Scottish Raptor Monitoring Scheme

Report 2005

Compiled and edited by

Brian Etheridge, Mark Holling, Helen Riley,
Chris Wernham and Des Thompson

SOC

Contents

1 Preface

In the week that I write this, I am appalled that the media carries yet another report on a poisoned raptor– this time a Golden Eagle. We simply have to find ways to eliminate such practices. They damage Scotland's international reputation, and they reduce public support for legitimate field sports to the detriment of many of our most fragile rural communities.

Most Scottish raptor populations are now recovering and many are at a higher level than at any time in the past 200 years. However, despite full legal protection since 1954, problems associated with illegal killings remain and these restrict the distribution and abundance of several species. I do hope that in the coming year we can redouble our collective efforts to improve dialogue between the different interests involved, searching even harder for common ground and a more effective way to eventually eliminate this stain on our country.

In doing so it will be all the more important that we have a robust evidence base which enables us to understand the vagaries of raptor population changes. That we have so much data on raptors is a great tribute to the skill, experience and energy of the two hundred and thirty members of the Scottish Raptor Study Groups. Scotland is fortunate indeed to have such an effective group of fieldworkers who do so much of the raptor surveying and monitoring in their own time.

The Scottish Raptor Monitoring Group, established in 2002, is to be commended for producing this third report; it is an important publication and builds on the previous reports for 2003 and 2004.

I would like to thank the following members of the group for all their work: David Stroud (Joint Nature Conservation Committee), Patrick Stirling–Aird, Wendy Mattingley, Alan Heavisides and Jon Hardey (Scottish Raptor Study Groups), Humphrey Crick and Chris Wernham (British Trust for Ornithology, Scotland), Malcolm Ogilvie (Rare Breeding Birds Panel) and Jeremy Wilson (Royal Society for the Protection of Birds, Scotland), Mark Holling (Scottish Ornithologists' Club), Nigel Buxton, Helen Riley, Brian Etheridge and the Group Chairman, Des Thompson (Scottish Natural Heritage). In particular, I would like to thank the Raptor Monitoring Officer, Brian Etheridge, for compiling this report so effectively. It is again based on nearly three and a half thousand breeding reports provided by raptor fieldworkers.

Andrew Thin,
Chairman, Scottish Natural Heritage
August 2007

---

2 Introduction

This is the third report by the Scottish Raptor Monitoring Group (SRMG) on the Scottish Raptor Monitoring Scheme (SRMS). The aim of the report is to provide clear and factual information on breeding birds of prey in Scotland during 2005. The format follows closely that used in the first two reports (Etheridge, 2005; Etheridge *et al.*, 2006).

2.1 The Scottish Raptor Monitoring Scheme (SRMS)

The SRMS was established on 24 June 2002 with the signing of an Agreement by the following parties: SNH (Scottish Natural Heritage), JNCC (Joint Nature Conservation Committee), SRSGs (Scottish Raptor Study Groups), BTO (British Trust for Ornithology, Scotland), RBBP (Rare Breeding Birds Panel), RSPB (Royal Society for the Protection of Birds, Scotland), and SOC (Scottish Ornithologists' Club) (Anonymous (2002)). The SRMS currently focuses primarily on the annual monitoring of the abundance, distribution and breeding success of diurnal birds of prey (Accipitriformes and Falconiformes) and owls (Strigiformes) native to Scotland. Because of its ecological similarity to raptors, the Common Raven is given honorary status as a bird of prey and is included in the Scheme.

2.2 Scottish Raptor Study Groups (SRSGs)

The SRSGs form a consortium of ten regional raptor study groups (Figure 1) with a combined membership of over 240 amateur and professional ornithologists. Members have extensive expertise in the field study of breeding birds of prey and conduct these studies largely in their own time. They have provided the bulk of the data collected in this report on raptor numbers, distribution and productivity.

2.3 Scottish Raptor Monitoring Group (SRMG)

The SRMG consists of representatives of the seven organisations who were signatories to the SRMS agreement. They meet up to four times a year and oversee the work of the scheme. A part-time Raptor Monitoring Officer (RMO), funded by SNH and employed by RSPB Scotland during the year under review, reports to the group and is primarily responsible for collecting and collating annual breeding records on all raptor and owl species from individuals, SRSGs and other organisations.

3 Raptor breeding report for 2005

3.1 Introduction to breeding report

The beginning of the year saw changes in the way breeding data were reported to the RMO with the introduction of a dedicated Excel spreadsheet for use by raptor field workers. The long-term aim is for this electronic form of recording and submission to replace the traditional nest record forms and summary sheets. Adoption of the spreadsheet with 'pull-down' menus should facilitate improved recording and reporting for the observer and aid the RMO in compiling a timely and comprehensive annual report.

The ten Scottish raptor study groups, RSPB Scotland, Scottish Natural Heritage and Natural Research Ltd. again supplied raptor, owl and raven breeding data for this report. Visits were made to 3618 home ranges during the spring to check for occupation (Annex 1). This represents an increase of 4% to the number of home ranges visited over both 2003 (3483) and 2004 (3488). Not all these home ranges were occupied. Annually across a wide range of raptor species, about one third of home ranges was unoccupied or was occupied by a single bird. Most home ranges will usually require a further visit to confirm the findings of the first one. When signs of occupation are present, a minimum of three visits is normally required to assess the outcome of the breeding attempt, more if successful breeding occurs (Hardey *et al.*, 2006). Annex 2 reveals that of the 3618 home ranges checked in 2005, 2289 (63%) held potential breeding pairs, and received further survey visits. This represents a huge investment in time and commitment by raptor enthusiasts who collectively trek many thousands of miles to remote nesting locations and climb or abseil hundreds of trees and crags to collect data on clutch and brood size.

Voles are an important prey item for many birds of prey including Hen Harrier, Common Kestrel and Barn Owl and all three species experienced reduced breeding success and productivity in 2005 suggesting a reduction in the abundance of voles. However, for the Short-eared Owl, a specialist vole hunter, these effects in 2005 appear to have been far more severe. Only 11 nesting attempts were reported in just two regions and there were no sightings of any birds from either Highland or Tayside despite extensive fieldwork in suitable habitat.

3.2 Observer coverage

Survey effort varies across Scotland and some raptor species and regions receive more comprehensive coverage than others. In the report, the scale of coverage achieved is indicated on the small maps associated with each species.

3.3 Occupation of Home Ranges

In many species of raptors and owls, breeding pairs are faithful to a home range. In some resident species such as Red Kite, Common Buzzard, Golden Eagle and Common Raven, the pair can remain together throughout the year and for at least part of the day will be on their home range. In migratory species such as European Honey-buzzard and Osprey, the pair bond breaks up at the end of the breeding season. If they survive the rigours of migration, the majority of adults will return to the same location the following year and pair up again. In long-lived species, the same pair of birds will typically occupy the same home range, and use the same nesting locations, over many years. For relatively short-lived species such as Hen Harrier, Eurasian Sparrowhawk and Merlin, providing the habitat remains unchanged, such/specific home ranges may be occupied by a succession of breeding pairs.

Not all home ranges will be occupied by a breeding pair and there are a variety of reasons why a pair of raptors may not breed in a given year e.g. one or both birds may be immature (not yet of breeding age) or food may be short. In some years, only a single bird may be present, caused by the death of a mate or even 'divorce', or recruitment to a new territory if the population is undergoing expansion. Some home ranges may be occupied only when the population reaches a certain level and others may have the appearance of being vacant for long periods, sometimes because of human interference. Others may suffer irreversible habitat changes, e.g. through afforestation, or be subjected to increased human disturbance and may never become regularly occupied again. For these reasons, it is important in the long-term monitoring of Scotland's bird of prey populations, that the presence of unoccupied ranges within a study area is recorded accurately, as well as the occurrences of breeding attempts and any production of young.

3.4 Terminology

The terms used in this report have the following definitions, based on Hardey *et al.* (2006):

Breeding range - the geographical area within which the species occurs and breeds.

Home range - the area that contains the nesting range plus the area over which a raptor or a pair of raptors forage. Some raptor species, such as Golden Eagle and Tawny Owl, defend more-or-less the entire home range, whereas others, including Northern Goshawks and Common Kestrels, defend only a core area of the home range around the nest site.

Nesting range - the locality within a home range that includes all the alternative nests used in successive years by a pair of birds.

Nesting territory - an area around an active nest that is defended by the resident pair of birds against intrusions by other raptors of the same species or against potential predators.

Occupancy - a nesting range is occupied if a single bird or pair of birds is recorded during the breeding season, or if there is strong evidence that birds are present (moulted feathers, pellets, plucks, faecal splash).

Territorial bird or pair - a single bird or pair that defends a territory against intrusions by other raptors of the same species or against potential predators. For some species, notably Common Buzzard, this territorial behaviour can occur throughout the year and not just during the breeding season.

Breeding pair - a pair that (a) defends a nesting territory in the spring; (b) repairs or builds a nest, or prepares a nest scrape; and (c) lays at least one egg.

Nest site - the area immediately around and including a nest.

Nesting or breeding success - the proportion or percentage of breeding pairs that successfully rear at least one chick to fledging.

Breeding failure - once occupancy by a breeding pair is established, failure occurs if no young fledge successfully. A broader definition will also include those territorial pairs, which appear capable of breeding but fail to lay eggs (this can be difficult to prove without careful and very regular observations).

Productivity - the number of young produced annually, normally expressed as the mean or average number of young per breeding pair.

Monitored home range - a home range occupied by a pair that receives sufficient repeat visits to establish the outcome of a breeding attempt.

3.5 Estimating breeding success: a note of warning

Ideally, all breeding attempts should be monitored from the start of pair formation to either breeding failure or the successful fledging of young. In a national report of this size using data from a wide range of field workers, this ideal is not achievable. The timing of survey visits may bias estimates of raptor breeding success. First visits to an area that occur later in the season will miss breeding attempts that failed early and overestimate nesting success. Non-breeding territorial pairs are a common component in raptor populations and these can be easily overlooked, exacerbating the problem. Therefore, there is a bias in favour of detection of nesting attempts that have a longer period of survival. In particular, nests are most likely to be found and examined at the chick stage; this places a strong positive slant on estimations of breeding success, as failure is more likely to occur at the pre-lay stage or during incubation. Moreover, it is not always possible to determine from the submitted summary recording forms at what stage in the breeding cycle individual nests were found. It is hoped that a new nest recording spreadsheet introduced at the start of 2005 and now widely adopted by raptor workers will help address this problem.

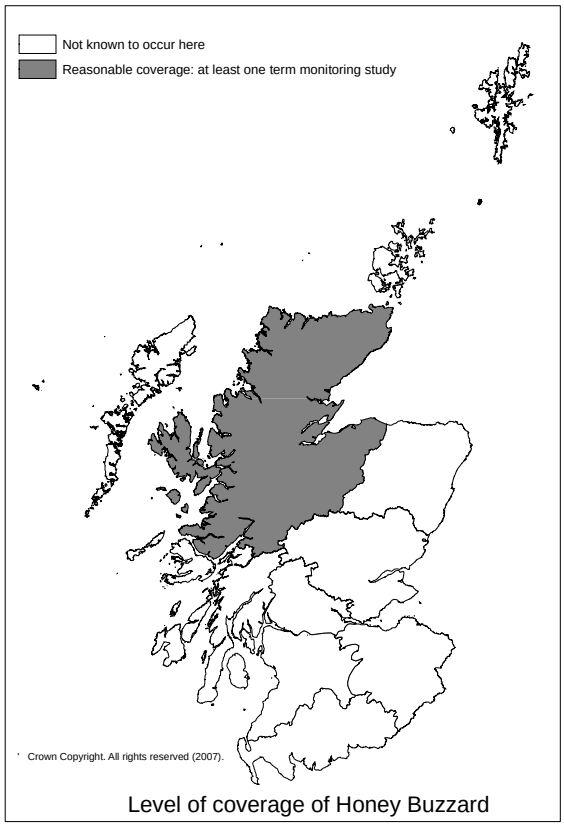
On some driven grouse-moors of Scotland, recent studies have shown that certain species of raptor that attempt to settle or breed there suffer from human interference (Etheridge *et al.*, 1997; Hardey *et al.*, 2003; Whitfield *et al.*, 2004). This can have a severe effect on species at a local level by reducing the number of breeding pairs present and their breeding success. It may also impact on surrounding populations, if birds are drawn into areas of apparently suitable habitat which is unoccupied because previous inhabitants have been removed – the so-called "black hole" effect (Whitfield *et al.*, 2004). Such interference can also diminish the enthusiasm of a volunteer raptor worker for monitoring raptors in what they perceive to be a hostile environment. The impact of this shift of effort away from some grouse-moors, particularly in regions where this form of land management may be a dominant feature, is that: a) data collected on raptor breeding populations may not be an accurate reflection of the species status and breeding success in the region. Some upland breeding species such as Hen Harrier, Golden Eagle or Peregrine Falcon may appear to have considerably higher occupancy of home ranges, breeding success and productivity than is actually the case nationally across all habitats, and b) persecution of birds of prey may be under-recorded.

Further SRMS work to more thoroughly assess annual changes in monitoring coverage, and to collect related habitat data to characterise nesting attempts will help to address whether these issues do indeed lead to any biases in the data collected.

4 Species accounts

4.1 European Honey-buzzard
Pernis apivorus

There were no confirmed breeding records in 2005. In Highland and Tayside, adult birds were recorded at five locations during the summer within the known breeding range. This can be a difficult species to prove breeding and nesting pairs are easily overlooked.



Level of coverage of Honey Buzzard

4.2 Red Kite
Milvus milvus

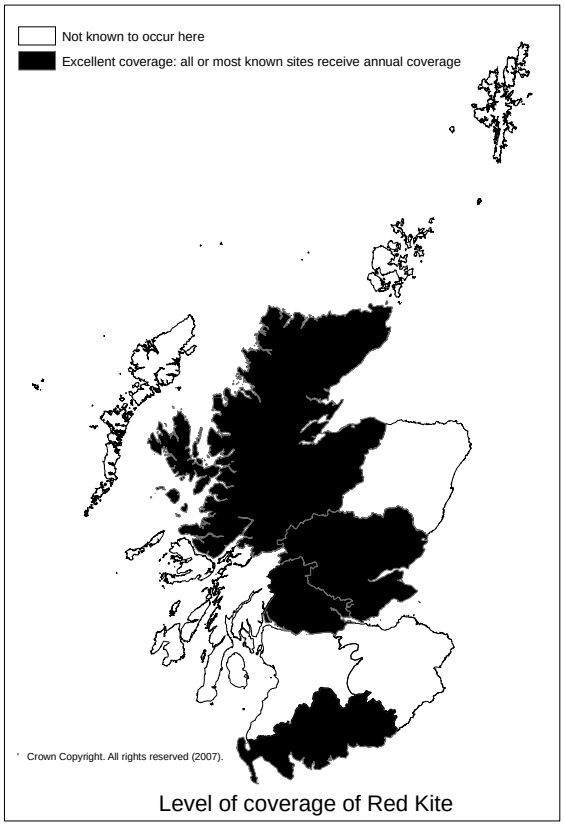
Following successful re-introductions to the Black Isle (1989–93), west Perthshire (1996–2001) and Galloway (2000–05) a slowly increasing population has become established in Scotland. Most breeding attempts are monitored by RSPB Scotland and many of the young produced are wing-tagged. Increases occurred in all three reintroduction areas in 2005 with the overall breeding population rising from 60 pairs in 2004 to 76, a 27% increase. Nesting success was similar in both years (82% and 80%). The number of fledged young produced increased by 14 (12%) to 129 (Tables 1 & 2).

