 2 storey part of the school and one chick on a lower roof over the single storey science/technical block.

On Monday 12 June one of the janitors reported that he had found 'a nest' in the school greenhouse and he was sure it was "one of those noisy black and white birds" !! I was able to confirm that a Eurasian Oystercatcher was incubating a clutch of 3 eggs in the middle of the greenhouse, under the staging, in a nest constructed from small pink 'Balmullo' gravel chips. The door had been left open for sometime and the bird had only ever used this opening as its means of entry and exit. A pane of glass at ground level at the opposite end of the greenhouse was removed and one of the birds was seen using this opening when returning to incubate. The greenhouse is situated in a very enclosed part of the school grounds and close to 2 frequently used doorways. Disturbance was unavoidable throughout the school day. When the nearer of the 2 entrances was used the adult on the rim of the flat roof usually alarmed, while the incubating adult ran out of the greenhouse door, jumped onto a low wall, ran along the top of the wall and then flew up to join the other adult on the roof. After the person(s) had left the area the incubating bird quickly returned to its nest.



The nest at Monifieth High School

Bruce Lynch

School broke up for the summer holidays on 28 June when the clutch of 3 eggs was still being incubated. The head janitor reported that the bird was still present on 9 July and the clutch intact. However, around this date the 2 permanent members of the janitorial staff went on holiday and a relief janitor was left in charge. I visited the nest site on 18 and 24 July and found the clutch reduced to 2 eggs which were cold to the touch and presumed to be deserted. There were no signs of damage to the remaining eggs, the missing egg was not in the immediate vicinity and there was no sign of adults. The nest had clearly failed.

Eurasian Oystercatchers have been breeding on roof tops, especially in the Aberdeen area, for up to 30 years. They have also been reported nesting in enclosed situations in forestry plantations (G Shaw, *Scottish Birds* 1996 18:183) However, I can find no reference to this species having nested inside a structure in an enclosed area in a suburban location.

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Observations of predation of Hen Harrier nestlings by Hooded Crows in Orkney

Compared with other raptors, Hen Harriers (*Circus cyaneus*) are unusual, because they are often simultaneously polygynous with males having harems of up to 5 females (Picozzi N 1984, Breeding biology of polygynous Hen Harriers *Circus c cyaneus* in Orkney. *Ornis Scandinavica* 15:1-10). Clear hierarchies in female reproductive success have been observed, with primary females producing significantly more fledglings than later settling secondary females (Picozzi N *op cit*). Simmons *et al* (Simmons R E, Smith P C and MacWhirter R B 1986, Hierarchies among Northern Harrier *Circus cyaneus* harems and the costs of polygyny. *Journal of Animal Ecology* 55:755-771) found that this reduced productivity was associated with lower provisioning rates by male harriers to their secondary females. Both Simmons et al and Picozzi recorded higher rates of predation for secondary female nests. They suggested that this might result from females being forced to hunt for themselves in order to compensate for the low provisioning of their males, and thereby leave their nests unattended and more vulnerable to predators.

The Orkney Hen Harrier has declined dramatically since the 1970s (Meek E R, Rebecca G W, Ribbands B and Fairclough K 1998, Orkney Hen Harriers: a major population decline in the absence of persecution. *Scottish Birds* 19:290-298), despite the absence of human persecution. One explanation for the decline is a shortage of prey available during the breeding season. Lower provisioning rates by male harriers may lead to reduced breeding success, as found for secondary females in harems and populations of Northern Harriers *C c hudsonius* in the USA during poor vole years (Hamerstrom F, Hamerstrom F N and Burke C J 1985, Effect of voles on mating systems of harriers in a central Wisconsin population of harriers. *Wilson Bulletin* 97:332-346; Simmons R, Barnard P, MacWhirter R B and Hansen G L 1986, The influence of polygyny, productivity, age and provisioning of breeding Northern Harriers: a 5 year study. *Canadian Journal of Zoology* 64: 2447-2456). An alternative explanation for the decline is an increase in numbers of Hooded Crows (*Corvus corone cornix*) which are considered to be the main egg predator of Hen Harriers in Orkney (Picozzi N *op cit*). Here we describe 2 incidents of crows attacking Hen Harrier nestlings, suggesting that low food availability and predation may interact in Orkney to reduce harrier breeding productivity.

Seven Hen Harrier nests were watched from hides in June and July 1999 on West Mainland, Orkney. Hides were placed 20-30m from the nests and moved over a one week period to a position 5m from the nest. A successful predation attempt by a crow on a harrier nestling was observed on 15 June during a watch on a brood of 4 Hen Harrier chicks (aged 13, 14, 15 and 16 days). The female harrier was seen to leave the nests at 1612 hrs presumably to hunt. At 1719 hrs a Hooded Crow alighted on the edge of the harrier nest, picking up a nestling (aged 15 days) by the head, dragged it out of the nest and pecked it to death. The female harrier arrived back at the nest before the crow had started to consume the nestling, and the crow flew off. During the period that the crow was present at the nest site, the harrier chicks displayed typical defensive behaviour of huddling together and giving alarm calls. The female harrier fed the dead chick to the other nestlings. Another predation attempt by a Hooded Crow was observed on 1 July, during a watch at a different nest containing a brood of 4 nestlings (aged 12, 18, 18 and 19 days). At 1325 hrs the female departed from the nest. At 1330 hrs a crow was seen to dive twice at one of the harrier chicks (aged 12 days), briefly landed twice on the nest, but took off immediately after landing each time. It dived for a third time at a different chick (aged 18 days), and again landed on the nest. At this point the female Hen Harrier returned and dived at the crow on the nest, landing on the chicks but missing the crow, and then chased the crow away from the

nest. The entire attack by the crow lasted less than 30 seconds from the time the crow first landed at the nest until the time that the female harrier returned to protect the nestlings. Picozzi (*op cit*) described Hooded Crows as the main predator of Hen Harrier eggs. Our observations suggest that Hooded Crows may also be important predators at the nestling stage, killing chicks at least up to the age of 15 days. To our knowledge, this is the first time that a Hooded Crow has been confirmed as having killed a Hen Harrier nestling. Our observations suggest that females that leave their nests unattended for extended periods of time expose their chicks to risk of predation. The adult female harrier was absent for 67 minutes prior to the attack when the crow successfully killed the nestling. The observation from the second nest suggests that if the female is present in the vicinity of the nest, she may be able to actively protect her chicks and prevent crow predation. The fact that Hooded Crows were observed attacking 2 of 7 nests that were watched suggests that these may not be isolated incidents. Predation risk may be increased in nests of secondary females or in areas where food is limiting during the nestling stage, due to the female harrier spending prolonged time periods foraging away from the nest site. Further investigation into the relationship between female attentiveness, provisioning rates and breeding success are required if this hypothesis is to be explored further.

We thank Kerry Lock for help with fieldwork and Xavier Lambin and Steve Redpath for useful comments on this manuscript.

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The number of pairs and breeding success of Common Ravens on Mainland, Orkney 1983-2000

Mainland is the largest of the Orkney islands with an area of approximately 490km^2 and a coastline of 234km, with 50km (21%) consisting of cliffs over 15m in height (Mather *et al* 1975, An Introduction to the Orkney coastline. In, Goodier R (ed). The Natural Environment of Orkney. Nature Conservancy Council, Edinburgh). The number of pairs of Common Ravens *Corvus corax* attempting to nest on Mainland together with their breeding success has been monitored annually during the period 1983 to 2000.

Common Ravens were found nesting on sea cliffs ranging from 3 to 100m in height and at a variety of inland sites. The inland sites included quarries both active and disused, pylons and ruined buildings, trees and an inland cliff. A nesting attempt was recorded if a lined nest or a nest with eggs or young was found. A nest was considered to have been successful either where the young were known to have fledged or if the young were within a week of fledging. The annual number of breeding pairs and their success is shown in Table 1.

It was found that, although there were fluctuations, the number of pairs attempting to nest annually rose from 27 in 1983 to 47 in 2000 (Table 1), an increase of 74%. In 11 of the years there were also pairs on territory that did not breed. The percentage of successful pairs varied from year to year (range 44.8% to 69%) with a mean of 56.8%. During the study period there was an increase in the proportion of pairs utilising inland sites. Seven pairs (25%) nested inland in 1983 including 4 in quarries and single pairs using building, tree and inland cliff sites. In 2000 there were 18 pairs (38%) occupying inland sites, with 6 in quarries, 6 on buildings, including a pylon, 5 in trees and one on an inland cliff.

Table 1 *Number of pairs and breeding success of Common Ravens, Mainland, Orkney 1983-2000.*

Year	Pairs attempting to breed	Pairs successful	% pairs successful	Pairs on territory but not breeding	Nests at inland sites	% nests at inland sites
1983	27	16	59.3	0	7	25
1984	28	14	50	0	6	21
1985	27	17	62	0	7	25
1986	24	14	58	0	6	25
1987	26	18	69	2	8	30
1988	29	14	48	3	10	34
1989	28	17	60.7	2	9	32
1990	28	16	57	0	10	35
1991	29	17	58.6	1	10	34
1992	29	13	44.8	0	11	37.9
1993	28	14	50	2	8	28
1994	35	21	60	1	9	25.7
1995	33	17	51.5	0	8	24
1996	33	22	66.6	4	9	27
1997	35	18	51.4	4	11	31
1998	38	21	55.3	4	14	36.8
1999	43	23	53.5	5	17	39.5
2000	47	30	63.8	6	18	38

Note: the number of non breeding pairs on territory includes 4 that built unlined nests

Table 2 *Breeding success of Common Ravens at sea cliff and inland sites, Mainland, Orkney 1983-2000.*

Type of site	Pairs attempting to nest	Pairs successful	% pairs successful	Young reared	Number of young reared per successful pair
Sea cliff	389	205	52.7	600	2.9
Inland site	178	117	65.7	352	3

Pairs nesting at inland sites appeared to be more successful with 65.7% rearing young compared with 52.7% of pairs using sea cliffs (Table 2). The mean number of young fledged per successful attempt however was very similar for both types of site. Despite the increase of breeding pairs of Common Ravens on Mainland, the number of pairs on other Orkney islands has apparently remained stable.

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Common Raven nest on collapsed roof beams and stone slabs *C J Booth*

Common Ravens nesting near a roost

In 1984 a roost of Common Ravens *Corvus corax* was established on a stretch of cliff in St Ola, Mainland, Orkney. This roost has been occupied throughout the period 1984 – 2000, with counts ranging from 53 to 146 birds. Since 1987, Common Ravens have nested at 3 sites in close proximity to this roost.

In 7 of the years between 1987 and 1995 a pair of Common Ravens attempted to nest on a cliff 400m to the west of the road, successfully rearing young in 4 of the years. In 1999, a pair built an unlined nest just 25m from the roosting ledges. On 1 April 2000 this nest had been built up and lined and a pair of Common Ravens was present, calling and very agitated. One of the birds appeared to come off the nest as I arrived at the site. On a further visit on 22 April the nest was deserted with the lining disturbed and no sign of the birds. On a cliff 400m to the east of the roost, another pair of Common Ravens, one of which was ringed, attempted to nest in both 1998 and 1999 but failed. This was possibly due to interaction with Northern Fulmars *Fulmarus glacialis*. In 2000, using the same nest site as in the previous 2 years, they successfully reared 4 young. Common Ravens are strongly territorial when breeding, so it seems surprising that pairs would attempt to nest so close to a well established roost.

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Correction

Prey captured and attacked by Merlins in winter

In R C Dickson's note in *Scottish Birds* 21:116 the fifth paragraph should read:

'In 1992-2000 only 4 species formed more than 5% of kills: Skylarks, Meadow Pipits, Chaffinches and Linnets/Twites *Carduelis flavirostris*. Expressed by weight Linnets/Twites emerged as the most important of kills (87%) with Skylarks providing (6%) of kills by weight, Chaffinches 4% and Meadow Pipits 3%'

Egg sizes of crossbills in Scotland

Due to an oversight several errors appeared in our recent paper (McGhie H A & Summers R W, Scottish Birds *21:85-87). I apologise for this confusion and amend them here.*

H A McGhie

Results

There were significant differences in length and breadth between the 3 groups of crossbills (Table 1). Parrot Crossbill eggs were significantly longer and broader than those of Common Crossbills ($t=4.9$, $P<0.001$ and $t=4.0$, $P<0.0001$, respectively), though there was overlap (Table 1). Likewise, the lengths and breadths of crossbill eggs from Scotland were significantly different from those of Parrot Crossbills ($t=4.9$, $P<0.001$ and $t=2.7$, $P=0.007$, respectively) but not from Common Crossbills ($t=0.85$, $P=0.4$ and $t=1.29$, $P=0.2$). The mean length of the Scottish eggs was actually smaller than the Common Crossbills. A similar pattern emerged using indices of egg volume. Egg volumes of Parrot Crossbills were significantly greater than those from Common Crossbills ($t=5.32$, $P<0.001$) and from crossbills in Scotland ($t=4.51$, $P<0.001$), but there was no difference between eggs from Common Crossbills and those from Scotland ($t=0.55$, $P=0.59$ Table 1).

Discussion

The egg measurements of the Common Crossbills and crossbills from Scotland were similar to those quoted by Nethersole-Thompson (1975. *Pine Crossbills* Poyser, Berkhamsted) and confirmed that those from Scotland were not intermediate between Common and Parrot Crossbills.

