

Scottish Raptor Monitoring Scheme Report 2013



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November 2014

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Front cover photo. 7-8 week old Golden Eagle chick, Foinavon SPA, Highland (Derek Spencer).

Back cover photo. Osprey brood, Perthshire (Keith Brockie).

Foreword

The last year has been one that has presented challenges for the Scottish Raptor Monitoring Scheme and the overseeing Scottish Raptor Monitoring Group. Having had a green light to proceed with revising and improving the Scheme we hit some difficulties in securing the increased funding required. Effectively this stalled the Scheme and employing a replacement for Brian Etheridge after his retirement. Brian kindly stepped back into the role to help cover co-ordination of 2013 data submission, and we thank him for that.

Originally we had a three year plan to improve the Scheme, however we have effectively lost a year due to the hiatus over funding. We will now have to make great strides to get the Scheme back on track. We will need everyone involved with the Scheme to help us to do this.

We are already underway with the appointment in June of Amy Challis as the new full-time Scheme coordinator. Amy has had a lot to get up to speed with but has had to hit the ground running, so welcome Amy! We've circulated a Scottish Raptor Newsletter recently, and whilst it has been seen by some as 'bureaucratic' we felt it was important to update people on where we are at. If you want a more varied Newsletter in future please submit articles and ideas to Amy. One key task is to catch up on the annual reporting and this 2013 gets the ball rolling and we are planning to have 2014 ready for the Scottish Raptor Study Group Conference in February 2015.

It is very pleasing to see an increase yet again in records submitted, and whilst it may be seen as banging the same drum we do need to encourage people to take more of an interest in the 'commoner' and more widespread species. These are ideal species to get people started on and increase a wider interest in raptors and raptor monitoring. It was refreshing to see the uptake of new technologies and even social media being put to good use with the various projects presented at the Conference by members of the Central Scotland branch.

Raptors continue to have a high profile in conservation and political terms and continued support of the Scheme is of critical importance in providing objective information on what is happening to our raptors. We are taking steps to ensure that data are managed sensibly and responsibly and whilst Data Sharing Protocols aren't the most exciting topic they are crucial in ensuring data are managed and shared appropriately.

I would like to thank the following for all their work on behalf of the Scheme: David Stroud (Joint Nature Conservation Committee), Patrick Stirling-Aird, Wendy Mattingley and Alan Heavisides (Scottish Raptor Study Group), Chris Wernham, Mark Wilson and Anne Cotton (British Trust for Ornithology, Scotland), Gordon Patterson and Kenny Kortland (Forestry Commission Scotland), Mark Holling (Rare Breeding Birds Panel), Staffan Roos, Duncan Orr-Ewing and Jeremy Wilson (Royal Society for the Protection of Birds, Scotland), Gordon Riddle (Scottish Ornithologists' Club), Roddy Fairley and Des Thompson (SNH) and Amy Challis (SRMS).

Andrew Stevenson
Chair of the Scottish Raptor Monitoring Group

1 Introduction

This is the eleventh report of the Scottish Raptor Monitoring Scheme covering the year 2013. It follows the previous annual reports in the series (Etheridge 2005; Etheridge *et al.* 2006, 2007, 2008, 2010, 2011, 2012 a & b, 2013). The aim of the report is to provide clear and factual information on territory occupation and breeding success of birds of prey in Scotland.

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). In 2012, Forestry Commission Scotland was invited to join the Scheme. During 2014 the partnership will sign a revised Agreement which secures the addition of Forestry Commission Scotland to the SRMS, and makes updates and some amendments to the original Agreement.

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, Northern Raven (henceforth Raven) is given honorary status as a bird of prey and is included in the Scheme. The SRMS is currently exploring the potential for broadening its remit to consider the monitoring of winter roosts of species such as Hen Harrier, Red Kite and Raven as, particularly in the case of the former two species, such data can give useful information of age and sex structure of the population.

1.2 Scottish Raptor Monitoring Group (SRMG)

The SRMG consists of representatives of the eight partner organisations of the SRMS. They meet regularly and oversee the work of the Scheme. Until his retirement from the post at the end of March 2013, Brian Etheridge was employed as part-time Raptor Monitoring Officer. The primary responsibilities of this role were to collect and collate annual breeding records on all raptor and owl species, and to report this and other relevant information concerning the Scheme to the SRMG.



Figure 1. The new Scottish Raptor Monitoring Coordinator (SRMC), Amy Challis.

In June 2014, Amy Challis took up the role of

Scottish Raptor Monitoring Coordinator (SRMC; Figure 1). This is a full time post with funding for the next two years to help take the work of the SRMS forward. Amy is based at BTO Scotland in Stirling University.

The SRMG has secured funding for the next two years to:

- continue to collect and collate data, and report annually on breeding populations of SRMS species (currently all raptors, owls and Raven) within Scotland, including updating trends information.
- increase the geographical monitoring coverage of SRMS species within Scotland.
- provide information to support the evidence base in respect of human interference with breeding populations of target species.
- promote monitoring of target species within Scotland by increasing awareness of the SRMS and developing an entry level recording project to encourage new volunteers into raptor monitoring.

1.3 Scottish Raptor Study Group (SRSG)

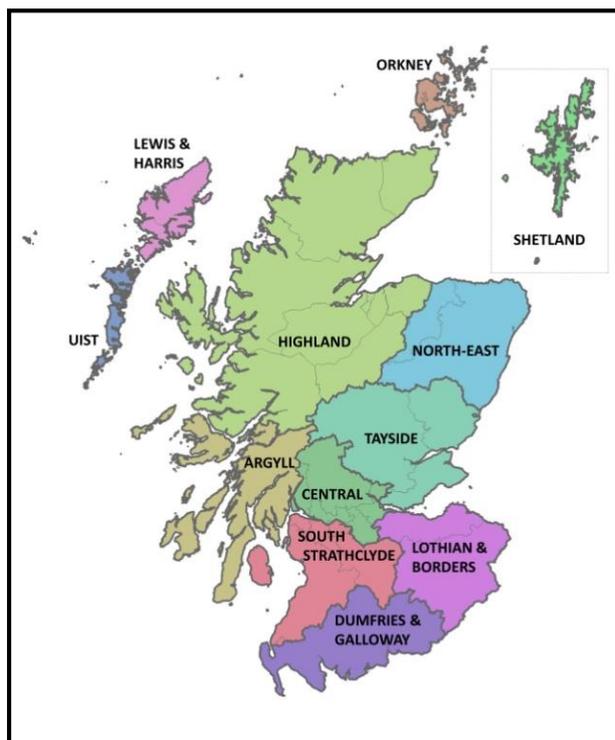


Figure 2. Scottish Raptor Study Group branch areas in 2013.

The Scottish Raptor Study Group (SRSG) now comprises twelve regional branches (Figure 2). The recent addition of Shetland now means that the whole of Scotland will be receiving coordinated monitoring effort.

The SRSG has a combined membership of more than 300, mostly voluntary, ornithologists. Members have extensive expertise in the field study of breeding birds of prey and conduct these studies largely in their own time.

2 Data management

2.1 Data contributors

The SRSG members have provided the bulk of the data collected in this report on raptor numbers, distribution and productivity. Following the 2013 season, data were received from the original eleven regional raptor study group branches, so these are the only areas reported on in the present report. We hope that the next report (for 2014) will also include information on the breeding success of Scheme species in Shetland.

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. Rare Breeding Birds Panel data were extracted from the annual returns to the relevant licensing bodies (SNH and BTO) made by the small number of Schedule 1 licence holders who were not members of the SRSG. A number of ecological consultancies also supplied data.

2.2 Observer coverage

For some of the scarcer species covered by the Scheme, such as Red Kite, Marsh Harrier, White-tailed Eagle and perhaps Osprey, a high proportion of the breeding population (90-100% for some species) is monitored each year, mainly by RSPB personnel and specialist groups of volunteers.

Amongst volunteer fieldworkers, the appeal of carrying out fieldwork on open moorland and mountain habitats is strong. Combined with the fact that raptors nesting in open habitats are, by and large, easier to survey compared to those nesting in woodlands, three widely but thinly spread upland species, Hen Harrier, Golden Eagle, and Peregrine Falcon, receive excellent coverage. The Scottish breeding populations for these species are in the range of 400–800 pairs, with up to 50% of the breeding population monitored annually. In years leading up to and including national surveys effort is often increased leading to an even greater proportion of the population being monitored.

Two lowland owl species, Barn and Tawny Owl, readily adapt to nest boxes and their relative ease of study means they are monitored by quite a number of raptor workers. Wider geographic coverage, however, is poor in terms of being able to determine estimates of population size, annual productivity and long-term trends. Common Buzzard (henceforth Buzzard) and Raven attract interest from a growing number of raptor enthusiasts.

A few species in Scotland present challenges as far as monitoring is concerned. European Honey-buzzard (henceforth Honey-buzzard) and Hobby are extremely scarce and Short-eared and Long-eared Owl exhibit cyclic occurrence related to vole abundance (Korpimäki & Norrdahl 1991) and/or secretive behaviour. However, two widespread species attract little attention from the majority of field workers, coverage of Eurasian Sparrowhawk (henceforth Sparrowhawk) and Common Kestrel (henceforth Kestrel) 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 Kestrel (Risely *et al.* 2012), is now causing concern.

2.3 Data analysis and reporting

The majority of data submitted to the SRMS are sent in electronically, using the custom-designed MS Excel recording spreadsheet. This spreadsheet is currently the best means of ensuring that the majority of submitted data are in a consistent format. This greatly reduces the need for manual correction and re-formatting of data, ensuring that the tables and other summary outputs required for the annual report can be generated quickly and efficiently.

Although the spreadsheet helps to standardise SRMS data, records still need to be carefully checked. It is important to make sure that data are entered into the correct fields, and are consistently reported. Making sure that observer, species, site names and codes, and location information are all comparable between different records makes the data in the Scheme a much more powerful and valuable tool for raptor conservation. Even slight variations between records in the way that data are reported, such as the same observer being listed as both “Joe Bloggs” and “J Bloggs”, could lead to confusion when calculating the area covered by long-term studies, which are among the most valuable datasets held by the Scheme. Your help in checking data are greatly appreciated. Although we carry out thorough checks on all data, we cannot always spot errors so the checking before data are submitted is important, and potentially saves us having to correct future reports.

Another important step in preparing SRMS records for summary and analysis is to identify duplicate records submitted to the scheme. These typically arise when data for one nest comes in from multiple sources. In 2013, over 100 duplicate records were identified and removed from the dataset before the summary tables were generated. Reporting of nest locations to a resolution of 100 m (i.e. six-figure grid references) greatly facilitates this process, and also makes it easier to identify and correct typos in grid references. Providing data at greater resolution will not make records less secure. The purposes for which nest location data can be used, and the spatial resolution it is made available at, will be strictly governed by rules agreed by all Scheme partners.

Readers may notice some differences between this report and earlier annual reports in the way that data have been reported for each species. In addition to reporting at the level of RSG regions, we have also reported data at county level, with a few regional exceptions (Figure 3). These include the following: (i) some counties have been amalgamated (e.g. North, East and South Ayrshire combined into Ayrshire - note this area includes the Clyde islands of Arran and Cumbrae which are part of North Ayrshire Council Area); (ii) Moray has been split into West Moray and East Moray following the boundary between Highland RSG and North-east Scotland RSG; and (iii) due to its large area Highland has been divided into smaller areas reflecting a combination of old counties (e.g. Inverness-shire) and Highland Council wards (e.g. Badenoch & Strathspey). Data for White-tailed Eagle continue to be reported at a broader geographic scale.

We are looking to further improve data submission and handling in the near future. The next couple of years will see the development of an on-line option for secure data submission to further enhance the SRMS. As well as decreasing the potential for recording errors and inconsistencies, the development of such a system will allow more flexible reporting. This means that, with appropriate permissions, individuals or groups of individuals (e.g. all raptor workers working on the same species within a particular long-term study area) might be able to explore and view summaries of their data in the context of other local, regional and national data. We are hoping to have a prototype of this on-line system ready for testing in the second half of 2015.

