ISSN 2632-2374

Scottish Raptor Monitoring Scheme Annual Report 2019

Amy Challis, Mark W. Wilson, Nina Schönberg, Mark A. Eaton, Andrew Stevenson & Patrick Stirling-Aird

Scottish Raptor Monitoring Scheme Annual Report 2019

This publication should be cited as follows:
Challis, A., Wilson, M.W., Schönberg, N., Eaton, M.A., Stevenson, A. & Stirling-Aird, P. (2020). *Scottish Raptor Monitoring Scheme Report 2019.* BTO Scotland, Stirling.

Front cover image: Female Hen Harrier watching her young being tagged in Badenoch and Strathspey (Dave Pierce).
Back cover image: Merlin chick ringed in Shetland (Julie Redpath).

Contents

1 ROUND-UP OF RAPTOR MONITORING SEASON IN 2019

An overview of the 2019 breeding season for Scottish raptors, with hyperlinks to more detailed data reporting on the SRMS website.

Pg. 1

2 REVISION OF SRMS DATA TABLES

An overview on the recent revision of the SRMS data tables, why this has taken place and how we would like people to interact with them going forward.

Pg. 9

3 TRENDS IN BREEDING NUMBERS & PRODUCTIVITY

Learn about progress on work in producing local trends in breeding numbers and productivity from SRMS data.

Pg. 10

4 NEW ONLINE DATA MANAGEMENT TOOLS NOW AVAILABLE

Introducing SRMS Online (the Scheme's new data entry system) and the SRMS Legacy Data Portal (the Scheme's portal for Scheme partners to efficiently and securely access SRMS data).

Pg. 15

5 RAPTOR PATCH – AN UPDATE

Find out about the Scheme's *Raptor Patch* initiative and our plans going forward

Pg. 18

Foreword

Welcome to the 2019 report. The 2019 breeding season did not suffer the same weather effects that the 2018 did and again there was a high level of monitoring across the country. The SRMS continues to develop and following on from the agreement on the revised Data Sharing & Use Policy the SRMS is now in a position to launch its online system, a major development. This will allow more efficient data management and it is pleasing to note a high level of interest in using this system from existing data suppliers. As part of the online development a portal has been created to allow partner bodies' easier and more efficient access to data. More detail can be found in the article in this report.

This report also contains articles on trend production where major strides have been made in generating these for all species where possible, and on revisions to data in the tables and in previous reports. This highlights that the SRMS is very much a 'live' scheme and will amend data when errors or new data from previous years comes to light. The annual tables on the website will be where the most up to date tables can be found.

It should be noted that whilst sign up to the SRMS Data Sharing & Use Policy has been very high there is still a small number of contributors who haven't returned their form yet. This has meant that about 9% of 2019 records cannot currently be used in the annual report and I would urge those who haven't yet returned the form to do so. There is legislation and policy around data management behind having these agreement forms and we do need to know if you are happy to sign up or not.

The last year has a number of changes within the partner representatives and we thank David Stroud, Mark Holling and Gordon Riddle for their many years supporting and developing the SRMS. We welcome their replacements, Danny Heptinstall (JNCC), Mark Eaton (RBBP), Nick Wilkinson (RSPB) and Mike Thornton (SOC). As ever thanks to all those who have contributed records: to the partner organisations which provide funding, NatureScot, BTO, FLS, SF, RSPB and SOC; and the partner representatives that help oversee the scheme. Special thanks to Nina Schönberg, who provided excellent maternity cover for Amy during the last year, and Amy and colleagues at BTO Scotland for their hard work collating and analysing the data.

Andrew Stevenson (Chair of the Scottish Raptor Monitoring Scheme)
on behalf of the Scottish Raptor Monitoring Group.

1 ROUND-UP OF RAPTOR MONITORING SEASON IN 2019

The Scottish Raptor Monitoring Scheme received 5,795 records (which the SRMS has permission to use) of raptor home ranges checked in 2019. This represents a tremendous effort from SRMS contributors to whom we are extremely grateful. This section provides an overview of the breeding season, setting the scene on the weather conditions and prey situation that Scottish raptors experienced in 2019. Here we also provide a summary of the records received from each region of Scotland in 2019, along with some species highlights, and provide links to more detailed breakdowns which can be seen in the appendices at the end of the report and on the SRMS website.

WEATHER

The winter preceding the 2019 breeding season was in general warmer and drier than the 1981 to 2010 average. While the year got off to a cold start, all-time high temperatures were recorded in many places in February, with below average rainfall. The temperatures remained above average through spring, while rainfall increased above average in most parts of Scotland, especially the Northern and Eastern parts of the country, which received 170% of the average rainfall over the spring months. The summer was warm (>1°C above average) but wet, only surpassed in rainfall by 1985. However, rainfall fell well below average in Western parts of Scotland towards the end of the year, with temperatures below average across most of the country.

VOLE ABUNDANCE

Cyclic changes in the annual and seasonal abundance of voles can have a profound effect on the number of pairs and breeding success of a number of raptor and owl species (e.g. Petty *et al.* 2000; Lambin *et al.* 2000), particularly affecting Kestrel, Barn Owl (Figure 1) 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. Following a crash in vole numbers in many parts of Scotland in 2018, their densities varied greatly between, and even within, different regions, in 2019. Some areas, such as Dumfries & Galloway, reported peak vole numbers early in the season resulting in high numbers of fledglings for species such as Barn Owls and Hen Harriers, comparable to that of the good breeding season in 2014. Conversely, numbers of breeding birds in many other areas were still experiencing the effect of the crash of vole numbers in 2018. Reports of an apparent increase in vole abundance in these areas towards the latter part of the year, however, may have a knock-on impact on the success of the 2020 breeding season.

Figure 1: Cache of voles in a Barn Owl nest box. (Photo: Neil Brown, Argyll RSG).

MONITORING

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 of establishing whether ranges are occupied or not. In 2019, a total of 5,795 raptor home ranges in Scotland received at least one visit to check for occupancy (Table 1). Figure 2

shows a summary of raptor monitoring coverage in 2019, depicting 10-km squares that received at least one visit to check for occupancy. Not all of these home ranges held pairs: some had only single birds and others were apparently vacant. The regional breakdown of home ranges checked in 2019 can be seen in Table 1.

Equally important to checking occupancy are follow-up visits to confirm the findings of the first visit and to monitor the nesting success of birds present. The nesting success, normally expressed as the percentage of monitored breeding pairs producing fledged young, together with the mean brood size, provides a measure of the health of the population. In 2019, 2,664 potential breeding pairs received further visits that enabled their nest success to be determined.

Species-specific and regional breakdowns showing the results of monitored breeding attempts can be found at the end of this report and on the SRMS website, http://raptormonitoring.org/.

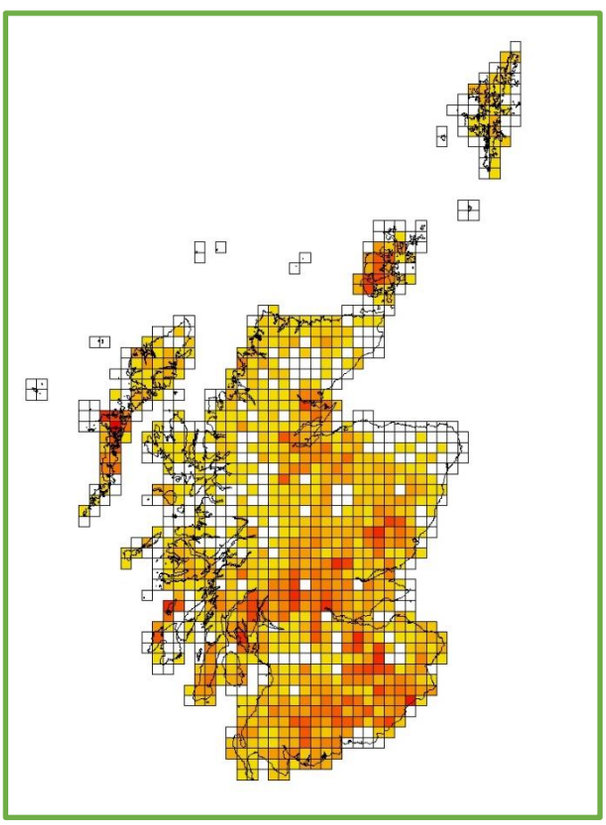

Figure 2: Raptor, owl and Raven monitoring coverage in Scotland in 2019. This map illustrates the number of SRMS species for which occupancy (or absence) was recorded for each 10-km square. The redder the square, the more species were covered. The maximum number of species checked for occupancy in a single square in 2019 was 11, from a total of 20 species. White indicates no monitoring records were received in a square for 2019. Note that this figure masks variation in coverage at finer geographic scales, and work is ongoing to improve our knowledge of coverage.

All SRMS fieldworkers are asked to follow best practice guidance for raptor monitoring set out in Hardey *et al*. (2013). For more information about what raptor monitoring entails please visit: http://raptormonitoring.org/raptor-monitoring

Table 1. The number of home ranges of raptors, owls and Raven checked in 2019 that were submitted to the Scottish Raptor Monitoring Scheme. For a given region and species combination a "-" indicates that the SRMS does not hold any previous records and "0" indicates that no records were provided for 2019 (but that SRMS does hold records from previous years). The most recent population estimates available for each species are also presented for context, where possible for Scotland, otherwise for a broader geographic region.

Species	Argyll	Central Scotland	Dumfries & Galloway	Highland	Lewis & Harris	Lothian & Borders	North-east Scotland	Orkney	Shetland	South Strathclyde	Tayside	Uist	TOTAL	Estimated population size (pairs)	Region estimate relates to	Year estimate relates to
Osprey	23	40	18	66	-	13	26	-	-	4	58	-	**248**	230	Scotland	2017[3]
Honey-buzzard	-	1	0	7	-	-	-	-	-	-	4	-	**12**	< 10	Scotland	2003-2015[1]
Golden Eagle	83	12	2	126	30	3	1	-	-	0	34	17	**308**	508	Scotland	2015[5]
Sparrowhawk	24	18	1	6	0	12	2	30	8	15	16	5	**137**	35,000	UK	2009[4]
Goshawk	-	8	40	11	-	45	0	-	-	7	20	-	**131**	165	Scotland	2017[3]
Marsh Harrier	0	1	-	0	-	1	0	0	-	-	15	-	**17**	< 10	Scotland	2003-2015[1]
Hen Harrier	25	4	20	59	8	18	9	249	-	47	51	33	**523**	460	Scotland	2016[2]
Red Kite	-	53	139	57	-	1	30	-	-	0	77	-	**357**	≥ 273	Scotland	2015[1]
White-tailed Eagle	39	-	-	53	21	-	1	1	-	-	3	11	**129**	122	Scotland	2017[3]
Buzzard	167	21	76	108	4	117	5	22	-	11	234	25	**790**	57,000–77,000	UK	2009[4]
Barn Owl	79	156	245	37	-	90	0	-	-	15	5	-	**627**	500–1000	Scotland	post 2004[6]
Tawny Owl	64	111	60	46	-	59	0	-	-	0	2	-	**342**	50,000	UK	2015[4]
Little Owl	-	-	-	-	-	5	-	-	-	-	-	-	**5**	<10	Scotland	2015[1]
Long-eared Owl	7	17	0	5	-	11	0	4	-	1	3	17	**65**	1,800–6,000	UK	2007-2011[4]
Short-eared Owl	9	10	0	1	-	13	0	133	-	5	26	18	**215**	620–2,180	UK	2007-2011[4]
Kestrel	26	35	14	16	1	56	0	44	-	19	61	11	**283**	2,750–5,500	Scotland	2013[7]
Merlin	5	7	10	76	8	39	98	86	63	14	40	4	**450**	733	Scotland	2008[8]
Hobby	-	-	1	0	-	0	-	-	-	-	7	-	**8**	632	UK	2017[3]
Peregrine	32	30	100	90	1	143	38	35	6	60	93	6	**634**	523 (479-592)	Scotland	2014[9]
Raven	90	65	74	24	13	52	0	4	17	32	96	47	**514**	7,400	UK & IOM	2009[4]
TOTAL:	**673**	**589**	**800**	**788**	**86**	**678**	**210**	**608**	**94**	**230**	**845**	**194**	**5795**			

Sources of estimated population sizes: [1]Challis *et al*. 2016; [2]Wotton *et al*. 2018; [3]Holling *et al*. 2019; [4]Musgrove *et al*. 2013; [5]Hayhow *et al*. 2017; [6]Shaw 2007; [7] Wilson *et al*. 2015; [8]Ewing *et al*. 2011; [9]Wilson *et al*. 2018.

SPECIES SUMMARIES

Throughout this report the names of birds follow the SOC list of English vernacular names (http://www.the-soc.org.uk/bird-recording/the-scottish-list/).

The following species accounts draw principally on the information presented in our SRMS summary tables which can be accessed on the SRMS website and viewed at the end of this report. These tables summarise the records which the SRMS has received in the standard SRMS format and have therefore passed through our quality assurance processes as set out in the SRMS Data Sharing & Use Policy (see http://raptormonitoring.org/srms-data/data-sharing-use-policy).

It is important to recognise that, for the majority of species, not all breeding pairs were monitored, thus the numbers presented do not represent absolute population size or provide a complete picture of breeding productivity, at either regional or national scales. Table 1 provides the most recent population estimates available for each species to help contextualise the SRMS data.

Our previous report (Challis *et al*., 2019) introduced the SRMS Data Sharing & Use Policy and asked our data providers to complete and return a SRMS Registration Form to confirm their consent (or otherwise) to the data sharing set out in the Policy.

While Registration Forms have been returned to the SRMS from the majority of data contributors granting permission for the SRMS to use their data in annual reporting, we have not yet received forms from some contributors, these accounting for about 9% of the potentially available records. We can only report on data for which we have this explicit permission and, as a consequence, the species accounts below are not as complete as they could be. We will update the summary tables on the SRMS website if and when we receive permission from any of these outstanding data providers.

DATA PROVIDER?
If you have not already done so, please complete and return a SRMS Registration Form to confirm your consent (or otherwise) to the data sharing set out in the Data Sharing & Use Policy. Registration forms can be downloaded here : http://raptormonitoring.org/getting-involved/registering-for-srms
Either complete electronically and email to srmc@bto.org or print off and post to Scottish Raptor Monitoring Coordinator, BTO Scotland, Beta Centre (Unit 15), Stirling University Innovation Park, Stirling, FK9 4NF

Osprey

In 2019, 170 of 248 home ranges checked were occupied by pairs. A further 20 home ranges were occupied by single birds. Of 162 pairs that were monitored, 142 were confirmed as having laid eggs. A total of 107 pairs went on to fledge a minimum of 196 young.

The coverage of this species in the Highland region is no longer considered complete (Highland Raptor Study Group Annual Report 2019) and this is also the case in Perthshire.

Honey-buzzard

Honey-buzzard continues to be a very under monitored species in Scotland with 12 records for checked home ranges reported to the SRMS in 2019 – one in Central Scotland, seven in Highland and four in Tayside. A couple of studies are continuing in Tayside and Central Scotland, though full details are not available to the SRMS and are therefore not reflected in our summary tables. A national survey of this species is being carried out by a group of enthusiasts in 2020 and 2021, and we would therefore hope to see an increase in new home ranges being identified and reported to the Scheme in future.

Golden Eagle

A total of 266 of 308 home ranges checked in 2019 were occupied by pairs, with a further seven home ranges in use (either single birds or fresh signs were reported). Of 233 pairs that were monitored, 159 were confirmed to lay eggs. In total, 102 pairs went on to fledge a minimum of 115 young; 47 out of the 233 (20%) monitored pairs failed early or did not breed.

In the Highland region five new territories have become occupied since the national survey in 2015 - two in areas with no known history of occupation and three reoccupied after long absences (Highland Raptor Study Group Annual Report 2019).

Figure 3: A Golden Eagle visiting a deer carcass in Argyll. (Photo: Scott Smith, Argyll RSG).

Sparrowhawk

In 2019, 82 of the 137 home ranges checked were occupied by pairs. Of the 72 pairs that were monitored, 67 were confirmed to lay eggs. A total of 62 pairs went on to fledge a minimum of 178 young.

Following the first known nesting attempt on Shetland in 2018, eight home ranges were occupied by pairs in 2019. Seven of these pairs laid eggs and all were successful with 1.7 young fledged per successful pair. The presence of more pairs was indicated by birders seeing pairs and young when looking for Two-barred Crossbills during the largest ever influx of this species into the UK. Sightings were followed up and other suitable plantations checked by ZRSG members (Pete Ellis, ZRSG *pers. com.*).

Goshawk

In 2019, 103 of the 131 home ranges checked were occupied by pairs, with a further 11 home ranges in use (either single birds or fresh signs were reported). Of 89 pairs that were monitored, 85 were confirmed to lay eggs. A total of 64 pairs went on to fledge a minimum of 116 young.

Marsh Harrier

Seventeen home ranges were checked across Scotland in 2019, 12 of these within the Tay reed beds which form part of the Firth of Tay & Eden Estuary SPA, the only site in Scotland for which this species is a qualifying feature. A total of 12 home ranges within the Tay reed beds were occupied by pairs in 2019 and of six pairs that were monitored five went on to successfully fledge a minimum of 13 young.