Table 1 ***Lengths, breadths (mm) and indices of volume (length x breadth^2 (cm^3)) of eggs from Parrot and Common Crossbills and crossbills from the Highlands of Scotland.***

		Parrot Crossbill	Common Crossbill	Highland crossbills
Number of clutches		20	79	105
Length	Mean	22.96	21.96	21.84
	SD	0.79	0.83	0.96
	Min	21.71	20.27	18.77
	Max	24.19	24.18	24.37
Breadth	Mean	16.44	16.00	16.10
	SD	0.50	0.43	0.52
	Min	15.72	14.75	14.78
	Max	17.46	17.03	17.29
Index of volume	Mean	6.22	5.63	5.67
	SD	0.49	0.43	0.50
	Min	5.51	4.53	4.21
	Max	7.31	6.59	6.85

ANOVA on egg length: $F_{(2,201)} = 13.3$ $P<0.001$
ANOVA on egg breadth: $F_{(2,201)} = 6.5$ $P<0.002$
ANOVA on egg volume: $F_{(2,201)} = 13.1$ $P<0.001$

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Obituary

William Brackenridge
1952 - 2000

A tragic car crash on the A9 ended Bill's life. He was returning from the SOC Conference. Birds had been his first and continuing love but, over the years, he developed and honed his skills in field identification, trained in ecology and became a leading light in the environmental movement in central Scotland. Billy, as most of the 'old hands' in Ayrshire knew him, was an almost unique character. Always keen to involve himself, and share his knowledge with others, Billy was a key figure within many local wildlife organisations in Ayrshire during the late 1960s and 70s. He always strove for perfection in survey work and did not suffer sloppy fieldwork gladly, especially if he suspected it could have been more thorough. The image of Billy, which remains for some of us to this day, is of a young, very keen birder, kitted out in sports jacket and tie (almost always!), striding up Carn Ban Mor one evening just to say that he'd forgotten to bring his tent, and would come back up in the morning so we could carry out a day's birding on the plateau.

As leader of the Ayrshire YOC his patience with young children was equal to that he showed towards adults in the SOC. His work with the local branch of the SWT involved him as one of the main contributors to the very thorough coastal survey, much of which is still a major reference in the county. It was the conservationist in Billy which most of us will remember. When a rare bird showed up anywhere he was, of course, eager to see it, but he was always able to see beyond this aspect of birding.

Bill joined North Lanarkshire Council in 1996 as an Ecologist after a spell as Countryside Ranger for Stirling District.

The Scottish Wildlife Trust got the right person when they chose Bill to kickstart the proposed Jupiter Wildlife Garden project at ICI, Grangemouth. He converted a tract of species poor grassland into arguably Scotland's most biodiverse wildlife garden, now producing thousands of wildflower plants annually for other wildlife gardens. Another successful project master minded by Bill was the conversion of the old sand and gravel quarries into the Doune Ponds, now an SWT reserve, popular with birds and visitors alike.

In North Lanarkshire he successfully launched the Local Biodiversity Action Plan targeting key habitats and species in a partnership effort across many agencies, which could not have been achieved without Bill's knowledge, commitment and persistence.

As a field ecologist he was forever finding something new, or rare, or at least unheard of by planners and developers! It was Bill who discovered the rare Blue Fleabane thriving on the industrial dereliction of Ravenscraig, and the even rarer Yellow wort in the grounds of the proposed Law Hospital. His surveys found new sites for Fritillaries, Water Voles, Otters, Black Grouse, Moonwort and Fragrant Orchids. One important outcome is that North Lanarkshire now has a comprehensive map of over 300 Sites of Importance for Nature Conservation approved by the Council and offered presumption against damaging development.

Bill was also a champion of wider environmental issues, recycling, renewable energies, environmental education for children and adults, all in the cause of a sustainable future. He had a low tolerance threshold of anyone who deliberately caused waste or pollution. On more than one occasion, while out on field surveys, he came across a council van, engine idling, going

nowhere. To the astonishment of the occupants Bill would reach in and simply switch off the ignition. Then followed a friendly but firm lecture on air pollution. None argued, many learned. Just days before his death, Bill was interviewed by the BBC Environmental Correspondent on the effects of global warming on Scotland's wildlife.

The division between work and play for Bill was seamless. As well as his SWT commitments, he was Membership Secretary for Biological Recording in Scotland (BRISC), Scottish coordinator for Countryside Jobs Monthly, Conservation Officer for West Scotland Butterfly Conservation, Assistant Editor of the Forth Naturalist and Historian, member of the Bean Goose Working Group and, of course, a regular contributor on Biodiversity for CSCT's New Leaf. His many trips abroad became exotic field surveys, broadening his knowledge and deepening his commitment to the natural world.

In memory of Bill, his family and friends have started to consider ideas on how a living memorial could be created. Several conservation agencies have promised their support and individual donations have been arriving. RSPB has offered to act as the 'bank' for the donations, which are ring fenced for this project. All contributions welcome. Cheques should be made out to RSPB and posted **c/o Bill Brackenridge Fund, Conservation and Greening Unit, Palacerigg House, Cumbernauld G6 3HU.**

A fine example to any young naturalist who wants to learn as much as he can from nature, Billy was an outstanding figure in the world of both Scottish birdwatching and conservation.

Bruce Forrester, Angus Hogg and Brian Thomson

Bill Brackenridge at the 2000 SOC Annual Conference. *Ray Murray*

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.

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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.

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Scottish Birds

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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**

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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) (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

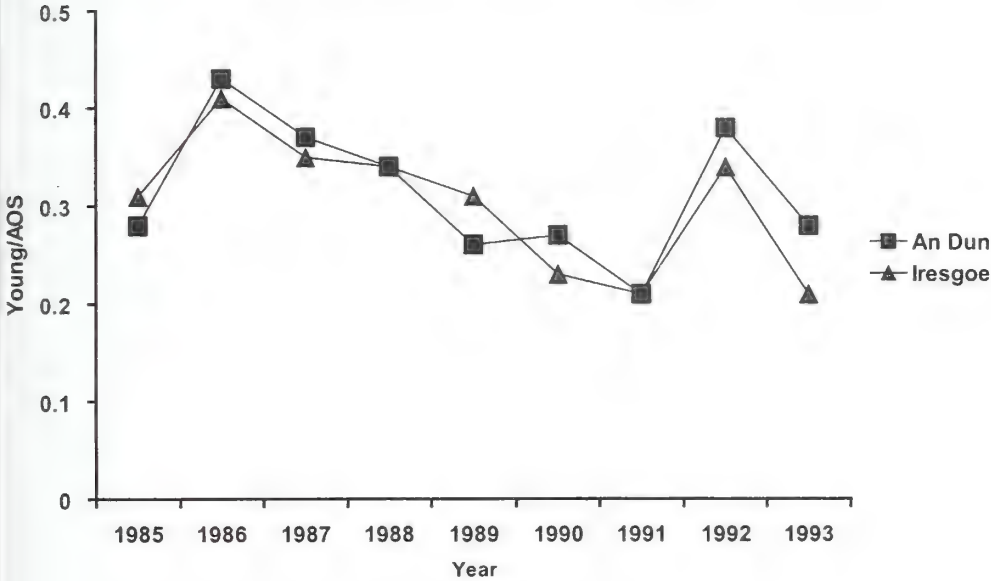
* χ^2 tests for broods of one chick and broods of more than one chick.

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.

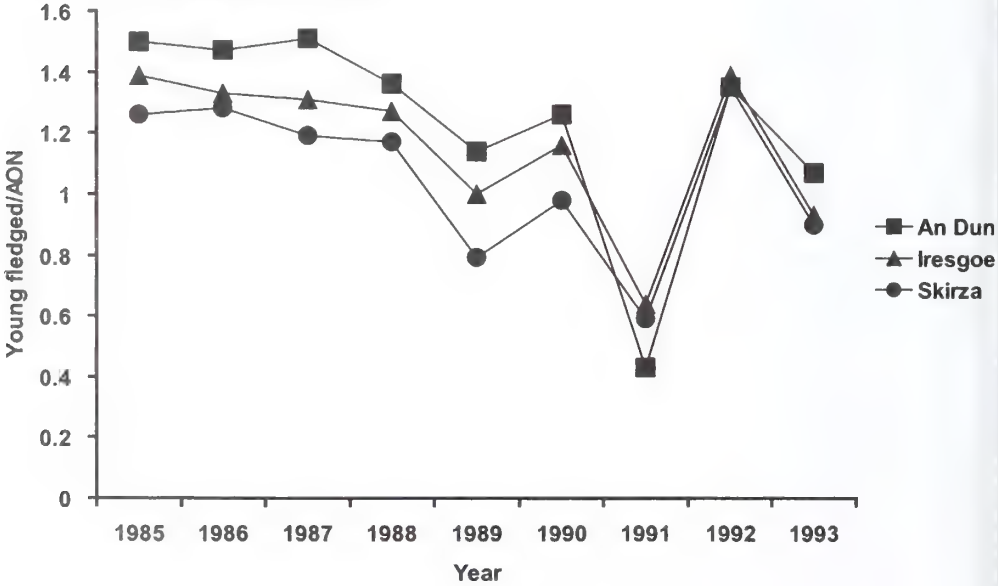
Fulmars showed a non significant increase in east Caithness; elsewhere in Scotland, increases in Shetland and south east Scotland between 1986 and 1993 were significant (Walsh *et al* 1994). Coverage of Fulmars by "old" plots was low and Fulmars on these plots tended to be distributed on cliff top sites 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 (*eg* 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.***

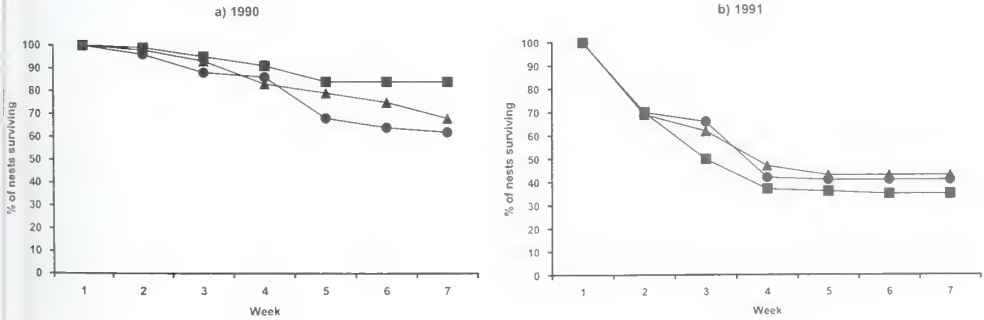


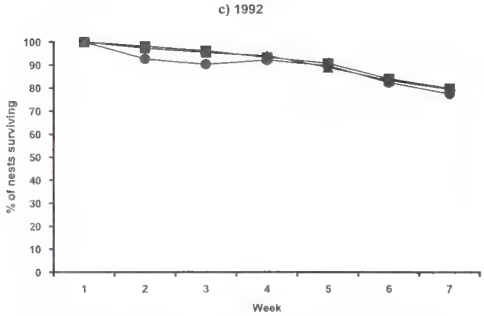
other North Sea colonies in 1988, there has been a decline in the productivity of the Caithness colonies since 1989. Chick production between 1988 and 1993 fluctuated dramatically compared with the period 1985-1988, though in keeping with other North Sea colonies, the fluctuations were not as dramatic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

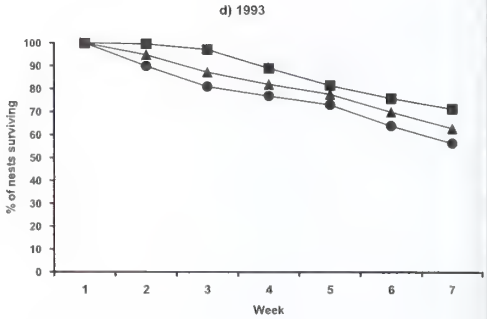
Harris and Wanless (1990) suggested that shortage of food might be responsible for the widespread breeding failure of Kittiwakes in the North Sea in 1988 and that this might be indicated by increased non-attendance of broods by adults observed at the Isle of May (Wanless and Harris 1989); similar conclusions 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.

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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

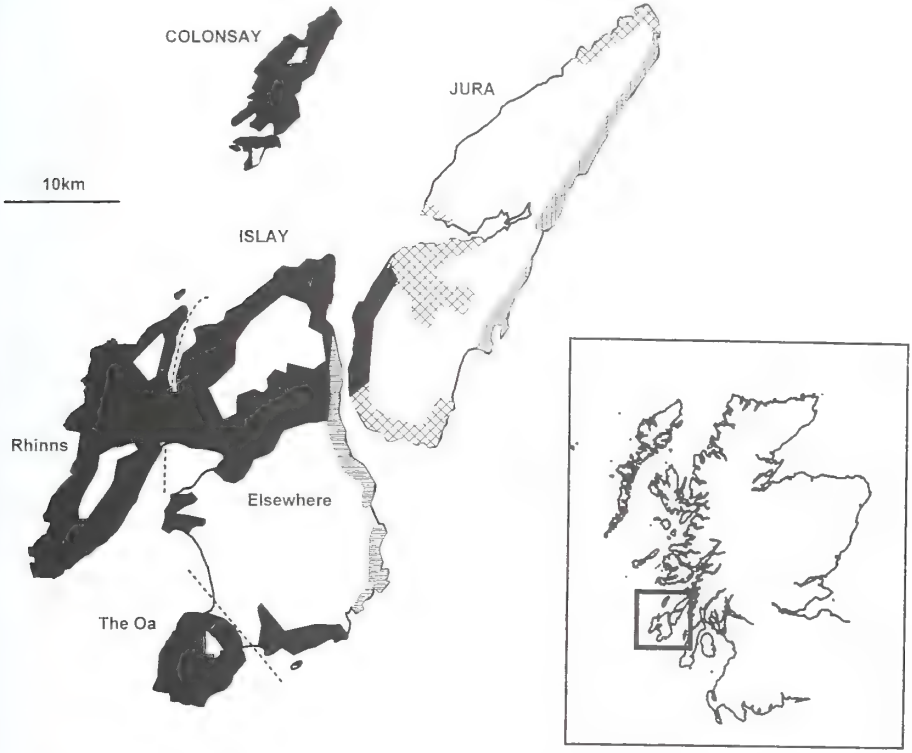
A total of 55 pairs of Red-billed Choughs were confirmed breeding in Scotland in 1998, with a further 3 probable breeding pairs and 8 pairs recorded as present. Approximately 75% of the breeding population was found on Islay and 20% on Colonsay, with single breeding pairs on Jura, Mull and in Galloway (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:		1986:		1992:		1998:	
	Pairs	Non Br	Pairs	Non Br	pairs	Non Br	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 ($F_{2,40}$=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 (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)

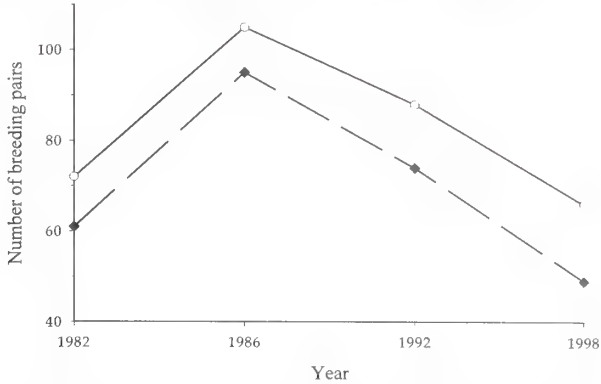
1996, Bignal & Curtis 1989). Other factors such as predation and interspecific competition for nest sites have also been suggested as important in limiting abundance and distribution (Bignal *et al* 1997). The current decline of Choughs on Islay has coincided with a period of relatively mild winters 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.