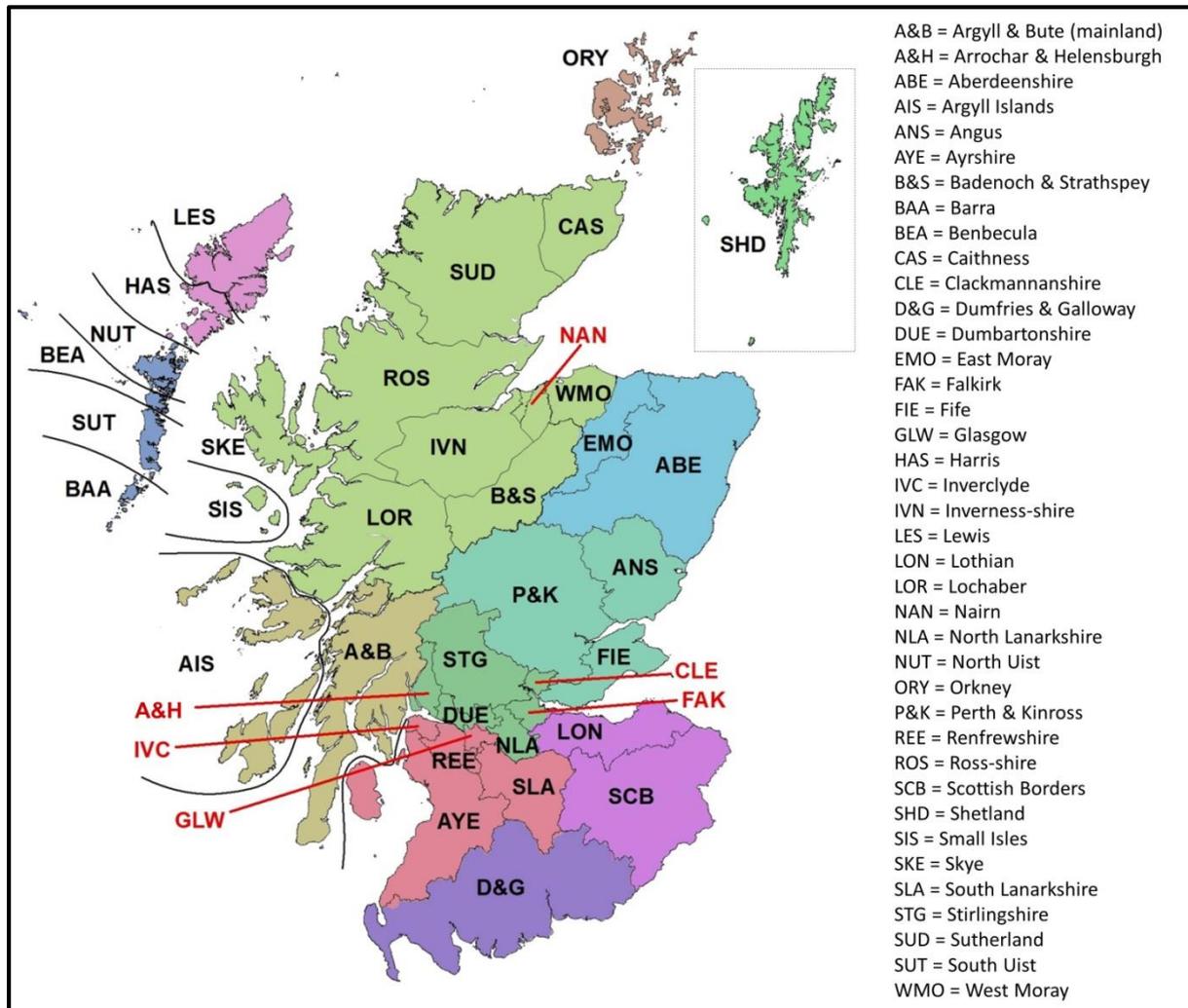


Figure 3. The regions according to which we have classified the data for the summary tables. Red labels are displaced in order to aid clarity, with the red lines indicating the regions to which they refer. N.B. Totals in the summary tables may not tally exactly with the numbers submitted by regional SRSG branches, due to the fact that in some regions records were submitted by two or more groups.

3 Raptor monitoring

3.1 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, Buzzard, Golden Eagle and Raven, pairs 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, pairs break 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 might 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, if the habitat remains unchanged, home ranges may be occupied by a succession of breeding pairs, with some individuals breeding with several partners over the course of their lives.

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. For example, 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 or separation from a mate, or recruitment to a vacant territory, particularly if the population is undergoing expansion. Some home ranges may be occupied only when the population reaches a certain level and others stay vacant for long periods, sometimes because of human interference. Others may suffer irreversible habitat changes, or be subjected to increased unintentional human disturbance, e.g. through a change in land use activities, and may never become regularly occupied again.

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

3.2 Monitoring of occupancy and breeding outcome

In general, raptor workers try to visit known home ranges and other suitable habitat several times before and during the breeding season with the aim to establish whether they are occupied or not. Here we describe some of the most important features of the best practice of monitoring raptors. For more detailed species-specific information we refer to Hardey *et al.* (2013).

For many species, a special licence (Schedule 1 licence, issued by SNH) is needed to visit the nest sites. This licence should be granted before any visit to a home range takes place.

For forest-dwelling species such as Buzzard, Goshawk and Sparrowhawk, winter visits to known and suitable habitat might be useful, as the lack of leaves makes it easier to find nests in deciduous trees. For some early-nesting species, such as Golden Eagle and Raven, visits to home ranges can start already in January, whereas for other species, especially migratory species such as Osprey, Marsh Harrier and Hobby, the first visit might occur in spring or even early summer. The most common way of establishing whether a territory is occupied is to watch from a distance whether suitable habitat is used by hunting, displaying and nest-building raptors. This can be done from a vantage point or from a vehicle. However, raptor workers also use indirect evidence to give indications of whether a home range is occupied. This is best collected by walking through the suitable habitat looking for new and old prey remains (pluckings), moulted feathers, pellets (regurgitated fur, feathers and bones from prey animals) and faeces (normally seen as white splashes). Once the occupancy status of the home range is established, the raptor worker normally tries to identify whether the home range is occupied by a single bird or a pair (and for a small number of species, e.g. hen harrier, whether a male might have more than one female) and the age of the birds in the home range. The age structure of the breeding birds in a population may give useful insights into survival of the various age groups and might act as an early signal if survival has declined for adult or sub-adult birds.

Data collected during this phase could also include habitat monitoring and thorough recording of visit dates. For reasons described above, many raptor home ranges are likely to be unoccupied in a given year. It is important that the presence of unoccupied ranges within a study area is recorded accurately, as it will give indications of changes in the number of breeding pairs, survey effort and habitat-specific changes of occupancy.

Once the nest has been located, the raptor worker monitors the breeding attempt. For this phase, it is of utmost importance that the timing of visits to the nest is undertaken according to best practice, i.e. at times when the risk of disturbing the adult birds is minimal. Visits should not be undertaken in adverse weather conditions (i.e. cold, wet or excessively hot). For some species, it is even recommended that no visits should be done during the egg stage of the breeding season (Hardey *et al.* 2013). The raptor worker tries to establish clutch size, brood size and fledging success (see “Terminology” on inside back cover), using the minimum number of visits required to establish these parameters. Often a visit during the chick stage is combined with the ringing of the chicks. For this, the person must be a licensed ringer (ringing permits issued by BTO on behalf of SNH), again following best practice described in Hardey *et al.* (2013) and BTO's "Ringers' Manual" (Redfearn and Clarke 2001). Finally, a visit around or just after the chicks are expected to fledge will reveal the number of fledglings from each nest. This visit should involve a nest inspection to check if any chicks might have died at the later stages of the breeding attempt. This is an important part of the monitoring, as it will give the final piece of information of the outcome of the breeding attempt.

Data collected during the nest monitoring phase includes, apart from clutch size, brood size and fledgling numbers, the type of nest (e.g. nest box, tree or cliff), nest site (e.g. species of tree) and if ringing occurs, the age, sex and size (e.g. wing and tarsus length as well as body mass) of the chicks.

Thorough recording of visit dates is also essential, as it will indicate stages and even specific dates when a potential nest failure might have happened.

3.3 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 scheme of this size, using data from a wide range of field workers, this ideal is typically not achievable. For example, 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. 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 common in raptor populations and 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, placing 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 received their first visit, 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 encouraged to submit information on the dates that they carry out every monitoring visit.

3.4 Factors limiting raptor populations

Many factors influence the distribution, numbers, and productivity of birds of prey in Scotland. For example, there is good evidence that raptors are limited in their distribution by the extent of suitable habitat (Anderson *et al.* 2009, Evans *et al.* 2010) and climate conditions (e.g. Taylor 1994).

The number of individuals in a population can be limited not only by the availability of suitable habitat, but also by a number of other factors. For example, both prey abundance and predation by larger raptors and mammals might influence raptor numbers at local and even national scales. For instance, the lack of voles on some Scottish islands (notably Shetland, Lewis and Harris) is associated with the absence of or very low densities of breeding vole eating owls and raptors. This has been used to explain the absence/low density of e.g. Short-eared Owl and Kestrels in these areas. Predation can have both direct (i.e. increased mortality; Newton 1998) and indirect (i.e. avoidance of perceived risky areas; Sergio & Hiraldo 2008) effects on the number of breeding raptors in an area. For example, Petty *et al.* (2003) showed that Kestrel numbers in Kielder Forest in Northern England declined when numbers of Goshawks in the forest increased. The causal link seems to have been predation of Kestrels by Goshawks, as many Kestrel remains were found near active goshawk nests (Petty *et al.* 2003). Locally, Red Fox predation is likely to limit breeding populations of Hen Harriers (Baines & Richardson 2013, McMillan 2014). Other natural factors constraining raptor numbers and breeding success include weather events such as cold, wet springs (Amar *et al.* 2011) and harsh winters (Taylor 1994).

Population size and breeding success of raptors are also affected by several anthropogenic factors. For example, forestry and agriculture operations can influence availability of nesting habitat and prey, and can cause failure of breeding attempts.

Non-deliberate disturbance by hillwalkers, climbers and mountain bikers have also been implicated in causing nesting failure, but there is little evidence that recreational disturbance has a measurable effect on national raptor populations (e.g. Whitfield *et al.* 2007). Another way in which human activities can impact raptor populations is secondary poisoning. This has had drastic effects on raptor populations in the recent past. For example, secondary poisoning by agricultural pesticides during the 1950s-1980s brought many raptor species close to extinction in the UK (e.g. Newton 1998). More recently, Second Generation Anticoagulant Rodenticides (SGARs) have been implicated in deaths of several species of owls and raptors (e.g. Hughes *et al.* 2013), but their effects on the national trends is so far unknown.

Deliberate killing has also had measurable impacts on bird of prey populations in Scotland, despite the fact that it is illegal. Several studies have shown that illegal killing is often associated with (though not restricted to) areas managed for Red Grouse (Etheridge *et al.* 1997; Hardey *et al.* 2003; Whitfield *et al.* 2004a & b, 2008; Redpath *et al.* 2010; Fielding *et al.* 2011; Amar *et al.* 2012). As the illegal killing of birds of prey repeatedly has been shown to be an important limiting factor for several raptor species, we summarise these studies here.

