Scottish Raptor Monitoring Scheme Trends 2009-2018: Species-focus

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Introduction

This document presents raptor population trends in Scotland by species. This approach will suit users of the trends who are particularly interested in the variation between different parameters and regions within individual species.

Clicking on the various links below will take you straight to the relevant account for the species of interest.

Osprey
Golden Eagle
Sparrowhawk
Goshawk
Hen Harrier
Red Kite
White-tailed Eagle
Buzzard
Barn Owl
Tawny Owl
Kestrel
Merlin
Peregrine
Raven

Front cover image: Ospreys in Perthshire (Keith Brockie).

Methods

'Clusters' – Because the SRMS does not currently hold standardised information on study area coverage and effort, or changes in these between years, it was necessary to derive clusters using a two-stage process: (i) initially based on characteristics of the records themselves; and then (ii) through a consultation process with data contributors.

Only records with a spatial resolution of at least 1-km were used. Species-specific nearest neighbour distances were used to identify sub-sets of records that fell into groups or 'clusters' consistent with reasonably comprehensive monitoring coverage.

Consultation with observers resulted in helpful feedback on the draft clusters and the trends based on them. This feedback was considered carefully before producing the regional and national trends documented here. However, we were not able to completely address all of the suggestions made, particularly where these pointed towards the use of data not currently held by the SRMS. Inclusion of such data in the future may allow us to produce improved trends for some the combinations of species and regions, or may allow trends to be calculated for new combinations for which trends cannot be derived with existing SRMS data.

More details of the methods used to produce trends can be found in a technical report available on the SRMS website (https://raptormonitoring.org/trends/technical-report).

Species Accounts

Within the following species accounts, trends are presented sequentially at two different geographic scales – firstly national (i.e. Scotland) and then for two different regional scales (SRMS Regions & Natural Heritage Zone Regions). Within each section the following points should be taken into consideration:

Interpreting trend graphs: The graphs show how the number of breeding pairs and parameters related to breeding productivity (breeding success, clutch size, brood size, and number of fledglings) have changed over the relevant trend period. The purple dots show the average value of the relevant parameter for each year. The numbers at the top of the graph show the number of records from each year contributing to the trend. The purple line delineates the predicted values for the trend, illustrating the steepness and direction of change over time. The pale purple shading shows the 95% confidence interval around these predicted values.

Where there were significant directional changes in numbers or breeding success parameters, trends are described as increases or decreases. Where start and end values were not significantly different, but there was still statistical evidence for change during the period (e.g. a 'peak' being an increase followed by a decrease, or a 'trough' being a decrease followed by an increase) trends are described as non-linear. It should be noted that, where a trend is reported as not significant, this simply means that we cannot be confident that the trend either increased or decreased over the relevant period. It does NOT mean that there was no change over this time. What it does mean is that, if there was a change, it was too small to detect robustly with the available data.

Threshold criteria for trends: Individual home ranges only contributed to regional or national trends if they were checked for occupancy during five or more years of the trend period. Numerical trends only include home ranges that are included in defined clusters (in which monitoring coverage and effort is assumed to be consistent across the defined series of years). For breeding productivity trends, all records (not just those from clusters) were considered for inclusion. Trends are only presented for regions in which ten or more home ranges

Front cover image: Ospreys in Perthshire (Keith Brockie).

contributed data in at least one year. Data from individual years in which fewer than five home ranges were checked were excluded from numerical trends, with the equivalent threshold being seven home ranges, for breeding productivity trends. No trend was produced if fewer than five years of suitable data were available for inclusion. Regional trends were also scrutinised for any major changes in sample size during the trend period for each (which could indicate major changes in survey coverage/effort) and years of apparently inconsistent coverage were excluded from the final trend.

For trends in clutch size, brood size and numbers of fledged young, records with minimum estimates (e.g. 2+, 3+, 4+) were included as the minimum quoted (e.g. 2+ becomes 2) as conservative measures of the appropriate parameter. For all breeding attempts with successful or unknown outcomes, the largest count from either of the 'Large_Young' or 'Young_Fledged' categories of the SRMS spreadsheet was used as the estimate of the actual number that went on to fledge. This may slightly overestimate the actual number of young that go on to fledge. The number of young recorded at different stages may also vary slightly between different studies/areas due to variation in recording decisions and monitoring effort between data contributors.

Any caveats that need to be considered when interpreting trends are noted below each of the tables and graphs, both in this report and in the various accounts available via the SRMS website. These caveats, together with their potential implications for the observed trend, are detailed below.

- 'a' – All data used – these are trends based on all available data for the period but, unlike national trends, are not considered to be robustly representative of the national population. This is due to under-representation of particular regions, habitats, demographic cohorts, or some combination of these.
- 'n' – Nest box based – a large proportion of monitored individuals are based in nest boxes. If nest boxes tend to be preferred over natural sites or vice versa, numerical trends may not be representative unless a high proportion of pairs nesting in natural sites are also found and monitored. Moreover, because only a small proportion of the population of any Scottish raptor breeds in nest boxes, if any measures of productivity differ between nesting attempts in boxes and those in natural sites, estimates of and trends in productivity may also be unrepresentative.
- 'r' – No home range random effect – inclusion of the home range as a random effect in a productivity trend model caused the results of that model to depart unrealistically from the observed range of variation for that trend, so this variable was removed from the model. This could make the trend more prone to being unduly influenced by variation between individual home ranges; particularly when the home ranges contributing to the trend changed over time.
- 's' – Sample sizes small – mean annual sample size is less than 20. This is likely to decrease the precision of annual estimates, and to increase the influence of 'noise' (random variation) on apparent change from one year to the next. This is not based on any formal power analyses but simply highlights that trends based on samples of more than 20 home ranges are likely to be more robust/representative than those based on smaller samples.
- 'v' – Variable effort – variation in sample size between years suggests that variable monitoring effort could result in inter-annual variation in the location and nature of home ranges that are monitored, or in the effort put into collecting data from these. Such variable effort could result in 'noise' (random variation between years) or, if effort increases or decreases over time, introduce bias into the trend.
- 'x' – Expanding population – population of a recently re-introduced species, known to be undergoing rapid expansion. This means that traditional approaches to raptor monitoring (focussing on known home ranges or discrete study areas) are likely to underestimate rates of population growth, and may bias measures of breeding productivity towards older, more experienced pairs.

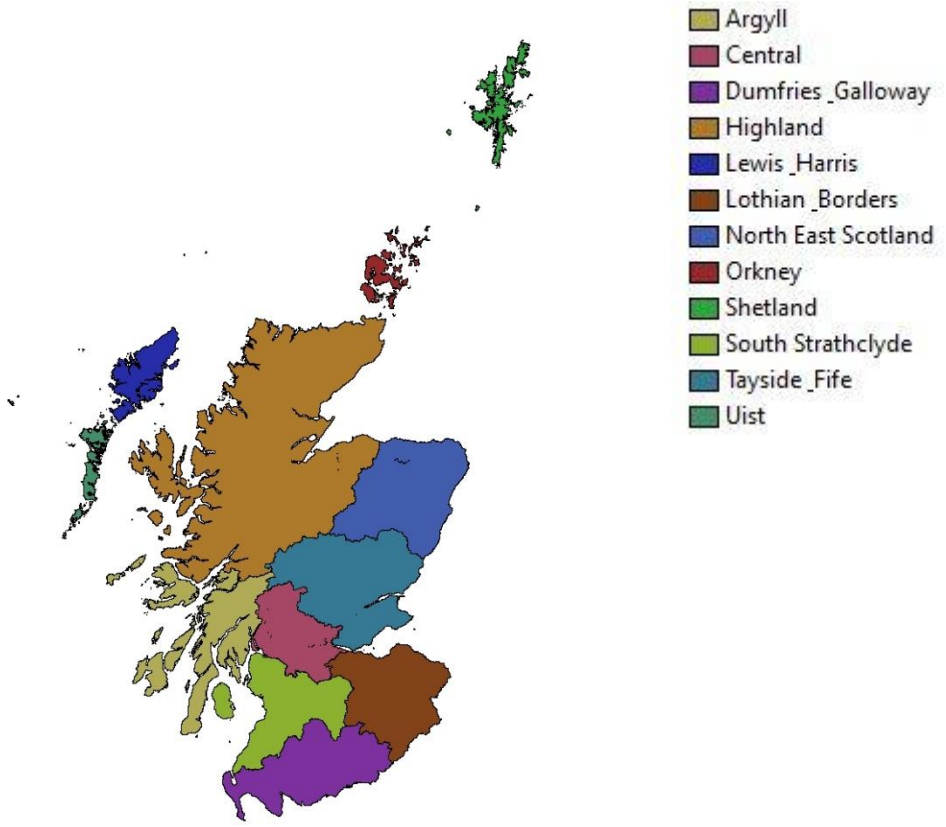


Figure 1: SRMS Region boundaries.

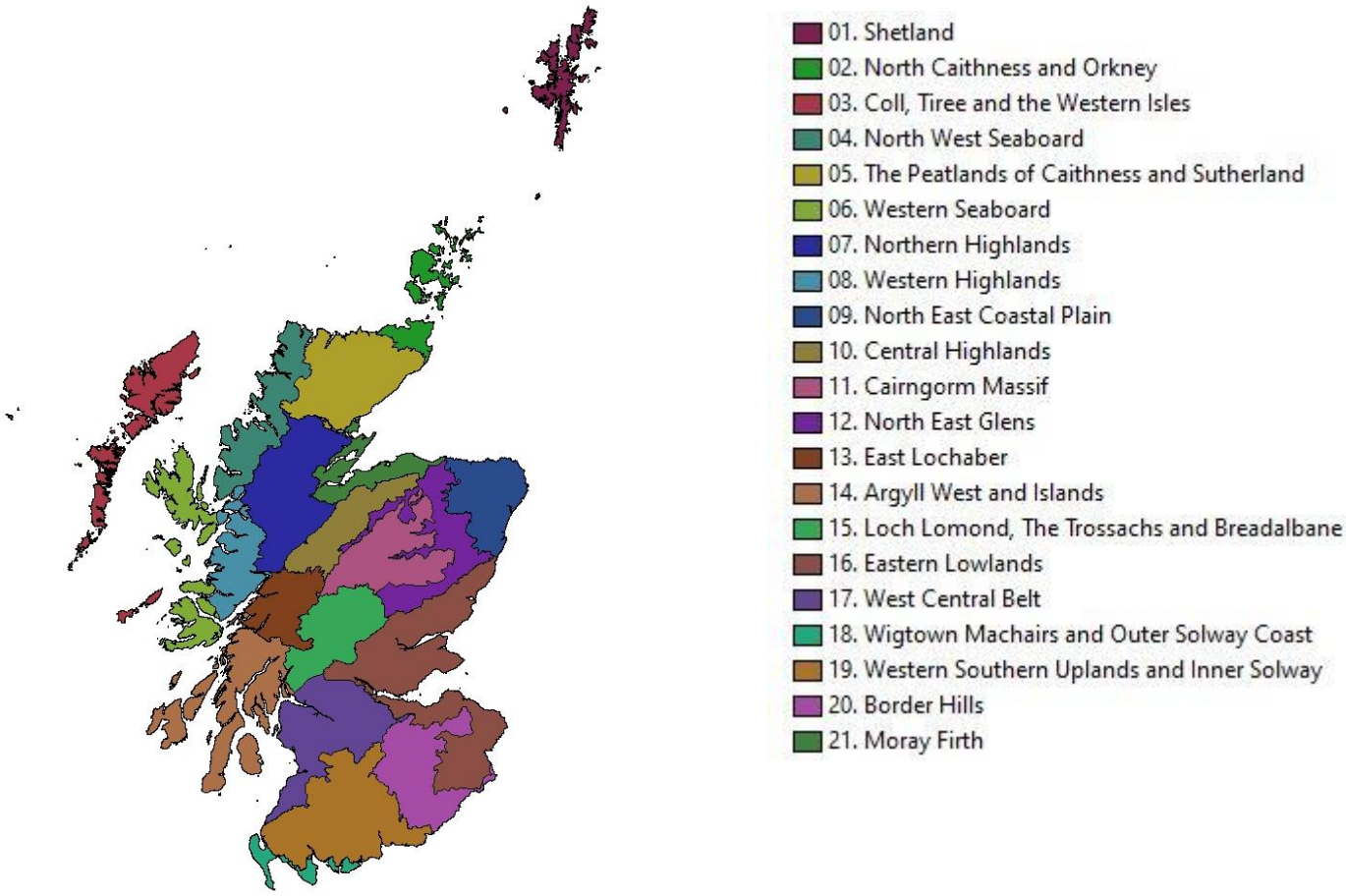


Figure 2: NHZ Region boundaries.

Osprey

Figure 3: Osprey brood in Perthshire (Photo: Keith Brockie, Tayside & Fife RSG).

Osprey is monitored widely across Scotland by SRMS data contributors.

Our latest analysis of SRMS Osprey data for the period 2009-2018 produced national trends for breeding success, clutch size, brood size and number of fledglings (Table 1). Trends in breeding numbers and productivity were produced for six of the eight SRMS regions (Table 2) and for six of the 18 NHZ regions for which the SRMS holds records for Osprey (Table 3).

Users of the published trends should be aware that while records for both trends in breeding numbers and productivity are drawn from much of the Osprey's range, none of these come from south of the Central Belt (Figure 15). There are also some gaps in coverage in the Highlands, including the heartland of the Osprey's Scottish range in Speyside (Figure 15). Ongoing population expansion can be difficult to monitor with study areas focused on existing concentrations of birds and in areas where survey effort is limited. Consultation with contributors has highlighted that it may be possible to miss new pairs establishing in between monitored sites ('in-filling'), even in well monitored study areas, if limited time is available to search for new territories (e.g. in Lothian & Borders, where the focus on monitoring at platforms leaves limited time to search for natural nest sites in the region).

National trends

A national trend in breeding numbers is not available. Breeding success showed non-linear variation (Table 1, Figure 4). Trends for clutch size, brood size and number of fledglings all showed no significant change (Table 1, Figure 4).

SRMS regional trends

There was a significant increase in breeding numbers of Osprey in Highland (+4.9%) but no significant change in four more regions (Argyll, Central, North East Scotland and Tayside & Fife) (Table 2, Figure 5).

Breeding success of Osprey decreased significantly in Lothian & Borders (-1.7%), with no significant change in five other regions (Argyll, Central, Highland, North East Scotland and Tayside & Fife) (Table 2, Figure 6).

Clutch size, brood size and number of fledglings showed no significant change in Tayside & Fife (Table 2, Figures 7-9). Number of fledglings did not change significantly in a further four regions (Argyll, Central, Highland and North East Scotland) (Table 2, Figure 9).

Trends for this species are not yet available for Dumfries & Galloway or South Strathclyde.

NHZ regional trends

There was a significant increase in breeding numbers of Osprey in NHZ 21 (+5.1%) but no significant change in two more regions (NHZs 14 and 16) (Table 3, Figure 10).