Highland

Seventy home ranges were checked in the spring of which 39 (56%) held pairs. After three years without change, this was a small population increase from the 35 pairs previously recorded, although the core nesting range on the Black Isle and Easter Ross remained unchanged. Breeding success was excellent. All 39 pairs laid clutches and 36 (92%) succeeded in rearing a minimum of 83 young. Mean brood size per pair occupying a home range was 2.1.

Central Scotland & Tayside

Populations in these two areas share a common origin - the second Scottish reintroduction scheme at Doune in west Perthshire. Despite a further increase in the combined population from 22 nesting pairs in 2004 to a minimum of 25 in 2005, breeding success declined to 60% from 77% the previous year. This resulted in four fewer young being reared. This disappointing result was attributed to heavy and persistent rainfall during the crucial hatching and small chick stage.



Level of coverage of Red Kite

Central Scotland

Twenty-nine home ranges were monitored and 21 (72%) held pairs. At least 17 of the pairs (81%) were confirmed as breeding (16 in 2004). Breeding success was poor with only 11 pairs (65% of those laying) fledging 22 young. The mean brood size per pair occupying a home range was a low 1.0

Tayside

Twelve home ranges were check and 11 pairs located. Eight pairs laid eggs but only four reared any young. This means the Tayside kite population increased from six to eight breeding pairs in 2005. However, at only 50%, nesting success was particularly low and only six young were reared, a disappointing reduction from the 13 fledged the

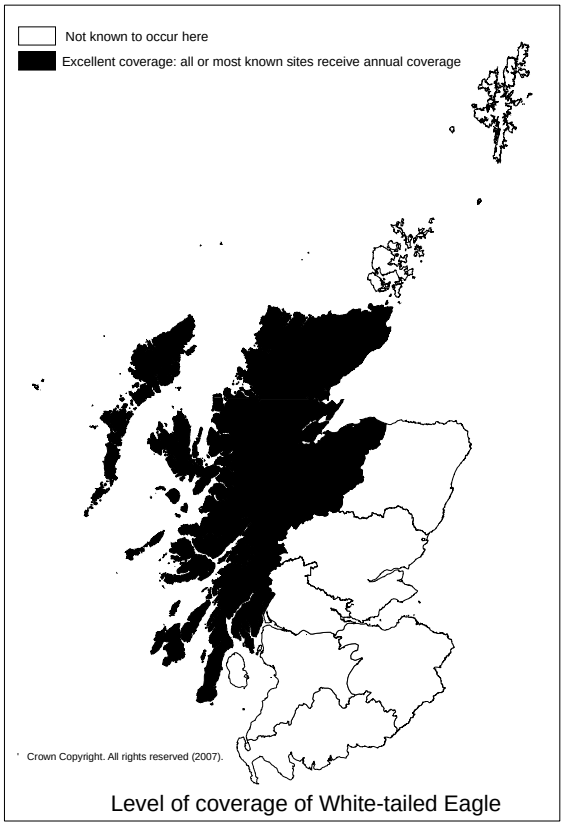
Table 1: Breeding success of Red Kites in Scotland, 2005.

Region	Home ranges checked	Pairs located	Single birds holding territory	Pairs laying eggs	Pairs hatching eggs	Pairs fledging young	Minimum number of young fledged
Highland	70	39	3	39	36	36	83
Tayside	12	11	0	8	6	4	6
Central Scotland	29	21	0	17	12	11	22
Dumfries & Galloway	15	12	0	12	10	10	18
TOTAL	**126**	**83**	**3**	**76**	**64**	**61**	**129**

previous year. Mean brood size per pair occupying a home range was a very low 0.5 young.

Dumfries & Galloway

A substantial increase in the numbers of breeding pairs in this region, from three in 2004 to 12 in 2005, gave a major boost to the Scottish Red Kite population. There were 10 successful nests (83%) producing 18 young. Mean brood size was 1.5 young per pair occupying a home range. A final batch of four young taken from Highland nests saw an end to re-introductions in this region and it is hoped this population will be now self-sustaining.



Level of coverage of White-tailed Eagle

4.3 White-tailed Eagle
Haliaeetus albicilla

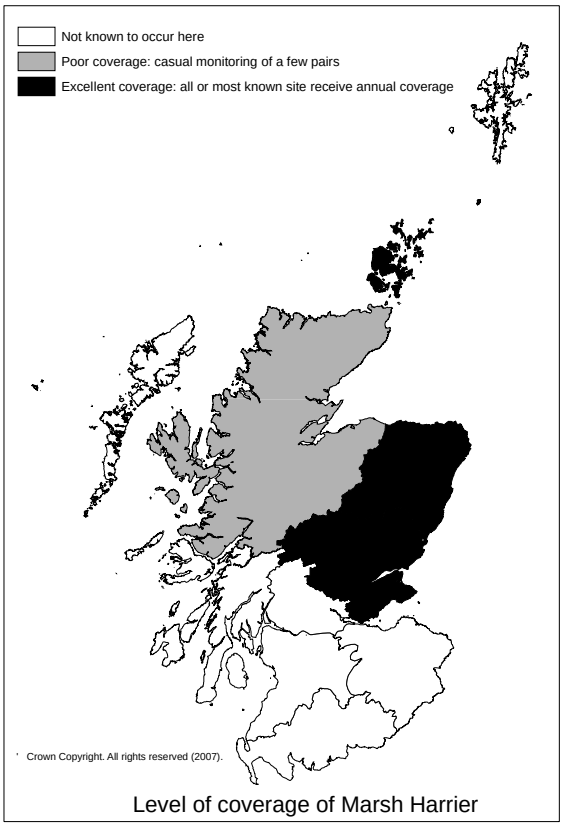
The monitoring of this spectacular sea-eagle continues to be organised by RSPB Scotland and funded by SNH. The number of territorial pairs in Scotland has been increasing slowly in recent years (Table 3) although the number of confirmed clutches laid in 2005 remained unchanged at 28. Fledging success, however, improved over 2004 with 17 broods producing 24 young. A more detailed report on the breeding success of Scottish White-tailed Eagles is provided by Grant (2006) and is available on request from the RSPB office in Inverness.

Table 2: Brood size at fledging and productivity of Red Kites in Scotland, 2005.

Region	Pairs laying eggs	Number of successful broods	Brood size 1	Brood size 2	Brood size 3	Total young	Mean brood size per laying per	Mean brood per successful pair
Highland	39	36	5	15	16	83	2.1	2.3
Tayside	8	4	3	-	1	6	0.8	1.5
Central Scotland	17	11	3	5	3	22	1.3	2.0
Dumfries & Galloway	12	10	4	4	2	18	1.5	1.8
TOTAL	**76**	**61**	**15**	**24**	**22**	**129**	**1.7**	**2.1**

Table 3: White-tailed Eagle breeding success and productivity in Scotland, 1996–2005 taken from Grant (2006).

Year	Areas occupied	Territorial pairs	Pairs laying eggs	Pairs hatching eggs	Pairs fledging young	Total young fledged	Young fledged per pair laying	Young fledged per territorial pair
1996	12	12	12	8	7	9	0.75	0.75
1997	14	14	11	6	5	9	0.64	0.64
1998	19	19	16	9	9	13	0.81	0.68
1999	20	20	16	9	6	11	0.69	0.55
2000	23	22	19	12	8	12	0.63	0.55
2001	24	23	17	10	7	11	0.65	0.48
2002	26	25	22	14	8	12	0.55	0.48
2003	31	31	25	20	16	26	1.04	0.84
2004	32	32	28	19	15	19	0.68	0.59
2005	33	33	28	21	17	24	0.86	0.73



Level of coverage of Marsh Harrier

4.4 Eurasian Marsh Harrier
Circus aeruginosus

The UK population of this species has expanded rapidly in the last 25 years from a low of only a single pair in 1971 to 156 breeding females in 1995 and an estimated 360 breeding females in 2005 (Eaton *et al.*, 2006). The Scottish segment of this population remains very small but is increasing slowly with nine pairs located in 2005 (Table 4), although only six apparently nested. One or two pairs of Marsh Harriers have been breeding annually in Orkney since 2001, although neither of the two pairs present in 2005 was believed to lay eggs. At the long-term Scottish stronghold of the Tay Estuary, three pairs were present with two pairs nesting successfully and fledging eight young. A new location in Highland was occupied and three young were reared. There were three breeding pairs in Northeast Scotland but while two pairs each reared broods of three, the other failed at the egg stage. Elsewhere in Scotland, there was increasing evidence of summering by individual Marsh Harriers and raptor fieldworkers are encouraged to submit all casual records so that any further colonisation of Scotland can be documented.

Level of coverage of Hen Harrier

4.5 Hen Harrier
Circus cyaneus

After intensive fieldwork for the third national Hen Harrier breeding survey in 2004 (Sim *et al.*, 2007), the number

of home ranges checked for occupancy in 2005 fell back to the 2003 level (Table 5). The data indicates a period of relative stability in the occupancy rate of home ranges and of breeding success over the three years 2003–2005, although a downward trend in the average brood size needs to be monitored closely. Regional reporting below and in Table 6 is based on the Scottish Regions defined in the published reports of the three national surveys of 1988/89, 1998 and 2004 (Figure 2), rather than by SRSG area (Figure 1).

Orkney

Coverage in the island group was maintained at 100% of the species' breeding range and the number of occupied home ranges recorded was very similar to 2004. Increased hatching and fledging success compensated for a small drop in the number of nests located with eggs, so that productivity between the two years was also very similar. There were 72 occupied home ranges, 60 nests with eggs and 33 successful breeding attempts. Seventy-six young were reared to fledging, giving a mean brood size per occupied home range of 1.1.

Hebrides

Excellent coverage of North and South Uist, and Benbecula was achieved as part of a survey of key raptor species commissioned by SNH on the islands. Forty-one home ranges were checked and 34 were found occupied and monitored. There was high hatching success (94%) but eight nests (25%) failed at the nestling stage. On Skye, Hen Harriers enjoyed a very good breeding season. Nine breeding pairs were monitored and seven were successful rearing 19 young. A single pair again bred on Eigg, fledging four young. There were no reports of breeding on either Lewis or Harris - islands where breeding has rarely been recorded in the past (Gibbons *et al.*, 1993). Productivity on the Hebrides was 1.7 fledged young per monitored occupied home range.

North Highlands

In the east Sutherland study area, 27 home ranges were checked and 15 were occupied by nesting pairs. Only eight (53%) were successful and 23 young fledged. Six out of the seven failures occurred during incubation. Further south in east Ross and Inverness-shire, two successful breeding attempts were recorded, each rearing four young. Combined productivity was 1.8 young per monitored occupied home range.

East Highlands

In this vast upland region, 52 occupied home ranges were located in early spring, half these in Perthshire. Forty-seven received follow visits and 43 nests with eggs were located. Thirty pairs (70%) were successful rearing 88 young. Mean brood size was 1.9 young per monitored occupied home range.

West Highlands and islands

An estimated 41% of the Scottish breeding population of Hen Harriers occurred in this region in 2004 (Sim *et al.*, 2007). One hundred and thirty-nine home ranges were checked in 2005 and 114 (82%) were found occupied by harrier pairs. Ninety-nine of the occupied home ranges were monitored and 75 nesting pairs were found. The majority of these nesting pairs (77%) were on the six islands, with the mainland areas of Argyll and Central holding the remaining 23%. Of pairs that laid eggs, 71% of island pairs nested successfully, compared with 65% on mainland, though the latter area had a higher mean brood size. Combining the two areas, 52 nests (69%) were successful, fledging 126 young. Mean brood size was 1.3 young per monitored occupied home range. These figures are lower than the 2004 estimates of 76% and 1.9 young.

Southwest and the Southern Uplands

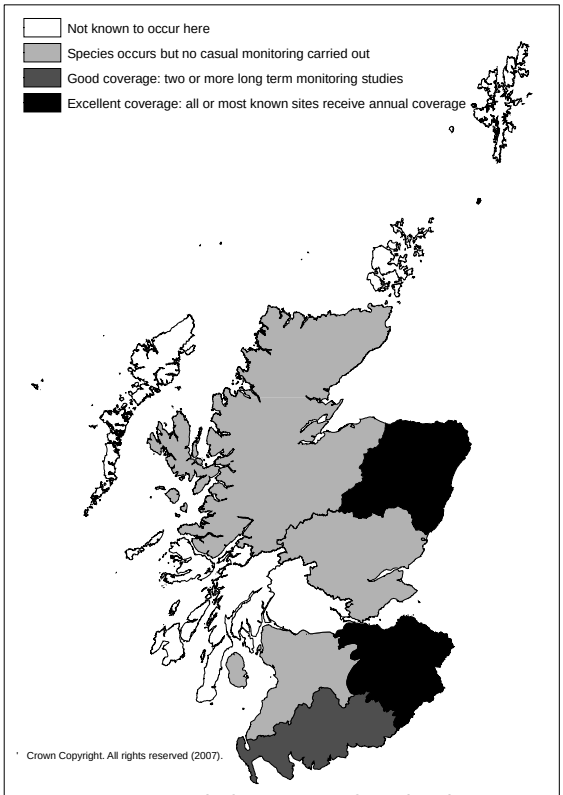
This is still an important region for Hen Harriers, but coverage was much reduced in South Strathclyde and Dumfries & Galloway following the national survey in 2004. In these two western regions, 29 occupied home ranges were monitored and 27 active nests were found. Seventeen pairs (63%) reared 65 young to fledging. Productivity was an excellent 2.2 young per occupied home range, an increase on the 2004 figures of 42% and 1.4. However, to the east, in adjacent Lothian & Borders, from four nesting pairs in 2004, the Hen Harrier population declined to a critical state. Two pairs were located in the spring and only one remained to nest, rearing three young.

Table 4: Breeding success of Eurasian Marsh Harriers in Scotland, 2005.

Region	Pairs located	Pairs laying eggs	Pairs fledging young	Minimum number of young fledged
Orkney	2	0	0	0
Highland	1	1	1	3
Northeast Scotland	3	3	2	6
Tay reed beds	3	2	2	8
TOTAL	**9**	**6**	**5**	**17**

Table 5: Home range occupancy and breeding success of Hen Harriers in Scotland, 2003-05.

	2003	2004	2005
Home ranges checked	379	457	395
Home ranges occupied (% of those checked)	335 (88%)	417 (91%)	342 (87%)
Occupied home ranges monitored	303	359	310
Nests found with eggs (% of monitored sites)	271 (89%)	326 (91%)	268 (86%)
Nests fledging young (% of nests with eggs)	171 (63%)	219 (67%)	175 (65%)
Minimum number of young fledged	529	630	466
Mean brood size per successful nest	3.1	2.9	2.7
Mean brood size per nest with eggs	2.0	1.9	1.7
Mean brood size per monitored occupied home range	1.7	1.8	1.5



Level of coverage of Goshawk

4.6 Northern Goshawk
Accipiter gentilis

The GB population was last estimated in 1995 at 400 pairs (Petty, 1996). This figure is in need of updating as major gains have been recorded in recent years in northern England and in Wales. There is little evidence of any recent change in the Scottish population but it is now likely to be larger than the 80 pairs that Petty (1996) estimated and may be in the region of 100+ pairs based on the number of known territories currently monitored and the lack of coverage in some key areas and habitats. The available data indicate that in Scotland the Goshawk has only become strongly established as a breeding species in the northeast, southeast and southwest. However, the species is easily overlooked when breeding in large commercial forests; a habitat monitored by few raptor enthusiasts in Scotland.