Away from the Tay reed beds there were a further three pairs located in Angus, two of which were monitored and fledged a minimum of six chicks. In Central Scotland three young fledged from a nest in Clackmannanshire, the first known successful breeding of Marsh Harriers in the Upper Forth bird recording area (Orr-Ewing, 2020).

Figure 4: A Marsh Harrier chick in a nest in the Tay Reed Beds (Photo: Robin Manson, Tayside & Fife RSG).

Hen Harrier

In 2019, 228 of 523 home ranges checked were occupied by pairs with a further 45 ranges occupied by single birds. Of 208 pairs that were monitored, 137 were confirmed to lay eggs, and 75 pairs went on to fledge a minimum of 188 young.

Red Kite

In 2019, 261 of 357 home ranges checked were occupied by pairs. Of 202 pairs that were monitored across Scotland as a whole, 197 were confirmed to lay eggs. A total of 158 pairs went on to fledge a minimum of 255 young.

Figure 5: Red Kite chick at a nest in Perthshire (Photo: Chris Baker, Tayside & Fife RSG).

White tailed-Eagle

In 2019, 122 of 129 home ranges checked were occupied by pairs, and 71 pairs fledged a minimum of 100 young.

Buzzard

In 2019, 531 of 790 home ranges checked were occupied by pairs, with a further 33 ranges occupied by single birds. Of 434 pairs that were monitored, 381 were confirmed to lay eggs. A total of 335 pairs went on to fledge a minimum of 487 young.

Figure 6: A Buzzard in Fife. (Photo: Harry Bell, Tayside & Fife RSG).

Barn Owl

In 2019, 248 of 627 home ranges checked were occupied by pairs, with a further 45 sites occupied by single birds. Of 232 pairs that were monitored, 208 were confirmed to lay eggs, and 186 pairs went on to fledge a minimum of 544 young.

Tawny Owl

In 2019, 120 of 342 home ranges checked were occupied by pairs. Of 112 pairs that were monitored, 111 were confirmed to lay eggs. A total of 89 pairs went on to fledge a minimum of 149 young.

Little Owl

This species continues to be a scarce breeder in Scotland. In 2019, four out of five locations in the Scottish Borders held single birds.

Long-eared Owl

In 2019, 13 of 65 home ranges checked were occupied by pairs. Only nine pairs were monitored: all laid eggs with eight pairs going on to rear at least 22 young.

Figure 7: A brood of five Long-eared Owl chicks at a nest in the Scottish Borders. (Photo: Tim Chamberlain).

Short-eared Owl

In 2019, 25 of 215 home ranges checked were occupied by pairs, with a further 45 home ranges occupied by single birds. Of 19 pairs that were monitored, 10 were confirmed to lay eggs. A total of 9 pairs went on to fledge a minimum of 12 young.

Kestrel

In 2019, 124 of 283 home ranges checked were occupied by pairs. Of 95 pairs that were monitored, 87 were confirmed to lay eggs. A total of 78 pairs went on to fledge a minimum of 291 young.

Merlin

In 2019, 161 of 450 home ranges checked were occupied by pairs. Of 139 pairs that were monitored, 120 were confirmed to lay eggs. A total of 92 pairs went on to fledge a minimum of 268 young.

The last national survey of this species was in 2008 (Ewing *et al*. 2011) and estimated a Scottish breeding population of 733 (512-979). The wide confidence interval indicates the high level of uncertainty about the number of pairs breeding (estimated at between 451 and 828) outside of areas monitored by SRSG members.

Figure 8: Merlin plucking post with remains of an Oak Eggar and Meadow Pipit in Perthshire. (Photo: Clive McKay, Tayside & Fife RSG).

Levels of survey coverage from national level schemes such as the Breeding Bird Survey in such areas are typically low, and the chances of Merlin breeding in surveyed areas going undetected are relatively high. Although SRMS partners recognise that it would be very valuable to update the population estimate generated by

the previous survey the decision was recently taken that such a survey would not go ahead in 2020, due to a lack of financial resources.

Merlin, is just one of the species for which the SRMS has recently been able to produce updated provisional trends. Read more about the work to produce robust tends in numbers and productivity in Chapter 3.

Hobby

This is a scarce breeding raptor in Scotland, with small numbers of records tending to reach the SRMS. In 2019 we received records of eight home ranges checked, seven in Tayside and one in Dumfries & Galloway. Of the four pairs that were monitored, all laid eggs and all four pairs fledged young, 1.8 young per successful pair. As a migrant breeder to the UK it has significantly increased its numbers and range and may well become a more regular breeder in Scotland.

Peregrine

In 2019, 260 of 634 home ranges checked were occupied by pairs, with a further 55 home ranges in use (either single birds or where fresh signs were reported). Of 233 pairs monitored, 192 were confirmed to lay eggs and 173 pairs went on to fledge a minimum of 370 young.

Figure 9: Four Peregrine chicks in an old Raven nest (Photo: Chris Baker, Tayside & Fife RSG).

Raven

In 2019, 369 of 514 home ranges checked were occupied by pairs. Of 298 monitored pairs, 260 were confirmed to lay eggs. A total of 235 pairs went on to fledge a minimum of 633 young.

Scarcer species

No records of breeding attempts by irregular breeders such as Snowy Owl, Pallid Harrier and Montagu's Harrier were supplied to the SRMS for the 2019 breeding season.

2 REVISION OF SRMS DATA TABLES

Over the last three years BTO Research Ecologist, Mark Wilson, and the SRMC have been working together to improve the Scheme's collation and curation processes. This has included updating and improving the programs that automatically generate the SRMS's annual summary tables. SRMG agreed that it would be timely to revise the SRMS annual reporting tables on the SRMS website to ensure that the most up to date monitoring data are available for all stakeholders. These updated tables have now been made available on the SRMS website at http://raptormonitoring.org/annual-report and on the relevant species pages.

DATA CURATION & MANAGEMENT

The SRMS acts as custodian for a very large amount of raptor data (currently greater than 73,000 records of individual breeding attempts). This role is performed by the SRMC (and supported by a BTO Scotland Research Ecologist) on behalf of the SRMG.

When data are received at the SRMS, they undergo a process of checking and archiving. This process includes checking for spatial errors and correcting erroneous grid references where they are identified, and checking for duplicate records. The data are run through a cleaning programme so records that are missing necessary information, incorrect in some respect, or duplicated can be found and replaced, amended or removed as appropriate. The aim of this process is to produce a quality assured dataset that is fit for the routine SRMS uses of the data and for wider sharing with partners and via data requests from external users. Cleaning ensures, for example, that observer, species, site names and codes and the habitat information are standardised wherever possible. Incomplete or inaccurate information on occupancy and nest contents are also filled in, where feasible, based on other information that has been provided.

Over the last three years, Mark Wilson has been developing and refining these cleaning processes and the computer programs that allow parts of it to be done in an automated way, to ensure that the data that the SRMS holds, uses and makes available to others are fit for purpose. This work has included updating the automated programs (written in R-code) that now generate the SRMS's annual summary tables.

UPDATE OF SRMS ANNUAL SUMMARY TABLES FROM 2015 ONWARDS

With the work on automating and refining the data checking and cleaning processes nearing completion, SRMG agreed it would be timely to reproduce all the SRMS annual tables on the SRMS website that had been produced in the new standard table format (used since 2015) using the latest cleaning code and all records submitted to the SRMS and now contained in the master dataset. This rerun of tables takes into account any post-publication errors in data submissions that we have been made aware of and any new data that have arrived at the SRMS after the publication of the annual report each year. **Readers will therefore notice discrepancies between the figures in the new updated tables and those published in our annual reports and on the website previously.**

Please get in touch and let us know if you ever identify what you believe may be anomalies in the data tables. These could be due to mistakes in data provided to the SRMS, missing data that have unintentionally been omitted from the overall dataset, or incorrect interpretation of records during the cleaning process.

The SRMS website should always be your first port of call for up-to-date annual tables http://raptormonitoring.org

3 TRENDS IN BREEDING NUMBERS & PRODUCTIVITY

A key objective for the Scottish Raptor Monitoring Scheme is to provide robust information on Scottish raptor populations, in order to report on trends in numbers, range, survival and productivity and also to understand the causes of population changes and constraints on raptor populations. Such trends are important in allowing us to monitor the health of our raptor populations, understand the causes of population change, and identify problems that conservation NGOs, statutory agencies and ultimately Scottish Government can act on to protect these raptors. This section of the report aims to provide a concise summary of all trend information available for Scottish raptors as a one-stop shop for stakeholders.

While it has taken more time than anticipated to start to deliver trends for the individual SRMS species, much work has been undertaken behind the scenes to prepare the dataset to facilitate this work. This has now reached the stage where we are able to produce local study area trends for all SRMS species quickly and efficiently. Below we explain how SRMS data are being used to generate provisional trends for one SRMS species, Merlin, and what the next steps will be to finalise local, regional and national trends for this and other SRMS species.

Merlin Population Trends 2003 – 2018: An assessment based on the data held in the SRMS

Mark Wilson (BTO Scotland)

Merlin is Scotland's smallest widespread raptor species, breeding in upland areas typically dominated by moorland and bog.

Figure 10: Three Merlin chicks (Photo: Chris Baker, Tayside & Fife RSG).

The majority of Merlin breeding attempts recorded in Scotland have been on the ground, but this species may also breed on boulders, rocky crags and ledges, and in old corvid nests in conifer plantations (Hardey *et al*. 2013). Merlin is widely regarded as one of the most difficult raptors to monitor effectively, requiring high survey effort to reliably determine occupancy or absence in areas of suitable habitat.

WHAT APPROPRIATE DATA DOES THE SRMS HOLD TO PRODUCE TRENDS FOR MERLIN?

Between 2003 and 2018 the SRMS received 5,377 records of nest site checks for Merlin. Table 2 shows how these are distributed between years and regions. The minimum number of records received (in 2006) was 191, but monitoring effort has increased substantially in recent years. Since 2012, the annual number of records received has been higher than the annual average since the start of the Scheme. Up to 2018, the three years in which the largest numbers of records were received were 2016 (488), 2017 (507) and 2018 (481).

Table 2. Number of home range checks reported to the SRMS each year, between 2003 and 2018, in each of the 12 SRMS Regions. The rows with red shading at the bottom of the table show the sum of the mean Bird Atlas count (based on timed tetrad visits) for 10 km squares in each region and, based on these regional totals, the approximate percentage of the Scottish population in each region, and an approximate measure of survey effort. This is calculated as the reported number of home range checks per region and is presented as a rate (per Atlas counted bird) in order to give a measure of per capita survey effort.

Year	ARGYLL	CENTRAL	DUMFRIES & GALLOWAY	HIGHLAND	LEWIS & HARRIS	LOTHIAN & BORDERS	NORTH EAST SCOTLAND	ORKNEY	SOUTH STRATHCLYDE	TAYSIDE	UIST	SHETLAND	Total
2003	9			88		43	84		9	47	10		290
2004	14	1	1	51		31	38	22	12	55			225
2005	5		1	75	12	26	72	17	16	51	17		292
2006	6		1	67		42	35	18	8		14		191
2007	5	7	9	83		53	55	21	10	52	22	1	318
2008	4	10	8	84	5	61	1		14	59	13		259
2009	2	3	9	61	9	49	30	14	13	49		1	240
2010	3	5	12	61	11	48	1		18	47			206
2011	6	13	12	57	3	50	92	24	11	51	4		323
2012	2	8	7	37	3	52	97	46	13	65	7		337
2013	6	7	10	62	3	51	89	52	16	54	7		357
2014	3	7	12	46	1	55	91	64	12	52	14	46	403
2015	3	3	10	66	4	40	108	71	18	54	7	76	460
2016	10		16	92	2	29	111	67	17	61	9	74	488
2017	2	3	10	103	6	40	100	80	13	63	9	78	507
2018	1	6	11	96	2	37	105	75	5	46	8	89	481
Atlas count	25	10	11	138	12	19	44	11	6	43	44	33	396
Atlas %	6.3	2.5	2.8	34.8	3	4.8	11.1	2.8	1.5	10.9	11.1	8.3	100
Effort	0.2	0.5	1.1	0.6	0.3	2.1	2.3	6.5	2.2	1.3	0.2	2.2	

The most recent national survey of breeding Merlin in the UK was in 2008 (Ewing *et al*. (2011), and estimated the number of breeding pairs in Scotland at 733. Relative abundance data from Bird Atlas Timed Tetrad Visit (TTV) surveys suggest that, at the time of the Atlas, 41.1% of this population (approximately 301 pairs) were in the sparsely populated and predominantly upland regions of Argyll and Highland.

Mean monitoring effort between 2014 and 2018 in these regions came to just 18% of all reported site checks. Moreover, as illustrated in Figure 11, coverage among different parts of the Merlin's range in the west and north of Scotland varies a lot, and so may not be very representative of the wider population, even at a regional level.

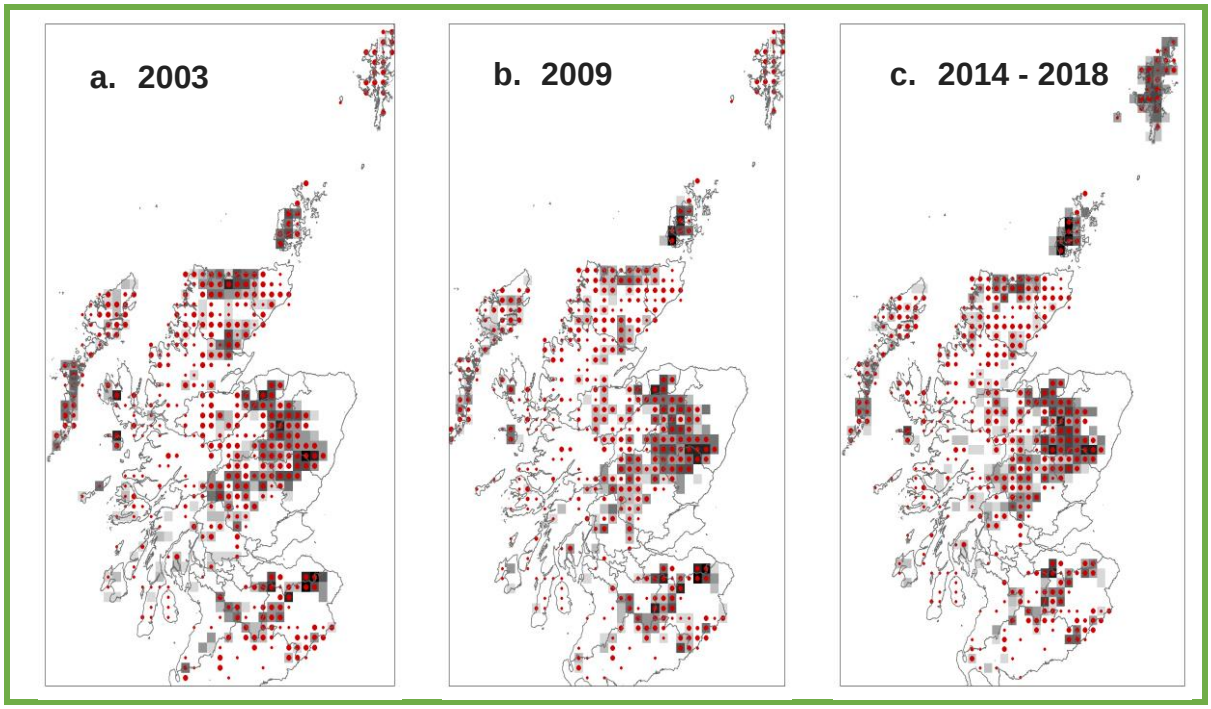

Figure 11: Maps showing variation in the number of checked Merlin territories reported to SRMS during three periods (grey squares, darker shade indicating greater more territories checked), in the context of the known Merlin breeding distribution taken from the 2007-2011 Bird Atlas (red dots, with size of positively related to probability of breeding).

The level of survey coverage was also relatively low in the Western Isles. The total number of territories checked in the Uists, Lewis and Harris between 2014 and 2018 varied between 10 and 15 (between 2 and 4% of all checks). Atlas counts in the Uists suggest that these islands support 11.1% of breeding Merlin in Scotland. |A separate study carried out just prior to the Atlas (Rae 2010) estimated the number of occupied territories in the Lewis Peatlands SPA alone to be 28 (4% of the Scottish population). Thus it seems likely that Lewis and Harris together accounted for at least 15% of the Scottish population around the time of the Atlas.

The region with the highest number of visits per breeding pair was Orkney, which is estimated to hold only 3% of breeding pairs in Scotland but where, between 2015 and 2018, the number of site checks carried out is the fourth highest (behind Highland, North East Scotland and Shetland) out of 12. Coverage in the rest of the Scottish mainland was relatively low in Central, D&G and Tayside (and relatively high in Lothian & Borders, South Strathclyde and North East Scotland. Spatial variation in coverage has remained broadly similar over the lifetime of the SRMS (Figure 11), with the most obvious changes being in Easter Ross and East Lothian (where coverage has decreased) and in Shetland (where it has greatly increased).

For which areas can trends in numbers and/or productivity be produced for Merlin?

