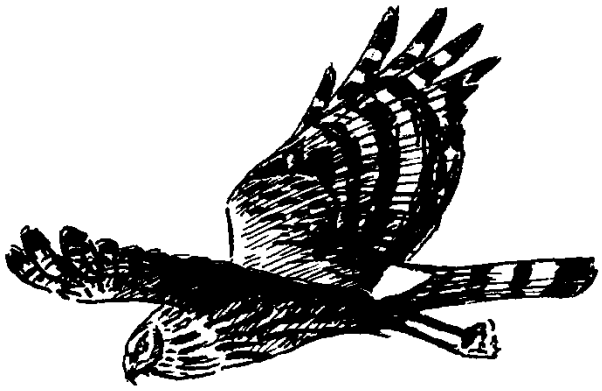
SCOTTISH RAPTOR MONITORING SCHEME

REPORT 2010



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Foreword

The publication of this 2010 report gets the Scheme's annual reporting back on track. This is the result of hard work behind the scenes, particularly by Brian Etheridge, Helen Riley and Chris Wernham. As Chair of the Scottish Raptor Monitoring Scheme since January 2010, I'm keenly aware of the annual reports' key role in disseminating the basic data collected on behalf of the Scheme, and also that their timely appearance helps generate and maintain enthusiasm for the Scheme.

That we have almost caught up with annual reporting whilst developing further work on producing raptor trends and indicators shows that everyone on the Scottish Raptor Monitoring Group is playing their part in taking the Scheme forward. Scottish Natural Heritage has funded a commissioned report on developing raptor trends and indicators, using both Scheme and RSPB data, and this will be finalised shortly (Roos *et al.* in prep.).

It is pleasing to see increased coverage of some species this year. Northern Goshawk is one of the most sensitive species from a reporting point of view as well as often being one of the most secretive species to work on, so it is good to see more information coming in and I hope that this will continue. Similarly the increase in Common Buzzard coverage is welcomed following encouragement to increase reporting on some of our commoner and more widespread raptors and owls.

2010 saw a national census of Hen Harrier in the UK and Isle of Man and it was good to see a significant proportion of the Scottish population covered by Scheme members. The results reinforce the importance of Scotland for the species but the finding of an overall decline is worrying. It appears that Orkney and a number of our west coast islands are becoming increasingly important as strongholds of the species. On a slightly more positive note there were signs of a better year and coverage for Common Kestrel, a species which continues to cause concern.

I would like to thank the following for all their work: David Stroud (Joint Nature Conservation Committee), Patrick Stirling-Aird, Wendy Mattingley, Alan Heavisides and Jon Hardey (Scottish Raptor Study Groups), Chris Wernham, Liz Humphreys, Staffan Roos and Anne Cotton (British Trust for Ornithology, Scotland), Mark Holling (Rare Breeding Birds Panel), Arjun Amar, Duncan Orr-Ewing and Jeremy Wilson (Royal Society for the Protection of Birds, Scotland), Gordon Riddle (Scottish Ornithologists' Club), Nigel Buxton, Simon Foster and Des Thompson (SNH), Brian Etheridge and Helen Riley for supporting the secretariat. In particular, I would like to thank the Raptor Monitoring Officer, Brian Etheridge, for leading the compilation of this report, and for his tireless work for the Scheme.

Andrew Stevenson
Chair of the Scottish Raptor Monitoring Group

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1 Introduction

This is the eighth report of the Scottish Raptor Monitoring Scheme, covering the year 2010. The aim of the report, as in previous years (Etheridge 2005; Etheridge *et al.* 2006, 2007, 2008, 2010, 2011, 2012) is to provide clear and factual information on breeding birds of prey in Scotland.

The Scottish Raptor Monitoring Group is moving towards making much more effective use of Scheme data to underpin raptor conservation efforts. A review of data submitted to the Scheme thus far has been completed (Roos *et al.* 2011), and we are particularly looking forward to catching up with the annual reports, to developing trends reporting for raptors in Scotland (the first trends will be published as an SNH commissioned report shortly; Roos *et al.* in prep.), and to making information available on a Scheme website.

1.1 Scottish Raptor Monitoring Scheme (SRMS)

The SRMS was established on 24 June 2002 with the signing of an Agreement by the following parties: Scottish Natural Heritage (SNH), Joint Nature Conservation Committee (JNCC), Scottish Raptor Study Groups (SRSGs), British Trust for Ornithology, Scotland (BTO), Rare Breeding Birds Panel (RBBP), Royal Society for the Protection of Birds, Scotland (RSPB), and Scottish Ornithologists' Club (SOC) (Anon. 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.

1.2 Scottish Raptor Study Groups (SRSGs)

The SRSGs form a consortium of eleven regional raptor study groups (Figure 1) active during 2010 with a combined membership of over 260 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. The majority of data submitted to the SRMS come in electronically on the MS Excel recording spreadsheet. We are very grateful to all those SRSG Members who now submit their data in this way, and encourage those that do not to please attempt this (with assistance from the RMO if required) in future. This will mean that information can be processed and reported more quickly and made available for important raptor conservation purposes.

1.3 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 BTO Scotland, 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. The group is pleased to see numbers of raptor workers increasing, and continues to promote this through the SRSG website (www.scottishraptorgroups.org/) and various publications (e.g. Thompson *et al.* 2010).

2 Breeding report 2010

2.1 Introduction

Members of the eleven regionally based raptor study groups in Scotland (Figure 1), all of which are part of the Scottish Raptor Study Groups, were the main contributors to this breeding report. Important data were also supplied by species officers employed by RSPB Scotland, primarily to monitor the reintroduced populations of Red Kite and White-tailed Eagle. Other organisations supplying data were Haworth Conservation Ltd, Natural Research Ltd and RPS Group. Rare Breeding Birds Panel data were also extracted from the annual returns to SNH and BTO by the small number of Schedule 1 licence holders who are not members of the SRSGs. Annex 1 provides a regional breakdown, based on Scottish Raptor Study Group boundaries (Figure 1), of the raptor home ranges that received at least one visit in the spring of 2010 to check on occupancy. A total of 4811 home ranges were visited, an 8% increase on the 2009 total of 4472. Not all these home ranges held pairs: some had only single birds and others were apparently vacant. If the monitoring effort is carried out rigorously each year, the occupancy rate expressed as a percentage of home ranges visited may reflect changes in population levels. Equally important are follow up visits to confirm the findings of the first visit and to monitor the nesting success of pairs present. This nesting success, normally expressed as the percentage of monitored pairs producing fledged young, together with the mean brood size, can also provide a window on the health of the population. A regional summary of monitored pairs is provided in Annex 2. This shows that 2824 potential breeding pairs received further visits enabling their nesting success to be determined. This constitutes a 9% increase on the previous year total of 2592 and is the highest total since the start of the scheme in 2003.

2.2 Observer coverage

For some of the scarcer species, such as Red Kite, Marsh Harrier, White-tailed Eagle and perhaps Osprey, a high proportion of the breeding population, reaching 90-100% for some species, is monitored each year, mainly by RSPB personnel and specialist groups. With the end of a 5 year SNH raptor monitoring contract in 2009, the coverage of the Uists was lower in 2010 than in recent years. Amongst amateur fieldworkers, the appeal of carrying out fieldwork on open moorland and mountain habitats is strong. Thus four widely but thinly spread upland species, Hen Harrier, Golden Eagle, Merlin and Peregrine Falcon, with Scottish breeding populations in the range of 400–800 pairs, receive excellent coverage, with up to 50% of the breeding population monitored annually. Also receiving good coverage are two lowland owl species, Barn and Tawny Owl, both because they readily adapt to nest boxes, thus allowing easier study. Common Buzzard and Common Raven attract support from a growing number of raptor enthusiasts, and record numbers of breeding returns for both species were received in 2010; there are, however, still several substantial regional gaps in coverage for the former species. A few species in Scotland, either because of their extreme scarcity (Honey-buzzard and Hobby), sporadic occurrence, and/or secretive behaviour (Short-eared and Long-eared Owl), present challenges as far as monitoring is concerned. Two widespread species attract little attention from the majority of field workers. Coverage of breeding Sparrowhawks and Common Kestrels needs to increase if we are to achieve effective monitoring to determine estimates of population size, annual productivity and long-term trends. This requirement is becoming ever more urgent as the declining status of these two species, in particular the Common Kestrel (Risely *et al.* 2011), is now causing concern.

2.3 Occupation of home ranges

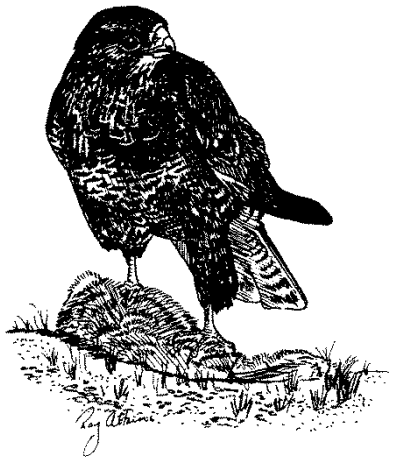
In many species of raptors and owls, breeding pairs are faithful to a home range. In some resident species such as Red Kite, Common Buzzard, Golden Eagle and Common Raven, the pair can remain together throughout the year and for at least part of the day will be on their home range. In migratory species such as Honey-buzzard, Marsh Harrier 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, Sparrowhawk and Merlin, providing the habitat remains unchanged, such 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 in short supply. 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.

