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#### Occupation patterns of lochs by Slavonian Grebes in Scotland

#### **R W SUMMERS & R A MAVOR**

The median arrival date of half the number of Slavonian Grebes on breeding lochs in Scotland was 4 April in 1993, 2 months before the mean date of laying of the first eggs. Lochs at higher altitudes were occupied later than those at lower altitudes. Most lochs (61%) held only one pair and the largest number (15 pairs) was at Loch Ruthven. Three lochs held 38% of the Scottish population. Loch areas varied from 0.3 to 376 ha (median 4 ha). The number of breeding pairs on a loch was correlated with the area of dense Bottle Sedge, the main breeding habitat. At some lochs, birds departed early in the season without nesting. On average, the last fledglings left at the same time as the last adults but some left a month before and others a month after the last adults. The median dates of departure of half the adults were 2 August 1992 and 29 July 1993, and the latest (19 October 1992) was from the main moulting site.

#### Introduction

The Slavonian Grebe *Podiceps auritus* is one of Britain's rarest breedings birds (Batten *et al.* 1990). It colonised Scotland in 1909 (McGhie 1994) and since then has bred in Highland, Grampian and Tayside Regions, usually nesting on moderately sized lochs in beds of Bottle Sedge *Carex rostrata* (Thom 1986). This study describes the timing of arrival and departure from different lochs and relates the number of grebes on the different lochs to loch size and the amount of breeding habitat.

#### Study area and methods

From the 40 lochs used by Slavonian Grebes in 1992 and 1993, 25 were selected for detailed observations. The subset comprised lochs from all parts of the current breeding range: Strathspey, Morayshire and north and south of the Great Glen, including a range of altitudes so that lowland lochs could be compared with upland lochs. The subset also held the bulk of the known Scottish breeding population, 65 out of 73 breeding pairs in 1993.

The fieldwork was carried out from 1 May to 31 October 1992 and 1 April to 31 October 1993. Study lochs were visited once or twice a week in order the count the grebes, using the methods of Crooke et al. (1993). Then, in order to time arrival and departure, smoothed lines were drawn through the series of counts using the distance weighted least squares method and the dates on which half the number of birds had arrived at, or departed from, a given loch were determined from the smoothed line. A similar method could not be used for fledglings since the loss of chicks from the lochs was partly due to mortality as well as emigration. Therefore, to get comparable departure dates for fledglings and adults, the dates on which the last fledglings and adults left were taken as the mid point of the period between the day of last observation and the first day when no birds were seen.

Loch sizes were measured by overlaying a grid, divided into scaled 0.25 ha squares, over a 1:25000 map of the lochs and counting squares which contained over 50% water. Altitudes of lochs were also taken from 1:25000 O.S. maps. The areas of sedge beds were estimated from their lengths and breadths, which were paced in the field. Dense sedge beds were those where the amount of water visible when viewing the bed at 30<sup>o</sup> (measured with a clinometer) was estimated at less than 50%.

For the sake of confidentiality, the lochs other than Loch Ruthven, which is a well-known RSPB reserve, have been given numbers rather than names. The names corresponding to these numbers are held at the RSPB and Scottish Natural Heritage offices at Inverness.

#### Results

The study did not start until 1 April in 1993 so the arrivals which took place in March were not timed. However, the median date at which half the number had arrived at a given loch could be calculated, at 4 April, and the latest date was 28 April. The altitude of the breeding lochs ranged from 17m to 739m (Table 1). The median altitude of those lochs with arrival dates before 1 April was 198m (quartiles 40-215m, n=9), whilst those with arrival dates after 1 April was 247.5m (quartiles 213-390m, n=14). This difference was significant (Mann-Whitney U=25, P=0.016) showing that lochs at higher altitudes.

Some of the lochs showed peaks in spring numbers. At Loch Ruthven, the population peaked at 39 birds in early May 1993, before falling to the breeding population of 15 pairs (Fig. 1). At loch 43, where there was no breeding in 1993, the spring peak was 12

Table 1. Characteristics of breeding lochs of Slavonian Grebes in 1993. Altitudes and areas were taken from all breeding lochs whilst sedge bed details refer only to study lochs.

and the second s				
	n	Median	Quartiles	Range
Altitude (m)	33	225	65-325	17-739
Area (ha)	33	4	1.3-9	0.3-376
Area of dense sedge (m <sup>2</sup> )	25	550	104-825	0-8706
Number of sedge beds	25	6	2-8	0-13

birds. Lochs 35 and 36 also had spring peaks (Fig. 1). Thus, the grebes initially occupied certain lochs preferentially before dispersing to other lochs for breeding.

## Table 2. The number of lochs withdifferent numbers of SlavonianGrebes in 1993

Number of lochs	Number of pairs
20	1
5	2
5	3
1	6
1	7
1	15

The number of pairs occupying each loch varied from 1 to 15 pairs in 1993 (Table 2). Loch Ruthven held the largest number (15 pairs) and the three main lochs held 38% of the entire Scottish population. Loch sizes varied from 0.3 ha to 376 ha; the median value was 4 ha (Table 1). The smallest loch which held more than one pair was 4.9 ha. Generally, the larger lochs held more pairs but there was no significant correlation between population size and the loch area (r<sub>31</sub>=0.30, ns). However, there was a correlation between the population size in 1993 and the amount of dense sedge beds (r<sub>23</sub>=0.82, P<0.001). On those lochs which had more than one pair of grebes, there was usually only one pair of grebes nesting in each sedge bed. However, the sharing of sedge beds took place at a number of lochs and the closest distance between two occupied nests was 2m.

The most simple pattern of occupancy of lochs was observed at those lochs where there was only one pair. Here, the birds arrived, bred and departed either together or separately (Fig. 1, loch 5). However, on those lochs with more than one pair, there were sometimes departures or arrivals of additional pairs, some of whom would attempt to nest (Fig. 1, loch 65).

Several lochs showed an autumn peak in grebe numbers. This was particularly noticeable at loch 35 where there was a large moulting group (Fig. 1). In 1992, the maximum number was 46 birds, while in 1993 the maximum was 44. Four moulting birds also occurred on loch 43 which had no breeding birds. It is also likely that some birds moulted at their breeding lochs, given that they were present during September (Fig. 1, loch 36).

The first birds to depart from a loch did so on 26 May 1993, from loch 37 where there was no breeding attempt. The median departure dates for half the adults from breeding lochs were 2 August 1992 (guartiles 17 July-20 August) and 29 July 1993 (quartiles 10 July-25 August), whilst the median departure dates for the last adults were 15 August 1992 (quartiles 30 July-15 September) and 14 August 1993 (quartiles 24 July-15 September). The median departure dates for the last fledglings were 14 August 1992 (quartiles 8 August-22 August) and 15 August 1993 (quartiles 4 August-12 September), and these dates were strongly correlated with the departure dates of the last adults (r7=0.92, P<0.001 for 1992 and r<sub>8</sub>=0.87, P= 0.001 for 1993). On average, chicks departed close to the time of the adults, but the range of chick





departures was from 34 days before, to 29 days after, the last adult. In the latter case, the chick fledged despite the long period of desertion. The latest date of departure was on 19 October 1992 at the main moulting site (loch 35). The pattern of departure from lochs was found to be unrelated to loch altitude or the breeding success of the birds.

#### Discussion

In Norway and Iceland, Slavonian Grebes have been found to arrive on the breeding lochs between mid April and mid June. Most of them were either paired, or mated soon after arrival (Fjeldså 1973a). These arrivals were later than in Scotland where there is less ice on lochs in spring. A relationship between occupancy and temperature is supported by the observation that lochs at higher altitudes were occupied after lowland lochs. Presumably, feeding conditions are related to temperature.

Although, on average, the lochs were occupied by 4 April in 1993, laying did not start until 7 May 1992 and 4 May 1993, and the mean date of first eggs was 5 June 1992 and 4 June 1993 (Summers et al. 1994). The corresponding dates in Norway and Iceland were 12 May (first egg) and 13 June (mean first egg date) (Fjeldså 1973a). It is not known why there is such a delay in nesting by Slavonian Grebes, but it may be related to the late growth of Bottle Sedge which provides the main nesting habitat (Summers et al. 1994). However, early establishment of territories is perhaps necessary to ensure a breeding attempt.

The main variable determining the number of Slavonian Grebes settling on a given loch seems to be the amount of suitable nesting habitat; beds of dense Bottle Sedge. Two of the lochs, lochs 35 and 43, appeared to be suitable feeding sites for grebes in that they had both spring peaks and moulting birds, but few and no breeding birds during the summer, respectively. The limited nesting habitat at these lochs may be the factor restricting breeding.

The pattern of departure from lochs was variable and dependent partly on whether the birds attempted to nest and whether there was a moulting population at that site. Thus, birds departed early if they did not attempt nesting and birds were present as late as October if moulting occurred.

The three main moulting sites, Loch Ruthven, and lochs 43 and 35 are all large lochs (over 100 ha), have large Stickleback *Gasterosteus aculeatus* populations (the main food of the Slavonian Grebe, Fjeldså 1973b) and clear water (Summers *et al.* 1994). The latter two qualities are related to the efficiency of catching fish (Summers *et al.* 1994). so perhaps these lochs are chosen because they provide good feeding opportunities.

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Slavonian Grebe

Ron Summers

#### Winter diet of Ravens in Perthshire

#### W A MATTINGLEY

This paper records the analyses of 700 pellets from roosts of non territorial Ravens in Glen Quaich, Perthshire, during the winters 1990-91, 1991-92 and 1992-93. Remains of lagomorphs were present in 94% of the pellets. Other food items occurring less frequently and irregularly included birds, sheep, small mammals, Rowan berries and moth cocoons.

#### Introduction

Ravens Corvus corax are scarce breeding birds in eastern Scotland compared with the west of the country (Gibbons et al. 1993). Most of the Perthshire breeding population of c60 pairs occur in the area to the west and south of the A9 road ( P Stirling-Aird, pers. comm.). There has been a slight decline in breeding pairs since the 1960's but the population has remained stable for the last 10 years, and maybe increasing. In addition to the known breeding pairs, a roost of up to 80 Ravens was found in Glen Quaich, central Perthshire, in 1990. It was occupied, at times erratically, over 3 winters from October to March. Roosts are assumed to hold mainly non breeding pairs and young birds (Holyoak & Ratcliffe 1968; Ratcliffe 1990; Goodwin 1986; Heinrich 1990) as territorial adults roost at or near their nest sites throughout the year (Coombes 1948; Dare 1986; Ratcliffe 1990; Heinrich 1990).

The diet of Ravens in various parts of Britain is well documented (Holyoak 1968; Marquiss *et al.* 1978; Newton *et al.* 1982; Marquiss & Booth 1986; Ewins *et al.* 1986) except for central Scotland where they are at the eastern edge of their breeding range. The unexpected find of a large number of roosting Ravens in the area provided an opportunity to investigate their diet by an analysis of pellets collected from the roost.

#### Study area and methods

In winters 1990-91, 91-92, 92-93, 15 - 80 Ravens frequently roosted in a Birch *Betula sp* wood centrally positioned in Glen Quaich. A small mature conifer plantation 4km from the birch wood at the lower end of the glen, and crags at the upper end, 6km from the birch wood, were also used as alternate roost sites.

Cushing (1941 in Knight & Call 1974) observed Ravens in California moving 60km daily from their roost to feed. Stiehl tracked Ravens in Oregon 40km from their roost (Heinrich 1990) and in Alaska, radio tagged Ravens made a 100km round trip. In Britain, little is known about distances travelled to and from roosts for daily feeding. In Cornwall, Coombs (1978) found an unusually large number of Ravens in an area of c9km diameter within a roost of up to 150 birds. Thus, the foraging area of this Perthshire roost could potentially encompass a vast area of the uplands of central Scotland but without some form of marking, the distances birds travel to feed remains unknown. Nevertheless, many birds were seen on the high ground of the area mainly within 15km of the roost; few were seen on the low ground.

Within an arbitrarily selected radius of 20km from the roosting glen, approximately 75% of the area is upland above 200m and suitable for foraging Ravens. Encompassed within this area are Glens Lednock, and Almond, Logiealmond, Glen Cochill, Upper Strathtay and south Loch Tay. The predominant land uses here are sheep farming, management for Red Grouse Lagopus lagopus scoticus and Red Deer Corvus elaphus, and coniferous forestry. Large populations of Rabbits Oryctolagus cuniculus and Mountain Hares Lepus timidus exist, particularly in Logiealmond, upper Glen Almond and Glen Quaich.

Regular collections of pellets were made when the roost was occupied over the 3 winters. The pellets were dried and broken up and the contents were identified using various guides (Day 1965, Corbett & Southern 1977, Yalden 1977, Debrot 1982) and a reference collection of fur and feathers.

#### Results

A total of 700 pellets was examined (Table 1), with fur and/or bones of lagomorph the most frequent component found in 94%. For each sample of pellets analysed in the 3 winters there was no significant difference between the samples ( $x^2$ =2.62; df = 11; P> 0.99) (Table 2). Some of the lagomorph bones could be identified to species and 31% of the pellets contained Rabbit but only 6% of the total showed signs of Hares.

The next most recorded constituent in 69% of the pellets was very fine well digested vegetable material presumed to be secondary ingested from the guts and dungof mammals. The proportion of pellets containing vegetable matter varied from 32 to 95% among samples but not consitently within any one year or season ( $x^2$ =32.81; df = 11; P< 0.001).

Where items occurred less frequently, some samples were combined to test for variation between seasons or years using the Chisquare test. Thus, smaller pellet samples from January 1991, February 1991, October to December 1992 and January 1993 with March 1993 were combined to provide 7 samples from different months/years for comparison (Table 2). Stones and grit were recorded in 16% of pellets overall but, in no sample did they occur more or less than expected ( $x^2 = 7.71$ ; df=6; 0.20<P<0.30). Remains of sheep, voles, birds, Rowan berries Sorbus acuparia, and moth cocoons were all present but the frequency of occurrence varied. At certain times, for each of these groups, higher or lower frequencies were found than expected.

In the large mammal category, sheep wool was found in 10% of pellets (Table 1). In October and November 1991 an unexpected number (>20% for each month) contained signs of sheep but the following year the combined October to December samples had <4%. Remains of the only other large mammal, Red Deer *Corvus elaphus* was present in <1% of pellets.