In Scotland, a large proportion of the uplands, particularly in the south and east of Scotland, is managed for driven grouse shooting, with a full-time gamekeeper and often one or more under-keepers. The keepers' primary aim is to manage the heather through regular burning and cutting to maximise the number of Red Grouse available for shooting and to legally control common and widespread predators such as crows, stoats, weasels and foxes. Historically gamekeepers also controlled birds of prey, but this practice became illegal country-wide in 1954. However, even after nearly 60 years of legal protection, birds of prey are still killed illegally in Scotland (Anon. 2013). Recent research has shown that these illegal activities, including nest destruction and the killing of sub-adults and adults, are adversely affecting the conservation status of several species. On many driven grouse-moors certain raptor species are scarce or absent and attempts to breed frequently fail due to human interference (Etheridge *et al.* 1997; Hardey *et al.* 2003; Whitfield *et al.* 2004a & b, 2008; Redpath *et al.* 2010; Fielding *et al.* 2011; Amar *et al.* 2012). This can have a severe effect on populations at a local or regional level by reducing the number and success of breeding pairs. It can also impact negatively on surrounding populations, by drawing dispersing birds into areas of apparently suitable habitat which are unoccupied because previous inhabitants have been removed. This phenomenon has been referred to as a "black hole", a "sink" or an "ecological trap" effect (Whitfield *et al.* 2004a & b). Population modelling has indicated that persecution, mainly in the form of poisoning, is responsible for an estimated 3–5% of annual deaths of adult Golden Eagles, and that in the absence of this mortality the Scottish population would increase (Whitfield *et al.*, 2004b, 2008). Illegal poisoning is a cause of poor population growth of re-introduced Red Kites in north Scotland,

compared with similar populations in elsewhere in the UK (Smart *et al.* 2010). A negative correlation has been found between recorded incidents of Hen Harrier persecution in different areas of Scotland and the proportion of successful nests. There is strong evidence that illegal persecution is causing the majority of breeding attempts on grouse moors to fail (Fielding *et al.* 2011) and is driving the current population decline on mainland Scotland (Hayhow *et al.* 2013). Furthermore, in northern England, the productivity of Peregrine Falcons breeding on grouse moors was found to be 50% lower than in non-grouse moor habitat, despite similar clutch and brood size (suggesting little difference in prey availability) between habitat types (Amar *et al.* 2012). Population modelling indicated that the grouse moor population of this raptor species was unsustainable and reliant on immigration (Amar *et al.* 2012).

Such illegal interference can also diminish the enthusiasm of volunteer raptor fieldworkers for monitoring raptors in what they perceive to be a hostile environment. The consequential impact of this shift of effort away from some grouse-moors, particularly where this form of land management is dominant at the regional scale, is that:

(i) data collected on some 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 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 of birds of prey may be under-recorded.

Ongoing SRMS work to more thoroughly assess annual changes in monitoring coverage, to objectively identify the causes of breeding failure and in particular cases of suspected persecution, and to collect related habitat data to characterise nesting attempts, will help to determine the degree to which these issues could be biasing the data collected.

The Scheme also aims to provide intelligence and evidence for illegal persecution wherever possible, in the form of objective information that can be passed to the National Wildlife Crime Unit. This will enable Scheme data to add to and complement other sources of information on the persecution of birds of prey, such as annual reviews published by the RSPB (e.g. Anon. 2012, 2013) and National PAW persecution maps (PAW, 2014).

4 Species accounts

Annex 1 provides a regional breakdown, based on Scottish Raptor Study Group boundaries (Figure 2), of the raptor home ranges that received at least one visit in the spring of 2013 to check on occupancy. A total of 5,896 home ranges were visited at least once in 2013. This is higher than the previous "record" from 2012, when 5,736 home ranges were checked. Thus, the organised raptor monitoring in Scotland continues to increase (Table 1). Not all of these home ranges held pairs: some had only single birds and others were apparently vacant.

Equally important are follow up visits to confirm the findings of the first visit and to monitor the nesting success of pairs present. The nesting success, normally expressed as the percentage of monitored breeding pairs producing fledged young, together with the mean brood size, can also provide an indication of the health of the population. Table 1 also shows that 2,929 potential breeding pairs received further visits in 2013, enabling their nesting success to be determined. This constitutes a 3.8% decrease on the previous year (Table 1 & Figure 4). A regional summary of these monitored home ranges is provided in Annex 2.

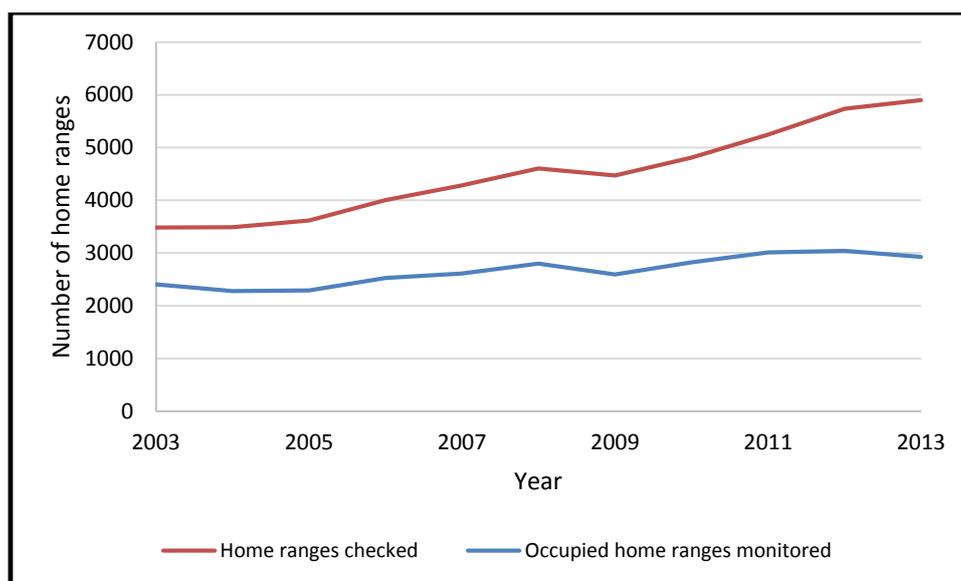


Figure 4. The number of raptor, owl and Raven home ranges checked for occupation and monitored for breeding outcome, and subsequently submitted to the Scottish Raptor Monitoring Scheme between 2003 and 2013.

4.1 European Honey-buzzard *Pernis apivorus*

In Scotland Honey-buzzards are known to occur regularly in four regions; Highland, Moray, Tayside and Dumfries & Galloway. In 2013 two pairs were located in Dumfries & Galloway. Only one pair laid eggs and went on to be successful fledging two young. No breeding records were received from any other region.

4.2 Red Kite *Milvus milvus* (Tables 2 & 3)

With effect from 2013 the Rare Breeding Birds Panel is no longer reporting on Red Kite as the UK population now exceeds 2000 breeding pairs. Since the reintroduction of Red Kites began in 1988 (through a partnership between RSPB Scotland and SNH), the increasing population in Scotland has been closely monitored by RSPB Scotland and annual coverage has been close to 100% (Table 2). Following the Scottish breeding population exceeding 200 pairs in 2012, SNH and RSPB Scotland decided to reduce the programme for monitoring this species in Central Scotland, Dumfries & Galloway and Tayside. It is fantastic to see that ongoing monitoring in these regions has been taken up by SRSB members, ensuring that an almost complete coverage of the expanding population was maintained in 2013.

The number of pairs laying eggs has risen year on year since 1995. This upward trend continued in 2013, with a 7% increase in number of pairs laying (Table 3). In 2013, 244 pairs were located, 226 of which were confirmed to lay eggs (Table 3). A total of 334 young fledged. Productivity and fledging success was similar to that in 2012, at 1.5 young per laying pair (Table 2). The slow geographical spread of Red Kites into some seemingly suitable habitat is puzzling, and is the topic of an ongoing PhD study at the University of Aberdeen.



Figure 5. Brood of four Red Kite chicks in Aberdeenshire (Ewan Weston).

4.3 White-tailed Eagle *Haliaeetus albicilla* (Tables 4 & 5)

Up to 2013, RSPB Scotland has been largely responsible for the coordination of monitoring of White-tailed Eagles as part of a re-introduction programme between RSPB Scotland, Forestry Commission Scotland and SNH. Overall in Scotland, the species continues to increase both numerically and geographically as well as maintaining a high breeding success (Table 4).

Following the release of 85 birds from Norway between 2007 and 2012 as part of the East Scotland Sea Eagles Project, the first breeding attempt in East Scotland occurred in 2013 (Table 5). A pair, both released in 2009, raised a healthy male chick in Fife marking the first successful breeding attempt by White-tailed Eagles breeding in East Scotland for nearly 200 years.

4.4 Marsh Harrier *Circus aeruginosus* (Table 6)

Marsh Harrier continues to be a scarce breeder and passage migrant in Scotland. In 2013, there were nine pairs located in Scotland; six at the important River Tay reed beds (the most extensive of this

habitat type in the UK), whilst two further pairs were found elsewhere in Tayside and a single pair was located in Aberdeenshire (Table 6).

Five of the six pairs at the River Tay reed beds were known to lay eggs and went on to fledge a minimum of 16 young from three broods of four and two broods of two. The sixth pair failed at the nest building stage or just after. The two pairs elsewhere in Tayside did not receive repeat visits and the Aberdeenshire pair did not stay around long enough to breed.

4.5 Hen Harrier *Circus cyaneus* (Tables 7 & 8)

Visits were made to a record high of 624 home ranges in 2013 (Table 7), all of them locations where Hen Harriers have bred regularly in the past 20 years. Pairs were found at 278 (45%) and of these 234 received follow-up visits.

The number of confirmed egg-laying pairs was 195, the highest number recorded since 2008 (Table 7). There were 107 successful nesting pairs and 286 young fledged. The productivity was low in 2013, with the mean brood size per monitored occupied home range of just 1.2 young (Table 7), and the mean brood size of 1.5 young per pair laying eggs, equalling the lowest recorded by the Scheme so far (Table 7).



Figure 6. Hen Harrier chick, Perthshire (Keith Brockie).

However, the productivity varied across Scotland. For example, in South West Scotland, Hen Harriers had their best year for a decade or so with a minimum of 28 fledging from each of Dumfries & Galloway RSG and South Strathclyde RSG areas, respectively (Table 8).

When published later this year, the updated Hen Harrier Conservation Framework (update of Fielding *et al.*, 2011) will guide conservation and management for this species.

4.6 Northern Goshawk *Accipiter gentilis* (Tables 9 & 10)

In 2013, 174 home ranges were checked. There was evidence of pairs in 124 home ranges (Table 9), with signs suggesting at least one bird in a further 15 ranges (Table 10). In total, 116 nests were monitored, 114 where eggs were laid and 86% of these produced young. The brood size was up slightly from the previous year, with 1.9 young per nesting pair (Table 9).

North-east Scotland continues to hold the highest number of home ranges checked (Table 10). In this region, 81% of previously known nesting woods were occupied, and there were three additional

newly established nesting places (Mick Marquiss, pers. comm.). The late snow and subsequent cold weather certainly impacted on breeding behaviour, with two nests abandoned before egg laying and other birds abandoning early refurbished nests to lay elsewhere within the same wood. The effects of the long cold spring were also seen further south in Scotland with several early nesting attempts failing in Lothian & Borders (Malcolm Henderson, pers. comm.). This was noticeable during early site visits to confirm occupancy. Follow up visits later showed that several of these sites had been deserted at the nest building stage or the early stages of egg laying and incubation. Those birds that did go on to incubate and were subsequently successful, laid about 2 weeks later than in previous years.

4.7 Eurasian Sparrowhawk *Accipiter nisus* (Tables 11 & 12)

In 2013, 116 home ranges were visited (Table 11) and only 60 were occupied (52%). Fifty-one home ranges received follow up visits, and eggs were laid at each of these sites but young fledged from only 38 of these.

Fewer home ranges were checked than in recent years (Table 11), which can be accounted for largely by decrease in monitoring effort for this species in South Strathclyde in this year (Table 12).