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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 1km 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).

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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.*

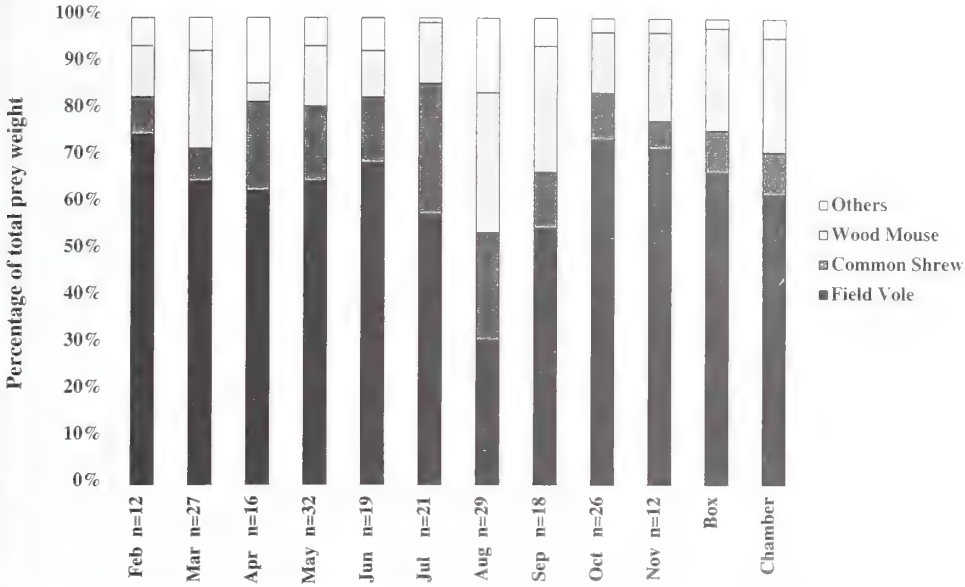
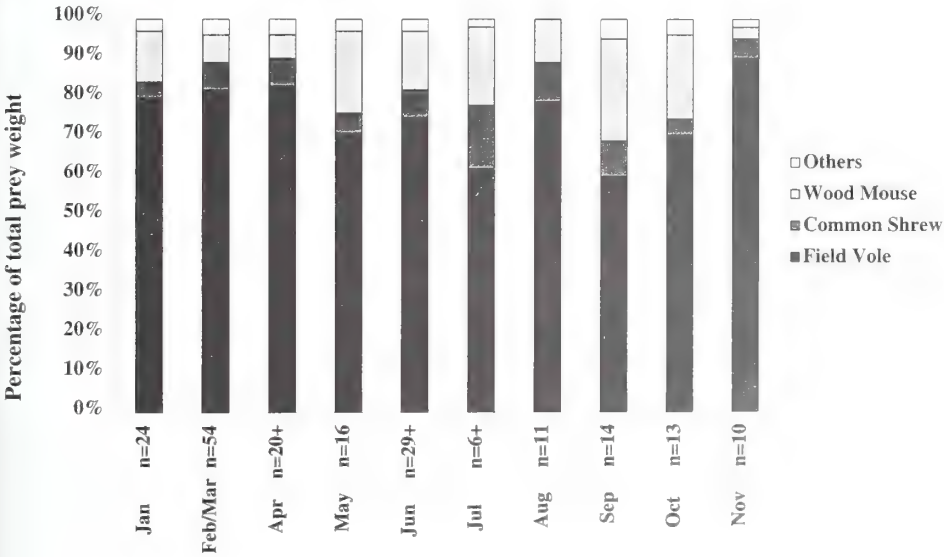


Figure 2. *Seasonal variation in diet at Site B.*



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***

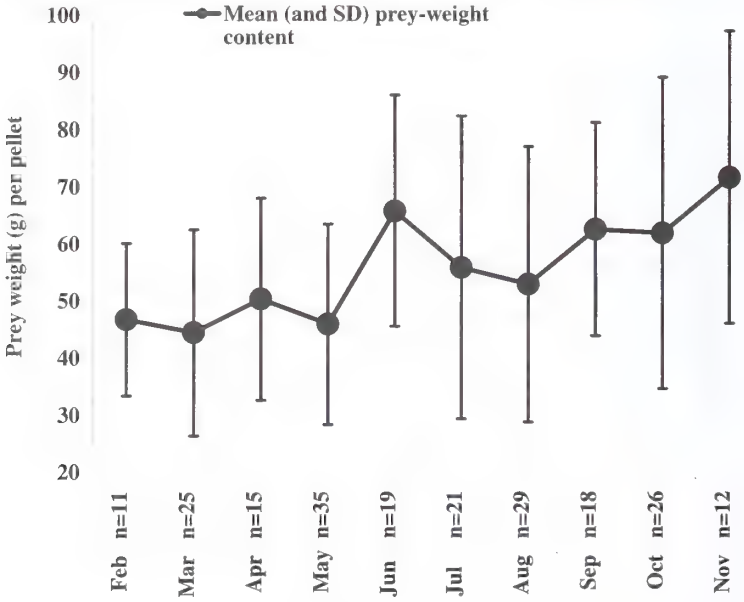
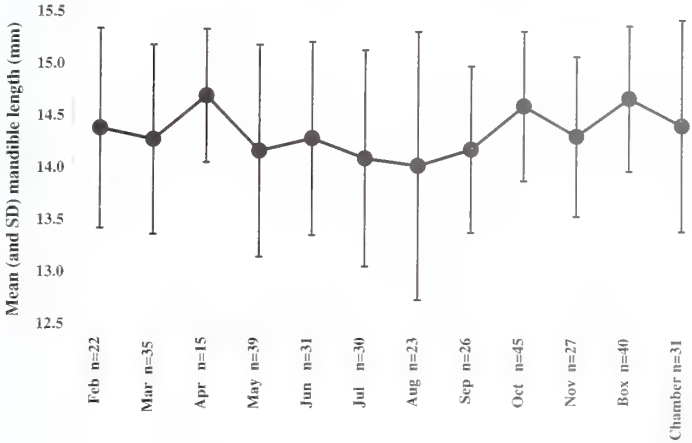


Figure 4. *Seasonal variation in the size of Field Vole prey at site A.*



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 $((\text{observed} - \text{expected})^2/\text{expected}) > 2.0$

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.

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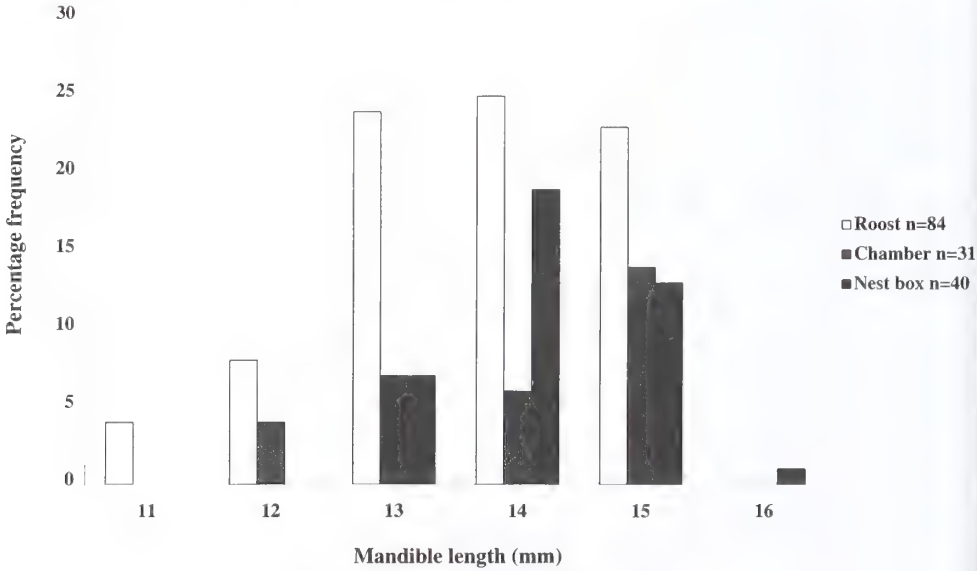
Figure 5. ***Field Vole jaw sizes in pellets from the male roost, nest chamber and nest box at site A in 1999***



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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.

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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 Westeran 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.

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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.

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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

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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.

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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.

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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).

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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.

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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.

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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.

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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)	(reseed)	(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.

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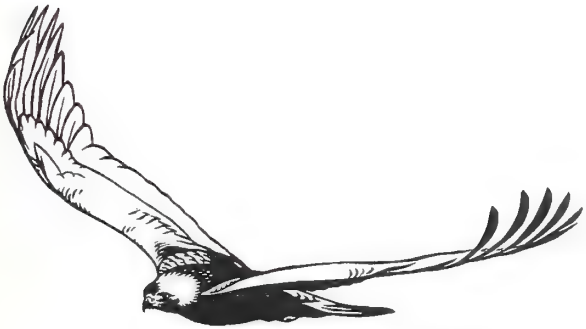

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Introduction

This 2 year edition of the Raptor Round Up has had a long and sometimes painful gestation, bedevilled by a whole series of delays and problems. These have finally been overcome and this report – for 1998 and 1999 – is the final result.

During this period birds of prey continued to occupy the political stage in Scotland. A vigorous and not always well informed debate in the general and specialised press rumbled on, focussing on the inter-related issues of illegal raptor persecution and legalised raptor culling.

Against this background birds of prey generally did well but marked exceptions to this trend persisted. Hen Harriers, as ever, held the dubious distinction of being Scotland's most persecuted bird. Golden Eagles still had 'holes' in their breeding distribution with no obvious ecological explanation for such gaps. Some Northern Goshawk populations did not expanded as well as others – the differences almost certainly attributable to persecution. Red Kites in all other respects a great success story - experienced levels of poisoning that may restrict their rate of expansion. Not all poor performance was persecution related. Far northern and western Peregrine Falcons showed low levels of site occupancy in some areas. Orkney Hen Harriers – free of human interference – continued to decline, a situation that is being examined in a dedicated research programme. However, there was continuing good news for Common Buzzards, Ospreys and White-tailed Eagles and not all populations of the persecuted species suffered from this chronic problem.

The future of the Raptor Round Up itself is now in some doubt. Some RSG workers have expressed the view that the new SNH/BTO raptor monitoring proposals will automatically mean the end of the Round Up. Others have said that the 2 things are not mutually exclusive and should continue in parallel. I offer no view of my own on this issue except to say that it should be resolved by a collective decision of the Groups. A 2000 Raptor Round Up already exists in embryonic form.

Keith Morton

This report was written by Keith Morton with layout and editing input from Sylvia Laing, Bob Dawson and Helen Cameron. It is based on material supplied by Scottish Raptor Study Group members. The Scottish Raptor Study Group logo was designed and drawn by Keith Brockie.

Red Kite

Milvus milvus

Central Scotland

	occupied	successful	chicks fledged
1998	2	2	5
1999	*6*	*4*	*5*

1998 - A first year male was established on another territory. Territory occupation/breeding progress is 2 years ahead of that of the northern release. A Red Kite was found poisoned some distance to the north of the release area in March. Twenty further new birds were introduced from Germany.

1999 – A seventh potential pair of birds spent some days together over an ill defined area that may prove to be a future territory. A sixth chick hatched but fell out of the nest and was predated. All young were wing tagged. One bird was found poisoned close to the eastern edge of the release area and a number of other poisonings in this immediate area gave cause for concern. Twenty further new birds were introduced from Germany.

Highland

	checked	occupied	laid	hatched	successful	chicks fledged
1998	38	28	23	21	20	44
1999	*48*	*32*	*30*		*22*	*54*

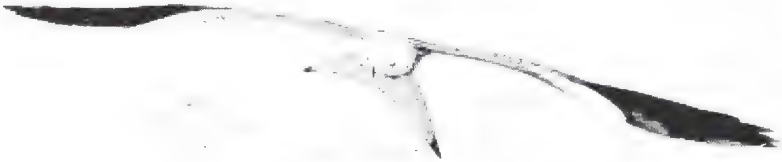
1998 – In addition to the 28 territories occupied by pairs, 4 territories held single adults. The numbers of pairs laying eggs showed no increase on the previous year. This is thought to be due to a combination of poor spring weather deterring new pairs from nesting and low recruitment of new breeding pairs. However, in terms of the number of pairs rearing broods and the total number of young fledged, 1998 was the most successful breeding season experienced so far. Forty one of the 44 young reared were marked (bright blue tag on the left wing - regional colour code - lime green tag on the right wing - year colour code - with a unique inscription - single white letter, white number or red symbol - on both tags). A male Black Isle chick from 1996 was located at a kite roost in Central region in the company of locally released birds. He paired with a 2 year old local and successfully reared 2 young. This is the first record of a North Scotland kite breeding away from the core area.

Four Red Kites were found dead during 1998 in Highland. Three of these were poisoned. No cause of death was found for the fourth, a tideline corpse near North Kessock.