Of the small mammals, Short-tailed Field Vole *Microtus agrestis* was the most commonly found (9%). Samples from February 1991 and January/March 1993 had the highest occurrence of vole at 27% and 16% respectively. The only other rodent identified was Wood Mouse *Apodemus sylvaticus*. Insectivores included Mole *Talpa europaea* and Common Shrew *Sorex araneus*: another 2% of pellets contained signs of insectivores but these were not identified to species level.

Figures snow	the i	nun	nber	'S O	fpe	llets	coi	ntai	ning	y ead	ch p	arti	cula	r fo	od i	tem	Per	rcer	ntag	es a	re ir	ı pa	rent	hes	is.
		2/12	2/90	6/	1/91	20,	1/91	3,	2/91	24/	2/91	6/1	0/91	17/1	1/91	25/1	0/92	14/1	1/92	12/1	2/92	30/	1/93	6/	3/93
	700		99		30		79		25		102		109		67		19		50		49		52		19
Lagomorph 398	(57)	67	(68)	6	(20)	44	(56)	15	(60)	66	(65)	51	(57)	31	(46)	17	(89)	31	(62)	30	(61)	30	(58)	10	(53)
Rabbit 217	(31)	25	(25)	20	(67)	31	(67)	8	(32)	25	(25)	46	(42)	27	(40)	1	(5)	5	(10)	10	(20)	15	(29)	4	(21)
Hare 41	(6)	2	(2)	1	(3)	3	(4)	2	(8)	6	(6)	10	(9)	3	(4)			4	(8)	1	(2)	7	(13)	2	(11)
Veg matter 483	(69)	74	(75)	21	(71)	56	(71)	24	(96)	97	(95)	62	(57)	42	(63)	6	(32)	28	(56)	16	(33)	45	(87)	12	(63)
Moth Cocoon 74	(11)	20	(20)	1	(3)	5	(6)			3	(3)	21	(19)	9	(13)	5	(26)	2	(4)	-1	(2)	4	(8)	3	(16)
Grit & Stones 115	(16)	20	(20)	9	(30)	10	(13)	2	(8)	17	(17)	23	(21)	12	(18)	2	(11)	4	(8)	6	(12)	10	(19)		
Vole 66	(9)	9	(9)	2	(7)	7	(9)	3	(12)	22	(22)	7	(6)	2	(3)	1	(5)	1	(2)	1	(2)	4	(8)	7	(37)
Wood Mouse 1	(0.1)									1	(1)														
Mole 9	(1)	1	(1)	1	(3)	2	(3)			3	(3)									1	(2)			1	(5)
Common Shrew 4	(0.6)	2	(2)							1	(1)			1	(1)										
Insectivore spp 11	(2)	5	(5)			4	(5)					2	(2)												
Sheep 70	(10)	10	(10)			3	(4)	2	(8)	10	(10)	27	(25)	14	(21)	3	(16	1	(2)						
Bird 118	(17)	9	(9)	1	(3)	8	(10)	3	(12)	10	(10)	56	(51)	26	(39)			4	(8)	- 1	(2)				
Red Deer 5	(0.7)	1	(1)									1	(1)							3	(6)				
Egg shell 6	(0.9)							1	(4)			1	(1)					1	(2)			1	(2)		
Raven feather 4	(0.6)											4	(4)											3	(16)
Garbage 5	(0.7)	4	(4)							1	(1)														
Beetle 29	(4)					2	(3)			4	(4)	11	(10)	9	(13)	1	(5)	1	(5)	1	(2)				
Woody stems 14	(2)	4	(4)					1	(4)	3	(3)	2	(2)	2	(3)					1	(2)	1	(2)		
Rowan berries 69	(10)	1	(1)							1	(1)	5	(5)	3	(4)	7	(37)	32	(64)	20	(41)				
Bird Cherries 3	(0.4)	1	(1)	1	(3)							1	(1)												
Birch catkin seed 4	(0.6)																					3	(6)	1	(5)
Vaccinium leaves 2	(0.3)											1	(1)					1	(2)						
Buds 2	(0.3)									1	(1)	1	(1)												
Castration Ring 1	(0.1)													1	(1)										
Oats 4	(0.6)					3	(4)			1	(1)														
Unid. material																								1	(5)
Trace hairs						1	(1)																		
Ulnid, bones										1	(1)	1	(1)												
Mud																		1	(2)						
Unid. mammals														2	(3)										

## Table 1. The composition of 700 Raven pellets collected in central Perthshire.

1995

Bird feathers with occasional legs and beaks were found in <16% of pellets (Table 1) and Galliformes, particularly Red Grouse, were most prevalent, particularly in the October and November 1991 samples. However, only 4% of pellets in the October/November/ December 1992 sample contained signs of bird and none were found in the January/ March 1993 sample. Raven feathers found in a small number of pellets were presumed to have been ingested during preening. Up to 8 moth cocoons were discovered in a single pellet but 1 to 3 were more commonly found in 11% of pellets. 20% and 19% of the sample contained cocoons in December 1990 and in October 1991. Small numbers of pellets (4%) contained the legs, elytra and exoskeletons of beetles *Coleoptera*. The majority of these were of the *Silphidae* family, the burying and carrion beetles. No other invertebrates were found.

Table 2 Results of Chi<sup>2</sup>analysis, testing for variation between samples in the number of pellets containing particular items. For commonly occurring items (lagomorph and vegetable matter) all 12 samples were compared (df=11) whereas for less frequently occurring items small samples had to be combined (see text) so that comparisions were between 7 samples (df=6).

Item	Chi <sup>2</sup> statistic	df (n-1)	Probability value
Lagomorph	2.62	11	>0.99
Vegetable matter	32.81	11	<0.001
Stones and grit	7.71	6	0.20 <p<0.30< td=""></p<0.30<>
Sheep	50.10	6	< 0.001
Vole	27.04	6	< 0.001
Bird	130.92	6	<0.001
Rowan	234.08	6	< 0.001
Moth Cocoons	29.40	6	<0.001

Rowan berries were recorded in 9% of pellets with 50% in October/November/December 1992 but not in the previous October and November. In some cases, the berries formed complete pellets and were frequently whole with skins and seeds intact, mucus being the only other recognisable constituent. Other vegetation in the form of seeds, leaves, buds etc was recognisable in <4% of pellets including the only other berry, Bird cherry *Prunus padus* (Table 1). Remaining items such as garbage and egg shell were present in only very small quantities.

#### Discussion

Comparing this study with others in Britain, only in Orkney was lagomorph found to be the predominant food outside the Raven breeding season (Marquiss & Booth 1986). Ravens there were regularly recorded scavenging Rabbit road casualties in the winter (Hope Jones 1980). This also occurred in Shetland (Ewins *et al.* 1986) and south Scotland (Marquiss *et al.* 1978).

In and around the Glen Quaich roosts, there are several large Rabbit warrens and myxomatosis was frequent in the 1990-91 and 1991-92 winters. Ravens are known to kill Rabbits, probably mostly when injured or young (Holyoak 1968; in Heinrich 1990; Nogales & Hernandez 1993; Marguiss & Booth 1986) and in the glen and surrounding area Ravens were regularly recorded near Rabbit warrens as well as feeding on carcasses. In one of the young plantations, about 7km from the roosting glen, pest controllers intentionally left shot or trapped Rabbits for Ravens and Common Buzzards Buteo buteo. Another regular source of lagomorphs were casualties on public roads crossing the higher ground within the area.

In Virginia USA (Harlow, Hooper, Chamberlain & Crawford 1975), medium sized mammals particularly Virginia Opossum Didelphis marsupialis and Cottontail Rabbit Sylvilagus spp. were more frequently found in pellets from the spring roost and nest sites than in those from the winter roost when sheep was the most common constituent due to a winter lambing regime in January and February. In the Perthshire study, sheep remains were present in only 10% of pellets. This lower than expected figure is not easily explained when stocking rates in the winter were 0.5 to 3 sheep/ha, with an expected mortality of 5-15%. Most sheep are kept inby in the winter, with few carcasses being available to Ravens (A & M Kennedy pers. comm.). The high frequency of sheep wool in pellets in October and November 1991 may be due to a 'cleanup' of summer deaths, when stocking rates were higher, but this does not explain the low proportion of sheep remains in the following year.

There were fewer than expected signs of Red Deer in the samples, perhaps because deer hair was seldom ingested when the birds fed on grallochs or opened carcasses. Ravens rely on Foxes *Vulpes vulpes*, raptors or humans to open up large mammal carcasses such as deer before they can feed (Hewson 1981; Marquiss & Booth 1986; Heinrich 1990).

Small mammals, particularly voles, have been an important food item in several studies. There is much suitable vole habitat near Glen Quaich and during the 1991-92 and 1992-93 winters, unusually large numbers of wintering Hen Harriers *Circus cyaneus* and Short-eared Owls *Asio flammeus* were in the area, suggesting high vole numbers, but only the February 1991 and March 1993 pellets contained a high frequency of voles.

Ravens are opportunistic feeders. In the autumn of 1992, the Perthshire Ravens took advantage of a large crop of Rowan berries. In the Canaries (Nogales & Hernandez 1993), berries and fruit were found to be important in the diet especially on the central and western islands where there was more vegetation and it was suggested that Ravens there were providing an important function as seed distributors. This may also occur in Perthshire.

Where vegetable matter is a significant constituent in the diet, Soler *et al.* (1993) suggest that the amount of grit and stones ingested increases. In their study area in southern Spain, the diet was mainly cereal, and grit was present in 97% of the pellets. In the present study, where lagomorph was the main food, grit and stones appeared in only 16% of pellets.

In December 1990 and October 1991, there was a high occurrence of moth cocoons, mainly of Northern Eggar *Lasiocampa quercus callunae* and Emperor *Pavonia pavonia* 

moths, in the Perthshire pellets. Only small frequencies of insect remains (mainly *Coleoptera*) were found in most other British studies and in the Canaries. However, in Idaho insects were the third most common constituent by weight in the summer and autumn diet. Only 2 studies (both in the USA) cited in Engel and Young have shown insects to be important in the diet of Ravens.

Garbage was found in very few pellets in Orkney, south Scotland and also in this study presumably because the distance to the nearest known rubbish tip was 20km. In Argyll, Ravens roost, throughout the year, within a short distance of a town dump which they scavenge daily, numbers varying from c20 to up to 200 depending on the amount of food exposed (G Scott *pers. comm.*).

Over the past 20 years, winter roosts have been known at different sites in central and western Perthshire with up to 80 birds being recorded (cited in Perth & Kinross SOC records) but recent counts suggest the winter population may be as high as 200 birds. Central Perthshire is therefore extremely important for wintering Ravens where they are relying heavily on Rabbits and Hares. Further studies are required to discover the movements of this population, the effects of persecution and the possible impact of Rabbit Haemorrhagic Disease (RHD).

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Raven

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#### Seabirds of Handa Island

#### **J G STONEMAN & N A WILLCOX**

Handa Island has been an important site for breeding seabirds since records began. This paper collates and presents the relevant data. Three new species have colonised within the past 100 years and the populations of most species have either increased or remained stable. However, Puffin, Shag, Kittiwake and large gull populations have decreased and Black Guillemots no longer breed.

#### Introduction

Handa Island has always been an important breeding ground for seabirds (eg Harvey-Brown and Buckley 1887, Harvey-Brown and MacPherson 1904, Lumsden 1886). The local minister, writing in the late 18th century, describes Handa as *being remarkable for being the resort of vast numbers of sea fowl of different kinds.. so great* (in number) *that the whole face of these tremendous rocks, and the sea in the neighbourhood, appear covered with them*" (Sinclair 1979). The 12 crofting families that inhabited the island until 1848 exploited the seabirds for food and feathers (Tulloch 1845).

The island was made a wildlife reserve in 1961 by agreement with the owners, Dr J & Mr J Balfour. It was managed by the RSPB until 1991 and subsequently by the Scottish Wildlife Trust. The first detailed island count was made by the RSPB in 1970 as part of Operation Seafarer (Cramp *et al.* 1974). Since 1972 most seabird monitoring studies have been recorded in seasonal wardens reports. This paper is a summary of a detailed report (Stoneman & Willcox 1995).

#### Methods

Unless otherwise referred to the data has been obtained from warden's reports. This includes all island counts made as part of the national Seabird Colony Register. The data used to compile this report where possible conforms to monitoring guidelines specified in the *Seabird Monitoring Handbook of Britain and Ireland (Walsh et al.* 1995). Where methods depart significantly from these guidelines, notes are given in the results section.

#### Results

#### 1. Fulmar Fulmarus glacialis

Handa was first colonised by Fulmars in 1903, the first such place in the northern Highlands (Cramp *et al* 1974). Six all island counts of apparently occupied sites (AOSs) have been made, the first in 1970 (Fig.1). They peaked in 1977, since when numbers have dropped slightly and levelled off at around 3000 pairs.

A single monitoring plot was established in 1983; the number of AOSs has not changed significantly. Productivity has been measured in this monitoring plot since 1992. From 1992-1995 (in chronological order) 0.43, 0.40, 0.56 and 0.42 chicks fledged per AOS.



#### Fig. 1 All-island counts of Fulmar AOSs 1970 - 1989

Fig. 2 All-island counts of Shag AONs 1970 - 1995



SB 18(2)



Fig. 3 AOTs and no.s of breeding pairs of Arctic Skuas 1968 - 1995

Fig. 4 AOTs and no.s of breeding pairs of Great Skuas 1964 - 1995



#### 2. Shag Phalacrocorax aristotelis

There are records of all island, land based counts from 1970. The population peaked in 1973 and 1974 when there were c400 apparently occupied nests (AONs). The population had dropped by over half by 1979, and, although it made a slight recovery, numbers have now fallen to an all time low (Fig.2).

This fall in numbers is reflected in monitoring plot counts which show a decline from 45 AONs in 1990 to just 18 in 1995.

#### 3. Arctic Skua Stercorarius parasiticus

Arctic Skuas first nested on Handa in 1968, the first place to be colonised in the NW Highlands (Cramp *et al.* 1974, Furness 1986). Numbers increased steadily from 1973 to 1985, after which the population stabilised at around 30 apparently occupied territories (AOTs) (Fig.3).

Productivity during the years 1989, 1990 and 1991 was assessed at 1.25, 1.19 and 1.36 chicks fledged per nest respectively (Baber 1989, Baber 1990 and Furness and Aitken 1992).

#### 4. Great Skua Stercorarius skua

Great Skuas first nested on Handa in 1964 (Waterston 1965, Furness 1986). After a slow start, numbers have increased steadily to 115 AOTs in 1995 (Fig.4).