It is striking that the SRMS for a number of years receives more data on the scarce Goshawk than the more common Sparrowhawk (cf. Tables 9 and 11). Sparrowhawks are far more widespread than their larger cousin and knowledge of their abundance and breeding success is important in assessing the health of the wider environment. The Sparrowhawk is a priority species and we urge all raptor study groups to consider setting up long-term study areas to monitor them. The Raptor Monitoring Coordinator can provide advice on setting up such studies.

4.8 Common Buzzard *Buteo buteo* (Tables 13 & 14)

In 2013, 1030 home ranges were checked, 696 of which were occupied by pairs. Five hundred and sixty-two occupied home ranges received follow-up visits. Five hundred and six pairs were confirmed to lay eggs, but only 446 of these went on to fledge young. A mean productivity of 1.3 young per monitored pair was recorded (Table 13).

The minimum number of young fledged per laying pair showed lots of regional variation which might be at least partly attributable to differences in prey density, though it could also be affected by regional differences in the proportion of failed nests that were found (see section 2.6 above).

4.9 Golden Eagle *Aquila chrysaetos* (Tables 15 & 16)

In 2013, 364 home ranges were checked for occupation, an increase on the previous year (Table 15). Golden Eagle pairs were present in 296 home ranges (81% of those visited) and there were signs of occupation at an additional 32 home ranges. There were follow up visits to 245 pairs, but 53 (22%) of

these failed early. The 114 successful pairs reared 128 young to fledging, a mean brood size per monitored pair of 0.5 young (Table 15).



Figure 7. Female (foreground) and male (background) Golden Eagle nestlings fitted with GPS satellite tags on Lewis (Ewan Weston).

Sadly, a regular breeding pair of Golden Eagles in Dumfries & Galloway was reduced to a single adult female, who displayed and built up eyries, but who was not seen with a new young male until mid-May – too late to breed (Chris Rollie, pers. comm.). Meanwhile, hopes for Golden Eagles in the Borders were raised by a breeding attempt, albeit unsuccessful, involving an adult male and an immature female (Alan Heavisides, pers. comm.; Table 16).

Recent work has shown that Southern Scotland could support 11-16 pairs. This would be a significant contribution to the Scottish population, with potentially positive implications for the species in the north of England (Fielding & Haworth 2014).

The next national survey for Golden Eagles will take place in 2015, being coordinated by RSPB as part of the Statutory Conservation Agency/RSPB Annual Breeding Bird Scheme (SCARABBS) programme. In the last national survey carried out in 2003, information was collected from 698 territories (Eaton *et al.* 2007). In 2015, SRSR will be hoping to increase its coverage of known home ranges to help to provide as complete a census of the population as is possible.

4.10 Osprey *Pandion haliaetus* (Tables 17 & 18)

The occupancy rate of checked sites of in the spring was the lowest recorded by the SRMS to date, with only 68% of known sites occupied by pairs (Table 17). This may, in part, be explained by the April weather in northern Morocco, Spain, Portugal and the Bay of Biscay, on the migration routes of many Ospreys, being very poor with heavy



Figure 8. Brood of three Ospreys in Aberdeenshire (Ewan Weston).

rains, cloudy conditions and strong winds, causing higher mortality than usual (Roy Dennis, pers. comm.).

Single birds were present at an additional 13 sites (Table 18). Of the 180 monitored pairs, 166 were confirmed to lay eggs and 129 succeeded in rearing young.

4.11 Barn Owl *Tyto alba* (Tables 19 & 20)

The breeding season of 2013 was poor for Barn Owls, both nationally (Table 19) and regionally (Table 26). Of the 622 sites checked, only 215 (35%) were occupied by pairs. This is the lowest occupancy rate reported by the Scheme to date (Table 19). Of the 196 pairs which received follow up visits, 189 (96%) went on to lay eggs but of these only 100 (53%) successfully fledged young. The mean brood size per laying pair was just 1.7, for a second consecutive year having previously been at least 2.0 since 2003 (Table 19).

4.12 Little Owl *Athene noctua*

Little Owl is a scarce breeding bird in Scotland. For the second consecutive year, a successful breeding attempt was reported from a site in Berwickshire where two young fledged. No reports were received from elsewhere in Scotland.

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

Tawny Owls are the most abundant owl species in Scotland. They are widespread on the Scottish mainland, except in more mountainous areas, and also occupy some islands, notably those close to the mainland (Petty 2007). The number of pairs monitored annually has ranged from 67 to 130 (Table 21). In 2013, a total of 218 nest sites were checked (mainly nest boxes) and 93 pairs were located. Ninety-two of these received follow up visits, of which 89 pairs laid eggs and 71 hatched young. A minimum number of 87 young fledged with a mean breeding success of 0.9 young per monitored pair, the lowest ever recorded by the Scheme (Table 21). Nesting data were submitted from Argyll, Central, Dumfries & Galloway, Highland, Lothian & Borders and Tayside (Table 22).

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

Although Long-eared Owls regularly breed in all regions of Scotland, apart from the Northern Isles, this is a secretive and overlooked species and is therefore under-recorded throughout its range.

In 2013, 27 of the 29 known territories that were checked showed signs of occupation (Table 23). Eighteen pairs were known to lay eggs and 16 pairs succeeded in fledging a minimum of 28 young. The mean brood size was 1.6 per laying pair (Table 23).

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

A total of 166 known sites were checked in 2013 of which 71 (43%) were found to hold pairs and 58 held single birds (Table 24). Thirty-seven nests were found and monitored, but only 21 (57%) fledged young. The mean brood size of 2.4 was the highest since 2010. However, any count of fledged young will always be conservative as they disperse away from the nest long before they are capable of flying. This is a species for which the SRMS is very keen to see expansion of monitoring coverage, but which is a challenging bird to survey systematically. Uist, for example, regularly has many more Short-eared Owls than the records suggest, with those records that are submitted generally limited to incidental records of confirmed breeding. To expand monitoring coverage of this species here presents a challenge for the existing raptor monitoring community as it would mean reducing effort on other species.

4.16 Common Kestrel *Falco tinnunculus* (Tables 25 & 26)

In 2013, visits were made to 241 home ranges with signs of occupation at 117, the lowest occupancy (49%) recorded by the SRMS (Table 26). This may partly reflect the recent erection of new nest boxes, particularly in Lothian & Borders that had not been taken up by Kestrels in 2013. This raises the question of how occupancy should be measured for boxes which have yet to be occupied or, indeed, boxes which have been occupied in previous years by several species. The SRMG recommends that the first year the species nests in a box be considered the start year for that box/territory.

Of the 93 pairs that were monitored, 80 pairs laid eggs (86%), the lowest ever recorded by the SRMS (Table 25). Of these, 70 pairs went on to successfully fledge a minimum of 211 young.

The Breeding Bird Survey (BBS) has reported a decline of 65% for Kestrels in Scotland between 1995 and 2012 (Harris *et al.* 2014), and the status of Kestrels is now of considerable concern. The establishment of more long-term study areas would be a welcome development for the Scheme. Increased coverage of more BBS squares across Scotland (see www.bto.org/volunteer-surveys/bbs) would also provide valuable information about contribution to monitoring the fortunes of this and other widespread raptors in Scotland. Where long-term study data for any species are available, it is possible to start to investigate the causes of population changes. An excellent example of such a study is an ongoing collaboration between Gordon Riddle (South Strathclyde RSG) and RSPB Scotland Conservation Scientists to look at trends in an Ayrshire population of Kestrels that has been monitored since 1972.

4.17 Merlin *Falco columbarius* (Tables 27 & 28)

The Scottish breeding population of Merlins was estimated at 733 pairs in 2008 (Ewing *et al.* 2011), which suggested little change from the 800 pairs estimated in the 1993-94 survey (Rebecca & Bainbridge, 1998). Monitoring of breeding Merlins has remained almost unchanged over the last ten years (the national survey year excepted; Table 27) and is a reflection of the enduring popularity of

this small falcon. Table 28 indicates that whilst coverage of breeding pairs is strong in some areas (Orkney, Northeast Scotland and parts of Tayside and Lothian & Borders), in others, important populations get poor or limited coverage (Lewis and much of the Highlands).

In 2013, visits were made to 389 home ranges and 205 (53%) had signs of occupation, though only 165 (42%) by breeding pairs (Table 27). A total of 137 pairs received follow up visits, of which 134 laid eggs, 112 reached the hatching stage and 105 fledged a minimum of 296 young – the second lowest number of fledglings recorded by the SRMS to date. This low number of fledglings may be a reflection of territories not being followed through to fledging as often Merlins are recorded secondary to other species being monitored (Wendy Mattingley, *pers comm*). Mean brood size recorded was slightly higher than in 2012, at 2.2 young per laying pair. This figure is low compared to the average of 2.6 young per laying pair over the period 2005-2011 (Table 28).



Figure 9. Merlin chick, Perthshire (Keith Brockie).

4.18 Eurasian Hobby *Falco subbuteo*

Three nesting pairs were located for the second year running, one in Badenoch & Strathspey and two in Angus. The Badenoch & Strathspey pair fledged a minimum of four young and the two Angus pairs fledged one and two young, respectively.

4.19 Peregrine Falcon *Falco peregrinus* (Tables 29 & 30)



Figure 10. Peregrine Falcon in Ayrshire (Angus Hogg).

After recovery from the detrimental effects of organochlorine pesticides on productivity and survival in the 1950s & 1960s, Scottish Peregrine numbers from the periodic national surveys peaked at 639 occupied territories in 1991 (Crick & Ratcliffe 1995). However, the numbers have subsequently shown signs of decline in some parts of Scotland, which is also captured in the annual SRMS data (Table 29). The last national survey in 2002 estimated 624 occupied territories (Banks *et al.* 2010) and the results of the 2014

survey are eagerly awaited by many.

In 2013, 648 home ranges were checked (Table 30). This is a historically high number (Table 29), and could probably be explained by the fact that many raptor workers increased their survey effort in the year prior to the national survey in 2014. There were signs of occupation at 354 (55%) of these; 314 by pairs and 40 by single birds. Follow up monitoring visits were made to 265 pairs. Of these, 18 either failed at an early stage or were not breeding, 35 pairs failed during incubation and a further 18 pairs failed with young. In total, 194 pairs successfully reared a minimum of 423 young, giving a mean brood size per monitored pair of 1.6 young.

4.20 Northern Raven *Corvus corax* (Tables 31 & 32)

The 2007-2011 Atlas showed that the breeding range and abundance of Ravens is increasing in many areas of Scotland (Balmer *et al.* 2013). Breeding adults are strongly site-faithful (Mearns, 2007). The number of Raven pairs monitored under the Scheme has increased from less than 200 in 2003 to more than 300 annually since 2008 (Table 31). In 2013, 539 home ranges were checked, 443 were found occupied and 374 pairs were monitored (Table 31). Of these, 343 (92%) were confirmed to lay eggs and 259 pairs (76%) reared young. With a minimum of 709 fledged young recorded, the mean breeding success was 1.9 fledged young per monitored pair and 2.1 per pair laying eggs (Table 31).

5 Acknowledgements

The Scottish Raptor Monitoring Scheme is supported by funding from Scottish Natural Heritage, for which we are extremely grateful. Much of the data were supplied by members of the Scottish Raptor Study Group regional branches to whom we extend our special thanks. RSPB Scotland kindly supplied full details of their long-term monitoring of reintroduced populations of White-tailed Eagles and Red Kites. Further data were supplied by the RPS Group and the Rare Breeding Birds Panel, which we appreciatively acknowledge.

For this 2013 report, we are extremely indebted to Brian Etheridge for handling the initial collation of the 2013 data before Amy came into post. We also thank Keith Brockie, Angus Hogg, Derek Spencer and Ewan Weston for contributing the photographs which feature throughout the report.

This publication should be cited as follows:

Challis, A., Holling, M., Stevenson, A., Roos, S., Stirling-Aird, P. & Wilson, M.W. (2014). *Scottish Raptor Monitoring Scheme Report 2013*. BTO Scotland, Stirling.