One hundred and sixteen known home ranges were checked and 81 (70%) bore signs of occupation (Table 7). Sixty-five home ranges received follow-up visits and active nests were located at 58. Fledging success was again high with 47 (81%) producing 117 young, giving a mean brood size of 1.8 young fledged per occupied monitored home range.

Highland

Eight known home ranges were checked in the spring, but only one breeding pair was found. A brood of three was reared successfully.

Northeast Scotland

In the long running study in Aberdeenshire, 31 home ranges were checked. Twenty-two (71%) were occupied and active nests with eggs were found at 19. Of these 15 (79%) were successful and reared a minimum of 34 young. Productivity was 1.5 young fledged per occupied monitored home range.

Tayside

Pairs were present at two home ranges but only one was monitored. This successfully produced two young.

Lothian & Borders

Fifty-three home ranges were checked in a Borders study and 41 (77%) showed signs of occupation. Twenty-eight received monitoring visits and 24 active nests were located. Of these, 19 succeeded in fledging 55 young. Breeding success at 79% compares favourably with 85% in 2004. Productivity was 2.0 young fledged per occupied monitored home range.

Dumfries & Galloway

Twenty-two home ranges were checked and 15 (68%) were occupied. Thirteen home ranges had active nests and 11

were successful (85%) producing 23 fledged young. Productivity averaged 1.8 fledged young per occupied monitored home range.

4.7 Eurasian Sparrowhawk
Accipiter nisus

Following their recovery from the pesticide era, Sparrowhawks were for many years a widespread and common species. However, they are now believed to be in long-term decline in parallel with the farmland and woodland small bird populations on which they prey (Park *et al.*, 2005). Despite their relative abundance, they remain a challenging and rewarding species to study and an increase in monitoring effort is encouraged by the SRMG.

Orkney

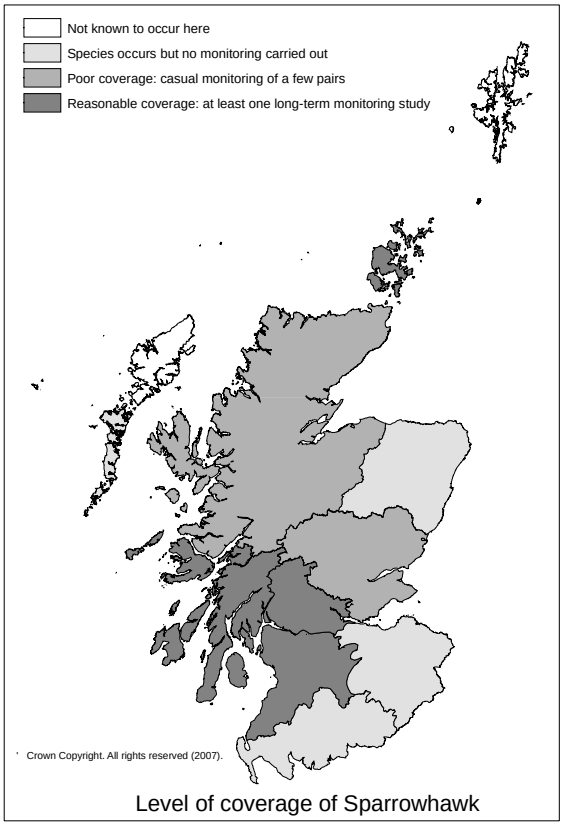
Breeding pairs were present on Mainland, Hoy, South Ronaldsay and possibly Rousay. Thirteen nesting sites were checked and there was evidence of occupation at ten of them (Table 8). Six were occupied by breeding pairs and four were successful. One pair reared five young. At the other three, the brood size was not recorded.

Table 6: Breeding success of Hen Harriers in Scotland, 2005.

Area	Home ranges checked	Home ranges occupied by pairs	Occupied home ranges monitored	Pairs laying eggs	Pairs hatching eggs	Pairs fledging young	Minimum number of young fledged
Orkney	**75**	**72**	**72**	**60**	**43**	**33**	**76**
Hebrides							
- North Uist	(17)	17	16	16	15	10	18
- Benbecula	(9)	9	9	9	8	7	16
- South Uist	(15)	14	9	9	9	7	18
- Skye & Eigg	14	11	10	10	9	8	23
sub–total	**55**	**51**	**44**	**44**	**41**	**32**	**75**
North Highlands							
- Sutherland	27	15	15	15	9	8	25
- Ross & Inverness	(3)	3	3	3	2	2	8
sub–total	**30**	**18**	**18**	**18**	**11**	**10**	**33**
East Highlands							
- Moray & Nairn	14	12	12	10	9	8	24
- Aberdeenshire	(10)	10	10	8	8	6	16
- Angus	(4)	4	4	4	2	2	7
- Perthshire	30	26	21	21	21	14	41
sub–total	**58**	**52**	**47**	**43**	**40**	**30**	**88**
West Highlands & Islands							
- Central Scotland	14	3	3	3	3	3	8
- Argyll mainland	20	16	16	14	11	8	22
- Mull & Coll	40	30	17	17	15	11	30
- Bute	(5)	5	5	5	4	4	12
- Islay & Colonsay	(26)	26	24	22	17	15	31
- Arran	34	34	34	14	12	11	23
sub–total	**139**	**114**	**99**	**75**	**62**	**52**	**126**
Southwest & Southern Uplands							
- South Strathclyde	(12)	12	12	11	6	6	28
- Dumfries & Galloway	(21)	21	17	16	12	11	37
- Lothian & Borders	5	2	1	1	1	1	3
sub–total	**38**	**35**	**30**	**28**	**19**	**18**	**68**
TOTAL	**395**	**342**	**310**	**268**	**216**	**175**	**466**

Table 7: Breeding success of Northern Goshawks in Scotland, 2005.

Region	Home ranges checked	Home ranges occupied	Home ranges monitored	Pairs laying eggs	Pairs hatching eggs	Pairs fledging young	Minimum number of young fledged
Highland	8	1	1	1	1	1	3
Northeast Scotland	31	22	22	19	[15]	15	34
Tayside	[2]	2	1	1	1	1	2
Lothian & Borders	53	41	28	24	19	19	55
Dumfries & Galloway	22	15	13	13	11	11	23
TOTAL	**116**	**81**	**65**	**58**	**47**	**47**	**117**



Level of coverage of Sparrowhawk

Highland

Three active nests were again monitored. All three were successful rearing seven young.

Tayside

Two nests each with three young were known to be successful.

Central Scotland

There was an increase to ten in the number of home ranges monitored in Central Scotland. Eight active nests were found and six successfully produced a minimum of 18 young.

Argyll

Twenty-one home ranges were checked and 17 showed signs of occupation. Eight nests were monitored. There was only a single failure and 28 young successfully fledged.

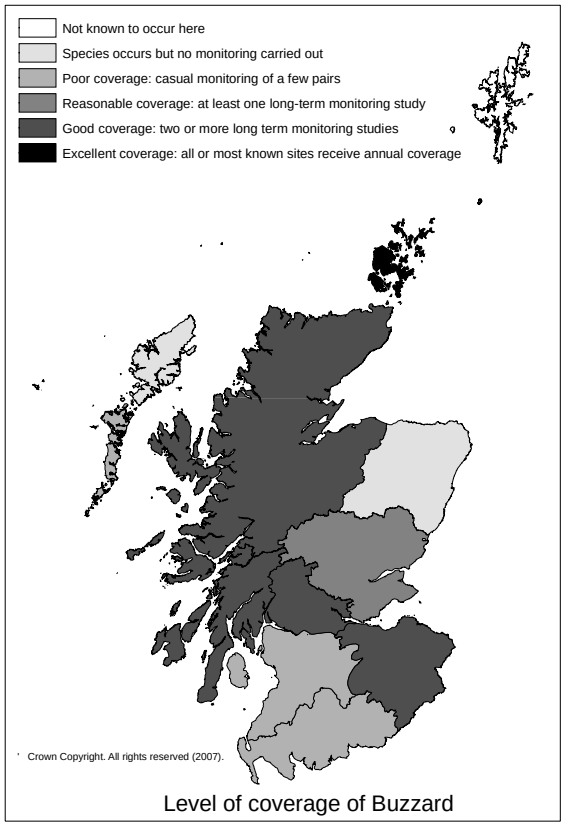
South Strathclyde

One major study in Ayrshire saw 49 home ranges checked with 29 (59%) showing fresh signs of occupation. There

Table 8: Breeding success of Eurasian Sparrowhawks in Scotland, 2005.

Region	Home ranges checked	Home ranges occupied	Home ranges monitored	Pairs laying eggs	Pairs fledging young	Minimum number of young fledged
Orkney	13	10	10	6	4	8
Highland	3	3	3	3	3	7
Tayside	2	2	2	2	2	6
Central Scotland	10	8	8	8	6	18
Argyll	21	17	8	8	7	28
South Strathclyde	49	29	28	28	25	83
TOTAL	**98**	**69**	**59**	**55**	**47**	**150**

were 28 nests located with a mean clutch size of 5.2 (*n* = 17). An impressive 25 nests (89%) were successful. Nineteen broods totalling 77 young were ringed, consisting of 31 males (40%) and 46 females (60%), a ratio very similar to 2003 and 2004. Broods present in six additional successful nests could not be accurately counted but boosted the total young fledged to a minimum of 83 young.



Level of coverage of Buzzard

4.8 Common Buzzard
Buteo buteo

The past 20 years have seen Common Buzzards spread from their historic western strongholds (Sharrock, 1976) to colonise much of eastern Scotland and England (Clements, 2000). Throughout their now extensive breeding range, they occur in greater densities and enjoy higher breeding success in areas where they are tolerated by humans and where rabbits are abundant and widespread.

Monitoring effort in 2005 was maintained at the same level as in 2004 (Table 9). There are still regions where little or no monitoring of this species occurs and where the SRMG would welcome an increase in survey coverage. The year-round territorial behaviour of Common Buzzards and their home range fidelity make them an excellent 'starter' species for new raptor enthusiasts, as well as rewarding and fascinating long-term monitoring projects for experienced 'raptorphiles'. Countrywide in 2005, checks were made at 418 known breeding territories and pairs of birds occupied 349 (83%). Two hundred and seventy-three pairs received monitoring visits and egg laying was confirmed for 261 (96%). There were 218 successful pairs (84% of laying pairs), rearing 377 young. Mean brood size was 1.4 young per monitored occupied home range.

Orkney

Two pairs again bred on Hoy and reared a single chick each. At a Mainland site, a pair that reared one chick was the first confirmed breeding on the island.

Uist

Three home ranges were checked, two were occupied and one reared a single chick.

Highland

Within this region, detailed information is available from a long-term study in Easter Ross. In this study, 74 home ranges were checked. Pairs of Common Buzzards were present at 58 (78%), single birds were at two and 14 home ranges were unoccupied. Four of the pairs did not lay eggs, one pair was not followed up and 53 pairs laid clutches. Forty-one pairs (77%) were successful and reared 73 young. The mean brood size was 1.3 young per monitored occupied home range. In a combined Highland summary, the total number of home ranges checked was 108 with 92 showing signs of occupation. Eighty-nine pairs received monitoring visits and 84 were known to lay eggs. There were 69 successful nests (82%) fledging 130 young. Mean brood size per monitored home range was 1.5 young.

Fife, Tayside & Central Scotland

An ongoing study in the Doune/Callander/Stirling area, covering parts of both Central and Tayside regions, was expanded in 2005 when 100 home ranges were checked. Pairs of birds were present at 93 territories. Sixty-seven of these received follow up visits and a minimum of 60 (90%) was confirmed to have laid eggs. There were 48 (80%) successful pairs, fledging 76 young. Mean fledged brood size was 1.1 per monitored occupied home range. In a Fife study, 13 home ranges were found occupied and 10 clutches were monitored. All 10 were successful, fledging 17 young.

Argyll

Most Common Buzzard breeding records in 2005 came from island-based monitoring. These studies indicate that compared with 2004, fewer pairs attempted to breed. Of those pairs that did, both fledging success was slightly lower and brood size was smaller than the previous year. Overall, 135 home ranges were checked and 93 (69%) were found occupied by pairs of birds. Sixty-two pairs received monitoring visits and all laid clutches of eggs. Fifty-two pairs (84%) were successful and reared 84 young, giving a mean brood size of 1.4 per monitored occupied home range.

South Strathclyde

Pairs of Common Buzzards occupied thirteen home ranges in the spring but only two were monitored. Both were successful with broods of one and two.

Table 9: Breeding success of Common Buzzards in Scotland, 2005.

Region	Home ranges checked	Home ranges occupied	Home ranges monitored	Pairs laying eggs	Pairs fledging young	Minimum number of young fledged
Orkney	**3**	**3**	**3**	**3**	**3**	**3**
Uist	**3**	**2**	**2**	**2**	**1**	**1**
Highland						
- Rum/Canna/Eigg	8	8	7	7	7	13
- Sutherland	11	11	10	9	8	14
- Easter Ross	74	58	57	53	41	73
- Badenoch	9	9	9	9	8	20
- Inverness	6	6	6	6	5	10
sub–total	**108**	**92**	**89**	**84**	**69**	**130**
Central, Fife & Tayside						
- Stirling & west Perthshire	100	93	67	60	48	76
- Fife	13	13	10	10	10	17
sub–total	**113**	**106**	**77**	**70**	**58**	**93**
Argyll						
- Coll/Tiree	6	6	6	6	6	14
- Cowal peninsula	26	23	14	14	13	15
- Colonsay/Oronsay	54	26	13	13	7	12
- Islay	12	12	6	6	4	6
- Bute	34	24	21	21	20	34
- Mainland	3	2	2	2	2	3
sub–total	**135**	**93**	**62**	**62**	**52**	**84**
South Strathclyde	**13**	**13**	**2**	**2**	**2**	**3**
Lothian & Borders						
- West Lothian	11	11	10	10	9	17
- Midlothian	14	14	14	14	14	29
- Pentland/Lammermuir Hills	18	16	14	14	10	17
sub–total	**43**	**41**	**38**	**38**	**33**	**63**
TOTAL	**418**	**349**	**273**	**261**	**218**	**377**

Lothian and Borders

The species continues its expansion throughout the region, despite localised persecution. In 2005, 43 known breeding sites were checked and pairs occupied 41 (95%). Follow-up visits were made to 38 of these and clutches of eggs were recorded at all. Breeding success was high with 33 pairs (87%) rearing 63 young to fledging. Mean brood size was high at 1.7 per monitored occupied home range.