Breeding success of Osprey did not change significantly in six regions (NHZs 12, 14-16 and 20-21) (Table 3, Figure 11).

Clutch size, brood size and number of fledglings showed no significant change in NHZ 16 (Table 3, Figures 12-14). Number of fledglings did not change significantly in a further three regions (NHZs 14-15 and 21) (Figure 14).

Trends for this species are not yet available for NHZs 04-05, 07-11, 13 and 17-19.

Details of contributing records

2,743 (151 to 326 per year, mean: 274 records) from 2009-2018 contributed to this trends analysis (Table 6).

Table 1: Summary of SRMS national trends for Osprey during 2009-2018. Non-significant changes are highlighted in grey. 'Non-linear' indicates non-linear trends.

	Pairs	Success	Clutch size	Brood size	Number of fledglings
Scotland	—	Non-linear	Not significant	Not significant	Not significant

Table 2: Summary of SRMS regional trends for Osprey during 2009-2018. Figures in parentheses indicate the annual change, with significant increases highlighted in green, significant decreases highlighted in blue and non-significant changes highlighted in grey. '—' indicates where the species occurs but no trend is available. 'No SRMS data' indicates where the SRMS does not hold any records for the region of interest. 'Absent' indicates where the species is not known to breed.

SRMS Region	Pairs	Success	Clutch size	Brood size	Number of fledglings
Argyll	Not significant [s]	Not significant [s]	—	—	Not significant
Central	Not significant	Not significant	—	—	Not significant
Dumfries & Galloway	—	—	—	—	—
Highland	**Increase (4.9%)**	Not significant	—	—	Not significant
Lewis & Harris	Absent	Absent	Absent	Absent	Absent
Lothian & Borders	—	**Decrease [s] (-1.7%)**	—	—	—
North East Scotland	Not significant [s]	Not significant	—	—	Not significant
Orkney	Absent	Absent	Absent	Absent	Absent
Shetland	Absent	Absent	Absent	Absent	Absent
South Strathclyde	—	—	—	—	—
Tayside & Fife	Not significant [s]	Not significant	Not significant	Not significant	Not significant
Uist	Absent	Absent	Absent	Absent	Absent

[s] *Sample sizes small.*

Table 3: Summary of NHZ regional trends for Osprey during 2009-2018. Figures in parentheses indicate the annual change, with significant increases highlighted in green and non-significant changes highlighted in grey. '—' indicates where the species occurs but no trend is available. 'No SRMS data' indicates where the SRMS does not hold any records for the region of interest. 'Absent' indicates where the species is not known to breed.

NHZ Region	Pairs	Success	Clutch size	Brood size	Number of fledglings
01. Shetland	Absent	Absent	Absent	Absent	Absent
02. North Caithness and Orkney	No SRMS data	No SRMS data	No SRMS data	No SRMS data	No SRMS data
03. Coll, Tiree and the Western Isles	Absent	Absent	Absent	Absent	Absent
04. North West Seaboard	—	—	—	—	—
05. The Peatlands of Caithness and Sutherland	—	—	—	—	—
06. Western Seaboard	Absent	Absent	Absent	Absent	Absent
07. Northern Highlands	—	—	—	—	—
08. Western Highlands	—	—	—	—	—
09. North East Coastal Plain	—	—	—	—	—
10. Central Highlands	—	—	—	—	—
11. Cairngorm Massif	—	—	—	—	—
12. North East Glens	—	Not significant [s]	—	—	—
13. East Lochaber	—	—	—	—	—
14. Argyll West and Islands	Not significant [s]	Not significant [s]	—	—	Not significant
15. Loch Lomond, The Trossachs and Breadalbane	—	Not significant [s]	—	—	Not significant
16. Eastern Lowlands	Not significant	Not significant	Not significant [rs]	Not significant [rs]	Not significant
17. West Central Belt	—	—	—	—	—
18. Wigtown Machairs and Outer Solway Coast	—	—	—	—	—
19. Western Southern Uplands and Inner Solway	—	—	—	—	—
20. Border Hills	—	Not significant [s]	—	—	—
21. Moray Firth	**Increase (5.1%)**	Not significant	—	—	Not significant

[r] No home range random effect, [s] Sample sizes small.

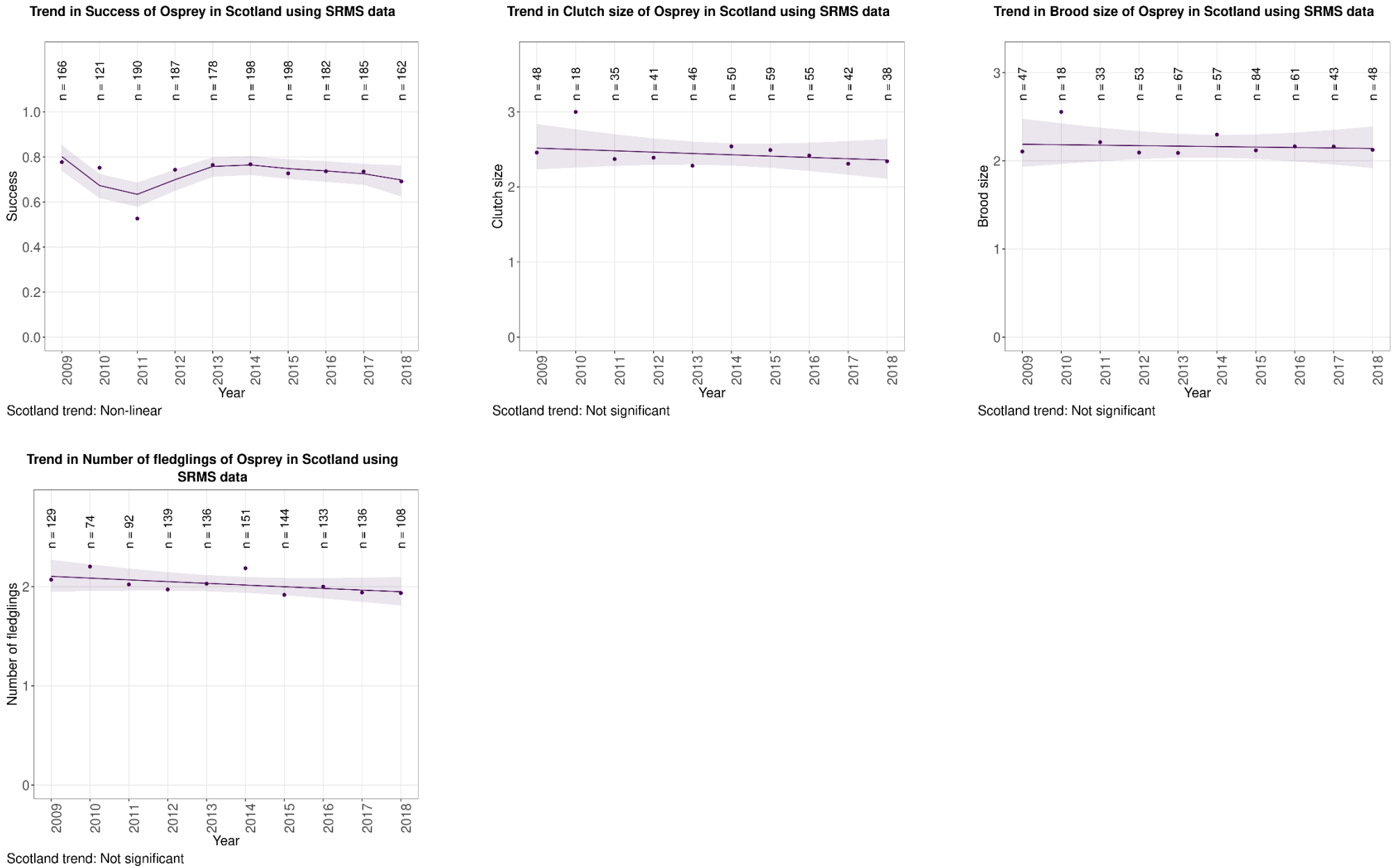


Figure 4: Trends in clutch size, brood size and number of fledglings of Osprey in Scotland during 2009-2018.

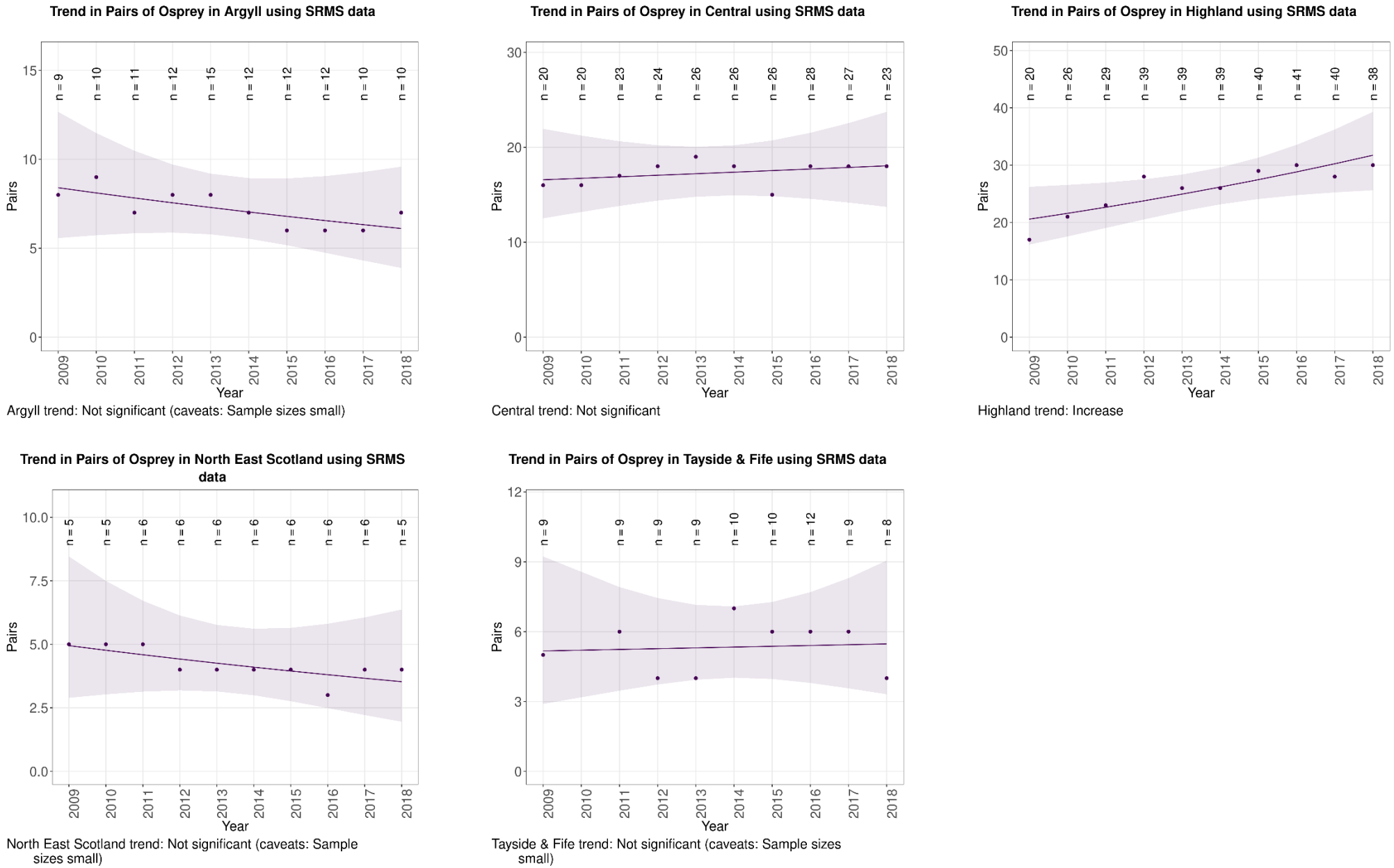


Figure 5: Trends in numbers of breeding pairs of Osprey by SRMS region during 2009-2018.

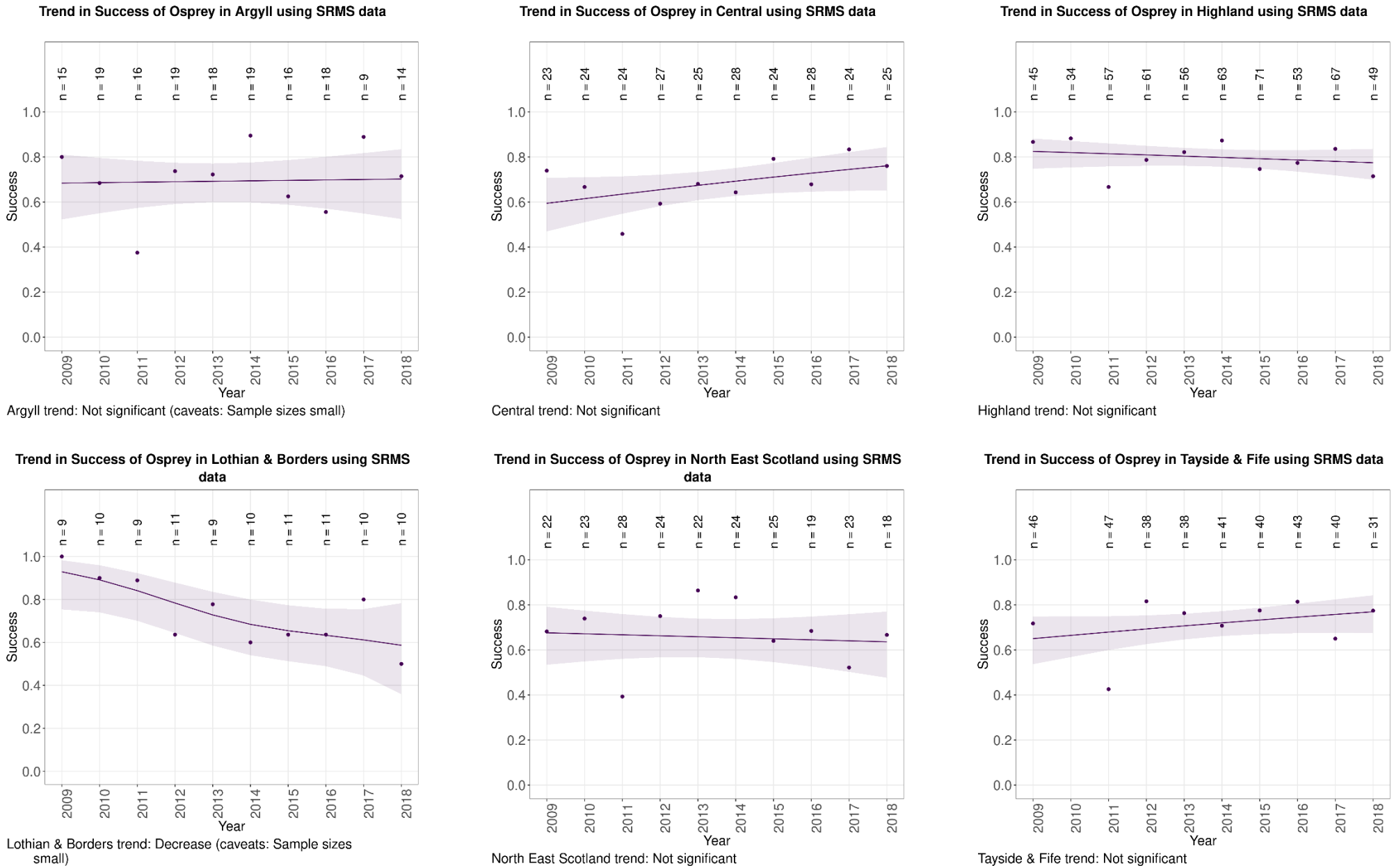


Figure 6: Trends in breeding success of Osprey by SRMS region during 2009-2018.