Please send breeding records for raptors, owls and Raven for 2014 to the
Scottish Raptor Monitoring Coordinator, Amy Challis at:
amy.challis@bto.org

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7 Tables

N.B. Data in the following tables present the data submitted to the SRMS in 2013. It is important to recognise that, for the majority of species, not all breeding individuals were monitored. Thus, the numbers in these tables do not represent entire populations or provide a complete picture of breeding productivity, at either regional or national scales. For more detail on completeness of coverage for these species by the SRMS please see section 2.2.

Table 1. Scottish Raptor Monitoring Scheme: The number and inter-annual percentage change of home ranges checked and monitored between 2003 and 2013.

Year	Home ranges checked	Annual change	Occupied home ranges monitored	Annual change
2003	3483		2406	
2004	3488	0.1	2277	-5.4
2005	3618	3.7	2289	0.5
2006	4006	10.7	2525	10.3
2007	4284	6.9	2614	3.5
2008	4606	7.5	2800	7.1
2009	4472	-2.9	2592	-7.4
2010	4811	7.6	2824	9.0
2011	5246	9.0	3011	6.6
2012	5736	9.0	3042	1.0
2013	5896	2.8	2929	-3.8

Table 2. Number of pairs laying eggs and breeding success of Red Kites in Scotland, 1992-2013.

Year	Pairs laying eggs	Pairs fledging young	Total young fledged	% of pairs that fledged young	Productivity (young per laying pair)
1992	1	1	1	100.0	1.0
1993	5	3	7	60.0	1.4
1994	8	7	13	87.5	1.6
1995	15	11	26	73.3	1.7
1996	17	16	39	94.1	2.3
1997	23	19	39	82.6	1.7
1998	25	22	49	88.0	2.0
1999	34	27	59	79.4	1.7
2000	39	35	86	89.7	2.2
2001	43	38	95	88.4	2.2
2002	50	43	112	86.0	2.2
2003	54	48	106	88.9	2.0
2004	60	49	115	81.7	1.9
2005	76	61	131	80.3	1.7
2006	84	69	151	82.1	1.8
2007	93	73	162	78.5	1.7
2008	121	97	210	80.0	1.7
2009	152	113	235	74.3	1.6
2010	162	134	293	82.7	1.8
2011	185	155	313	83.8	1.7
2012	212	170	312	80.2	1.5
2013	226	179	334	79.2	1.5
TOTAL:	1685	1370	2888	81.3	1.8

N.B. Breeding in North Scotland started in 1992, in Central Scotland in 1998, in Dumfries & Galloway in 2003, and in Aberdeen in 2008. The mean values given for the final columns are the unweighted means, i.e. the sample sizes for each year have not been taken into consideration.

Table 3. Breeding success of Red Kites in Scotland in 2013.

Reintroduced populations	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
North Scotland	93	61	56	0	56	50	50	108
- Inverness-shire	11	5	5	0	5	4	4	9
- Lochaber	2	2	0	0	0	0	0	0
- Ross-shire	78	52	49	0	49	44	44	94
- Sutherland	2	2	2	0	2	2	2	5
Aberdeenshire	31	19	18	0	18	15	15	40
- Aberdeenshire	29	18	17	0	17	15	15	40
- Angus	2	1	1	0	1	0	-	-
Central Scotland	132	87	82	7	75	56	51	95
- Perth & Kinross	77	55	53	4	49	36	34	64
- Stirling	55	32	29	3	26	20	17	31
Dumfries & Galloway	84	77	77	0	77	65	63	91
TOTAL:	340	244	233	7	226	186	179	334

Table 4. The number of White-tailed Eagle pairs monitored, their breeding success and productivity in Scotland, 1996-2013.

Year	Territorial pairs monitored	Pairs laying eggs	Pairs hatching eggs	Pairs fledging young	Total young fledged	Young fledged per laying pair	Young fledged per territorial pair
1996	12	12	8	7	9	0.8	0.8
1997	14	11	6	5	9	0.8	0.6
1998	19	16	9	9	13	0.8	0.7
1999	20	16	9	6	11	0.7	0.6
2000	22	19	12	8	12	0.6	0.6
2001	23	17	10	7	11	0.7	0.5
2002	25	22	14	8	12	0.6	0.5
2003	31	25	20	16	26	1.0	0.8
2004	32	28	19	15	19	0.7	0.6
2005	33	28	21	17	24	0.9	0.7
2006	36	31	25	21	29	0.9	0.8
2007	42	35	31	24	34	1.0	0.8
2008	44	35	21	20	28	0.8	0.6
2009	46	39	31	24	36	0.9	0.8
2010	52	47	34	33	46	1.0	0.9
2011	57	49	38	33	43	0.9	0.8
2012	67	59	46	41	60	1.0	0.9
2013	82	74	55	86	99	1.3	1.2
TOTAL:	657	563	409	380	521	0.9	0.7

Table 5. Breeding success of White-tailed Eagles in Scotland in 2013. The majority of these data were provided by RSPB as summaries in the White-tailed Eagle Project newsletter available at: http://www.rspb.org.uk/Images/WTE_newsletter_2013_tcm9-369335.pdf. There are minor deviations from these figures where a small number of additional records have become available.

Study area	Confirmed occupied by pairs	Incubation confirmed	Pairs hatching eggs	Pairs fledging young	Minimum number of young fledged
Argyll Islands	22	22	17	25	29
Isle of Skye, Lochalsh & the Small Isles	17	13	10	19	26
Orkney	1	0	–	–	–
North Scotland mainland	1	1	0	–	–
Tayside	1	1	1	1	1
Western Isles	24	22	18	26	38
West Scotland mainland	15	13	10	21	24
TOTAL:	80	71	55	85	109

Table 6. The number of pairs of Marsh Harriers located and their breeding success in Scotland, 2003-2013.

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
2011	5	5	4	10
2012	9	9?	5	12
2013	9	5	5	16

* One male in 2010 was polygamous.

Table 7. Home range occupancy and breeding success of Hen Harriers in Scotland, 2003-2013.

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	303	2.8	1.7	1.4
2011	490	267	54	246	186	76	111	45	291	2.6	1.6	1.2
2012	558	259	46	217	160	74	107	49	275	2.6	1.7	1.3
2013	624	278	45	234	195	83	107	46	286	2.7	1.5	1.2

Table 8. The number of home ranges checked and the breeding success of Hen Harriers in Scotland in 2013.

Region	Home ranges checked	Home ranges occupied by pairs	Additional home ranges with single birds	Pair 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
Argyll	86	43	9	30	0	30	25	21	53
- Argyll & Bute (mainland)	22	11	6	7	0	7	6	5	14
- Argyll Islands	64	32	3	23	0	23	19	16	39
Central	17	4	2	4	2	2	2	2	7
- Arrochar & Helensburgh	9	4	0	4	2	2	2	2	7
- North Lanarkshire	0	0	0	0	-	-	-	-	-
- Stirling	8	0	2	0	-	-	-	-	-
Dumfries & Galloway	24	13	7	12	2	10	8	8	28
Highland	77	34	10	25	2	23	18	17	39
- Badenoch & Strathspey	4	1	1	1	0	1	0	2	3
- Inverness-shire	9	4	4	2	1	1	1	1	4
- Isle of Skye	23	6	1	3	0	3	2	2	5
- Lochaber	2	1	0	1	0	1	0	-	-
- Nairn	2	0	0	0	-	-	-	-	-
- Ross-shire	4	3	1	2	0	2	2	1	2
- Small Isles	4	3	1	3	0	3	3	2	5
- Sutherland	12	10	2	7	0	7	6	4	10
- West Moray	17	6	0	6	1	5	4	5	10
Lothian & Borders	5	3	1	3	0	3	2	2	6
- Scottish Borders	5	3	1	3	0	3	2	2	6
North-east	12	5	3	4	1	3	1	-	-
- Aberdeenshire	8	3	1	2	1	1	1	0	-
- East Moray	4	2	2	2	0	2	0	-	-
Orkney	215	102	20	101	27	74	40	20	53
South Strathclyde	71	12	2	11	1	10	8	8	28
- Ayrshire	38	7	2	6	0	6	6	6	22
- Inverclyde	4	0	0	0	-	-	-	-	-
- Renfrewshire	8	0	0	0	-	-	-	-	-
- South Lanarkshire	21	5	0	5	1	4	2	2	6
Tayside	90	36	7	24	4	20	18	14	39
- Angus	23	0	0	0	-	-	-	-	-
- Perth & Kinross	67	36	7	24	4	20	18	14	39
Uist	27	26	1	20	0	20	19	15	33
- Benbecula	4	4	0	4	0	4	3	0	0
- North Uist	10	9	1	7	0	7	7	6	13
- South Uist	13	13	0	9	0	9	9	9	20
TOTAL:	624	278	62	234	39	195	141	107	286

Table 9. The number of Northern Goshawk home ranges checked, their occupancy and breeding success in Scotland, 2003-2013.

Year	Home ranges checked	Home ranges occupied	%	Pairs known to lay eggs	Pairs known to fledge young	%	Minimum number of young fledged	Young per breeding pair
2003	117	84	72	62	52	84	121	2.0
2004	132	86	65	67	60	90	126	1.9
2005	116	81	70	58	47	81	117	2.0
2006	116	78	67	60	48	80	108	1.8
2007	136	87	64	70	60	86	127	1.8
2008	139	89	64	70	61	87	163	2.3
2009	128	85	66	77	68	88	167	2.2
2010	143	97	68	92	75	82	182	2.0
2011	158	116	73	102	89	87	212	2.1
2012	171	128	75	117	98	84	202	1.7
2013	174	124	71	114	98	86	215	1.9

Table 10. The number of checked home ranges and the breeding success of Northern Goshawks in Scotland in 2013.

Region	Home ranges checked	Home ranges occupied by pairs	Further home ranges in use ¹	Pairs 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
Central	5	4	0	3	0	3	3	3	8
- Stirling	5	4	0	3	0	3	3	3	8
Dumfries & Galloway	37	31	0	31	0	31	30	26	53
Highland	1	0	0	0	-	-	-	-	-
- Inverness-shire	1	0	0	0	-	-	-	-	-
Lothian & Borders	46	27	10	20	0	20	19	20	49
- Lothian	1	1	0	1	0	1	1	1	2
- Scottish Borders	45	26	10	19	0	19	18	19	47
North-east	73	53	4	[53]	[2]	51	47	43	93
South Strathclyde	3	3	0	3	0	3	3	3	5
- Ayrshire	1	1	0	1	0	1	1	1	1
- South Lanarkshire	2	2	0	2	0	2	2	2	4
Tayside	9	6	1	6	0	6	3	3	7
- Angus	8	5	1	5	0	5	2	2	5
- Perth & Kinross	1	1	0	1	0	1	1	1	2
TOTAL:	174	124	15	116	2	114	105	98	215

¹ Fresh signs or single birds recorded

Figures in square brackets were not supplied, therefore a minimum figure has been used.

Table 11. Home range occupancy and breeding success of Eurasian Sparrowhawks in Scotland, 2003-2013.

Year	Home ranges checked	Home ranges occupied by pairs	%	Pair occupied home ranges monitored	Pairs known to lay eggs	%	Pairs fledging young	%	Minimum number of young fledged	Mean brood size per laying pair	Mean brood size per monitored occupied home range
2003	63	45	71	43	39	91	33	77	114	2.9	2.7
2004	72	58	81	44	44	100	35	80	97	2.2	2.2
2005	98	69	70	59	55	93	47	80	150	2.7	2.5
2006	84	51	61	39	36	92	31	79	112	3.1	2.9
2007	104	67	64	55	52	95	42	76	135	2.6	2.5
2008	98	64	65	54	52	96	45	83	123	2.4	2.3
2009	176	97	55	89	87	98	78	88	182	2.1	2.0
2010	128	71	55	61	58	95	53	87	157	2.7	2.6
2011	128	97	76	89	76	85	72	81	177	2.3	2.0
2012	140	79	56	69	59	86	50	72	134	2.3	1.9
2013	116	60	52	51	51	100	38	75	120	2.4	2.4

Table 12. Breeding success of Eurasian Sparrowhawks in Scotland in 2013.