4.9 Golden Eagle
Aquila chrysaetos

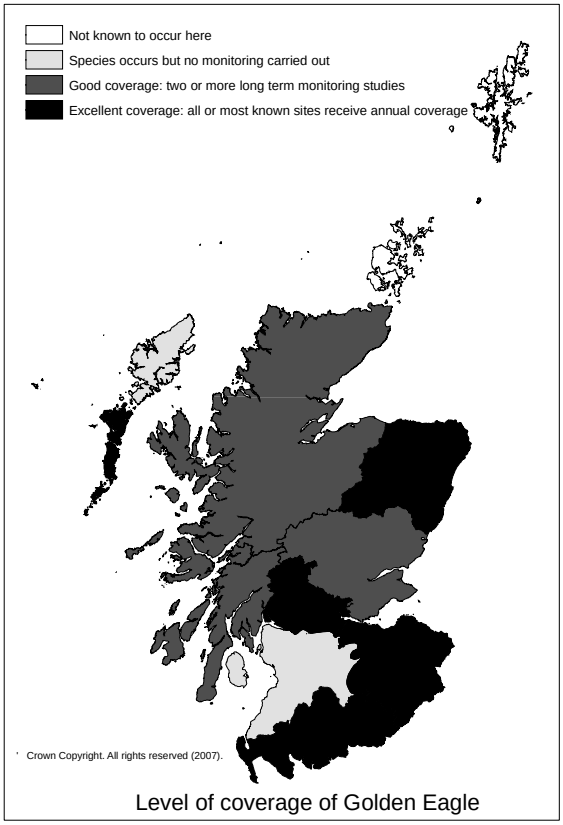
The 2003 national survey estimated the Golden Eagle population in Scotland to be 443 pairs (Eaton *et al.*, 2007). In 2005, 264 home ranges were checked for occupation (Table 10). Pairs were recorded at 220 (83%) and single birds at a further 19 (7%). Raptor enthusiasts monitored the breeding success of 207 pairs, 47% of the estimated population. It is thought that a higher proportion of Golden Eagles fail during their breeding attempt than any other raptor species in Scotland. Of the 207 pairs monitored in 2005, 56 (27%) either did not lay or failed soon after eggs were laid; a distinction that is often hard to make given the difficulty of nest access. A further 69 (33%) failed during incubation with 10 (5%) failing during the chick rearing stage. Only 72 breeding pairs (35%) were successful and reared 88 young. This gives a mean brood size of 0.4 young per monitored pair. These figures represent a decline from 2004 when 54% of pairs were successful and the mean brood size was 0.6 young. In 2005, 22% of successful pairs reared two young compared with 20% in 2004. At 13 home ranges, one or both members of the pair present were in immature plumage. Three of these pairs were confirmed

Table 10: Breeding success of Golden Eagles in Scotland, 2005.

Region	Home ranges checked	Home ranges occupied[1]	Additional home ranges occupied[2]	Pairs monitoired	Pairs failing early[3]	Pairs laying eggs	Pairs hatching eggs	Pairs fledging young	Minimum number of young fledged
Uist	**28**	**27 (2)**	**0**	**27**	**6**	**21**	**8**	**5**	**7**
Highland									
- Sutherland & Wester Ross	13	11	1	10	4	6	5	5	5
- Skye	34	31	0	31	8	23	12	12	13
- Lochaber	7	6	1	6	0	6	3	3	3
- Rum, Canna & Eigg	6	6	0	6	2	4	2	2	3
- West Inverness	12	7	4	7	3	4	4	4	4
- Ardnamurchan, Morvern & Sunart	23	19	1	19	9	10	3	2	2
- Badenoch	13	10	3	8	1	7	4	4	5
sub–total	**108**	**90(4)**	**10**	**87**	**27**	**60**	**33**	**32**	**35**
Northeast Scotland	**19**	**15(1)**	**2**	**14**	**3**	**11**	**4**	**4**	**7**
Tayside									
- Perthshire west of A9 road	12	8	1	7	2	5	3	3	5
- Perthshire east of A9 road	4	4	0	4	0	4	3	3	5
- Angus glens	8	5	0	4	0	4	2	2	4
sub–total	**24**	**17(1)**	**1**	**15**	**2**	**13**	**8**	**8**	**14**
Central Scotland	**7**	**7(0)**	**0**	**5**	**0**	**5**	**5**	**3**	**3**
Argyll									
- Islay, Jura & Colonsay	9	9	0	8	1	7	5	5	6
- Mull	36	31	0	29	11	18	10	8	9
- Mainland incl. Bute	25	20	4	18	5	13	8	6	6
sub–total	**70**	**60(4)**	**4**	**55**	**17**	**38**	**23**	**19**	**21**
Lothian & Borders	**3**	**3(1)**	**0**	**3**	**0**	**3**	**1**	**1**	**1**
Dumfries & Galloway	**5**	**1(0)**	**2**	**1**	**1**	**0**	**0**	**0**	**0**
TOTAL	**264**	**220(13)**	**19**	**207**	**56**	**151**	**82**	**72**	**88**

[1] by pairs (including immature pairs)
[2] by single birds or showing signs of occupation
[3] or non-breeding

to lay eggs but only one succeeded in rearing a single chick.



Level of coverage of Golden Eagle

Uist

Twenty-eight home ranges were checked and 27 were occupied by a pair of eagles and monitored. Nineteen pairs (70%) failed at an early stage, during incubation or were non-breeding and a further three pairs (11%) failed with young. There were only five confirmed successful pairs (19%) rearing seven young. Mean brood size per monitored pair was 0.3 young.

Highland

This is the most important region in Scotland for the species, holding about 44% of the Golden Eagle population. Coverage in 2005 was good, with 108 known home ranges checked, the majority in the west of the region. Ninety pairs (83%) were located and 87 received follow up visits. There were 32 successful breeding pairs (37%) rearing 35 young. Mean brood size per monitored pair was 0.4 young.

Northeast Scotland

Nineteen home ranges were checked in an area dominated by grouse-moors. Fifteen (79%) held pairs and the breeding successes of 14 were monitored. Just four pairs (29%) reared young. Three of the successful broods consisted of two young, a demonstration of the potential high productivity of Golden Eagle pairs in this region and providing a mean brood size per monitored pair to 0.5 young.

Tayside

Twenty-four home ranges were checked and 17 (71%) were found occupied by pairs of eagles. Fifteen received further visits and eight pairs (53%) succeeded in rearing young. There were two broods with a single chick and six broods of two. This high number of twins boosted the mean brood size per monitored pair to 0.9 young.

Central Scotland

Adult pairs occupied the seven home ranges checked in 2005. Five pairs were monitored throughout the breeding season and three succeeded in rearing single chicks. Mean brood size per monitored pair was 0.6 young.

Argyll and Islands

Seventy home ranges were checked for occupation and 60 pairs (86%) were located. Monitoring was carried out on 55 pairs. There were 19 (35%) successful breeding pairs rearing 21 young. Mean brood size per monitored pair was 0.4 young.

Lothian and Borders

Three pairs were known to lay eggs in the region, one of these an immature pair. A single chick was reared in the sole successful breeding attempt.

Dumfries and Galloway

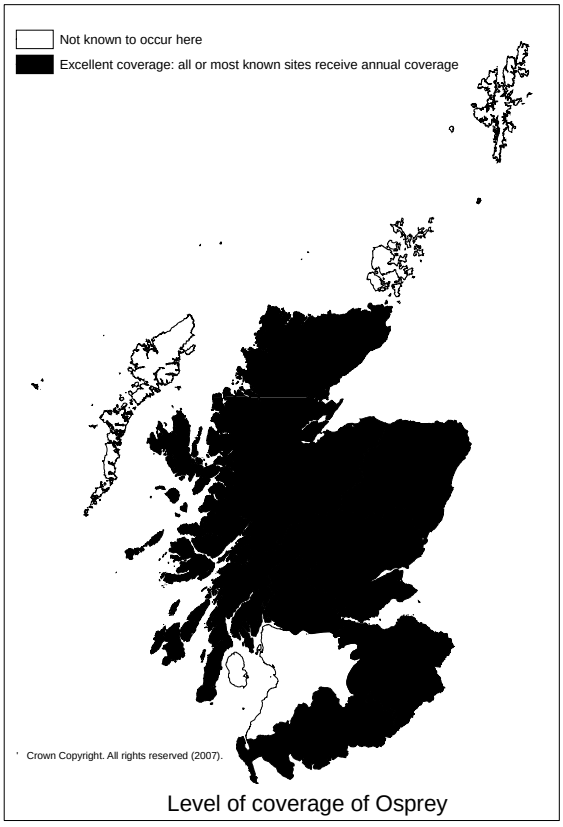
Five historic territories were checked for occupation. One pair and two single birds were found. The pair either failed early or made no attempt at breeding. Golden Eagles in this region now appear very close to extinction.

4.10 Osprey
Pandion haliaetus

Monitoring of the Scottish population is close to 100% with most known nesting locations visited annually. There were 180 pairs present in 2005 compared with 182 in 2004 (Table 11). Nesting success, however, showed a small improvement over the previous year with 158 pairs laying eggs (155 in 2004) and 124 (78%) successful (114 and 74% in 2004). There was also a corresponding increase in young reared. However, these figures do imply a levelling off in the Osprey breeding population in recent years, suggesting that limiting factors have begun to operate (Dennis & McPhie, 2003). This was particularly marked in Highland and the Northeast, whereas in Tayside the number of pairs located actually fell from 57 in 2004 to 46 in 2005 (Table 12). In the south and west, areas of Scotland where Ospreys are still actively colonising, the growth in breeding numbers continues. There was a 36% increase in Argyll, Central, and Lothian & Borders, from 22 pairs in 2004 to 30 in 2005. Dumfries & Galloway is yet to be fully exploited by Ospreys, and just a single pair bred again.

Table 11: Population and nesting success of Ospreys in Scotland, 1995-2005 taken from Dennis (2006).

Year	Pairs present at nest	Pairs laying eggs	Pairs fledging young	Minimum number of young fledged
1995	99	92	73	146
1996	104	93	74	155
1997	111	102	77	159
1998	130	116	92	193
1999	136	125	87	183
2000	147	121	-	195
2001	153	135	104	219
2002	158	128	104	213
2003	162	140	109	229
2004	182	155	114	233
2005	180	158	124	241



Level of coverage of Osprey

Highland

There was little change in this important population in 2005. Eighty-one pairs were again found at traditional nest sites and at least 72 definitely laid eggs. Fifty-five pairs (76%) were successful, rearing 105 young. Mean brood size per pair occupied nest site was 1.3 young.

Northeast Scotland

There were seventeen pairs present and all laid eggs, of which 14 (82%) reared 28 young. Mean brood size per pair occupied nest site was 1.6 young.

Tayside

Checks at 68 nest sites revealed 46 pairs present, of which 38 were confirmed as laying eggs. Thirty-two pairs (84%) bred successfully rearing 59 young. Mean brood size was 1.3 young per pair occupied nest site.

Central Scotland

The 18 pairs located and 17 confirmed to lay eggs were both up on the 2004 figures of 14 and 12. There were three breeding failures in 2005 with 14 pairs (82%) rearing 30 young and a mean brood size per pair occupied nest site of 1.7.

Argyll

Ten pairs were present in 2005 and nine pairs laid eggs. There were only five successful breeding pairs (56%). The nine young that fledged gave a disappointing mean brood size per pair occupied nest site of 0.9.

Lothian & Borders

A small increase was recorded this year: five pairs were present and four were confirmed to lay eggs. Three pairs reared nine young, including an impressive brood of four young, a rare event in Scotland.

Dumfries & Galloway

The number of pairs present in the region increased to three, although only one was confirmed to lay eggs. The pair reared two young successfully.

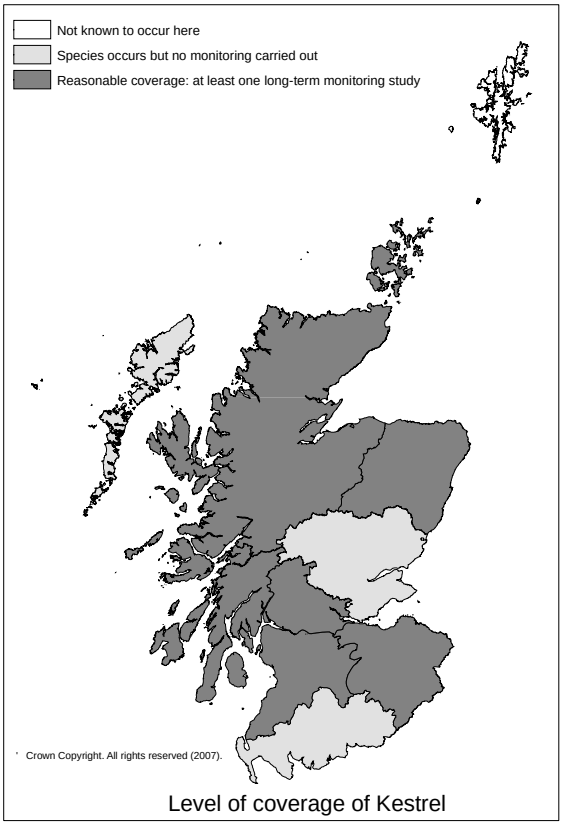
4.11 Common Kestrel
Falco tinnunculus

The number of breeding Common Kestrels recorded in 2005 was low despite an increase in monitoring effort. This was particularly marked in southwest Scotland. It was at least partly due to a crash in vole numbers following the population peak in 2004. Overall, 151 breeding sites were

Table 12: Breeding success of Ospreys in Scotland, 2005.

Region	Nest sites checked	Pairs present	Single birds present	Pairs laying eggs	Pairs fledging young	Minimum number of young fledged
Highland	108	81	3	72	55	105
Northeast Scotland	18	17	2	17	14	28
Tayside	68	46	4	38	32	59
Central Scotland	21	18	-	17	14	30
Argyll	11	10	-	9	5	9
Lothian & Borders	10	5	-	4	3	9
Dumfries & Galloway	3	3	-	1	1	2
TOTAL	**239**	**180**	**9**	**158**	**124**	**242**

checked (Table 13) and pairs occupied 112 (74%). Monitoring visits were carried out at 92 sites and at 83 (90%) clutches of eggs were laid. Sixty-four pairs (77%) were successful, rearing 231 chicks. Mean brood size per monitored occupied home range was 2.5.



Level of coverage of Kestrel

Orkney

Twelve breeding sites were located on four islands. They included five ground-nesting pairs. Nine of the sites received monitoring visits and seven produced 22 young, giving a mean brood size of 2.4 young per monitored occupied home range.

Highland

Eleven breeding sites were checked, all with eggs. Productivity was good with ten pairs fledging 40 young. Mean brood size per monitored occupied home range was 3.6.

Northeast Scotland

Fourteen breeding locations were occupied. There was a single failure, with 13 pairs rearing 50 young. Mean brood size per monitored occupied home range was 3.6, similar to Highland.

Central Scotland

In a new study, 15 occupied sites were monitored and clutches of eggs were laid at 14. There were ten successful pairs producing a minimum of 25 fledged young. Mean brood size per monitored occupied home range was a low 1.7.

Argyll

A sample of 34 known nesting sites was checked and 21 were found occupied. Eight received follow up visits, seven pairs laid eggs but only three reared any young. With only seven young fledged, the mean brood size per monitored occupied home range was very low at 0.9.