For Merlin, seven clusters of home ranges were identified where coverage has been high enough to calculate trends (at least in occupancy), either for the whole period between 2003 and 2018 (6 areas), or else for the last 10 years of this period (1 area). These clusters are shown in Figure 12. Three of them cover an almost continuous area from West Moray (Cluster 3) through Aberdeenshire (Cluster 4) to Angus (Cluster 2). An average of 142 Merlin home ranges were checked each year within this area – more than in all the

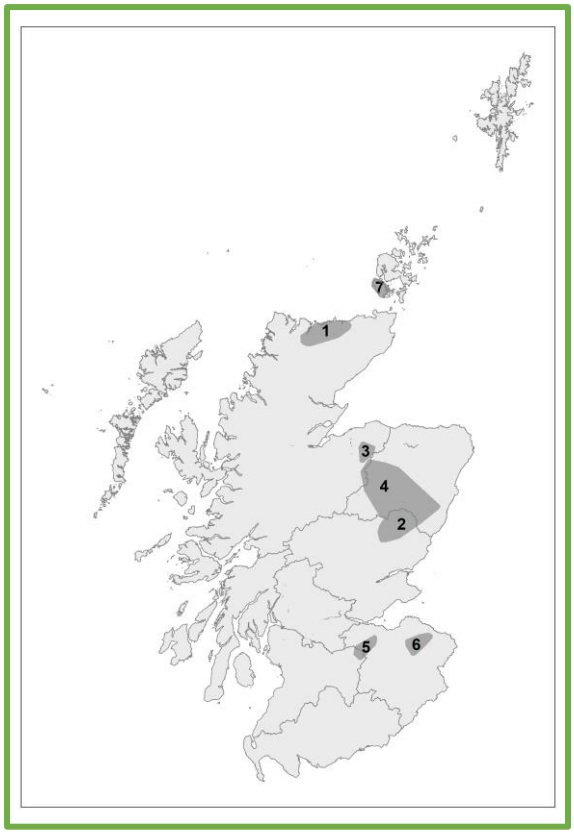

Figure 12: Areas corresponding to the clusters of home ranges from which sufficient data were reported to estimate population trends for Merlin between 2003 and 2018 (1 – 6) or between 2009 and 2018 (7).

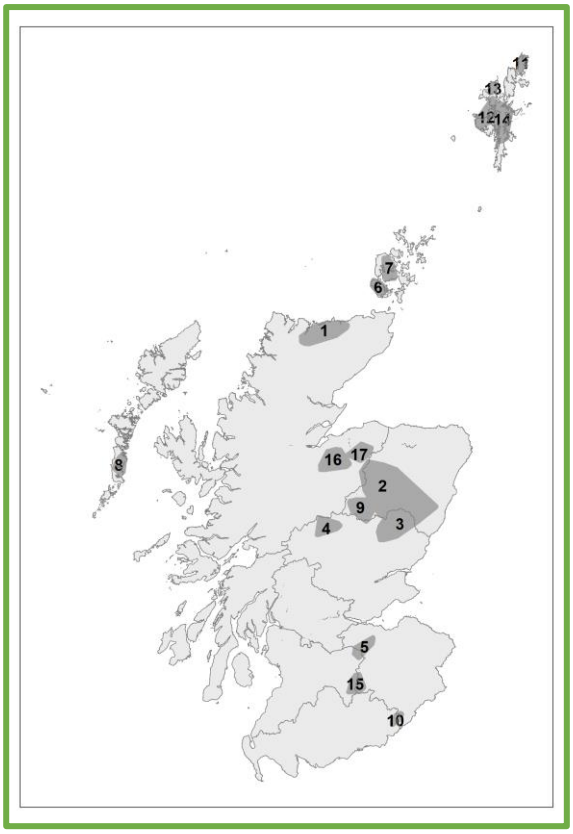

Figure 13: Areas corresponding to the clusters of Merlin home ranges for which sufficient data will be available to estimate trends if data continue to be reported at the same rates as during the period 2014 to 2018.

other four separate clusters together. Two of these are in separate hill ranges south of Edinburgh (Cluster 5 in the Pentlands and Cluster 6 in the Lammermuirs). The other two clusters are in north Sutherland (Cluster 1) and the island of Hoy in Orkney (Cluster 7). There were no clusters in western Scotland (including the Hebrides), in the central highlands or in the southern uplands.

If levels of coverage during the past five years are maintained (Figure 13), new areas for which it may be possible to derive population trends for Merlin will include South Uist, some (relatively small) areas in the central Highlands and Southern Uplands, and much of Shetland. However, recent levels of coverage in the Lammermuirs are now insufficient to produce trends (this is due to cessation of Merlin survey work in this area by the three main raptor workers responsible for conducting the Lammermuir study).

Provisional trends for breeding Merlins in these areas have been produced and are summarised in Table 3. Occupancy in most clusters has decreased over the course of the trend period. However, a corresponding decrease in the number of pairs reported is apparent only in the Lammermuirs (Cluster 6). This indicates that, as for other species, the observed drop in occupancy may be a consequence of reduced search effort for new nest sites, or sites within the same home range being classed incorrectly as belonging to different home ranges. At Clusters 1 and 6 (Northern Sutherland and the Lammermuirs), respectively, the proportion of pairs fledging at least one offspring increased between 2003 and 2018. In Northern Sutherland, this increase was primarily down to low levels of breeding success being recorded in the first two years of surveys, during which the number of pairs monitored was higher than in

subsequent years. Similarly, in the Lammermuirs the increase in breeding success is mirrored by a dramatic decrease in the number of pairs reported in the area. In both clusters, it may be that the pattern of increased breeding success is due to lower survey effort at the start of the breeding season. This means that more pairs fail before they can be found, resulting in fewer pairs being recorded, and a higher proportion of these going on to be successful. Only in one cluster (Cluster 2, in Angus) was there a significant (downward) trend in fledged brood size. A discussion with the observers in this area would be needed to determine whether or not this may have been due to reduced effort put into trying to find all fledged young from each successful nest.

Table 3. Clusters of home ranges for which putative trends have been calculated. The period for which coverage is sufficient to calculate occupancy trends is given, along with the main region from which home ranges in the cluster are drawn, the maximum number of home ranges reported in the cluster in any one year and, for linear trends, the mean annual rate of change (as a percentage) for any significant trends. The shade of blue or red indicates the rate of decrease or increase, respectively, in the relevant measure. Non-linear trends are shaded with diagonal hatching. Decreases followed by increases indicated by the word "Trough", and increases followed by decreases indicated by the word "Peak". "T – P" signifies a trough followed by a peak.

Cluster	Period	Main Region	Max HR Checked	Occupancy	Pairs	Success	Fledged
1	2003 - 2018	Sutherland	28	T - P	TROUGH	2	
2	2003 - 2018	Angus	54	-2			-7
3	2003 - 2018	West Moray	13	-2			
4	2003 - 2018	Aberdeenshire	75	-3	T - P		TROUGH
5	2003 - 2018	Pentlands	24	-2	TROUGH		
6	2003 - 2018	Lammermuirs	27	-3	-5	3	
7	2009 - 2018	Orkney	32	-3			

What are the next steps to update trends for Merlin and other SRMS species?

During 2020/21, provisional up-to-date trends will be produced for all SRMS species and a consultation process will be carried out to get feedback from data providers on the trends that have been produced and the extent to which they are deemed representative. This latter work is important because to date the SRMS has not been able to document changes in coverage/effort in individual study areas, and these have a bearing on the rigour of trends (particularly in breeding numbers) that can be produced. For this reason, it will be important for us to liaise with observers to sense-check the trends that have been produced. It is likely that appropriate caveats will need to be attached to some trends, in order to make readers aware of any variation in effort that could have influenced the patterns shown. Ultimately, we want to make sure that all the trends we produce reliably indicate changes in the size or productivity of Scottish raptors, whether at a local scale (as illustrated here) or at larger regional and national scales.

In our next annual report we expect to be able to present final up-to-date trends for all SRMS species. These trends will be presented at different scales - the local study area scale (i.e. for the clusters described above) but also at the regional scale (i.e. SRMS region & Natural Heritage Zones) and national scale (i.e. Scotland) where these are possible. Once trends have been published for all SRMS species, our focus will turn to producing a monitoring enhancement strategy for the SRMS, with input from all SRMS partners, to maintain areas of good coverage, and find ways of improving coverage elsewhere.

4 NEW ONLINE DATA MANAGEMENT TOOLS NOW AVAILABLE

Over the last five years, with generous funding from the BTO-JNCC Partnership, BTO core funds and NatureScot, SRMS in association with the BTO Information Systems-team, has been working on developing two online-based data systems for the Scottish raptor-monitoring audience. The first, the online recording system, called SRMS Online, has been developed to piggy-back on the much larger and comprehensive system for housing ringing and nest recording information (Demography On-line, or DemOn) developed by BTO, part-funded through their partnership with JNCC. It aims to accommodate more detailed and consistent recording of raptor occupancy and breeding data each year, and to equip its users with tools to easily coordinate their monitoring, store their data and eventually report on it, all under one roof. The second, the Legacy Dataset, in turn, provides access for the Scheme's partner organisations to the data held by the Scheme, accessed via a secure online interface. Both of these systems were launched on March 31st 2020 and are now available for the appropriate stakeholders.

SRMS ONLINE – OUR NEW ONLINE RECORDING SYSTEM

SRMS Online has been developed fundamentally to tackle the limitations of the Scheme's existing data recording spreadsheet and to thus improve data quality. One of the major differences between the online system and how data have been recorded until now is that SRMS Online facilitates recording of data on a visit by visit basis. By capturing more information on what is being observed by raptor workers during each of their monitoring visits (which has previously remained only in their own field notebooks), a more detailed picture of what is happening throughout the breeding season can be drawn. Capturing the stage of breeding attempts and nest contents (where possible without disturbance) at each visit improves the information that can be obtained from the data in a number of ways:

- It reduces the bias that can be introduced into productivity recording when there is a tendency (as there can be with many species) to find and monitor nests that are more successful.
- Because the stage of the nest is recorded at each visit, daily nest failure rates can be calculated, allowing the stage of the breeding cycle at which failures occur to be assessed and changes in this through time estimated.
- It allows checking of when individual visits were made, and therefore the quality of the monitoring that is carried out (i.e. have visits been made at the key times for each species to assess occupancy, hatching success and fledging success?).

At the same time, the system also aims to provide its users with the improved capacity to not only store, manage and report on their monitoring data independently, but also to coordinate their monitoring locally (e.g. as part of one of the Scottish Raptor Study Group branches).

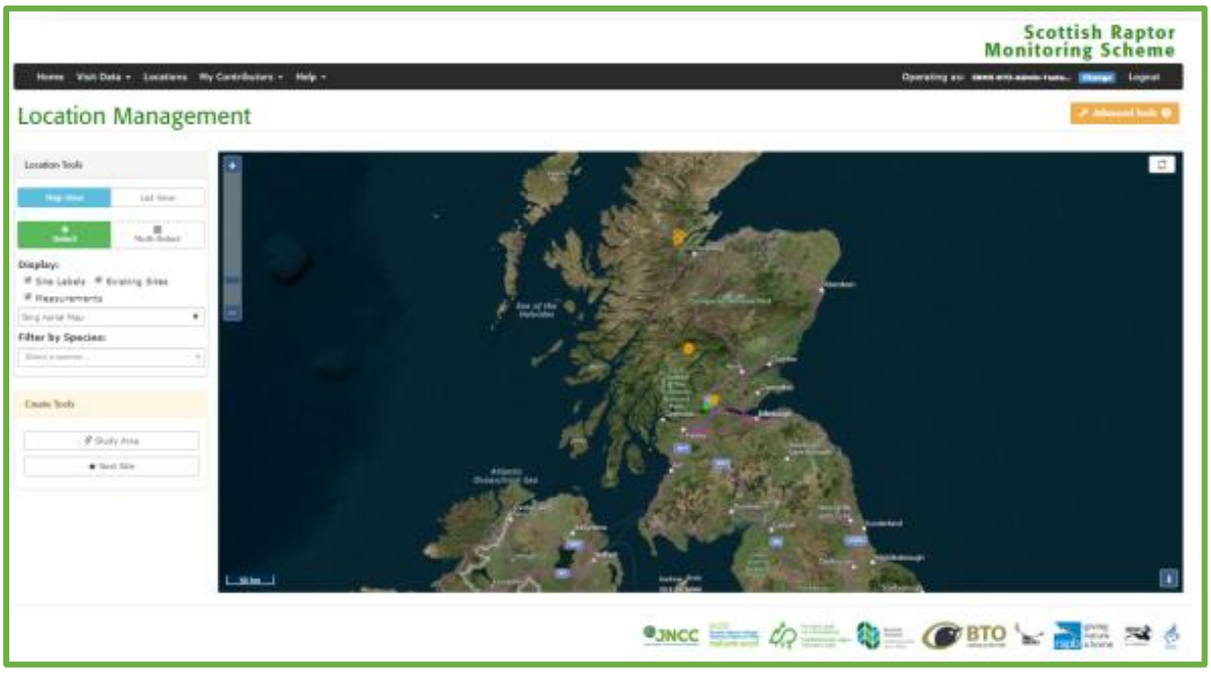

Figure 14: A snapshot of the SRMS Online interface showing how locations can be managed via a map view.

How does it work?

SRMS Online is hosted by BTO's secure online servers at the University of East Anglia. Each user logs into the system with their unique confidential credentials, but they also have the ability to grant different levels of access to their records to other SRMS Online users or decide to share sites between accounts. The system is thus able to adjust to the many different ways raptor workers may interact with each other using the system to support raptor monitoring activities, while ensuring that data are stored securely and managed according to the preferences of each individual user, and in accordance with the SRMS Data Sharing & Use Policy[1]. Having SRMS Online built on top of a much larger BTO web-based survey platform has meant that the system could be developed with comprehensive functionality but at a much reduced cost to SRMS. It also means that the system benefits from the ability to capitalise on existing and upcoming BTO survey web-based functionalities, data management and reporting modules. In addition, it provides the opportunity, going forward, to link SRMS Online directly with other BTO-organised monitoring activity, such as ringing, if resources allow, providing easier data management facilities for users of both systems.

One of the main advantages of the new system is the ability to create permanent species-specific nest and observation sites, which can be visualised and managed both in list and map formats. This means, that especially for those species, such as Ospreys and Eagles, which tend to return to the same sites year after year, the site details only need to be completed once, ensuring consistency between years when it comes to recording data against them (and less duplication of data entry for users). In addition to this, SRMS Online also allows users to draw boundaries for Study Areas that they cover, which is in line with the area-based approach that SRMS encourages its data providers to take (see Chapter 5).

[1] http://raptormonitoring.org/srms-data/data-sharing-use-policy

The system allows users to add monitoring records on a visit by visit basis, in one of two ways; either by recording data into 'Visit Logs', which will group together visits made to a particular site during a single breeding attempt; or alternatively, by creating 'Observation Sites' away from known nest sites in a more casual manner. The latter have not been possible to record in the past, using the MS Excel spreadsheet used by the SRMS, but such records will act as a valuable source of information when it comes to understanding occupancy and guiding future survey efforts.

The new visit-based approach of SRMS Online described above, accommodates the recording of detailed observations from each visit made by a raptor worker to a particular site, which are more rooted in time. This allows the SRMS to pinpoint with more accuracy when events, from first signs of display to fledging or failure take place, and to thus track potential changes over time. This also means that if monitoring records are recorded in the system on an ongoing basis during the breeding season, monitoring efforts can be tracked and thus coordinated in real time.

Going forward

With the SRMS Online now up and running, SRMS continues to work with its data contributors, partner organisations and the BTO IS Team to discuss future developments of the system. These include aspects such as better integration of location management and data entry, improved reporting capabilities and an effort recording functionality. If resources allow in future, the direct linking of SRMS Online and the Legacy Dataset (see below) will allow users to have direct access to their monitoring records pre-SRMS Online. At the moment, records held in the SRMS Legacy Dataset cannot be automatically merged into the new online system because previously the SRMS only collected data summarised for each breeding attempt, not the more detailed information recorded on a visit-by-visit basis that the online system now supports.

If you are registered with SRMS and would like to contribute your monitoring records via SRMS Online going forward, please contact the SRMC on srmc@bto.org.
You can also visit http://raptormonitoring.org/srms-data/want-to-contribute-data-to-the-srms for more information.

THE LEGACY DATASET: RAPTOR DATA AT THE FINGERTIPS OF CONSERVATION PROFESSIONALS

The Legacy Dataset platform has been designed to provide the SRMS partners with access to SRMS data, for agreed purposes listed in the Scheme's Data Sharing & Use Policy. The Legacy Dataset includes all records provided to the Scheme since data submission began in 2003, for which our data contributors have given permission to be used and shared in accordance with the Data Sharing & Use Policy and will be updated annually. Records from any particular field breeding season are typically submitted to the SRMS in the same autumn and are added to the Legacy Dataset in the spring of the following year (ahead of the next breeding season). To coordinate access to the Legacy Dataset, each of the Scheme's nine partner organisations has a named 'Gatekeeper', who controls access to the data and ensures that the Policy is adhered to strictly within their organisation. The SRMS is delighted to have reached this milestone of data sharing between partners, as this will facilitate efficient access to relevant raptor breeding records for each organisation through a centralised database for the whole of Scotland. It will also facilitate the delivery of data to others that require it for legitimate conservation purposes (e.g. the National Wildlife Crime Unit) and the servicing of data requests from users external to the SRMS partnership (in cases where these requests have been approved by all partners).