Region	Home ranges checked	Home ranges occupied by pairs	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
Argyll	15	9	7	0	7	6	4	9
- Argyll & Bute (mainland)	9	5	4	0	4	3	3	8
- Argyll Islands	6	4	3	0	3	3	1	1
Central	26	11	10	0	10	10	9	32
- Falkirk	1	1	1	0	1	1	1	5
- North Lanarkshire	2	2	2	0	2	2	2	9
- Stirling	23	8	7	0	7	7	6	18
Dumfries & Galloway	7	5	5	0	5	5	1	3
Highland	8	5	5	0	5	5	5	15
- Caithness	2	1	1	0	1	1	1	1
- Inverness-shire	1	0	0	-	-	-	-	-
- Ross-shire	4	4	4	0	4	4	4	14
- Small Isles	1	0	0	-	-	-	-	-
Lewis & Harris	1	1	1	0	1	1	1	7
- Lewis	1	1	1	0	1	1	1	7
Lothian & Borders	36	15	11	0	11	9	9	34
- Lothian	36	15	11	0	11	9	9	34
North-east	1	1	1	0	1	1	1	1
Orkney	19	10	9	0	9	8	6	15
Uist	3	3	2	0	2	2	2	4
- North Uist	2	2	2	0	2	2	2	4
- South Uist	1	1	0	-	-	-	-	-
TOTAL:	116	60	51	0	51	47	38	120

Table 13. Home range occupancy and breeding success of Common Buzzards in Scotland, 2003-2013.

Year	Home ranges checked	Home ranges occupied by pairs	%	Pair occupied home ranges monitored	Pairs known to lay eggs	%	Pairs fledging young	%	Minimum number of young fledged	Mean brood size per pair laying	Mean brood size per monitored occupied home range
2003	342	298	87	270	246	91	209	77	435	1.8	1.6
2004	388	338	87	285	279	98	240	84	505	1.8	1.8
2005	418	349	83	273	261	96	218	80	377	1.4	1.4
2006	499	416	83	337	300	89	251	74	475	1.6	1.4
2007	652	528	81	410	360	88	307	75	590	1.6	1.4
2008	742	627	85	409	346	85	311	76	546	1.6	1.3
2009	660	491	74	382	325	85	275	72	476	1.5	1.2
2010	913	672	74	495	443	89	400	81	674	1.5	1.4
2011	989	747	76	539	490	91	398	74	699	1.4	1.3
2012	931	669	72	536	464	87	394	74	640	1.4	1.2
2013	1030	696	68	562	506	90	446	79	736	1.5	1.3

Table 14. The number of Common Buzzard home ranges checked and their breeding success in Scotland in 2013.

Region	Home ranges checked	Home ranges occupied by pairs	Home ranges occupied by single birds	Pairs 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
Argyll	156	69	12	40	1	41	39	37	60
- Argyll & Bute (mainland)	78	42	6	27	0	29	28	29	49
- Argyll Islands	78	27	6	13	1	12	11	8	11
Central	277	225	9	164	37	128	114	107	154
- Falkirk	20	16	4	4	0	4	4	4	7
- Glasgow	3	3	0	3	1	2	2	2	3
- North Lanarkshire	33	26	2	18	2	16	14	14	21
- Stirling	221	180	3	139	34	106	94	87	123
Dumfries & Galloway	68	58	2	57	0	58	51	76	139
Highland	122	97	1	84	2	82	73	70	133
- Badenoch & Strathspey	12	12	0	12	0	12	12	12	27
- Caithness	5	4	0	3	1	2	2	2	3
- Inverness-shire	7	6	1	4	0	4	4	4	6
- Isle of Skye	1	1	0	1	0	1	1	1	2
- Lochaber	3	3	0	2	0	2	2	2	5
- Ross-shire	82	59	0	51	0	51	43	41	74
- Small Isles	5	5	0	4	1	3	2	2	3
- Sutherland	7	7	0	7	0	7	7	6	13
Lewis & Harris	8	8	0	8	1	7	7	4	7
- Harris	3	3	0	3	0	3	3	3	5
- Lewis	5	5	0	5	1	4	4	1	2
Lothian & Borders	61	56	1	56	1	55	52	41	90
- Lothian	31	31	0	31	0	31	28	28	66
- Scottish Borders	30	25	1	25	1	24	24	13	24
North-east	185	87	0	76	25	59	50	48	61
Orkney	13	8	1	8	1	7	6	4	10
South Strathclyde									
- Ayrshire	1	1	0	1	0	2	2	2	2
Tayside	122	70	10	52	0	54	52	48	66
- Angus	9	9	0	8	0	8	7	7	9
- Fife	13	12	0	12	0	12	12	11	11
- Perth & Kinross	100	49	10	32	0	34	33	30	46
Uist	17	17	0	16	3	13	12	9	14
- Benbecula	6	6	0	6	2	4	3	3	5
- North Uist	6	6	0	6	1	5	5	2	3
- South Uist	5	5	0	4	0	4	4	4	6
TOTAL:	1030	696	36	562	71	506	458	446	736

Table 15. Home range occupancy and breeding success of Golden Eagles in Scotland, 2004-2013.

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 pair	Mean brood size per monitored pair
2004	232	175	75	19	151	81	54	97	1.2	0.6
2005	264	220	83	19	207	72	35	88	1.2	0.4
2006	290	233	80	27	218	78	36	84	1.1	0.4
2007	291	227	78	26	216	92	43	104	1.1	0.5
2008	310	242	78	28	224	111	50	123	1.1	0.6
2009	307	242	79	28	232	95	41	111	1.2	0.5
2010	344	264	77	36	247	111	45	134	1.2	0.5
2011	345	280	81	26	247	91	37	108	1.2	0.4
2012	356	306	86	14	280	95	34	109	1.2	0.4
2013	365	297	81	32	246	114	46	128	1.1	0.5

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

Table 16. Breeding success of Golden Eagles in Scotland in 2013.

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	Minimum number of young fledged
Argyll	74	70	6	1	53	11	42	26	24	27
- Argyll & Bute (mainland)	36	33	6	1	25	3	22	14	12	12
- Argyll Islands	38	37	0	0	28	8	20	12	12	15
Central	9	7	2	0	6	1	5	3	3	3
- Stirling	9	7	2	0	6	1	5	3	3	3
Dumfries & Galloway	2	2	2	0	2	1	1	1	1	1
Highland	179	137	13	23	113	29	84	51	50	56
- Badenoch & Strathspey	11	9	4	2	5	0	5	4	4	6
- Inverness-shire	7	3	0	1	3	0	3	1	1	1
- Isle of Skye	34	30	0	0	30	5	25	13	11	13
- Lochaber	47	39	4	5	28	11	17	9	5	5
- Ross-shire	53	34	5	11	27	7	20	13	14	14
- Small Isles	7	7	0	0	6	0	6	5	8	10
- Sutherland	20	15	0	4	14	6	8	6	7	7
Lewis & Harris	24	23	1	1	21	1	20	11	8	9
- Harris	6	6	0	0	5	0	5	3	1	1
- Lewis	18	17	1	1	16	1	15	8	7	8
Lothian & Borders	4	2	1	0	2	0	2	0	-	-
- Lothian	1	1	0	0	1	0	1	0	-	-
- Scottish Borders	3	1	1	0	1	0	1	0	-	-
North-east	19	13	0	2	13	6	11	6	6	6
Tayside	36	25	1	5	23	3	20	16	15	19
- Angus	9	4	0	1	3	0	3	3	3	3
- Perth & Kinross	27	21	1	4	20	3	17	13	12	16
Uist	17	17	1	0	12	1	11	10	7	7
- Benbecula	2	2	1	0	2	1	1	1	1	1
- North Uist	7	7	0	0	4	0	4	4	2	2
- South Uist	8	8	0	0	6	0	6	5	4	4
TOTAL:	364	296	27	32	245	53	196	124	114	128

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

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

Table 17. Breeding site occupancy and breeding success of Ospreys in Scotland, 2003-2013.

Year	Breeding sites checked	Breeding sites occupied by pairs	%	Pairs monitored	Pairs failing early or non-breeding	Pairs laying eggs	Pairs known to fledge young	%	Minimum number of young fledged	Mean brood size per successful nest	Mean brood size per monitored pair
2003	232	162	70	[162]	[22]	140	109	67	229	2.1	1.4
2004	230	182	79	[182]	[27]	155	114	63	233	2.0	1.3
2005	239	180	75	[180]	[22]	158	124	69	242	2.0	1.3
2006	206	155	75	[155]	[12]	143	111	72	225	2.0	1.5
2007	198	140	71	138	19	119	92	67	182	2.0	1.3
2008	>211	208-211	-	204	31	173	148-149	73	303	2.0	1.5
2009	209	168	80	166	10	156	130	78	259	2.0	1.6
2010	229	193	84	190	24	166	144	76	306	2.1	1.6
2011	260	202	78	201	28	173	104	52	210	2.0	1.0
2012	276	195	71	194	14	180	142	73	278	2.0	1.4
2013	290	197	68	180	14	166	129	72	259	2.0	1.4

Figures in square brackets were not supplied, therefore the maximum possible figure was used.

Table 18. Breeding success of Ospreys in Scotland in 2013.

Region	Breeding sites checked	Pairs present	Single birds	Pairs monitored	Pairs failing early or non-breeding	Pairs laying eggs	Pairs hatching eggs	Pairs fledging young	Minimum number of young fledged
Argyll	31	18	0	18	2	16	13	6	13
- Argyll & Bute (mainland)	31	18	0	18	2	16	13	6	13
Central	37	26	2	22	4	18	16	13	24
- Stirling	37	26	2	22	4	18	16	13	24
Dumfries & Galloway	13	7	0	7	2	5	5	5	10
Highland	88	66	5	58	3	55	49	44	92
- Badenoch & Strathspey	10	9	0	9	0	9	8	8	16
- Inverness-shire	13	11	1	10	0	10	10	6	12
- Ross-shire	35	21	2	15	0	15	12	11	22
- Sutherland	15	13	0	12	1	11	9	9	19
- Sutherland & Caithness	4	4	0	4	2	2	2	2	6
- West Moray & Nairn	11	8	2	8	0	8	8	8	17
Lothian & Borders	14	12	0	10	0	10	8	9	18
- Lothian	1	1	0	1	0	1	0	0	0
- Scottish Borders	13	11	0	9	0	9	8	9	18
North-east	36	23	0	23	0	23	19	19	43
- Aberdeenshire	30	18	0	18	0	18	15	15	33
- East Moray	6	5	0	5	0	5	4	4	10
South Strathclyde	4	4	0	4	3	1	1	1	3
- Ayrshire	2	2	0	2	2	0	-	-	-
- South Lanarkshire	2	2	0	2	1	1	1	1	3
Tayside	67	41	6	38	0	38	33	32	56
- Angus	9	9	0	8	0	8	8	7	11
- Perth & Kinross	58	32	6	30	0	30	25	25	45
TOTAL:	290	197	13	180	14	166	144	129	259

Table 19. Nest site occupancy and breeding success of Barn Owls in Scotland, 2003-2013.

Year	Nesting sites checked	Occupied by pairs	% of those checked	Pairs monitored	Pairs laying eggs	% of those monitored	Pairs fledging young	Breeding success: % of those laying	Minimum number of young fledged	Mean brood size per laying pair
2003	260	238	92	–	226	–	209		656	2.9
2004	279	252	90	–	226	–	197		535	2.4
2005	316	253	80	–	204	–	160		433	2.1
2006	368	278	76	267	249	93	215	86	591	2.4
2007	474	391	82	374	352	94	320	91	1032	2.9
2008	524	409	78	369	340	92	276	81	688	2.0
2009	579	337	58	308	290	94	262	90	795	2.7
2010	545	347	64	330	312	95	285	91	919	2.9
2011	551	301	55	288	283	98	269	95	809	2.9
2012	702	295	42	279	240	86	188	78	402	1.7
2013	622	215	35	196	189	96	100	53	317	1.7

Table 20. Breeding success of Barn Owls in Scotland in 2013.