South Strathclyde

The long-term study based in Ayrshire involved the checking of 38 known breeding sites. Twenty (53%) were occupied and 17 received further visits. Fourteen pairs laid eggs and 11 (79%) were successful, rearing 45 young. The mean brood size per monitored occupied home range was 2.6 young. Compared with 2004, territory occupation was down from 85% to 53%, the proportion of pairs laying full clutches down from 92% to 82%, fledging success down from 96% to 79% and mean brood size was down from 4.2. Overall, the number of young kestrels fledging in the study area in 2005 was less than half the previous year's total. This was attributed to a collapse in vole numbers.

Table 13: Breeding success of Common Kestrels in Scotland, 2005.

Region	Home ranges checked	Home ranges occupied	Home ranges monitored	Pairs laying eggs	Pairs hatching young	Pairs fledging young	Minimum number of young fledged
Orkney	12	12	9	9	7	7	22
Highland	11	11	11	11	10	10	40
Northeast Scotland	14	14	14	14	13	13	50
Central Scotland	15	15	15	14	12	10	25
Argyll	34	21	8	7	4	3	7
South Strathclyde	38	20	17	14	11	11	45
Lothian & Borders	27	19	18	14	11	10	42
TOTAL	**151**	**112**	**92**	**83**	**68**	**64**	**231**

Lothian & Borders

In a second long-term study of breeding Kestrels by volunteer fieldworkers in southern Scotland, based in the Pentland Hills, 27 known breeding sites were checked in the spring. Kestrels were present at 19 (70%) and 18 received follow-up visits. Egg laying occurred at 14 breeding sites (78%), and 10 (71%) were successful in rearing young. A minimum of 42 young fledged, a mean brood size per monitored occupied home range of 2.3. Like the Ayrshire study, these figures are all down on the previous year and are thought to reflect a reduction in vole prey. Territory occupation declined by 53%, the proportion of territorial pairs laying eggs declined by 12% and breeding success declined by 14%.

4.12 Merlin
Falco columbarius

The Merlin had a successful breeding season in 2005. After the difficulties experienced in the previous year when torrential summer rain caused many failures, the weather in 2005 was more settled during the crucial nestling period and there were fewer complete failures. Monitoring effort by raptor workers was maintained at a high level with visits made to 409 home ranges during the spring (Table 14). Two hundred and ninety (71%) showed signs of occupation and at 189 (65%), laying pairs were located and monitored. This relatively low incidence of proved breeding at home ranges showing signs of occupation was particularly marked in several long-term study populations. This could be due to either a failure at the pre-laying stage followed by site abandonment or a failure occurring during egg laying or at the start of incubation. Being primarily a ground nester throughout much of its Scottish range, the Merlin would appear to be more vulnerable to predation risks than crag or tree nesting species and this may be a significant cause of these apparent early breeding failures. Another possibility is that occupation of some home ranges early in the breeding season may be only temporary as prospecting pairs and individuals move between sites in search of optimum conditions.

Of the 189 pairs that laid eggs, 162 nests (86%) reached the chick stage and 156 (83%) succeeded in rearing fledged young. A minimum of 500 young was recorded. Mean brood sizes were 3.2 young per successful pair and 2.6 per laying pair and 1.7 per occupied home range.

Shetland

Eleven known breeding home ranges were checked in the spring. Occupation and breeding attempts occurred at nine and seven (78%) were successful, rearing 30 young.

Orkney

Four islands were visited. Twenty home ranges showed signs of occupation in the spring and at least 15 clutches were laid. There may have been more clutches but it is believed that some pairs failed early before a nest could be located. Despite two fewer pairs located than in 2004, hatching and fledging success at 87% and a mean brood size per laying pair of 3.2 was a major improvement on the previous year (53% and 1.2). At least 48 young fledged compared with only 21 in 2004.

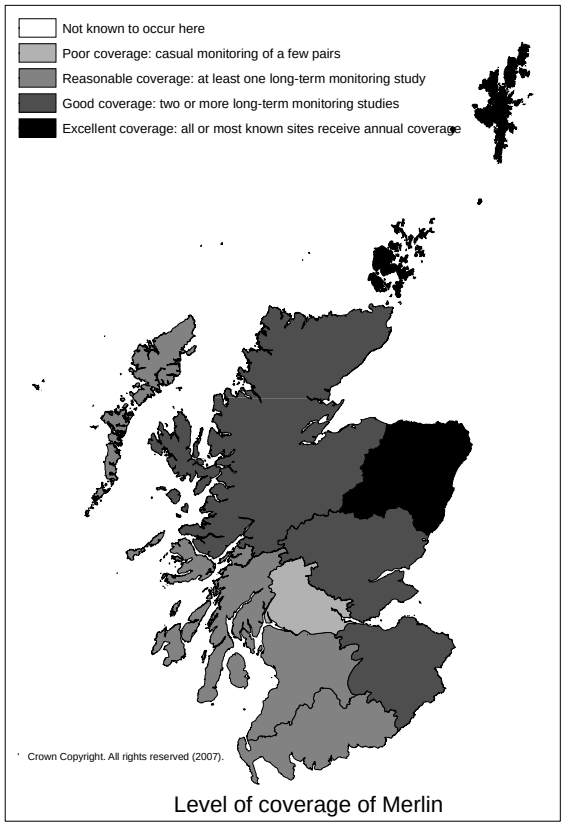
Western Isles

Comprehensive bird survey work on Lewis provided the most detailed coverage yet of Merlins on the 'long island', revealing that it holds an important breeding population. There were signs of occupation at 28 locations and at 21, the pair present laid eggs. However, hatching success was poor at 67% and the number of laying pairs producing young was a low 57%. There were 32 young, giving a mean brood size per laying pair of 1.5.

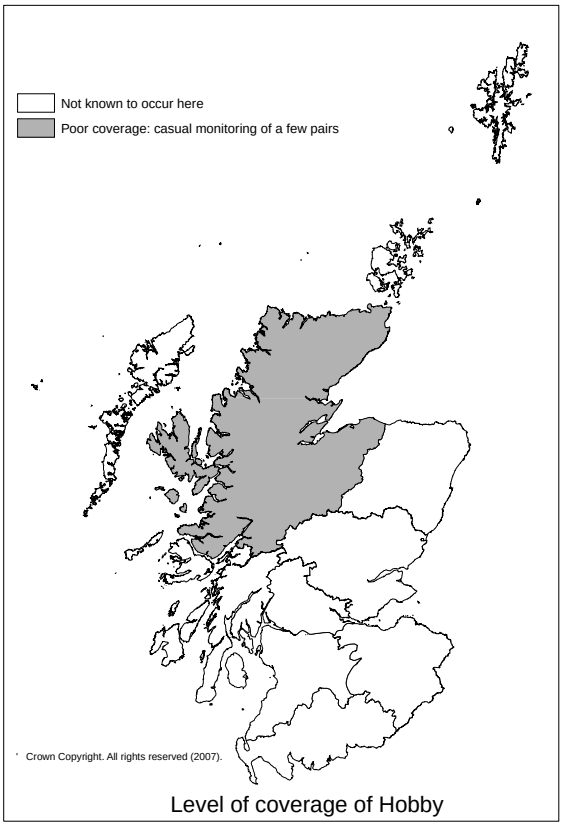
Breeding Merlin on the Uists and Benbecula faired better. Twenty-nine home ranges had signs of occupation but only fifteen pairs that laid eggs received monitoring visits. Nesting success at 73% was much higher than on Lewis and with 31 young reared, the mean brood size per laying pair was higher at 2.1.

Table 14: Breeding success of Merlins in Scotland, 2005.

Region	Home ranges checked	Home ranges with signs of occupation	Pairs laying eggs	Pairs hatching eggs	Pairs fledging young	Minimum number of young fledged
Shetland	**11**	**9**	**9**	**7**	**7**	**30**
Orkney						
- Mainland	10	10	8	8	8	31
- Hoy	7	7	4	4	4	14
- Rousay & Stronsay	3	3	3	1	1	3
sub–total	**20**	**20**	**15**	**13**	**13**	**48**
Western Isles						
- Lewis	29	28	21	14	12	32
- Uists & Benbecula	29	29	15	13	11	31
sub–total	**58**	**57**	**36**	**27**	**23**	**63**
Highland						
- Skye & Rum	12	10	7	7	7	23
- Sutherland	32	21	9	7	7	24
- Ross-shire	3	3	3	3	3	11
- Inverness	6	4	2	2	2	5
- Nairn	7	1	1	1	1	5
- West Moray	16	8	8	7	7	23
sub–total	**76**	**47**	**30**	**27**	**27**	**91**
Northeast Scotland						
- East Moray	19	11	10	9	9	24
- Lower Deeside	21	6	4	2	2	7
- Mid/Upper Deeside	32	20	16	13	12	37
- Donside	18	8	8	6	6	19
sub–total	**90**	**45**	**38**	**30**	**29**	**87**
Tayside						
- Perthshire	46	35	20	18	17	44
- Angus	22	18	10	10	10	31
sub–total	**68**	**53**	**30**	**28**	**27**	**75**
Argyll	**7**	**7**	**3**	**3**	**3**	**7**
South Strathclyde	**18**	**16**	**8**	**7**	**7**	**25**
Lothian & Borders						
- Pentland Hills	8	5	4	4	4	13
- south of Peebles	6	1	1	1	1	3
- Moorfoot Hills	6	4	2	2	2	8
- Lammermuir Hills	35	20	8	8	8	35
sub–total	**55**	**30**	**15**	**15**	**15**	**59**
Dumfries & Galloway	**6**	**6**	**5**	**5**	**5**	**15**
TOTAL	**409**	**290**	**189**	**162**	**156**	**500**



Level of coverage of Merlin



Level of coverage of Hobby

Highland

Following the disastrous breeding season in 2004 caused by torrential rain, there was improved breeding success in the west Moray study area. Eight monitored pairs laid clutches and seven successfully raised 23 young. In Sutherland, nine laying pairs were monitored and seven produced 24 young. Elsewhere in the region, 13 nests received visits and all were successful with 44 young. Overall, 76 home ranges were checked in the spring. Of these, 47 (62%) had signs of occupation and 30 monitored pairs laid eggs. There were only three recorded failures (10%) and 27 pairs reared 91 young, a mean brood size per laying pair of 3.0.

Northeast Scotland

Breeding pairs of Merlin in this region receive excellent coverage. All known home ranges are checked for occupation and breeding pairs monitored closely. Across the four study areas, 90 home ranges were checked and 45 (50%) showed evidence of occupation. Breeding occurred at 38 (84%) and 29 (76%) produced 87 fledged young. Mean brood size per laying pair was 2.3.

Tayside

There are two long-term studies of breeding Merlin in this region, in Perthshire and Angus. Together they involved the checking of 68 home ranges in the spring and 53 (78%) showed signs of occupation. Further visits were carried out at 41 home ranges and 30 nests were found and monitored. Twenty-seven nests (90%) were successful and 75 young fledged. The mean brood size per laying pair was 2.5.

Argyll

Seven occupied home ranges were reported and five were monitored further. Breeding probably occurred at all five but only three successful nests were confirmed, rearing a minimum of seven young.

South Strathclyde

Sixteen of the 18 known home ranges had signs of occupation in the spring, but only eight egg laying pairs were monitored. One pair failed and the seven successful pairs reared 25 young. Mean brood size was 3.1 young per laying pair.

Lothian & Borders

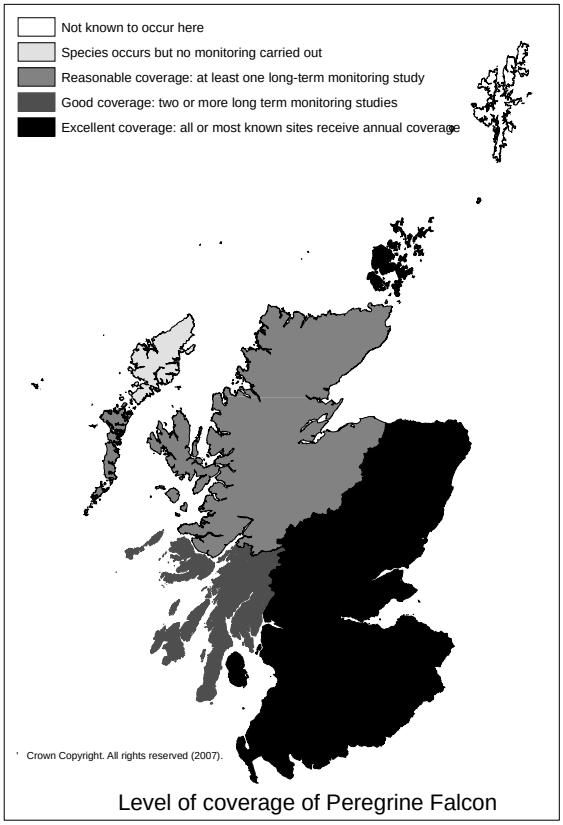
Occupancy checks were carried out at 55 home ranges covering four breeding areas of moorland and 30 had early signs of occupation. Only 15 (50%) pairs went on to lay eggs but all 15 of these bred successfully. The 59 fledged young give a mean brood size per laying pair of 3.9, an excellent result.

Dumfries & Galloway

Six occupied home ranges were located. Five breeding pairs received follow up visits. All five were successful producing 15 young. Mean brood size per laying pair was 3.0.

4.13 Eurasian Hobby
Falco subbuteo

Hobbies were again seen in the Badenoch & Strathspey district in Highland during the summer months, in areas where breeding was reported in 2001–2003. No reports of nesting were received, however, from here or any other region in Scotland.



Level of coverage of Peregrine Falcon

4.14 Peregrine Falcon
Falco peregrinus

One in six of every raptor and owl home range monitored in 2005 was that of a Peregrine, making it one of most closely studied species in Scotland. This level of commitment is very welcome, especially as in some regions there are signs that the population gains shown by this species over the past 30 years are now in reverse (Banks *et al.*, 2003). There was a decline in the breeding performance compared with 2004 and it appears that 2005 was not a good breeding season for Peregrine Falcons. This trend was reflected across all regions but particularly marked in Northeast Scotland, Tayside, Argyll and Dumfries & Galloway. Within regions, inland home ranges had lower occupancy rates than those in coastal areas (Table 15). This difference cannot be explained easily, but may be connected to differences in food availability and in some locations, persistent persecution (Hardey *et al.*, 2003). A specific research project is being developed by the SRMS to look at environmental influences on Peregrine populations (see Wernham & Humphreys (2006)).

Country wide, checks for occupancy were carried out at 572 known home ranges and pairs were found at 353 ranges (62%). Single birds were recorded at an additional 31 sites (5%). Three hundred and six pairs were monitored further and at least 289 (94%) were confirmed as breeding. There were 190 (66%) successful broods, raising 400 young. Mean overall brood size was 1.3 young per monitored occupied home range. These figures (Table 16) are lower than the equivalent figures for both 2003 and 2004.

Orkney

All known home ranges were again checked and 12 pairs and a single adult were in occupation. Breeding occurred at all nine sites that received monitoring visits, but success was poor with only four (44%) succeeding, rearing six young.

Uists

With better coverage in the Uists and Benbecula, 13 occupied home ranges were located. The breeding success of six pairs was monitored and five succeeded in rearing 14 young.