Cyclic changes in the annual and seasonal abundance of the Field Vole *Microtus agrestis* can have a profound effect on the breeding success on a number of raptor and owl species (e.g. see Lambin *et al.* 2000; Petty *et al.* 2000), particularly Common Kestrel, Barn Owl and Short-eared Owl (Village 1990; Korpimäki & Norrdahl, 1991; Taylor 1994). If vole populations reach a peak during the spring and summer months, these predators can respond with an increase in the number of pairs settling to breed, and corresponding increases in brood size, nesting success and productivity. Conversely, when vole numbers are low, the reverse can occur.

The winter of 2009/2010 will be remembered as one of extreme cold, with prolonged periods of deep snow cover. Beginning in mid-December, snow and freezing temperatures extended through to the following March, making the winter comparable with those of 1946/47 and 1978/79; since 1910, only the winter of 1962/63 was colder. In northern Scotland, it was the coldest winter on record, with the highest number of days with frosts (Anon. 2012). Barn Owls are essentially a tropical species, poorly adapted for severe winter weather, and fieldwork in 2010 suggested that the population was badly hit, particularly those breeding in the upland forests of Galloway and in the Highlands. Elsewhere, an increase in the monitoring of this species may have concealed any negative impact of the cold spell on the numbers breeding. Moreover, protected by the snow cover, it seems likely that Field Vole numbers increased rapidly, peaking in the early spring in time for the start of the raptor breeding season and increasing the clutch and brood sizes of a number of species that feed extensively on them, such as Common Buzzards, Hen Harriers and all the owls.



2.4 Terminology

The terminologies used in this report have the following definitions and are based on Hardey *et al.* (2009):

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

Home range - constitutes the immediate area around the nest site and 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 and have extensive home

ranges for hunting which overlap with those of neighbouring pairs.

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, usually on more than one occasion, 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 nest and its immediate surrounds (e.g. the tree or ledge on which the nest is placed).

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, can be expressed in one of three ways: (i) as the mean number of young fledged per occupied home range; (ii) the mean number of young fledged per breeding pair, territorial pair or female laying eggs; or (iii) the mean number of young fledged per successful pair or female.

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

2.5 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 always achievable. The timing of survey visits may bias estimates of raptor breeding success. Individual fieldworkers often cover large geographical areas so first visits to different parts of the study area must necessarily be staggered, and usually areas which held breeding pairs of a target species in the previous year are prioritised. First visits to an area that occur later in the season may 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. In the early years of the SRMS, it was not always possible to determine from data submitted at what stage in the breeding cycle individual nests were found, nor in many cases of nest failure, what caused this to happen. The nest recording spreadsheet introduced at the start of 2005 (updated in 2009) and now widely adopted by raptor workers is helping to address these issues, and raptor observers are strongly encouraged to submit information on the dates that they carry out monitoring visits.

2.6 Persecution

Many factors influence the numbers, distribution and productivity of birds of prey in Scotland. A large proportion of the uplands, particularly in the south and east of Scotland, is managed for driven grouse shooting. Gamekeepers are employed to manage the heather through regular burning and

cutting to maximise the number of Red Grouse *Lagopus lagopus* available for shooting, and to control common and widespread predators such as crows *Corvus spp.*, stoats *Mustela erminea*, weasels *Mustela nivalis* and foxes *Vulpes vulpes*. However, research has shown that illegal activities directed at birds of prey such as nest destruction and the killing of sub-adults and adults, are adversely affecting the conservation and status of several species, and are associated with some intensively managed grouse moors. On many such areas some raptor species are scarce or absent and many attempts to breed fail (Etheridge *et al.* 1997; Hardey *et al.* 2003; Whitfield *et al.* 2004a & b, 2008; Fielding *et al.* 2011; Redpath *et al.* 2010). This can have a severe effect on species at a local, regional and national level by reducing the number of breeding pairs present and their breeding success. It also impacts on surrounding populations, if birds are drawn into areas of apparently suitable habitat which are unoccupied because previous inhabitants have evidently been removed – the so-called "black hole" or "ecological trap" effect (Whitfield *et al.* 2004a). Population modelling has indicated that persecution is responsible for an estimated 3–5% of annual deaths of adult golden eagles, and in the absence of this mortality the Scottish population would increase (Whitfield *et al.* 2004b, 2008). Illegal poisoning is also a major cause of poor population growth of re-introduced Red Kites in north Scotland, compared with similar populations in England (Smart *et al.* 2010). A negative association has been found between recorded incidents of Hen Harrier persecution in different areas of Scotland and the proportion of successful nests, and there is mounting evidence that illegal persecution is causing many breeding attempts to fail in a number of areas (Fielding *et al.* 2011).

Such illegal interference may diminish the enthusiasm of a volunteer raptor worker for monitoring raptors in what he or she perceives to be a hostile environment. Consequently there appears to be a shift of survey effort away from some grouse-moors, particularly where this form of land management is dominant at the regional scale. This means that:

(i) data collected on some raptor 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 may appear to have considerably higher occupancy of home ranges, breeding success and productivity than is actually the case nationally across all habitats. This is because in areas not being surveyed, occupancy may be low and mortality high compared with other habitats; and

(ii) persecution and other forms of nest failure may be under-recorded.

Ongoing SRMS work is examining differences in survey effort, habitat and the causes of breeding failure with the aim of addressing whether these issues do indeed lead to any biases in the data collected and conclusions relating to human interference.

The Scheme aims to provide intelligence and evidence relating to alleged illegal persecution to the National Wildlife Crime Unit. The Scheme makes a direct input to the Scottish Raptor Persecution Priority Delivery Group, formed recently to assist the Partnership for Action against Wildlife Crime (PAW). PAW publishes annual maps of poisoning incidents[1] which complement other sources of information on the persecution of birds of prey, such as annual reviews published by the RSPB (RSPB 2010, 2011).

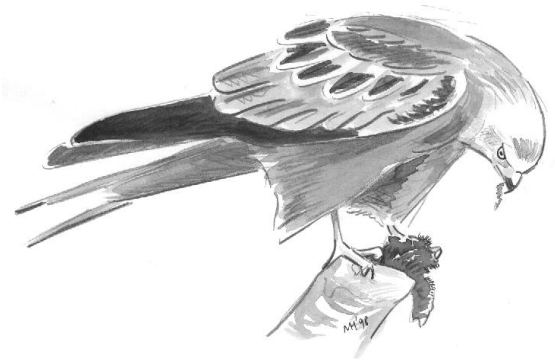
There is a growing effort to stamp out raptor persecution, which actively involves land use, conservation and enforcement bodies. The evidence base being amassed by the Scheme is vital to supporting this. A range of other ongoing studies involving satellite tracking of raptors and the development of new forensic tools is complementary to this effort, and again involves members of the Scheme.

[1] www.scotland.gov.uk/Topics/Environment/Wildlife-Habitats/paw-scotland/types-of-crime/crimes-against-birds/Poisoninghotspotmaps2010/2010

3 Species accounts

3.1 European Honey-buzzard *Pernis apivorus*

Coverage of this species in Scotland is poor, partly due to the low numbers of pairs present, the difficulty of locating an active nest and the confusion with the similar Common Buzzard, which is not closely related. Extensive mature forests of over 2000 ha, both broadleaf or conifer, are potential breeding areas (Bijlsma 1993), both in upland and lowland locations. In 2010, three areas in the north of Scotland where the species has bred in the past were visited but there were no signs of occupation. At a location in the south of Scotland, a pair was present and breeding was probably attempted but was thought to fail due to forestry operations.



3.2 Red Kite *Milvus milvus* (Tables 1 & 2)

The first six Red Kites, collected under licence from the Swedish breeding population, were released on the Black Isle in 1989, starting a reintroduction process that has seen a further ten schemes established throughout England, Ireland and Scotland. The results have been so successful that when combined with the original Welsh population, the estimated UK and Ireland Red Kite breeding population in 2010 was over 2,200 pairs (Anon. 2011). Red Kites have achieved this because they are capable of breeding when only one year old, though most do not breed until their second or third year. Furthermore, they enjoy relatively high breeding success and annual survival. However, in northern Scotland, low recruitment of birds in their first and second years due to illegal poisoning and direct persecution in some areas managed for game shooting, particularly grouse moors, has slowed the population growth (Smart *et al.* 2010). Furthermore, this research has shown that in the absence of this killing, the growth rate of the kite population in North Scotland, where persecution appears particularly severe, would be closer to that of the kite population in southern England; the latter population is currently estimated at 800 pairs (Anon. 2011). On a more encouraging note, the Aberdeen reintroduction scheme, only two years after the first breeding attempt, recorded eleven territorial pairs, seven successful nests and at least 16 fledged young. Breeding Red Kites received high monitoring coverage by RSPB staff at the four reintroduction areas in 2010 and most pairs were located and their breeding success followed: 248 known home ranges were checked and pairs were present at 173 (70%). The breeding attempts of 167 pairs were monitored. Five pairs failed early or were non-breeding but the majority, 162, were confirmed to lay eggs. One hundred and forty-four pairs (86% of monitored pairs) succeeded in hatching eggs and 134 fledged at least one young (80%). There were 293 fledged young, giving a mean brood size per monitored pair of 1.8 fledged young.