5 RAPTOR PATCH – AN UPDATE

Since 2016 SRMS has been piloting a raptor monitoring initiative called '*Raptor Patch*', with the aim to get more people involved in raptor monitoring and to increase the monitoring coverage of the more widespread, but disproportionately under-monitored species Kestrel, Sparrowhawk, Buzzard and Raven. With over 40 Raptor Patches initiated across Scotland, this next phase of the initiative will see increased promotion to engage more volunteers and associated training and support for those taking part to expand coverage still further.

THE BACKGROUND

The rationale behind the *Raptor Patch* initiative is to provide additional information on the more abundant, but under-recorded raptor species in Scotland. It provides an opportunity to fill significant gaps in current monitoring coverage and to engage with people new to raptor monitoring, providing them with the skills and confidence to make important contributions towards understanding how raptors are faring in Scotland.

Figure 15: Kestrel – one of the key *Raptor Patch* species, the SRMS is trying to improve monitoring coverage of through our *Raptor Patch* initiative (Photo: Harry Bell, Tayside & Fife RSG).

Raptor Patch involves individuals or groups selecting a defined geographic area (a "patch"), where efforts are focussed on confirming occupancy (whether or not a nesting range is occupied) and fledging success (whether or not chicks successfully fledge from the nest) for one or more of the four *Raptor Patch* focal species – Buzzard, Kestrel, Sparrowhawk and Raven.

The ideal *Raptor Patch* is one that is representative of the wider landscape in which it sits (i.e. not only restricted to a single habitat, such as a patch of woodland for example) and that is a manageable size (we recommend the ideal size is around 2 km x 2 km square), allowing it to be covered consistently from year to year. *Raptor Patch* is an area-based monitoring approach, where raptor workers aim to achieve complete coverage over a specified area, while taking into account survey effort. This approach is essential when it comes to understanding how our raptors populations (breeding numbers) are changing over time, whilst also providing additional data on productivity when observers have the time. Through this approach, the SRMS is able to gain information on areas that are occupied by birds and their numbers, but it can also highlight areas where breeding raptors are absent. The standardised approach also means that information on how much effort was actually put into survey work in each year is recorded routinely, making interpretation of the data on breeding numbers much more robust.

Where are we at now?

While the largest concentration of Raptor Patches currently is in Central Scotland (see Figure 16), there are Raptor Patches in more remote areas, such as in Orkney and the Isle of Skye. The existing "Raptor Patchers" come from a range of backgrounds and have started with varying levels of previous raptor experience. For some of them, monitoring a Raptor Patch has provided an opportunity to simply get out and explore the native wildlife in their area while contributing towards important citizen science data collection, whereas for others, it has also provided an important boost to their CV's when it comes to ecological surveying.

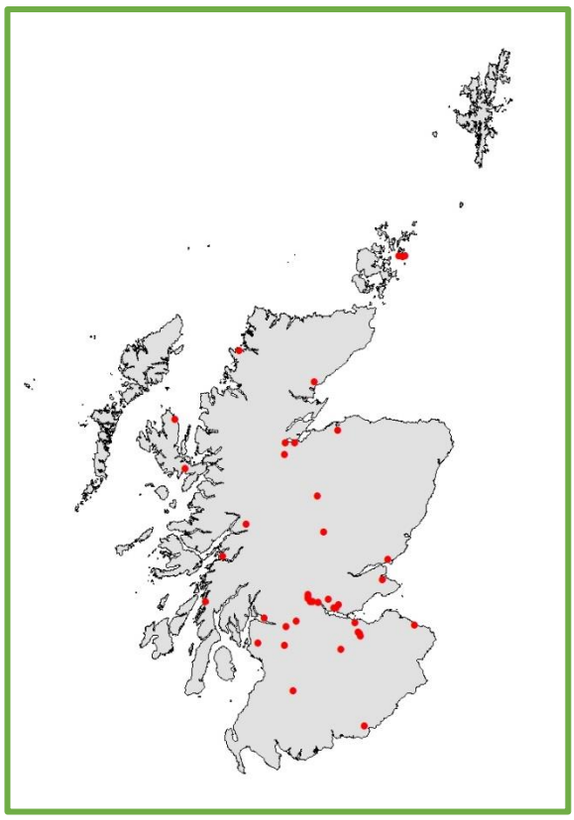

Figure 16: Raptor Patches active in 2019 and initiated for 2020.

One of the strengths of the *Raptor Patch* initiative is that can be adapted to a myriad of settings (see case study).

Going Forward

Raptor Patch is now in its fifth year as a restricted trial project. But now that the SRMS Online system is ready for accepting data (see Chapter 4), and other essential areas of SRMS work have been delivered, the Scheme will be putting more resources into promoting the initiative and providing activities and training to get more volunteers involved. Expansion of coverage will be guided by ongoing work on existing data held by the Scheme, which is assessing where gaps exist for species geographically and thus where efforts will be focused wherever possible to provide the greatest benefits in terms of data collection.

Future work will involve promotion of the initiative at appropriate events, continuation of Spring raptor monitoring training and social events supported by experienced raptor workers from the Scheme's partner organisations, and

supporting volunteers with all aspects of setting up and running a successful *Raptor Patch*. The recent launch of the new online recording system (SRMS Online) (see Chapter 4) has been designed with this area-based monitoring in mind and will be better able to handle this ideal way of monitoring than the previous spreadsheet-based recording system.

CASE STUDY: *RAPTOR PATCH* AT THE UNIVERSITY OF EDINBURGH'S VET SCHOOL

In January 2020, *Raptor Patch* surveying was initiated by Dr Glen Cousquer, Lecturer and MVetSci programme coordinator in Conservation Medicine, at the University of Edinburgh's Vet School. In addition to providing reliable information about the Kestrels, Sparrowhawks, Buzzards and Ravens breeding on the Easter Bush campus, it seeks to build on the success of the Hedgehog Friendly Campus Initiative and develop the University's awareness of, and commitment to, biodiversity on campus. It is hoped that this will give rise to greater awareness of the biodiversity at Easter Bush and how to better care for it.

"*The Raptor Patch initiative seeks to engage the staff and student body so that they have opportunities to participate in surveying work and, in doing so, develop their own understanding and appreciation of the birds who share the campus with us*," says Glen.

"*We want to develop ways of bringing campus biodiversity and conservation into the curriculum and establish its wider relevance and value to the University community and to University life*[2]."

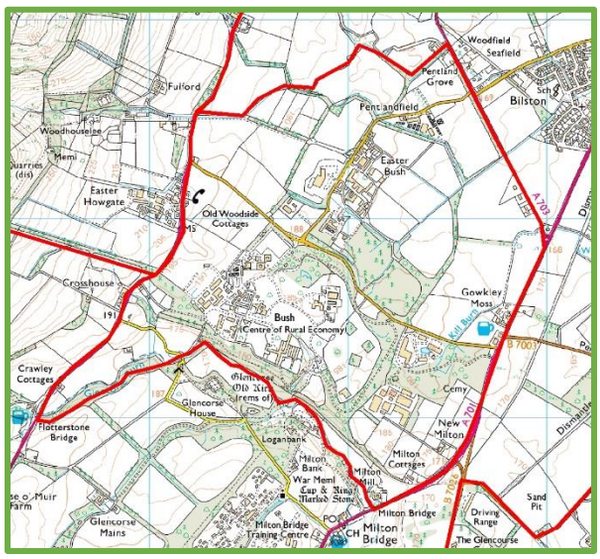

Figure 17: A map of the Easter Bush Campus Raptor Patch, nicely filling in a gap in monitoring coverage between two existing Patches.

While the Covid-19 pandemic, unfortunately, prevented the ability to get the patch properly up and running in 2020, prior to lockdown, a team of some twenty people who are keen to participate and ensure the area is adequately covered were recruited and an initial survey of the area was conducted.

For more information on the *Raptor Patch* initiative and how to get involved, please visit
http://raptormonitoring.org/getting-involved/raptor-patch

[2] https://www.teaching-matters-blog.ed.ac.uk/embedding-systems-thinking-and-sustainability-in-transdisciplinary-teaching-and-learning/

6 REFERENCES

Challis, A., Wilson, M.W., Holling, M., Roos, S., Stevenson, A. & Stirling-Aird, P. (2016). Scottish Raptor Monitoring Scheme Report 2015. BTO Scotland, Stirling.

Challis, A., Eaton, M., Wilson, M. W., Holling, M., Stevenson, A. & Stirling-Aird, P. (2019). Scottish Raptor Monitoring Scheme Report 2018. BTO Scotland, Stirling.

Challis, A., Edwards, C., Heavisides, A., Holling, M., Kortland, K., Mattingley, W., Riddle, G., Roos, S., Stevenson, A., Stirling-Aird, P.K., Stroud, D.A., Wernham, C.V. & Wilson, M.W. (2019). The Scottish Raptor Monitoring Scheme: recent developments in good practice monitoring, Bird Study, DOI: 10.1080/00063657.2018.1477737

Ewing, S.R., Rebecca, G.W., Heavisides, A., Court, I., Lindley, P., Ruddock, M., Cohen, S. & Eaton, M.A. (2011). Breeding status of Merlins *Falco columbarius* in the UK in 2008. *Bird Study* 58: 379–389.

Hayhow, D.B., Benn, S., Stevenson, A., Stirling-Aird, P.K. & Eaton, M.A. (2017). Status of Golden Eagle *Aquila chryssetos* in Britain in 2015. *Bird Study* 64: 281-294.

Holling, M. & the Rare Breeding Birds Panel (2019). Rare Breeding Birds in the United Kingdom in 2017. *British Birds* 112: 697-772.

Korpimäki, E., & Norrdahl, K. (1991). Numerical and Functional Responses of Kestrels, Short-eared Owls, and Long-eared Owls to Vole Densities. *Ecology* 72: 814-826.

Lambin, X., Petty, S. J. & Mackinnon, J. L. (2000). Cyclic dynamics in field vole populations and generalist predation. *Journal of Animal Ecology* 69: 106-118.

Musgrove, A., Aebischer, N., Eaton, M., Hearn, R., Newson, S., Noble, D., Parsons, M., Risely, K. & Stroud, D. (2013). Population estimates of birds in Great Britain and the United Kingdom. *British Birds* 106: 64–100.

Orr-Ewing, D. (2020) Marsh Harrier Breeding in Upper Forth in 2019. *Scottish Birds* 40 (2): 127-128.

Petty, S. J., Lambin, X., Sheratt, T.N., Thomas, C. J., Mackinnon, J. L., Coles, C. F., Davison, M. & Little, B. (2000). Spatial synchrony in field vole *Microtus agrestis* abundance in a coniferous forest in northern England: the role of vole-eating raptors. *Journal of Applied Ecology* 37 (Suppl.1): 136–147.

Rae, S. (2010) Density and productivity of ground-nesting Merlins on an island with no indigenous terrestrial predators. *Scottish Birds* 30: 7-13.

Shaw, G. (2007). *Barn Owl.* In The Birds of Scotland, ed. by R.W. Forrester, I.J. Andrews, C.J. McInerny, R.D. Murray, R.Y. McGowan, B. Zonfrillo, M.W. Betts, D.C. Jardine & D.S. Grundy. The Scottish Ornithologists' Club, Aberlady. pp. 902-906.

Stroud, D.A., Bainbridge, I.P., Maddock, A., Anthony, S., Baker, H., Buxton, N., Chambers, D., Enlander, I., Hearn, R.D., Jennings, K.R, Mavor, R., Whitehead, S. & Wilson, J.D. - on behalf of the UK SPA & Ramsar Scientific Working Group (eds.) (2016). The status of UK SPAs in the 2000s: the third network review. 1,108 pp. JNCC, Peterborough.

Taylor, I. R. (1994). *Barn Owls: Predator-Prey Relationships and Conservation*. Cambridge University Press, Cambridge.

Village, A. (1990). *The Kestrel*. T. & A.D. Poyser, London.

Wilson, M.W., Austin, G.E., Gillings S. & Wernham, C.V. (2015). Natural Heritage Zone Bird Population Estimates. SWBSG Commissioned report number SWBSG_1504. pp72. Available from: www.swbsg.org

Wilson, M.W., Balmer, D.E., Jones, K., King, A.V., Raw, D., Rollie, C.J., Rooney, E., Ruddock, M., Smith, G.D., Stevenson, A., Stirling-Aird, P.K., Wernham, C.V., Weston, J. and Noble, D.G

(2018). The breeding population of Peregrine Falcon *Falco peregrinus* in the United Kingdom, Isle of Man and Channel Islands in 2014. *Bird Study* 65:1-19

Wotton, S.R., Bladwell, S., Mattingley, M., Morris, N.G., Raw, D., Ruddock, M., Stevenson, A. & Eaton, M.A. (2018). Status of the Hen Harrier *Circus cyaneus* in the UK and Isle of Man in 2016. *Bird Study* 65: 145-160.

https://www.metoffice.gov.uk/research/climate/maps-and-data/summaries/index

Breeding success of raptors in Scotland in 2019

N.B. Data in the following tables present the data submitted to the SRMS in 2019. It is important to recognise that, for the majority of species, not all breeding pairs 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. To explore trends through time we would recommend that you consult the national, regional or local trends available on the SRMS website.

In order to aid understanding of the data in the following tables descriptions of some of the main headings reported against are provided below:

Home ranges checked = this is the total number of home ranges that received a visit to check for occupancy. This figure excludes records where no young were produced but no indication was given as to whether the home range was occupied or not. The number of home ranges checked is therefore likely to be a minimum figure.

Home ranges occupied by pairs = this is the total number of home ranges that were found to be occupied by a pair.

Home ranges occupied by single birds = this is the total number of home ranges that were found to be occupied by a single bird.

Further home ranges in use = this is typically the total number of additional home ranges to those occupied by pairs. This figure always includes single birds and for some species also fresh signs.

Pairs monitored = this is the total number of home ranges occupied by pairs monitored. This figure includes all nests that were reported to have reached the large chick stage.

Pairs failing early or non-breeding = this is the total number of territories occupied by pairs which produced no fledglings and where no eggs are known to have been laid. This figure excludes records where it was not reported whether eggs were laid (i.e. eggs laid was reported as outcome unknown). The number of pairs failing early or non-breeding is therefore likely to be a minimum.

Pairs known to lay eggs = this is the total number of monitored pairs laying eggs.

Pairs known to hatch eggs = this is the total number of monitored pairs hatching eggs. This figure is only from monitored home ranges and therefore excludes data for sites that were not reported to have reached the large chick stage.

Pairs known to fledge young = this is the total number of pairs producing at least one fledgling. This figure includes pairs with young last seen at large chick stage.

Minimum number of young fledged = this is the total number of young fledged regionally or nationally. This figure includes pairs with young last seen at large chick stage.

Productivity = this is based exclusively on observed numbers of fledged young. Breeding attempts that were assumed to be successful (because they reached large chick stage and were not recorded to fail) but where number of fledged young was not recorded, do not contribute to estimates of productivity. In a few instances (mostly in regions where there were few monitored broods), this means that no data were available to derive estimates of productivity, despite there being one or more (assumed) successful breeding attempts. Productivity values for these situations are expressed as "0" (rather than as "-") or, for young fledged per successful pair, "0 (n=0)".