#### Fig. 5 Breeding pairs of large gull spp. 1970 - 1995





Fig. 6 Kittiwake peak AONs on the Great Stack 1983 - 1995 and for the four monitoring plots combined 1990 - 1995

#### Fig 7 Average Guillemot head count in monitoring plots 1975 - 1995 and 1990 - 1995.



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Since 1988 between 50 and 100 Great Skuas have been recorded at the Hill Loch club (a congregation of non breeding birds).

Productivity during the years 1989, 1990 and 1991 was assessed at 1.25, 1.20 and 1.28 chicks fledged per nest respectively (Baber 1989, Baber 1990 and Furness and Aitken 1992).

#### 5. Common Gull Larus canus

Handa has a small population of fewer than 20 pairs of Common Gulls (Fig.5).

### 6. Lesser Black-backed Gull Larus fuscus

Small numbers (0-6 pairs) of Lesser Blackbacked Gulls bred up to 1989.

#### 7. Herring Gull Larus argentatus

Numbers of Herring Gull peaked at 418 pairs in 1977 but have subsequently declined to only 12 pairs in 1995 (Fig.5).

## 8. Great Black-backed Gull Larus marinus

In 1970 there were 62 pairs of Great Blackbacked Gulls, but, since 1989, numbers have declined to a stable population of 26-27 pairs (Fig.5). At one time there were 20-25 pairs on the top of the Great Stack but human disturbance in 1883 and 1886 caused them to abandon the breeding site (Harvey-Brown and MacPherson 1904, Gordon 1935); in 1995 2 pairs nested on top of the Great Stack.

#### Fig 8 Average Razorbill head count on Little Stack 1974 - 1995



#### Fig. 9 Peak Puffin Counts 1977 - 1995



#### 9. Kittiwake Rissa tridactyla

Total island counts of apparently occupied nests were made in 1970 (8,328), 1977 (12,500), 1987 (10,732) and 1995 (7,418). Monitoring plot counts made since 1983 for the Great Stack, and since 1990 for a further 3 plots, indicate a largely stable population over the period, although there was a peak in numbers in 1991 (Fig.6).

Five productivity monitoring plots were established in 1990; productivity has ranged from 1.22 to 1.58 chicks fledged per pair.

#### 10. Common Tern Sterna hirundo

Fewer than 8 pairs of Common Terns usually breed on Handa.

#### 11. Arctic Tern Sterna paradisaea

Until 1981 only one pair of Arctic Terns bred. Since then there have been 1-5 pairs.

#### 12. Guillemot Uria aalge

Island censuses conducted in 1970 (30,790 individuals), 1977 (25,000), 1987 (98,680) and 1994 (119,589+) indicate a substantial increase in numbers. In contrast, there has been little change in numbers at the 2 monitoring plots that were established in 1975 (Fig.7). Two additional plots have been monitored since 1990. There has been a small increase in numbers in the four monitoring plots combined (Fig.7).

Guillemot productivity studies have been carried out since 1991 at 3 sites. Approximately 0.70 chicks have fledged per pair each year.

#### 13. Razorbill Alca torda

All island counts made in 1970 (8,367), 1977 (9,000) and 1987 (16,390) indicate a substantial increase in numbers. On the other hand, counts made at a monitoring plot

indicate a steady decline (Fig.8). Productivity was measured in 1988 and 1990 with 0.64 and 0.84 chicks fledged per occupied site respectively.

#### 14. Black Guillemot Cepphus grylle

Harvey-Brown and Buckley (1887) reported local knowledge that Black Guillemots bred at one time on Handa but that "the rats had managed to dislodge them". Small numbers (2-4 pairs) nested between 1970 and 1978, but have not bred since.

#### 15. Puffin Fratercula arctica

Harvey-Brown and MacPherson (1904) reported that Puffins used to nest on the slopes of the island, but when they visited they found that "rats simply swarm over the best areas, and the Puffins have been forced...over the edge". Puffins are now found only on the Great Stack and on cliff ledges.

Until 1977 the number of pairs present on the island was merely estimated. Since then the peak numbers of individuals (ie late July or early August) have been recorded on a monitoring plot on the Great Stack and on all island censuses (Fig.9). Whole island counts increased by almost 300% between 1980 and 1987 while numbers on the Great Stack remained relatively stable.

#### Discussion

Handa Island has been an important site for breeding seabirds since records began. It currently holds 13 species in the breeding season. Fulmars, Arctic Skuas and Great Skuas have colonised the island this century and the populations of most of the other breeding species have either remained constant or have increased. The most important species on the island is the Guillemot which breeds at an internationally important level. Numbers have increased substantially since 1970, reflecting national trends (Lloyd *et al.* 1991). Handa Island hold the largest colony of Guillemots in Britain and Ireland. In the 1987 census Handa held 8.2% of the population of Britain and Ireland: almost double the number of birds in the next largest colony.

Whole island censuses of Razorbills have also shown a substantial increase in numbers, consistent with national trends. In the 1987 census Handa was the largest colony in Britain and Ireland with 9.1% of the population (Lloyd *et al.* 1991).

The expansion of the Kittiwake population between 1970 and 1987 also follows national trends. The reason for the subsequent 30% decline is uncertain. The very high productivity figures recorded since 1990 suggest an ample source of recruits for the breeding population.

The principal colony of Arctic Skuas in Sutherland is on Handa (Lloyd et al. 1991). Although numbers of Arctic Skuas have been increasing in other areas, the increase on Handa between 1973 and 1985 was the most pronounced compared to anywhere else in Britain (Gibbons et al. 1993). Handa is also an important site for Great Skuas whose Their breeding numbers are still rising. success between 1989 and 1991 was considered to be spectacularly and consistently high (R Furness, pers. comm.). The increase in the Arctic Skua population levelled off in 1985, possibly because of competition from Great Skuas (Furness 1987).

Some species have declined. Shag numbers have plummeted since 1970, in contrast to national trends. Lloyd *et al.* 1991 relate Shag declines in other parts of the country to poor

food supply (particularly in early spring) and marine pollution.

The Herring Gull has also shown a long term decline consistent with national trends. Great Black-backed Gull numbers have also declined to a lesser extent.

Human interference is believed to have had a lasting affect on the Puffin and the Black Guillemot. Historical records link the decline of these 2 species with predation by Brown Rats (Harvey-Brown and Buckley 1887, Harvey-Brown and MacPherson 1904). Research carried out in 1994 and 1995 (Aragundi 1994, Warden's Reports 1994 and 1995) provides further evidence that rats are limiting seabirds. Puffins are limited to inaccessible areas such as the Great Stack and Black Guillemots have been eliminated. The eradication of rats on the island is one of the most important future management options for the reserve, opening up the prospect of an increase in the numbers of Puffins and a return of Black Guillemots It could also allow other species of burrow nesting birds, such as the Manx Shearwater Puffinus puffinus and the Storm Petrel Hydrobates pelagicus, to colonise the island.

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Guillemot

Don Smith

## An analysis of prey taken by Merlins within the Lammermuir Hills, 1984-1994

A HEAVISIDES, I R POXTON & A W BARKER

The prey remains found at Merlin breeding sites within the Lammermuir Hills during the period 1984-1994 have been analysed. A total of 2040 individual bird prey items were recorded, representing 43 species. However, only 7 of these species accounted for approximately 89% by number (or 75% by weight) of the total items located. A small number of insects and a single vole were also recorded. The relative importance of open country species, and in particular the Meadow Pipit, was confirmed, although woodland species were found to be significant early in the season. Fledglings and nestlings were frequently taken during June. Although all nests were on prime grouse moorland only 1% of prey were small chicks of this species.

#### Introduction

The Merlin *Falco columbarius* is well recognised as the small, uncommon raptor of the uplands of western and northern Britain. Its habitat in the breeding season is typically open moorland, and, in contrast to most other raptors, appears to benefit from nesting on well managed grouse moorland, with heather as opposed to grass, the dominant vegetation (Bibby and Nattrass 1986; Cramp and Simmons 1980). Its diet consists almost entirely of small birds of the open country, and an abundance of such species is presumably a prerequisite for successful breeding.

As part of a comprehensive study of the breeding biology of the Merlin in the Lammermuir Hills in southeastern Scotland, which was started in 1984, records have been kept of the prey items found within the vicinity

of Merlin nests. This paper presents an analysis of this aspect of the study. Of the several other published studies on the prey of Merlins, those most likely to be comparable were undertaken in Northumberland by Newton *et al* (1978;1984;1986) and in Wales by Bibby (1987).

#### Study area and Methods

The Lammermuir Hills form a distinct group at the northeastern end of the Southern Uplands of Scotland. They cover approximately 400 square kilometres, and around two thirds of the land is managed primarily for sheep rearing and Red Grouse *Lagopus I. scoticus* shooting. Additionally some Pheasant *Phasianus colchicus* rearing occurs around the edge of the area in coniferous plantations and remnants of old woodland. The breeding population of Merlins has been studied and monitored systematically since the early 1980s. All known sites are visited annually and the area supports around 15 pairs. The habitat is remarkably similar throughout the study area and all nests were located on heather moorland managed for sheep and grouse shooting, with some additional hunting access to small areas of woodland, river valley systems and some more grassy, sheepwalk habitat but generally well away from agricultural farmland.

During each site visit a search was usually made of likely plucking areas. The most frequently used areas were on fence lines, burnt heather patches, bare areas, rocks and grouse shooting butts. Remains were normally identifiable *in situ* but if this was not possible they were placed in labelled plastic bags and removed for later identification. This was undertaken with the aid of bird skins, including specimens from the Royal Scottish Museum.

#### Results

A total of 2040 individual bird prey items were found during the 11 year period. Additionally a small number of insects and a single Field Vole *Microtus agrestis* were recorded. Remains of species normally associated with woodland or scrub were found, in small numbers only, at virtually all sites. A few sites would appear to offer greater opportunities for capture of such species but all were clearly most heavily reliant upon birds of the open country.

Bird prey numbers and the percentage of diet by numbers and weight is outlined in Table 1. Mean prey species weights were calculated from data provided in *Birds of the Western Palearctic* (Cramp and Simmons 1977-1994) and are also included in Table 1. In the case of wader and grouse chicks, none of which were much more than about a quarter developed, corrections for weight were made based on this proportion. A total of 43 species were recorded ranging in size from Goldcrest (seeTable 1 for scientific names of prey species) to Woodcock and in weight from circa 6 to 300 grams. The commonest 3 species which were Meadow Pipit, Skylark and Wheatear are in the range of 18-36 grams.

The problem of being sure that the larger prey items were indeed killed by Merlins, rather than other raptors such as the Peregrine *Falco peregrinus*, is acknowledged. Larger species kill remains were, however, not attributed to the Merlin unless found in clearly occupied territories on plucking posts and in near association with passerine kills. The larger species were not generally found during the incubation period suggesting these were only taken when the female was contributing to the hunting.

In terms of numbers the most important species were clearly Meadow Pipit (62.9 %), Skylark (9.3%), Wheatear (6.2%), Chaffinch (4.5%), Starling (2.5%), Snipe (2.3%) and Fieldfare (1.4%).Clearly Meadow Pipits are captured approximately 7 times more often than Skylarks and 10 times more often than Wheatears. On a weight basis the order of importance changes slightly to: Meadow Pipit (37.7%), Skylark (10.8%), Snipe (8.1%), Starling (6.4 %), Wheatear (4.7%), Fieldfare (4.5%) and Chaffinch (3.3%). These 7 species contributed approximately 89% of all avian food taken by number or 75% by weight. The study only followed the Merlins through until late July and it would seem possible that the importance of the Starling might well increase from that time until the young Merlins had dispersed, as flocks of mainly juvenile

			-						
	Number Mar/Apr	rs foun May	din June	July	total	Percent number	t of diet by weight	/ Mean weights	
								used gms	
Red Grouse Lagopus I. scoticus		0+4*	0+14*	0+2*	20	1.0	4.8	150*	
Golden Plover Pluvialis apricaria	2		2	UIL	4	0.2	13	210	
Lapwing Vanellus vanellus	3	5+3*	- 1+1*		13	0.2	3.5	220 50*	
Snipe Gallinago gallinago	11	23	7+2*	з	46	2.2	0.0	115,201	
Woodcock Scolopax rusticola #	2	1	,,,	0	2	2.0	1.4	200	
Redshank Tringa Totanus	-	1			1	-0.1	1.4	300	
Common Sandpiper		1			1	<0.1	0.2	150	
Actitis hypoleucos		2	5	1	0	0.4	0.7	~~	
Feral/racing Pigeon		2	J	1	、	0.4	0.7	00	
Columbia livia var	2	2			~	• •			
Skylark Alauda anyensis	10	5	101		6	0.3	2.9	400	
Sand Martin Pinaria rinaria	10	02	104	14	190	9.3	10.8	36	
Swallow Hirundo rustico					1	<0.1	<0.1	13	
Moadow Pipit Anthus protonois	100	1	1		2	<0.1	<0.1	19	
Piod Wagtail Mataailla alka	132	5/4	479	98	1283	62.9	37.7	18.5	
Wrop Troglodutos tragladutos #	4	4	5	5	18	0.9	0.6	20	
Duppook Drupolla madularia l				1	1	<0.1	<0.1	8.5	
Dufinock Fruhelia modulans #	1	2		1	4	0.2	0.1	19	
Robin Erithacus rubecula #	1	2			3	0.1	0.1	18	
White a star star star star star star star st		5	5	2	12	0.6	0.3	17	
wheatear <i>Oenanthe</i> oenanthe	3	72	42	9	126	6.2	4.7	24	
Ring Ouzel Turdus torquatus	1	3	1		5	0.2	0.8	100	
Blackbird Turdus merula #	6	4	1		11	0.5	1.7	96	
Fieldtare Turdus pilaris	22	6			28	1.4	4.5	102	
Song Thrush Turdus philomelos #	4	9			13	0.6	1.5	74	
Redwing Turdus iliacus	5	2			7	0.3	0.7	62	
Mistle Thrush Turdus viscivorus #	1	3			4	0.2	0.8	123	
Whitethroat Sylvia communis #				1	1	<0.1	<0.1	15	
Willow Warbler								-	
Phylloscopus trochilus #	1	11	2		14	0.2	0.2	8.5	
Goldcrest Regulus regulus #	10	1			11	0.5	0.1	6	
Coal Tit Parus ater #	1	7		1	9	0.4	0.1	9	
Blue Tit Parus caeruleus #	4	2			6	0.3	0.1	115	
Great Tit Parus major #	1	2			3	0.1	0.1	18	
Treecreeper Certhia familiaris #	1				1	<0.1	<0.1	9	
Starling Sturnus vulgaris	5	4	34	7	50	2.5	64	80	
House Sparrow Passer domesticus	¥	4			4	0.2	0.7	30	
Chaffinch Fringilla coelebs #	28	49	14		91	4.5	33	30	
Siskin Carduelis spinus #	1	5			6	4.5	0.1	14	
Greenfinch Carduelis chloris #	2	5	1	1	0	0.3	0.1	14	
Goldfinch Carduelis carduelis #	-	a	i.	1	3	0.4	0.4	28	
Bullfinch Pvrrhula pvrrhula #	1	0			1	-0.1	-0.1	10	
Bedpoll Carduelis flammea #			1		1	<0.1	<0.1	30	
Linnet Carduelis cannabina #	1	3	1 2	2		<u. i<="" td=""><td>&lt; U. I</td><td>14</td></u.>	< U. I	14	
Crosshill Lovia cunvirostra #	1	J	2	3	9	0.4	0.3	19	
Vellowhammer Emberiza citricolla #	2	c	0		1	<0.1	0.1	41	
Snow Bunting Plastranhanay nin-	2	5	2		9 9	0.4	0.4	26	
Show bunning Flectrophenax nivalis	2				2	0.1	0.1	38	

#### Table 1 Bird prey species of Merlins in the Lammermuir Hills 1984-94

#counted as woodland/scrub species in Table 3 small chicks (weights estimated)

Starlings were common on the moors from late June onwards.