3.3 White-tailed Eagle *Haliaeetus albicilla* (Tables 3 & 4)

In contrast to most small or medium sized raptors, eagles have delayed sexual maturity and low rates of reproduction. Therefore, growth of a reintroduced population of a species such as White-tailed Eagle will occur at a slower rate than that of a species like the Red Kite, with a faster breeding rate (Evans *et al.* 2009). Nevertheless, the past ten years have seen the Scottish White-tailed Eagle breeding population more than double, with a four-fold increase in the number of young reared. Moreover, 2010 was by far the most successful year since the start of the reintroduction scheme 35 years ago. At least 52 territorial pairs were located and 47 pairs were confirmed to lay eggs. Of these,

33 (70%) successfully reared 46 young to fledging. Evans *et al.* (2010), examined habitat characteristics where White-tailed and Golden Eagles are overlapping in range in Scotland, and found that overlap in diet and habitat use was more limited than has been suggested and therefore competition between the species was less likely to be a constraint where they occur together.

3.4 Marsh Harrier *Circus aeruginosus* (Table 5)

Despite the species' strong population growth in England and on the Continent, in Scotland the Marsh Harrier remains a very scarce summer visitor and breeder. Most, if not all, of the nesting pairs are concentrated in one location – the vast reed-beds of the Tay Estuary. The species is regularly seen on passage, often inland over open moorland, where it may be at risk of persecution. There were just four breeding attempts recorded in 2010, and all were successful with 11 young reared. Two broods of three and two young were provisioned by a single bigamous male.

3.5 Hen Harrier *Circus cyaneus* (Tables 6 & 7)

The fourth national breeding survey of Hen Harrier was carried out in 2010. The results show that the population in the UK and the Isle of Man has declined significantly since the previous survey in 2004 (Hayhow *et al.* in prep). The estimated population was 662 pairs of which 505 (76%) were in Scotland. This represents a 20% decline from the 633 territorial pairs estimated in Scotland in 2004. The West Highlands again held the largest population (194 pairs) with the lowest mainland population (57 pairs) present in Southern Uplands. The regions used to summarise the Scheme data (Table 6) are the same as those used for the national survey (Figure 2). While helping with the 2010 national survey (Hayhow *et al.* in prep), Raptor Study Group members and others visited 383 known home ranges in 2010, and 240 (63%) were found occupied by Hen Harrier pairs. The breeding attempts of 222 of these pairs were monitored. Forty pairs (18%) failed early, disappeared under unknown circumstances or did not appear to breed. Of the 182 pairs that were confirmed to lay eggs, a further 74 (33%) failed either during incubation or at the chick stage. The 108 successful pairs recorded (49% of those monitored) fledged a minimum of 308 chicks. The mean number of young fledged per monitored occupied home range was 1.4. All these figures are below the seven year average for 2003-2009 (Table 7) and may suggest a deteriorating situation for this species in the uplands.

3.6 Northern Goshawk *Accipiter gentilis* (Tables 8 & 9)

The number of breeding pairs of Goshawk located and monitored each year is showing a welcome increase (Table 8). In 2010, breeding pairs were recorded in six regions, the most so far, although the core population in Scotland appears to be confined to just three of them. Nevertheless, the results for the year are encouraging, representing the highest annual number of pairs located, laying eggs and fledging young, and the highest total number of young raised to date (Table 9). Visits were made to 143 home ranges and pairs were detected at 97 ranges (68%), with single birds detected at a further 13 (9%). All 97 pairs were followed up, five (5%) failed early or were not breeding, the remaining 92 pairs all laying eggs. From these, 78 (80%) were known to hatch their eggs and 75 (77%) fledged at least one young. Mean fledged brood size per monitored breeding pair was 1.9 young, slightly less than the 2009 estimate of 2.0.

3.7 Eurasian Sparrowhawk *Accipiter nisus* (Table 10)

Following the impressive increase in monitoring experienced in 2009, when 177 home ranges were visited and 89 breeding pairs monitored, 2010 saw a disappointing decline of around 30% with only 128 home ranges and 61 breeding pairs checked and monitored respectively. Sparrowhawks feed primarily on small farmland and woodland birds. As such, the hawks abundance and breeding success generally reflects that experienced by their

prey. Nesting success recorded in 2010 was 87%, with a mean fledged brood size per occupied monitored home range of 2.6 that is higher than that recorded in recent years.

3.8 Common Buzzard *Buteo buteo* (Table 11)

The Common Buzzard has undergone a remarkable recovery in distribution and abundance. Throughout the UK, and in little over 20 years, Common Buzzards have colonised most of the agricultural low ground in the east of the country from which they have been absent for so long (Moore 1957). In 2010, the records submitted to the SRMS indicate Common Buzzards to be, by far, the most monitored raptor species in Scotland. The number of home ranges checked was 913, a 33% increase in the number monitored compared with 2009. Of these, 672 (74%) were occupied by possible or confirmed breeding pairs. Follow-up visits were made to 495 pairs; 52 (11%) failed early or were non-breeders and of the 443 (89%) that were confirmed to lay eggs, 407 (82%) reached the hatching stage and 400 (81%) succeeded in rearing at least one young, the highest recorded percentages so far. At least 674 young were known to fledge, the mean brood size of 1.4 fledged young per monitored pair occupied home range is close to the long term average.

3.9 Golden Eagle *Aquila chrysaetos* (Tables 12 & 13)

Golden Eagles have attracted a lot of publicity and attention in recent years, much of it because of ongoing persecution of this species in the uplands: four poisoned birds were recorded in 2010 (RSPB 2011). As a breeding species, they have been surveyed nationally on three occasions, in 1982-83 (424 pairs), 1992 (422 pairs) and 2003 (442 pairs). These results indicate stability in the number of pairs between 1982-83 and 1992, followed by a small increase in 2003. In this last survey, recorded increases in the Hebrides were partially offset by declines in the eastern and south-central Highlands (Eaton *et al.* 2007). There are currently about 700 known home ranges in Scotland, including historic, vacant and active ones. Since 2004, records submitted to the Scheme indicate a steady increase in the number of home ranges checked for occupancy and the number of occupied ranges receiving monitoring visits. In 2010, 352 home ranges were checked for occupancy (Table 12). There were signs of occupation at 305 (87%): 269 by pairs (88%) and 36 (12%) by single, often immature birds. The breeding output of 252 pairs was followed in 2010. Failure to lay eggs or early loss of a clutch were the main causes of breeding failure, involving 71 pairs (28%). A further 54 losses (21%) occurred during incubation and 12 (5%) during chick rearing. The 115 (46%) successful nests recorded 140 fledged young. Single chicks were reared by 90 Golden Eagle pairs (78%) and 25 pairs (22%), mainly by those in the east of the range, raised two. The mean fledged brood size per monitored pair was 0.56 young; the highest recorded since 2004 (Table 13).

3.10 Osprey *Pandion haliaetus* (Table 14)

No longer a species unique to the Scottish Highlands, Ospreys have extended their range throughout Scotland over the last 30 years and have established small populations in England and Wales; some of these pairs are due to a successful introduction scheme in central England in the 1990s (Appleton *et al.* 1997). During the last decade, the number of pairs breeding in southern, western (i.e. Argyll) and central Scotland has increased. This trend is expected to continue for the

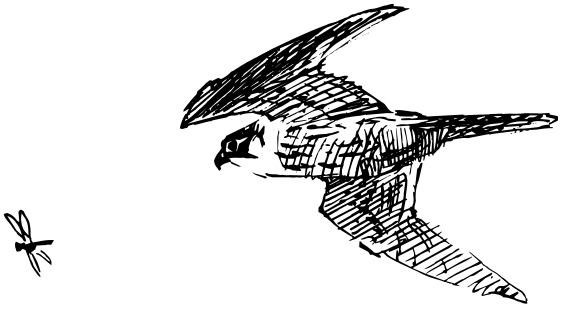
foreseeable future. Nevertheless, the north of Scotland, including Aberdeenshire and Highland Perthshire, remains the British stronghold. Ospreys have yet to colonise the islands of the western seaboard or in the far north, despite a seemingly plentiful supply of attractive feeding habitat for fishing and the presence of numerous fish-farms and hatcheries. In 2010, pairs were present at 193 (84%) of the 229 breeding sites checked and 190 pairs were subsequently monitored. Early failure or non-breeding affected 24 pairs (13%) and a further 22 pairs (12%) that laid eggs also failed. However, overall breeding success at 76% was high and 144 pairs produced a minimum of 306 young. Mean fledged brood size per monitored pair was 1.6 young, a figure identical to the previous year.