Raptor, owl and Raven nest site and home range data submitted under the Scottish Raptor Monitoring Scheme in 2019

Species	Argyll	Central Scotland	Dumfries & Galloway	Highland	Lewis & Harris	Lothian & Borders	North-east Scotland	Orkney	Shetland	South Strathclyde	Tayside	Uist	TOTAL
Osprey	23	40	18	66	-	13	26	-	-	4	58	-	**248**
Honey-buzzard	-	1	0	7	-	-	-	-	-	-	4	-	**12**
Golden Eagle	83	12	2	126	30	3	1	-	-	0	34	17	**308**
Sparrowhawk	24	18	1	6	0	12	2	30	8	15	16	5	**137**
Goshawk	-	8	40	11	-	45	0	-	-	7	20	-	**131**
Marsh Harrier	0	1	-	0	-	1	0	0	-	-	15	-	**17**
Hen Harrier	25	4	20	59	8	18	9	249	-	47	51	33	**523**
Red Kite	-	53	139	57	-	1	30	-	-	0	77	-	**357**
White-tailed Eagle	39	-	-	53	21	-	1	1	-	-	3	11	**129**
Buzzard	167	21	76	108	4	117	5	22	-	11	234	25	**790**
Barn Owl	79	156	245	37	-	90	0	-	-	15	5	-	**627**
Tawny Owl	64	111	60	46	-	59	0	-	-	0	2	-	**342**
Little Owl	-	-	-	-	-	5	-	-	-	-	-	-	**5**
Long-eared Owl	7	17	0	5	-	11	0	4	-	1	3	17	**65**
Short-eared Owl	9	10	0	1	-	13	0	133	-	5	26	18	**215**
Kestrel	26	35	14	16	1	56	0	44	-	19	61	11	**283**
Merlin	5	7	10	76	8	39	98	86	63	14	40	4	**450**
Hobby	-	-	1	0	-	0	-	-	-	-	7	-	**8**
Peregrine	32	30	100	90	1	143	38	35	6	60	93	6	**634**
Raven	90	65	74	24	13	52	0	4	17	32	96	47	**514**
TOTAL:	**673**	**589**	**800**	**788**	**86**	**678**	**210**	**608**	**94**	**230**	**845**	**194**	**5795**

Raptor, Owl and Raven breeding attempts monitored under the Scottish Raptor Monitoring Scheme in 2019

Species	Argyll	Central Scotland	Dumfries & Galloway	Highland	Lewis & Harris	Lothian & Borders	North-east Scotland	Orkney	Shetland	South Strathclyde	Tayside	Uist	TOTAL
Osprey	13	28	12	45	-	11	18	-	-	3	32	-	**162**
Honey-buzzard	-	-	0	1	-	-	-	-	-	-	1	-	**2**
Golden Eagle	67	9	2	92	26	0	1	-	-	0	23	13	**233**
Sparrowhawk	7	15	1	4	0	10	1	13	8	8	4	1	**72**
Goshawk	-	5	26	8	-	32	0	-	-	6	12	-	**89**
Marsh Harrier	0	1	-	0	-	0	0	0	-	-	8	-	**9**
Hen Harrier	8	3	9	26	7	6	9	98	-	8	20	14	**208**
Red Kite	-	25	78	41	-	1	14	-	-	0	43	-	**202**
White-tailed Eagle	33	-	-	49	19	-	1	1	-	-	2	7	**112**
Buzzard	39	13	48	75	3	101	3	15	-	6	120	11	**434**
Barn Owl	29	57	77	19	-	45	0	-	-	3	2	-	**232**
Tawny Owl	14	33	17	22	-	25	0	-	-	0	1	-	**112**
Little Owl	-	-	-	-	-	0	-	-	-	-	-	-	**0**
Long-eared Owl	1	1	0	1	-	4	0	0	-	0	1	1	**9**
Short-eared Owl	0	0	0	0	-	0	0	11	-	1	1	6	**19**
Kestrel	3	29	3	10	0	23	0	7	-	7	10	3	**95**
Merlin	0	0	7	22	4	13	37	10	33	4	9	0	**139**
Hobby	-	-	1	0	-	0	-	-	-	-	3	-	**4**
Peregrine	10	13	47	17	0	53	9	16	0	24	42	2	**233**
Raven	59	44	33	18	10	35	0	2	9	19	51	18	**298**
TOTAL:	**283**	**276**	**361**	**450**	**69**	**359**	**93**	**173**	**50**	**89**	**385**	**76**	**2664**

Breeding success of Osprey in Scotland in 2019

Region	Breeding sites checked	Breeding sites occupied by pairs	Breeding sites 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	Productivity (Young fledged per successful pair)	Productivity (Young fledged per pair laying eggs)	Productivity (Young fledged per pair occupied home range monitored)
Argyll	**23**	**16**	**3**	**13**	**2**	**10**	**9**	**9**	**13**	**1.4 (n=9)**	**1.3**	**1.0**
- Argyll Mainland	21	14	3	11	2	8	7	7	11	1.6 (n=7)	1.4	1.0
- Bute	2	2	0	2	0	2	2	2	2	1.0 (n=2)	1.0	1.0
Central Scotland	**40**	**29**	**0**	**28**	**2**	**25**	**18**	**16**	**31**	**1.9 (n=16)**	**1.2**	**1.1**
- Arrochar & Helensburgh	3	2	0	1	0	1	1	1	3	3.0 (n=1)	3.0	3.0
- Dunbartonshire	4	4	0	4	0	4	4	3	5	1.7 (n=3)	1.2	1.2
- North Lanarkshire	1	1	0	1	0	1	1	1	2	2.0 (n=1)	2.0	2.0
- Stirling	32	22	0	22	2	19	12	11	21	1.9 (n=11)	1.1	1.0
Dumfries & Galloway	**18**	**12**	**4**	**12**	**4**	**8**	**7**	**6**	**14**	**2.3 (n=6)**	**1.8**	**1.2**
Highland	**66**	**47**	**7**	**45**	**3**	**41**	**33**	**31**	**62**	**2.0 (n=31)**	**1.5**	**1.4**
- Badenoch & Strathspey	1	1	0	1	0	1	1	1	3	3.0 (n=1)	3.0	3.0
- Inverness-shire	11	10	1	10	1	8	5	5	9	1.8 (n=5)	1.1	0.9
- Lochaber	3	3	0	2	0	2	2	2	3	1.5 (n=2)	1.5	1.5
- Nairn	1	1	0	1	1	0	0	0	0	-	-	-
- Ross-shire	32	19	6	19	1	18	13	11	25	2.3 (n=11)	1.4	1.3
- Sutherland	18	13	0	12	0	12	12	12	22	1.8 (n=12)	1.8	1.8
Lothian & Borders	**13**	**11**	**1**	**11**	**2**	**9**	**8**	**7**	**15**	**2.1 (n=7)**	**1.7**	**1.4**
- Lothian	1	1	0	1	0	1	1	1	2	2.0 (n=1)	2.0	2.0
- Scottish Borders	12	10	1	10	2	8	7	6	13	2.2 (n=6)	1.6	1.3
North-east Scotland	**26**	**18**	**1**	**18**	**0**	**18**	**14**	**14**	**24**	**1.7 (n=14)**	**1.3**	**1.3**
- Aberdeenshire	25	18	1	18	0	18	14	14	24	1.7 (n=14)	1.3	1.3
- East Moray	1	0	0	0	0	0	0	0	0	-	-	-
South Strathclyde	**4**	**3**	**0**	**3**	**0**	**3**	**3**	**3**	**4**	**1.3 (n=3)**	**1.3**	**1.3**
- Ayrshire	3	3	0	3	0	3	3	3	4	1.3 (n=3)	1.3	1.3
- South Lanarkshire	1	0	0	0	0	0	0	0	0	-	-	-
Tayside	**58**	**34**	**4**	**32**	**2**	**28**	**23**	**21**	**33**	**1.5 (n=20)**	**1.1**	**1.0**
- Angus	10	7	1	6	0	5	5	3	4	1.3 (n=3)	0.8	0.7
- Perth & Kinross	48	27	3	26	2	23	18	18	29	1.6 (n=17)	1.2	1.1
TOTAL:	**248**	**170**	**20**	**162**	**15**	**142**	**115**	**107**	**196**	**1.8 (n=106)**	**1.4**	**1.2**

Breeding success of Honey-buzzard in Scotland in 2019

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
Central Scotland	**1**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**
- Stirling	1	0	1	0	0	0	0	0	0
Highland	**7**	**2**	**1**	**1**	**0**	**1**	**1**	**1**	**1**
- Inverness-shire	5	1	1	1	0	1	1	1	1
- Ross-shire	2	1	0	0	0	0	0	0	0
Tayside	**4**	**1**	**1**	**1**	**0**	**1**	**1**	**1**	**2**
- Angus	2	0	0	0	0	0	0	0	0
- Perth & Kinross	2	1	1	1	0	1	1	1	2
TOTAL:	**12**	**3**	**3**	**2**	**0**	**2**	**2**	**2**	**3**

Breeding success of Golden Eagle in Scotland in 2019

Region	Home ranges checked	Home ranges occupied by pairs	Of which immature pairs[1]	Further home ranges in use (single birds or fresh signs)	Pairs monitored	Failed early or non-breeding	Pairs known to lay eggs	Pairs known to hatch eggs	Pairs known to fledge young	Minimum number of young fledged	Productivity (Young fledged per successful pair)	Productivity (Young fledged per pair laying eggs)	Productivity (Young fledged per pair occupied home range monitored)
Argyll	**83**	**69**	**1**	**2**	**67**	**20**	**40**	**24**	**19**	**19**	**1.0 (n=19)**	**0.5**	**0.3**
- Argyll Islands	45	34	0	2	32	9	22	13	12	12	1.0 (n=12)	0.5	0.4
- Argyll Mainland	37	35	1	0	35	11	18	11	7	7	1.0 (n=7)	0.4	0.2
- Bute	1	0	0	0	0	0	0	0	0	0	-	-	-
Central Scotland	**12**	**10**	**1**	**1**	**9**	**1**	**6**	**3**	**2**	**2**	**1.0 (n=2)**	**0.3**	**0.2**
- Arrochar & Helensburgh	2	0	0	1	0	0	0	0	0	0	-	-	-
- Stirling	10	10	1	0	9	1	6	3	2	2	1.0 (n=2)	0.3	0.2
Highland	**126**	**114**	**7**	**2**	**92**	**16**	**66**	**51**	**45**	**53**	**1.2 (n=45)**	**0.8**	**0.6**
- Badenoch & Strathspey	21	19	1	0	19	3	13	10	10	14	1.4 (n=10)	1.1	0.7
- Inverness-shire	17	12	0	2	10	3	7	5	5	6	1.2 (n=5)	0.9	0.6
- Isle of Skye	4	4	1	0	4	1	3	3	2	2	1.0 (n=2)	0.7	0.5
- Lochaber	24	23	2	0	18	4	10	7	5	6	1.2 (n=5)	0.6	0.3
- Nairn	1	1	1	0	1	0	1	1	1	1	1.0 (n=1)	1.0	1.0
- Ross-shire	28	25	0	0	22	3	19	14	12	13	1.1 (n=12)	0.7	0.6
- Small Isles	4	4	0	0	4	0	4	3	3	3	1.0 (n=3)	0.8	0.8
- Sutherland	27	26	2	0	14	2	9	8	7	8	1.1 (n=7)	0.9	0.6
Lewis & Harris	**30**	**28**	**0**	**1**	**26**	**4**	**21**	**16**	**15**	**15**	**1.0 (n=15)**	**0.7**	**0.6**
- Harris	8	8	0	0	8	0	8	7	7	7	1.0 (n=7)	0.9	0.9
- Lewis	22	20	0	1	18	4	13	9	8	8	1.0 (n=8)	0.6	0.4
Lothian & Borders	**3**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**-**	**-**	**-**
- Scottish Borders	3	1	0	0	0	0	0	0	0	0	-	-	-
North-east Scotland	**1**	**1**	**0**	**0**	**1**	**0**	**1**	**1**	**1**	**1**	**1.0 (n=1)**	**1.0**	**1.0**
- East Moray	1	1	0	0	1	0	1	1	1	1	1.0 (n=1)	1.0	1.0
South-west Scotland	**2**	**2**	**0**	**0**	**2**	**0**	**2**	**2**	**2**	**2**	**1.0 (n=2)**	**1.0**	**1.0**

Breeding success of Golden Eagle in Scotland in 2019 (continued)

Region	Home ranges checked	Home ranges occupied by pairs	Of which immature pairs[1]	Further home ranges in use (single birds or fresh signs)	Pairs monitored	Failed early or non-breeding	Pairs known to lay eggs	Pairs known to hatch eggs	Pairs known to fledge young	Minimum number of young fledged	Productivity (Young fledged per successful pair)	Productivity (Young fledged per pair laying eggs)	Productivity (Young fledged per pair occupied home range monitored)
Tayside	**34**	**26**	**3**	**1**	**23**	**5**	**12**	**12**	**12**	**17**	**1.4 (n=12)**	**1.4**	**0.7**
- Angus	4	4	0	0	4	0	2	2	2	4	2.0 (n=2)	2.0	1.0
- Perth & Kinross	30	22	3	1	19	5	10	10	10	13	1.3 (n=10)	1.3	0.7
Uist	**17**	**15**	**0**	**0**	**13**	**1**	**11**	**8**	**6**	**6**	**1.0 (n=6)**	**0.5**	**0.5**
- Barra	3	3	0	0	1	0	1	1	1	1	1.0 (n=1)	1.0	1.0
- Benbecula	2	2	0	0	2	1	0	0	0	0	-	-	-
- North Uist	6	4	0	0	4	0	4	2	2	2	1.0 (n=2)	0.5	0.5
- South Uist	6	6	0	0	6	0	6	5	3	3	1.0 (n=3)	0.5	0.5
TOTAL:	**308**	**266**	**12**	**7**	**233**	**47**	**159**	**117**	**102**	**115**	**1.1 (n=102)**	**0.7**	**0.5**

[1]These immature pairs are included in the column ‘Home ranges occupied by pairs’. Pairs consisting of either one or two birds with immature plumage are treated as immature pairs.

Breeding success of Sparrowhawk in Scotland in 2019

Region	Home ranges checked	Home ranges occupied by pairs	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	Productivity (Young fledged per successful pair)	Productivity (Young fledged per pair laying eggs)	Productivity (Young fledged per pair occupied home range monitored)
Argyll	**24**	**11**	**7**	**0**	**7**	**6**	**6**	**15**	**2.5 (n=6)**	**2.1**	**2.1**
- Argyll Islands	7	3	0	0	0	0	0	0	-	-	-
- Argyll Mainland	13	5	5	0	5	4	4	10	2.5 (n=4)	2.0	2.0
- Bute	4	3	2	0	2	2	2	5	2.5 (n=2)	2.5	2.5
Central Scotland	**18**	**17**	**15**	**0**	**15**	**15**	**15**	**64**	**4.3 (n=15)**	**4.3**	**4.3**
- Clackmannanshire	1	0	0	0	0	0	0	0	-	-	-
- North Lanarkshire	7	7	7	0	7	7	7	27	3.9 (n=7)	3.9	3.9
- Stirling	10	10	8	0	8	8	8	37	4.6 (n=8)	4.6	4.6
Dumfries & Galloway	**1**	**1**	**1**	**0**	**1**	**1**	**1**	**1**	**1.0 (n=1)**	**1.0**	**1.0**
Highland	**6**	**4**	**4**	**0**	**4**	**4**	**4**	**8**	**2.0 (n=4)**	**2.0**	**2.0**
- Inverness-shire	3	2	2	0	2	2	2	5	2.5 (n=2)	2.5	2.5
- Ross-shire	2	2	2	0	2	2	2	3	1.5 (n=2)	1.5	1.5
- West Moray	1	0	0	0	0	0	0	0	-	-	-
Lothian & Borders	**12**	**10**	**10**	**0**	**10**	**10**	**10**	**32**	**3.1 (n=9)**	**3.1**	**3.1**
- Lothian	10	8	8	0	8	8	8	26	3.2 (n=8)	3.2	3.2
- Scottish Borders	2	2	2	0	2	2	2	6	2.5 (n=1)	2.5	2.5
North-east Scotland	**2**	**2**	**1**	**0**	**1**	**1**	**1**	**2**	**2.0 (n=1)**	**2.0**	**2.0**
- Aberdeenshire	2	2	1	0	1	1	1	2	2.0 (n=1)	2.0	2.0
Orkney	**30**	**13**	**13**	**4**	**9**	**8**	**5**	**8**	**1.6 (n=5)**	**0.9**	**0.6**
Shetland	**8**	**8**	**8**	**0**	**7**	**7**	**7**	**13**	**1.7 (n=6)**	**1.7**	**1.5**
South Strathclyde	**15**	**8**	**8**	**0**	**8**	**8**	**8**	**19**	**2.4 (n=8)**	**2.4**	**2.4**
- Arran & Cumbrae	14	7	7	0	7	7	7	16	2.3 (n=7)	2.3	2.3
- Ayrshire	1	1	1	0	1	1	1	3	3.0 (n=1)	3.0	3.0
Tayside	**16**	**7**	**4**	**0**	**4**	**4**	**4**	**13**	**3.2 (n=4)**	**3.2**	**3.2**
- Angus	10	4	1	0	1	1	1	3	3.0 (n=1)	3.0	3.0
- Fife	6	3	3	0	3	3	3	10	3.3 (n=3)	3.3	3.3
Uist	**5**	**1**	**1**	**0**	**1**	**1**	**1**	**3**	**3.0 (n=1)**	**3.0**	**3.0**
- North Uist	3	0	0	0	0	0	0	0	-	-	-
- South Uist	2	1	1	0	1	1	1	3	3.0 (n=1)	3.0	3.0
TOTAL:	**137**	**82**	**72**	**4**	**67**	**65**	**62**	**178**	**2.9 (n=60)**	**2.7**	**2.5**