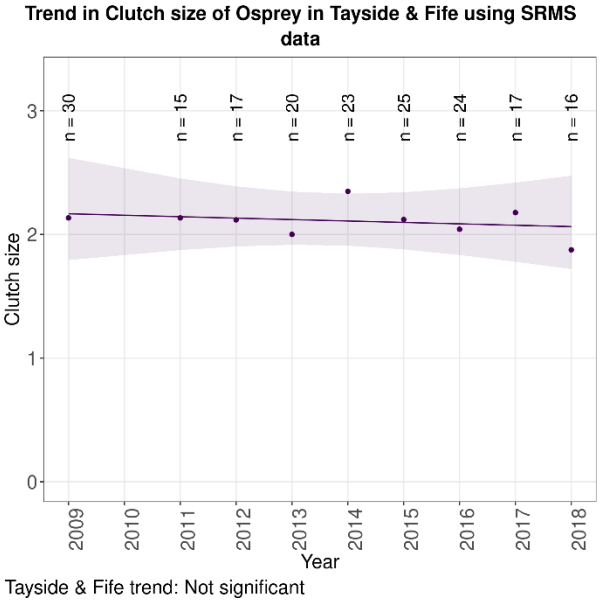


Figure 7: Trends in clutch size of Osprey by SRMS region during 2009-2018.

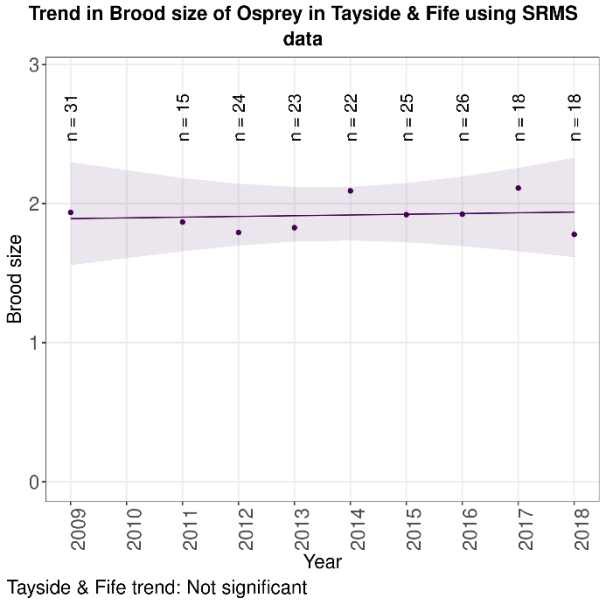
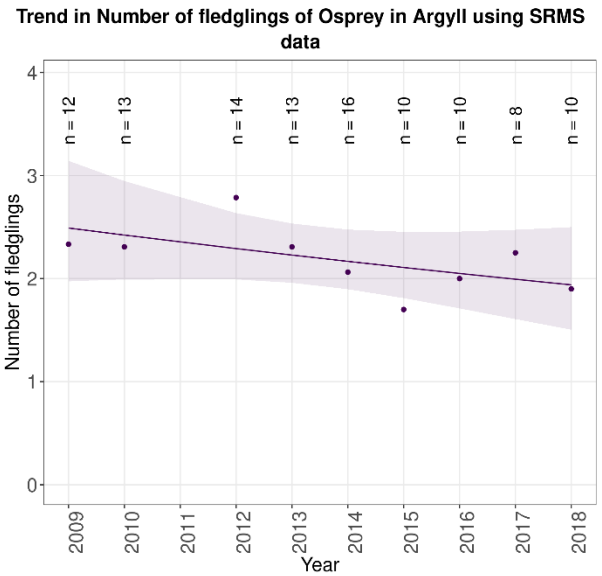
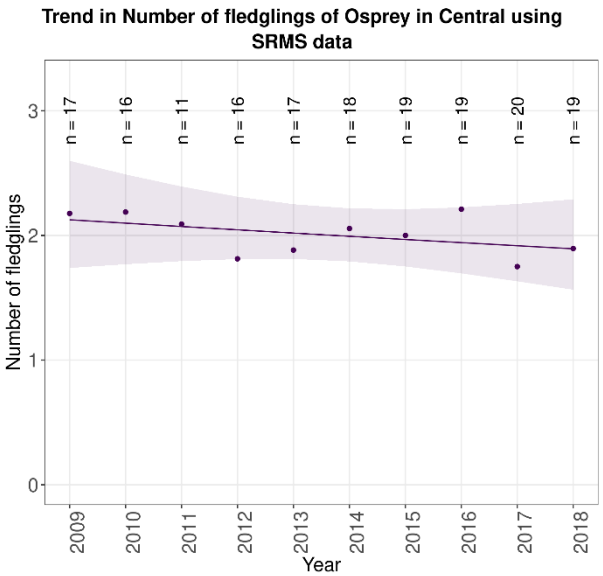
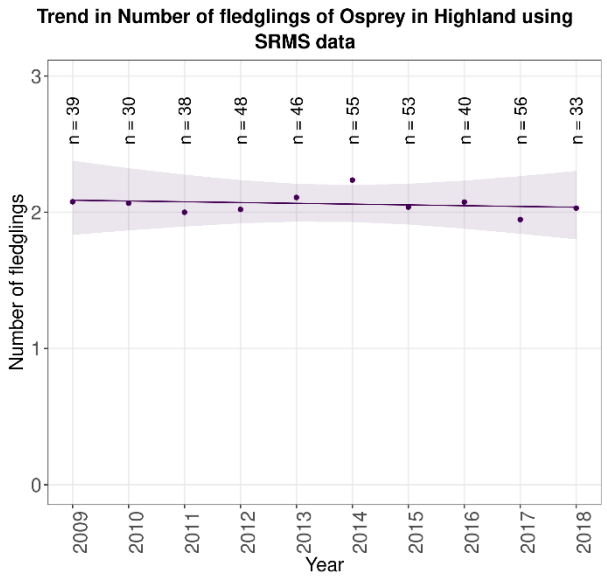
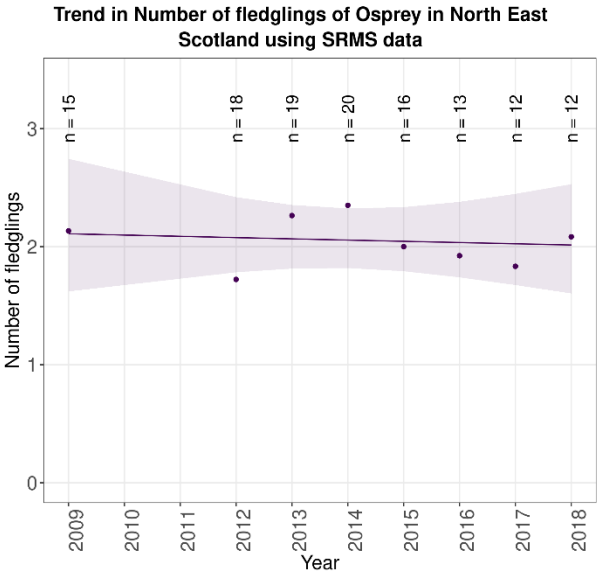


Figure 8: Trends in brood size of Osprey by SRMS region during 2009-2018.









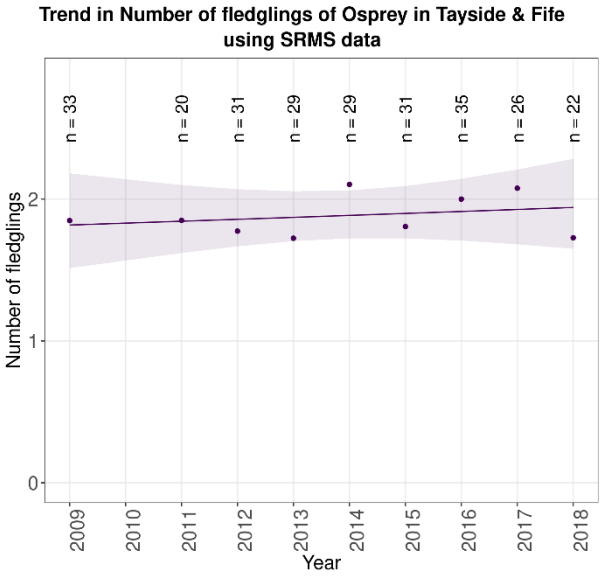
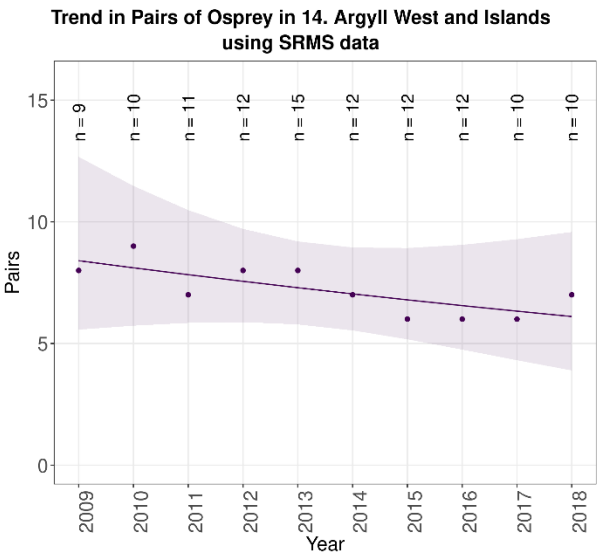
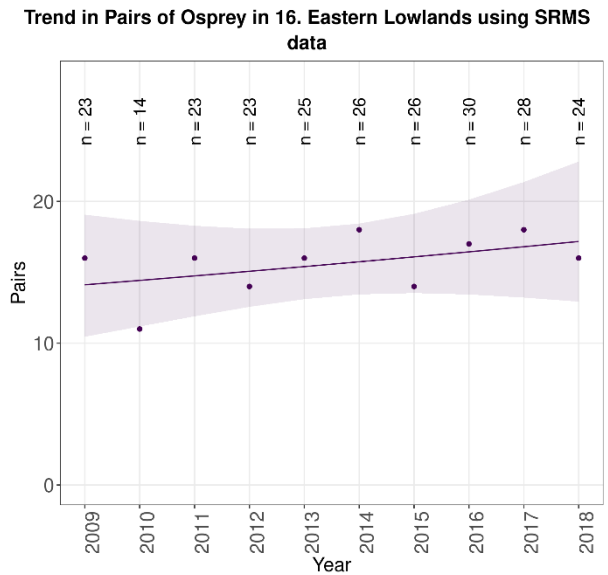


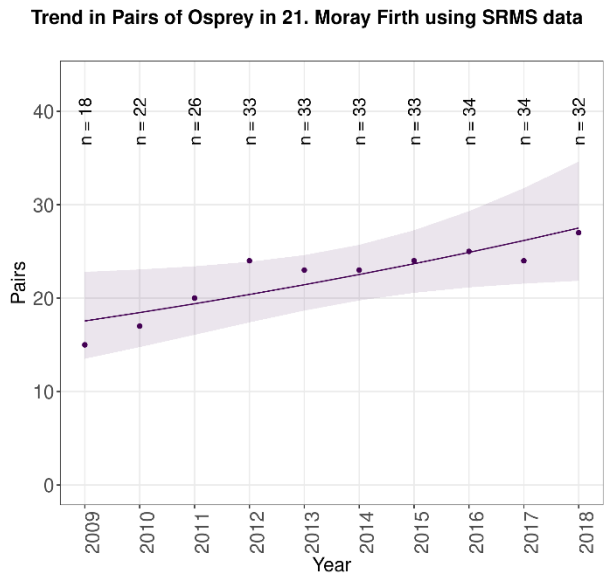
Figure 9: Trends in number of fledglings of Osprey by SRMS region during 2009-2018.



14. Argyll West and Islands trend: Not significant (caveats: Sample sizes small)

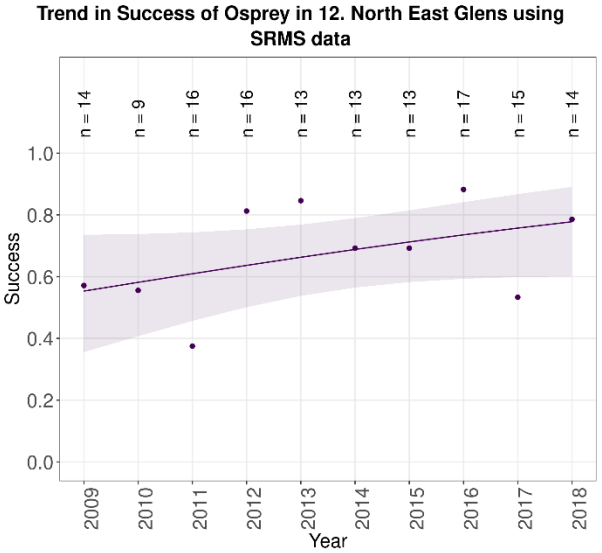


16. Eastern Lowlands trend: Not significant

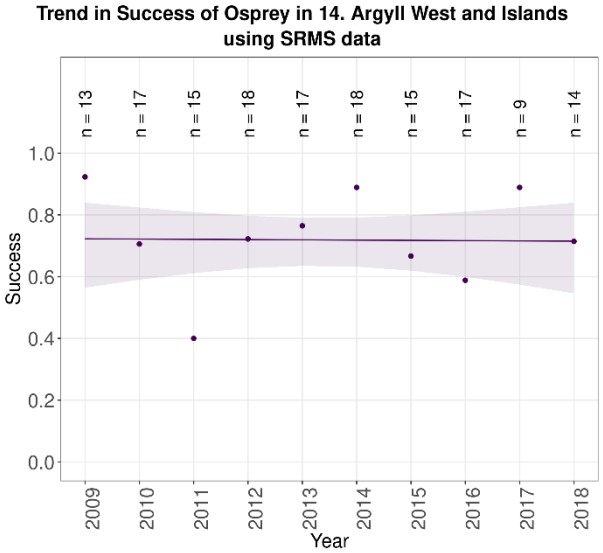


21. Moray Firth trend: Increase

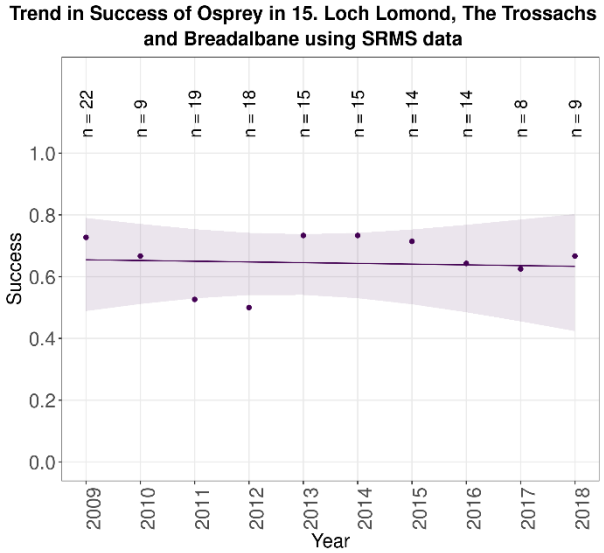
Figure 10: Trends in numbers of breeding pairs of Osprey by NHZ region during 2009-2018.