3.11 Common Kestrel *Falco tinnunculus* (Table 15)

2010 appears to have been a good year for breeding Common Kestrels in Scotland. There was an increase in monitoring effort, more pairs were located and a higher proportion of them bred successfully. However, there is still a need for a further substantial increase in the monitoring of this species. For example, if each active Raptor Study Group member monitored one additional pair, the annual sample of nest histories would more than double. Better still, if two extra groups of observers were able to adopt a study area each and follow a sufficient sample of pairs each year, following Gordon Riddle's highly successful studies in Ayrshire (Riddle 2011), this would make a huge contribution to our understanding of the species in Scotland and the reasons for the apparent declines that are occurring currently (Risely *et al.* 2011). In 2010, 123 known nest sites were visited and pairs were present at 98 (80%). Of these, 77 received further visits and 71 were successful. Nesting success at 92% was high and an absolute minimum of 222 young were reared. Mean brood was 2.9 fledged young per monitored pair but this is likely to be much higher as 21 of the fledged broods could not be counted and were credited with only one or two chicks each.

3.12 Merlin *Falco columbarius* (Table 16)

Three national breeding surveys have been carried out on Merlins, in 1983-84, 1993-94 and in 2008. The most recent suggested the population has remained relatively stable since 1993-94, with an estimated population of 1162 pairs in the UK and 1128 pairs (95% CL: 849–1427) in Britain (Ewing *et al.* 2011). Scotland again held the highest number with 733 pairs (63% of the UK total), a non-significant decline of 7% on the 1993-94 estimate. In 2010, checks were made on 400 home ranges in the spring. Of these, 201 (50%) showed evidence of Merlin presence and 168 (42%) held a pair; 133 received follow up visits and 113 (85%) reached the fledging stage. There were at least 335 young, but it is probable that more were reared as many broods could not be accurately counted and therefore only minimum figures for brood size at fledging were recorded. Mean brood size at 2.5 young per monitored pair was slightly lower than 2009, as was both home range occupancy and breeding success.



3.13 Eurasian Hobby *Falco subbuteo*

A single breeding pair was recorded at a long established site in Highland in 2010. The nesting attempt, high in an old crow nest at the top of a mature Scots Pine, was successful and three young fledged. One of the chicks was fitted with a satellite transmitter and the young bird was tracked to wintering grounds in West Africa, the first time this has been done in the UK.

3.14 Peregrine Falcon *Falco peregrinus* (Tables 17, 18 & 19)

The most recent national survey in 2002 (Banks *et al.* 2010), revealed the number of breeding Peregrines in UK and Isle of Man was the highest ever recorded and that the population recovery within UK since 1991 had continued (Crick & Ratcliffe 1995). However, this general increase was the product of differing regional changes, with a rapid expansion in southern England, stability or small increases in south Scotland and continuing declines in northern and western Scotland. Also within regions there were noticeable differences; in north-east Scotland, there was a 50% increase in occupancy at coastal sites and a 19% decline at inland ones. Both reduced food supply and increased persecution were implicated in the inland declines.

In 2010, visits were made to 554 home ranges. Single birds were present at 33 home ranges (6%), pairs were seen at 280 (50.5%) and 241 home ranges (43.5%) were vacant. The breeding success of pairs on 262 home ranges was monitored. Thirty-two pairs failed at a very early stage, disappeared following earlier occupation, or were apparently not breeding. Clutches of eggs were confirmed laid by 230 pairs, from which 192 pairs reached the hatching stage and 181 (69%) were finally successful, fledging a minimum of 438 young. This gives a mean fledged brood size per monitored pair of 1.7 young. Both breeding success and mean fledged brood size are the highest since the start of the SRMS in 2003. Regretably, since 2008, monitoring of the important Peregrine population in North-east Scotland has almost ceased and it is very much hoped that raptor enthusiasts in this region will be able to increase monitoring effort on this species once more.

Table 18 shows variation in home range occupancy by habitat. Occupancy was lowest in habitats classed either as 'grouse moor' (37%) or 'other moorland' (43%) and in both, more than half of the home ranges checked were vacant. Occupancy was highest in 'lowland farmland' (71%). Table 19 examines breeding success by habitat and again 'grouse moor' was lowest both in fledging success (65%) and mean brood size (1.4), whilst 'urban/industrial' (a habitat that includes man-made structures such as bridges and buildings and also operational quarries) had the highest in both categories, 80% and 2.1 respectively. These results add support to the findings of a recent study that examined the impact of grouse moor management on Peregrine populations across northern England (Amar *et al.* 2011).

3.15 Barn Owl *Tyto alba* (Table 20)

Barn Owls are particularly vulnerable to prolonged periods of snow cover and frosts, and the winter of 2009/2010 was the most severe experienced in the UK for 27 years. From the middle of December, heavy snow and freezing temperatures with record breaking lows occurred on a daily basis until the end of January, with further heavy snow falls at the end of February in Scotland. Many Barn Owls died during this period and the 1019 ringed birds recovered during the year represented over 10% of the grand total recovered in the previous 100 years suggesting mortality on a very large scale (Clark *et al.* 2011). It seems likely that those pairs resident in upland areas of Scotland were almost completely wiped out or were forced to move to lower ground. This was apparent in the Galloway Forest population in the south-west Scotland (G. Shaw, pers. comm.). Despite this, the 2010 breeding season turned out to be very successful for the species.

Of the 545 nesting sites checked, most of them nest boxes, 60 (11%) held single birds and 347 (64%) had pairs, the latter a 6% increase on 2009. Follow-up visits were made on 330 pairs and 312 (95%) pairs were confirmed to lay clutches of eggs. Hatching success (93%) and fledging success (91%) were high and a minimum of 919 young fledged successfully. Mean fledged brood size per monitored pair was 2.8 young. All these figures are an improvement of previous years. Given that the winter snow apparently enabled the vole population to peak; this may have encouraged more of the surviving pairs of Barn Owls to nest and to experience higher breeding success and productivity.

3.16 Little Owl *Athene noctua*

Following the single breeding record in 2009, there were no records submitted for this species in 2010.

3.17 Tawny Owl *Strix aluco* (Tables 21 & 22)

In 2010, 137 nest sites (mostly nest boxes) were checked, a slight increase over the previous year. Tawny Owl pairs were present in 90 (66%) and 86 were later revisited and laid eggs. Seventy pairs reached the hatching stage (81%) and 66 (77%) reared at least one young. There were at least 122 fledged young, giving a mean brood size per monitored pair of 1.4 young. These figures are much higher than in 2009 and show a return to the long-term average for 2003-2009 (Table 22).

3.18 Long-eared Owl *Asio otus* (Table 23)

This under-recorded species again proved elusive, with signs of occupation at 24 (86%) of the 28 known breeding territories visited. At these, just 15 laying pairs were confirmed and all 15 were successful, fledging at least 28 young.

3.19 Short-eared Owl *Asio flammeus* (Table 24)

Data submitted to the SRMS in 2010 indicated that Short-eared Owls had a better breeding season than the previous year. There were 56 reports of pairs present in suitable breeding habitat together with an additional 14 single birds seen. Of the 27 nests found and monitored, 24 (89%) reared young. Because the young owlets disperse away from the nest long before they can fly, it is always difficult obtaining an accurate figure on the number reared. However, at least 74 young were counted, suggesting that 2010 was a good breeding season for the species and that a mean of 2.7 young per monitored nest was reared. It seems likely that the high vole numbers that occurred following the prolonged snow cover benefitted this species too.

3.20 Common Raven *Corvus corax* (Table 25)

The increase in monitoring effort over the past eight years was maintained in 2010 with visits made to 503 home ranges, 9% higher than the number visited in 2009. Raven pairs were present at 436 (87%) home ranges and 343 received further visits. Non-breeding or early failure affected 26 pairs (8%) but 299 pairs were confirmed to lay eggs. Of these, 283 pairs hatched eggs and 279 pairs reared a minimum of 731 young. Hatching success at 95% and fledging success at 93% were

very high figures compared to recent years, and may possibly be a hard weather effect – the increased availability of carrion leading to better breeding condition and an abundant food supply for young. This was not reflected in the mean fledged brood size of 2.1 young per monitored pair, which remained close to average. However, in most of the study areas the number of fledged young could not be counted accurately and minimum figures were supplied for many successful nests. It is likely that the true number of young fledged is higher than that estimated by an unknown amount.

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6 Species Tables

Table 1. Population growth and breeding success of Red Kites in Scotland, 1992-2010. The mean values given for the final columns are the unweighted means, i.e. the sample size for each year has not been taken into consideration.

Year [1]	Pairs laying eggs	Pairs fledging young	Total young fledged	% of pairs that fledged young	Productivity: young laying pair
1992	1	1	1	100.00	1.00
1993	5	3	7	60.00	1.40
1994	8	7	13	87.50	1.63
1995	15	11	26	73.33	1.73
1996	17	16	39	94.12	2.29
1997	23	19	39	82.61	1.70
1998	25	22	49	88.00	1.96
1999	34	27	59	79.41	1.74
2000	39	35	86	89.74	2.21
2001	43	38	95	88.37	2.21
2002	50	43	112	86.00	2.24
2003	54	48	106	88.89	1.96
2004	60	49	115	81.67	1.92
2005	76	61	131	80.26	1.72
2006	84	69	151	82.14	1.80
2007	93	73	162	78.49	1.74
2008	121	97	210	80.00	1.74
2009	152	113	235	74.34	1.55
2010	162	134	293	82.72	1.81
TOTAL	**1062**	**866**	**1929**	**81.54**	**1.82**

[1] Breeding in North Scotland started in 1992, in Central Scotland in 1998, in Dumfries & Galloway in 2003 and in Aberdeen in 2008.
[2] Some totals published in earlier reports have been corrected in this table

Table 2. Breeding success of Red Kites on Scotland in 2010.