Highland

A drop in the number of home ranges monitored in Highland occurred in 2005, which is worrying in the light of the 2002 Peregrine breeding survey (Banks *et al.*, 2003) that revealed a decline in numbers in northern Scotland since the 1991 survey and that many traditional strongholds were deserted. Twenty-three home ranges were checked and 19 were found occupied. Further visits occurred at 16 ranges and 15 (94%) succeeded in rearing 34 young. Mean brood size per monitored pair was 2.1.

Northeast Scotland

Coverage was maintained at a high level with most known sites in the region receiving an initial visit. One hundred home ranges were checked and pairs were found at 53. Single birds were present at a further two locations. Fifty-one pairs were monitored further and all 51 laid clutches of eggs. Successful broods were recorded at 32 home ranges (63%). There were 64 fledged young and the mean brood size per monitored pair was 1.3.

Tayside

East of the A9 and M90 roads (including parts of Fife)
Of the thirty-seven home ranges checked in this study area, pairs were located at 18 (49%) and single birds at a further seven, the latter the highest recorded occupancy rate (19%) by single birds for any area of Scotland. Monitoring visits were carried out on 13 pairs and all were confirmed to lay eggs. There were 10 (77%) successful pairs rearing 19 young. Mean brood size per monitored pair was 1.5 young.

West of the A9 and M90 roads
In the adjoining study area west of these major trunk roads, 35 known home ranges were checked for occupation. Of these, pairs occupied 24 (69%) ranges and an additional four single birds were present. The progress of 22 pairs

Table 15: Home range occupancy rates for Peregrine Falcon pairs in Scotland, 2005.

Region	Inland (sample size)	Coastal (sample size)
Highland	**75% (12/16)**	**100% (7/7)**
Tayside & Fife		
- east of A9 & M90	49% (18/37)	-
- west of A9 & M90	69% (24/35)	-
- Angus	55% (18/33)	86% (6/7)
Central Scotland	**78% (25/32)**	**-**
Argyll		
- mainland	50% (11/22)	-
- islands	-	92% (12/13)
South Strathclyde	**51% (20/39)**	**100% (10/10)**
Lothian & Borders	**59% (44/74)**	**71% (12/17)**
Dumfries & Galloway		
- Nithsdale	38% (10/26)	-
- Galloway	50% (16/32)	-
- Moffat & Eskdale	55% (11/20)	-
- Wigton & Kirkcudbright	-	79% (19/24)
Total sample mean	**57% (209/366)**	**85% (66/78)**

was monitored and 21 were confirmed to lay eggs. Of these, 15 (68% of monitored pairs) successfully reared 29 young. Mean brood size per monitored pair was 1.3 young.

Angus inland
Thirty-three home ranges were checked in the spring and 18 pairs and a single bird were present. Follow-up visits were conducted on 13 pairs and 12 were confirmed to lay eggs. Seven pairs succeeded in rearing 16 fledged young. Mean brood size per monitored pair was 1.2 young. Occupancy of known nesting locations (55%) and breeding success (54%) was low for the second year in a row.

Angus coast
A small increase in the coastal coverage found six breeding pairs at the seven home ranges checked. Four successful pairs (67%) produced at least six young. Mean brood size per monitored pair was 1.0 young.

Central Scotland

Early spring checks of 32 home ranges located 25 pairs (78% occupancy) and 2 single birds. Seventeen pairs were monitored and 16 produced eggs. There were 13 successful pairs (76% of monitored pairs) and 25 fledged young. Mean brood size per monitored pair was 1.5 young.

Argyll

Mainland
Checks at 22 known home ranges revealed 11 pairs (50% occupancy) and 3 single birds. Nine pairs received further visits and eight were confirmed breeding. However, success was poor - only three pairs (33%) reared a single chick each. Mean brood size per monitored pair was a very low 0.3 young.

Islands (Bute, Coll, Colonsay, Islay, Mull and Tiree)
Breeding success was much higher than on the mainland. Thirteen island home ranges were checked and 12 pairs (92% occupancy) and a single bird were located. Nine breeding pairs were monitored and six (67%) succeeded in rearing 12 young. Mean brood size per monitored pair was 1.3 young.

South Strathclyde

Inland
Pairs were present at 20 (51%) of the 39 home ranges visited, with single birds present at another two. Eighteen of these received follow-up visits and 16 were confirmed as egg-layers. There were 10 successful pairs (56% of monitored pairs) rearing 22 young to fledging. Mean brood size per monitored pair was 1.2 young. These figures are very similar to the previous year.

Coast
Ten coastal home ranges were checked in the spring. All ten were occupied by Peregrine pairs and received further monitoring visits. At least nine pairs laid eggs and there was a single failure. Eight pairs (80% of monitored pairs) reared 21 young. Mean brood size per monitored pair was high at 2.1 young.

Lothian & Borders

Inland
An impressive 74 sites were checked for occupation. Forty-four pairs and a single bird were found, an occupation rate by pairs of 59%. All 44 pairs were monitored and at least 40 were known to lay eggs. Of these, 22 (50% of monitored

pairs) succeeded in rearing 49 young. Mean brood size per monitored pair was 1.1 young.

Coast
Seventeen coastal home ranges were checked and 12 pairs (71%) were present and monitored. Due to the difficulties of access to some sea cliff nest sites only eight of these pairs were confirmed to lay full clutches but it is possible that other pairs laid and failed early. Seven pairs bred successfully (58% of monitored pairs) rearing 18 young. Mean brood size per monitored pair was 1.5 young.

Dumfries & Galloway

Nithsdale
For the second year running, 26 home ranges were checked. Ten pairs (38%) and two single birds were located. Nine pairs laid full clutches of eggs but only four (40% of monitored pairs) succeeded in rearing any young. The eight fledged young gave a mean brood size per monitored pair of 0.8.

Galloway inland
A sample of 32 home ranges was visited and 16 (50%) had

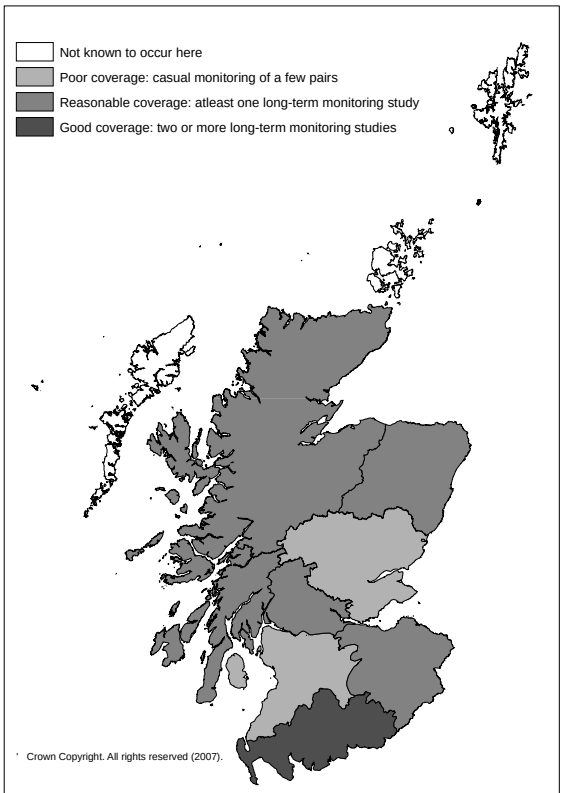
Table 16: Breeding success of Peregrine Falcons in Scotland, 2005.

Region	Home ranges checked	Home ranges occupied by pairs	Home ranges occupied by single birds	Pairs monitored	Pairs laying eggs	Pairs fledging young	Minimum number of young fledged
Orkney	**15**	**12**	**1**	**9**	**9**	**4**	**6**
Uist	**13**	**13**	**0**	**6**	**6**	**5**	**14**
Highland	**23**	**19**	**0**	**16**	**16**	**15**	**34**
Northeast Scotland	**100**	**53**	**2**	**51**	**51**	**32**	**64**
Tayside & Fife							
- east of A9 & M90	37	18	7	13	13	10	19
- west of A9 & A90	35	24	4	22	21	15	29
- Angus inland	33	18	1	13	12	7	16
- Angus coast	7	6	0	6	6	4	6
sub–total	**112**	**66**	**12**	**54**	**52**	**36**	**70**
Central Scotland	**32**	**25**	**2**	**17**	**16**	**13**	**25**
Argyll							
- mainland	22	11	3	9	8	3	3
- islands	13	12	1	9	9	6	12
sub–total	**35**	**23**	**4**	**18**	**17**	**9**	**15**
South Strathclyde							
- inland	39	20	2	18	16	10	22
- coast	10	10	0	10	9	8	21
sub–total	**49**	**30**	**2**	**28**	**25**	**18**	**43**
Lothian & Borders							
- inland	74	44	1	44	40	22	49
- coast	17	12	0	12	8	7	18
sub–total	**91**	**56**	**1**	**56**	**48**	**29**	**67**
Dumfries & Galloway							
- Nithsdale	26	10	2	10	9	4	8
- Galloway inland	32	16	2	15	14	7	15
- Moffat & Eskdale	20	11	2	11	11	6	15
- Kirkcudbright & Wigtown coast	24	19	1	15	15	12	24
sub–total	**102**	**56**	**7**	**51**	**49**	**29**	**62**
TOTAL	**572**	**353**	**31**	**306**	**289**	**190**	**400**

pairs in occupation and two had single birds. The breeding attempts of 15 pairs were monitored and 14 laid clutches of eggs. There were seven successful pairs (47% of monitored pairs) fledging 15 young. Mean brood size per monitored pair was 1.0 young.

Moffat and Eskdale
Twenty home ranges received checks. Eleven pairs (55%) and two single birds were present All 11 pairs received follow up visits and laid eggs. Six pairs (55% of monitored pairs) reared 15 young, the other five failing. Mean brood size per monitored pair was 1.4 young.

Wigtown & Kirkcudbright coast
Twenty-four known coastal eyries were checked in the spring and 19 pairs (79%) and a single adult were seen. Fifteen laying pairs were monitored and 12 (80%) had successful breeding attempts. The 24 young reared gave a mean brood size per monitored pair of 1.6.



Level of coverage of Barn Owl

4.15 Barn Owl
Tyto alba

The Scottish population of this attractive owl appears to be at a high level, which may be the result of a run of mild winters in recent years. Furthermore, due to new monitoring projects in Northeast Scotland and South Strathclyde, there was also improved coverage of this species in 2005 (Table 17). Overall in Scotland, checks were made at 316 known Barn Owl nesting locations and 253 pairs (80%) were found plus an additional 18 single birds (6%). There was a minimum of 219 laying pairs (87%) and 204 of these breeding attempts were monitored. One hundred and sixty pairs bred successfully rearing 433 young. Mean brood size per monitored breeding pair and productivity was 2.1 young and 78%. By comparison, in the previous two years, the figures for breeding success and productivity were 2.9 young and 92% in 2003, and 2.4 young and 87% in 2004. Several field workers conducting long-term studies of Barn Owls considered that 2005 was a poor one for nesting pairs, especially in the farmland areas. Vole populations had crashed leaving previously regularly successful sites either unoccupied or with non-breeding pairs.

Highland

Twenty-seven known nesting locations were checked in the spring and pairs occupied 24 (89%). Twenty-three pairs laid eggs and 22 of these attempts were monitored further. There were eight breeding failure, four during incubation and four when the young were small. Fourteen pairs (64% of monitored pairs) succeeded in rearing 35 young. Mean brood size was 1.6 per monitored breeding attempt.

Northeast Scotland

In a single farmland study, 27 (93%) of the 29 nesting locations checked were found occupied by pairs. At least 24 pairs laid eggs and were monitored. Nineteen pairs (79%) succeeded in rearing 52 young, giving a mean brood size of 2.2 per monitored breeding attempt.

Central Scotland

The results for two studies are combined. Thirty-six nesting locations were checked for occupation and pairs of owls were found at 27 (75%). Single birds were present at four of the locations (11%). Egg laying was confirmed at 24 (89%) and there were seven breeding failures, three during incubation and four at the chick stage. The 17 (71%) successful pairs reared 41 young. Mean brood size was 1.7 young per monitored breeding attempt.

Argyll

Thirty-one nesting locations were checked in the spring and pairs occurred at 30, with the other having a single bird. Twenty-six (87%) of the pairs laid eggs and the breeding success of 19 was followed up. Thirteen of these (68%) bred successfully, rearing 37 young. All six failures occurred at the egg stage of the breeding cycle. Mean brood size was 1.4 per monitored breeding attempt.

South Strathclyde

All ten nesting locations that were visited were to be occupied by Barn Owl pairs. Six of these (60%) produced clutches of eggs. Only one nesting attempt was fully monitored. This was successful producing a single chick.

Lothian & Borders

In this region, Barn Owls had a more successful breeding season than in other Scottish regions. Of 17 nesting locations checked, 16 (94%) held pairs. All 16 laid eggs and

Table17: Breeding success of Barn Owls in Scotland, 2005.

Region	Nesting locations checked	Home ranges occupied by pairs	Home ranges occupied by single birds	Pairs laying eggs	Monitored breeding attempts	Pairs hatching eggs	Pairs fledging young	Minimum number of young fledged
Highland	**27**	**24**	**0**	**23**	**22**	**18**	**14**	**35**
Northeast Scotland	**29**	**27**	**0**	**24**	**24**	**19**	**19**	**52**
Central Scotland	**36**	**27**	**4**	**24**	**24**	**21**	**17**	**41**
Argyll	**31**	**30**	**1**	**26**	**19**	**13**	**13**	**37**
South Strathclyde	**10**	**10**	**0**	**6**	**1**	**1**	**1**	**1**
Lothian & Borders	**17**	**16**	**0**	**16**	**16**	**15**	**15**	**44**
Dumfries & Galloway								
- Galloway Forest	31	18	0	14	14	12	12	33
- West Wigtonshire	99	75	13	60	58	51	44	108
- Kircudbright & Dumfries	36	26	0	26	26	25	25	82
sub–total	**166**	**119**	**13**	**100**	**98**	**88**	**81**	**223**
TOTAL	**316**	**253**	**18**	**219**	**204**	**175**	**160**	**433**

their breeding attempts monitored. There was only a single failure and 15 pairs (94%) successfully reared 44 young. Mean brood size was 2.8 young per monitored breeding attempt.

Dumfries & Galloway

There are three major long-term monitoring studies being carried out on this species in this region, each is reported separately.

Galloway Forest
Thirty-one nesting locations were checked and pairs occupied 18 (58%). Of these, 14 pairs (78%) laid eggs of which 12 (86%) succeeded in rearing 33 young. Mean brood size was 2.4 per monitored breeding attempt.

West Wigtonshire
Ninety-nine known nesting locations were checked and 75 (76%) held pairs. Single birds were present at 13 (13%) of the locations. Sixty (80%) of the pairs laid eggs and 58 of these attempts received further monitoring visits. Forty-four pairs (76%) succeeded in rearing 108 young. Mean brood size was 1.9 per monitored breeding attempt.