A 1997 Black Isle chick was seen in south east Iceland from 15 December 1997 and throughout 1998. This remarkable sighting (1,017km north west) constitutes the first ever record of a Red Kite in Iceland. There were more normal winter sightings of Highland tagged birds from Tiree, Tayside, Kyle of Lochalsh and Strathspey. Further afield were 2 birds in Ireland (Co. Clare and Co. Cork) and a single bird at Rhayader in Wales.

1999 - In terms of the number of pairs rearing broods and the total number of young fledged, 1999 was the most successful breeding season experienced so far. There was a 30% increase in the number of young reared compared to 1998. It has been suggested that there should be a greater number of pairs than actually exists at the present in North Scotland. Low recruitment in 1997 may be to blame for this.

The breeding results would have been even higher but for the miserably cold weather experienced during mid May and early June which caused several inexperienced pairs to fail. A bird from North Scotland area was recovered dead under power lines near Bilbao, Spain in May.



Angus Hogg

White-tailed Eagle *Haliaeetus albicilla*

occupied	laid	successful	chicks	fledged
1998	17	15	9	13
1999	*18*	*15/16*	*6*	*11*

10 Year Summary

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
No of pairs or trios	9	9	8	8	10	10	12	13-15	18-18	15-16
No of areas occupied	12	10	10	10	11	14	14	14	18	20
No of clutches laid	9	8	9	6	8	9	12	11-13	16-17	15-16
No of clutches known to have hatched	2	4	4	4	4	6	8	6	9	9
No of broods fledging Young	2	4	4	4	4	5	7	5	9	6
No of young fledged	2	7	7	5	5	7	9	9	13	11
Cumulative no of territories producing young	4	4	5	5	5	6	8	9	12	12

The second phase of the release programme begun in 1993 was concluded in 1998 with the import of the final batch of chicks from Norway. Between 1993 and 1998 a total of 59 birds were released.

In 1998&99 successful pairs fledged a total of 13 chicks. This included the first birds to breed from the second phase release - 2 pairs - and a new Scottish bred pair which had failed in 1997. Breeding success figures would have been better but for the attention of egg collectors who robbed 2 established and normally productive pairs. Eggs stolen at one of these sites were within a few days of hatching.

1999 was the second most successful year since the reintroduction project began 24 years ago. A total of 11 young fledged from Scottish nests, 2 less than in 1998. All nest failures were attributed to natural causes, although disturbance was suspected at one site. One pair failed when an apparently healthy 3 week old chick fell out of the nest. One of the birds released in 1998 was found dead (of natural causes) in Sutherland. Of the 59 released in the second phase only 3 have been recovered dead.

The cumulative number of pairs to have successfully produced young remains unchanged and 12.

John Love

Hen Harrier *Circus cyaneus*

Orkney

	breeding females	breeding males	nesting attempts	laid	hatched	fledged	chicks fledged
1998	46	27	34	26	14	9	20
1999		*17*	*24*	*21*	*10*	*10*	*21*

1998 - This season saw the start of a PhD study into Orkney's Hen Harriers.

The results from 1998 show a very similar pattern to that of recent years. In Orkney as a whole where 46 females and 27 females of which 39 females and 21 males were in the West Mainland, 5 pairs were on Hoy and 2 females with one male were on Rousay. The number of males in the West Mainland is higher than thought in 1996/97 but the difference is mainly in the number of first year birds (5 in 1998). One of the Hoy males was also a first year.

Twelve of the females (11 in the West Mainland and one on Rousay) were non breeders but 34 females (28 West Mainland, 5 on Hoy and one on Rousay) did attempt to nest. Eight of the West Mainland females did not lay so the success of 26 nests with contents was followed. Twelve of these (9 in the West Mainland and 3 on Hoy) failed at the egg stage while a further 5 (all in the West Mainland) failed at the chick stage. There were thus only 9 successful nests (6 West Mainland, 2 Hoy, and one Rousay) which produced a total of 20 fledged young (11 West Mainland, 5 on Hoy and 4 on Rousay).

1999 - In the West Mainland study area 32 females and 20 males - of which 4 were first year males - were located. Twelve of the females were non breeders but of the 20 which did attempt to nest only 18 laid eggs. Ten of the nests failed during incubation but 8 hatched young. In addition, one of the failed females successfully re laid to give a total of 9 broods. From these a total of 20 young fledged, a productivity of 2.2 young per successful nest of 1.0 per breeding female.

On Hoy, 4 pairs attempted to nest. At one site nesting material was carried in; it is not known whether eggs were laid but this site did not rear young. Another site failed during incubation and another at the chick stage. The fourth nest reared 2 chicks.

On Rousay a female and an adult male were seen occasionally but no nest was ever found and no young were reared.

The overall Orkney totals were thus 25 males (of which 4 were first years) and 37 females (of which 13 were non breeders). The 24 females which attempted to breed laid at least 21 clutches from which 22 young were reared. The improved breeding success of the birds which bred in the West Mainland is thought to be due to the supplementary feeding being carried out as an experimental part of a the PhD study.

Lothian and Borders

1998 – Five pairs were seen but only one was allowed to breed and this subsequently failed.

Lammermuirs – 1 pair seen early which then disappeared;
Moorfoots - 3 pairs possibly present, one predated at large young stage;
Pentlands - one territorial pair.

1999 - Ten pairs were known but only 3 pairs within the Borders portion of the Langholm study area raised any young.

Pentlands - one pair and an extra female were seen in one area from mid April to early May. A male was seen 2-3km away from this in early May. There were no further sightings.

Moorfoots - There was a pair in one area April-May, seen skydancing but with no evidence of nesting. An extra male was seen on one occasion. A pair at another site c 4km away was seen in mid April and were skydancing in late May.

Lammermuirs - A male was seen at one site in April and another displaying at another site in May. There was an unsubstantiated report that a male and 3 females were killed in the Lammermuirs.

Tweedsmuir Hills – a male was displaying in early April and pair at the end if the month. Nothing more was seen on 2 visits in mid and late May. A pair were prospecting and male displayed at different site but no nest was found.

Langholm Area (Borders only) – Three pairs fledged 7 young.

Elsewhere – A pair was present in the Newcastleton area (outwith the Langholm study area) with no evidence of success. A pair was present south of Hawick.

Argyll

1998 - Selected 10km squares were surveyed in Argyll by RSG members and RSPB field staff as part of the national survey. Fifty two territorial pairs were located in these squares and the study area. Some of these survey squares in Kintyre, Islay and Jura held up to 5 pairs (probable plus possible). Quoting just these higher figures would obscure the overall picture. Some surveyors found no harriers in their chosen squares including one square in mid Argyll which supported none for the first time in 10 years of study. Based on this data an extrapolated figure of 124 pairs was estimated for Argyll (25% of the extrapolated Scottish population). The RSPB Loch Gruinart reserve had a good year for Hen Harriers with nine territories occupied and 5 successful pairs raising 12 chicks.

Where causes of nest failure were identified, most appeared to be natural including a site that was predated by a Fox on Cowal. However the presence of adult female feathers at another failed nest on Cowal and the remains of a dead adult female at a site on Bute are of more concern.

1999 - sample sites were monitored on Mull, Islay (including the RSPB Reserve at Loch Gruinart) Mid Argyll, Knapdale, Kintyre, Cowal and Bute. At Loch Gruinart reserve it was a poor season with only 3 pairs producing 8 young. On Bute, one nest fledged 2 chicks and also contained 2 further chicks which failed to develop primaries and died. (These symptoms have been seen once previously, 2 years ago).

Andrew Stevenson

	occupied	laid	fledged	chicks fledged	young per successful territory
1998	(47-52)‡ 27*	-	18	52	2.88
1999	*(27)‡‡ 24***	*21*	*16*	*39+*	*2.43*

1998 - The survey required proof of occupation but did not require nests to be located and breeding success to be followed up. This explains the discrepancy between the large numbers of occupied territories and the far smaller figures for nests completely monitored by group members.
‡ 1998 - Numbers in brackets are all probable plus all possible pairs located.
‡‡ 1999 - Numbers in brackets include all pairs located, including territorial pairs present in early spring but which did not stay to breed.
* 1998 No of sites fully monitored (included in the number of probable and possible pairs) for breeding success.
*** 1999 No of sites (included in the total) that were fully monitored for breeding success.*

North East

1998 – The national survey resulted in good coverage. Persecution continued to be recorded as the major cause of failure with adults dissappearing from a number of local populations.

1999 – 1999 was a another poor year for harriers. In lower Deeside, where there were usually 15 or so pairs each year in the 1970s and 80s, there were only two pairs. One was definitely persecuted and the other probably so.

	pairs	outcome unknown	failed	successful	chicks fledged
1998	27	4	17	6	18/19+
1999	*14*	*1*	*6*	*7*	*19*

Central

1998 – The partial coverage of the area suggests a poor season. For one of the 3 failed pairs this was the second year running that this has happened. One pair may have been successful but the result was not confirmed.

1999 – There were a few records from the south east of the group's area including 2 females and a male present in spring at one location. In Dunbartonshire one pair reared 4young, one paired reared 3 young, one pair failed and one additional pair was present.

	checked	failed	fledged	chicks fledged
1998	4	3	1?	?
1999	*5*	*1*	*2*	*7*

Tayside

1998 – In Perthshire fewer pairs were located than previously but mean productivity of successful pairs was high. There were 17 pairs West of the A9 and 25 in the core area East of the A9. One bigamous male was successful with both broods but there were a lot of "spare" birds around.

In Angus 2pairs were located, of which one was successful. In both cases the male of the pair was a first summer bird – indicative of persecution in the area. The successful pair laid 7 eggs of which 3 hatched. The number of pairs in Angus is far below the carrying capacity – again indicative of persecution.

	occupied	fledged	chicks fledged
1998			
Perthshire	42	17	61+
Angus	2	1	2+
Total	44	18	63+
1999			
Perthshire	***23***	***13***	***37***
Angus	***3***	***2***	***6***
Total	*25*	*15*	*43*

1999 – In Perthshire coverage was lower in the main study area than in 1998. Early failures were attributed to heavy rain and productivity was slightly down on the previous year. There appears to be a continued gradual decline in the west of the area.

In Angus 2 pairs succeeded – the best performance since monitoring started in 1983 but almost certainly only a fraction of the area's true carrying capacity with persecution the most likely cause of this situation.

Dumfries & Galloway and South Strathclyde

1998 – Overall this was a record year for breeding in south west Scotland, with more pairs occupying territory than ever recorded before. However this number is certainly bolstered by the situation at Langholm where the species continues to enjoy protection. In addition, the simple occupation figures mask a high level of persecution in many areas away from Langholm especially in upper

	occupied	laid	successful	failed (human)	outcome unknown	chicks fledged
1998						
S.Strath.	44	31	13/14	22 (20)	9	46+
D & G	34	27	20	9 (5)	5	63+
Total	78	58	33/34	31 (25)	14	109+
1999						
S.Strath	*34*	*34*	*7*	*27(17)+*	*1*	*18*
D & G	*20*	*16*	*10*	*6(5)*	*0*	*30+*
Total	*54*	*50*	*17*	*33(22)*	*1*	*48+*

Nithsdale and around Muirkirk where productivity is consistently low.

1999 - Persistent persecution in upper Nithsdale is fast reducing the breeding population, with only 3 breeding attempts in 1999 (all unsuccessful). Several years ago some 10 to 12 pairs were regularly attempting to breed in this area but this has been greatly reduced by nest destruction and almost certainly by the killing of the females at the nest. This sub population is likely to be reduced to sporadic breeding attempts by prospecting pairs. Heavy persecution also remains apparent in South Strathcyde in the Muirkirk area resulting in a mean of only 0.53 chicks produced for each occupied territory.

Highland

1998 – The late spring and cool wet summer of 1998 resulted in a below average breeding season for unpersecuted pairs. A sample of 15 nests gave a mean clutch size of 4.8, slightly below the long term average. Brood sizes tended to be on the small size with 4 b/2, 5 b/3, 4b/4 and a single b/5 from the sample of 23 nests. This gives a mean brood size of 1.9 young per breeding pair and 3.1 per pair rearing young. Nine nests (39%) failed completely. The causes were: unknown (1-2); persecution (5-6); natural predation (2).

1999 - In contrast to the 1998 survey year 1999 was a poor year for data collection of this species the Highland area. Only 10 active nests were checked, the lowest number since 1987. The high number of nests monitored in the period 1989 to 1995 correspond with a long term RSPB study involving wing tagging of young. There was a brief resurgence in the number of nests recorded in 1998, the year of a national Hen Harrier breeding survey. The recent reduction in the number of nest records submitted could reflect either a lack of effort by the group or may mirror a general decline in the number of breeding pairs present. There is some evidence to suggest the latter. No harriers were recorded at 5 traditional breeding sites which did receive repeated visits in the spring of 1999. All were on active grouse moors, 3 in east Inverness and 2 in Badenoch and Strathspey. This could suggest that persistent persecution is now having an impact on the number of pairs not only on sporting estates but also on other moors throughout our study area.