Region	Home ranges checked	Pairs located	Pairs monitored	Pairs failing early or non-breeding	Pairs laying eggs	Pairs hatching eggs	Pairs fledging young	Minimum number of young fledged
Highland	81	53	51	2	49	43	36	85
Aberdeenshire	11	11	11	2	9	7	7	16
Perthshire	54	36	32	0	32	30	30	66
Stirling	48	21	21	0	21	15	14	28
Dumfries & Galloway	54	52	52	1	51	49	47	98
Grand total	**248**	**173**	**167**	**5**	**162**	**144**	**134**	**293**

Table 3. Breeding success of White-tailed Eagles in Scotland in 2010.

Study area	Pairs monitored	Pairs laying eggs	Pairs hatching eggs	**Pairs fledging young**	**Minimum number of young fledged**
Skye, Lochalsh & Small Isles	17	13	6	6	8
Argyll islands	13	12	12	11	15
Western Isles	12	12	8	8	15
NW Mainland	10	10	8	8	8
Grand total	52	47	34	**33**	**46**

Table 4. White-tailed Eagle breeding success and productivity in Scotland, 1996-2010.

Year	**Territorial pairs monitored**	**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	8	7	9	0.75	0.75
1997	14	11	6	5	9	0.82	0.64
1998	19	16	9	9	13	0.81	0.68
1999	20	16	9	6	11	0.69	0.55
2000	22	19	12	8	12	0.63	0.55
2001	23	17	10	7	11	0.65	0.48
2002	25	22	14	8	12	0.55	0.48
2003	31	25	20	16	26	1.04	0.84
2004	32	28	19	15	19	0.68	0.59
2005	33	28	21	17	24	0.86	0.73
2006	36	31	25	21	29	0.94	0.81
2007	42	35	31	24	34	0.97	0.81
2008	44	35	21	20	28	0.80	0.64
2009	46	39	31	24	36	0.92	0.78
2010	52	47	34	33	46	0.98	0.88
Total	**451**	**381**	**270**	**220**	**319**	**0.84**	**0.71**

Table 5. Breeding success and productivity of Marsh Harriers in Scotland, 2003-2010.

Year	**Pairs located**	**pairs laying eggs**	**Pairs fledging young**	**Minimum number of young fledged**
2003	6	6	5	17
2004	8	5	5	15
2005	9	6	5	17
2006	9	7	7	20
2007	8	5	2	3
2008	4	4	2	3
2009	6	3	3	10
2010	4*	4	4	11

*one male in 2010 was polygamous

Table 6. Breeding success of Hen Harriers in Scotland in 2010. For this species, the regions are those used to summarise the findings of national surveys carried out in 1988/89, 1994, 2004 and 2010 (Figure 2).

Region	Home ranges checked	Home ranges occupied by pairs	Occupied home ranges monitored	Pairs failing early or non-breeding	Pairs known to lay eggs	Pairs known to hatch eggs	Pairs known to fledge young	Minimum number of young fledged
Orkney								
West Mainland	46	45	45	12	33	18	16	56
East Mainland	6	6	6	1	5	4	4	14
Rousay	7	7	7	2	5	3	3	6
Hoy	13	12	12	2	10	8	8	21
Sub-total	**72**	**70**	**70**	**17**	**53**	**33**	**31**	**97**
Hebrides								
North Uist	9	9	1	0	1	1	1	2
Benbecula	8	6	5	0	5	5	5	8
South Uist	2	2	2	0	2	2	2	6
Skye & Eigg	21	14	13	1	12	11	5	15
Sub-total	**40**	**31**	**21**	**1**	**20**	**19**	**13**	**31**
North Highlands								
Sutherland	14	11	11	**0**	11	8	6	13
Ross & Inverness	10	10	9	0	9	6	6	18
Sub-total	**24**	**21**	**20**	**0**	**20**	**14**	**12**	**31**
East Highlands								
Moray	19	9	9	1	8	6	4	13
Aberdeen	2	2	2	1	1	1	1	3
Angus	23	0	0	0	0	0	0	0
Perthshire	54	45	42	6	36	29	21	54
Sub-total	**98**	**56**	**53**	**8**	**45**	**36**	**26**	**70**
West Highlands & Islands								
Central	19	3	3	0	3	3	3	4
Kintyre & mid-Argyll	12	8	7	0	7	3	3	5
Cowal & Bute	14	8	8	4	4	4	4	14
Islay, Colonsay & Coll	17	11	8	0	8	6	5	15
Sub-total	**62**	**30**	**26**	**4**	**22**	**16**	**15**	**38**
Southwest & Southern Uplands								
South Strathclyde	76	21	21	7	14	10	6	22
Lothian & Borders	2	2	2	0	2	2	2	6
Dumfries & Galloway	9	9	9	3	6	3	3	13
Sub-total	**87**	**32**	**32**	**10**	**22**	**15**	**11**	**41**
Grand total	**383**	**240**	**222**	**40**	**182**	**133**	**108**	**308**

Table 7. Home range occupancy and breeding success of Hen Harriers in Scotland, 2003-2010.

Year	Home ranges checked	Home ranges occupied by pairs	%	Monitored pair occupied home ranges	Pairs known to lay eggs	%*	Pairs known to fledge young	%*	Minimum number of young fledged	Mean brood size per successful nest	Mean brood size per pair laying	Mean brood size per monitored occupied home range
2003	379	335	88	303	271	89	171	56	529	3.1	2.0	1.7
2004	457	417	91	359	236	91	219	61	630	2.9	1.9	1.8
2005	395	342	87	310	268	86	175	56	466	2.7	1.7	1.5
2006	428	355	83	278	223	80	144	52	381	2.6	1.5	1.4
2007	415	298	72	253	213	84	147	58	432	2.9	2.0	1.7
2008	422	311	74	311	232	75	128	41	370	2.9	1.6	1.2
2009	365	232	64	208	162	78	108	52	326	3.0	2.0	1.6
2010	383	240	63	222	182	82	108	49	308	2.8	1.7	1.4

* expressed as a percentage of monitored pair occupied home ranges

Table 8. Home range occupancy and breeding success of Northern Goshawks in Scotland, 2003-10.

Year	Home ranges checked	Home ranges occupied	%	Pairs known to lay eggs	Pairs known to fledge young	%	Minimum number of young fledged
2003	117	84	72	62	52	84	121
2004	132	86	65	67	60	90	126
2005	116	81	70	58	47	81	117
2006	116	78	67	60	48	80	108
2007	136	87	64	70	60	86	127
2008	139	89	64	70	61	87	163
2009	128	85	66	77	68	88	167
2010	143	97	68	92	75	82	182

Table 9. Breeding success of Northern Goshawks in Scotland in 2010.

Region	Home ranges checked	Home ranges occupied by pairs	Further home ranges in use[1]	Home ranges monitored	Pairs failing early or non-breeding	Pairs known to lay eggs	Pairs known to hatch eggs	Pairs known to fledge young	Minimum number of young fledged
Highland	2	1	0	1	0	1	1	1	2
North-east Scotland	57	46	0	46	3	43	35	32	77
Tayside	4	1	2	1	0	1	1	1	2
South Strathclyde	2	2	0	2	0	2	2	2	4
Lothian & Borders	54	28	11	28	1	27	23	23	57
Dumfries & Galloway	24	19	0	19	1	18	16	16	40
Grand total	**143**	**97**	**13**	**97**	**5**	**92**	**78**	**75**	**182**

[1] Fresh signs or single birds recorded

Table 10. Breeding success of Sparrowhawks in Scotland in 2010.

Region	Home ranges checked	Home ranges occupied by pairs	Occupied home ranges monitored	Pairs failing early or non-breeding	Pairs known to lay eggs	Pairs known to hatch eggs	Pairs known to fledge young	Minimum number of young fledged
Lewis & Harris	1	1	1	0	1	1	1	2
Uist	2	2	2	0	2	2	2	6
Highland	7	6	5	0	5	5	5	10
Tayside	1	1	1	0	1	1	1	2
Central Scotland	6	6	6	2	4	3	3	8
Argyll								
Islands	6	6	4	0	4	4	4	5
Mainland	8	3	2	0	2	2	2	8
South Strathclyde								
Ayrshire study	53	25	22	1	21	18	17	70
other records	2	2	1	0	1	1	1	3
Lothian & Borders								
Edinburgh city study	38	15	15	0	15	15	15	35
other records	2	2	1	0	1	1	1	4
Dumfries & Galloway	2	2	1	0	1	1	1	4
Grand total	**128**	**71**	**61**	**3**	**58**	**54**	**53**	**157**

T**able 11**. Breeding success of Common Buzzards in Scotland in 2010.