Breeding success of Goshawk in Scotland in 2019

Region	Home ranges checked	Home ranges occupied by pairs	Further home ranges in use (single birds or fresh signs)	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	Productivity (Young fledged per successful pair)	Productivity (Young fledged per pair laying eggs)	Productivity (Young fledged per pair occupied home range monitored)
Central Scotland	**8**	**6**	**0**	**5**	**1**	**4**	**2**	**2**	**2**	**1.0 (n=2)**	**0.5**	**0.4**
- Stirling	8	6	0	5	1	4	2	2	2	1.0 (n=2)	0.5	0.4
Dumfries & Galloway	**40**	**26**	**5**	**26**	**1**	**25**	**19**	**16**	**31**	**1.9 (n=16)**	**1.2**	**1.2**
Highland	**11**	**9**	**0**	**8**	**0**	**8**	**7**	**7**	**18**	**2.6 (n=7)**	**2.2**	**2.2**
- Badenoch & Strathspey	7	5	0	5	0	5	5	5	14	2.8 (n=5)	2.8	2.8
- Inverness-shire	3	3	0	2	0	2	1	1	2	2.0 (n=1)	1.0	1.0
- Nairn	1	1	0	1	0	1	1	1	2	2.0 (n=1)	2.0	2.0
Lothian & Borders	**45**	**41**	**3**	**32**	**0**	**32**	**29**	**26**	**42**	**1.6 (n=26)**	**1.3**	**1.3**
- Scottish Borders	45	41	3	32	0	32	29	26	42	1.6 (n=26)	1.3	1.3
South Strathclyde	**7**	**6**	**1**	**6**	**1**	**4**	**3**	**2**	**2**	**1.0 (n=2)**	**0.5**	**0.3**
- Arran & Cumbrae	1	1	0	1	0	1	1	1	1	1.0 (n=1)	1.0	1.0
- Ayrshire	5	5	0	5	1	3	2	1	1	1.0 (n=1)	0.3	0.2
- South Lanarkshire	1	0	1	0	0	0	0	0	0	-	-	-
Tayside	**20**	**15**	**2**	**12**	**0**	**12**	**11**	**11**	**21**	**1.9 (n=11)**	**1.8**	**1.8**
- Angus	5	4	1	4	0	4	4	4	10	2.5 (n=4)	2.5	2.5
- Fife	3	0	1	0	0	0	0	0	0	-	-	-
- Perth & Kinross	12	11	0	8	0	8	7	7	11	1.6 (n=7)	1.4	1.4
TOTAL:	**131**	**103**	**11**	**89**	**3**	**85**	**71**	**64**	**116**	**1.8 (n=64)**	**1.4**	**1.3**

Breeding success of Marsh Harrier in Scotland in 2019

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	Productivity (Young fledged per successful pair)	Productivity (Young fledged per pair laying eggs)	Productivity (Young fledged per pair occupied home range monitored)
Central Scotland	**1**	**1**	**0**	**1**	**0**	**1**	**1**	**1**	**3**	**3.0 (n=1)**	**3.0**	**3.0**
- Clackmannanshire	1	1	0	1	0	1	1	1	3	3.0 (n=1)	3.0	3.0
Lothian & Borders	**1**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**-**	**-**	**-**
- Scottish Borders	1	0	1	0	0	0	0	0	0	-	-	-
Tayside	**15**	**9**	**1**	**8**	**0**	**8**	**8**	**7**	**19**	**2.7 (n=7)**	**2.4**	**2.4**
- Angus	3	2	0	2	0	2	2	2	6	3.0 (n=2)	3.0	3.0
- Fife	2	0	0	0	0	0	0	0	0	-	-	-
- Perth & Kinross	10	7	1	6	0	6	6	5	13	2.6 (n=5)	2.2	2.2
TOTAL:	**17**	**10**	**2**	**9**	**0**	**9**	**9**	**8**	**22**	**2.8 (n=8)**	**2.4**	**2.4**

Breeding success of Hen Harrier in Scotland in 2019

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	Productivity (Young fledged per successful pair)	Productivity (Young fledged per pair laying eggs)	Productivity (Young fledged per pair occupied home range monitored)
Argyll	**25**	**13**	**1**	**8**	**0**	**8**	**8**	**8**	**14**	**1.8 (n=8)**	**1.8**	**1.8**
- Argyll Islands	16	8	0	3	0	3	3	3	8	2.7 (n=3)	2.7	2.7
- Argyll Mainland	9	5	1	5	0	5	5	5	6	1.2 (n=5)	1.2	1.2
Central Scotland	**4**	**3**	**1**	**3**	**0**	**2**	**1**	**1**	**1**	**1.0 (n=1)**	**0.5**	**0.3**
- Arrochar & Helensburgh	4	3	1	3	0	2	1	1	1	1.0 (n=1)	0.5	0.3
Dumfries & Galloway	**20**	**9**	**1**	**9**	**2**	**6**	**4**	**4**	**18**	**4.5 (n=4)**	**3.0**	**2.0**
Highland	**59**	**29**	**4**	**26**	**2**	**24**	**17**	**12**	**31**	**2.6 (n=12)**	**1.3**	**1.2**
- Badenoch & Strathspey	8	3	0	3	0	3	2	2	5	2.5 (n=2)	1.7	1.7
- Caithness	2	2	0	2	0	2	2	2	4	2.0 (n=2)	2.0	2.0
- Inverness-shire	8	4	2	3	2	1	1	1	4	4.0 (n=1)	4.0	1.3
- Isle of Skye	13	8	0	8	0	8	8	3	7	2.3 (n=3)	0.9	0.9
- Lochaber	2	0	0	0	0	0	0	0	0	-	-	-
- Nairn	3	0	1	0	0	0	0	0	0	-	-	-
- Ross-shire	4	2	0	2	0	2	2	2	6	3.0 (n=2)	3.0	3.0
- Small Isles	2	2	0	1	0	1	1	1	3	3.0 (n=1)	3.0	3.0
- Sutherland	9	8	0	7	0	7	1	1	2	2.0 (n=1)	0.3	0.3
- West Moray	8	0	1	0	0	0	0	0	0	-	-	-
Lewis & Harris	**8**	**8**	**0**	**7**	**0**	**7**	**3**	**1**	**4**	**4.0 (n=1)**	**0.6**	**0.6**
- Lewis	8	8	0	7	0	7	3	1	4	4.0 (n=1)	0.6	0.6
Lothian & Borders	**18**	**7**	**2**	**6**	**0**	**6**	**6**	**4**	**12**	**3.0 (n=4)**	**2.0**	**2.0**
- Scottish Borders	18	7	2	6	0	6	6	4	12	3.0 (n=4)	2.0	2.0
North-east Scotland	**9**	**9**	**0**	**9**	**0**	**9**	**8**	**8**	**18**	**2.2 (n=8)**	**2.0**	**2.0**
- Aberdeenshire	2	2	0	2	0	2	2	2	6	3.0 (n=2)	3.0	3.0
- East Moray	7	7	0	7	0	7	6	6	12	2.0 (n=6)	1.7	1.7
Orkney	**249**	**98**	**22**	**98**	**56**	**42**	**32**	**19**	**40**	**2.1 (n=19)**	**1.0**	**0.4**
South Strathclyde	**47**	**8**	**1**	**8**	**2**	**6**	**3**	**2**	**7**	**3.5 (n=2)**	**1.2**	**0.9**
- Ayrshire	15	0	0	0	0	0	0	0	0	-	-	-
- Inverclyde	13	0	0	0	0	0	0	0	0	-	-	-
- Renfrewshire	8	0	1	0	0	0	0	0	0	-	-	-
- South Lanarkshire	11	8	0	8	2	6	3	2	7	3.5 (n=2)	1.2	0.9

Breeding success of Hen Harrier in Scotland in 2019 (continued)

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	Productivity (Young fledged per successful pair)	Productivity (Young fledged per pair laying eggs)	Productivity (Young fledged per pair occupied home range monitored)
Tayside	**51**	**21**	**6**	**20**	**4**	**13**	**6**	**4**	**12**	**3.0 (n=4)**	**0.9**	**0.6**
- Angus	9	2	0	2	0	2	0	0	0	-	-	-
- Perth & Kinross	42	19	6	18	4	11	6	4	12	3.0 (n=4)	1.1	0.7
Uist	**33**	**23**	**7**	**14**	**0**	**14**	**13**	**12**	**31**	**2.7 (n=11)**	**2.3**	**2.3**
- Benbecula	2	2	0	1	0	1	1	1	1	1.0 (n=1)	1.0	1.0
- North Uist	16	9	6	3	0	3	3	3	9	3.0 (n=3)	3.0	3.0
- South Uist	15	12	1	10	0	10	9	8	21	2.5 (n=7)	2.0	2.0
TOTAL:	**523**	**228**	**45**	**208**	**66**	**137**	**101**	**75**	**188**	**2.5 (n=74)**	**1.4**	**0.9**

Breeding success of Red Kite in Scotland in 2019

Region	Home ranges checked	Home ranges occupied by pairs	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	Productivity (Young fledged per successful pair)	Productivity (Young fledged per pair laying eggs)	Productivity (Young fledged per pair occupied home range monitored)
Central Scotland	**53**	**30**	**25**	**2**	**23**	**19**	**15**	**23**	**1.5 (n=14)**	**1.0**	**0.9**
- Stirling	53	30	25	2	23	19	15	23	1.5 (n=14)	1.0	0.9
Dumfries & Galloway	**139**	**119**	**78**	**2**	**76**	**64**	**59**	**79**	**1.3 (n=59)**	**1.0**	**1.0**
Highland	**57**	**42**	**41**	**0**	**41**	**40**	**38**	**72**	**1.9 (n=38)**	**1.8**	**1.8**
- Badenoch & Strathspey	1	1	1	0	1	1	1	3	3.0 (n=1)	3.0	3.0
- Inverness-shire	12	9	9	0	9	9	9	18	2.0 (n=9)	2.0	2.0
- Ross-shire	41	30	29	0	29	28	26	46	1.8 (n=26)	1.6	1.6
- Sutherland	3	2	2	0	2	2	2	5	2.5 (n=2)	2.5	2.5
Lothian & Borders	**1**	**1**	**1**	**0**	**1**	**1**	**1**	**1**	**1.0 (n=1)**	**1.0**	**1.0**
- Unknown	1	1	1	0	1	1	1	1	1.0 (n=1)	1.0	1.0
North-east Scotland	**30**	**21**	**14**	**1**	**13**	**12**	**12**	**21**	**1.8 (n=12)**	**1.6**	**1.5**
- Aberdeenshire	30	21	14	1	13	12	12	21	1.8 (n=12)	1.6	1.5
Tayside	**77**	**48**	**43**	**0**	**43**	**36**	**33**	**59**	**1.8 (n=32)**	**1.3**	**1.3**
- Angus	17	10	9	0	9	8	8	12	1.5 (n=8)	1.3	1.3
- Perth & Kinross	60	38	34	0	34	28	25	47	1.8 (n=24)	1.4	1.4
TOTAL:	**357**	**261**	**202**	**5**	**197**	**172**	**158**	**255**	**1.6 (n=156)**	**1.3**	**1.3**

Breeding success of White-tailed Eagle in Scotland in 2019

Region	Home ranges checked	Home ranges occupied by pairs	Pairs monitored	Pairs known to lay eggs	Pairs known to hatch eggs	Pairs known to fledge young	Minimum number of young fledged	Productivity (Young fledged per successful pair)	Productivity (Young fledged per pair laying eggs)	Productivity (Young fledged per pair occupied home range monitored)
Argyll	**39**	**36**	**33**	**30**	**23**	**21**	**26**	**1.2 (n=21)**	**0.9**	**0.8**
- Argyll Islands	30	29	28	26	21	20	25	1.2 (n=20)	1.0	0.9
- Argyll Mainland	9	7	5	4	2	1	1	1.0 (n=1)	0.2	0.2
Highland	**53**	**52**	**49**	**43**	**35**	**31**	**45**	**1.4 (n=30)**	**1.0**	**0.9**
- Badenoch & Strathspey	1	1	1	1	1	1	2	2.0 (n=1)	2.0	2.0
- Inverness-shire	1	1	1	1	1	1	1	1.0 (n=1)	1.0	1.0
- Isle of Skye	23	22	20	18	15	13	19	1.5 (n=13)	1.1	1.0
- Lochaber	11	11	10	9	7	6	7	1.0 (n=5)	0.7	0.6
- Ross-shire	9	9	9	7	6	5	9	1.8 (n=5)	1.3	1.0
- Small Isles	3	3	3	3	2	2	3	1.5 (n=2)	1.0	1.0
- Sutherland	5	5	5	4	3	3	4	1.3 (n=3)	1.0	0.8
Lewis & Harris	**21**	**21**	**19**	**14**	**11**	**10**	**14**	**1.4 (n=10)**	**1.0**	**0.7**
- Harris	3	3	2	1	1	1	1	1.0 (n=1)	1.0	0.5
- Lewis	18	18	17	13	10	9	13	1.4 (n=9)	1.0	0.8
North-east Scotland	**1**	**1**	**1**	**1**	**1**	**1**	**2**	**2.0 (n=1)**	**2.0**	**2.0**
- Aberdeenshire	1	1	1	1	1	1	2	2.0 (n=1)	2.0	2.0
Orkney	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1.0 (n=1)**	**1.0**	**1.0**
Tayside	**3**	**2**	**2**	**0**	**0**	**0**	**0**	**-**	**-**	**-**
- Angus	1	1	1	0	0	0	0	-	-	-
- Fife	1	0	0	0	0	0	0	-	-	-
- Perth & Kinross	1	1	1	0	0	0	0	-	-	-
Uist	**11**	**9**	**7**	**7**	**7**	**7**	**12**	**1.7 (n=7)**	**1.7**	**1.7**
- Barra	1	1	0	0	0	0	0	-	-	-
- Benbecula	1	1	1	1	1	1	2	2.0 (n=1)	2.0	2.0
- North Uist	6	6	5	5	5	5	8	1.6 (n=5)	1.6	1.6
- South Uist	3	1	1	1	1	1	2	2.0 (n=1)	2.0	2.0
TOTAL:	**129**	**122**	**112**	**96**	**78**	**71**	**100**	**1.4 (n=70)**	**1.0**	**0.9**

Breeding success of Buzzard in Scotland in 2019

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	Productivity (Young fledged per successful pair)	Productivity (Young fledged per pair laying eggs)	Productivity (Young fledged per pair occupied home range monitored)
Argyll	**167**	**65**	**6**	**39**	**1**	**36**	**34**	**33**	**46**	**1.4 (n=33)**	**1.3**	**1.2**
- Argyll Islands	90	33	1	14	0	12	10	9	16	1.8 (n=9)	1.3	1.1
- Argyll Mainland	23	13	0	11	1	10	10	10	11	1.1 (n=10)	1.1	1.0
- Bute	54	19	5	14	0	14	14	14	19	1.4 (n=14)	1.4	1.4
Central Scotland	**21**	**15**	**3**	**13**	**0**	**10**	**10**	**9**	**16**	**1.8 (n=9)**	**1.6**	**1.2**
- Clackmannanshire	1	1	0	1	0	1	1	1	2	2.0 (n=1)	2.0	2.0
- Dunbartonshire	1	0	1	0	0	0	0	0	0	-	-	-
- Glasgow	2	1	1	0	0	0	0	0	0	-	-	-
- Stirling	17	13	1	12	0	9	9	8	14	1.8 (n=8)	1.6	1.2
Dumfries & Galloway	**76**	**59**	**3**	**48**	**3**	**43**	**42**	**39**	**56**	**1.2 (n=28)**	**1.0**	**0.9**
Highland	**108**	**79**	**6**	**75**	**10**	**64**	**46**	**42**	**61**	**1.4 (n=41)**	**0.9**	**0.8**
- Badenoch & Strathspey	8	8	0	8	1	7	6	6	9	1.5 (n=6)	1.3	1.1
- Inverness-shire	8	7	1	6	0	6	6	5	5	0.8 (n=4)	0.7	0.7
- Nairn	1	0	0	0	0	0	0	0	0	-	-	-
- Ross-shire	78	55	1	54	9	45	29	26	37	1.4 (n=26)	0.8	0.7
- Small Isles	1	1	0	1	0	1	1	1	1	1.0 (n=1)	1.0	1.0
- Sutherland	12	8	4	6	0	5	4	4	9	2.2 (n=4)	1.8	1.5
Lewis & Harris	**4**	**3**	**1**	**3**	**0**	**3**	**2**	**2**	**3**	**1.5 (n=2)**	**1.0**	**1.0**
- Lewis	4	3	1	3	0	3	2	2	3	1.5 (n=2)	1.0	1.0
Lothian & Borders	**117**	**106**	**1**	**101**	**7**	**85**	**82**	**79**	**143**	**1.6 (n=63)**	**1.5**	**1.3**
- Lothian	37	34	0	34	0	34	34	32	73	2.2 (n=30)	2.1	2.1
- Scottish Borders	80	72	1	67	7	51	48	47	70	1.2 (n=33)	1.1	0.8
North-east Scotland	**5**	**4**	**0**	**3**	**0**	**3**	**3**	**3**	**3**	**1.0 (n=3)**	**1.0**	**1.0**
- Aberdeenshire	5	4	0	3	0	3	3	3	3	1.0 (n=3)	1.0	1.0
Orkney	**22**	**15**	**3**	**15**	**5**	**10**	**9**	**8**	**17**	**2.1 (n=8)**	**1.7**	**1.1**
South Strathclyde	**11**	**7**	**0**	**6**	**0**	**6**	**6**	**6**	**7**	**1.2 (n=6)**	**1.2**	**1.2**
- Arran & Cumbrae	8	4	0	4	0	4	4	4	5	1.2 (n=4)	1.2	1.2
- Ayrshire	3	3	0	2	0	2	2	2	2	1.0 (n=2)	1.0	1.0

Breeding success of Buzzard in Scotland in 2019 (continued)