Most of the nest records submitted in 1999 were not on driven grouse moors, so that nesting success of the sample (70%) was higher than the long term average (see table below). Mean brood size in 1999 at 2.0 young per clutch laid and 2.9 young per successful nest was close to the long term average.

	laid	hatched	fledged	chicks fledged
1998				
Sutherland	7	6	5	13
E Ross	2	2	2	7
Bad & Strath	4	0	0	0
Nairn	1	1	1	4
W Moray	9	8	6	20
Total	23	17	14	44

Hen Harrier breeding success in Highland and west Moray, 1989 to 1999

Year	laid	fledged	nesting success %	chicks fledged	Mean brood per successful nest nest	Mean brood per clutch laid
1989	36	19	53%	63	3.3	1.8
1990	38	25	66%	77	3.1	2.0
1991	34	21	62%	60	2.9	1.8
1992	47	28	60%	104	3.7	2.2
1993	50	24	48%	75	3.1	1.5
1994	51	25	49%	78	3.1	1.5
1995	43	24	56%	83	3.5	1.9
1996	19	13	68%	40	3.1	2.1
1997	12	9	75%	26	2.9	2.2
1998	23	14	61%	44	3.1	1.9
1999	10	7	70%	20	2.9	2.0
1989-99	**363**	**209**	**58%**	**670**	**3.2**	**1.8**

Nick Picozzi

Northern Goshawk *Accipiter gentilis*

Borders

	checked	occupied	laid	hatched	fledged	chicks
1998	46	38	35	26	23	46
1999	*50*	*43*	*36*	*31*	*29*	*73*

1998 – Twenty four of the nests were on Forest Enterprise ground, the rest in private woodlands. A high proportion of the many failures were around egg laying time and also around hatching time. This was attributed to the severe weather which had a marked effect on the season as a whole. There were 1.2 chicks produced per occupied site. No incidents of direct persecution were recorded although human interference is still considered to be the main factor limiting Border Goshawks. Six new sites were discovered, which highlights the feeling that if more woods could be checked yet more new sites would be discovered. Goshawks are now confirmed to be established in Berwickshire, although one of the chicks from the site was found dead on the nest from frounce - not recorded in South Scotland/ North England since 1991. All previous cases of frounce have resulted in the death of the entire brood.

1999 – A marked improvement on 1998 with over 50% more chicks fledged. Clutches of 5 were common and one clutch of 6 was recorded. There were 1.7 chicks produced per occupied site.

Central Scotland

1998 - One successful pair was recorded with at least two young reared and a second pair seen elsewhere. It is suspected that up to five or six pairs may attempt to breed annually in the Group's area.

1999 – The single recorded pair reared 4 young. There were various records of single birds seen elsewhere.

Arthur Gilpin

North East

1998 – No specific data are available but the general picture reported was of a high failure rate due to spring snow.

1999 – The following data are from the Dee and Don catchments between Huntly and Fettercairn

checked	pairs found	nests found	fledged	chicks fledged
21	17	16	13	31+

North East RSG fieldworkers have noted the marked difference in rate of expansion between their Goshawk population and that in the English/ Scottish Border country. Borders goshawks have had at least a 25-fold increase in breeding numbers between the 1970s and the present whereas the North East population has barely doubled over the same period. This has been attributed to substantial differences in the levels of direct persecution.

Tayside

1998 - One successful nest was reported in Angus which fledged 3 young. There may be a second site.

1999 – Two successful nests were recorded in Angus with 2 and 4 young of which at least 4 certainly fledged

Dumfries & Galloway

1998 – Prior to 1999 there was no attempt made to assess the size of the breeding Goshawk population in the region, although there is no doubt that the species is fairly widespread with breeding pairs reported in all three counties. The following information is derived from a few ad hoc records recorded from various sources.

In the Forest Park at least 2 pairs bred, one successfully, with a single male seen regularly in a third location. In Dumfriesshire 2 pairs were located, one known to be successful with 3 chicks, and 2 further sites were apparently unoccupied. There were reports of persecution in Nithsdale but nothing substantive was discovered.

1999 – More quantitative data were available for 1999 with results as follows.

checked	occupied	laid	fledged	chicks fledged
10	8	7	5	9+

Common Buzzard *Buteo buteo*

Argyll

1998 & (*1999*)	checked	occupied	laid	fledged	young fledged
SW Mull	22+ (-)	22+ (-)	17 (-)	15 (*16*)	20 (*25*)
Colonsay	- (*48*)	19 (*18*)	8 (-)	5 (*10*)	7 (*14*)
Cowal: Glenbranter	- (-)	26 (*31*)	- (-)	8 (*23*)	8 (*29*)
Cowal: Elsewhere	- (-)	12 (*40*)	- (-)	4 (-)	5 (-)
Bute	4 (-)	4 (*4*)	4 (-)	4 (*2*)	8 (*3*)
Total	**- (-)**	**83 (-)**	**- (-)**	**36 (-)**	**48 (-)**

1998 - Monitoring data was obtained from several areas including data from 16 nests on SW Mull and coverage of all of Colonsay/Oronsay.

1999 - Large samples were monitored again in several areas. On Colonsay/Oronsay Rabbit populations were low in 1999. Coupled with poor weather during the breeding season this led to the poorest productivity recorded in 10 years. In the Cowal, Glenbranter study area 26 occupied territories were identified and 8 successful pairs fledged only 8 young. Only one of the monitored pairs throughout Cowal produced more than one chick. Observations suggest that pairs nesting in the extreme south of Cowal, south of Tighnabruaich, may have fared a little better.

North East

The Buzzard population in the 15km^2 area between Kemnay and Dunecht on the Old Castle Fraser estate was surveyed in both 1998 and 1999. A total of 20 breeding sites were located by searching woods or shelter belts for old nests. Breeding pairs were then located s they displayed in the spring and their subsequent breeding success recorded. The density of breeding pairs varied from 1.26/km^2 (1998) to 1.13/km2 (1999) and site occupancy fell from 100% to 80%. There was no evidence of persecution. Productivity was similar in both years (1.59 young/occupied site in 1998; 1.58 young/occupied site in 1999) as was the number of young fledged per successful site (1.88 young/successful site in 1998; 1.93 young/ successful site in 1999).

In 1998 only, the Buzzard population on a large part (35km^2) of Dunecht estate was also surveyed. The density was 1.0 pairs/ km^2. Site occupancy in 1999 was known to be similar but breeding data were not collected. The difference in breeding density between the 2 study areas is thought to reflect habitat differences with more open areas without suitable breeding sites on Dunecht estate. The results are shown in the following table.

	Kenmay/Dunecht (15km²)		Dunecht (35km²)
	1998	*1999*	1998
checked	19	*19*	37
sites/km²	1.27	*1.27*	1.06
occupied by a single bird	0	*0*	2
occupied by a pair	19	*17*	34
pairs/ km²	1.27	*1.13*	1.03
failed	2	*3*	6
successful	17	*14*	30
min. no. young fledged	32	*27*	61
mean young/occupied site	1.68	*1.59*	1.69
mean young/ successful site	1.88	*1.93*	2.03
mean young/ km²	2.0	*1.8*	1.74

Highland

The Highland RSG received details of the breeding performance of 96 pairs of Buzzards in 1998 and 102 pairs in 1999 (of which 99 were sufficiently complete to include in the table). The most complete and detailed study in both years was that done in Easter Ross to the east of Tain.

1998 & (1999)	occupied	laid	hatched	fledged	chicks fledged
N & W Sutherland	12 (24)	12 (22)	11 (20)	11 (19)	18 (34)
Skye and Small Isles+	14 (8*)	14 (8*)	14 (8)	14 (8)	22 (10)
Easter Ross	58 (52)	53 (49)	45 (42)	42 (38)	94 (71)
Strathspey	58 (8)	53 (8)	45 (8)	42 (7)	94 (18)
Others	7 (7*)	7 (7*)	7 (7)	7 (7)	18 (18)
Total	96 (99)	91 (94)	78 (85)	75 (79)	155 (151)

+ 1999 figures are for Skye only
* These figures should be treated with caution as nests were mainly checked late in the season and early failures may have been missed

1998 - Overall a good year for breeding Buzzards in the Highland area. In the main Easter Ross study area 58 pairs were carefully followed. Mean clutch size was once again 2.8. The mean brood 6 of successful pairs was 2.4, but due to the 21% of pairs that failed, only 1.6 young were fledged per territorial pair. These productivity figures were slightly higher than normal and the highest recorded since 1992.

In the second main study area, the north and west of Sutherland, breeding success was slightly lower than in Easter Ross with most birds rearing only 1 or 2 chicks. None reared more than 2, whereas in Easter Ross, of the 39 successful broods, 19 had more than 2 chicks. However, only one of the Sutherland pairs failed totally, compared with 11 of the Easter Ross pairs. The breeding success in Sutherland was well below the 1997 record of

2.3 young per pair. This was almost certainly due to the summer weather conditions which were far wetter and windier than the unusually warm, dry summer of 1997.

Details were received from a new area in the west, Skye and the Small Isles (mainly Eigg and Canna). The overall pattern of success there was very similar to that in NW Sutherland.

Strathspey productivity was again very low with 4 out of 5 monitored nests failing. At 3 of these sites persecution from estates engaged in game management was strongly suspected. Prior to an increase in game management, these 3 sites had been very successful over a 15 year period.

The figures from other areas suggest a very high success rate. These figures, however, are almost certainly biased towards successful nests as very little systematic searching is done to locate all nests early on in the breeding cycle, so that early breeding failures were missed, inflating the overall success rate.

1999 – this was considered an average year for Buzzards in the Highland Group's area. The close study of 52 pairs in the Tain area of Easter Ross revealed a mean clutch size of 2.8. Mean brood size of successful pairs was low at 1.9 and a 22% failure rate meant that only 1.4 chicks fledged per territorial pair. This is at the bottom end of the recorded range of productivity. This was attributed to cool, wet weather during June.

In the other main study area in north and west Sutherland breeding success was similar to 1998 and similar to that recorded in Easter Ross. There were few total failures but most pairs reared only 1 or 2 chicks.

In contrast to 1998 productivity from the few pairs monitored in Strathspey was good with only one failure and half the pairs producing 3 chicks. No persecution was recorded in 1999 whereas it was considered to be the main factor in failures in 1998.

Skye appeared to have a poor season and the figures may overstate productivity since many sites were only checked late in the season and some early failures may have been missed. A similar situation applies with the "others" data in the table (mainly from the Black Isle and Strathpeffer areas).

Overall, however, Highland Buzzards continue to do well with productivity fluctuating only slightly and being sufficient to sustain a healthy and expanding population.

Lothian and Borders

During 1998 and 1999 both the Borders and Lothian continued to see substantial re-colonisation by Buzzards. In the Borders the species remained significantly commoner in its core areas in the north and west of the region with an estimated minimum there of 350 pairs in 1998 and 357 in 1999. In the south and east of the region the species is still much more thinly spread but re-colonisation continues. In this part the minimum number of pairs was 56 in 1998 and 41 in 1999.

The Lothian Buzzard population also continued its spectacular success story and further expansion and in filling took place. The following table summarises the productivity this situation between 1993 and 1999.

Lothian Buzzards	**1999**	**1998**	**1997**	**1996**	**1995**	**1994**	**1993**
Territorial pairs	86	82	62	52	50	33	20
Successful pairs	66	56	45	38	33	21	11
Total young recorded	159	120	128	102	91	37	25
Chicks per successful pair	2.4	2.14	2.86	2.68	2.76	1.76	2.27
Chicks per territorial pair	1.85	1.46	2.05	1.96	1.82	1.12	1.25

Andrew Stevenson

Golden Eagle *Aquila chrysaetos*

Central Scotland

	checked	occupied	successful	chicks fledged
1998	9	7	5	5
1999	*8*	*8*	*5*	*6*

1998 - Full coverage was achieved. Single birds were recorded in the 2 unoccupied ranges.

1999 – At one otherwise successful site the uneaten remains of the 4 week old second chick were found at a regular perch used by the adults.

Tayside

1998 and (*1999*)	checked	occupied	fledged	chicks fledged
W of A9	16 (*14*)	10 (*13*)	2 (*2*)	2+ (*2*)
E of A9	13 (*13*)	12 (*11*)	7 (*6*)	11+ (*9*)
Total	29 (*27*)	22 (*22*)	9 (*8*)	13+ (*11*)

1998 - West of the A9 had a very poor year, even by West Perthshire standards. Two sites failed on eggs – both clutches were analysed and both had failed with no embryo development having taken place. One clutch was from a home range with extremely poor food resources in the west of the area which habitually fails at the egg stage. The other was on the edge of a grouse moor with good bird and Hare resources close by but on a very open ledge, probably a victim of poor weather. The anomaly of no breeding in part of the relatively food rich east end of the study area continues. Although forestry plantation in one range is likely to be affecting food supply, a further 5 territories are apparently ideal for these birds. A complete lack of signs of birds in the most western territory in Perthshire is worrying, particularly as it follows a long term failure to produce.

East of the A9 there was a reasonable season with weather probably the cause of poor success in areas like Glen Clova.

1999 - West of the A9 only 4 nests reached the laying stage and 2 of these failed. The production of the few succesful nests in the study area - and always the same ones - must be crucial to the whole local population.

Argyll

1998 – the number of successful pairs was a little lower than the previous year dropping to 22 (25 in 1997) and 27 fledged young produced compared to 31/32 in 1997. Five sets of twins were fledged for the second consecutive year. In the study area on South mainland Argyll the season was described as pretty poor and extremely confusing in some areas where it proved difficult to assign non-breeding birds to particular territories.

An adult Golden Eagle was caught in a Fox snare on the Cowal in April and although released unharmed this may have contributed to the lack of a breeding attempt in this territory. A Golden Eagle was found poisoned close to a known nest site in a mid Argyll territory that has had a singular lack of breeding success for many years. While it was estimated that it had been dead for 3 to 4 weeks a very freshly dead Hare and lamb were

	checked	occupied	fledged	% occupied territories to fledge	chicks fledged	chicks per successful pair
1998	61	54	22	40.7%	27+	1.22
1999	*61*	*57*	*16*	*28.0%*	*17*	*1.06*

found laid as poisoned baits nearby and a live immature eagle was seen in the area.

1999 – Overall this year had a poor breeding season in Argyll especially in the south Argyll mainland study area where it was described as 'utterly miserable and the worst year on record' by the RSG workers concerned. Although site occupancy was slightly up on 1998 productivity was much poorer and only one set of twins fledged.

Dumfries & Galloway

1998 - Two pairs attempted to breed, both producing eggs but only one pair being successful, fledging a single chick. This latter success was due in large part to the dedicated efforts of 2 local RSG members who together co ordinated and largely carried out a nest protection scheme. At least one immature bird continues to be seen in a recently deserted territory.