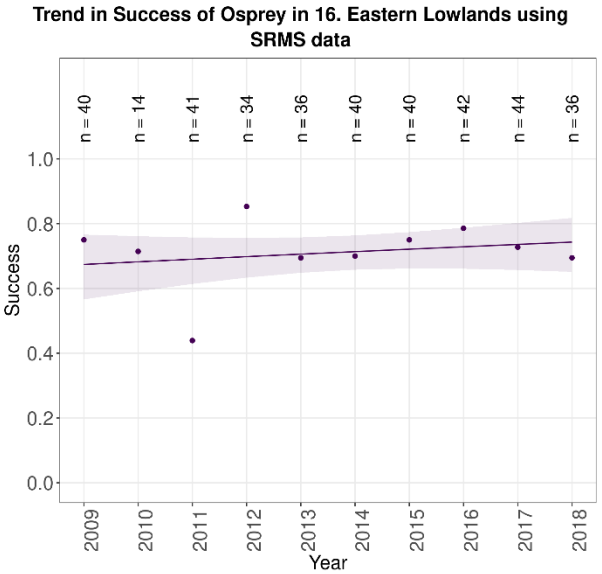
12. North East Glens trend: Not significant (caveats: Sample sizes small)



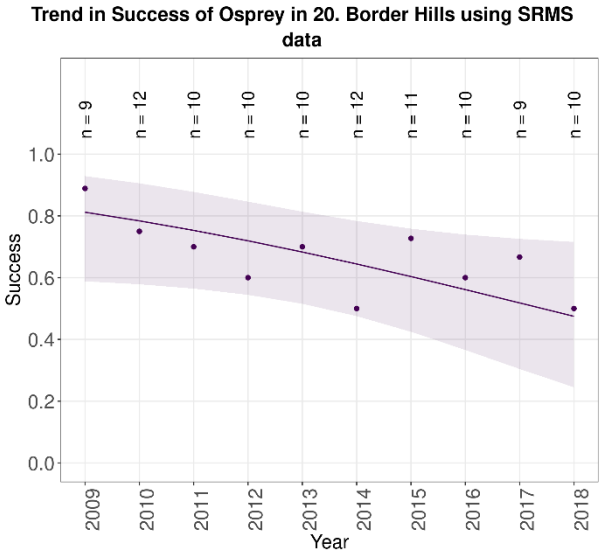
14. Argyll West and Islands trend: Not significant (caveats: Sample sizes small)



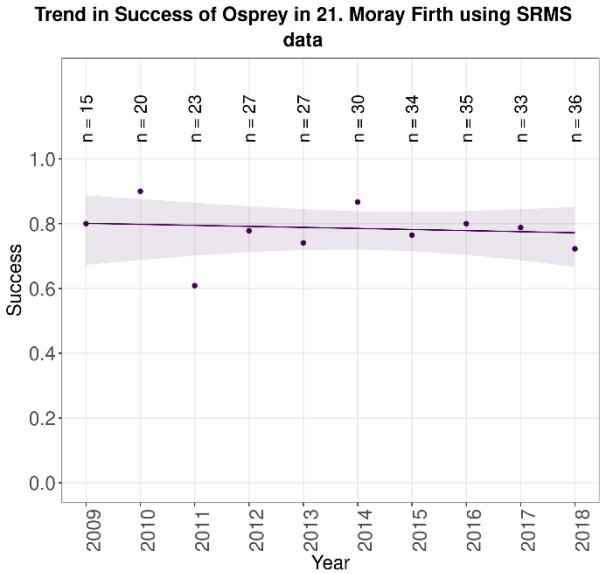
15. Loch Lomond, The Trossachs and Breadalbane trend: Not significant (caveats: Sample sizes small)



16. Eastern Lowlands trend: Not significant



20. Border Hills trend: Not significant (caveats: Sample sizes small)



21. Moray Firth trend: Not significant

Figure 11: Trends in breeding success of Osprey by NHZ region during 2009-2018.

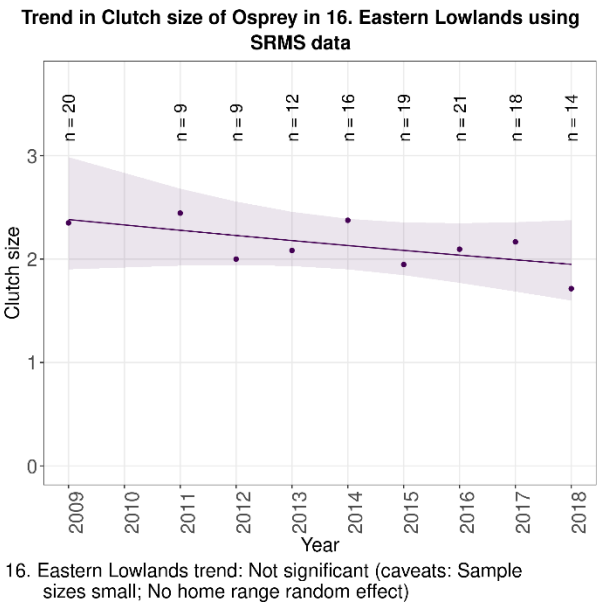


Figure 12: Trends in clutch size of Osprey by NHZ region during 2009-2018.

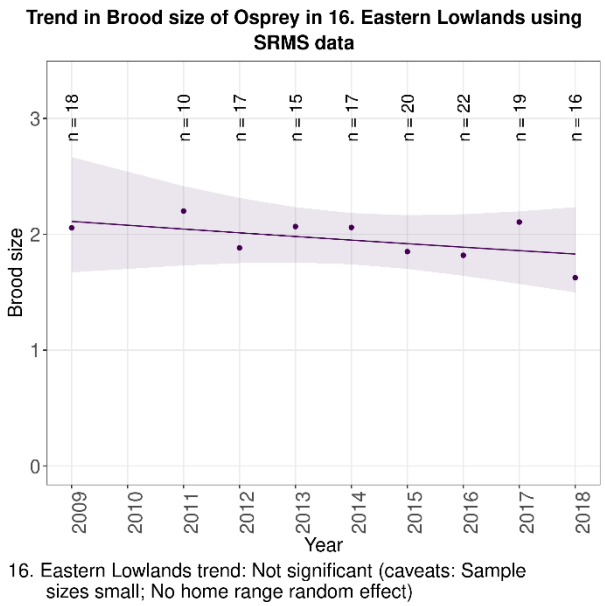
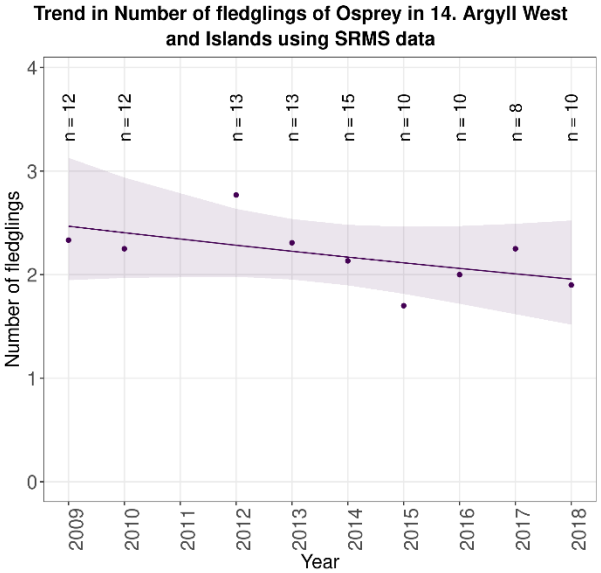
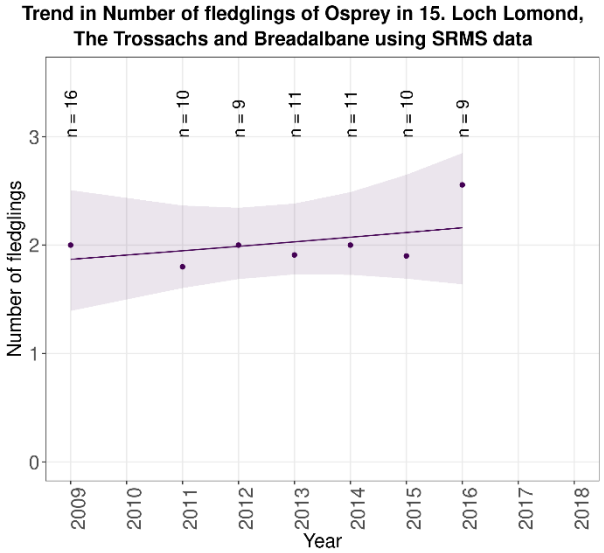


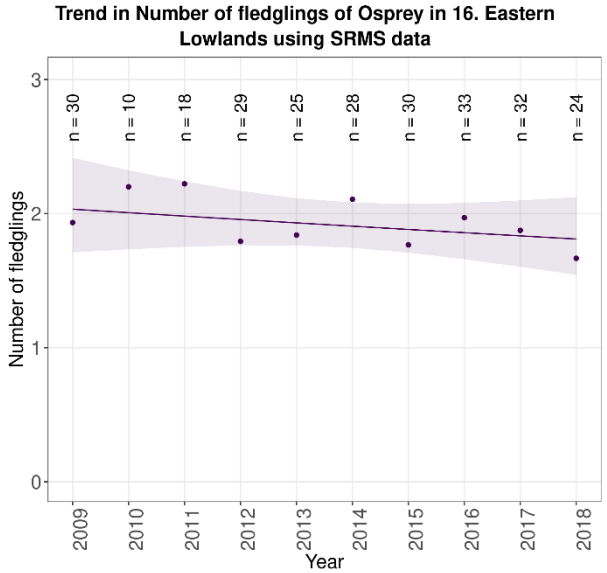
Figure 13: Trends in brood size of Osprey by NHZ region during 2009-2018.



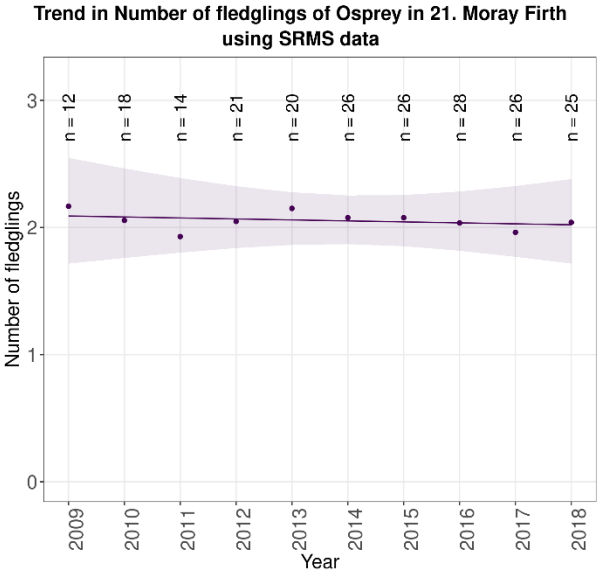
14. Argyll West and Islands trend: Not significant



15. Loch Lomond, The Trossachs and Breadalbane trend: Not significant



16. Eastern Lowlands trend: Not significant



21. Moray Firth trend: Not significant

Figure 14: Trends in number of fledglings of Osprey by NHZ region during 2009-2018.

Table 4: Details of SRMS Regional trends for Osprey.

Parameter	Region	First year of trend	Last year of trend	Number of years	Mean number of home ranges across years	Mean parameter value (and 95% confidence limits)	Trend during the period	Caveats	Estimated % annual change (and 95% confidence limits)
Pairs	Argyll	2009	2018	10	11.3	7.2 (6.5 to 7.9)	Not significant	Sample sizes small	-3.5 (-11.0 to 4.6)
	Central	2009	2018	10	24.3	17.3 (16.4 to 18.2)	Not significant		1.0 (-4.2 to 6.3)
	Highland	2009	2018	10	35.1	25.8 (22.8 to 28.8)	Increase		4.9 (0.5 to 9.5)
	North East Scotland	2009	2018	10	5.7	4.2 (3.7 to 4.7)	Not significant	Sample sizes small	-3.7 (-13.3 to 7.0)
	Tayside & Fife	2009	2018	9	9.4	5.3 (4.5 to 6.2)	Not significant	Sample sizes small	0.6 (-9.2 to 11.5)
Success	Argyll	2009	2018	10	16.3	0.7 (0.6 to 0.8)	Not significant	Sample sizes small	0.2 (-2.7 to 3.0)
	Central	2009	2018	10	25.2	0.7 (0.6 to 0.7)	Not significant		2.1 (-0.2 to 4.4)
	Highland	2009	2018	10	55.6	0.8 (0.8 to 0.8)	Not significant		-0.5 (-1.7 to 0.6)
	Lothian & Borders	2009	2018	10	10.0	0.7 (0.6 to 0.8)	Decrease	Sample sizes small	-1.7 (-3.3 to -0.4)
	North East Scotland	2009	2018	10	22.8	0.7 (0.6 to 0.7)	Not significant		-0.4 (-2.9 to 1.9)
	Tayside & Fife	2009	2018	9	40.4	0.7 (0.7 to 0.8)	Not significant		1.5 (-0.5 to 3.4)
Clutch size	Scotland	2009	2018	10	43.2	2.4 (2.4 to 2.5)	Not significant		-0.7 (-2.9 to 1.5)
	Tayside & Fife	2009	2018	9	20.8	2.1 (2.0 to 2.2)	Not significant		-0.5 (-4.0 to 3.0)
Brood size	Scotland	2009	2018	10	51.1	2.2 (2.1 to 2.2)	Not significant		-0.2 (-2.5 to 2.0)
	Tayside & Fife	2009	2018	9	22.4	1.9 (1.8 to 2.0)	Not significant		0.3 (-3.2 to 3.9)
Number of fledglings	Scotland	2009	2018	10	124.2	2.0 (2.0 to 2.1)	Not significant		-0.8 (-2.2 to 0.6)
	Argyll	2009	2018	9	11.8	2.2 (2.1 to 2.4)	Not significant		-2.7 (-7.1 to 1.8)
	Central	2009	2018	10	17.2	2.0 (1.9 to 2.1)	Not significant		-1.3 (-4.8 to 2.4)
	Highland	2009	2018	10	43.8	2.1 (2.0 to 2.1)	Not significant		-0.3 (-2.6 to 2.1)
	North East Scotland	2009	2018	8	15.6	2.1 (1.9 to 2.2)	Not significant		-0.5 (-5.1 to 4.3)
	Tayside & Fife	2009	2018	9	28.4	1.9 (1.8 to 2.0)	Not significant		0.7 (-2.5 to 4.1)

Table 5: Details of NHZ Regional trends for Osprey.