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	Productivity (Young fledged per successful pair)	Productivity (Young fledged per pair laying eggs)	Productivity (Young fledged per pair occupied home range monitored)
Tayside	**234**	**157**	**6**	**120**	**1**	**110**	**108**	**106**	**121**	**1.1 (n=106)**	**1.1**	**1.0**
- Angus	94	87	3	67	0	61	61	59	60	1.0 (n=59)	1.0	0.9
- Fife	37	23	3	20	1	19	18	18	23	1.3 (n=18)	1.2	1.1
- Perth & Kinross	103	47	0	33	0	30	29	29	38	1.3 (n=29)	1.3	1.2
Uist	**25**	**21**	**4**	**11**	**0**	**11**	**10**	**8**	**14**	**1.6 (n=7)**	**1.2**	**1.2**
- Benbecula	2	2	0	1	0	1	1	1	1	0.0 (n=0)	0.0	0.0
- North Uist	14	10	4	3	0	3	3	2	3	1.5 (n=2)	1.0	1.0
- South Uist	9	9	0	7	0	7	6	5	10	2.0 (n=5)	1.4	1.4
TOTAL:	**790**	**531**	**33**	**434**	**27**	**381**	**352**	**335**	**487**	**1.5 (n=306)**	**1.3**	**1.2**

Breeding success of Barn Owl in Scotland in 2019

Region	Nest sites checked	Nest sites occupied by pairs	Nest sites occupied by single birds	Pairs monitored	Failed early or non-breeding	Pairs known to lay eggs	Pairs known to hatch eggs	Pairs known to fledge young	Minimum number of young fledged	Productivity (Young fledged per successful pair)	Productivity (Young fledged per pair laying eggs)	Productivity (Young fledged per pair occupied home range monitored)
Argyll	**79**	**30**	**6**	**29**	**7**	**20**	**17**	**17**	**49**	**2.9 (n=17)**	**2.4**	**1.7**
- Argyll Islands	8	4	0	3	0	3	3	3	7	2.3 (n=3)	2.3	2.3
- Argyll Mainland	69	26	6	26	7	17	14	14	42	3.0 (n=14)	2.5	1.6
- Bute	2	0	0	0	0	0	0	0	0	-	-	-
Central Scotland	**156**	**60**	**6**	**57**	**6**	**51**	**48**	**48**	**146**	**3.0 (n=48)**	**2.9**	**2.6**
- Clackmannanshire	8	8	0	8	0	8	8	8	30	3.8 (n=8)	3.8	3.8
- Dunbartonshire	13	4	1	4	0	4	4	4	9	2.2 (n=4)	2.2	2.2
- North Lanarkshire	19	13	1	13	1	12	11	11	33	3.0 (n=11)	2.8	2.5
- Stirling	116	35	4	32	5	27	25	25	74	3.0 (n=25)	2.7	2.3
Dumfries & Galloway	**245**	**83**	**24**	**77**	**3**	**72**	**65**	**63**	**191**	**3.0 (n=63)**	**2.7**	**2.5**
Highland	**37**	**21**	**4**	**19**	**0**	**19**	**16**	**16**	**43**	**2.7 (n=16)**	**2.3**	**2.3**
- Badenoch & Strathspey	5	4	0	4	0	4	2	2	6	3.0 (n=2)	1.5	1.5
- Caithness	5	4	0	4	0	4	4	4	13	3.2 (n=4)	3.2	3.2
- Inverness-shire	7	1	2	1	0	1	1	1	2	2.0 (n=1)	2.0	2.0
- Ross-shire	12	6	1	6	0	6	5	5	12	2.4 (n=5)	2.0	2.0
- Sutherland	8	6	1	4	0	4	4	4	10	2.5 (n=4)	2.5	2.5
Lothian & Borders	**90**	**48**	**4**	**45**	**3**	**42**	**39**	**38**	**105**	**2.8 (n=38)**	**2.5**	**2.3**
- Lothian	7	2	0	2	0	2	2	1	1	1.0 (n=1)	0.5	0.5
- Scottish Borders	83	46	4	43	3	40	37	37	104	2.8 (n=37)	2.6	2.4
South Strathclyde	**15**	**3**	**1**	**3**	**0**	**2**	**2**	**2**	**7**	**3.5 (n=2)**	**3.5**	**2.3**
- Ayrshire	13	3	1	3	0	2	2	2	7	3.5 (n=2)	3.5	2.3
- South Lanarkshire	2	0	0	0	0	0	0	0	0	-	-	-
Tayside	**5**	**3**	**0**	**2**	**0**	**2**	**2**	**2**	**3**	**1.5 (n=2)**	**1.5**	**1.5**
- Fife	2	2	0	2	0	2	2	2	3	1.5 (n=2)	1.5	1.5
- Perth & Kinross	3	1	0	0	0	0	0	0	0	-	-	-
TOTAL:	**627**	**248**	**45**	**232**	**19**	**208**	**189**	**186**	**544**	**2.9 (n=186)**	**2.6**	**2.3**

Breeding success of Tawny Owl in Scotland in 2019

Region	Nest sites checked	Nest sites occupied by pairs	Pairs monitored	Pairs known to lay eggs	Pairs known to hatch eggs	Pairs known to fledge young	Minimum number of young fledged	Productivity (Young fledged per successful pair)	Productivity (Young fledged per pair laying eggs)	Productivity (Young fledged per pair occupied home range monitored)
Argyll	**64**	**17**	**14**	**14**	**11**	**11**	**17**	**1.5 (n=11)**	**1.2**	**1.2**
- Argyll Islands	1	0	0	0	0	0	0	-	-	-
- Argyll Mainland	61	17	14	14	11	11	17	1.5 (n=11)	1.2	1.2
- Bute	2	0	0	0	0	0	0	-	-	-
Central Scotland	**111**	**34**	**33**	**33**	**27**	**24**	**46**	**1.9 (n=24)**	**1.4**	**1.4**
- Dunbartonshire	1	1	1	1	1	1	2	2.0 (n=1)	2.0	2.0
- North Lanarkshire	11	8	7	7	4	4	10	2.5 (n=4)	1.4	1.4
- Stirling	99	25	25	25	22	19	34	1.8 (n=19)	1.4	1.4
Dumfries & Galloway	**60**	**19**	**17**	**17**	**16**	**15**	**22**	**1.5 (n=15)**	**1.3**	**1.3**
Highland	**46**	**22**	**22**	**22**	**18**	**17**	**28**	**1.6 (n=17)**	**1.3**	**1.3**
- Badenoch & Strathspey	1	1	1	1	1	1	1	1.0 (n=1)	1.0	1.0
- Inverness-shire	5	3	3	3	2	2	5	2.5 (n=2)	1.7	1.7
- Ross-shire	40	18	18	18	15	14	22	1.6 (n=14)	1.2	1.2
Lothian & Borders	**59**	**26**	**25**	**24**	**22**	**21**	**35**	**1.7 (n=21)**	**1.5**	**1.4**
- Lothian	11	5	5	5	5	5	9	1.8 (n=5)	1.8	1.8
- Scottish Borders	48	21	20	19	17	16	26	1.6 (n=16)	1.4	1.3
Tayside	**2**	**2**	**1**	**1**	**1**	**1**	**1**	**1.0 (n=1)**	**1.0**	**1.0**
- Fife	1	1	0	0	0	0	0	-	-	-
- Perth & Kinross	1	1	1	1	1	1	1	1.0 (n=1)	1.0	1.0
TOTAL:	**342**	**120**	**112**	**111**	**95**	**89**	**149**	**1.7 (n=89)**	**1.3**	**1.3**

Breeding success of Little Owl in Scotland in 2019

Region	Nest sites checked	Nest sites occupied by pairs	Nest sites occupied by single birds	Pairs monitored	Failed early or non-breeding	Pairs known to lay eggs	Pairs known to hatch eggs	Pairs known to fledge young	Minimum number of young fledged	Productivity (Young fledged per successful pair)	Productivity (Young fledged per pair laying eggs)	Productivity (Young fledged per pair occupied home range monitored)
Lothian & Borders	**5**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**-**	**-**	**-**
- Scottish Borders	5	0	4	0	0	0	0	0	0	-	-	-
TOTAL:	**5**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**-**	**-**	**-**

Breeding success of Long-Eared Owl in Scotland in 2019

Region	Known territories checked for occupation	Pairs found	Pairs monitored	Pairs known to lay eggs	Pairs known to fledge young	Minimum number of fledged young	Productivity (Young fledged per successful pair)	Productivity (Young fledged per pair laying eggs)	Productivity (Young fledged per pair occupied home range monitored)
Argyll	**7**	**1**	**1**	**1**	**1**	**4**	**4.0 (n=1)**	**4.0**	**4.0**
- Argyll Islands	7	1	1	1	1	4	4.0 (n=1)	4.0	4.0
Central Scotland	**17**	**2**	**1**	**1**	**1**	**3**	**3.0 (n=1)**	**3.0**	**3.0**
- Arrochar & Helensburgh	6	1	0	0	0	0	-	-	-
- Stirling	11	1	1	1	1	3	3.0 (n=1)	3.0	3.0
Highland	**5**	**2**	**1**	**1**	**1**	**4**	**4.0 (n=1)**	**4.0**	**4.0**
- Badenoch & Strathspey	1	0	0	0	0	0	-	-	-
- Ross-shire	1	0	0	0	0	0	-	-	-
- Small Isles	1	1	1	1	1	4	4.0 (n=1)	4.0	4.0
- West Moray	2	1	0	0	0	0	-	-	-
Lothian & Borders	**11**	**4**	**4**	**4**	**3**	**8**	**2.7 (n=3)**	**2.0**	**2.0**
- Lothian	6	2	2	2	2	6	3.0 (n=2)	3.0	3.0
- Scottish Borders	5	2	2	2	1	2	2.0 (n=1)	1.0	1.0
Orkney	**4**	**0**	**0**	**0**	**0**	**0**	**-**	**-**	**-**
South Strathclyde	**1**	**0**	**0**	**0**	**0**	**0**	**-**	**-**	**-**
- Ayrshire	1	0	0	0	0	0	-	-	-
Tayside	**3**	**1**	**1**	**1**	**1**	**1**	**1.0 (n=1)**	**1.0**	**1.0**
- Angus	2	0	0	0	0	0	-	-	-
- Perth & Kinross	1	1	1	1	1	1	1.0 (n=1)	1.0	1.0
Uist	**17**	**3**	**1**	**1**	**1**	**2**	**2.0 (n=1)**	**2.0**	**2.0**
- North Uist	17	3	1	1	1	2	2.0 (n=1)	2.0	2.0
TOTAL:	**65**	**13**	**9**	**9**	**8**	**22**	**2.8 (n=8)**	**2.4**	**2.4**

Breeding success of Short-eared Owl in Scotland in 2019

Region	Sites checked	Pairs found	Additional single birds recorded	Pairs monitored	Pairs known to lay eggs	Pairs known to hatch eggs	Pairs known to fledge young	Minimum number of young fledged	Productivity (Young fledged per successful pair)	Productivity (Young fledged per pair laying eggs)	Productivity (Young fledged per pair occupied home range monitored)
Argyll	**9**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**-**	**-**	**-**
- Argyll Islands	6	1	0	0	0	0	0	0	-	-	-
- Argyll Mainland	3	0	0	0	0	0	0	0	-	-	-
Central Scotland	**10**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**-**	**-**	**-**
- Arrochar & Helensbugh	3	0	1	0	0	0	0	0	-	-	-
- Stirling	7	0	0	0	0	0	0	0	-	-	-
Highland	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**-**	**-**	**-**
- Caithness	1	1	0	0	0	0	0	0	-	-	-
Lothian & Borders	**13**	**1**	**2**	**0**	**0**	**0**	**0**	**0**	**-**	**-**	**-**
- Lothian	1	0	0	0	0	0	0	0	-	-	-
- Scottish Borders	12	1	2	0	0	0	0	0	-	-	-
Orkney	**133**	**11**	**30**	**11**	**4**	**4**	**3**	**4**	**1.3 (n=3)**	**1.0**	**0.4**
South Strathclyde	**5**	**1**	**0**	**1**	**0**	**0**	**0**	**0**	**-**	**-**	**-**
- Ayrshire	4	0	0	0	0	0	0	0	-	-	-
- South Lanarkshire	1	1	0	1	0	0	0	0	-	-	-
Tayside	**26**	**2**	**2**	**1**	**0**	**0**	**0**	**0**	**-**	**-**	**-**
- Angus	10	0	0	0	0	0	0	0	-	-	-
- Perth & Kinross	16	2	2	1	0	0	0	0	-	-	-
Uist	**18**	**8**	**10**	**6**	**6**	**6**	**6**	**8**	**1.3 (n=6)**	**1.3**	**1.3**
- Benbecula	2	1	1	0	0	0	0	0	-	-	-
- North Uist	15	6	9	5	5	5	5	7	1.4 (n=5)	1.4	1.4
- South Uist	1	1	0	1	1	1	1	1	1.0 (n=1)	1.0	1.0
TOTAL:	**215**	**25**	**45**	**19**	**10**	**10**	**9**	**12**	**1.3 (n=9)**	**1.2**	**0.6**

Breeding success of Kestrel in Scotland in 2019

Region	Home ranges checked	Home ranges occupied by pairs	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	Productivity (Young fledged per successful pair)	Productivity (Young fledged per pair laying eggs)	Productivity (Young fledged per pair occupied home range monitored)
Argyll	**26**	**3**	**3**	**0**	**2**	**2**	**2**	**5**	**2.5 (n=2)**	**2.5**	**1.7**
- Argyll Islands	7	0	0	0	0	0	0	0	-	-	-
- Argyll Mainland	15	2	2	0	2	2	2	5	2.5 (n=2)	2.5	2.5
- Bute	4	1	1	0	0	0	0	0	-	-	-
Central Scotland	**35**	**32**	**29**	**0**	**29**	**29**	**29**	**119**	**4.1 (n=29)**	**4.1**	**4.1**
- Dunbartonshire	4	4	4	0	4	4	4	19	4.8 (n=4)	4.8	4.8
- Falkirk	1	1	1	0	1	1	1	4	4.0 (n=1)	4.0	4.0
- Glasgow	1	1	1	0	1	1	1	5	5.0 (n=1)	5.0	5.0
- North Lanarkshire	22	21	18	0	18	18	18	68	3.8 (n=18)	3.8	3.8
- Stirling	7	5	5	0	5	5	5	23	4.6 (n=5)	4.6	4.6
Dumfries & Galloway	**14**	**5**	**3**	**0**	**3**	**3**	**3**	**14**	**4.7 (n=3)**	**4.7**	**4.7**
Highland	**16**	**13**	**10**	**1**	**9**	**7**	**6**	**16**	**2.7 (n=6)**	**1.8**	**1.6**
- Inverness-shire	8	6	5	1	4	4	4	13	3.2 (n=4)	3.2	2.6
- Lochaber	1	1	0	0	0	0	0	0	-	-	-
- Ross-shire	6	5	4	0	4	2	1	1	1.0 (n=1)	0.2	0.2
- West Moray	1	1	1	0	1	1	1	2	2.0 (n=1)	2.0	2.0
Lewis & Harris	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**-**	**-**	**-**
- Lewis	1	1	0	0	0	0	0	0	-	-	-
Lothian & Borders	**56**	**23**	**23**	**1**	**21**	**18**	**18**	**81**	**4.5 (n=18)**	**3.9**	**3.5**
- Lothian	26	10	10	0	10	8	8	38	4.8 (n=8)	3.8	3.8
- Scottish Borders	30	13	13	1	11	10	10	43	4.3 (n=10)	3.9	3.3
Orkney	**44**	**7**	**7**	**3**	**4**	**4**	**1**	**1**	**1.0 (n=1)**	**0.2**	**0.1**
South Strathclyde	**19**	**10**	**7**	**0**	**7**	**7**	**7**	**23**	**3.3 (n=7)**	**3.3**	**3.3**
- Ayrshire	17	9	6	0	6	6	6	21	3.5 (n=6)	3.5	3.5
- Renfrewshire	2	1	1	0	1	1	1	2	2.0 (n=1)	2.0	2.0
Tayside	**61**	**25**	**10**	**1**	**9**	**9**	**9**	**21**	**1.9 (n=5)**	**1.9**	**1.7**
- Angus	32	8	4	0	4	4	4	7	1.2 (n=2)	1.2	1.2
- Fife	9	5	3	1	2	2	2	9	4.5 (n=2)	4.5	3.0
- Perth & Kinross	20	12	3	0	3	3	3	5	1.0 (n=1)	1.0	1.0

Breeding success of Kestrel in Scotland in 2019 (continued)

Region	Home ranges checked	Home ranges occupied by pairs	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	Productivity (Young fledged per successful pair)	Productivity (Young fledged per pair laying eggs)	Productivity (Young fledged per pair occupied home range monitored)
Uist	**11**	**5**	**3**	**0**	**3**	**3**	**3**	**11**	**3.7 (n=3)**	**3.7**	**3.7**
- Benbecula	2	0	0	0	0	0	0	0	-	-	-
- North Uist	3	0	0	0	0	0	0	0	-	-	-
- South Uist	6	5	3	0	3	3	3	11	3.7 (n=3)	3.7	3.7
TOTAL:	**283**	**124**	**95**	**6**	**87**	**82**	**78**	**291**	**3.9 (n=74)**	**3.5**	**3.2**