Table 2 shows the increasing importance of young birds of some species as prey as the breeding season progresses. All 31 nestlings (1.5% of total prey) specifically identified were Meadow Pipits. With such poorly developed prey remains, it is possible that some may have been wrongly assigned to this species although none were suspected of being any other. All Red Grouse chicks were small and probably only just able to fly. Lapwing and Snipe chicks were too small to have been flying. Fledglings were defined as birds with incompletely grown feathers, usually with waxy sheaths still attached, but which were presumed capable of flight when caught. In the case of Starlings, these were of little importance as prey until flocks of juveniles appeared on the hills from around late June. Juvenile plumage was identifiable from prey remains. The overall proportion of birds of the year identified amongst prey remains rose from 1% in May to 31% in June, dropping to 21% in July.

Non bird prey identified consisted of 12 Emperor Moths Saturnia pavonia, 6 Northern Eggar Moths Lapsiocampa quercus, one Bumble Bee Bombus sp., many Ladybirds Coccinellidae sp. and one Field Vole Microtus agrestis. In the case of the moths, wings were found on the plucking posts as were the wings and body 'fur' of the bee. The vole's tail was found in a regurgitated Merlin pellet. Ladybirds

Species	Age	Number fo	und in:		
	U	Mar/Apr	May	June	July
Red Grouse	Adult				
	Chick		4	14	2
Lapwing	Adult	3	5	1	
	Chick		3	1	
Snipe	Adult	11	23	7	3
,	Chick			2	
Skylark	Adult	10	62	99	14
Okylan	Fledgling			5	
Meadow Pipit	Adult	132	572	350	87
,	Fledgling		2	102	7
	Nestling			27	4
Pied Wagtail	Adult	4	4	3	
5	Fledgling			2	5
Wheatear	Adult	3	72	29	8
	Fledgling			13	1
Starling	Adult	5	4	3	
	Juvenile			31	7

Table 2 Merlin prey species which included identified chicks/fledglings/nestlings/ iuveniles

are not normally noted in this area but in 1986 were extremely common and many body casings were found in Merlin pellets. This was the only year this was observed. It is clearly possible that insect prey is much more common than indicated from these few remains but, in terms of importance, is unlikely to approach that of avian species.

Table 3 illustrates the relative importance of birds associated mainly with woodland and scrub during the early part of the breeding season when the more open country species are still scarce, and their declining importance thereafter. Table 1 shows which species were allocated into each category. Allocation of species into the woodland/scrub or open-country categories follows that used by Newton *et al* (1984). Easily the most important woodland prey species was the Chaffinch, 4.5% by number overall.

#### Discussion

The analysis of prey remains produced findings more comparable to those found in Northumberland during 1974-82 (Newton *et al.* 1978, 1984) than to those in Wales 1981-84 (Bibby 1987). The Northumberland study covered a large area of upland similar in nature to the Lammermuirs but also with more open grassland and young forest

plantations. The Welsh nests were also located predominantly on open moorland but generally within 2 to 4 km of abundant farmland. This feature was shown by Bibby (1987) to be the strongest correlate of prey diversity. Information on hunting distances from nests is scarce but Merlins in Grampian were proven to take prey from a distance of 5.6 km (Rebecca et al 1990). Within this range most Lammermuir Merlin nests were within reach of only a little (generally rough grazing) farmland, and a few small woodland shelterbelts. The available woodland/scrub prev habitat is certainly less in this study area than in either the Northumberland or, in particular, the Welsh case. The totals of bird prev species identified in the 3 localities are respectively Wales 55, Northumberland 50 and Lammermuirs 43. Most of the prey species found in Wales, but not in the Lammermuirs, were predominantly woodland or scrub species and several are scarce or absent in the latter area. A few species, predominantly waders such as Golden Plover, Snipe and Redshank, were scarce or absent in Wales where they are uncommon moorland breeding birds.

Despite a wider habitat variety in the Northumberland study area than in the Lammermuirs, the main prey species proportions between these areas, both in

	Nun	Number (N) and percentage of prey species in:										
	April		May		June		July					
	N	%	N	%	Ν	%	N	%				
Open country species	144	68.2	726	86.0	703	96.7	141	95.2				
Woodland species	70	31.8	118	14.0	24	3.3	7	4.8				

Table 3 Proportion of open country and woodland prey species in different months

terms of numbers and percentage by weight, are broadly similar. The Welsh study shows a similar dependency on the Meadow Pipit. easily the commonest upland species of that size in all areas, but more divergence when comparing the relative importance of other bird prev. The proportion of Meadow Pipits identified amongst prey remains was respectively 63% in the Lammermuirs, 56% Northumberland and in 60.5% in Wales. Skylark was the second most frequently taken species in both Northumberland with 12% and in the Lammermuirs with 9%. In Wales, however, Skylark was only the fifth most abundant prey recorded accounting for only 2.8% of the total. Chaffinch was the second most common prey species in this area at 8.3%. Wheatear was found to be the third most often taken species in the Lammermuirs with 6.2% and in Wales with 4.5% but only the fifth in Northumberland with 2.0%

All 3 studies found that the proportion of the total identified which consisted of woodland/ scrub species fell as the breeding season progressed. In the Lammermuirs (Table 3), the highest percentage of these species, 31.8% was recorded during April, compared with 23.1% in Northumberland and 47.3% in Wales, and fell to 4.1% in July with 7.0% and 15.5% respectively in the other study areas. It is clear that in all areas, as the available open country prey increases with their arrival on to the moors in spring, so the need to hunt on the moorland edge habitat decreases.

The proportion of prey consisting of all juvenile (ie.nestlings, fledglings and those identifiably in juvenile plumage) birds compared with the Welsh figures is interesting with 31% in each area during June, increasing in Wales during July to 68.4% but falling in the Lammermuirs to 21%. The Northumberland figures included full grown juveniles with adults and so are not directly comparable but an increasing proportion with time of fledgling birds (including nestlings) was clear with a July maximum of 27.6%. The incidence of confirmed Meadow Pipit nest robbing by Merlins in the Lammermuirs with approximately 1.5% of total prev identified specifically as nestlings compares with approximately 0.6% in Northumberland. In the Welsh study numbers were calculated in a way not directly comparable but would suggest perhaps an even higher incidence. Earlier studies have also identified this activity (Armitage 1932. Hård and Enemar 1980, Kermot 1981, Sperber and Sperber 1963, Roberts et al 1962).

All moorland bird species of suitable size regularly observed in the study area were recorded as prey items except for Dipper *Cinclus cinclus.* This supports the conclusions of other studies that Merlins will feed primarily on all available small, mainly open-country bird species available locally (Watson 1979, Hodson 1978, Hård and Enemar 1980, Oliphant and McTaggart 1977).

Insect prey may be much more common than indicated from analysis of located remains. Northern Eggar and Emperor Moths are seen regularly and may well be normally eaten or dissected where killed. The taking of ladybirds in numbers during the one year when there was an eruption shows that Merlins can take advantage of whatever is suitable and common.

Although the study area is entirely within well managed grouse moorland, only 1% of prey were small grouse chicks (an average of 2 per year), clearly indicating that Merlins do not make any impact on grouse stocks.

#### Acknowledgements

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#### Yellow-Legged Gulls in Scotland

#### **R W FORRESTER**

There is a strong possibility that Yellow-legged Gull may be treated as a full species in Britain. With this possibility in mind the Scottish Birds Records Committee has been reviewing Scottish records of Herrings Gulls with yellow legs. 'To date 3 records of Yellow-legged Gull are regarded as acceptable. The identification of Yellow-legged and similar gulls is discussed. Observers are asked to note the need for detailed descriptions.

Traditionally it has been considered that there are many races of Herring Gull Larus argentatus stretching around the northern hemisphere. The classification supported at present by the British Ornithologists' Union has 6 races occurring in Europe; argenteus breeding in Britain, Ireland, western France and the North Sea coast to West Germany, nominate argentatus from Denmark and Scandinavia eastwards, michahellis in western France, western Iberia, the Mediterranean and Morocco. cachinnans from the Black Sea eastwards, atlantis in Azores, Madeira and Canary Islands, plus the American race smithsonianus which has now been recorded as a rare vagrant to Britain.

Many authorities have in recent years considered that the races of Herring Gull with yellow legs occurring in southern Europe (*cachinnans, michahellis* and *atlantis*) should correctly be treated as a separate species which they have called Yellow-legged Gull *Larus cachinnans*. Several countries, including Holland and USA, have now given Yellow-legged Gull full species status, but the BOU, which is responsible for maintaining the official list of British birds, adopts a more conservative approach and does not at present recognize it as a separate species. One of the real difficulties is that, while the situation in western Europe is relatively clear, our knowledge of exactly what happens in eastern Europe and beyond is inadequate. It is, however, understoood that the BOU are monitoring the situation and as this could at some time in the future result in Yellowlegged Gull being treated as a full species, the Scottish Birds Records Committee (SBRC) has set out to attempt to establish the status in Scotland of this group of races. Whilst SBRC has a policy of supporting the classification adopted by the BOU, for simplicity we will use the name Yellow-legged Gull in the remainder of this paper to refer to the group of races cachinnans, michahellis and atlantis.

The breeding range of Yellow-legged Gulls of the race *michahellis* has, in recent years, expanded in a northerly direction, with new colonies in France close to the English Channel. Probably as a result of this range expansion, Yellow-legged Gulls have started to occur regularly in southern England, although the first accepted British record was only in 1971. Flocks of 100 or more birds are now recorded annually in south east England (West Sussex to Essex) in the late summer/ autumn period and a scattering of winter records are occurring throughout much of southern England westward to Cornwall. The species is, however, less common north of the Midlands although records are now more frequent in several areas, e.g. Tyneside, where there is now a regular late summer influx. Whilst observer awareness has undoubtedly improved, there has certainly been a recent increase in the number of birds reaching England.

#### Status in Scotland

The status of Yellow-legged Gull in Scotland remains far from clear and is complicated by the fact that a proportion of Herring Gulls of the race argentatus breeding around the eastern Baltic have yellow legs, these being generally referred to as "omissus". The status of "omissus" birds is poorly understood and, to complicate matters further, some authorities consider "omissus" to be a separate race of Herring Gull. Due to the breeding range of "omissus" being primarily to the north east of the British Isles, they appear more likely to occur in Scotland than in England, possibly arriving with other argentatus birds which winter in Scotland in large numbers. On the other hand, michahellis, which now breeds in northern France, is much more likely to occur in southern England than in Scotland. It is. however, not yet clear whether Yellow-legged Gulls already occur in Scotland more frequently than "omissus" although that is likely soon to be the situation if Yellow-leaged Gulls continue their recent northward expansion in western Europe.

## Records of Herring Gulls with yellow legs in Scotland prior to 1989

Prior to 1989 there were only 16 known records in Scotland of Herring Gulls with yellow legs and these were all either published without further comment or described as "*omissus*"

birds. Baxter & Rintoul (1953) refer to the Scandinavian Herring Gull Larus argentatus omissus in The Birds of Scotland and quote 2 sight records: Fair Isle 28 September 1921 (with yellow legs); Orkney 14 August 1946, and 3 recoveries in Scotland of Scandinavian ringed birds. As they described the Scottish breeding race as argentatus, whereas it is now treated as argenteus, it would appear that the Scandinavian ringed birds (no leg colour mentioned) would more likely belong to the nominate race argentatus with pink legs. The Orkney record also has no mention of leg colour and, therefore, may not be a yellow legged bird. The Fair Isle record, attributed to Dr Eagle Clarke and Admiral L Stenhouse, must be considered to be the only definite record of a vellow legged Herring Gull published in that book. Valerie Thom (1986) states that yellow legged Herring Gulls are occasionally reported and these may belong to either L.a. omissus or L.a.michahellis but no specific records are listed.

The first record detailed in *Scottish Birds* SB 1:459 states "A Herring Gull was seen at Seafield, Leith on 10 April 1961 with bright yellow legs. Its size and pale silver mantle were the same as ordinary Herring Gulls with it and its race remains indeterminate (A G Ablett)." From the above description, although very limited, the bird was most likely an "*omissus*".

The next reference in *Scottish Birds* SB 5:389 is interesting. "A yellow-legged Herring Gull at Bridge of Don, Aberdeen, on 19 January 1969 with pure white, unstreaked head. Identical to nearby Herring Gulls in size, build and general behaviour. Bill appeared slightly brighter yellow with more noticeable red spot. Its back and wings were slightly darker than those of other Herring Gulls. The legs and

feet were dull yellow, not as bright as those of a Lesser Black-backed Gull *Larus fuscus*, but distinctly yellow and not merely pale flesh or ivory as in many Herring Gulls. I consider that this bird showed the characteristics of a Scandinavian Herring Gull *L.a.omissus*. (M A MacDonald)" Whilst the observer considered at the time that this was an "omissus" bird, it actually showed some characteristics of Yellow-legged Gull.