1999 – Two pairs again attempted to breed. One pair hatched at least one chick which disappeared after about a week. This was probably due to the severe weather in mid May but human interference has not been entirely discounted. The eggs at the other site failed to hatch, possibly due to inadvertent disturbance by stalkers. Discussions with the site managers have hopefully prevented this happening again in future.

The Golden Eagle's tenure in Dumfries and Galloway as a breeding species remains precarious and every effort to enhance habitat and protect sites should be made.

North East RSG

	occupied	laid	successful	chicks fledged
1998	18	15	10	14(+2)
1999				

1998 – Eighteen pairs is now the usual number of birds present. No singles were reported. One chick was reared in each of two sites on one estate where persecution has been rife, probably because both were in new eyries and so avoided notice and persecution. Generally a good year although all the birds that use high nests failed due to the cold wet spring. One site seems to have been occupied by an old bird or pair of old birds for several years now and they do not appear to be laying eggs.

Highland

1998 - The 92 pairs monitored for breeding success throughout the Highland area in 1998 was much the same as in previous years. Records were well distributed across the area, with the usual tendency for more pairs to be checked in the west than the east. Comparatively few pairs were checked in North Lochaber (the area between Kyle of Lochalsh and Fort William) compared with previous years. Typically, for most pairs, information was incomplete for the middle part of the breeding season, notably for the nestling period. Therefore, as in previous years, the results are presented to show ultimate breeding success figures only. A small number of pairs for which data on ultimate breeding success were either incomplete of uncertain have been excluded.

The overall breeding success was substantially higher than the long term average. The shortage of records from North Lochaber, where success is generally quite poor, probably contributed to this. However, all areas tended to show relatively good success, especially in the west, and in both Skye and the Small Isles performance was conspicuously good.

One clutch of 3 eggs was reported from Strathspey, although none of these hatched. There is continued evidence of human persecution at a number of sites in the east of the region. Although the summer period was wetter than average, the early spring was comparatively mild. The latter was probably one factor contributing to the generally good breeding success reported in 1998.

1999 – The number of pairs monitored was appreciably less than the usual 90 to 100 although records continued to be well distributed across the area albeit with the usual tendency for more pairs to be checked in the west. As in 1998, few North Lochaber pairs were checked and this year fewer than usual were visited in Wester Ross and Sutherland. Again, for most pairs, information was incomplete for the middle part of the breeding season, notably for the nestling period. Therefore, as in previous years, the results are presented to show ultimate breeding success figures only and data on a small number of pairs for which data on ultimate breeding success were either incomplete of uncertain have been excluded.

Productivity was below the long term average and was generally similar across the region except in South Lochaber where it was low. Several failures were attributed to human persecution, notably in Strathspey where an adult and chick were found poisoned on the nest. This pattern is consistent with previous years.

1998 & (*1999*)	checked	fledged	chicks fledged	yng/successful pair
NW Suth./NW Ross	18 (*8*)	10 (*4*)	10 (*4*)	1.00 (*1.00*)
E Ross/E Suth/S'pey	15 (*15*)	7 (*6*)	8 (*9*)	1.14 (*1.50*)
Skye & Lochalsh	32 (*32*)	16 (*15*)	24 (*17*)	1.50 (*1.13*)
N Lochaber	2 (*1*)	0 (*0*)	0 (*0*)	0.00 (*0.00*)
S Lochaber	20 (*20*)	6 (*5*)	8 (*5*)	1.33 (*1.00*)
Small Isles	5 (*3*)	4 (*2*)	5 (*2*)	1.25 (*1.00*)
Total	92 (*79*)	43 (*32*)	55 (*37*)	1.26 (*1.16*)

Osprey *Pandion haliaetus*

1998 & (*1999*)	occupied	laid	hatched	successful	chicks fledged
Highland	64 (*69*)	59 (*65*)	53 (*56*)	47 (*47*)	99 (*98*)
Tayside	41 (*45*)	36 (*39*)	32 (*26*)	28 (*25*)	61 (*51*)
Rest	25 (*22*)	21 (*21*)	17 (*17*)	17 (*15*)	32 (*34*)
Total	**130 (*136*)**	**116 (*125*)**	**102(*99*)**	**92 (*87*)**	**192 (*183*)**

1998 - Highland

1988 was another good year for Highland Ospreys with a good start to the season and a record number of successful pairs. Sixty four pairs were found - 5 more than in 1997 - with one other site holding a single male. Egg collectors destroyed 5 breeding attempts. Only one other nest failed to hatch. In the third week of May, the wind moved to the north east and was cold and there were frequent, but not heavy, rains throughout the rest of the season in the breeding areas. Heavy rains in the mountains caused high river levels which prevented male Ospreys catching enough fish in one estuary, resulting in the loss of 3 small broods. The failure of 3 further broods was attributed to cold, wet weather. Forty seven pairs raised flying young (7 more than in 1997) and 99 chicks fledged (22 more than in 1997). There were 15 broods of 3, 22 broods of 2 and 10 singles. Productivity was 1.55 young per pair with an eyrie, 1.68 young per pair laying eggs. Mean brood size was 2.11. Twelve chicks were collected under licence by Roy Dennis for the English release project. All of these fledged and migrated successfully from Rutland Water.

1998 - Tayside

More pairs were located in 1998 but the final outcome, in terms of numbers of young fledged, was the same as 1997 at 61 chicks. Two new eyries were found on electricity pylons – there are now 4 such nests. One long established female was probably killed by another female which took over the site. The original bird was a 1990 chick from Aberdeenshire, the interloper was a 1994 chick from Nairn. Two large chicks died when their nest fell out in high winds. The wind and rain caused other nests to fail particularly at hatching time. Fifty five young were colour ringed.

1998 – Elsewhere

A slow expansion continues in the north east with new fish ponds proposed in one part of the region which will probably increase the attractiveness to ospreys.

One new pair was found in Argyll which had a markedly better season than in 1997. Several other summering birds were seen and 6 Argyll chicks were colour ringed.

Despite 2 new pairs recorded, Central Scotland had a poor 1998 season. One pair failed to lay and another produced a single runt chick without proper feather growth. Two pairs used artificial nests.

A number of summering birds were seen in

Dumfries and Galloway and some stick carrying activity was recorded.

1999 – Highland

Although the numbers of occupied territories continued to increase in 1999 and more pairs laid eggs and hatched chicks than ever before, the final score of fledged chicks was one down on 1998. A severe storm on 21 May destroyed 2 occupied nests. Two other nests suffered broken eggs when intruding Ospreys fought with the incubating bird. Egg collecting accounted for 2 failures. As in 1998 high river levels limited fishing success in one area and 2 broods died as a result. Other brood failures were also attributed to poor weather conditions. The Loch Garten pair tried to buck the trend by laying 4 eggs, although only 3 chicks were fledged. Forty seven pairs raised flying young (the same as in 1998) and 98 chicks fledged (99 in 1998). There were 13 broods of 3, 26 broods of 2 and 8 singles. Productivity was 1.42 young per pair with an eyrie, 1.51 young per pair which laid eggs. Mean brood size was 2.08. Twelve further chicks were taken under licence by Roy Dennis for the Rutland Water release project and all these fledged and migrated successfully. Two of the 1997 released Rutland males returned to summer there.

1999 – Tayside

As in Highland site occupancy and breeding attempts in Tayside were up on the previous year but productivity was ultimately disappointing. A series of losses during incubation were attributed to poor weather in late May. Four pairs continued to nest on electricity pylons and a further pair used a lower, two pole, power line support. This nest was struck by lightning on 1 August, killing the single chick. This was the only nest to reach the hatch stage that failed to fledge young. Fifty one chicks fledged (10 less than in 1998). There were 6 broods of 3, 14 broods of 2 and 5 singles. Productivity was 1.13 young per occupied nest, 1.31 young per pair that laid and 2.04 per successful nest.

1999 – Elsewhere

There was little hard evidence of the hoped for continued expansion in the north east with fewer active nests found than in 1998 although some of these were at new sites. Failures during incubation and at nestling stage were attributed to poor weather and a male found dead at one regular site appeared to have suffered a collision injury. There were, however, pairs rumoured at a number of other sites and so no actual contraction of the regional population may have taken place.

In South and West Scotland the populations remained stable with further sightings of non-breeding birds giving continued hope of further expansion. Unlike the longer established Highland and Tayside populations the numbers of fledged young increased from 1998 figures although 2 fledged birds are thought to have died before migration. Seventeen chicks were ringed.

Satellite tracking

A number of transmitters have been attached both to Rutland released ospreys and to birds from Scotland. These can be tracked by satellite (as part of the Rutland project). Much fascinating information has emerged. Ospreys, unlike most large migratory raptors, have long been thought to be capable of long flights over water. This allows a broad front migration without using 'pinch points' like Gibraltar or the straits around Sicily. The satellite work has confirmed this and also shown the birds' ability to make long, single flight crossings of the western Sahara. This and much more of interest can be seen at **www.ospreys.org.uk.**

Common Kestrel *Falco tinnunculus*

Ayrshire study area

	1998	*1999*
Number of territories checked	44	*40*
Number of territories occupied	33	*21*
% occupation	75	*52*
Number of clutches known	25	*10*
Average clutch size	5.1	*5*
% of eggs which hatched	70	*90*
Number of results known	27	*17*
Average young reared per breeding pair	3	*2.76*
Average young reared per successful pair	4.1	*4 3*
Number of breeding attempts failed	7	*6*
% failed	26	*35*
% brood survival	86	*91*
Number of young ringed	71	*36*
Number of adults trapped/ringed	13	*6*

1998 - As expected, vole numbers declined from the 1997 peak but by no means crashed, being found readily at nests until the end of the season. Weather played a very significant role and may have contributed to several late breeding attempts with poor results. January to mid February was mild, dry and sunny, a "false spring" that had many pairs inspecting sites and even making scrapes. This ended with a poor spell of weather into March with heavy snow in March and April. Site occupancy was good (75%) and the first egg was laid on 11 April, two weeks later than 1997. The early start to the season produced a long period between display/site inspection and laying - in 5 cases as long as 3 months. These birds may have lost condition after the early start and nested late after recovering with - ultimately - poor productivity. Nevertheless overall productivity was above average though not approaching 1997's record figures.

Thirteen of the known first egg laying dates were in April, 7 in May, the latest being on 15 May. Mean clutch sizes (5.1) were down from 1997 with 6 hens laying 6 eggs (8 in 1997).The hatching rate was also reduced.

Thirteen adults were trapped under licence and all hens (11) except one weighed over 290g. The exception (229g) - a first year bird - reared only one chick. Four of the captured birds were retraps: one hen on the same territory as 1997; one adjacent to the territory from which it fledged in 1997; one 18 km. from its 1997 natal site; one - the most interesting - 2 territories from where it was ringed as a breeding adult in 1992.

Of the 7 failures, one was at pre laying stage, 4 during incubation and 2 during the brood period. Three failures were due to desertion in poor weather, one was due to egg collecting and 2 were

for reasons unknown. Brood survival was high - as is usual.

A bird ringed as a chick in 1995 at the Ardeer ICI plant was found dead at Cumnock nearly 3 years later and 37 km from its natal site.

1999 - Productivity hinged on 2 factors, a dearth of voles which was apparent until well into July and a critical spell of very bad weather from 5-26 April. One pair which laid early did persist through this period but territory occupation was very low at 52% and at least 5 pairs which had been well settled left their without laying. Once this bad spell was over the weather was dry and sunny for a few weeks and the remaining pairs began to breed. The mixed weather which followed did not adversely affect breeding and those pairs which eventually laid were very successful and on a par with the 1998 results. Several nest boxes were lost during the severe weather on Boxing Day and some conifer belts were flattened.

The first laid egg was in a lowland site on 8 April, the remaining pairs laying between 27 April and 3 May, a very narrow time band but indicative of pairs starting to lay as soon as the weather improved. Only 2 hens laid clutches of 6 (6 in 1998; 18 in 1997). Hatching rate was exceptionally high at 90%.

Very few adults were trapped due to the low numbers of breeding pairs found, one hen was caught in the same territory for the third year in succession and another was caught in the same breeding territory as in 1998. Six hens averaged 295g, well within 'good condition' limits.

Six pairs failed, 5 at pre laying stage during the bad weather, the other for an unknown reason. The pairs which did breed had a successful season. Mean clutch size was high (5.0). Ninety per cent of eggs hatched and brood survival was also 90%.

One bird ringed as a nestling in the Carrick Forest in 1998 was found dead under powerlines on Newtonmore Golf course in March 1999.

Arthur Gilpin

Highland

The most complete Kestrel data for Highland came from Easter Ross and East Sutherland study areas in both 1998 and 1999 and these are shown below.

All are from nest box sites.

	pairs	laid	hatched	fledged	chicks fledged	Mean clutch (n)	Mean brood (n)
1998							
E Ross	7	7	7	6	26	4.8 (6)	4.3 (6)
E Sutherland	6	6	5	5	21	5.0 (6)	4.2 (5)
1999							
E. Ross	6	6	6	6	24	5.1 (6)	4.8 (5)
E Sutherland	3	3	3	2	7	4.0 (3)	3.5 (2)

Argyll

1998 - on SW Mull at least 10 successful pairs were located and the 5 pairs for which fledging information was obtained reared approximately 18 young. A pair located on Colonsay is thought to have failed. On Cowal, where numbers of voles were falling following a 1997 peak, 26 nests were located (Glenbranter study area and elsewhere) and the monitored pairs that were successful continued to have a high productivity fledging a minimum of 70 young. Two successful pairs were monitored on Bute.

	Territories Occupied	Territories known to have fledged young	Min no of young fledged	No of young per successful territory
SW Mull	10	5	18	3.6
Colonsay	1	0	0	0
Cowal	26	14	70	5.0
Bute	2	2	7	3.5
Total	39	21	95	5

1999 - data were less complete than for 1998 (and have not been tabulated) but monitoring revealed much lower numbers of birds with very low vole numbers across wide areas of Argyll.

Merlin *Falco columbarius*

Central

In both 1998 and in 1999 3 pairs were recorded but no results were obtained.