Parameter	Region	First year of trend	Last year of trend	Number of years	Mean number of home ranges across years	Mean parameter value (and 95% confidence limits)	Trend during the period	Caveats	Estimated % annual change (and 95% confidence limits)
Pairs	14. Argyll West and Islands	2009	2018	10	11.3	7.2 (6.5 to 7.9)	Not significant	Sample sizes small	-3.5 (-11.0 to 4.6)
	16. Eastern Lowlands	2009	2018	10	24.2	15.6 (14.1 to 17.1)	Not significant		2.2 (-3.2 to 7.9)
	21. Moray Firth	2009	2018	10	29.8	22.2 (19.5 to 24.9)	Increase		5.1 (0.4 to 10.1)
Success	Scotland	2009	2018	10	176.7	0.7 (0.7 to 0.7)	Non-linear		Non-linear
	12. North East Glens	2009	2018	10	14	0.7 (0.6 to 0.8)	Not significant	Sample sizes small	2.9 (-0.7 to 6.4)
	14. Argyll West and Islands	2009	2018	10	15.3	0.7 (0.6 to 0.8)	Not significant	Sample sizes small	-0.1 (-2.9 to 2.5)
	15. Loch Lomond, The Trossachs and Breadalbane	2009	2018	10	14.3	0.7 (0.6 to 0.7)	Not significant	Sample sizes small	-0.2 (-3.5 to 2.9)
	16. Eastern Lowlands	2009	2018	10	36.7	0.7 (0.7 to 0.8)	Not significant		0.8 (-1.0 to 2.6)
	20. Border Hills	2009	2018	10	10.3	0.7 (0.6 to 0.7)	Not significant	Sample sizes small	-2.5 (-5.4 to 0.1)
	21. Moray Firth	2009	2018	10	28	0.8 (0.7 to 0.8)	Not significant		-0.3 (-2.1 to 1.4)
Clutch size	Scotland	2009	2018	10	43.2	2.4 (2.4 to 2.5)	Not significant		-0.7 (-2.9 to 1.5)
	16. Eastern Lowlands	2009	2018	9	15.33333	2.1 (2.0 to 2.3)	Not significant	Sample sizes small; No home range random effect	-2.2 (-6.0 to 1.7)
Brood size	Scotland	2009	2018	10	51.1	2.2 (2.1 to 2.2)	Not significant		-0.2 (-2.5 to 2.0)
	16. Eastern Lowlands	2009	2018	9	17.11111	1.9 (1.8 to 2.1)	Not significant	Sample sizes small; No home range random effect	-1.6 (-5.5 to 2.5)
Number of fledglings	Scotland	2009	2018	10	124.2	2.0 (2.0 to 2.1)	Not significant		-0.8 (-2.2 to 0.6)

Parameter	Region	First year of trend	Last year of trend	Number of years	Mean number of home ranges across years	Mean parameter value (and 95% confidence limits)	Trend during the period	Caveats	Estimated % annual change (and 95% confidence limits)
Number of fledglings	14. Argyll West and Islands	2009	2018	9	11.44444	2.2 (2.1 to 2.4)	Not significant		-2.5 (-7.0 to 2.1)
	15. Loch Lomond, The Trossachs and Breadalbane	2009	2016	7	10.85714	2.0 (1.8 to 2.2)	Not significant		2.1 (-4.6 to 9.2)
	16. Eastern Lowlands	2009	2018	10	25.9	1.9 (1.8 to 2.0)	Not significant		-1.3 (-4.3 to 1.9)
	21. Moray Firth	2009	2018	10	21.6	2.1 (2.0 to 2.1)	Not significant		-0.4 (-3.7 to 3.1)

Table 6: Number of Osprey home range checks for occupancy reported to the SRMS during 2009-2018, in each of the 12 SRMS Regions, with approximate proportion of estimated population monitored. At the bottom of the table, row A is the mean number of home range checks over the most recent five years. Row B gives the estimated proportion of the national population in each region, based on Bird Atlas Timed Tetrad Visit (TTV) data. The depth of red shading indicates the relative importance of each region for this species. If survey effort was spread evenly across the whole population, the ratio of A:B would not vary much between regions.

Year	ARGYLL	CENTRAL SCOTLAND	DUMFRIES & GALLOWAY	HIGHLAND	LEWIS & HARRIS	LOTHIAN & BORDERS	NORTH EAST SCOTLAND	ORKNEY	SHETLAND	SOUTH STRATHCLYDE	TAYSIDE & FIFE	UIST	Total
2009	20	28	7	64		10	39			1	55		224
2010	24	29	10	49		12	23			3	1		151
2011	25	33	12	80		11	31			3	65		260
2012	28	35	14	92		14	32			2	67		284
2013	31	38	14	88		14	36			3	65		289
2014	30	41	16	92		15	39			5	69		307
2015	29	43	15	103		15	41			2	74		322
2016	33	48	15	81		15	32			3	83		310
2017	25	45	15	101		15	42			2	81		326
2018	28	43	18	74		15	27			3	62		270
A: Mean home range checks	**29.0**	**44.0**	**15.8**	**90.2**	**Absent**	**15.0**	**36.2**	**Absent**	**Absent**	**3.0**	**73.8**	**Absent**	**307.0**
B: Proportion of estimated Scottish population	6	9	3	41	0	5	10	0	0	0	25	0	100

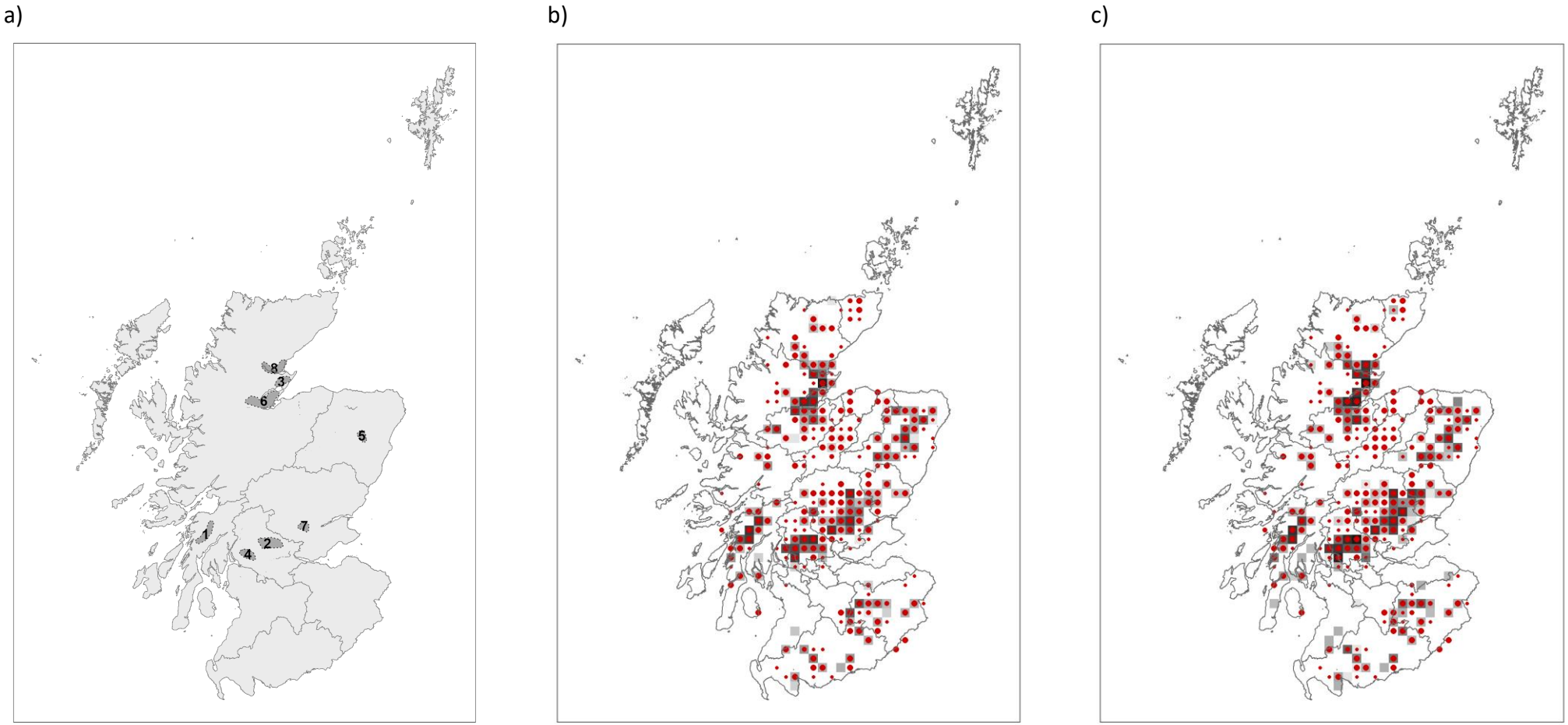


Figure 15: Areas corresponding to the clusters of home ranges from which sufficient data were reported to attempt to derive population trends for Osprey between 2009 and 2018 (a) together with maps showing variation in the number of Osprey records reported to SRMS during 2009-2013 (b) and 2014-2018 (c), in the context of the known Osprey breeding distribution taken from the 2007-2011 Bird Atlas. SRMS data are depicted as grey squares with darker shading indicating more records while Bird Atlas data are depicted as red dots with the size of dot positively related to probability of breeding.

Golden Eagle

Figure 16: Golden Eagles in Perthshire (Photo: Keith Brockie, Tayside & Fife RSG).

Golden Eagle is monitored widely across Scotland by SRMS data contributors.

Golden Eagle has also been subject to periodic national survey via The Statutory Conservation Agency/RSPB Annual Breeding Bird Scheme (SCARABBS) programme. Population trends are available from four SCARABB*S* surveys: 1982/83 (Dennis *et al.* 1984) 424 pairs; 1992 (Green 1996) 422 pairs; 2003 (Eaton *et al.* 2007) 442 pairs; 2015 (Hayhow *et al.* 2017) 508 pairs. Using direct comparisons of coverage between the four surveys, the breeding population increased by 15% between 1992 and 2015 (and by 20% from 1982-83).

Our latest analysis of SRMS data for the period 2009-2018 produced trends for breeding success, clutch size, brood size and number of fledglings of Golden Eagle at a national level (Table 7, Figure 17). Trends in breeding numbers and productivity were produced for five of the ten SRMS regions (Table 8) and for nine of the 15 NHZ regions for which the SRMS holds Golden Eagle records (Table 9).

Users of the published trends should be aware that while records for trends in breeding numbers come from across most of the Golden Eagle's range, none are currently drawn from Lewis & Harris (one of the most densely populated parts of this species' range) or North East Scotland (which is on the edge of the species range, where particular pressures mean trends may diverge from those in other parts of Scotland) (Figure 24). Records for productivity trends are drawn from across much of the range, though there are none from North East Scotland.

Consultation with data contributors has highlighted the limitations of study area based trends in breeding numbers for expanding populations, (e.g. Golden Eagle in Argyll where new pairs are being found on a regular basis, some as a result of satellite tracking work, others being detected in areas being previously monitored for other species and as part of survey work in relation to proposed or new developments). Trends drawn from intensively monitored areas may not always be representative of the wider landscape, necessitating caution when extrapolating these trends to wider areas (e.g. Increases in Highland have been concentrated in areas that are well monitored, casting doubt on how well trends represent the region).

National trends

A trend in breeding numbers is not available at a national level (Table 7). A trend for breeding success showed no significant change (Table 7, Figure 17). Trends for clutch size, brood size and number of fledglings all showed no significant change (Table 7, Figure 17).

SRMS regional trends

Breeding numbers of Golden Eagle in four regions (Central, Highland, Tayside & Fife and Uist) did not change significantly (Table 8, Figure 18).

Breeding success of Golden Eagle in five regions *(*Argyll, Highland, Lewis & Harris, Tayside & Fife and Uist) did not change significantly (Table 8, Figure 19).

No trends are available for clutch size or brood size (Table 8). Number of fledglings in three regions (Argyll, Highland and Tayside & Fife) did not change significantly (Table 8, Figure 20).

Trends for this species are not yet available for Dumfries & Galloway, Lothian & Borders, North East Scotland or South Strathclyde.

NHZ regional trends

Breeding numbers of Golden Eagle in four regions (NHZs 03-04 and 14-15) did not change significantly (Table 9, Figure 21).

Breeding success of Golden Eagle in nine regions (NHZs 03-04, 06-08, 10-11 and 14-15) did not change significantly (Table 9, Figure 22).

No trends are available for clutch size or brood size (Table 9). The number of fledglings in NHZ 03 did not change significantly (Table 9, Figure 23).

Trends for this species are not yet available for NHZs 05, 12-13, 19 and 19-20.

Details of contributing records

3,722 (316 to 647 per year, mean: 372 records) from 2009-2018 contributed to this trends analysis (Table 12).

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Dennis, R.H., Ellis, P.M., Broad, R.A. & Langslow, D.R. (1984) The status of the Golden Eagle in Britain. Br. Birds, 77, 592-607.

Mark A. Eaton, Ian A. Dillon, Patrick K. Stirling-Aird & D. Philip Whitfield (2007) Status of Golden Eagle *Aquila chrysaetos* in Britain in 2003, Bird Study, 54:2, 212-220, DOI: 10.1080/00063650709461477

R.E. Green (1996) The status of the Golden Eagle in Britain in 1992, Bird Study, 43:1, 20-27, DOI: 10.1080/00063659609460992

Daniel B. Hayhow, Stuart Benn, Andrew Stevenson, Patrick K. Stirling-Aird & Mark A. Eaton (2017) Status of Golden Eagle *Aquila chrysaetos* in Britain in 2015, Bird Study, 64:3, 281-294, DOI: 10.1080/00063657.2017.1366972

Table 7: Summary of SRMS national trends for Golden Eagle during 2009-2018. Non-significant changes are highlighted in grey. '—' indicates where the species occurs but no trend is available.