Eight records were published in *Scottish Bird Reports* during the 1980s none of which was believed to belong to the Yellow-legged Gull group:

"yellow legged bird Tyninghame, East Lothian 4 September 1983 " SBR 1983:26

"yellow legged birds: 1 Thurso Bay, Highland 9 and 11 September 1985; 1 Musselburgh, Lothian 21 April 1985" *SBR* 1985;109

"yellow legged individuals, perhaps Scandinavian" *omissus*" singles Strathclyde, Oban 29 January and 4 February 1986, Rigmuir 11 February 1986, Wellbrae 25 October 1986" *SBR* 1986:241

"Scandinavian *L.a.omissus* 1 Doonfoot, Strathclyde 9 January 1987 and another Hogganfield Loch, Strathclyde 24 January 1987" *SBR* 1987: 28.

The following records of "omissus" also exist for Ayrshire:

Adult in Ayr harbour 8 March 1974

1 Seamill 2 December 1980

1 Troon 19 November 1982

1 possible "omissus" Doonfoot 23 October 1988.

As *Scottish Blrds* did not publish these 4 records it may be that other records of yellow-legged Herring Gulls have not been recorded.

#### Records of yellow legged Herring Gulls/ Yellow-legged Gulls in Scotland from 1989

The picture changed considerably from 1990 when it became clear that the southern European races of Herring Gull might become a separate species. Prior to that time there was little interest in Herring Gulls with vellow legs in Scotland and many records undoubtedly went unreported. However, Scottish Bird Reports for the 3 years 1990-1992 included 19 records of yellow legged birds, all but one being claimed as belonging to the Yellow-legged Gull group. The published records for 1990-1992 did not include any information to assist with identification and SBRC requested Local Records to obtain and submit full descriptions.

Although details of many records are still awaited, it has become apparent that many of these published records were not fully documented and the observers are not now able to produce full details. From information submitted to SBRC we have been able to accept the following records as showing the characteristics of races belonging to the Yellow-legged Gull group (*michahellis*, *cachinnans* and *atlantis*):

1 adult Kirkwall, Orkney 20 April 1989 (N Odin, M Gray, E R Meek). This record has not previously been published.

1 adult Newton Shore, Ayr, Strathclyde 6 January - 12 July 1991 (R H Hogg *et al*) and what was presumed the same bird also at Newton Shore, Ayr 3 April - 14 May 1994 (A A Murray *et al*). This bird was evidently seen in 1992 and 1993, but no details have been submitted to SBRC.

1 adult/sub-adult (probably 3rd or 4th year) Doonfoot, Strathclyde 1 August 1992 (A Stevenson).

Several additional records have been examined by SBRC but have been found to be insufficiently documented to prove identification conclusively. This has to a large extent been due to observers in the past not being fully aware of the important characteristics required to separate Yellowlegged Gull from "*omissus*", due partly to lack of adequate identification criteria in field guides.

There are, therefore, 3 Scottish records of Yellow-legged Gull which are acceptable to SBRC. We welcome details of any records which have yet to be submitted to us.

#### Identification

Whilst there are slight differences, e.g. size and outer primary pattern, no clear features have yet been established for separating the races *michahellis, cachinnans* and *atlantis* from each other in the field and we do not believe this should be attempted by anyone lacking experience of the differentraces. We therefore concentrate comment on the characteristics used to separate Yellowlegged Gull from Herring Gull.

In adult plumage, Yellow-legged Gull has vellow legs, a dark mantle (similarin shade to Common Gull L. canus), long extensively black wing tips (with only a small white subterminal mirror), rather a rounded head, red orbital rings and a bright yellow bill with a prominent red spot (sometimes with black subterminal markings in winter). Note. however, that bare part colours fade in winter and the legs in particular often become a pale, washed out, creamy yellow. Michahellis is generally slightly larger and bulkier than the argenteus race of Herring Gull, but Yellowlegged Gulls from the west coast of Iberia may be smaller and more similar to Lesser Black-backed Gulls in size and proportion. From late summer to early winter, most adults have very subdued head streaking and often look white headed from a distance, at a time when *argentatus* and *argenteus* races of Herring Gull have heavily streaked heads. However, at closer range, Yellow-legged Gulls often show a small grey smudge over and behind the eye and pale grey streaking over the crown and nape. This difference in head pattern usually breaks down from December onwards as both species acquire summer plumage. Yellow-legged Gull moults its primaries on average a full month earlier than Herring Gull and this can lead to autumn individuals having longer primaries than the local Herring Gulls.

First year birds resemble Lesser Black-backed Gulls but, after their post juvenile moult, are largely white headed and whiter on the underparts, are pale above, chequered darker (thus recalling first year Great Black-backed Gull L. marinus), have a contrasting black bill. pale edged solidly dark tertials (with sometimes some subterminal mottling), a well defined black tail band and a dark band along Note that, like Lesser the greater coverts. Black-backed Gulls, the leading underwing coverts are dark chocolate brown, contrasting with grever under greater coverts and under remiges (Herring Gull is more uniformly paler brown on the underwings). First year birds start to acquire grey feathering on the back and scapulars as early as April and, by late May, they have generally acquired a completely dark "saddle" (back and scapulars) and so are much easier to recognize.

Second year birds also show the dark grey "saddle", have a white head and underparts and a black tail band which contrasts with the white tail base and rump. The overall effect thus recalls a giant first year Common Gull. The underwing pattern is similar to first year (second year Herring Gulls are usually whiter in this area). The bill usually remains black but gradually turns greeny at the base before becoming yellow with black subterminal markings by second summer.

Third year birds resemble adults but with traces of brown immature feathering on the primary coverts and maybe the rest of the wings and tail.

The call is distinctive, with male Yellow-legged Gulls having a very loud and deep call, strongly recalling Great Black-backed Gull.

Occasional individual gulls have been recorded showing most of the characteristics of adult Yellow-legged Gull but with pink legs. These are probably either variant Yellowlegged Gulls with pink legs, or Herring Gulls showing plumage convergence with Yellowlegged Gull. Until this position is clarified, with our current state of knowledge, it is, therefore, preferable that leg colour is clearly seen by any observer claiming a record of this species from an area where it is less than common, e.g. Scotland.

Adult "omissus" birds have yellow legs and red orbital rings, as have Yellow-legged Gulls. They may also have more black on the primaries than pink legged argentatus, thus looking a little more like Yellow-legged Gulls. Although "omissus" do have slightly darker backs/upper wings, they are likely to resemble argentatus Herring Gulls in all other characteristics. With our present state of knowledge, immatures are probably indistinguishable from ordinary argentatus Herring Gulls.

#### Discussion

Although 3 records have now been accepted the status of Yellow-legged Gull in Scotland is not yet clear. This is largely as a result of observers' previous lack of understanding of the existence of different populations of Herring/Yellow-legged Gulls with yellow legs and the knowledge of how to distinguish them. This situation is now rapidly changing. Whilst published information on identification has until recently been inadequate, this situation is improving.

SBRC has now included Yellow-legged Gull in the list of species which require to have full descriptions completed prior to acceptance. It is, therefore, most important that observers are aware of the need to fully document any claimed Scottish record. In addition, SBRC would welcome full descriptions of any *omissus* birds seen to enable us to better understand the status in Scotland of the different yellow legged forms. Observers should endeavour to obtain as detailed a description as possible.

#### Acknowledgements

We wish to thank Keith Vinicombe, Alan Dean and Rob Hume who very kindly assisted us by commenting on most of the documented Scottish records, by providing details of key features to use in the assessment of records and by making very helpful suggestions which improved an earlier draft of this paper

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Peregrine

Don Smith

#### SHORT NOTES

#### Raptor evasion and defensive behaviour by Barnacle Geese

On 5 November 1994 at Caerlaverock Wildfowl and Wetlands Trust Reserve, Dumfries & Galloway, I was observing, from a one-man hide, a flock of c.1500 Barnacle Geese Branta leucopsis 60metres from me. The birds were feeding in the usual dispersed pattern on improved pasture, partly inundated with large pools caused by heavy overnight rain. A flock of c.40 Wigeon Anas penelope was feeding in a similar pattern on one of the flooded pools among the Barnacle Geese.

Suddenly an immature female Peregrine Falco peregrinus appeared, and made a low banking stoop in an attempt to catch a Wigeon, all of which rapidly took flight to the nearest large water body some c.40m away, leaving one female on its own in the field. The Peregrine banked round sharply at low level to dive on this single bird. The Wigeon was decapitated. The Barnacle Geese which had been closest to the attack had left a radius of c.30-40m around the Peregrine and its kill. The Peregrine continued to eat its victim for about 10-15 minutes, after which it flew off.

The behaviour which followed I find most extraordinary. The Peregrine, on leaving the carcase, flew directly low over the heads of the surrounding Barnacle Geese at a height of less than 1m. The geese quickly formed themselves into small circular groups of 20-40 birds all facing inward toward the centre of the circle, leaving large spaces between each group. The Peregrine passed over very low, without initially making any attempts at attack, but returned about 3 seconds later at the same height and made a vain attempt to strike into 2 of these groups. The Barnacle Geese had their necks at full stretch toward the predator and on 3 occasions the geese were also seen to stretch out their wings in what seemed an effort to protect neighbouring birds. This "attack" by the Peregrine on the Barnacle Geese lasted 15 seconds. After this the Peregrine flew off and the Barnacle Geese resumed feeding. Unfortunately I was unaware if there were any juveniles in the groups which came under aerial threat.

A similar incident occurred at the same site on 3 December 1994, probably involving the same Peregrine. Whilst I was overlooking c.3000 Barnacle Geese from the Avenue Tower at Caerlaverock, an immature female Peregrine spooked the flock into flight. It seemed to single out its victim from the flock and struck an adult Barnacle Goose in mid air. This bird tumbled to the ground, somewhat dazed, and stood alone in the field while the Peregrine swung round and made 2 more attempts at striking it. The goose faced the flying Peregrine with its wings fully outstretched and neck extended. This defensive action was successful as the Peregrine did not pursue the attack but sat on a fence post about 30-40m away for about 5 minutes, watching the Barnacle Goose, which did not attempt to fly away. After this the Peregrine turned its attention to other Barnacle Geese which were feeding in a neighbouring field. This flock of c70 included a family party of 5 which was about 30m away from the main body of geese. The Peregrine first made 2 attacks on the family party and these birds adopted the circular grouping action immediately, with the 2 adults, wings outstretched, sheltering the 3 goslings

between them. After these unsuccessful attacks the falcon turned its attentions to the 70 birds nearby. They immediately took up the closed circular formation again, which thwarted the attacks of the Peregrine.

After these incidents the Peregrine flew off over the merse. It continued to chase other birds including more Barnacle Geese, but during my observations it was not successful. This behaviour is very rarely seen at Caerlaverock but has been observed prior to 1994 (P J Shimmings, *pers. comm.*). The relevant volume of *BWP* does not describe any behaviour similar to this in Barnacle Geese.

I thank T W Dougall for commenting on the first draft of this note.

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Barnacle Geese

Bobby Smith



Sparrowhawk

Angus Hogg

#### Sparrowhawk forced to land in sea

On Saturday 4 March 1995, at the mouth of the Cromarty Firth, we saw a male Sparrowhawk Accipiter nisus flying low above the water and being harassed by up to 20 Common (*Larus canus*) and Herring (*L. argentatus*) Gulls. The hawk was forced to land in the water half way across the Firth which is c1km wide at this point. The bird was not harassed by the gulls and seemed to be buoyant while on the water. It remained on the water for c. 2mins before taking off but was then repeatedly forced to land in the sea. It progressed by only a few metres on each flight when it seemed to be struggling to keep in the air. As the hawk neared the shore, two Hooded Crows (*Corvus corone*) joined the gulls in harassing it. Fifty metres from the south shore of the Firth, the Sparrowhawk took off one last time with great difficulty and flew to the shore and into some bushes with the crows still in pursuit.

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#### Feeding rates of Hen Harriers in West Galloway

Despite a fairly large literature on Hen Harriers Circus cyaneus in Britain, there are few published observations of their feeding rates throughout the breeding cycle apart from details given on nestling feeding rates (Balfour & MacDonald, 1970, Scott. Birds6:157-166; The Hen Harrier. Watson. 1977. Berkhamsted; Picozzi, 1978. Ibis 120:498-509). During observations of breeding Hen Harriers in west Galloway their feeding rates were recorded between 1968-88 at 15 moorland nests from the prelaying stage through to post fledging and the results pooled from all nests.

Table 1 gives details of feeding rates in four stages: prelaying, incubation, nestling and post fledging. Overall the total number of prey deliveries was 129 times in 236.5hours of observation (0.55 deliveries/hr) but prey deliveries were less in the prelaying and incubation stages (0.46 deliveries/hr) than in the nestling and post fledging stages (0.69 deliveries/hr). In all stages, however, males acted primarily as food providers and in the prelaying stage (0.39 deliveries/hr) males provided prey for the largely inactive female. According to Simmons *et al.* (1987. *Ornis Scand.*18:33-41) food at this stage is probably vital to successful pair bonding. Interestingly,

Stage	No. of items brought	No hours obs.	No. of prey deliveries/ hours	Per Mor No.	iods of day ming hours obs.	s (d Af No	eliveries) ternoon 5. hours 0bs.		Evening No. hou ol	rs os.
Prelaying	20	51	0.39	10	27.00	7	14.00	3	10.00	(a)
Incubation	51	101	0.50	12	35.25	18	37.00	21	28.35	(b)
Nestling	34	50.30	0.67	13	19.30	2	9.00	19	22.00	(c)
Post fledging	24	34	0.70	6	11.00	7	8.30	11	14.30	(d)
Totals	129	236.30	0.55	41	92.55	34	68.30	54	75.05	
Notes (a) $x^2 = 0.67$ , 2d.f., (d) $x^2 = 0.64$ , 2 d.f.	NS (b) x <sup>2</sup> = , NS	= 5.08, 1	d.f., P<0.02	(c)	x <sup>2</sup> = 3.92,	2 d	.f., NS			

 Table 1 Feeding rates of Hen Harriers in relation to the breeding cycle in

 West Galloway, 1968-88.

though, the rate increased by 28% during the incubation stage to 0.50 deliveries/hr but the difference in rates between prelaying and incubation was not statistically significant and could have arisen by chance (J. Watson in litt.), although it may be an adaptive advantage for males to feed females for as much as possible before the young hatch so that a greater proportion of the food can go to feed the nestlings (see Cade. 1982. The Falcons of the World, London). The rates continued to increase in the nestling (0.67 deliveries/hr) and post fledging stages (0.70 deliveries/hr) when females assisted males in the provision of food. Thus there seems to be a significant difference in feeding rates between stages with the highest occurring in the nestling and post fledging stages ( $x^2 = 5.75$ , 1d.f. P<0.02). Males continued to act as the main providers in the nestling stage (no polygamous nests were involved) in the ratio of 2:7 (74%). In the post fledging stage, however, the roles were reversed when females contributed more deliveries than males in the ratio of 3:0 (75%).