Tayside

1998 & (*1999*)	checked	occupied	fledged	chicks fledged
Perthshire	39 (*42*)	22 (*23*)	12+ (*8[+4?]*)	40+ (*25+*)
Angus	22 (*28*)	12 (*12*)	9 (*9*)	26+ (*30+*)
Total	61 (*70*)	32 (*35*)	21 (*17[+4?]*)	66+ (*55+*)

1998 – In Perthshire fewer territories were checked than in previous years. Despite the weather there was a higher production of young per successful pair than in recent years. Five pairs not checked through to fledging would almost certainly have been successful. A number of territories appeared not to have been occupied in Glen Lyon (this is also true for Peregrine territories) but this area has a number of treenesting pairs which may have been more difficult to locate. The Angus the breeding season was again very wet – the wettest on record. Several sites which are usually successful failed, with some not being occupied at all. This was partly offset by the finding of 2 new (successful) sites. Brood depletion was also higher than usual. Seven broods were colour ringed. One pair re laid and raised a brood of 2.

1999 – In Perthshire extremely bad April weather seemed to affect some areas more than others. Breeding pairs were scarce in West Perthshire especially Farragon, East Rannoch and Glen Lyon. There also appeared to be a lack of prey, in particular Meadow Pipits, in these areas in late April and May. In Angus the 1999 season was one of the most successful since monitoring began in 1983 with the most fledged young since 1990 and the second best since 1994. Losses at successful sites of 2 to 3 years ago are balance by new successful sites. One site failed at chick stage due to Fox predation.

South Strathclyde Dumfries & Galloway

1998 & (*1999*)	checked	occupied	successful	chicks fledged
S. Strath.	26 (*17*)	17 (*9*)	5 (*1*)	11+ (*1+*)
D & G	31 (*16*)	18 (*13*)	6 (*10*)	17+ (*22+*)
Total	57 (*33*)	35 (*22*)	11 (*11*)	28+ (*23+*)

1998 – The extra effort of the Hen Harrier survey produced a reduced effort on Merlins. There is certainly an unknown number of additional pairs and the outcome at many known sites was not discovered. The species continues to be rather scarce in the region and largely confined to heather moors and a few suitable forest edges with adjacent moorland.

1999 – This species is difficult to census and Dumfries and Galloway group workers record breeding outcome in only a few areas. Generally the population appears to be low but stable following the declines that resulted from afforestation. In Galloway a much reduced population breeds in a few places around the forest edge where there is sufficient productive moorland nearby.

Argyll

	checked	occupied	successful	chicks fledged
1998	9	5	2	7
1999	*7*	*5*	*3 [4*]*	*7 [12*]*

** includes a brood of 5, 10/14 days old at last visit*

1998 - Four previously regular sites were apparently vacant in 1998 and evidence of occupation was established in only 5 areas including Mull, Colonsay, Islay and Cowal. A few additional sightings of adults in the breeding season were reported from suitable breeding habitat during the course of other field work but no follow up searches were possible.

1999 – On Mull birds were reported from 4 separate areas in the breeding season (more than usual) and included one pair where 10 to 14 day old chicks were present on the last visit. A bird was reported in a suitable location on Jura. In Mid Argyll birds were absent from on regularly used site but a bird was seen in a new suitable area. A Knapdale pair were on territory but the nest was not found. One Kintyre site was seemingly vacant and a second pair fledged 2 to 3 young. In Cowal 2 new successful pairs were found.

North East

1998 & (*1999*)	checked	occupied	laid	hatched	fledged	chicks fledged
Lower Deeside	21	10 (*8*)	10 (*8*)	8 (*7*)	8 (*6*)	24 (*13*)
Mid/upper Deeside	26*	10 (*11*)	10 (*11*)	9 (*10*)	9 (*9*)	31 (*30*)
Donside/Moray	41*	20 (*18*)	17 (*18*)	12 (*15*)	10 (*14*)	38 (46)
Total	88	40 (*37*)	37 (*37*)	29 (*32*)	27 (*29*)	93 (*89*)

*partial coverage

1998 - full coverage was achieved in Lower Deeside with the rate of occupation and success matching that of recent seasons. There were some brood reductions associated with heavy rain late in the season.

In Mid and Upper Deeside there was only partial coverage. Site occupation was low in the Braemar area but occupied sites did well and there was very good breeding success elsewhere.

Some parts of Donside and Moray were only partly covered. Site occupation was patchy in Donside and overall success was only average due to poor weather. Persecution was again suspected at one Donside estate where some sites have had birds present every year - but only first year males - and one site has young every year but none have fledged since 1990.

1999 - Lower Deeside had full coverage which found the lowest number of birds breeding there since the study began 20 years ago. Some brood reduction was noted.

In Mid and Upper Deeside there was partial coverage with a similar pattern to 1998 with low occupancy in the Braemar area but good productivity from active sites, especially in Mid Deeside.

In Donside and Moray there was almost full coverage of the areas normally monitored. Occupation was patchy being poor in Mid Donside and Cabrach but an increase was noted in Upper Donside. One new site was found and active sites had good breeding success.

Shetland

	checked	occupied	laid	hatched	fledged	chicks fledged
1998	34	17	15	13	12	36+
1999	*33*	*14*	*13*	*12*	*11*	*27+*

Coverage of Merlins in Shetland has been less complete in the 1990s than during the 1980s but it would appear that there has been a steady decline since 1996 with reductions noted in both core and peripheral areas.

Lothian & Borders

1998 &(*1999*)	checked	occupied	hatched	fledged	min. chicks fledged
Lammermuirs	30 (*30*)	16 (*13*)	7 (*6*)	5 (*4*)	20 (*12*)
Moorfoots	10 (*10*)	4 (*3*)	3 (*2*)	2 (*2*)	7 (*6*)
S. of Tweed	7 (*5*)	5 (*3*)	3 (*2*)	3 (*2*)	9 (*6*)
Pentlands	- (*10+*)	4 (*6*)	1 (*4*)	0 (*4*)	0 (*9*)
Other	2 (*2*)	0 (*0*)	0 (*0*)	0 (*0*)	0 (*0*)
Total	49 (*57+*)	29 (*25*)	14 (*14*)	10 (*12*)	36 (*33*)

1998 - Some briefly glorious early spring weather raised hopes of a good breeding season for Merlins this year. These were dashed when the weather turned poor and remained so throughout most of April, May, June and July. April was reported as the wettest this century. Breeding success was undoubtedly adversely affected by cold, wet weather and poor visibility. Overall success was markedly down in all areas compared with the 1997 season.

In the Lammermuirs, although there was evidence of early occupation at 16 sites, only 9 definitely reached the egg stage (2 pairs may have laid and quickly failed) and the others appeared deserted before egg laying was likely. Five nests had 5 eggs and 4 laid 4. Only 5 pairs managed to raise young (20) to ringing age.

Two of the failed pairs had small young disappear and 2 failed to hatch. At one of the latter the female was found long dead by the nest. She had not been predated. After the season an adult male was found long dead in a crow trap within about 4kmof this nest, conceivably the mate of the dead female who may have starved on the nest.

In the Pentlands full details are not available but it is understood that there were breeding attempts, none of which succeeded.

It was one of the poorest years on record in the Moorfoots with only 4 sites certainly occupied. One clutch failed to hatch and another failed at the small young stage. The 2 others were last visited when the nests contained 2 and 5 small chicks respectively.

South of the Tweed 5 occupied sites were located and 4 were known to lay - each with 4 eggs. The fifth pair formed a scrape but did not seem to get any further. Lack of signs and sightings suggests that one nest probably failed. The remaining 3 nests were seen to contain 4, 3 and 2 young respectively. The brood of 3 were ringed but the others were not revisited beyond 10 days old.

Two other sites in the west of the area were checked but found not to be occupied.

1999 - this year saw a third poor year in a recent run of such years (1996, 1998 and 1999) with the fewest successful nests and the lowest number of chicks in the Lammermuir and Moorfoot parts of the study area since monitoring began. Most worrying was the low levels of early season site occupancy (other than in the Pentlands) which suggest an underlying population decline rather than a series of individual seasons with poor productivity. This begs the question, are declining farmland bird numbers affecting Merlin winter

survival rates? Continued monitoring is essential in order to try and answer this question.

The Lammermuirs were characterised by low occupancy with some "occupied" sites holding only single birds for a brief period. Only 8 sites definitely laid and 2 of these failed before hatching. At one the female was killed at the nest, probably by a Stoat. Stoats were also suspected of predating 2 broods. The 12 chicks ringed from only 4 successful nests were the fewest ever recorded for the area by the study.

In the Moorfoots coverage was somewhat patchy but still revealed a low level of site occupancy with previously used areas confirmed as unoccupied. The outcome at one occupied site is unknown and only 2 sites were known to raise young.

South of the Tweed of the 5 sites checked only 2 certainly raised chicks. Success was not confirmed for a third site still in use in mid May. In contrast with other areas and previous years good occupancy was recorded in the Pentlands. At least 6 sites laid (4 clutches of 4 and 2 of 3), one in a tree nest. The clutches of 3 both failed but all others at least reached large brood stage with the tree site confirmed to fledge.

Orkney

checked	occupied	laid	hatched	successful	chicks fledged	
1998	58	20	17	12	9	c.32
1999	*57*	*17*	*14*	*10*	*10*	*c.30*

1998 - All 58 known sites were checked. Ten were found occupied in the West Mainland, one on Rousay and 9 on Hoy. At one of these 20 sites the birds are known not to have laid, at another no nest was ever found but the site was definitely unsuccessful while at a third, the scrape was not found until after the eggs had apparently been predated. Eggs were thus confirmed at 17 sites, the mean clutch size being 3.8. There were a further 5 failures at egg stage but chicks were hatched at 6 West Mainland and 6 Hoy sites, the mean brood size at this stage being 4.3 (n = 11). Three broods were lost to predators (a Short-eared Owl being implicated at one) but the remaining 3 sites in the West Mainland and 6 on Hoy were successful.

1999 - Fifty seven sites were checked with 9 found occupied on the West Mainland, one on Rousay and 7 on Hoy. At least 14 sites had eggs and a further 2 may have laid before failure. All 10 sites that hatched are also thought to have fledged.

Highland

1998 - Although information was received from 51 territories, only 26 sites were followed through all stages of the breeding cycle. Breeding success differed significantly from area to area. Pairs in West Moray, Nairn, and Badenoch and Strathspey had a relatively good breeding season, despite continuous rainy weather during the summer. Although continuous, the rainfall was generally light in nature and did not seem to impair the Merlins' ability to obtain enough prey for

1998 & (*1999*)	checked	occupied	laid	hatched	fledged	chicks fledged
Bad./Strath.	4 (*0*)	2 (*0*)	2 (*0*)	2 (-)	2 (*0*)	7 (*0*)
W Moray/Nairn	17 (*17*)	8 (*7*)	7 (*7*)	7 (-)	7 (*6*)	24 (*21*)
Caith/Suth	16 (*34*)	16 (*19*)	13 (*17*)	11 (-)	6 (*10*)	12 (*32*)
E/W Ross	2 (*1*)	1 (*1*)	0 (*1*)	0 (-)	0 (*1*)	0 (*4*)
Inverness	12 (*11*)	2 (*5*)	1 (*1*)	u/k (-)	u/k (*1*)	u/k (*2*)
Skye	- (*1*)	- (*1*)	- (*1*)	- (-)	- (*1*)	- (*3*)
Total	51 (*64*)	29 (*33*)	23 (*27*)	20 (-)	14 (*19*)	43 (*62*)

successful breeding. Nine out of 10 pairs which laid eggs, successfully fledged young giving a fledging rate of 3.4 per young per successful nest which was just below the ten year average for the area. (In comparison, heavy torrential rainfall during the crucial fledging period in 1997 resulted in Merlins in the same area having the poorest ever breeding success recorded).

Approximately 50% of breeding sites checked in West Moray, Nairn, and Badenoch and Strathspey during 1998 were unoccupied. Most of these sites were located in West Moray. The reasons for this low occupancy are difficult to understand for some formerly regularly occupied territories. At least one site appears to have been affected by surrounding moorland being lost to now maturing forestry. Two other regularly occupied sites may also have been affected by planting of trees on site in recent years.

Some other sites checked were not core sites but are irregularly occupied and generally only used in peak years. This may be due to lack of territorial males in some years, as it is thought to be males that hold the sites.

Further north in Sutherland, Merlins had a relatively poor breeding season with 50% of the pairs followed through failing to breed successfully. Breeding success, as measured y successful nests, was well below average and when measured by the number of pairs laying eggs, gave a mean of only 1.0 young per pair, which was less than half the 10 year average for the area (2.2 young per pair). Three pairs failed at the egg stage (remains of one female werefound near the nest). Three failed at small young stage (young were known to be predated at one nest). Although reasons for failure were unknown at some nests, predation would appear to be a likely factor.

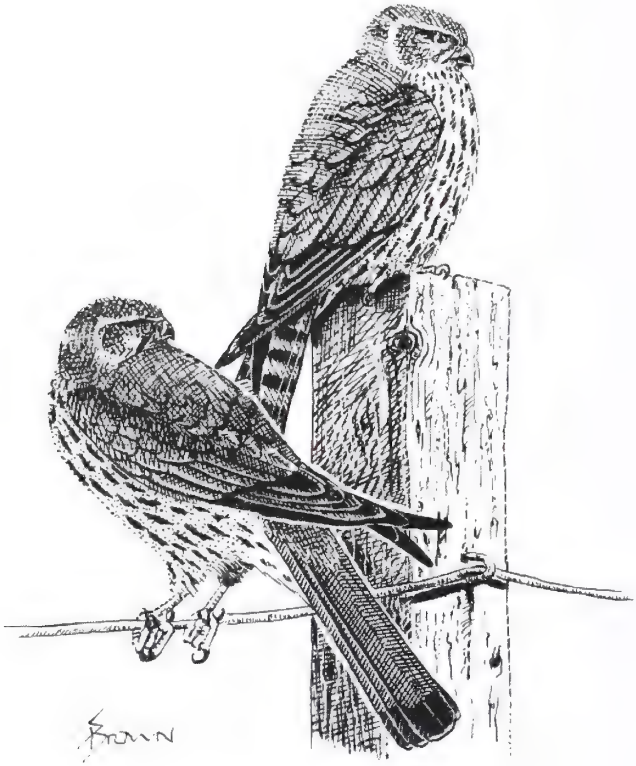
Only 2 sites were checked in Ross reflecting a lack of observers in this area which contains much suitable habitat. Only one site was occupied and the pair subsequently failed to breed successfully. Twelve breeding sites were checked in Invernessshire, far more than has hitherto be usual. Two sites were definitely occupied. Single males were seen at 2 sites. Signs of occupancy were found at 2 other sites. Approximately 45% of breeding sites checked were unoccupied.