	Pairs	Success	Clutch size	Brood size	Number of fledglings
Scotland	—	Not significant	Not significant	Not significant	Not significant

Table 8: Summary of SRMS regional trends for Golden Eagle during 2009-2018. Non-significant changes are highlighted in grey. '—' indicates where the species occurs but no trend is available. 'No SRMS data' indicates where the SRMS does not hold any records for the region of interest. 'Absent' indicates where the species is not known to breed.

SRMS Region	Pairs	Success	Clutch size	Brood size	Number of fledglings
Argyll	—	Not significant [v]	—	—	Not significant [s]
Central	Not significant [s]	—	—	—	—
Dumfries & Galloway	—	—	—	—	—
Highland	Not significant	Not significant	—	—	Not significant
Lewis & Harris	—	Not significant	—	—	—
Lothian & Borders	—	—	—	—	—
North East Scotland	—	—	—	—	—
Orkney	Absent	Absent	Absent	Absent	Absent
Shetland	Absent	Absent	Absent	Absent	Absent
South Strathclyde	—	—	—	—	—
Tayside & Fife	Not significant [s]	Not significant	—	—	Not significant [s]
Uist	Not significant [s]	Not significant [sv]	—	—	—

[s] Sample sizes small, [v] Variable effort.

Table 9: Summary of NHZ regional trends for Golden Eagle during 2009-2018. Non-significant changes are highlighted in grey. '—' indicates where the species occurs but no trend is available. 'No SRMS data' indicates where the SRMS does not hold any records for the region of interest. 'Absent' indicates where the species is not known to breed. 'Absent' indicates where the species is not known to breed.

NHZ Region	Pairs	Success	Clutch size	Brood size	Number of fledglings
01. Shetland	Absent	Absent	Absent	Absent	Absent
02. North Caithness and Orkney	Absent	Absent	Absent	Absent	Absent
03. Coll, Tiree and the Western Isles	Not significant	Not significant	—	—	Not significant [rs]
04. North West Seaboard	Not significant [s]	Not significant [sv]	—	—	—
05. The Peatlands of Caithness and Sutherland	—	—	—	—	—
06. Western Seaboard	—	Not significant [rsv]	—	—	—
07. Northern Highlands	—	Not significant [s]	—	—	—
08. Western Highlands	—	Not significant	—	—	—
09. North East Coastal Plain	Absent	Absent	Absent	Absent	Absent
10. Central Highlands	—	Not significant [sv]	—	—	—
11. Cairngorm Massif	—	Not significant [sv]	—	—	—
12. North East Glens	—	—	—	—	—
13. East Lochaber	—	—	—	—	—
14. Argyll West and Islands	Not significant [s]	Not significant	—	—	—
15. Loch Lomond, The Trossachs and Breadalbane	Not significant [s]	Not significant [s]	—	—	—
16. Eastern Lowlands	—	—	—	—	—
17. West Central Belt	Absent	Absent	Absent	Absent	Absent
18. Wigtown Machairs and Outer Solway Coast	Absent	Absent	Absent	Absent	Absent
19. Western Southern Uplands and Inner Solway	—	—	—	—	—
20. Border Hills	—	—	—	—	—
21. Moray Firth	Absent	Absent	Absent	Absent	Absent

[r] No home range random effect, [s] Sample sizes small, [v] Variable effort.

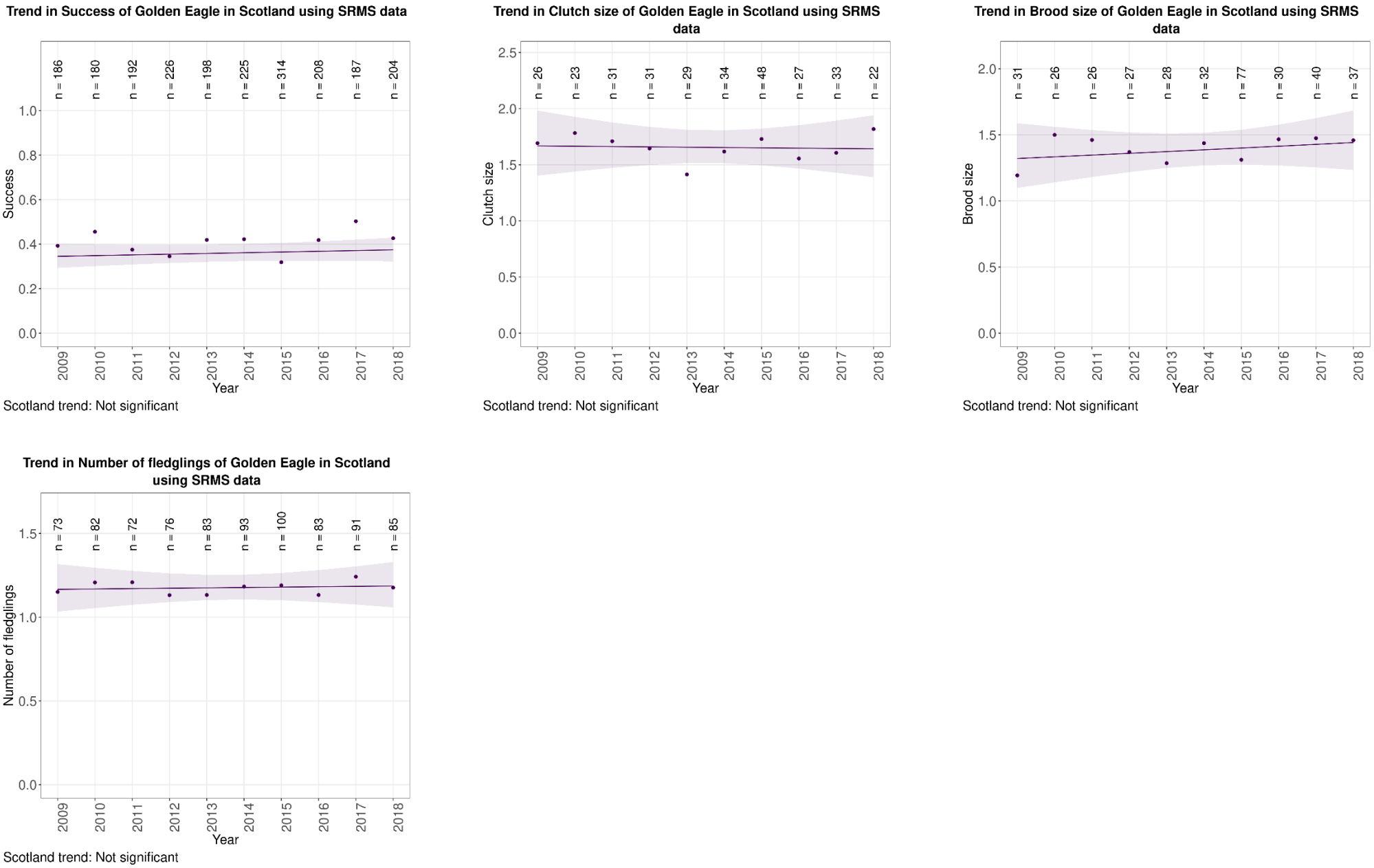
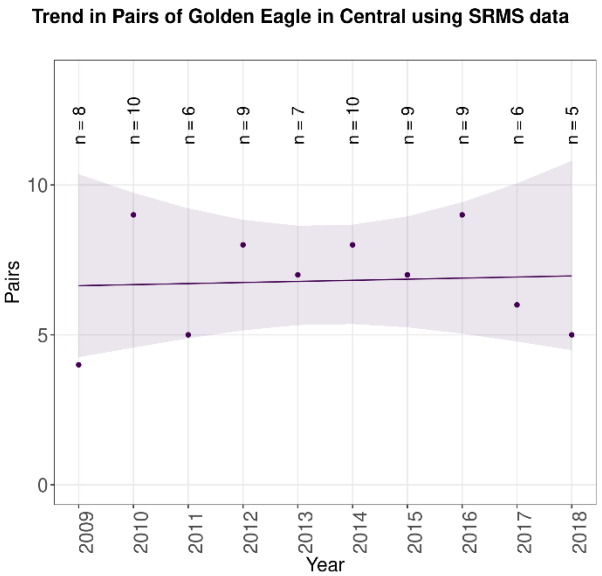
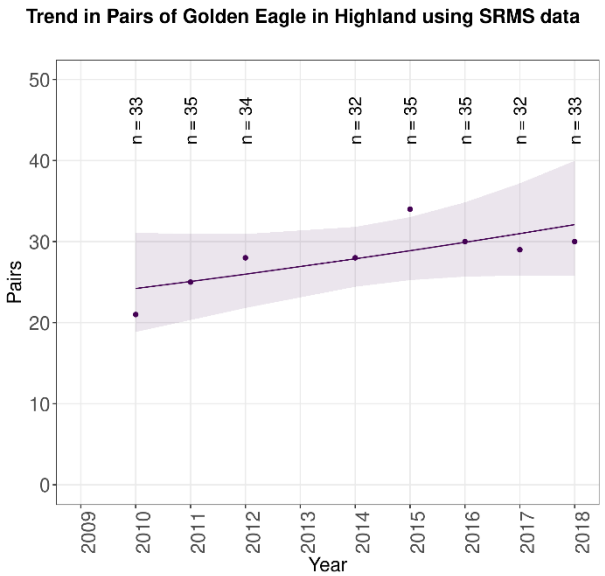
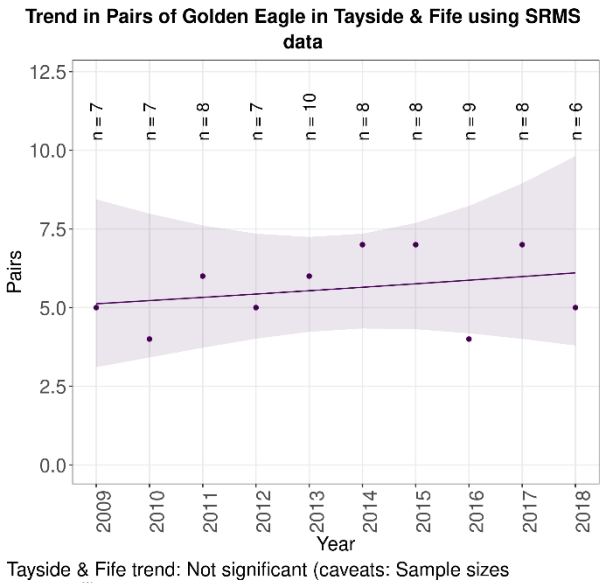


Figure 17: Trends in breeding success, clutch size, brood size and number of fledglings of Golden Eagle in Scotland during 2009-2018.







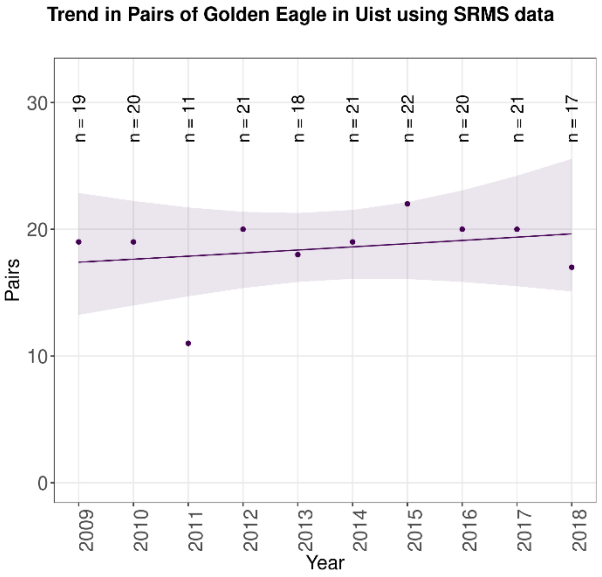
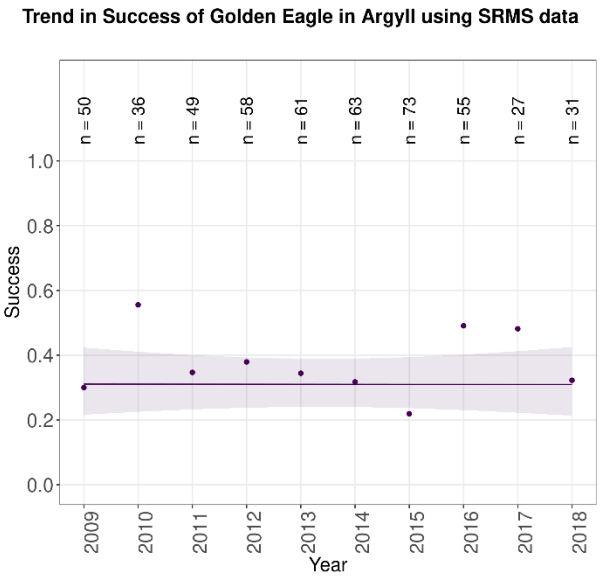
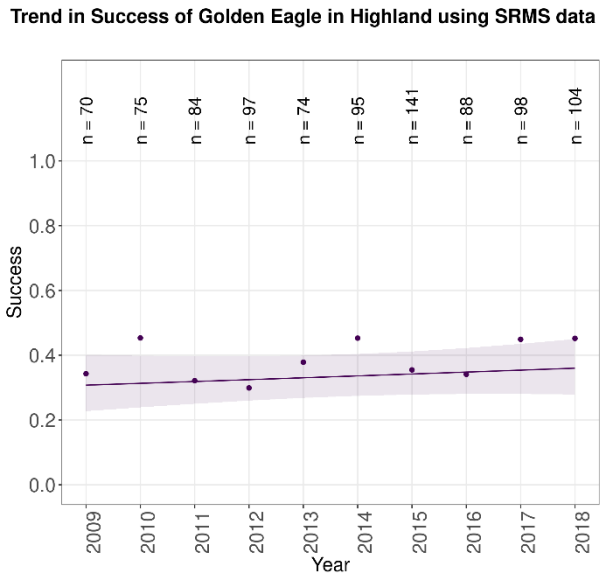


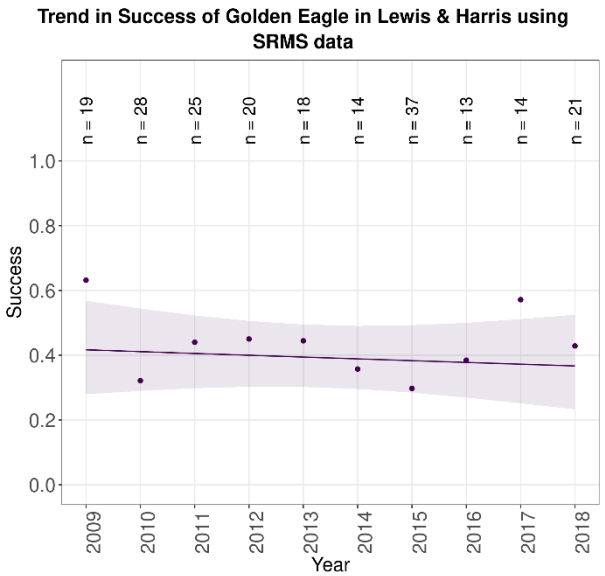
Figure 18: Trends in numbers of breeding pairs of Golden Eagle by SRMS region during 2009-2018.