Breeding success of Merlin in Scotland in 2019

Region	Home ranges checked	Home ranges occupied by pairs	Home ranges occupied (pairs, singles or fresh signs)	Pairs monitored	Failed early on non-breeding	Pairs known to lay eggs	Pairs known to hatch eggs	Pairs known to fledge young	Minimum number of young fledged	Productivity (Young fledged per successful pair)	Productivity (Young fledged per pair laying eggs)	Productivity (Young fledged per pair occupied home range monitored)
Argyll	**5**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**-**	**-**	**-**
- Argyll Islands	3	0	1	0	0	0	0	0	0	-	-	-
- Argyll Mainland	2	0	1	0	0	0	0	0	0	-	-	-
Central Scotland	**7**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**-**	**-**	**-**
- Arrochar & Helensbugh	1	0	1	0	0	0	0	0	0	-	-	-
- Dunbartonshire	1	0	0	0	0	0	0	0	0	-	-	-
- Stirling	5	0	0	0	0	0	0	0	0	-	-	-
Dumfries & Galloway	**10**	**8**	**0**	**7**	**0**	**7**	**3**	**2**	**7**	**3.5 (n=2)**	**1.0**	**1.0**
Highland	**76**	**32**	**13**	**22**	**1**	**21**	**20**	**16**	**39**	**2.4 (n=15)**	**1.8**	**1.7**
- Badenoch & Strathspey	19	4	3	4	0	4	4	4	10	2.5 (n=4)	2.5	2.5
- Inverness-shire	2	1	0	1	0	1	1	1	2	2.0 (n=1)	2.0	2.0
- Lochaber	4	1	3	1	0	1	1	1	4	4.0 (n=1)	4.0	4.0
- Nairn	7	3	0	3	1	2	2	1	3	3.0 (n=1)	1.5	1.0
- Ross-shire	2	1	0	1	0	1	1	1	4	4.0 (n=1)	4.0	4.0
- Small Isles	3	1	1	1	0	1	1	1	1	0.0 (n=0)	0.0	0.0
- Sutherland	27	19	6	9	0	9	8	6	14	2.3 (n=6)	1.6	1.6
- West Moray	12	2	0	2	0	2	2	1	1	1.0 (n=1)	0.5	0.5
Lewis & Harris	**8**	**8**	**0**	**4**	**0**	**4**	**4**	**3**	**9**	**3.0 (n=3)**	**2.2**	**2.2**
- Harris	3	3	0	0	0	0	0	0	0	-	-	-
- Lewis	5	5	0	4	0	4	4	3	9	3.0 (n=3)	2.2	2.2
Lothian & Borders	**39**	**13**	**4**	**13**	**1**	**11**	**7**	**7**	**24**	**3.4 (n=7)**	**2.2**	**1.8**
- Lothian	9	3	0	3	1	2	2	2	6	3.0 (n=2)	3.0	2.0
- Scottish Borders	30	10	4	10	0	9	5	5	18	3.6 (n=5)	2.0	1.8
North-east Scotland	**98**	**37**	**3**	**37**	**0**	**32**	**30**	**28**	**79**	**2.8 (n=28)**	**2.5**	**2.1**
- Aberdeenshire	73	32	2	32	0	27	25	23	64	2.8 (n=23)	2.4	2.0
- East Moray	25	5	1	5	0	5	5	5	15	3.0 (n=5)	3.0	3.0
Orkney	**86**	**10**	**3**	**10**	**6**	**4**	**4**	**2**	**2**	**1.0 (n=2)**	**0.5**	**0.2**
Shetland	**63**	**34**	**0**	**33**	**1**	**31**	**26**	**25**	**85**	**3.4 (n=25)**	**2.7**	**2.6**

Breeding success of Merlin in Scotland in 2019 (continued)

Region	Home ranges checked	Home ranges occupied by pairs	Home ranges occupied (pairs, singles or fresh signs)	Pairs monitored	Failed early on non-breeding	Pairs known to lay eggs	Pairs known to hatch eggs	Pairs known to fledge young	Minimum number of young fledged	Productivity (Young fledged per successful pair)	Productivity (Young fledged per pair laying eggs)	Productivity (Young fledged per pair occupied home range monitored)
South Strathclyde	**14**	**5**	**0**	**4**	**2**	**2**	**2**	**2**	**7**	**3.5 (n=2)**	**3.5**	**1.8**
- Ayrshire	2	1	0	0	0	0	0	0	0	-	-	-
- South Lanarkshire	12	4	0	4	2	2	2	2	7	3.5 (n=2)	3.5	1.8
Tayside	**40**	**14**	**9**	**9**	**0**	**8**	**8**	**7**	**16**	**2.1 (n=6)**	**1.9**	**1.7**
- Angus	9	4	1	3	0	3	3	3	7	2.3 (n=3)	2.3	2.3
- Perth & Kinross	31	10	8	6	0	5	5	4	9	2.0 (n=3)	1.6	1.3
Uist	**4**	**0**	**4**	**0**	**0**	**0**	**0**	**0**	**0**	**-**	**-**	**-**
- North Uist	3	0	3	0	0	0	0	0	0	-	-	-
- South Uist	1	0	1	0	0	0	0	0	0	-	-	-
TOTAL:	**450**	**161**	**39**	**139**	**11**	**120**	**104**	**92**	**268**	**3.0 (n=90)**	**2.3**	**2.0**

Breeding success of Hobby in Scotland in 2019

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	Productivity (Young fledged per successful pair)	Productivity (Young fledged per pair laying eggs)	Productivity (Young fledged per pair occupied home range monitored)
Dumfries & Galloway	**1**	**1**	**0**	**1**	**0**	**1**	**1**	**1**	**2**	**2.0 (n=1)**	**2.0**	**2.0**
Tayside	**7**	**4**	**1**	**3**	**0**	**3**	**3**	**3**	**5**	**1.7 (n=3)**	**1.7**	**1.7**
- Angus	6	3	1	2	0	2	2	2	4	2.0 (n=2)	2.0	2.0
- Perth & Kinross	1	1	0	1	0	1	1	1	1	1.0 (n=1)	1.0	1.0
TOTAL:	**8**	**5**	**1**	**4**	**0**	**4**	**4**	**4**	**7**	**1.8 (n=4)**	**1.8**	**1.8**

Breeding success of Peregrine in Scotland in 2019

Region	Home ranges checked	Home ranges occupied by pairs	Further home ranges in use (single birds or fresh signs)	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	Productivity (Young fledged per successful pair)	Productivity (Young fledged per pair laying eggs)	Productivity (Young fledged per pair occupied home range monitored)
Argyll	**32**	**10**	**2**	**2**	**10**	**1**	**9**	**6**	**6**	**10**	**1.5 (n=5)**	**1.0**
- Argyll Islands	7	3	0	0	3	0	3	2	2	4	1.5 (n=1)	1.0
- Argyll Mainland	16	5	1	1	5	1	4	3	3	5	1.7 (n=3)	1.2
- Bute	9	2	1	1	2	0	2	1	1	1	1.0 (n=1)	0.5
Central Scotland	**30**	**17**	**5**	**5**	**13**	**1**	**12**	**12**	**11**	**28**	**2.5 (n=11)**	**2.3**
- Arrochar & Helensburgh	2	0	1	1	0	0	0	0	0	0	-	-
- Clackmannanshire	2	2	0	0	1	0	1	1	1	2	2.0 (n=1)	2.0
- Dunbartonshire	1	1	0	0	0	0	0	0	0	0	-	-
- Falkirk	3	3	0	0	3	0	3	3	3	9	3.0 (n=3)	3.0
- North Lanarkshire	8	4	3	3	4	0	4	4	3	9	3.0 (n=3)	2.2
- Stirling	14	7	1	1	5	1	4	4	4	8	2.0 (n=4)	2.0
Dumfries & Galloway	**100**	**54**	**8**	**10**	**47**	**1**	**42**	**39**	**37**	**69**	**1.8 (n=36)**	**1.6**
Highland	**90**	**22**	**13**	**14**	**17**	**1**	**16**	**16**	**16**	**33**	**2.1 (n=16)**	**2.1**
- Badenoch & Strathspey	17	4	2	2	1	1	0	0	0	0	-	-
- Caithness	8	2	2	2	2	0	2	2	2	4	2.0 (n=2)	2.0
- Inverness-shire	16	6	3	4	5	0	5	5	5	11	2.2 (n=5)	2.2
- Nairn	2	0	0	0	0	0	0	0	0	0	-	-
- Ross-shire	31	5	1	1	5	0	5	5	5	11	2.2 (n=5)	2.2
- Small Isles	1	1	0	0	1	0	1	1	1	1	1.0 (n=1)	1.0
- Sutherland	13	3	5	5	2	0	2	2	2	3	1.5 (n=2)	1.5
- West Moray	2	1	0	0	1	0	1	1	1	3	3.0 (n=1)	3.0
Lewis & Harris	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**-**	**-**
- Lewis	1	1	0	0	0	0	0	0	0	0	-	-
Lothian & Borders	**143**	**53**	**9**	**11**	**53**	**13**	**39**	**32**	**32**	**85**	**2.7 (n=32)**	**2.2**
- Lothian	36	13	5	5	13	3	10	9	9	23	2.6 (n=9)	2.3
- Scottish Borders	107	40	4	6	40	10	29	23	23	62	2.7 (n=23)	2.1

Breeding success of Peregrine in Scotland in 2019 (continued)

Region	Home ranges checked	Home ranges occupied by pairs	Further home ranges in use (single birds or fresh signs)	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	Productivity (Young fledged per successful pair)	Productivity (Young fledged per pair laying eggs)	Productivity (Young fledged per pair occupied home range monitored)
North-east Scotland	**38**	**11**	**1**	**1**	**9**	**1**	**8**	**8**	**8**	**19**	**2.4 (n=8)**	**2.4**
- Aberdeenshire	30	11	1	1	9	1	8	8	8	19	2.4 (n=8)	2.4
- East Moray	8	0	0	0	0	0	0	0	0	0	-	-
Orkney	**35**	**16**	**3**	**3**	**16**	**4**	**12**	**12**	**12**	**21**	**1.8 (n=12)**	**1.8**
Shetland	**6**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**-**	**-**
South Strathclyde	**60**	**24**	**3**	**3**	**24**	**2**	**20**	**19**	**18**	**34**	**1.8 (n=17)**	**1.6**
- Arran & Cumbrae	7	4	0	0	4	0	4	4	4	9	2.2 (n=4)	2.2
- Ayrshire	35	14	3	3	14	2	11	11	10	17	1.6 (n=9)	1.5
- Inverclyde	1	0	0	0	0	0	0	0	0	0	-	-
- Renfrewshire	2	1	0	0	1	0	1	1	1	1	1.0 (n=1)	1.0
- South Lanarkshire	15	5	0	0	5	0	4	3	3	7	2.3 (n=3)	1.8
Tayside	**93**	**48**	**9**	**9**	**42**	**2**	**32**	**32**	**31**	**63**	**2.0 (n=31)**	**2.0**
- Angus	31	14	3	3	11	0	6	6	5	9	1.8 (n=5)	1.5
- Fife	25	15	1	1	15	0	14	14	14	29	2.1 (n=14)	2.1
- Perth & Kinross	37	19	5	5	16	2	12	12	12	25	2.1 (n=12)	2.1
Uist	**6**	**4**	**2**	**2**	**2**	**0**	**2**	**2**	**2**	**8**	**4.0 (n=2)**	**4.0**
- Benbecula	1	1	0	0	1	0	1	1	1	4	4.0 (n=1)	4.0
- North Uist	3	1	2	2	0	0	0	0	0	0	-	-
- South Uist	2	2	0	0	1	0	1	1	1	4	4.0 (n=1)	4.0
TOTAL:	**634**	**260**	**55**	**60**	**233**	**26**	**192**	**178**	**173**	**370**	**2.2 (n=170)**	**1.9**

Breeding success of Raven in Scotland in 2019

Region	Home ranges checked	Home ranges occupied by pairs	Pairs monitored	Failed early or non-breeding	Pairs known to lay eggs	Pairs known to hatch eggs	Pairs known to fledge young	Minimum number of young fledged	Productivity (Young fledged per successful pair)	Productivity (Young fledged per pair laying eggs)	Productivity (Young fledged per pair occupied home range monitored)
Argyll	**90**	**60**	**59**	**6**	**47**	**45**	**44**	**116**	**2.6 (n=44)**	**2.5**	**2.0**
- Argyll Islands	25	11	11	0	10	10	10	29	2.9 (n=10)	2.9	2.6
- Argyll Mainland	39	31	30	5	24	23	22	55	2.5 (n=22)	2.3	1.8
- Bute	26	18	18	1	13	12	12	32	2.7 (n=12)	2.5	1.8
Central Scotland	**65**	**55**	**44**	**6**	**38**	**32**	**32**	**90**	**2.8 (n=30)**	**2.3**	**2.0**
- Arrochar & Helensburgh	7	7	6	1	5	4	4	8	2.0 (n=4)	1.6	1.3
- Clackmannanshire	2	2	2	0	2	2	2	5	2.0 (n=1)	2.0	2.0
- Dunbartonshire	1	0	0	0	0	0	0	0	-	-	-
- Falkirk	2	2	2	0	2	2	2	7	3.5 (n=2)	3.5	3.5
- North Lanarkshire	14	13	13	1	12	12	12	34	2.8 (n=12)	2.8	2.6
- Stirling	39	31	21	4	17	12	12	36	2.9 (n=11)	2.1	1.7
Dumfries & Galloway	**74**	**54**	**33**	**0**	**32**	**28**	**28**	**68**	**2.4 (n=26)**	**2.1**	**2.0**
Highland	**24**	**23**	**18**	**1**	**17**	**17**	**17**	**39**	**2.2 (n=16)**	**2.2**	**2.1**
- Badenoch & Strathspey	4	4	4	0	4	4	4	9	2.2 (n=4)	2.2	2.2
- Inverness-shire	6	6	3	0	3	3	3	8	2.3 (n=2)	2.3	2.3
- Lochaber	1	1	1	0	1	1	1	1	1.0 (n=1)	1.0	1.0
- Nairn	1	1	1	0	1	1	1	2	2.0 (n=1)	2.0	2.0
- Ross-shire	8	7	6	1	5	5	5	11	2.2 (n=5)	2.2	1.8
- Sutherland	4	4	3	0	3	3	3	8	2.7 (n=3)	2.7	2.7
Lewis & Harris	**13**	**11**	**10**	**1**	**9**	**9**	**8**	**18**	**2.1 (n=7)**	**1.9**	**1.7**
- Harris	1	1	1	0	1	1	0	0	-	-	-
- Lewis	12	10	9	1	8	8	8	18	2.1 (n=7)	2.1	1.9
Lothian & Borders	**52**	**41**	**35**	**1**	**33**	**33**	**31**	**89**	**2.8 (n=28)**	**2.6**	**2.5**
- Lothian	16	12	12	0	12	12	12	39	3.2 (n=12)	3.2	3.2
- Scottish Borders	36	29	23	1	21	21	19	50	2.5 (n=16)	2.2	2.0

Breeding success of Raven in Scotland in 2019 (continued)

Region	Home ranges checked	Home ranges occupied by pairs	Pairs monitored	Failed early or non-breeding	Pairs known to lay eggs	Pairs known to hatch eggs	Pairs known to fledge young	Minimum number of young fledged	Productivity (Young fledged per successful pair)	Productivity (Young fledged per pair laying eggs)	Productivity (Young fledged per pair occupied home range monitored)
Orkney	**4**	**3**	**2**	**0**	**2**	**2**	**2**	**5**	**2.5 (n=2)**	**2.5**	**2.5**
Shetland	**17**	**10**	**9**	**1**	**8**	**8**	**7**	**24**	**3.3 (n=6)**	**2.9**	**2.6**
South Strathclyde	**32**	**22**	**19**	**1**	**13**	**13**	**13**	**38**	**2.9 (n=13)**	**2.9**	**2.0**
- Ayrshire	32	22	19	1	13	13	13	38	2.9 (n=13)	2.9	2.0
Tayside	**96**	**61**	**51**	**3**	**45**	**40**	**39**	**97**	**2.5 (n=39)**	**2.2**	**1.9**
- Angus	28	8	6	0	5	4	4	8	2.0 (n=4)	1.6	1.3
- Fife	12	9	9	0	8	7	7	21	3.0 (n=7)	2.6	2.3
- Perth & Kinross	56	44	36	3	32	29	28	68	2.4 (n=28)	2.1	1.9
Uist	**47**	**29**	**18**	**0**	**16**	**14**	**14**	**49**	**3.5 (n=14)**	**3.1**	**2.7**
- Benbecula	7	5	2	0	2	2	2	4	2.0 (n=2)	2.0	2.0
- North Uist	25	12	6	0	6	5	5	18	3.6 (n=5)	3.0	3.0
- South Uist	15	12	10	0	8	7	7	27	3.9 (n=7)	3.4	2.7
TOTAL:	**514**	**369**	**298**	**20**	**260**	**241**	**235**	**633**	**2.8 (n=225)**	**2.5**	**2.2**

Published by BTO Scotland on behalf of the
Scottish Raptor Monitoring Scheme using funding generously provided by
the SOC's The Birds of Scotland Fund