Region	Home ranges checked	Home ranges occupied by pairs	Occupied home ranges monitored	Pairs failing early or non-breeding	Pairs known to lay eggs	Pairs known to hatch eggs	Pairs known to fledge young	Minimum number of young fledged
Orkney	**8**	**4**	**3**	**0**	**3**	**3**	**3**	**6**
Lewis & Harris	**23**	**23**	**22**	**0**	**22**	**19**	**19**	**36**
Uist	**13**	**13**	**5**	**0**	**5**	**5**	**5**	**14**
Highlands								
Eigg	6	6	6	1	5	5	5	12
Caithness & Sutherland	27	22	18	1	17	16	16	34
Ross-shire	78	52	52	9	43	40	39	69
Inverness-shire	3	3	2	0	2	2	2	5
Badenoch & Strathspey	9	9	9	0	9	9	9	17
Sub-total	**123**	**92**	**87**	**11**	**76**	**72**	**71**	**137**
North-east Scotland	**170**	**119**	**70**	**0**	**70**	**59**	**59**	**78**
Tayside & Fife								
Perthshire	15	14	4	0	4	4	4	5
Strathallan study	91	55	26	6	20	20	20	20
Fife	18	17	17	4	13	10	10	13
Sub-total	**124**	**86**	**47**	**10**	**37**	**34**	**34**	**38**
Central Scotland								
N Lanarkshire	8	8	8	0	8	8	8	15
Stirling study*	179	147	117	14	103	93	90	142
Sub-total	**187**	**155**	**125**	**14**	**111**	**101**	**98**	**157**
Argyll								
Tiree & Mull	13	13	3	0	3	3	3	5
Colonsay	57	20	18	12	6	6	5	7
Islay	5	5	5	1	4	3	3	5
Cowal	29	27	14	0	14	14	14	25
Bute	63	20	16	1	15	15	15	26
Kintyre	7	6	5	0	5	3	3	6
Sub-total	**174**	**91**	**61**	**14**	**47**	**44**	**43**	**74**
Lothian & Borders								
Lothian	40	38	34	1	33	31	30	66
Borders	17	17	14	1	13	13	13	30
Sub-total	**57**	**55**	**48**	**2**	**46**	**44**	**43**	**96**
South Strathclyde	**15**	**15**	**11**	**0**	**11**	**11**	**11**	**12**
Dumfries & Galloway	**19**	**19**	**16**	**1**	**15**	**15**	**14**	**26**
Grand total	**913**	**672**	**495**	**52**	**443**	**407**	**400**	**674**

Table 12. Breeding success of Golden Eagles in Scotland in 2010.

Region	Home ranges checked	Home ranges occupied by pairs	Of which immature pairs[1]	Further home ranges in use[2]	Pairs monitored	Failed early or non-breeding	Pairs laying eggs	Pairs hatching eggs	Pairs fledging young	Min. number of young fledged
Lewis & Harris										
Lewis	18	18	0	0	17	7	10	6	6	6
Harris	20	20	0	0	20	3	17	6	5	5
Sub-total	**38**	**38**	**0**	**0**	**37**	**10**	**27**	**12**	**11**	**11**
Uists										
North Uist	6	6	0	0	6	0	6	4	4	4
Benbecula	2	2	0	0	2	1	1	1	1	1
South Uist	6	5	0	0	5	1	4	4	3	3
Sub-total	**14**	**13**	**0**	**0**	**13**	**2**	**11**	**9**	**8**	**8**
Highland										
Sutherland	33	22	3	5	16	7	9	8	8	13
Wester Ross	22	11	1	5	11	4	7	5	4	4
Easter Ross	8	6	0	0	5	2	3	3	3	3
Skye	34	29	0	0	29	6	23	16	13	15
Rum, Canna & Eigg	6	6	0	0	6	1	5	4	4	5
Ardnamurchan, Morvern & Sunart	24	21	1	1	21	12	9	3	3	3
West Inverness	17	8	1	3	8	4	4	4	4	4
East Inverness	16	6	1	9	6	1	5	4	4	5
Badenoch	13	10	1	3	10	1	9	7	7	12
Sub-total	**173**	**119**	**8**	**26**	**112**	**38**	**74**	**54**	**50**	**64**
North-east Scotland	**19**	**15**	**0**	**2**	**10**	**3**	**7**	**7**	**7**	**10**
Tayside										
Perthshire west of A9 road	15	11	0	1	8	2	6	5	4	4
Perthshire east of A9 road	5	5	0	0	5	3	2	1	1	1
Angus glens	16	10	0	0	10	2	8	8	8	12
Sub-total	**36**	**26**	**0**	**1**	**23**	**7**	**16**	**14**	**13**	**17**
Central Scotland	**11**	**10**	**0**	**0**	**10**	**4**	**6**	**4**	**2**	**2**
Argyll										
Lochaber & north Argyll	13	7	0	3	7	0	7	5	3	3
South Argyll	24	22	1	1	21	4	17	11	10	13
Mull, Islay & Colonsay	19	17	0	2	17	2	15	10	10	11
Sub-total	**56**	**46**	**1**	**6**	**45**	**6**	**39**	**26**	**23**	**27**
Lothian & Borders	**3**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**
Dumfries & Galloway	**2**	**2**	**1**	**0**	**2**	**1**	**1**	**1**	**1**	**1**
Grand total	**352**	**269**	**10**	**36**	**252**	**71**	**181**	**127**	**115**	**140**

[1] These immature pairs are included in the column 'Home ranges occupied by pairs'. For the purpose of this report, we regard pairs consisting of either one or two birds with immature plumage as immature pairs.

[2] Additional home ranges occupied by single birds or showing signs of occupation but no pair seen.

Table 13. Home range occupancy and breeding success of Golden Eagles in Scotland, 2004-2010.

Year	Home ranges checked	Home ranges occupied by pairs	%	Further home ranges in use[1]	Pairs monitored	Pairs known to fledge young	%	Minimum number of young fledged	Mean brood size per successful nest	Mean brood size per monitored pair
2004	232	175	75	19	151	81	54	97	1.20	0.64
2005	264	220	83	19	207	72	35	88	1.22	0.43
2006	290	233	80	27	218	78	36	84	1.08	0.39
2007	291	227	78	26	216	92	43	104	1.13	0.48
2008	310	242	78	28	224	111	50	123	1.11	0.55
2009	307	242	79	28	232	95	41	111	1.17	0.48
2010	352	269	76	36	252	115	46	140	1.22	0.56

[1] Additional home ranges occupied by single birds or showing signs of occupation but no pair seen.

Table 14. Breeding success of Ospreys in Scotland in 2010.

Region	Breeding sites checked	Pairs present	Pairs monitored	Pairs failing early or non-breeding	Pairs laying eggs	Pairs hatching eggs	Pairs fledging young	Minimum number of young fledged
Highland	77	65	62	4	58	52	50	106
North-east Scotland	23	23	23	2	21	17	17	35
Tayside	53	41	41	2	39	34	34	64
Central Scotland	28	24	24	6	18	17	16	38
Argyll	24	20	20	4	16	13	13	30
South Strathclyde	3	2	2	1	1	1	1	3
Lothian & Borders	11	10	10	1	9	9	9	18
Dumfries & Galloway	10	8	8	4	4	4	4	12
Grand total	**229**	**193**	**190**	**24**	**166**	**147**	**144**	**306**

Table 15. Breeding success of Common Kestrels in Scotland in 2010.

Region	Nest sites checked	Pairs present	Pairs monitored	Pairs failing early or non-breeding	Pairs laying eggs	Pairs hatching eggs	Pairs fledging young	Minimum number of young fledged
Orkney	5	5	4	0	4	4	4	7
Lewis & Harris	5	5	0	-	-	-	-	-
Highland	13	13	9	0	9	8	8	19
Isle of Eigg	5	5	5	0	5	5	5	10
Tayside	13	13	10	0	10	10	10	23
Central Scotland	7	7	5	0	5	5	5	13
Argyll	17	14	8	0	7	7	7	16
South Strathclyde	42	26	26	2	24	24	23	95
Lothian & Borders	14	8	8	0	8	8	7	30
Dumfries & Galloway	2	2	2	0	2	2	2	9
Grand total	**123**	**98**	**77**	**2**	**74**	**73**	**71**	**222**

Table 16. Breeding success of Merlins in Scotland in 2010.