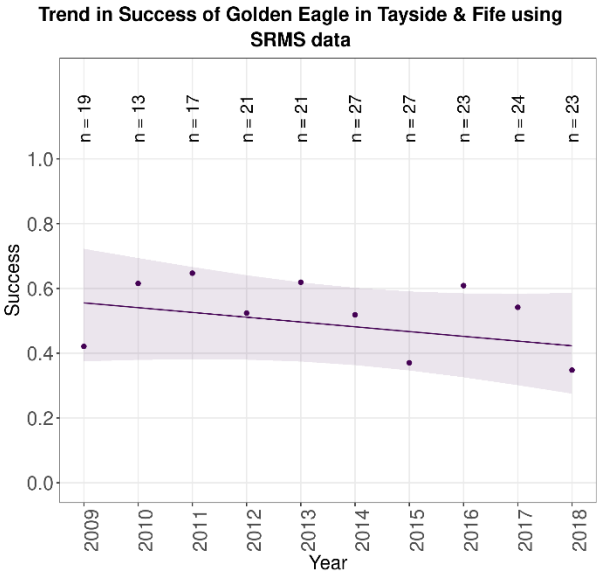
Argyll trend: Not significant (caveats: Variable effort)



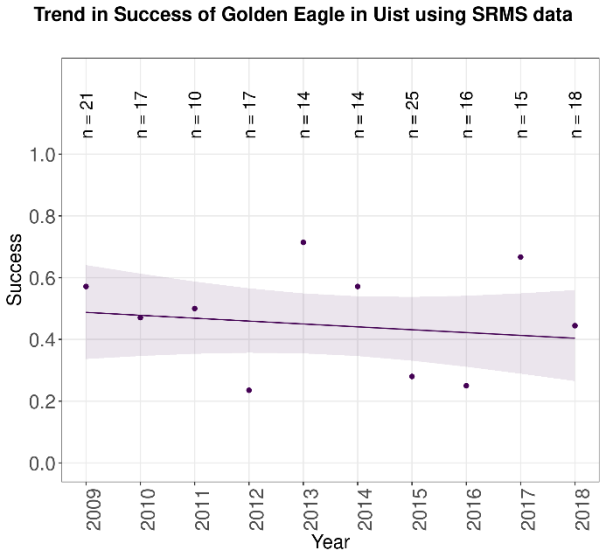
Highland trend: Not significant



Lewis & Harris trend: Not significant

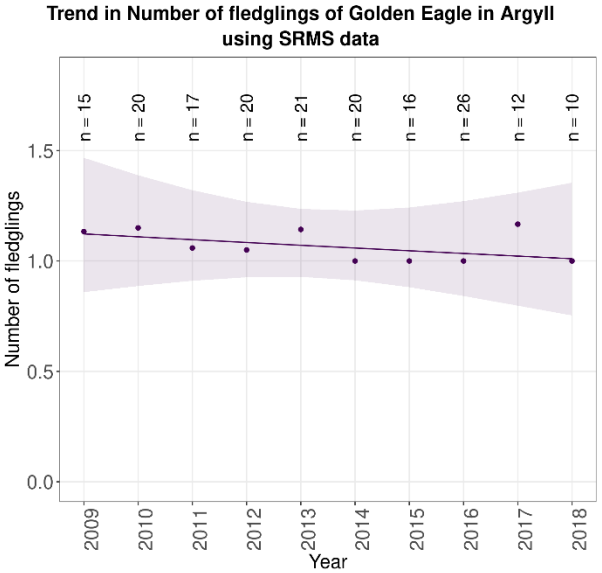


Tayside & Fife trend: Not significant

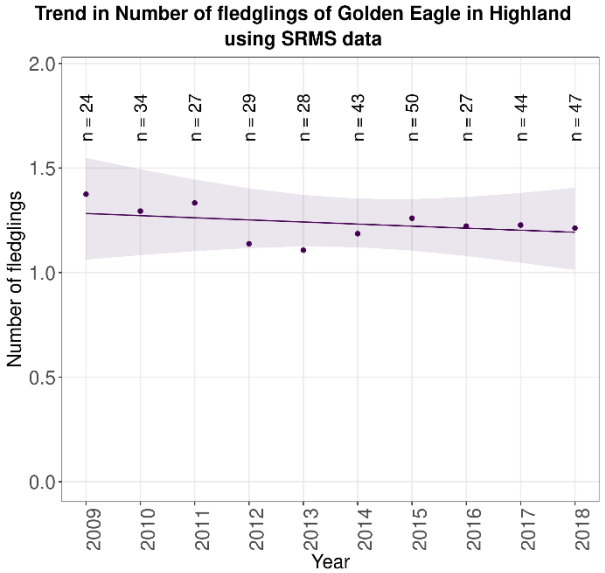


Uist trend: Not significant (caveats: Sample sizes small, Variable effort)

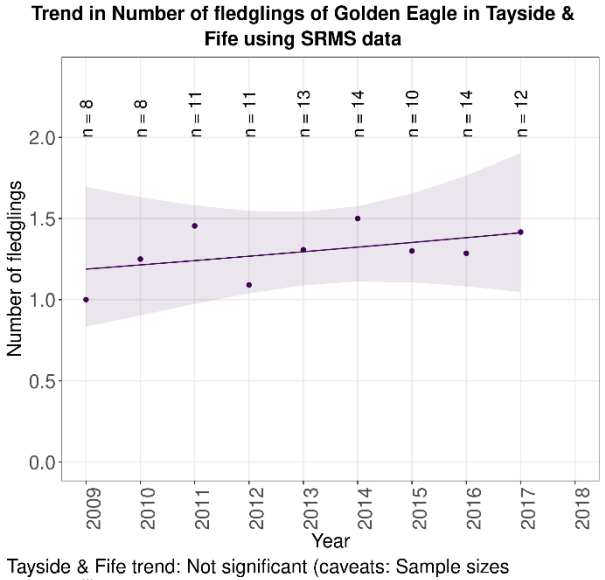
Figure 19: Trends in breeding success of Golden Eagle by SRMS region during 2009-2018.



Argyll trend: Not significant (caveats: Sample sizes small)

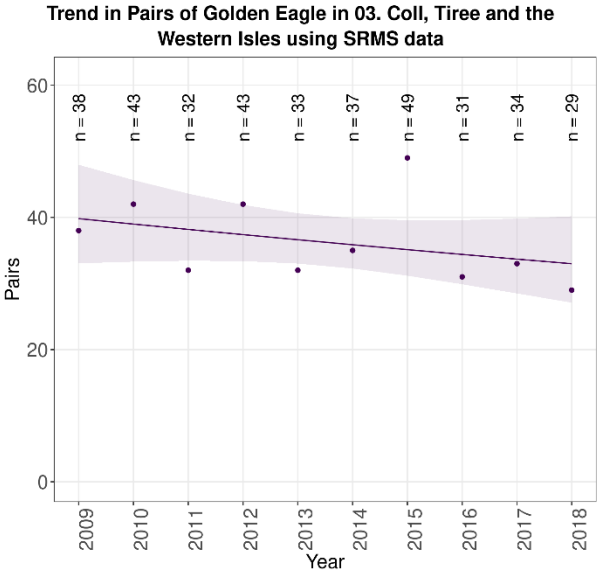


Highland trend: Not significant

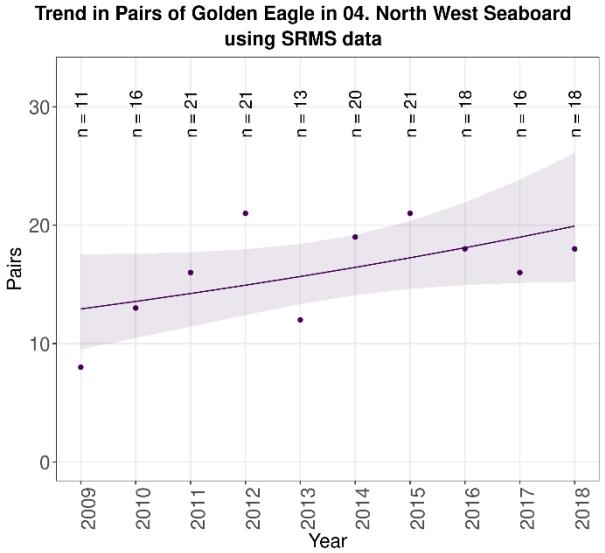


Tayside & Fife trend: Not significant (caveats: Sample sizes small)

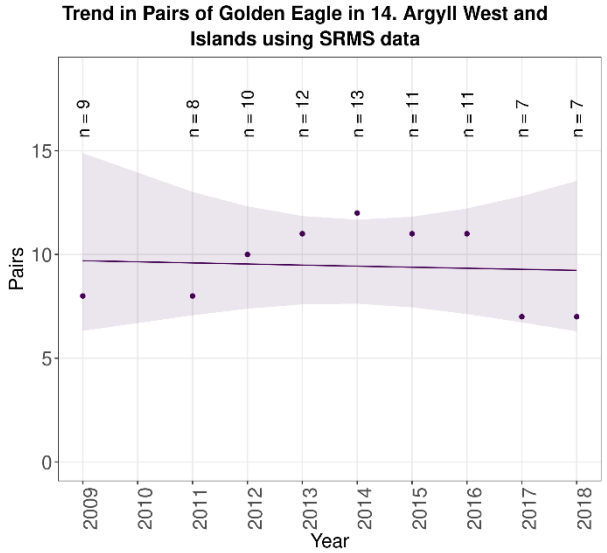
Figure 20: Trends in number of fledglings of Golden Eagle by SRMS region during 2009-2018.



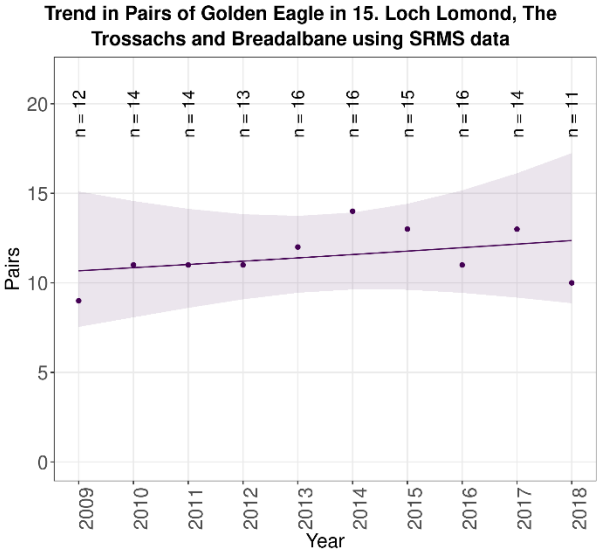
03. Coll, Tiree and the Western Isles trend: Not significant



04. North West Seaboard trend: Not significant (caveats: Sample sizes small)

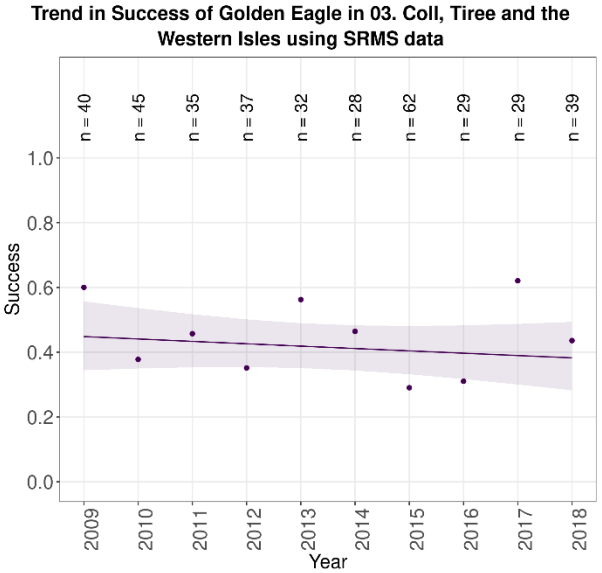


14. Argyll West and Islands trend: Not significant (caveats: Sample sizes small)

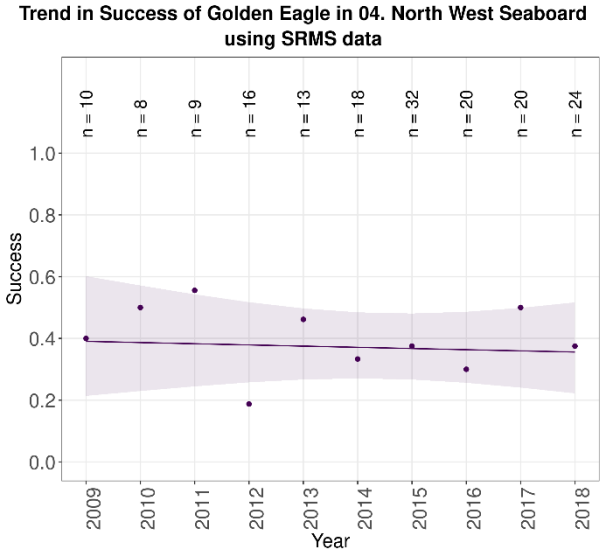


15. Loch Lomond, The Trossachs and Breadalbane trend: Not significant (caveats: Sample sizes small)

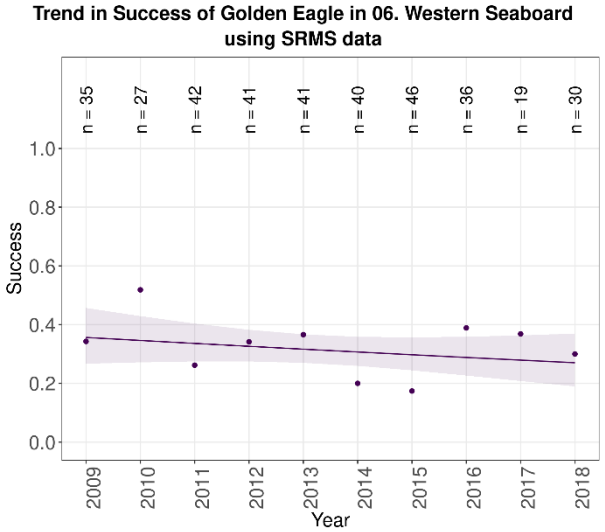
Figure 21: Trends in breeding pairs of Golden Eagle by NHZ region during 2009-2018.