Region	Nesting sites checked	Occupied by pairs	Occupied by single birds	Pairs monitored	Failed early or non-breeding	Pairs laying eggs	Pairs hatching eggs	Pairs fledging young	Minimum number of young fledged
Argyll	80	41	9	38	0	38	32	7	23
- Argyll & Bute (mainland)	71	36	9	33	0	33	27	7	23
- Argyll Islands	9	5	0	5	0	5	5	0	0
Central	139	38	2	36	3	33	27	23	69
- Arrochar & Helensburgh	5	3	1	3	0	3	2	2	9
- Clackmannanshire	9	5	0	5	0	5	5	5	13
- Falkirk	6	4	0	4	0	4	2	0	-
- North Lanarkshire	7	4	1	3	0	3	3	1	3
- Stirling	112	22	0	21	3	18	15	15	44
Dumfries & Galloway	252	75	21	75	5	70	62	39	131
Highland	17	11	0	10	1	9	9	8	28
- Caithness	6	3	0	3	0	3	3	3	9
- Inverness-shire	4	4	0	3	0	3	3	3	15
- Nairn	1	1	0	1	0	1	1	0	-
- Ross-shire	1	1	0	1	0	1	1	1	2
- Small Isles	1	1	0	1	1	0	-	-	-
- Sutherland	4	1	0	1	0	1	1	1	2
Lothian & Borders	55	16	5	14	0	14	12	7	22
- Lothian	5	1	1	1	0	1	1	0	-
- Scottish Borders	50	15	4	13	0	13	11	7	22
North-east	22	10	1	9	0	10	10	9	25
South Strathclyde	52	20	7	11	0	12	12	4	8
- Ayrshire	49	20	7	11	0	12	12	4	8
- South Lanarkshire	3	0	0	0	0	0	0	0	0
Tayside	5	4	0	3	0	3	3	3	11
- Perth & Kinross	5	4	0	3	0	3	3	3	11
TOTAL:	622	215	45	196	9	189	167	100	317

Table 21. Annual breeding success and productivity of Tawny Owls in Scotland, 2003-2013.

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
2011	130	104	80	193	1.5
2012	124	98	79	179	1.4
2013	92	51	55	87	0.9

Table 22. Breeding success of Tawny Owls in Scotland in 2013.

Region	Nest sites checked	Pairs present	Pairs monitored	Pairs laying eggs	Pairs hatching eggs	Pairs fledging young	Minimum number of young
Argyll	3	2	2	1	1	0	0
- Argyll & Bute (mainland)	2	1	1	0	0	0	0
- Argyll Islands	1	1	1	1	1	0	0
Central	84	33	32	30	21	19	33
- Stirling	84	33	32	30	21	19	33
Dumfries & Galloway	38	8	8	8	8	8	10
Highland	38	19	19	19	12	11	17
- Badenoch & Strathspey	3	3	3	3	1	1	3
- Inverness-shire	1	1	1	1	1	0	0
- Ross-shire	24	14	14	14	10	10	14
- Sutherland	10	1	1	1	0	-	-
Lothian & Borders	44	21	21	21	21	6	13
- Lothian	1	1	1	1	1	1	1
- Scottish Borders	43	20	20	20	20	5	12
Tayside	11	10	10	10	8	7	14
- Perth & Kinross	11	10	10	10	8	7	14
TOTAL:	218	93	92	89	71	51	87

Table 23. Breeding success of Long-eared Owls in Scotland in 2013.

Region	Known territories checked for occupation	Territories with signs of occupation	Pairs laying eggs	Pairs fledging young	Minimum number of fledged young
Argyll	5	4	2	1	2
- Argyll & Bute (mainland)	1	1	1	1	2
- Argyll Islands	4	3	1	0	0
Highland	5	5	4	4	8
- Badenoch & Strathspey	2	2	0	-	-
- Inverness-shire	1	1	2	2	5
- Small Isles	2	2	2	2	3
Lothian & Borders	9	9	5	5	7
- Lothian	3	3	2	2	6
- Scottish Borders	6	6	3	3	1
North-east	2	0	1	1	3
Tayside	6	6	6	5	8
- Angus	3	3	3	3	5
- Perth & Kinross	3	3	3	2	3
Uist	2	2	-	-	-
- North Uist	2	2	0	-	-
TOTAL:	29	27	18	16	28

Table 24. The number of sites checked and the breeding success of Short-eared Owls in Scotland in 2013.

Region	Sites checked	Pairs found	Additional single birds recorded	Nests monitored	Pairs fledging young	Minimum number of young fledged
Argyll	7	0	2	0	0	0
- Argyll & Bute (mainland)	2	0	0	0	0	0
- Argyll Islands	5	0	2	0	-	-
Central	16	4	3	2	1	3
- Arrochar & Helensburgh	5	2	3	1	1	3
- Stirling	11	2	0	1	0	-
Dumfries & Galloway	4	2		2	2	3
Highland	8	7	1	2	2	7
- Badenoch & Strathspey	1	1	0	0	-	-
- Caithness	0	0	0	0	-	-
- Lochaber	6	5	1	1	1	5
- Small Isles	1	1	0	1	1	2
Lothian & Borders	14	2	4	1	1	1
- Lothian	1	0	1	0	-	-
- Scottish Borders	13	2	3	1	1	1
Orkney	95	41	44	18	3	5
Tayside	14	7	4	5	5	15
- Angus	2	1	0	0	-	-
- Perth & Kinross	12	6	4	5	5	15
Uist	8	8	0	7	7	16
- Benbecula	3	3	0	2	2	7
- South Uist	5	5	0	5	5	9
TOTAL:	166	71	58	37	21	50

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Table 25. Home range occupancy and breeding success of Common Kestrels in Scotland, 2003-2013.

Year	Home ranges checked	Home ranges with signs of occupation	%	Pair occupied home ranges monitored	Pairs known to lay eggs	% of pair occupied home ranges monitored	Pairs fledging young	% of pair occupied home ranges monitored	Minimum number of young fledged	Mean brood size per pair laying	Mean brood size per pair occupied home range
2003	74	64	86	57	54	95	50	88	184	3.4	3.2
2004	-	127	-	110	106	96	87	79	338	3.2	3.1
2005	151	112	74	92	83	90	64	70	231	2.8	2.5
2006	113	94	83	74	66	89	63	85	211	3.2	2.9
2007	90	52	58	39	36	92	35	90	139	3.9	3.6
2008	115	90	78	68	63	93	59	87	206	3.3	3.0
2009	105	58	55	52	48	92	45	87	140	2.9	2.7
2010	123	98	80	77	74	96	71	92	222	3.0	2.9
2011	212	140	66	95	89	94	86	91	274	3.1	2.9
2012	298	172	58	134	128	96	111	83	320	2.5	2.4
2013	241	117	49	93	80	86	70	75	211	2.6	2.3

Table 26. Breeding success of Common Kestrels in Scotland in 2013.

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
Argyll	13	5	3	0	3	2	2	7
- Argyll & Bute (mainland)	3	2	2	0	2	2	2	7
- Argyll Islands	10	3	1	0	1	0	-	-
Central	55	21	17	4	13	12	12	47
- Arrochar & Helensburgh	9	4	4	2	2	2	2	8
- Falkirk	4	3	3	0	3	3	3	11
- North Lanarkshire	8	5	2	0	2	2	2	8
- Stirling	34	9	8	2	6	5	5	20
Dumfries & Galloway	29	10	8	0	8	7	7	25
Highland	15	10	10	0	10	10	10	19
- Caithness	1	1	1	0	1	1	1	3
- Inverness-shire	3	1	1	0	1	1	1	5
- Isle of Skye	1	1	1	0	1	1	1	1
- Lochaber	2	0	0	-	-	-	-	-
- Nairn	1	1	1	0	1	1	1	3
- Ross-shire	3	2	2	0	2	2	2	2
- Small Isles	3	3	3	0	3	3	3	4
- Sutherland	1	1	1	0	1	1	1	1
Lothian & Borders	7	7	7	3	4	4	4	15
- Lothian	6	6	6	3	3	3	3	10
- Scottish Borders	1	1	1	0	1	1	1	5
North-east	9	5	5	1	4	4	4	16
Orkney	30	13	12	5	7	5	4	12
South Strathclyde	36	16	9	0	9	9	9	30
- Ayrshire	33	14	7	0	7	7	7	25
- Renfrewshire	3	2	2	0	2	2	2	5
Tayside	34	18	12	0	12	11	8	20
- Angus	8	3	2	0	2	1	0	-
- Fife	1	0	0	-	-	-	-	-
- Perth & Kinross	25	15	10	0	10	10	8	20
Uist	13	12	10	0	10	10	10	20
- Benbecula	1	1	0	-	-	-	-	-
- North Uist	3	2	2	0	2	2	2	3
- South Uist	9	9	8	0	8	8	8	17
TOTAL:	241	117	93	13	80	74	70	211

Table 27. Breeding range occupancy and breeding success of Merlin in Scotland, 2003-2013.

Year	Home ranges checked	Home ranges with signs of occupation	%	Pair occupied monitored home ranges	Pairs known to lay eggs	% of pair occupied monitored home range	Pairs fledging young	% of pair occupied monitored home range	Minimum number of young fledged	Mean brood size per pair laying	Mean brood size per pair occupied monitored home range
2003	387	242 ¹	63	[190]	190	–	141	–	476	2.5	–
2004	403	254 ¹	63	[175]	175	–	115	–	319	1.8	–
2005	409	290	71	[189]	189	–	156	–	500	2.6	–
2006	462	285	62	189	171	90	133	70	402	2.4	2.1
2007	397	262	66	168	157	93	128	76	403	2.6	2.4
2008 ²	513	314	61	209	187	89	142	68	433	2.3	2.1
2009	318	204	64	145 ³	126	87	112	77	353	2.8	2.4
2010	400	201	50	133	127	95	113	85	335	2.6	2.5
2011	362	202	56	137	121	88	108	79	324	2.7	2.4
2012	369	211	57	145	135	93	100	69	287	2.1	2.0
2013	389	205	53	137	134	98	105	77	296	2.2	2.2

¹ Figures refer to home ranges occupied by pairs, a slightly lower figure than those showing signs of occupation.

² 2008 was the year of a National Merlin Survey, resulting in improved coverage.

³ Corrected figure from 2009 report.

Table 28. The number of home ranges checked and the breeding success of Merlin in Scotland in 2013.