Region	Home ranges checked	Home ranges with signs of occupation[1]	Home ranges occupied by pairs	Pairs monitored	Failed early or non-breeding	Pairs laying eggs	Pairs hatching eggs	Pairs fledging young	Minimum number of young fledged
Orkney									
West Mainland	40	8	6	6	1	5	4	4	11
East Mainland	3	0	0	0	0	0	0	0	0
Rousay	2	2	2	2	0	2	1	1	4
Hoy	29	4	3	3	0	3	3	3	10
Outer isles	3	0	0	0	0	0	0	0	0
Sub-total	**77**	**14**	**11**	**11**	**1**	**10**	**8**	**8**	**25**
Lewis & Harris	**11**	**11**	**10**	**6**	**0**	**6**	**4**	**4**	**9**
Highland									
Ross-shire/Sutherland	25	24	20	13	1	12	11	11	24
Inverness/Badenoch	15	15	15	8	0	8	8	7	25
West Moray/Nairn	24	5	3	3	0	3	3	3	12
Sub-total	**64**	**44**	**38**	**24**	**1**	**23**	**22**	**21**	**61**
North-east Scotland									
East Moray	23	10	8	8	0	8	7	7	18
Lower Deeside	22	6	6	6	0	6	4	4	13
Mid/upper Deeside	36	20	18	16	1	15	14	14	46
Donside	18	7	7	7	0	7	6	6	19
Sub-total	**99**	**43**	**39**	**37**	**1**	**36**	**31**	**31**	**96**
Tayside									
Perthshire	28	18	15	13	2	11	10	10	22
Angus	29	20	17	16	0	16	16	14	40
Sub-total	**57**	**38**	**32**	**29**	**2**	**27**	**26**	**24**	**62**
Central Scotland	**4**	**1**	**1**	**1**	**0**	**1**	**1**	**1**	**1**
Argyll	**5**	**2**	**1**	**1**	**0**	**1**	**1**	**1**	**3**
South Strathclyde	**25**	**18**	**15**	**10**	**0**	**10**	**10**	**10**	**32**
Lothian & Borders									
Moorfoot Hills	8	3	2	2	0	2	2	2	4
Lammermuir Hills	24	7	3	3	0	3	3	3	13
Pentland Hills	8	2	1	1	0	1	1	1	1
South of River Tweed	8	8	7	3	0	3	3	3	13
Sub-total	**48**	**20**	**13**	**9**	**0**	**9**	**9**	**9**	**31**
Dumfries & Galloway	**10**	**10**	**8**	**5**	**1**	**4**	**4**	**4**	**15**
Grand total	**400**	**201**	**168**	**133**	**6**	**127**	**116**	**113**	**335**

[1]The number of home ranges that was occupied by pairs and single birds plus the number of home ranges where fresh signs of Merlins were observed.

Table 17. Breeding success of Peregrine Falcons in Scotland in 2010.

Region	Home ranges checked	Home ranges occupied by single birds	Home ranges occupied by pairs	Pairs monitored	Pairs failing early or non-breeding	Pairs laying eggs	Pairs hatching young	Pairs fledging young	Minimum number of young fledged
Orkney									
Mainland	10	1	5	4	1	3	3	3	6
Hoy	13	0	3	3	0	3	3	3	6
other islands	5	0	3	2	0	2	1	1	3
Sub-total	**28**	**1**	**11**	**9**	**1**	**8**	**7**	**7**	**15**
Uist	**2**	**0**	**2**	**2**	**0**	**2**	**2**	**2**	**3**
Highland									
Sutherland/Caithness	12	1	9	8	0	8	5	5	10
Easter Ross	5	0	4	4	0	4	4	4	9
Inverness	15	1	6	6	1	5	4	4	8
Isle of Canna	2	0	2	2	0	2	1	1	1
sub-total	**34**	**2**	**21**	**20**	**1**	**19**	**14**	**14**	**28**
North-east Scotland	**2**	**0**	**1**	**1**	**0**	**1**	**1**	**1**	**3**
Tayside & Fife									
west of A9 and A90	31	4	19	17	5	12	10	10	19
east of A9 and M90	30	1	20	17	1	16	15	14	38
Angus upland	34	3	15	9	2	7	7	6	10
Angus coastal plain	9	2	7	7	2	5	4	4	8
sub-total	**104**	**10**	**61**	**50**	**10**	**40**	**36**	**34**	**75**
Central Scotland	**40**	**3**	**23**	**21**	**3**	**18**	**15**	**14**	**27**
Argyll									
mainland	18	0	12	10	1	9	9	9	22
islands	15	0	12	12	3	9	7	7	16
sub-total	**33**	**0**	**24**	**22**	**4**	**18**	**16**	**16**	**38**
South Strathclyde									
upland/ moorland	29	1	10	10	1	9	7	5	10
coast/lowland/industrial	25	3	16	16	0	16	13	10	21
sub-total	**54**	**4**	**26**	**26**	**1**	**25**	**20**	**15**	**31**
Lothian & Borders									
heather moorland	37	3	13	13	1	12	7	7	17
upland sheep walk	22	1	6	6	0	6	4	4	13
lowland farmland	25	1	17	17	0	17	13	12	35*
urban/industrial	6	1	5	5	1	4	4	4	13
sea-cliff/coast	58	2	17	17	2	15	14	14	45
sub-total	**148**	**8**	**58**	**58**	**4**	**54**	**42**	**41**	**123**
Dumfries & Galloway									
Kirkcudbright and Wigtown coast	29	2	20	20	2	18	16	14	33
Moffat and Eskdale	21	3	12	12	0	12	11	11	32
Nithsdale	26	0	8	8	4	4	2	2	6
Galloway inland	33	0	13	13	2	11	10	10	24
sub-total	**109**	**5**	**53**	**53**	**8**	**45**	**39**	**37**	**95**
TOTAL	**554**	**33**	**280**	**262**	**32**	**230**	**192**	**181**	**438**

* includes 7 fostered chicks obtained from eggs stolen in Wales and confiscated from an illegal trader by Customs & Excise at Heathrow Airport.

Table 18. Variation in home range occupancy of Peregrine Falcons between different habitat types within 1km^2 of the nest site in Scotland in 2010.

Habitat type	Home ranges checked	Home ranges occupied by pairs	%	Home ranges occupied by single birds	%	Vacant home ranges	%
Grouse moor	98	36	37	6	6	56	57
Other upland	136	58	43	8	6	70	51
Woodland	41	23	56	3	7	15	37
Lowland farmland	35	25	71	0	0	10	29
Urban/Industrial	44	30	68	8	18	6	14
Coastal	118	63	53	4	3	51	43
Grand total	**472**	**235**	**50**	**29**	**6**	**208**	**44**

Table 19. Variation in breeding success of Peregrine Falcons between different habitat types within 1km^2 of the nest site in Scotland in 2010.

Habitat type	Pairs moni-tored	Pairs failing early or non-breeding	%	Pairs laying eggs	%	Pairs hatching eggs	%	Pairs fledging young	%	Minimum number of young fledged	Mean no. of young fledged per monitored pair
Grouse moor	31	4	13	27	87	22	71	20	65	42	1.4
Other upland	54	5	9	49	91	40	74	38	70	99	1.8
Woodland	23	3	13	20	87	16	70	16	70	39	1.7
Lowland farmland	25	2	8	23	92	19	76	18	72	48	1.9
Urban/Industrial	30	2	7	28	93	27	90	24	80	62	2.1
Coastal	58	5	9	53	91	45	78	42	72	103	1.8
Grand total	**221**	**21**	**10**	**200**	**90**	**169**	**76**	**158**	**71**	**393**	**1.8**

Table 20. Breeding success of Barn Owls in Scotland in 2010.

Region	Nesting sites checked	Occupied by pairs	Occupied by single birds[1]	Pairs monito -red	Failed early or non-breeding	Pairs laying eggs	Pairs hatching eggs	Pairs fledging young	Minimum number of young fledged
Highland									
Sutherland & Caithness	4	3	1	2	0	2	2	2	8
Ross-shire	11	2	1	2	0	2	2	2	9
Inverness & Badenoch	4	2	1	2	0	2	1	1	4
Isle of Eigg	2	1	1	1	1	0	0	0	0
Sub-total	**21**	**8**	**4**	**7**	**1**	**6**	**5**	**5**	**21**
Tayside									
Perthshire	5	5	0	3	0	3	2	2	2
Angus	5	3	0	3	0	3	3	3	8
Fife	10	9	1	8	3	5	2	2	6
Sub-total	**20**	**17**	**1**	**14**	**3**	**11**	**7**	**7**	**16**
Central Scotland									
Clackmannan	8	8	0	8	0	8	7	7	16
Stirling	60	60	0	60	3	57	51	49	164
Falkirk & N Lanark	7	5	2	5	0	5	5	5	18
West Dunbarton	4	4	0	4	0	4	4	4	8
Sub-total	**79**	**77**	**2**	**77**	**3**	**74**	**67**	**65**	**206**
Argyll									
Islay & Mull	7	7	0	4	1	3	3	3	3
Cowal & Bute	7	5	0	5	0	5	5	5	15
Knapdale & Kintyre	50	32	10	29	4	25	21	21	56
Sub-total	**64**	**44**	**10**	**38**	**5**	**33**	**29**	**29**	**74**
South Strathclyde									
East Ayrshire	41	23	7	22	1	21	19	19	64
South Ayrshire	14	8	2	6	1	5	5	5	13
Sub-total	**55**	**31**	**9**	**28**	**2**	**26**	**24**	**24**	**77**
Lothian & Borders	**61**	**44**	**8**	**43**	**1**	**42**	**41**	**41**	**159**
Dumfries & Galloway									
Galloway Forest	38	5	0	5	0	5	5	5	16
Stranraer, The Rhins & West Wigton	92	52	10	52	3	49	49	49	140
Galloway & Kirkcudbright	47	20	8	18	0	18	18	18	69
Dumfries	68	49	8	48	0	48	45	42	141
Sub-total	**245**	**126**	**26**	**123**	**3**	**120**	**117**	**114**	**366**
Grand total	**545**	**347**	**60**	**330**	**18**	**312**	**290**	**285**	**919**

[1]The number of nesting sites occupied by single birds includes nesting locations where fresh signs of occupation (pellets, splashes) were seen, but no birds observed.

Table 21. Breeding success of Tawny Owls in Scotland in 2010.