1999 - Thirty three sites were found occupied by pairs. Records from a further 5 sites were not complete enough for inclusion in the totals.

In west Moray only 36% of sites were occupied, though many of these are not regularly occupied. In Inverness 50% of sites were unoccupied. It is thought that excessive burning for grouse management contributes to this low occupancy. Early season weather was poor with much rain but

this was mostly light and does not seem to have affected clutch size or incubation. Improved weather during the critical fledging period meant that successful pairs had a fairly productive season. From the 14 sites where clutch size was known a mean of 4.0 eggs per nest was at the upper end of the usual range. . Overall a mean of 3.2 chicks per successful nest was near the Highland long term average. Nine nest failures were recorded, 5 of these attributed to predation.

Monitoring effort was substantially improved in Sutherland and continues to be much better in Inverness. Nevertheless Inverness-shire could still do with more Merlin workers and Ross-shire is very short of coverage with much of the county appearing very suitable for the species.



Peregrine Falcon *Falco peregrinus*

Central Scotland

	checked	occupied pairs	occupied single	successful	chicks fledged
1998	36	26	3	19	39+
1999	*32*	*25*	*2*	*12*	*30+*

1998 - Although the general perception is that the 1998 summer was a poor one, the weather did not break until towards the end of May by which time most young Peregrines were past the early, vulnerable stage. Thus weather conditions in the incubation and early fledgling periods were favourable for the Peregrine in 1998, even if not for some other species.

1999 - There appear to have been problems - some at least being persecution related - in the south of the Group's area. The apparent drop in occupancy was offset to some extent by the appearance of a "new" - probably hitherto undiscovered – site in the middle of the area.

Tayside

1998 (*1999*)	checked	occupied	fledged	chicks fledged
Perth W of A9	37 (*34*)	26 (*23*)	18 (*12*)	42+ (*28*)
Perth E of A9	19 (*20*)	17 (*17*)	7 (*8*)	11+ (*19+*)
Angus	35 (*25*)	26 (*21*)	- (-)	30 (*11*)
Total	91 (*79*)	69 (*61*)	- (-)	83+ (*58+*)

1998 - There was a noticeable lack of success on some grouse moor estates and 1998 was considered overall to be a poorer year than normal.

1999 – There was concern that Peregrines are showing a decline in Tayside particularly in the west and north of the area. Fewer immature birds were recorded around territories during the season.

South Strathclyde and Dumfries & Galloway

1998 (*1999*)	checked	occupied	laid	fledged	no. chicks fledged
S.Strath coast	9 (*9*)	6 (*7*)	4 (*6*)	4 (*4*)	10+ (*10+*)
S Strath inland	30 (*32*)	13 (*18*)	13 (*14*)	8 (*7*)	22+ (*15*)
S.Strath Total	39 (*41*)	19 (*25*)	17 (*20*)	12 (*11*)	32+ (*25+*)
D & G Coast	28 (*32*)	24 (*22*)	22 (*18*)	18 (*14*)	33+ (*29 ?+*)
D & G inland	69 (*76*)	52 (*56*)	48 (*53*)	35 (*31*)	76+ (*64 ?+*)
D & G Total	97 (*108*)	76 (*78*)	70 (*71*)	53 (*45*)	109+ (*93 ?+*)
Total	136 (*149*)	95 (*103*)	87 (*91*)	65 (*56*)	141+ (*118+*)

1998 - Peregrines in South West Scotland have produced more young than ever recorded before (the previous best year being 1997). Coverage was again generally very good with occupation being about 'normal', which indicates that the anticipated reduction in pairs (perhaps associated with pigeon interests) in south Ayrshire has not occurred. Having said that, one or 2 grouse moor sites in East Ayrshire and Upper Nithsdale which became active in recent years have since ceased to be occupied due to persistent persecution.

1999 – Peregrines continued to do well in the south west and the population now appears to be largely stable although there may be some room for further expansion in the east of the area. Persecution now appears to almost entirely confined to grouse moors in East Ayrshire and Upper Nithsdale and to one or 2 pigeon racing valleys in East Ayrshire. The taking of eggs and chicks has reduced, although some of this still does occur. There is, however, a widespread feeling in the Groups that prey availability in early spring is reduced. If this proves to be true it may yet bring about a reduction in breeding numbers.

Shetland

	checked	occupied	laid	hatched	fledged	chicks fledged
1998	8	1	1	1	1	4
1999	8	0	0	0	0	0

There is now less coverage of Peregrines than during the 1980s but sufficient to confirm that the species is close to extinction as a breeding bird in Shetland. Since 1995 successful breeding has been recorded in only 2 years with single pairs nesting successfully in 1996 and 1998.

Argyll

1998 (*1999*)	Checked	occupied	successful	chicks fledged
Cowal	16 (*19*)	11 (*14*)	7 (*2*)	17 (*5*)
Other areas*	26 (*9*)	21 (*9*)	7 (*9*)	16 (*12+*)
Total	42 (*28*)	32 (*23*)	14 (*11*)	33 (*17+*)

*incomplete survey

The Cowal is shown separately because it is the only area where systematic Peregrine monitoring is carried out.

1998 - the overall productivity of all monitored sites was considerably better than in 1997 and on the Cowal it was judged to be the best year since the study began. The 4 failed sites on the Cowal all occurred at the egg/small young stage. An adult female found dead below a nest site on Bute was thought to have died from natural causes.

1999 – As is usually the case, with the exception of the of the well worked study area on the Cowal, the monitored sites were widely scattered and coverage was far from complete. A certain amount of incomplete data were obtained at a number of other sites not included in the table. There was a very poor season on the Cowal. Five sites used in recent years had no birds present. Ten failures of occupied sites were at egg/small young stage and data were incomplete for the 2 remaining sites.

Highland

1998 & (*1999*)	checked	occupied	laid	hatched	fledged	min. chicks fledged
Caithness	0 (*0*)	- (-)	- (-)	- (-)	- (-)	- (-)
N&W Suth.	3 (*3*)	3 (*3*)	3 (*3*)	3 (*1*)	3 (*1*)	5 (*2*)
W Ross	2 (*0*)	1 (-)	1 (-)	1 (-)	1 (-)	2 (-)
E Suth.	7 (*3*)	6 (*2*)	5 (*1*)	4 (*1*)	4 (*1*)	7 (*3*)
E Ross	6 (*7[5]*)	6 (*4*)	6 (*3*)	4 (*2*)	4 (*2*)	5 (*5*)
E Inverness	8 (*4*)	8 (*3*)	6 (*3*)	5 (*3*)	5 (*2*)	9 (*4*)
Bad & Strath	1 (*3*)	1 (*2*)	0 (*2*)	- (*1*)	- (*1*)	- (*1*)
Moray & Nairn	2 (*1*)	2 (*1*)	2 (*1*)	2 (*0*)	2 (*0*)	5 ()
Small Isles	1 (*1*)	1 (*1*)	1 (*?*)	1 (*?*)	1 (*?*)	2 (*?*)
Lochaber	0 (*1*)	- (*0*)	- (-)	- (-)	- (-)	- (-)
Total	30 (*23*)	28 (*16*)	24 (*13*)	20 (*8*)	20 (*7*)	35 (*15*)

1998 – in addition to the 28 sites found occupied one other site held a single bird. Only 4 of the 24 pairs known to lay failed during incubation. All 20 pairs that hatched young were ultimately successful. Productivity figures, overall, indicate an average year despite the poor weather in June. Some nests were not followed through to fledging and this caused problems with calculating productivity. The small sample size for some areas also continues to be a problem. The overall productivity recorded was a mean of 1.3 chicks per territorial pair, 1.5 per pair that laid and 1.8 per successful pair.

1999 – whilst there was some decrease in the level of monitoring in 1998 there was also a more worrying decrease in site occupancy. Pairs were absent from 43% of the sites checked and no occupancy by single birds was detected. It is suspected that the underlying cause is a decline in prey availability. Some failures were unexplained, in particular a fully incubated clutch that failed to hatch. Other post laying failures had more obvious causes with one case of egg collecting, an eyrie in a ravens nest washed out by heavy rain and a brood of large chicks predated by a Pine Marten. Productivity was therefore poor overall at a mean of 0.94 chicks per territorial pair but good amongst the relatively few (7) successful pairs at 2.14 chicks per pair.

Lothian and Borders

	checked	occupied	successful	chicks fledged
1998	49	39	30	93
1999	*58*	*44*	*29*	*83*

1998 - 93 fledged young is the most ever recorded, although mean brood size is down. New sites continue to be found and there is currently little evidence of thefts.

1999 – the population continues to expand with 5 new sites found in 1999 although productivity was less than in 1998. Human interference is still detected – at 3 nests – but most failures appeared to be natural. Coastal sites had a good year.

Orkney

	checked	occupied	laid	hatched	fledged	chicks fledged
1998	27	16	7+	7+	5+	10+
1999	*21*	*14*	*6 (7+?)*	*6 (7+)*	*1+*	*1+*

1998 - Information was more than usually incomplete in 1998 but sufficient monitoring was carried out through the season to confirm that at least 10 chicks fledged.

1999 – A good deal was found out about the extent of site occupancy but monitoring was less intensive in the later stages of the season. A single bird was present at one otherwise unoccupied site. Although the single confirmed fledgling is probably an underestimate of the local productivity the overall impression was one of a poor season (for instance no young are thought to have emerged from any of the 6 occupied Mainland sites).

North East

	unoccupied (% all sites)	occupied (% occupied sites)	laid (% occupied sites)	fledged (% occupied sites)	min young fledged
1998					
Grouse Moor	23 (45%)	28 (55%)	15 (54%)	4 (14%)	7
Other Inland	10 (26%)	28 (74%)	22 (79%)	17 (60%)	35+
Coast	5 (24%)	16 (76%)	12 (75%)	5 (31%)	9+
Total	38 (35%)	72 (65%)	49 (68%)	25 (35%)	49+
1999					
Grouse Moor	*21 (48%)*	*23 (52%)*	-	*11 (48%)*	*18*
Other Inland	*7 (21%)*	*26 (79%)*	-	*15 (58%)*	*38*
Coast	*2 (11%)*	*17 (89%)*	-	*8 (47%)*	*15*
Total	*30 (31%)*	*66 (69%)*	-	*34 (52%)*	*71*

1998 - inland grouse moor sites

At grouse moor sites occupancy declined further and productivity was extremely low – 0.25 young fledging per occupied site. Young fledged on only 3 grouse estates with 1.75 young fledging per successful nest. This is linked to continued high levels of persecution. Poisoned baits were found at 3 eyries with adults known to have disappeared from another 9 sites. This part of the population is not rearing enough young to be self sustaining. Unless persecution pressure is significantly reduced, this part of the Peregrine population will continue to decline.

1998 - other inland sites

Other inland sites were much more successful with1.25+ young fledging per occupied site and occupancy of 74%, the highest level for 2 years. This part of the population continues to expand with 2 new sites being confirmed in 1998, although the rate of occupancy of new sites is believed to be depressed by the low productivity of the population as a whole.

Higher eyries (above 600m altitude) all failed in the poor weather although adults were observed at all of the sites checked (3) with breeding attempted in at least 2 sites. Deer forest pairs had reasonable success. Eight pairs reared 15 young (1.88 young fledged per occupied site) out of 11 occupied sites (1.36 fledged young per occupied site). This is the most productive section of the population. The remaining sites were associated with either farm land or forestry. Fourteen occupied sites produced 15 young (1.07 fledged young per occupied site) from 4 successful pairs (1.88 young per successful site).

1998 - coastal sites

Site occupancy increased with 4 new pairs located. Three were in new sites; the fourth involved a territory being split between 2 pairs. Productivity was low (0.68 fledged young per occupied site)

with only 5 pairs out of 16 occupying sites fledging young (1.80 fledged young per successful site). Terrible weather in early April was involved in 2 and possibly more of the failures.

1999 - inland grouse moor sites

The year saw an improvement on some grouse moor sites so that, although occupancy showed a slight decline, productivity at occupied sites was much higher than of late. This is due to Operation Falcon, a joint Grampian Police/SNH/RSG initiative in conjunction with some local estates. Peregrines consistently failed to occupy sites or breed successfully on 14 other estates not involved in the initiative, a high level of failure linked directly to persecution. A worrying trend is the lack of adult Peregrines to replace lost birds. In former years adult birds were quickly replaced. This is no longer the case. The decrease in occupied sites – a decline from 79% to 52% in 5 years – is an indication of the lack of a large non breeding population.

1999 – other inland sites

Site occupancy (79%) was greater than on grouse moors (52%) and breeding success was higher with 58% of occupied sites fledging young. Five sites at higher altitude in deer forest suffered the effects of bad weather and only 2 pairs fledged young, both in north facing corries. Eight lower deer forest sites performed similarly to 1998 with 7 pairs producing 15 chicks (eight pairs/15 chicks in 1998). Quarry sites did well with 5 pairs raising 13 young. Inland sites off grouse moors continue to be the most productive element of the north east population.

1999 – coastal sites

No new sites were located. Success was very low on the north coast (only one chick fledged from eight occupied sites). By contrast east coast pairs did better (7 pairs from 9 occupied sites produced at least 14 young). The reason for this difference is not apparent.

Crispin Fisher

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Derek Robertson

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