Breckenridge (1935. *Condor* 37:268-276) too found that male Northern Harriers *Circus cyaneus cyaneus* captured 80% of prey for the young during the period of their greatest growth and Picozzi found that prey brought to nestlings by males ranged from 56-86%.

Table 1 also gives feeding rates in the separate stages of the breeding cycle at different times of the day but there seems to be no significant difference in delivery rates except in the incubation stage when there was more than expected in the evening ( $x^2 = 5.08$ , 1d.f. P<0.02).

In comparison with feeding rates in the nestling stage in other localities, the rates recorded in west Galloway are lower (Table 2). Simmons *et al.* point out that feeding rates between populations in North America and Europe are not comparable as different sized prey are involved. In general, though, feeding rates in the incubation and nestling stages are lower in Britain than in North America (Table 2).

 Table 2 Comparison of feeding rates of Hen Harriers in Scotland and North

 America

Locality	Prelaying	Incubation	Nestling	Post Fledging	Source
Orkney	-	-	0.82	-	Balfour & MacDonaid, 1970
East Galloway	-	-	0.94	-	Watson, 1977
Kincardineshire	-	-	0.91	-	Picozzi, 1978
North America	-	2.50	3.00	-	Simmons <i>et al</i> 1987
West Galloway	0.39	0.50	0.67	0.70	This study

Date	Nest	No.of items	Interval	Equivalent to	
	stage	brought	of mins.	deliveries/hour	
5.7.68	PF	2	15	8.0	
19.6.70	Ν	3	30	6.0	
13.7.78	Ν	2	30	4.0	
17.7.78	Ν	3	30	6.0	
29.7.84	Ν	3	20	9.0	
21.5.87	I	2	30	4.0	
30.5.87	1	2	17	6.0	

## Table 3 'Runs' of prey deliveries to Hen Harriers nests in West Galloway 1968-87.

I= incubation stage, N = nestling stage, PF =post fledging stage

However, evidence of some high individual delivery rates were obtained in west Galloway. On 7 dates only, delivery rates at 6 nests were particularly high, equivalent to 6-13 times above the average rate (Table 3). This could have indicated that there were 'runs' of prey deliveries similar to that found by Knapton & Sanderson (1985, *Canadian Field Naturalist* 99:375-377) in Canada when passerine nestlings were brought to a Merlin's *Falco columbarius* brood in very short periods of time. Nestling prey possibly did not figure

largely in prey deliveries to Hen Harrier nests in west Galloway. On only one occasion during these observations were three callow nestling Sky Larks *Alauda arvensis* found at a nest. Donald Watson (*in litt.*) has also recorded high delivery rates to nests in east Galloway and, on three occasions, recorded deliveries of 4 items in one hour and 2 items twice in 27 min. This is equivalent to 4.0 deliveries/hr; about four times his average rate.

I thank Donald and Dr Jeff Watson for their useful comments.

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#### Aspects of the breeding biology of the Common Buzzard in Glen Roy

From 1986 to 1991, and also in 1994, I studied territory distribution and occupancy, nest sites, reproductive success and food of Common Buzzards *Buteo buteo* in Glen Roy, Highland. The main study area ran from Roy Bridge to Brae Roy and covered 29km<sup>2</sup>. An altitudinal boundary of 350 metres above sea level was also used, as Buzzards did not nest, and rarely hunted, above this height. Within the study area, 5 territories were located (Fig. 1).

In general, raptor territory size is related to food density (Schoener 1966 Ecology 49:123-141). In Glen Roy, territory 3 covered nearly twice the area of the other territories, and was alone in having deer forest as the predominant habitat type, suggesting that food was sparser in deer forest. Occasional non breeding and territory vacancies in territories 3,4, and 5 were not obviously related to ecological factors, but territories 1 and 2, which were both vacant from 1991, had seen noticeable ecological change. Both were dominated (65% and 70% of the area) by plantation forestry planted in the late 1970s. After about 10 years, plantations in this area reach a thicket stage in which Buzzards cannot hunt, and it is likely that the development of these Sitka spruce Picea sitchensis trees resulted in the loss of the 2 Buzzard pairs.

The maximum population density (1pair/ 5.8km<sup>2</sup>) was apparently low for the west of Scotland (Moore 1957 *Brit. Birds* 50:173-197; Brown L 1976 *British Birds of Prey* Collins, London) and was probably determined by nest site and/or food availability (Newton 1979 *Population Ecology of Raptors* Poyser, London). In territory 3 there were few nest sites, and the 1.5m depth of one nest suggested many years of use. Greater nest site potential existed in the other territories, with broad leaved woodland offering the best opportunities for nest sites. However, the wide range of nest site locations used suggested that food availability was probably more important as a determinant of territory density and distribution.

Twenty one nests were located in the 5 territories, an average of 4.5 nests per pair. This is a similar figure to that reported for Buzzards elsewhere (Tubbs 1967 *Brit. Birds* 60:381-394; Picozzi and Weir 1974 *Brit. Birds* 69:199-210). Seventeen of the nests were typical tree nests, with one each in Scots Pine *Pinus sylvestris*, Alder *Alnus glutinosa*, Birch *Betula pubescens* and Rowan *Sorbus aucuparia* and the remainder in Oak *Quercus spp*, the most abundant large trees in the study area.

Of 26 pair years, 9 produced one young, 10 produced 2 young and 2 produced 3 young. In each of 3 years, predation accounted for the loss of 2 eggs, 2 eggs and 2 young, and in 2 years a pair failed early in the season, all in the lower glen. The average number of young fledged per breeding pair/year was 1.35, less than the 1.7 found by Tubbs (1972 Bird Study 19:96-104) for pairs in the Scottish Highlands, but similar to the national average of 1.37 (Brown L 1976 British Birds of Prey Collins, London). Pair 2 had the lowest productivity, and pair 3 were consistent in fledging 2 young in each year that they bred. However, fledging success did not differ significantly between either pairs (Kruscal Wallis, H=5.0 adj. for ties, df=4, p=0.2888) or



#### Figure 1 Map showing principal study area and Buzzard territory distribution.

 Approximate boundaries of buzzard territories. Numbering corresponds to that used in the text.

Altitude above sea level, in metres. Contour interval is 100 metres.

SB 18(2)

0\_\_\_\_\_3 km

years (Kruscal Wallis, H=2.1 adj. for ties, df=6, p=0.910). Reproductive output, measured as the number of young fledged per known laying pair, was negatively correlated with total rainfall, measured at nearby Fersit, in May in each year (r=-0.717, df=6, p<0.05). This result is consistent with the finding of Kostrzewa and Kostrzewa (1990 *lbis* 132:550-559).

Absolute numbers of prey items recorded were low, but the range of species identified, mostly small birds and mammals, was similar to that found by Swann and Etheridge (1995 *Bird Study* 42:37-43) in nearby Glen Urguhart.

Observations of Common Buzzard breeding biology in Glen Roy are in keeping with results from other parts of Britain, and demonstrate the versatile nature of this species.

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Buzzard

Bobby Smith

## Arctic Skua incubating own egg and Common Gull eggs in Common Gull nest

The 75 hectare island of Eynhallow, Orkney, has breeding populations of around 15 pairs of Arctic Skuas *Stercorarius parasiticus* and 200 - 300 pairs of Common Gulls *Larus canus.* Generally, the Common Gulls nest near the shore while the Arctic Skuas nest on short Heather *Calluna vulgaris* and lichen on the inland slopes.

Arctic Skua nests are normally unlined depressions in the heather with 2 eggs, so, in 1994, we were surprised to find a grass lined nest, clearly that of a Common Gull with 2 Common Gull eggs in it as well as one Arctic Skua egg. All were warm. Arctic Skua eggs are similar in size to Common Gull eggs, although they are less pointed in shape, and much darker in colour, with a silky lustre as opposed to the matt surface of the gull eggs.

We retreated and presently watched a dark phase Arctic Skua land at the nest and begin incubating all 3 eggs. There wereno Common Gulls in the immediate vicinity, although gulls could be heard calling from a colony on the nearest shore, around 200 metres away. The skua was still seen to be incubating later in the day.

Furness (1987) stated that, due to skua nests being well spaced and territories vigorously

defended, the chances of a foreign egg getting into a skua's nest are small. Both cases he had observed himself related to Great Skua Catharacta skua with 3 eggs, all from that species. Crawford (1974) reported an incident of a South Polar Skua Catharacta maccormicki incubating the egg of an Adelie Penguin Pygoscelis adeliae in its own nest; it was suggested that the skua may have stolen this egg to eat but, when at its nest, accidentally treated it as if one of its own eggs. We thought that on Eynhallow a Common Gull nested away from the normal colony, inside the territory occupied by a pair of Arctic Skuas, and rather than a foreign egg getting into a skua nest the opposite occurred. The fact that the gull nest was lined with grass indicates that the gull was the original owner of the nest site. The skua perhaps originally intended to predate the eggs but became confused on alighting by the nest, eventually to the point of laving one of its own eggs in it.

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#### Roseate Terns return to the Isle of May

During the 1930s, 1940s and early 1950s up to 15-20 pairs of Roseate Terns Sterna dougallii bred on the Isle of May, Firth of Forth, although in most years the total was only 2-5 pairs (details in Eggeling, 1960, The Isle of May). A single pair nested unsuccessfully in 1956 and the species then abandoned the island. This exodus coincided with the disappearance of the colonies of Common Tern S. hírundo, Arctic Tern S. paradisaea and Sandwich Tern S. sandvicensis. Common and Arctic Terns recolonised the Isle of May in 1979 and 1984 respectively (Wanless, 1988, Scottish Birds 15:1-8) and numbers of both species have increased substantially since. In 1995 about 800 pairs of "Comic" terns nested. A single pair of Sandwich Terns hatched a chick in 1990, but breeding was probably unsuccessful (Isle of May NNR Warden's Report),

Since 1956 Roseate Terns have become a very rare species in Scotland; an estimated 9 pairs bred in 1994 (Walsh, Brindley & Heubeck, 1990. *UK Conservation No. 18*) and until recently the species was recorded only rarely on the Isle of May. However, since 1989 birds have occasionally visited the Isle of May tern colony. The Isle of May NNR Wardens' Reports document the following

records: a bird on the ground in June 1989, 1-2 birds on 4 dates in May 1990, 2 birds in 1991, 2 singles in 1992, birds sporadically, and including a displaying pair, in June 1993 and up to 3 birds, again including a displaying pair, in June 1994. The latter pair were seen clearly and neither carried a ring (J Calladine *pers. comm.*).

A Roseate Tern was seen in the tern colony in June 1995 but apparently disappeared. However, on 16 July, while walking up the main track, we were mobbed by a tern making an unusual call. The bird landed nearby to reveal itself as an adult Roseate Tern. Not only that but it was ringed! A telescope was set up in a (successful) attempt to read the ring number, and, as we struggled with the minute numbers, a small spiky downed Roseate chick emerged from behind a rock and pecked at the adult's beak. Later a second adult arrived and fed the chick. This adult also carried a ring. Sadly, the chick was not seen after it was about 2 weeks old

We anticipated that these birds would have originated in east Britain. However, both had been ringed at Rockabill, Dublin (371km away), which is now the main colony in Ireland and Britain. One had been ringed as a chick in 1989, the other as a chick in 1992.

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#### Presumed feeding movements of auks offshore from Portnahaven on the southwest coast of Islay

The window of my house overlooks the lower part of Eilean Mhic Coinnich (MacKenzie Island) and the Atlantic where it meets the North Channel. In December 1993, I noticed large numbers of auks flying south nearly every day. Rather than counting for long periods, I counted for 5 minute periods approximately every 30 minutes. By January 1994 it was apparent that birds were flying south during the period of a rising tide and, in order to verify this, I made numerous observations throughout ebbing tides, when I saw only occasional birds flying south.

Birds began to fly south just before Low Water at Orsay Island at a rate of around 25 per minute, increasing in number at Low Water to around 50 per minute and continuing for a further 4-5 hours. Peak numbers were usually at 1-3 hours after Low Water when they have reached 50 per second. They have frequently been 1000 per minute but have ranged from 100 to1000, regardless of wind direction or speed. These numbers were obtained by counting for 5 minute periods and dividing by 5.

During one particularly strong movement I asked Tristan ap Rheinallt, Bird Recorder for Argyll, to observe the exceptional number of birds from my window at Lagmore House. After doing so, he went to Rubha na Faing approximately 1 mile (2km) to the north from where he carries out regular seawatches. He noted that only few birds could be seen from that point but, from a high vantage point at Claddach half way between Rubha na Faing and Lagmore, he could see that the birds



were flying in towards Orsay Island from well offshore. We both also noted that birds could not be seen from Port Wemyss overlooking the southeastern point of Orsay Island and Rhinns Point.

From mid March 1994 the number of birds seen flying south decreased considerably and from the end of April to December 1994 I was absent from Lagmore House. In December 1994 my observations began again and confirmed the same pattern up to the time of writing: mid March 1995.

As the total number of birds seen flying south in one day has been so large (up to 100,000+) I wondered if they were feeding in the strong tidal stream which flows behind Orsay Island up to the West Bank, some 4 miles (8km) to the northwest. I also wondered whether I might be seeing the same birds on more than one occasion. On 4 March 1995 I noticed that auks were flying much closer to shore than usual in a northwest wind so I went up to Port Wemyss to see if they could be seen rounding Orsay Island. On this occasion the birds were clearly visible and could be seen landing on the water where the tidal stream begins. Presumably they more usually alight slightly further south of Orsay where they cannot be seen from Port Wemyss.

At Spring Tides the tidal stream flows northwest and then northnorthwest at about 6 knots (Gilbert MacLellan and other local fishermen). Thus, presumably, the birds are feeding on the rising tide in heavy overfalls and when they reach the end of the tidal stream near the West Bank, fly back to the start again. Certainly large numbers of gulls, Gannets *Morus bassana* and Fulmars *Fulmarus glacialis* can be seen gathering over this tidal stream after Low Water, which suggests that it is a rich feeding area.

During the winter months, at Orsay, there is a period of rising tide during the hours of daylight on all but the 2 days around each Neap Tide. On these days surface currents and tidal streams will be at their minimum and the height at High Water also at its minimum, so that birds can feed during daylight and will not be moved any great distance. The numbers of birds observed at Neap Tides have been less than 50 per minute. On all of the remaining 24 or 25 days of the lunar cycle, birds have been seen flying south in considerable numbers with the exceptional numbers usually, but not always, occurring during Spring Tides when the tidal stream is at its maximum rate.