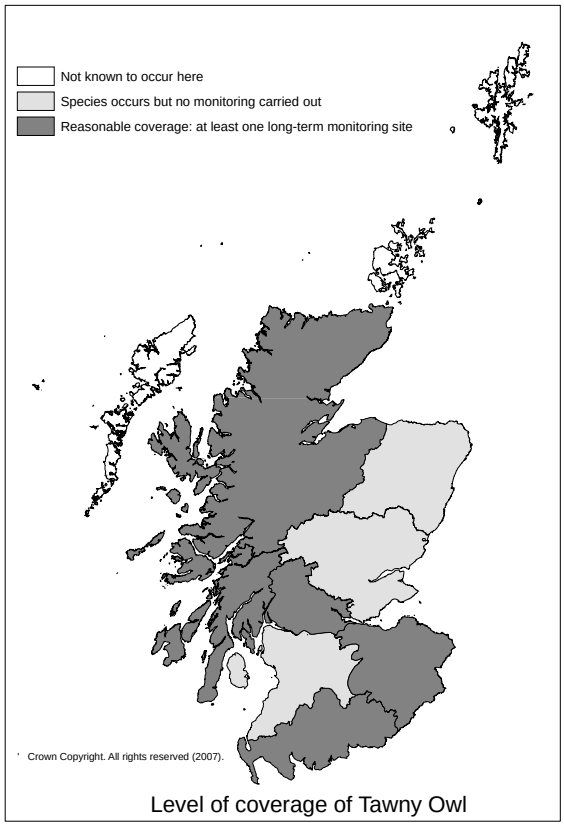
Kirkcudbrightshire & Dumfries
This study area, the most eastern of the three in the region, recorded the most successful breeding results in Scotland, comparable with the neighbouring Lothian & Borders region. Checks were carried out at 36 nesting location and 26 (72%) held Barn Owl pairs. All 26 pairs were confirmed to lay eggs and with only one failure, they had a 96% breeding success. The 82 fledged young provided a mean brood size of 3.2 per monitored breeding attempt.

4.16 Tawny Owl
Strix aluco

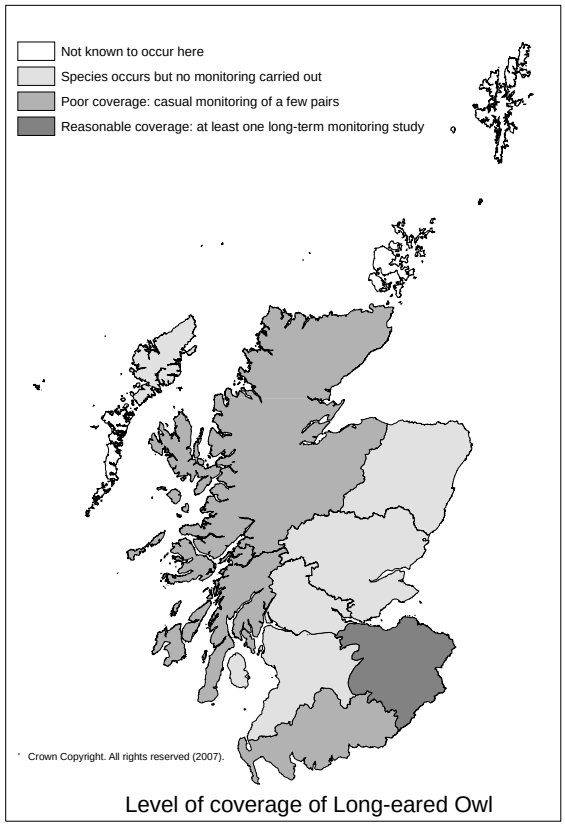
In 2005, there was a welcome 40% increase in the number of breeding pairs monitored (Table 18). There are several studies in Highland and in Lothian & Borders based around the provision of nest boxes. Of 103 boxes checked in these two regions, 59 (57%) showed evidence of occupation and 55 (53%) held laying pairs. Elsewhere, information on the number of nest boxes available and checked was not provided. Owl workers are encouraged to provide this information to ensure the reporting of this species is as complete as possible. Throughout the country, 101 nest boxes held evidence of occupation in the spring with 92 (91%) gaining breeding pairs. Sixty-three of these pairs (68%) nested successfully rearing a minimum 103 young. Mean brood size per laying pair was 1.1. Tawny Owls have apparently mirrored the two-year decline in productivity and nesting success shown by Barn Owls.

Highland

Two nest box studies are running in the region and in 2005 they had contrasting results. On the Black Isle in a scheme based in forest plantations, only three (13%) of 23 boxes had breeding pairs and only one succeeded in rearing young. Many of the boxes showed evidence of Pine Martens *Martes martes*, perhaps a significant effect. In a nearby Easter Ross study, 28 (74%) of 38 boxes contained a nesting pair. Twenty-one pairs (75%) fledged 34 young, giving a productivity of 1.2 young per laying pair. Elsewhere in the region, there were records of nine pairs breeding. Seven (78%) were successful and produced 15 young giving a mean brood size of 1.7 young per laying pair.



Level of coverage of Tawny Owl



Level of coverage of Long-eared Owl

Central Scotland

Twelve nest boxes showed signs of occupation and ten pairs of owls laid eggs. Just three (30%) were successful rearing a single chick each. Mean brood size was a low 0.3 young per laying pair.

Argyll

On the Cowal peninsula, the breeding activities of 18 pairs were monitored. There were 11 (61%) successful pairs and 15 fledged young. Mean brood size per laying pair was

Table 18: Breeding success of Tawny Owls in Scotland, 2005.

Region	Nesting boxes checked	Nesting boxes occupied	Pairs laying eggs	Pairs fledging young	Minimum number of young fledged
Highland					
- Black Isle	23	3	3	1	2
- Easter Ross	38	31	28	21	34
- other areas	11	9	9	7	15
sub–total	**72**	**43**	**40**	**29**	**51**
Central Scotland	**-**	**12**	**10**	**3**	**3**
Argyll					
- Cowal	-	18	18	11	15
- other areas	-	2	2	2	3
sub–total	**-**	**20**	**20**	**13**	**18**
Lothian & Borders	**-**	**10**	**7**	**6**	**9**
Dumfries & Galloway	**31**	**16**	**15**	**12**	**22**
TOTAL	**-**	**101**	**92**	**63**	**103**

0.8 young. Elsewhere in the region, two successful pairs reared three young.

Lothian & Borders

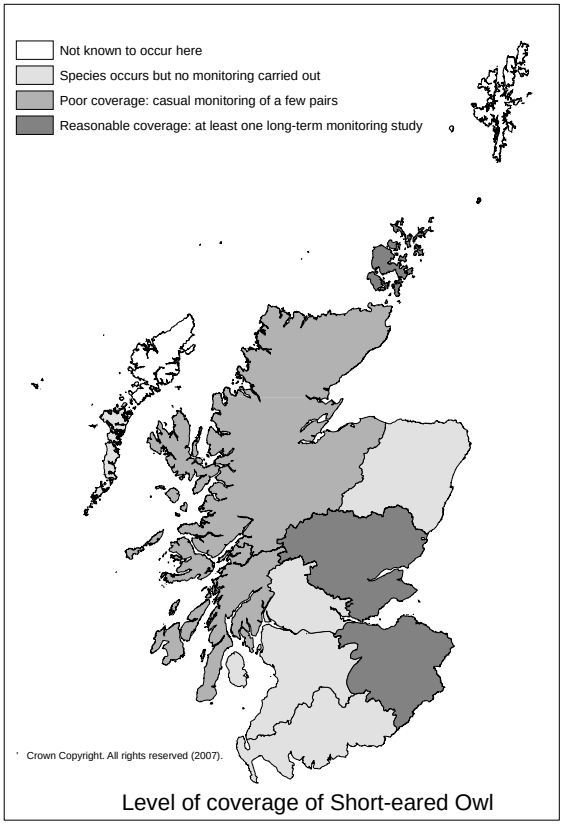
Ten nest boxes showed signs of occupation and seven were used for nesting. Six attempts were successful producing nine young. Mean brood size was 1.3 young per laying pair.

Dumfries & Galloway

In a large study of 31 nest boxes, 15 (48%) were occupied by laying birds. There were 12 (80%) successful breeding pairs producing 22 young. Mean brood size was 1.5 young per laying pair.

4.17 Long-eared Owl
Asio otus

As suggested in the 2004 report, Long-eared Owls are one of the most difficult species to monitor effectively. The number of breeding attempts recorded in 2005 was particularly low (Table 19). Fourteen occupied territories were located in the four regions that reported this species and eight laying pairs were monitored. All eight were successful, rearing a minimum of 23 young.

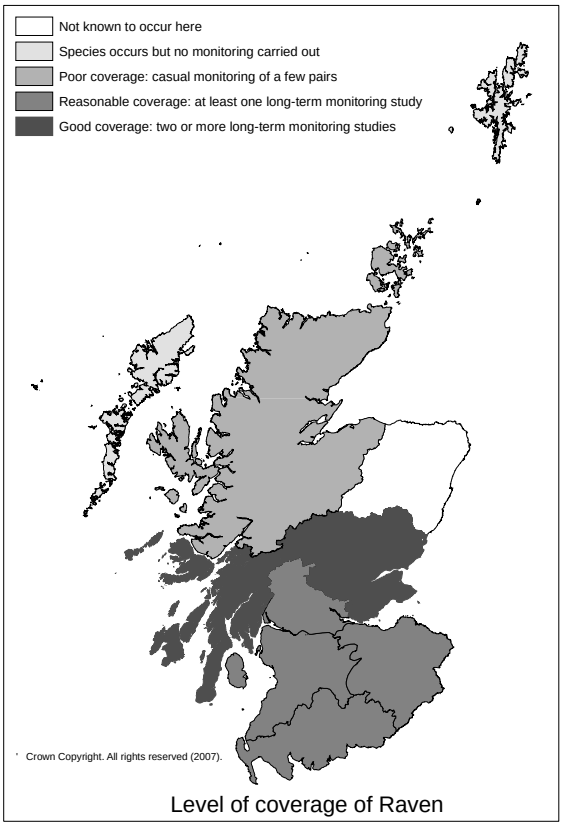


Level of coverage of Short-eared Owl

4.18 Short-eared Owl
Asio flammeus

Few raptor enthusiasts target Short-eared Owls as their focal species, with most breeding attempts being detected incidentally when carrying out fieldwork on other upland and moorland species. Hence, apparent changes in the numbers reported from one year to the next should be interpreted with caution. However, in 2005, breeding reports of this crepuscular owl declined markedly (Table 20), which has been attributed to a collapse in vole numbers. Only five occupied territories were found on Orkney compared with 42 the previous year. In Argyll, a similar situation prevailed with reported nests down from 16 to six, whilst on the extensive moors of Highland and Tayside, there were no breeding attempts reported. Countrywide, eleven nests were found but only five were monitored. All five were successful, producing a minimum of 13 young.

A number of SRMS partner organisations have together developed proposals to test survey methods for this species, with fieldwork to be undertaken during the 2006 and 2007 breeding seasons (Wernham & Humphreys, 2006).



Level of coverage of Raven

4.19 Common Raven
Corvus corax

For the third year running, there was a sizable increase in the number of nesting attempts reported, suggesting that the breeding range and population size of this charismatic species continues to expand (Table 21). However, Common Ravens are still largely absent as a breeding species from inland areas of Northeast Scotland and Moray (per I. Francis, unpublished results from NE Bird Atlas), as well as large parts of east Highland, where upland land use is dominated by grouse-moors. Visits in the early spring were made at 289 known home ranges and pairs were present at 257 (89%). The breeding success of 177 pairs was monitored and 139 (79%) fledged at least one young.

Table 19: Breeding success of Long-eared Owls in Scotland, 2005.

Region	Known territories checked for occupation	Territories showing signs of occupation	Pairs laying eggs	Pairs fledging young	Minimum number of young fledged
Highland	3	2	2	2	6+
Tayside	1	1	1	1	2+
Central Scotland	4	4	2	2	2+
Lothian & Borders	8	7	3	3	5+
TOTAL	**16**	**14**	**8**	**8**	**23+**

There were 371 young counted giving a mean brood size per breeding pair of 2.1, a figure down on last year's mean brood count of 2.5.

Highland

Four known breeding sites were checked on the mainland and were found occupied. All four pairs bred successfully, rearing ten young. Five successful nesting pairs were monitored on Isle of Eigg and 14 young were recorded fledging. Mean brood size per laying pair was 2.7.

Tayside

In the Angus and Perth & Kinross districts, checks were made at 49 home ranges and 44 (90%) were occupied. Twenty-nine laying pairs were monitored and 26 (90%) succeeded in rearing a minimum of 74 young. Mean brood size was 2.6 young per laying pair.

Central Scotland

Raven pairs occupied 29 (91%) of 32 home ranges checked. Eighteen laying pairs were monitored and 16 (89%) bred successfully. A minimum of 35 young were reared giving a mean brood size per laying pair of 1.9.

Argyll

On the islands of Colonsay, Coll, Islay, Jura and Tiree, 38 home ranges were checked and pairs occupied 34 (89%). A sample of 23 laying pairs was monitored. Fifteen pairs (65%) were successful rearing 57 young, giving a mean brood size per laying pair of 2.5. Elsewhere, on Bute and the Cowal peninsula, checks were made at 76 home ranges and pairs were found at 62 (82%). Forty-seven egg laying pairs were monitored and 31 (66%) succeeded in rearing 74 young. Mean brood size per laying pair was 1.6.

South Strathclyde

Thirty-six home ranges were checked and pairs were present at 34 (94%). Seventeen egg laying pairs received follow up visits and there was just one breeding failure. Sixteen pairs (94%) reared 44 young. The mean brood size was 2.6 young per laying pair.

Lothian & Borders

Twenty-five home ranges were checked in the spring and Ravens were present at them all. At least 18 pairs laid eggs and were monitored. There were three breeding failures with 15 pairs (83%) rearing a minimum of 40 young. The mean brood size per egg laying pair was 2.2 young.

Dumfries & Galloway

Checks were carried out at 23 home ranges for signs of occupation. Pairs were present at 19 (83%). Fifteen pairs that laid eggs received further visits and ten (67%) bred successfully, rearing a minimum of 20 young. Mean brood size was a low 1.3 young per laying pair.

Table 20: Breeding success of Short-eared Owls in Scotland, 2005.

Region	Occupied sites	Nests found	Nests monitored	Pairs fledging young	Minimum number of young fledged
Orkney	5	5	3	3	9
Highland	0	-	-	-	-
Tayside	0	-	-	-	-
Argyll	6	6	2	2	4+
Lothian & Borders	5	0	-	-	-
TOTAL	**16**	**11**	**5**	**5**	**13+**

Table 21: Breeding success of Common Ravens in Scotland, 2005.