Region	Home ranges checked	Home ranges with signs of occupation	Home ranges occupied by pairs	Pairs monitored	Failed early on non-breeding	Pairs laying eggs	Pairs hatching eggs	Pairs fledging young	Minimum number of young fledged
Argyll	6	5	4	3	0	3	2	2	2
- Argyll & Bute (mainland)	4	4	4	3	0	3	2	2	2
- Argyll Islands	2	1	0	0	-	-	-	-	-
Central	7	4	1	0	-	-	-	-	-
- Arrochar & Helensburgh	1	1	0	0	-	-	-	-	-
- Stirling	6	3	1	0	-	-	-	-	-
Dumfries & Galloway	10	9	8	8	0	8	8	8	26
Highland	67	40	36	29	0	29	24	24	66
- Badenoch & Strathspey	11	8	7	7	0	7	7	7	18
- Inverness-shire	7	7	7	4	0	4	3	2	3
- Isle of Skye	1	1	1	1	0	1	1	1	1
- Lochaber	1	1	0	0	-	-	-	-	-
- Nairn	7	4	4	4	0	4	4	4	17
- Ross-shire	5	4	3	2	0	2	2	2	7
- Small Isles	6	3	3	3	0	3	1	1	2
- Sutherland	8	8	7	5	0	5	3	3	6
- West Moray	21	4	4	3	0	3	3	4	12
Lewis & Harris	3	3	3	2	0	2	2	1	3
- Harris	3	3	3	2	0	2	2	1	3
Lothian & Borders	53	25	20	17	0	17	15	13	37
- Lothian	16	5	4	4	0	4	3	2	7
- Scottish Borders	37	20	16	13	0	13	12	11	30
North-east	99	44	39	35	1	34	25	24	79
- Aberdeenshire	76	34	30	28	1	27	19	18	61
- East Moray	23	10	9	7	0	7	6	6	18
Orkney	52	12	9	9	2	7	6	4	14
South Strathclyde	20	15	15	13	0	13	10	12	32
- Ayrshire	10	8	8	7	0	7	4	6	14
- South Lanarkshire	10	7	7	6	0	6	6	6	18
Tayside	65	41	23	15	0	15	14	11	21
- Angus	27	16	10	9	0	9	8	8	13
- Perth & Kinross	38	25	13	6	0	6	6	3	8
Uist	7	7	7	6	0	6	6	6	16
- Benbecula	1	1	1	0	-	-	-	-	-
- South Uist	6	6	6	6	0	6	6	6	16
TOTAL:	389	205	165	137	3	134	112	105	296

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 observed.

Table 29. Occupancy of Peregrine Falcon home ranges in Scotland, 2003-2013.

Year	Home ranges checked	Number occupied	%	Pairs recorded	%	Single birds recorded	%
2003	595	402	68	–	–	–	–
2004	579	406	70	375	65	31	5
2005	572	384	67	353	62	31	5
2006	595	391	66	352	59	39	7
2007	633	385	61	338	53	47	7
2008	597	344	58	317	53	27	5
2009	529	303	57	272	51	31	6
2010	554	313	57	280	51	33	6
2011*	524	318	61	291	56	27	5
2012	618	361	58	315	51	46	7
2013	648	354	55	314	48	40	6

* Northeast Scotland totals for 2011 are not included as the 'home ranges checked' figure was not supplied.

Table 30. Breeding success of Peregrine Falcons in Scotland in 2013.

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
Argyll	37	4	19	14	0	14	10	5	9
- Argyll & Bute (mainland)	22	3	8	7	0	7	4	2	3
- Argyll Islands	15	1	11	7	0	7	6	3	6
Central	35	2	24	22	3	19	15	15	34
- Clackmannanshire	2	0	2	2	0	2	1	1	2
- Falkirk	5	0	5	4	1	3	3	3	7
- North Lanarkshire	8	1	4	4	0	4	4	4	10
- Stirling	20	1	13	12	2	10	7	7	15
Dumfries & Galloway	112	9	50	44	2	42	37	37	73
Highland	34	1	24	19	0	19	16	13	30
- Badenoch & Strathspey	1	0	1	1	0	1	1	1	2
- Caithness	4	1	3	1	0	1	1	1	2
- Inverness-shire	11	0	8	7	0	7	6	4	9
- Isle of Skye	3	0	0	0	-	-	-	-	-
- Lochaber	1	0	1	0	-	-	-	-	-
- Nairn	2	0	2	2	0	2	2	1	2
- Ross-shire	2	0	1	1	0	1	0	-	-
- Sutherland	5	0	4	3	0	3	3	3	8
- West Moray	5	0	4	4	0	4	3	3	7
Lewis & Harris	1	0	1	1	0	1	1	1	2
- Lewis	1	0	1	1	0	1	1	1	2
Lothian & Borders	141	5	55	54	11	43	37	36	102
- Lothian	37	2	20	20	5	15	13	13	34
- Scottish Borders	104	3	35	34	6	28	24	23	68
North-east	83	4	46	30	1	29	25	23	45
- Aberdeenshire	72	3	41	27	1	26	22	20	38
- East Moray	11	1	5	3	0	3	3	3	7
Orkney	33	6	10	7	1	6	6	5	8
South Strathclyde	70	6	33	31	0	31	26	25	52
- Ayrshire	49	5	24	22	0	22	19	18	34
- Renfrewshire	7	0	3	3	0	3	2	2	4
- South Lanarkshire	14	1	6	6	0	6	5	5	14
Tayside	97	3	47	39	0	39	35	34	68
- Angus	33	0	17	13	0	13	11	9	14
- Fife	21	1	11	11	0	11	9	10	21
- Perth & Kinross	43	2	19	15	0	15	15	15	33
Uist	5	0	5	4	0	4	4	0	0
- Benbecula	1	0	1	1	0	1	1	0	-
- North Uist	2	0	2	2	0	2	2	0	0
- South Uist	2	0	2	1	0	1	1	0	0
TOTAL:	648	40	314	265	18	247	212	194	423

Table 31. Home range occupancy and breeding success of Northern Ravens in Scotland, 2003-2013.

Year	Nesting sites checked	Occupied by pairs	% of those checked	Pairs monitored	Pairs laying eggs	% of those monitored	Pairs fledging young	Breeding success: % of those laying	Minimum number of young fledged	Mean brood size per laying pair
2003	–	–	–	168	148	88	127	86	363	2.5
2004	221	208	94	–	164	–	154	94	417	2.5
2005	289	257	89	–	177	–	139	79	371	2.1
2006	360	324	90	289	249	86	217	87	603	2.4
2007	408	352	86	299	261	87	237	91	636	2.4
2008	404	353	87	317	296	93	219	74	632	2.1
2009	463	394	85	330	316	96	271	86	707	2.2
2010	503	436	87	343	299	87	279	93	731	2.4
2011	465	393	85	321	288	90	264	92	725	2.5
2012	450	371	82	324	297	92	265	89	725	2.4
2013	539	443	82	374	343	92	259	76	709	2.1

Table 32. The number of checked Northern Raven home ranges and their breeding success in Scotland in 2013.

Region	Home ranges checked	Home ranges occupied by pairs	Pairs monitored	Failed early or non-breeding	Pairs confirmed with eggs	Pairs hatching eggs	Pairs fledging young	Minimum number of young fledged
Argyll	72	56	50	3	47	37	34	89
- Argyll & Bute (mainland)	41	35	31	2	29	24	20	46
- Argyll Islands	31	21	19	1	18	13	14	43
Central	79	69	59	14	45	41	38	109
- Arrochar & Helensburgh	20	16	15	3	12	10	10	31
- Clackmannanshire	3	1	1	0	1	1	1	2
- Dunbartonshire	1	1	1	1	0	0	0	0
- Falkirk	2	2	1	0	1	1	1	1
- North Lanarkshire	7	7	7	0	7	6	5	13
- Stirling	46	42	34	10	24	23	21	62
Dumfries & Galloway	89	71	52	2	50	40	31	75
Highland	30	28	21	0	21	21	21	58
- Badenoch & Strathspey	3	2	2	0	2	2	2	7
- Caithness	2	2	2	0	2	2	2	2
- Inverness-shire	5	4	3	0	3	3	3	8
- Ross-shire	3	3	1	0	1	1	1	2
- Small Isles	11	11	7	0	7	7	7	19
- Sutherland	6	6	6	0	6	6	6	20
Lewis & Harris	5	4	4	0	4	4	4	15
- Harris	1	1	1	0	1	1	1	4
- Lewis	4	3	3	0	3	3	3	11
Lothian & Borders	40	29	26	0	26	23	20	58
- Lothian	10	7	7	0	7	7	7	22
- Scottish Borders	30	22	19	0	19	16	13	36
North-east	5	2	2	1	1	0	-	-
South Strathclyde	45	36	29	0	29	29	24	70
- Ayrshire	45	36	29	0	29	29	24	70
Orkney	[34]	34	34	[0]	[25]	[25]	25	71
Tayside	96	78	65	2	63	47	40	103
- Angus	20	16	15	0	15	8	5	13
- Fife	8	5	5	0	5	3	3	7
- Perth & Kinross	68	57	45	2	43	36	32	83
Uist	44	36	32	1	32	26	22	61
- Barra	4	4	1	0	1	1	1	4
- Benbecula	5	5	5	0	5	3	3	8
- North Uist	20	14	13	0	14	12	9	26
- South Uist	15	13	13	1	12	10	9	23
TOTAL:	539	443	374	23	343	293	259	709

Figures in square brackets were not supplied and therefore inferred from other values in the table.

Annex 1

Raptor, owl and Northern Raven nest site and home range data submitted under the Scottish Raptor Monitoring Scheme in 2013.

Species	Argyll	Central Scotland	Dumfries & Galloway	Highland	Lewis & Harris	Lothian & Borders	North-east Scotland	Orkney	South Strathclyde	Tayside	Uist	TOTAL
European Honey-buzzard			5									5
Red Kite		55	84	93			29			79		340
White-tailed Eagle												84
Marsh Harrier							2			8		10
Hen Harrier	86	17	24	81		5	8	215	71	90	27	624
Northern Goshawk		5	37	1		46	73		3	9		174
Eurasian Sparrowhawk	15	26	7	8	1	36	1	19			3	116
Common Buzzard	156	277	68	122	8	61	185	13	1	122	17	1030
Golden Eagle	74	9	2	179	24	4	20			36	17	365
Osprey	31	37	13	94		14	30		4	67		290
Barn Owl	80	139	252	17		55	22		52	5		622
Tawny Owl	3	84	38	38		44				11		218
Long-eared Owl	5			5		9	2			6	2	29
Short-eared Owl	7	16	4	8		14		95		14	8	166
Common Kestrel	13	55	29	15		7	9	30	36	34	13	241
Merlin	6	7	10	90	3	53	76	52	20	65	7	389
Eurasian Hobby				1						5		6
Peregrine Falcon	37	35	112	45	1	141	72	33	70	97	5	648
Northern Raven	72	78	89	30	5	40	5	34	46	96	44	539
TOTAL:	585	840	774	830	42	529	534	492	303	745	143	5896

Annex 2

Raptor, owl and Northern Raven breeding attempts monitored under the Scottish Raptor Monitoring Scheme in 2013.

Species	Argyll	Central Scotland	Dumfries & Galloway	Highland	Lewis & Harris	Lothian & Borders	North-east Scotland	Orkney	South Strathclyde	Tayside	Uist	TOTAL
European Honey-buzzard			2									2
Red Kite		29	77	56			17			54		233
White-tailed Eagle												82
Marsh Harrier							1			5		10
Hen Harrier	30	4	12	27		3	2	101	11	24	20	234
Northern Goshawk		3	31			20	53		3	6		116
Eurasian Sparrowhawk	7	10	5	5	1	11	1	9			2	51
Common Buzzard	40	164	57	84	8	56	76	8	1	52	16	562
Golden Eagle	53	6	2	113	21	2	14			23	12	246
Osprey	18	22	7	63		10	18		4	38		180
Barn Owl	38	36	75	10		14	9		11	3		196
Tawny Owl	2	32	8	19		21				10		92
Long-eared Owl	2			3						6		11
Short-eared Owl		2	2	2		1		18		5	7	37
Common Kestrel	3	17	8	10		7	5	12	9	12	10	93
Merlin	3		8	36	2	17	28	9	13	15	6	137
Eurasian Hobby				1						2		3
Peregrine Falcon	14	22	44	22	1	54	27	7	31	39	4	265
Northern Raven	50	58	52	21	4	26	2	34	30	65	32	340
TOTAL:	260	405	390	473	37	251	253	199	113	360	109	2929

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 - 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 Goshawks and Kestrels, defend only a core area of the home range around the nest site and have extensive home ranges for hunting which can 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 pair or single bird that defends a territory against intrusions by other raptors of the same species or against potential predators. For some species, notably 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; or (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 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 might also include territorial pairs that appear capable of breeding but fail to lay eggs, but such criteria are often 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 or average 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.



Published by BTO Scotland on behalf of the
Scottish Raptor Monitoring Scheme