I would be interested to know whether any similar feeding movements have been observed elsewhere.

> Jane Dawson, Lagmore House, Portnahaven, Isle of Islay

Accepted June 1995

#### Successful breeding of Bluethroat in Scotland

On 17 July 1995 a gamekeeper and his son, who were repairing a grouse butt on an area of heather moorland in Highland Region, heard an unfamiliar call. This turned out to be from a male Red-spotted Bluethroat Luscinia svecica. It became apparent that the female was also present and that they were carrying food. After a brief search the nestwas located and found to contain 3 well feathered young. Although the nest was only some 10 metres from the butt, the birds seemed unconcerned at the activity and continued to feed the young throughout the rest of that day. Not being sure who to contact, the gamekeeper told another local man who got in touch with the RSPB.

On 20 July I was taken to the site and, after a couple of minutes, the birds appeared. Having seen Bluethroats on migration I was surprised at the male's behaviour. When coming in with food he would perch on top of a nearby bush before flying down to the nest. The female was always more circumspect and would approach the nest at ground level. In the 15 minutes or so that we were there the young were fed 4 times (twice by each parent: 2 crane-flies *Tipulidae* and 2 smallcaterpillars). Two faecal sacs were removed, both by the male. On a previous visit, white moths and hairy caterpillars were also seento be brought in.

The site was revisited on 23 July. Two young were found to have fledged and were being fed by the parents. One young remained in the nest. On 25 July all 3 young were being fed out of the nest. I was unable to return until 1 August when I could find no sign of the birds despite a fairly exhaustive search of the vicinity.

The site seemed unusual in that it was located on an east facing slope at an altitude of c450m on an area of open Heather *Calluna vulgaris* moorland with patches of Juniper *Juniperus communis*; the nearest water was some 200 metres distant. The nest itself was constructed of woven grass stems and set in a hollow under a small bank. Surprisingly it was located in an area of c200m<sup>2</sup> which had been burnt for grouse management in 1994. The only living vegetation within 5 metres of the nest were some little patches of unburnt heather and some regenerating blaeberry *Vaccinium myrtillus*; a burnt juniper bush lay close by.

This is the third proven breeding of Bluethroats in the UK but only the second successful one (*Brit. Birds* 61: 524-525; 81:118-119). As on the other occasions, it followed a spring when above average numbers of migrant Bluethroats were seen in Scotland.

I would like to thank the finders and the other people who contacted me; unfortunately confidentiality prevents me from naming them.

#### Stuart Benn, RSPB, Etive House, Beechwood Park, Inverness IV2 3BW

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#### Juvenile Bluethroat in Inverness-shire

At 9.00 hours on 7 August 1995 whilst mist netting in an estuarine reedbed beside the Beauly Firth at Lentran, Highland Region, I was surprised to discover a Bluethroat *Luscinia svecica* in the net. This bird, which was also seen and photographed by Graeme Prest, was identified as a first year male in a fairly advanced stage of post juvenile moult. The wing feathers were unmoulted and most of the juvenile body feathers had been moulted with some new feathers still growing. Some pale juvenile feathers on the crown had not yet been moulted and new ones were still in pin giving it a very streaky appearance.

In Birds in Scotland V M Thom (1986) states that the earliest recorded date for Bluethroats on autumn passage is 29 August with the main passage between mid September and mid October. The early date of this bird and the fact that most passerines do not normally migrate over long distances whilst in active moult suggest that this bird may have been reared locally.

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Accepted October 1995



Bluethroat

David Mitchell

#### Polyterritoriality in a population of Corn Buntings on North Uist

Polyterritoriality is the maintenance of 2 (or more) spatially separate territories at the same time and occurs in only a few species of birds. Three instances of polyterritoriality were recorded during a 5 year study of a colour ringed population of Corn Buntings Miliaria calandra on North Uist. Two males were polyterritorial in very similar circumstances in 1988. In both these cases, the male initially defended just one territory with a single incubating female and then took over a second one, previously held by another male. The fate of the previous territory owners and the circumstances of the takeovers were not known. In both cases, at take over, a single female was already present there and had just failed in a first nesting attempt. Both females nested again on the territory shortly after the takeovers. The 2 males continued to be seen on both territories for the remainder of the breeding season. The 2 territories held by one of the males were 600m apart and separated by 2 other territories. The female

on this male's first territory failed to fledge any young, while the female on its second subsequently fledged 3 young. The 2 held by the other male were 400m apart and separated by a single territory. The female on this male's first territory fledged 3 young but the female on the second failed to fledge any young. The third instance of polyterritoriality occurred in 1990. The male again initially held one territory and then for a period of about 3 weeks simultaneously defended a second, 1500m from the first. The second territory was previously unoccupied and no females nested on either.

Polyterritorial males were rare despite the apparent potential for males to increase their productivity by taking over territories of other males. The takeovers may be possible only when the previous owner dies or is too ill to defend the territory which could account for the rarity of the phenomenon. However, if this is the case, it seems odd that in the 2 takeovers



Corn Bunting feeding young

CORN BUNTING FEEDING YOUNG GRAMPIAN 1979 E Pickard

that were recorded, it was not an immediate neighbour that had taken advantage of the situation. It has been suggested that polyterritoriality in Pied Flycatchers Ficedula hypoleuca is a means by which males deceive females into thinking they are unmated (Lundberg & Alatalo, 1992, The Pied Flycatcher, Poyser). In this species, males establish a second territory once a female has chosen to nest on their first territory. This increases their chances of acquiring a second female since females would be unlikely to settle on the male's first territory knowing there was already a female present. Wood Warblers Phylloscopus sibilatrix are similarly polyterritorial, though late nesting females of this species were thought to have little choice

but to pair with polyterritorial males, because the few unpaired monoterritorial males available defended territories in unsuitable habitat (Temrin, 1989, Anim. Behav., 37: 579-586). The situation is clearly different in the present study since 2 of the polyterritorial Corn Buntings took over territories that were previously occupied by other males and already had females settled on them. The third polyterritorial male did establish its second territory in a previously unoccupied area, but did not have a female nesting on its first territory. Although polyterritoriality is an important part of the mating system of Pied Flycatchers and Wood Warblers it is rare and, apparently, more opportunistic in the Corn Bunting.

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#### Goldfinch feeding on seaweed

On 2 September 1994, my husband and I were bird watching along the banks of the River Forth at Culross. We saw a Goldfinch *Carduelis carduelis* fly down to the shore where it started to peck at a bright green seaweed. We observed it more closely

through a telescope and confirmed that it was indeed eating the seaweed. Small pieces were taken in and not discarded. C J Henty believes the seaweed to be a species of *Enteromorpha*, probably *E. intestinalis*. BWP mentions that the leaves of land plants are eaten occasionally but quotes no records involving seaweed.

#### Barbara Hay, 33 Springbank Gardens, Dunblane, Perthshire FK15 9JY

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#### Red backed Shrike breeding in Perthshire

In June 1994 we were informed by a Perthshire householder that he thought a Red-backed Shrike *Lanius collurio* was present in his garden. Identification was confirmed on 22 June by Alan Barclay, David Allan and Susan White when 2 adult Red-backed Shrikes (male and female) were seen.

With minimum disturbance a nestwas located on 1 July by DA who had observed the male carrying food to the nest. The female took flight as the nest was approached and 6 nestlings approximately 4 days old were noted. The nest site was in a Broom Cytisus scoparius 3.5m in height intertwined with Bramble Rubus fruticosus agg, with the nest 1.5m from the ground. Habitat within the immediate vicinity of the nest site was a dense thicket of Broom, Blackthorn Prunus spinosa and Gorse Ulex europaeus intertwined with Bramble. The birds were observed hunting up to about 120m from the nest site in mainly scrub habitat with a few scattered trees, although the area also included several gardens and some short grassland. The scrub in the hunting territory was less tall and dense than at the nest site.

The 6 young were ringed on 5 July; no runts were apparent and about 1-2mm of feathers had emerged from the primary and secondary pins of the young birds. The site was not visited until 7 days after ringing.

To confirm fledging, observations were made from a distance, on 9 days between 12 and 29 July. On 14 July 3 young birds were noted perched on a shrub close to the nest site. At different times on the same day both adults were recorded, in each case followed by a fledged young bird. A total of 3 young birds was also observed on 18 and 29 July together with the adult female. This was the maximum number of fledglings recorded at any one time. Two juveniles were noted on 26 July hunting and feeding independently from a fenceline perch; 29 July was the last date on which a Red-backed Shrike was seen on territory. The last sighting of the adult male was on 14 July. It is possible that he hunted further afield, although searches were made in suitable habitats outwith the nesting area.

On one occasion, mobbing of the shrikes by Swallows *Hirundo rustica* was observed. Repeated stoops were made by 6 or 7 Swallows at 3 fledged young shrikes perched close together in the outer branches of a Blackthorn. The young birds responded by moving several cm closer towards the centre of the bush. The Swallows then turned their attention to the adult female which was perch hunting from a nearby fence. The adult shrike appeared to ignore the Swallows and continued hunting by flighting down to the ground and back to the fence. The whole episode lasted for about 4 minutes.

The adults' hunting behaviour usually involved flighting to the ground from fences about 1m in height, although tall trees and telegraph wires were also utilised as perches. Prey identification in the field was not possible although on one occasion the adult female was observed in hot pursuit of a Willow Warbler (*Phylloscopus trochilus*). The outcome of this chase was unknown as both birds dashed into a dense shrub.

Prey species were identified by pellet analyses. A single pellet was collected from the nest rim at the time of ringing and a further 5 were collected from beneath the nest after

the birds had left the area. The nest itself contained food debris and was removed later for analysis. The inherent dangers of pellet analysis mean that some softer bodied prev may be under estimated or missed. Insects were identified to generic level. All 6 pellets contained parts of Bumble bees Bombus spp. 2 pellets contained parts of Carabid beetles Pterostichus sp, 1 pellet only contained parts of Dung beetle Geotrupes sp. There were small pieces of bone in 2 pellets; one also contained a claw which suggests a bird. The nest also contained fragments of Bumble bees and Carabid beetles as well as pieces of Whirlygig Beetle (Gyrynus sp.) and a bone from a frog Rana. Prey species identified do not differ greatly from those observed by Ash (J S 1970. Brit Birds 63:185-205, 225-239) and (Bibby C 1973. Bird Study 20:103-110) in southern England.

As a British breeding species the Red-backed Shrike has been in decline for over 100 years. Their last stronghold was in south east England where they became extinct in 1989. Rare Bird Breeding Panel Reports in *British Birds*, however, record that breeding occurred in at least one site in England in 1991 and in 1992.

Red-backed Shrikes have been seen in suitable habitat in the breeding season in Scotland between 1977 and 1992. In most cases only single birds were noted or breeding was not recorded. Breeding was proven in Scotland, however, during the three summers of 1977-79 and in 1992. It has been speculated that these shrikes were birds of Scandinavian origin that had drifted to the 'wrong' side of the North Sea during spring migration.

Red-backed Shrikes did not return to this study site, or to the surrounding area, in 1995.

We acknowledge with thanks: D. Allan and S. White for field observations; J. Ralston (SNH) and K. Baker (BTO) for swift processing of Schedule 1 Licences; and, especially, those understanding householders, who must unfortunately remain anonymous, who permitted ornithologists to view and study *their* shrikes from underneath their shrubs and behind their herbaceous borders!

A M Barclay, Scottish Wildlife Trust, Loch of the Lowes, Dunkeld, Perthshire PH8 0HH B R S Morrison, 7 Dixon Terrace, Pitlochry, Perthshire PH 16 5QX



Red-backed Shrike

Steven Brown

#### Willow Warbler feeding Mistle Thrush nestlings

On the afternoon of 7 July 1994, a Willow Warbler *Phylloscopus trochilus* was seen by Stuart Ross carrying food to a Mistle Thrush *Turdus viscivorus* nest in a Yew Tree *Taxus baccata* in Glen Feshie. The tree was 25 metres from the front door. The nest was 20 metres from the base but, because of the sloping ground, it was easy to see into the nest with binoculars.

An adult Mistle Thrush was seen to land in a clump of Birches *Betula sp* 100 metres from the Yew from where it flew straight to the back of the Yew and hopped down to the nest. At this point the nestlings responded much more energetically than for the Willow Warbler. Their calls were unmistakable Mistle Thrush 'churrings' and the birds raised themselves onto their feet. The adult deposited a large food item into the nearest beak. It then flew off towards a grain field. Eighteen minutes later, the Mistle Thrush returned and was met with the same enthusiasm as before. The bird then flew off. During these 18 minutes,

the Willow Warbler had visited the nest 6 times, each time bringing food. It always landed on the nest next to what seemed the strongest nestling. However, the Willow Warbler would then move along the line, and it was often the second or third beaks which received the food. On one occasion, it removed a large faecal sac.

I watched the nest for a further hour, but the adult Mistle Thrush did not return. Alarm notes were heard once not far away, and an adult was seen feeding in the field about 50 metres from the nest. However, during that hour, the Willow Warbler continued its attentions. It foraged mainly amongst the leave of an Ash *Fraxinus excelsior* nearby.

On 8 July the nest was empty. On 9 July an adult Mistle Thrush was seen on the ground near the Birch clump. It was carrying food when it flew off into a nearby wood, possibly to feed fledged young.



P W Gossip, Briarhill, 7 Highfield Road, North Berwick, EH39 4BW

Willow Warbler

Stan da Prato

#### Carrion Crows roosting on ground with Black-headed Gulls

While engaged in dawn and dusk surveillance at Forfar Loch, Angus, intermittently throughout March 1995, I noted that up to 47 Carrion Crows *Corvus corone* were nightly sharing a ground roost site on a gravel promontory in association with a roost of up about 700 Black-headed Gulls *Larus ridibundus*, about 350 Oystercatchers and with a smaller number of waterfowl species also in attendance.

Ground roosting by Carrion Crows is not in itself uncommon. I have, for example, notes on one of 243 birds roosting in heather on South Uist and shore roosting by small groups was regular in Fife and in the Solway area.