Region	Nest sites checked	Pairs present	Pairs monitored	Pairs laying eggs	Pairs hatching eggs	Pairs fledging young	Minimum number of young fledged
Highland							
Inverness-shire	8	8	8	8	7	6	10
Sutherland	13	8	7	7	4	4	6
Black Isle	20	3	3	3	3	3	6
Easter Ross	27	17	17	17	15	13	23
Badenoch & Strathspey	5	5	5	5	4	4	7
sub-total	**73**	**41**	**40**	**40**	**33**	**30**	**52**
Tayside	**19**	**18**	**16**	**16**	**13**	**13**	**22**
Central	**3**	**3**	**3**	**3**	**3**	**3**	**8**
South Strathclyde	**3**	**3**	**3**	**3**	**3**	**3**	**6**
Lothian & Borders	**28**	**14**	**14**	**14**	**10**	**10**	**20**
Dumfries & Galloway	**11**	**11**	**10**	**10**	**8**	**7**	**14**
Grand total	**137**	**90**	**86**	**86**	**70**	**66**	**122**

Table 22. Annual breeding success and productivity in Scottish Tawny Owls, 2003-2010.

Year	Pairs monitored	Pairs fledging young (%)	Minimum number of young fledged	Mean brood size per pair monitored
2003	70	60 (86%)	131	1.9
2004	67	57 (85%)	108	1.6
2005	92	63 (68%)	103	1.1
2006	123	88 (72%)	173	1.4
2007	101	78 (77%)	142	1.4
2008	77	62 (81%)	111	1.4
2009	91	64 (70%)	93	1.0
2010	86	66 (77%)	122	1.4

Table 23. Breeding success of Long-eared Owls in Scotland in 2010.

Region	Known territories checked for occupation	Territories with signs of occupation	Pairs laying eggs	Pairs fledging young	Minimum number of fledged young
Highland	2	2	1	1	3
Isle of Eigg	5	5	5	5	9
Isle of Colonsay	3	2	0	0	0
Tayside	5	5	3	3	6
Lothian & Borders	13	10	6	6	10
Grand total	**28**	**24**	**15**	**15**	**28**

Table 24. Breeding success of Short-eared Owls in Scotland in 2010.

Region	Sites checked	Pairs found	Additional single birds recorded	Nests monitored	Pairs fledging young	Minimum number of young fledged
Highland	1	0	1	0	0	0
Tayside	32	25	7	10	9	32
Central Scotland	9	6	0	4	4	12
Argyll	14	13	0	7	5	13
Lothian & Borders	16	10	6	4	4	12
Dumfries & Galloway	2	2	0	2	2	5
Grand total	**74**	**56**	**14**	**27**	**24**	**74**

Table 25. Breeding success of Common Ravens in Scotland in 2010. Figures in square brackets were not supplied, the one given is a minimum figure.

Region	Home ranges checked	Home ranges occupied by pairs	Pairs monitored	Failed early or non-breeding	Pairs laying eggs	Pairs hatching eggs	Pairs fledging young	Minimum number of young fledged
Orkney	**[56]**	**[56]**	**56**	**0**	**[38]**	**[38]**	**38**	**108**
Lewis & Harris								
Inland	23	23	20	2	18	16	16	37
Coastal	28	28	21	0	21	17	17	37
Sub-total	**51**	**51**	**41**	**2**	**39**	**33**	**33**	**74**
Uist	**14**	**14**	**12**	**0**	**12**	**11**	**11**	**29**
Highland								
Sutherland	10	10	10	0	10	10	10	36
Inverness & Badenoch	6	6	6	0	6	6	6	17
Eigg & Rum	10	10	5	0	5	5	5	19
Sub-total	**26**	**26**	**21**	**0**	**21**	**21**	**21**	**72**
Tayside								
Highland Perthshire	33	33	28	6	22	22	22	59
Lowland Perth & Kinross	24	17	13	2	11	10	10	25
Angus	17	10	10	1	9	8	6	13
Fife	7	7	7	1	6	6	6	18
Sub-total	**81**	**67**	**58**	**10**	**48**	**46**	**44**	**115**
Central Scotland	**29**	**25**	**22**	**1**	**21**	**18**	**18**	**37**
Argyll								
Tiree & Coll	19	17	7	2	5	5	5	13
Colonsay	20	13	11	1	10	10	10	32
Islay & Jura	7	7	4	0	4	4	4	13
Bute	26	14	12	2	10	9	9	23
Kintyre	6	5	3	0	3	2	2	6
Sub-total	**78**	**56**	**37**	**5**	**32**	**30**	**30**	**87**
South Strathclyde								
Inland	32	26	22	2	20	20	20	56
Coastal	13	10	10	2	8	8	8	14
Sub-total	**45**	**36**	**32**	**4**	**28**	**28**	**28**	**70**
Lothian & Borders								
Lothian	9	6	6	1	5	5	5	14
Borders	51	49	26	2	24	23	23	66
Sub-total	**60**	**55**	**32**	**3**	**29**	**28**	**28**	**80**
Dumfries & Galloway	**63**	**50**	**32**	**1**	**31**	**30**	**28**	**59**
Grand total	**503**	**436**	**343**	**26**	**299**	**283**	**279**	**731**

Annex 1: Raptor, owl and Common Raven nest site and home ranges data submitted under the Scottish Raptor Monitoring Scheme in 2010.

Species	Argyll	Central Scotland	Dumfries & Galloway	Highland	Lewis & Harris	Lothian & Borders	Northeast Scotland	Orkney	South Strathclyde	Tayside & Fife	Uist	TOTAL
European Honey-buzzard			1	3								**4**
Red Kite		48	54	81			11			54		**248**
White-tailed Eagle	13			27	9						3	**52**
Eurasian Marsh Harrier										4		**4**
Hen Harrier	43	19	9	45		2	21	72	76	77	19	**383**
Northern Goshawk			24	2		54	57		2	4		**143**
Eurasian Sparrowhawk	14	6	2	7	1	40			55	1	2	**128**
Common Buzzard[1]	174	187	19	123	23	57	170	8	15	124	13	**913**
Golden Eagle	56	11	2	173	38	3	19			36	14	**352**
Osprey	24	28	10	77		11	23		3	53		**229**
Common Kestrel	17	7	2	18	5	14		5	42	13		**123**
Merlin	5	4	10	64	11	48	99	77	25	57		**400**
Eurasian Hobby				1								**1**
Peregrine Falcon	33	40	109	34		148	2	28	54	104	2	**554**
Barn Owl	64	79	245	21		61			55	10		**535**
Tawny Owl		3	11	73		28			3	19		**137**
Long-eared Owl	3			7		13				5		**28**
Short-eared Owl	14	9	2	1		16				32		**74**
Common Raven	78	29	63	26	51	60		56	45	81	14	**503**
TOTAL	**538**	**470**	**563**	**783**	**138**	**555**	**402**	**246**	**375**	**674**	**67**	**4811**

[1] Common Buzzard totals for a study area covering parts of both Central and Tayside regions are included under Central Scotland.

Annex 1 shows the total number of all breeding sites and home ranges (by area) checked in 2010 and reported under the SRMS. This includes traditional nesting sites and home ranges which were found unoccupied, and also sites and home ranges which were found occupied but received no follow-up visits, so their breeding success is unknown.

Annex 2: Raptor, owl and Common Raven breeding attempts monitored under the Scottish Raptor Monitoring Scheme in 2010.

Species	Argyll	Central Scotland	Dumfries & Galloway	Highland	Lewis & Harris	Lothian & Borders	Northeast Scotland	Orkney	South Strathclyde	Tayside & Fife	Uist	TOTAL
European Honey-buzzard			1									**1**
Red Kite		21	52	51			11			32		**167**
White-tailed Eagle	13			27	9						3	**52**
Eurasian Marsh Harrier										4		**4**
Hen Harrier	23	3	9	33		2	11	70	21	42	8	**222**
Northern Goshawk			19	1		28	46		2	1		**97**
Eurasian Sparrowhawk	6	6	1	5	1	16			23	1	2	**61**
Common Buzzard[1]	61	125	16	87	22	48	70	3	11	47	5	**495**
Golden Eagle	45	10	2	112	37		10			23	13	**252**
Osprey	20	24	8	62		10	23		2	41		**190**
Common Kestrel	8	5	2	14		8		4	26	10		**77**
Merlin	1	1	5	24	6	9	37	11	10	29		**133**
Eurasian Hobby				1								**1**
Peregrine Falcon	22	21	53	20		58	1	9	26	50	2	**262**
Barn Owl	38	77	123	7		43			28	14		**330**
Tawny Owl		3	10	40		14			3	16		**86**
Long-eared Owl	2			7		10				5		**24**
Short-eared Owl	7	4	2			4				10		**27**
Common Raven	37	22	32	21	41	32		56	32	58	12	**343**
TOTAL	**283**	**322**	**335**	**512**	**116**	**282**	**209**	**153**	**184**	**383**	**45**	**2824**

[1] Common Buzzard totals for a study area covering parts of both Central and Tayside regions, are included under Central Scotland RSG.

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 2010 i.e. they were effectively monitored to enable breeding success and productivity to be estimated.

Figure 1. Scottish Raptor Study Groups in 2010.