Region	Home ranges checked	Home ranges occupied	Pairs laying eggs	Pairs fledging young	Minimum number of young fledged
Orkney	**1**	**1**	**1**	**1**	**3**
Highland					
- mainland	4	4	4	4	10
- Eigg	5	5	5	5	14
sub–total	**9**	**9**	**9**	**9**	**24**
Tayside					
- Angus	8	7	5	5	16
- Perth & Kinross	41	37	24	21	58
sub–total	**49**	**44**	**29**	**26**	**74**
Central Scotland	**32**	**29**	**18**	**16**	**35**
Argyll					
- Colonsay, Coll, Islay, Jura & Tiree	38	34	23	15	57
- Bute & Cowal	76	62	47	31	74
sub–total	**114**	**96**	**70**	**46**	**131**
South Strathclyde					
- inland	29	27	11	10	29
- coastal	7	7	6	6	15
sub–total	**36**	**34**	**17**	**16**	**44**
Lothian & Borders	**25**	**25**	**18**	**15**	**40**
Dumfries & Galloway	**23**	**19**	**15**	**10**	**20**
TOTAL	**289**	**257**	**177**	**139**	**371**

5 Acknowledgements

This publication is supported by a grant from Scottish Natural Heritage. The Scottish Raptor Monitoring Group would like to extend special thanks to members of the Scottish Raptor Study Groups who supplied much of the information on which this report is based. Further breeding data came from commissioned surveys carried out for Scottish Natural Heritage, survey work by Natural Research Ltd. and long term species monitoring programmes by RSPB Scotland, all of which we gratefully acknowledge.

The cover photograph of a Red Kite was supplied by Tony Cross of the Welsh Kite Trust and the photograph of a Common Kestrel at the nest by Gordon Riddle of the Scottish Raptor Study Groups. All other photographs are by Mark Hamblin. Copyright remains with the photographers and the Scottish Raptor Monitoring Group is most grateful for their excellent contributions which enliven this report. We also thank Julie-Ann Goodlet-Rowley and David Rowley who undertook the typesetting.

The Scottish Raptor Monitoring Officer welcomes all raptor, owl and Common Raven breeding records and can be contacted at the following address: Brian Etheridge, c/o RSPB North Scotland Office, Etive House, Beechwood Park, Inverness, IV2 3BW. brian.etheridge@rspb.org.uk

This publication should be cited as follows: Etheridge, B., Holling, M., Riley, H.T., Wernham, C.V. & Thompson, D.B.A. 2007. *Scottish Raptor Monitoring Scheme Report 2005.* Scottish Ornithologists' Club, Aberlady.

References

Anonymous (2002). *Scottish Raptor Monitoring Scheme Agreement*. Scottish Natural Heritage, Perth.

Banks, A. N., Coombs, R. H. & Crick, H. Q. P. (2003). *The Peregrine Falcon Breeding Population of the UK and Isle of Man in 2002. BTO Research Report No. 330*. BTO, Thetford.

Clements, R. (2000). Range expansion of the Common Buzzard in Britain. *British Birds* 93, 242–248.

Dennis, R. (2006). *Ospreys 2005*. Highland Foundation for Wildlife, Nethybridge.

Dennis, R. & McPhie, F. A. (2003). Growth of the Scottish Osprey Population. The Stationery Office, Edinburgh.

Eaton, M. A., Ausden, M., Burton, N., V., G. P., Hearn, R. D., Hewson, C. M., Hilton, G. M., Noble, D. G., Ratcliffe, N. & Rehfisch, M. M. (2006). *The State of the UK's Birds 2005*. RSPB, BTO, WWT, CCW, EN, EHS, and SNH, Sandy, Bedfordshire.

Eaton, M. A., Dillon, I. A., Stirling-Aird, P. K. & Whitfield, D. P. (2007). The status of the Golden Eagle *Aquila chrysaetos* in Britain in 2003. *Bird Study* 54, 212–220.

Etheridge, B. (2005). *Scottish Raptor Monitoring Report 2003*. Scottish Ornithologists' Club, Aberlady.

Etheridge, B., Holling, M., Thompson, D. B. A. & Riley, H. T. E. (2006). *Scottish Raptor Monitoring Report 2004*. Scottish Ornithologists' Club, Aberlady.

Etheridge, B., Summers, R. W. & Green, R. E. (1997). The effects of illegal killing and destruction of nests by humans on the population dynamics of the Hen Harrier *Circus cyaneus* in Scotland. *Journal of Applied Ecology* 34, 1081–1105.

Gibbons, D., Reid, J. & Chapman, R. (1993). *The New Atlas of Breeding Birds in Britain and Ireland: 1988–1991*. T. & A. D. Poyser, London.

Grant, J. (2006). *Sea Eagle project Newsletter 2005*. RSPB Scotland, Inverness.

Hardey, J., Crick, H., Wernham, C., Riley, H., Etheridge, B. & Thompson, D. (2006). *Raptors: A Field Guide to Survey and Monitoring*. The Stationery Office, Edinburgh.

Hardey, J., Rollie, C. J. & Stirling-Aird, P. K. (2003). Variation in breeding success of inland peregrine falcons (*Falco peregrinus*) in three regions of Scotland 1991–2000. In: *Birds of Prey in a Changing Environment*, Thompson, D.B.A., Redpath, S.M., Fielding, A.H., Marquiss, M. and Galbraith, C.A. (eds). The Stationery Office, Edinburgh.

Park, K. J., Calladine, J. R., Graham, K. E., Stephenson, C. M. & Wernham, C. V. (2005). *The Impact of Predatory Birds on Waders, Gamebirds, Songbirds and Fisheries Interests.* A report to Scotland's Moorland Forum by the Centre for Conservation Science, University of Stirling and the British Trust for Ornithology, Scotland. Scottish Natural Heritage, Edinburgh.

Petty, S. J. (1996). History of the Northern Goshawk *Accipiter gentilis* in Britain. In: *The Introduction and Naturalisation of Birds*, Holmes, J. S. and Simons, J. R. (eds). HMSO, London.

Sharrock, J. T. R. (1976). *Atlas of Breeding Birds in Britain and Ireland*. T. & A. D. Poyser, London.

Sim, I. M. W., Dillon, I. A., Eaton, M. A., Etheridge, B., Lindley, P., Riley, H., Saunders, R., Sharpe, C. & Tickner, M. (2007). Status of the Hen Harrier Circus cyaneus in the UK and the Isle of Man in 2004, and a comparison with the 1988/89 and 1998 surveys. *Bird Study* 54, 256–267.

Wernham, C. & Humphreys, E. (2006). The Scottish Raptor Monitoring Scheme. *BTO News* 265.

Whitfield, D. P., Fielding, A. H., Mcleod, D. R. A. & Howarth, P. F. (2004). Modelling the effects of persecution on the population dynamics of Golden Eagles *Aquila chrysaetos* in Scotland. *Biological Conservation* 119, 319–333.

Annex 1: Raptor, Owl and Common Raven nest site and home ranges data submitted under the Scottish Raptor Monitoring Scheme in 2005.

	Argyll RSG	Central Scotland RSG	Dumfries & Galloway RSG	Highland RSG	Lothian & Borders RSG	Northeast Scotland RSG	Orkney RSG	South Strathclyde RSG	Tayside RSG	Uist RSG	Shetland	RSPB Scotland	TOTAL
European Honey-buzzard	-	-	-	4	-	-	-	-	1	-	-	-	**5**
Red Kite	-	[29][a]	[15][a]	[70][a]	-	-	-	-	[12][a]	-	-	126	**126**
White-tailed Eagle	-	-	-	-	-	-	-	-	-	-	-	33	**33**
Eurasian Marsh Harrier	-	-	-	1	-	3	2	-	3	-	-	-	**9**
Hen Harrier	91	14	21	44	5	24	75	46	34	41	-	-	**395**
Northern Goshawk	-	-	22	8	53	31	-	-	2	-	-	-	**116**
Eurasian Sparrowhawk	21	10	-	3	-	-	13	49	2	-	-	-	**98**
Common Buzzard	135	100[b]	-	108	43	-	3	13	13	3	-	-	**418**
Golden Eagle	70	7	5	108	3	19	-	-	24	28	-	-	**264**
Osprey	11	21	3	108	10	18	-	-	68	-	-	-	**239**
Common Kestrel	34	15	-	11	27	14	12	38	-	-	-	-	**151**
Merlin	7	-	6	76	55	90	20	18	68	58[c]	11	-	**409**
Eurasian Hobby	-	-	-	1	-	-	-	-	-	-	-	-	**1**
Peregrine Falcon	35	32	102	23	91	100	15	49	112	13	-	-	**572**
Barn Owl	31	36	166	27	17	29	-	10	-	-	-	-	**316**
Tawny Owl	20	12	31	72	10	-	-	-	-	-	-	-	**145**
Long-eared Owl	-	4	-	3	8	-	-	-	1	-	-	-	**16**
Short-eared Owl	6	-	-	-	5	-	5	-	-	-	-	-	**16**
Common Raven	114	32	23	9	25	-	1	36	49	-	-	-	**289**
TOTAL	**575**	**283**	**379**	**606**	**352**	**328**	**146**	**259**	**377**	**143**	**11**	**159**	**3618**

[a]Red Kite totals in square brackets are included under the RSPB Scotland heading but not in the individual RSG totals.
[b]Common Buzzard totals for a study area covering parts of both Central and Tayside regions, are included under Central Scotland RSG.
[c]Merlin total for Uist RSG includes a sample of 29 from Isle of Lewis, which is currently outside their recording area.

Annex 1 shows the total number of all breeding sites and home ranges (by area) checked in 2005 and reported under the SRMS. This includes traditional nesting sites and home ranges that were found unoccupied during the visit, and also sites and home ranges which were found occupied but received no follow-up visits, so their breeding success is unknown. Some area breakdowns are not given to protect localities.

Annex 2: Raptor, Owl and Common Raven breeding attempts monitored under the Scottish Raptor Monitoring Scheme in 2005.

	Argyll RSG	Central Scotland RSG	Dumfries & Galloway RSG	Highland RSG	Lothian & Borders RSG	Northeast Scotland RSG	Orkney RSG	South Strathclyde RSG	Tayside RSG	Uist RSG	Shetland	RSPB Scotland	TOTAL
European Honey-buzzard	-	-	-	-	-	-	-	-	-	-	-	-	**0**
Red Kite	-	[21]a	[12]a	[39]a	-	-	-	-	[11]a	-	-	83	**83**
White-tailed Eagle	-	-	-	-	-	-	-	-	-	-	-	33	**33**
Eurasian Marsh Harrier	-	-	-	1	-	3	-	-	2	-	-	-	**6**
Hen Harrier	62	3	17	28	1	22	72	46	25	34	-	-	**310**
Northern Goshawk	-	-	13	1	28	22	-	-	1	-	-	-	**65**
Eurasian Sparrowhawk	8	8	-	3	-	-	10	28	2	-	-	-	**59**
Common Buzzard	62	67b	-	89	38	-	3	2	10	2	-	-	**273**
Golden Eagle	55	5	1	87	3	14	-	-	15	27	-	-	**207**
Osprey	10	18	3	81	5	17	-	-	46	-	-	-	**180**
Common Kestrel	8	15	-	11	18	14	9	17	-	-	-	-	**92**
Merlin	3	-	5	30	15	38	15	8	30	36c	9	-	**189**
Eurasian Hobby	-	-	-	-	-	-	-	-	-	-	-	-	**0**
Peregrine Falcon	18	17	51	16	56	51	9	28	54	6	-	-	**306**
Barn Owl	19	24	98	22	16	24	-	1	-	-	-	-	**204**
Tawny Owl	20	10	15	40	7	-	-	-	-	-	-	-	**92**
Long-eared Owl	-	2	-	2	3	-	-	-	1	-	-	-	**8**
Short-eared Owl	2	-	-	-	-	-	3	-	-	-	-	-	**5**
Common Raven	70	18	15	9	18	-	1	17	29	-	-	-	**177**
TOTAL	**337**	**187**	**218**	**420**	**208**	**205**	**122**	**147**	**215**	**105**	**9**	**116**	**2289**

[a]Red Kite totals in square brackets are included under the RSPB Scotland heading but not in the individual RSG totals.
[b]Common Buzzard totals for a study area covering parts of both Central and Tayside regions, are included under Central Scotland RSG.
[c]Merlin total for Uist RSG includes a sample of 21 from Isle of Lewis, which is currently outside their recording area.

Annex 2 shows the total number of all breeding sites and home ranges (by area) that were found to be occupied and which received follow-up visits in 2005, i.e. they were effectively monitored to enable a level of breeding success and productivity to be estimated. Some area breakdowns are not given to protect localities.

Figure 1: Scottish Raptor Study Group areas in 2005

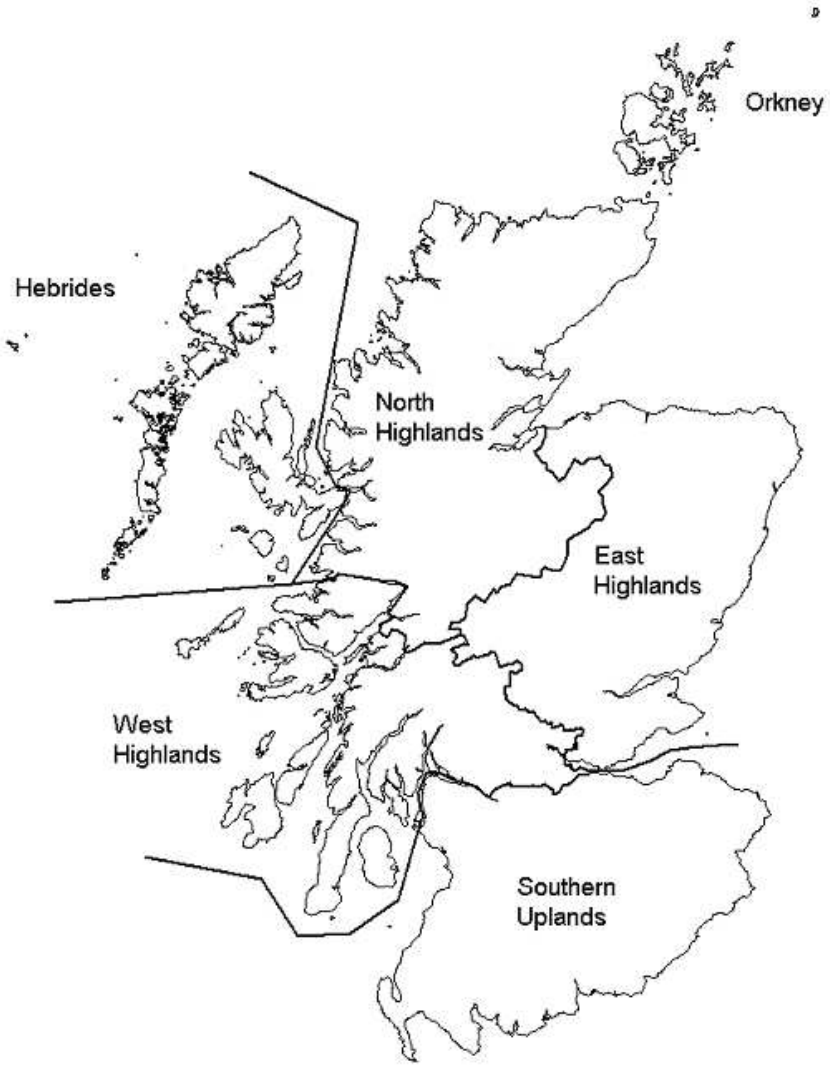


Figure 2: Location of the regions used to summarise hen harrier breeding data in this report and in the 1988/89, 1998 & 2004 national surveys (from Sim *et al.* 2007).

Published by the SOC on behalf of the
Scottish Raptor Monitoring Scheme
with financial support from Scottish Natural Heritage

ISSN 0036 9144