A significant aspect of the Forfar site was that there are apparently many suitable roosting trees including a closed canopy conifer stand within c600 metres used by other species as a roost. Clearly the ground roost was preferred by the crows and there appeared to be a close association with the gulls. There was no significant antagonism between the 3 main species but it became obvious that the gulls were much more alert and performed regular minor 'panic flights', usually returning to their original position within an average of 2.8 minutes. The exact causes of their alarm could not be determined in all cases although they were seen to respond to passing Heron (3), Cormorant (1), Tawny Owl (1), Sparrowhawk (2) and nearby factory noises (17). Crows reacted to the gulls' flighting with increased calling by head raising and turning, walking short distances, resuming a relaxed posture when the gulls guietened.

It appeared that the crows found it advantageous to roost in association with the gulls.

#### John G Young, SNH, Area Officer, Angus and Dundee Districts West Lodge, Lindertis, Airlie, by Kirriemuir, Angus DD8 5NP

Accepted June 1995

#### Correspondence

#### Roosting behaviour of Wheatear

I agree with Dott, (1995, *Scott. Birds* 18:60) that "Roosting is an aspect of behaviour often given scant treatment in species accounts."

but it is not true that *BWP* Vol 5 (1988) "does not detail roosting". Outside the breeding season "both sexes roost singly in grass or heather tussock, burrow entrance, stone wall, etc (P J Conder). Each bird uses several roost sites Berk (1961)" (page 780).

#### Jeffrey Boswall, Biological Imaging, Derby University, Green Lane, Derby DE1 1RX

#### SB 18(2)

#### OBITUARIES

#### George Mackenzie Dunnet

#### 1928 - 1995

The Scottish Ornithologists' Club made George Dunnet an honorary member in June 1986. He was born in Caithness and went to school at Peterhead. He was awarded first class honours in zoology at Aberdeen University, obtaining an excellent grounding in knowledge of the whole animal kingdom. He worked for his PhD degree at Aberdeen on Starlings and then visited Oxford where he attended seminars with Charles Elton and Niko Tinbergen who were giants in the formative years of the young zoologists of the 1950s and 1960s. The patterns of discussions and seminars which evolved in Oxford spread to Aberdeen as well as more widely to many of the academic centres of the post war world.

George became Regius Professor of Natural History at Aberdeen University, President of the British Ecological Society, a long term fellow of the Royal Society of Edinburgh, an honorary Doctor of the University of Stirling, and was awarded the OBE and CBE. He was a distinguished academic, a notable teacher, a gifted administrator and, above all, an objective scientist. But it will be for other things that his memory will linger long in the minds of his fellow members of our club. George was a friend to so many and this is how we will remember him.

George Dunnet took first to Australia, and then to Aberdeen, the informal yet critical

thinking of the Oxford era of the 1950s. Under the guidance of Vero Wynne-Edwards, he initiated studies of community ecology at Culterty Field Station in the University of Aberdeen at a time when the discipline was burgeoning elsewhere. His approach was characterised by the encouragement of young zoologists working on their own projects to develop a critical attitude to the development of ideas and each other's progress, criticizing also their seniors' ideas in a way that had not always been encouraged by previous generations of academic scientists. In this, George's role was humble; he criticised yet advised, seldom forcing his opinions except as a development of logical thinking. And in all this, he took a great interest in the careers of his staff and students, helping where he could but always encouraging people to improve their own thinking and enhance their scientific development. Sociality was also very important in this Culterty tradition, with not only regular serious discussions but also light hearted gatherings at the pub on Friday evenings and frequent parties at Culterty House, which was also George and Mom's (his wife) home. Mom's kitchen at Culterty provided not only physical warmth for visitors from southern climes but also a welcome. friendship and often useful advice, much appreciated by newcomers faced with the problems of a strange environment.

Stimulated initially by Wynne-Edwards and Robert Carrick, George became increasingly interested in seabirds and in marine conservation. He will be remembered by Scottish ornithologists as the first chairman of the Seabird Group and for his co authorship of 5 papers on Rooks, but mainly for his work on Fulmars in Orkney on the uninhabited island of Eynhallow. This programme was low intensity, but very carefully planned to be a long term study with aims and questions



George Dunnet

David Jenkins

which were scientifically important in their own right but which also provided a basis for introducing successive year classes of students to the rigour of a well designed field project. The study has continued in every breeding season from 1950 to the present. The initial aims were to determine for Fulmars whether they were able to relay if the egg was lost, whether they could breed in consecutive years, and how long they lived. Later, their general breeding ecology was studied, leading finally to research on how new birds are recruited to the breeding population and whether Fulmars breed to the end of their lives or become senescent. Many results have been published in a series of papers that are well known. They include the facts that Fulmars lay only one egg and do not relay in the same year if the egg is lost, they are able to breed in consecutive years, they begin breeding at about 8 years old and breed for over 30 years, usually pairing with the same This is one of the longest mate for life. running studies of seabirds in the world, with data collected on over 1000 individuals at over 1000 nest sites on Eynhallow.

George's modest yet strongly supportive leadership gained him many friends and Culterty became one of Britain's foremost ecological research stations. While it was initially primarily ornithological, this role changed to encompass work on fish, mammals and invertebrates as well as the modelling of community interactions. It was in the primarily ornithological phase that the SOC recognised George's contribution to the development of critical thinking among Scotland's young scientific ornithologists. It was characteristic of George's approach to ecology that, not only did he attract to Culterty nearly 100 postgraduate students, about half from overseas, but he also visited them subsequently on their home ground and thus acquired a worldwide perspective on ecological and conservation problems. Partly as a result, he also spent sabbatical years on research and teaching in New Zealand and Australia.

This international outlook on practical ecological problems was combined with He was always considerable charm. supportive of friends and colleagues and was greatly in demand as chairman of committees, where he acquired a well deserved reputation in guiding groups containing members likely to maintain opposing views on difficult auestions. He was always objective and much in demand within his university and in the wider field of practical conservation. His success derived from his ability to appreciate the personal contribution which colleagues could make to particular problems, to pick the right people for each assessment, to evaluate problems critically, always to be ready to list to controversial views but to base policy recommendations, particularly in wildlife conservation, on the most objective evaluation of the facts available.

In the late 1960s and 1970s George was prominent in encouraging the oil industry to promote an ecological awareness in the developing offshore oil business. Early problems were concerned with pipelines, and he chaired the Aberdeen University Environmental Liaison Group which, in 1977, evolved into the Shetland Oil Terminal Advisory Group which he was still chairing at the time of his death. SOTEAG won the confidence, not only of the oil companies and Sullom Voe Terminal management, but also of academics, leading to major symposia involving the Royal Society of Edinburgh and research on oil related problems near Sullom Voe, including a major programme monitoring seabirds throughout Shetland.

George's nonconfrontational style was widely appreciated. Always approachable, he would not shy away from difficult issues and his strength was in finding a way forward which left those concerned with protecting the environment, and those whose business it was to create wealth by extracting oil from it, both feeling that they could work together. His work for SOTEAG was specifically mentioned in his OBE citation in 1986.

His experience in tackling difficult issues led to his chairmanship of the Review Team on Badgers and Bovine Tuberculosis, of the Fish Farming Advisory Committee and of the Salmon Advisory Committee. This last job was particularly challenging and his success led to a CBE in 1994. At the time of his death he was in Copenhagen, working with the international group examining the environmental impact of the proposed bridge over the Kattegat between Denmark and Sweden.

George's ability to apply his knowledge and understanding of ecology to practical problems was capitalised upon by the Nature Conservancy and its successor organizations. He served on the Scottish Committee of NC, on NC's Scientific Advisory Committee and he was chairman of the Nature Conservancy Council's Advisory Committee on Science. He became a member of the Main Board of Scottish Natural Heritage, chairman of its Research Board and a member of the Joint Nature Conservation Committee. He always tried to lead his committees to base their policy recommendations on deductions and predictions based on facts, wherever these were available, and on probabilities when facts were scarce or absent. In these circumstances, he recognized the need for intuitive approaches based on experience. Nonetheless, throughout his career he had always tried to ensure that scientific objectivity informed debate about nature conservation. even if, for sound pragmatic reasons, scientific objectivity did not carry the day. But he was the only scientist on the Main Board of SNH and became increasingly concerned that the voice of science was not heard in circumstances when this would be reasonable and that a nature conservation agency which, in the past, had claimed to base its policies on objective science was no longer doing so. Accordingly, he gave notice of early retirement from SNH in 1994 although his appointment had more than another year to run. This was a great disappointment to him, and the decision was not reached lightly, involving a considerable period of stress.

George's life was one of public service. This was widely recognized and his personal warmth, humanity and honesty, together with his conviction that science based conservation is an important ethic, led to much respect and a very wide circle of friends. He is sadly missed. On 22 September 1995, George's ashes were scattered on his beloved Eynhallow, enriching forever this enchanting island.

#### David Jenkins

#### William Gerald Harper

#### 1915 - 1995

Bill Harper, who died in hospital in Edinburgh on 14 September, will be remembered in ornithological circles as Honorary Librarian of the Waterston Library, a post he held with considerable distinction and dedication for 18 years and for his pioneering work on radar ornithology in the late 1950s.

Born in Brighton, Sussex, on 22 December 1915, during the First World War, he spent the whole of his childhood in Brighton, attending the local Grammar School with his elder brother Stanley. They were both clever boys, and both went on to Imperial College, London, in Bill's case to study physics and then optics for an M.Sc.

On leaving university he joined the Bermuda Meteorological Service in 1937 and then, during the war, he was in uniformand assisted in providing weather services for the USAF. It was in Bermuda that Bill met and later married Hetty and where their two sons, John and Geoffrey, were born in the latter war years.

The family returned to England in 1947, where Bill had a short spell weather forecasting at Heathrow, before being posted to Shetland to be Director of the Meteorological Observatory on the hill above Lerwick. The 5 years in Shetland saw the awakening of Bill's interest in birds. Family holidays were spent on Fair Isle, staying in the old naval huts then occupied by the bird observatory.

In 1953, they left Shetland to settle in Luton, Bedfordshire, for another 5 year period. Bill was in charge of the British Meteorological Office Radar Research Station which was situated at East Hill, near Dunstable. It was here that he was to conduct some important work on radar 'angels'.

Using radars much less powerful and sophisticated than modern equipment, he was able to observe 'angel' occurrences on most operational days. Recordings of the daytime density of 'angels' at this station had been maintained since 1952, so that analysis of these records permitted Bill to show that the periods of intense 'angel' activity corresponded to the times of spring and autumn bird migration. Further conclusive evidence was revealed by studying the directions of movement of 'angels'. This research resulted in 2 important papers in Nature (1957) and Proc. of the Royal Society (1958). Unbeknown to him at the time, Ernst Sutter had been studying the same mysterious radar echoes in Switzerland and pipped him to the post by publishing his results earlier in 1957.

The next move was to Malvern, Worcestershire in 1958, where Bill worked at the Royal Radar Establishment. He and Hetty then spent 2 years in Aden and 6 in Germany, finding time to make a number of trips to Africa and in Arabia. In 1973 Bill's career meant a move to Edinburgh to be in charge of the Meteorology Unit at Corstorphine. He retired in 1977 and thereafter devoted much of his time to watching birds and serving the SOC. He succeeded Irene Waterston as Librarian in October 1977, a post he held until this spring when ill health forced him to resign.

Under his able custodianship the library expanded greatly and reflected the large increase in the publication of bird books over the last 20 years. The number and range of journals were also considerably increased and this section is without equal in Scotland. With his extensive knowledge he was well able to direct and assist any library user, be they professional researcher or the club member simply looking for information on the birding opportunities of their chosen holiday destination. His stand of second hand books, sold for the benefit of library funds, was an essential part of our conferences. He was

always ably assisted by Hetty, who does much valuable work in keeping the library in good order and who did work in the Bird Bookshop for many years.

His many friends will remember Bill as a man of quiet good humour, sincere and honourable and always willing to lend a hand when the need arose. He was totally dependable and he will be sadly missed.

**David Clugston** 



Bill Harper

Hetty Harper

#### 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 will bereviewed by at least 2 members of the editorial panel and, in some cases, 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; 2 copies are required and the author should also retain one. We are happy to accept papers on Applemac computer discs. We cannot handle other formats as both the SOC computers and those at our printers are on the Apple system. Please contact Sylvia Laing on 0131 556 6042 to discuss this. Headings should not be underlined, nor typed entirely in capitals. Scientific names in italics should follow the first text reference to each species. Names of birds should follow the official Scottish list (Scottish Birds Vol 17: 146-159). 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 written:....on 5 August should be 1991.....but on the 5th (if the name of the month does not follow). Please note that papers shorter than c700 words will be treated as Short Notes, where all references should be incorporated into the text, and not listed at the end, as in full articles

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 should be on a separate sheet. Maps and diagrams should be in Indian ink and be camera ready, but drawn so as to permit reduction to half their original size.

## Erratum - The status and distribution of wintering Pink-footed and Greylag Geese in east central Scotland. Vol 18: 24-50

M V Bell & S F Newton, the authors, have asked us to point out that all references to km<sup>2</sup> should be 'one km square' apart from p.27, paragraph one, last line. This change was made at the proof stage. Unfortunately the authors did not see the proofs and consequently were unable to correct this and other typographical errors. We very much regret this break down in our procedures.

#### Editorial changes

Scottish Birds has been edited by Mrs Anne-Marie Smout since 1991. This issue is the first for which Dr Stan da Prato has been responsible. The new editor and the SOC as a whole wish to thank Anne-Marie for her hard work and commitment to the journal. We also thank Dr Bryan Nelson and Professors David Jenkins and Peter Slater for their valuable work on the Editorial Panel. The new editor is particularly grateful that Bryan and David have agreed to stay on and that Dr Ian Bainbridge has agreed to join the Panel.



## Neotropical bird club launched

A club has been launched to promote the study and conservation of the birds of the Neotropics (South America, Central America and the Caribbean). It is currently seeking founder members to help reach the launch budget of £2000, which is required to get the club running and to publish the two first issues of its intended journal 'Continga'. Founder members will be asked to pay a minimum of £25, and will be formally acknowledged in the first issue of 'Continga'. 'Continga' will provide a colourful and much needed forum for exchange of information on the avifauna of this extremely rich and diverse area, and will contain papers and features on the birds and their conservation as well as news of recent observations and discoveries (at present, new species are still being discovered at the rate of more than two a year). It is hoped that in due course the club will be able to provide direct funding and support for practical conservation programmes.

For further details and membership forms, please contact: Rob Williams, Publicity Officer, Neotropical Bird Club, c/o The Lodge, Sandy, Bedfordshire SG19 2DL



NEOTROPICAL

BIRD CLUB

# **Scottish Birds**

### Volume 18 Part 2 December 1995

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