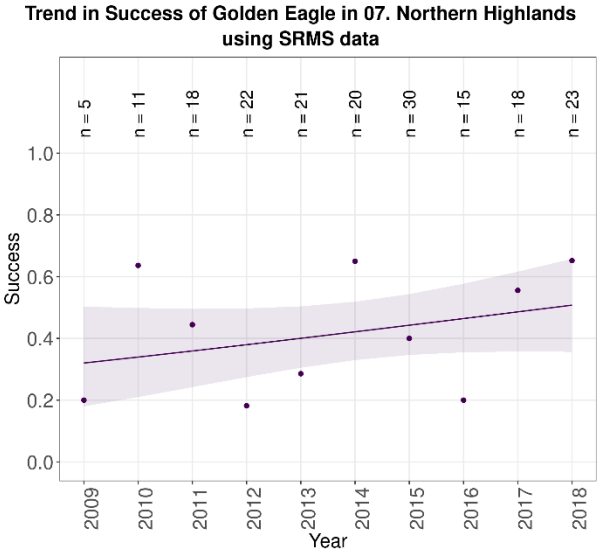
03. Coll, Tiree and the Western Isles trend: Not significant



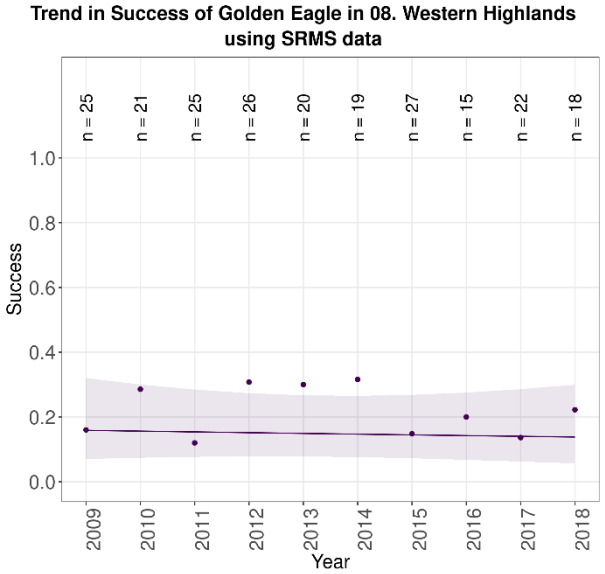
04. North West Seaboard trend: Not significant (caveats: Sample sizes small; Variable effort)



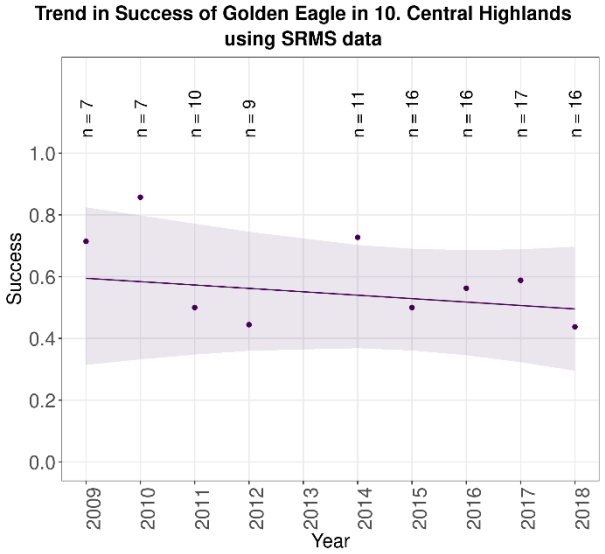
06. Western Seaboard trend: Not significant (caveats: Sample sizes small; Variable effort; No home range random effect)



07. Northern Highlands trend: Not significant (caveats: Sample sizes small)

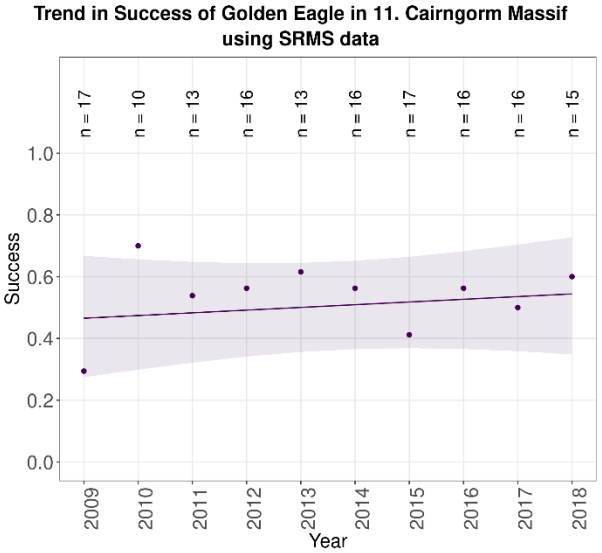


08. Western Highlands trend: Not significant

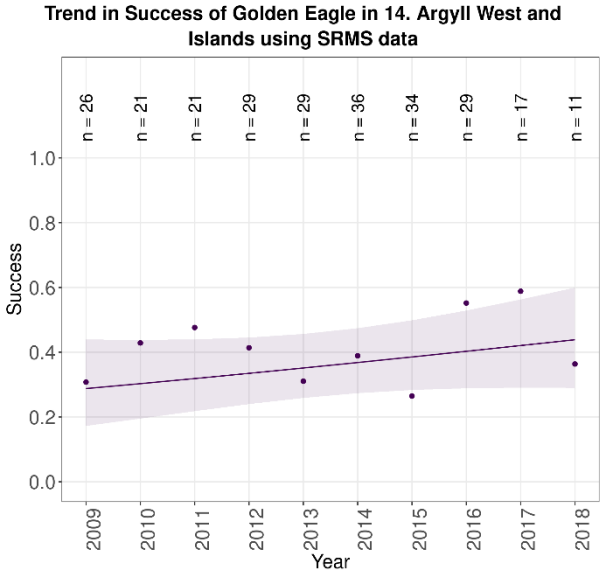


10. Central Highlands trend: Not significant (caveats: Sample sizes small; Variable effort)

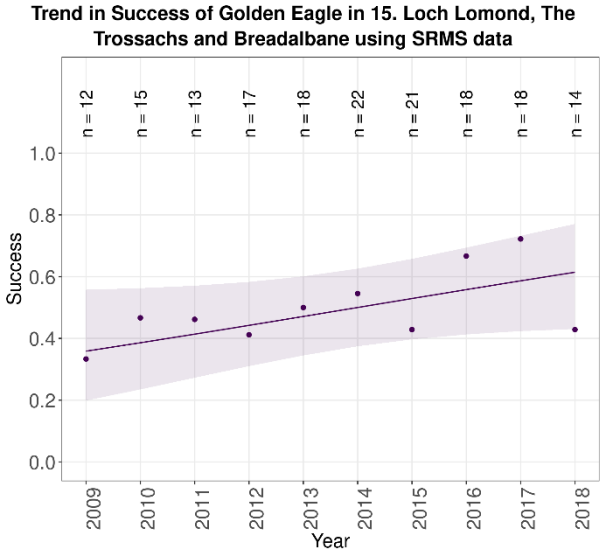
Figure 22: Trends in breeding success of Golden Eagle by NHZ region during 2009-2018.



11. Cairngorm Massif trend: Not significant (caveats: Sample sizes small; Variable effort)



14. Argyll West and Islands trend: Not significant



15. Loch Lomond, The Trossachs and Breadalbane trend: Not significant (caveats: Sample sizes small)

Figure 22 continued: Trends in breeding success of Golden Eagle by NHZ region during 2009-2018.

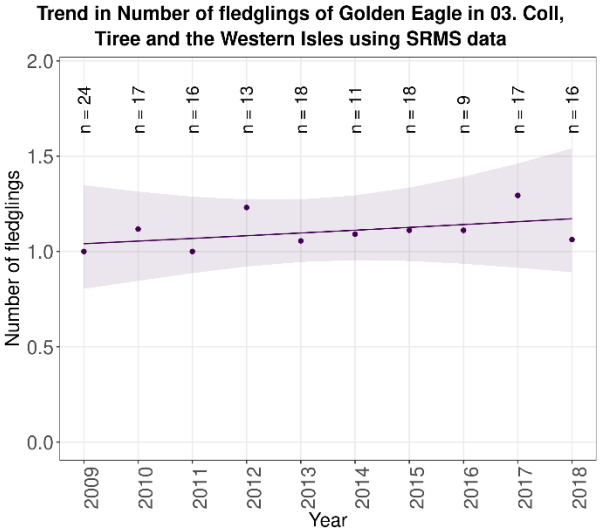


Figure 23: Trends in number of fledglings of Golden Eagle by NHZ region during 2009-2018.

Table 10: Details of SRMS Regional trends for Golden Eagle.

Parameter	Region	First year of trend	Last year of trend	Number of years	Mean number of home ranges across years	Mean parameter value (and 95% confidence limits)	Trend during the period	Caveats	Estimated % annual change (and 95% confidence limits)
Pairs	Central	2009	2018	10	7.9	6.8 (5.5 to 8.1)	Not significant	Sample sizes small	0.5 (-7.4 to 9.2)
	Highland	2010	2018	8	33.6	28.1 (24.9 to 31.3)	Not significant		3.6 (-1.3 to 8.7)
	Tayside & Fife	2009	2018	10	7.8	5.6 (4.8 to 6.4)	Not significant	Sample sizes small	2.0 (-6.9 to 11.7)
	Uist	2009	2018	10	19.0	18.5 (16.4 to 20.6)	Not significant	Sample sizes small	1.4 (-3.6 to 6.6)
Success	Argyll	2009	2018	10	50.3	0.4 (0.3 to 0.4)	Not significant	Variable effort	0.0 (-1.7 to 1.7)
	Highland	2009	2018	10	92.6	0.4 (0.4 to 0.4)	Not significant		0.6 (-0.7 to 1.8)
	Lewis & Harris	2009	2018	10	20.9	0.4 (0.3 to 0.5)	Not significant		-0.6 (-3.1 to 2.0)
	Tayside & Fife	2009	2018	10	21.5	0.5 (0.4 to 0.6)	Not significant		-1.5 (-4.2 to 1.2)
	Uist	2009	2018	10	16.7	0.5 (0.4 to 0.5)	Not significant	Sample sizes small, Variable effort	-0.9 (-3.7 to 1.8)
Clutch size	Scotland	2009	2018	10	30.4	1.7 (1.6 to 1.7)	Not significant		-0.2 (-3.4 to 3.1)
Brood size	Scotland	2009	2018	10	35.4	1.4 (1.3 to 1.4)	Not significant		1.0 (-2.2 to 4.3)
Number of fledglings	Scotland	2009	2018	10	83.8	1.2 (1.1 to 1.2)	Not significant		0.2 (-2.0 to 2.4)
	Argyll	2009	2018	10	17.7	1.1 (1.0 to 1.1)	Not significant	Sample sizes small	-1.2 (-6.3 to 4.3)
	Highland	2009	2018	10	35.3	1.2 (1.2 to 1.3)	Not significant		-0.8 (-4.0 to 2.5)
	Tayside & Fife	2009	2017	9	11.2	1.3 (1.2 to 1.4)	Not significant	Sample sizes small	2.2 (-4.7 to 9.5)

Table 11: Details of NHZ Regional trends for Golden Eagle.

Parameter	Region	First year of trend	Last year of trend	Number of years	Mean number of home ranges across years	Mean parameter value (and 95% confidence limits)	Trend during the period	Caveats	Estimated % annual change (and 95% confidence limits)
Pairs	03. Coll, Tiree and the Western Isles	2009	2018	10	36.9	36.3 (31.8 to 40.8)	Not significant		-2.1 (-5.5 to 1.5)
	04. North West Seaboard	2009	2018	10	17.5	16.2 (13.2 to 19.2)	Not significant	Sample sizes small	4.9 (-0.6 to 10.7)
	14. Argyll West and Islands	2009	2018	9	9.777778	9.4 (8.0 to 10.9)	Not significant	Sample sizes small	-0.5 (-7.9 to 7.4)
	15. Loch Lomond, The Trossachs and Breadalbane	2009	2018	10	14.1	11.5 (10.4 to 12.6)	Not significant	Sample sizes small	1.6 (-4.6 to 8.3)
Success	Scotland	2009	2018	10	212	0.4 (0.4 to 0.4)	Not significant		0.3 (-0.5 to 1.1)
	03. Coll, Tiree and the Western Isles	2009	2018	10	37.6	0.4 (0.4 to 0.5)	Not significant		-0.7 (-2.6 to 1.1)
	04. North West Seaboard	2009	2018	10	17	0.4 (0.3 to 0.5)	Not significant	Sample sizes small; Variable effort	-0.4 (-3.5 to 2.8)
	06. Western Seaboard	2009	2018	10	35.7	0.3 (0.3 to 0.4)	Not significant	Sample sizes small; Variable effort; No home range random effect	-1.0 (-2.9 to 0.9)
	07. Northern Highlands	2009	2018	10	18.3	0.4 (0.4 to 0.5)	Not significant	Sample sizes small	1.9 (-0.8 to 4.7)
	08. Western Highlands	2009	2018	10	21.8	0.2 (0.2 to 0.3)	Not significant		-0.2 (-2.0 to 1.6)
	10. Central Highlands	2009	2018	9	12.11111	0.6 (0.5 to 0.7)	Not significant	Sample sizes small; Variable effort	-1.1 (-5.0 to 2.7)
	11. Cairngorm Massif	2009	2018	10	14.9	0.5 (0.4 to 0.6)	Not significant	Sample sizes small; Variable effort	0.9 (-2.3 to 4.0)

Parameter	Region	First year of trend	Last year of trend	Number of years	Mean number of home ranges across years	Mean parameter value (and 95% confidence limits)	Trend during the period	Caveats	Estimated % annual change (and 95% confidence limits)
Success	14. Argyll West and Islands	2009	2018	10	25.3	0.4 (0.3 to 0.5)	Not significant		1.5 (-0.7 to 3.8)
	15. Loch Lomond, The Trossachs and Breadalbane	2009	2018	10	16.8	0.5 (0.4 to 0.6)	Not significant	Sample sizes small	2.6 (-0.3 to 5.7)
Clutch size	Scotland	2009	2018	10	30.4	1.7 (1.6 to 1.7)	Not significant		-0.2 (-3.4 to 3.1)
Brood size	Scotland	2009	2018	10	35.4	1.4 (1.3 to 1.4)	Not significant		1.0 (-2.2 to 4.3)
Number of fledglings	Scotland	2009	2018	10	83.8	1.2 (1.1 to 1.2)	Not significant		0.2 (-2.0 to 2.4)
	03. Coll, Tiree and the Western Isles	2009	2018	10	15.9	1.1 (1.1 to 1.1)	Not significant	Sample sizes small; No home range random effect	1.3 (-3.5 to 6.4)

Table 12: Number of Golden Eagle home range checks for occupancy reported to the SRMS during 2009-2018, in each of the 12 SRMS Regions, with approximate proportion of estimated population monitored. At the bottom of the table, row A is the mean number of home range checks over the most recent five years. Row B gives the estimated proportion of the national population in each region, based on Bird Atlas Timed Tetrad Visit (TTV) data. The depth of red shading indicates the relative importance of each region for this species. If survey effort was spread evenly across the whole population, the ratio of A:B would not vary much between regions.

Year	ARGYLL	CENTRAL SCOTLAND	DUMFRIES & GALLOWAY	HIGHLAND	LEWIS & HARRIS	LOTHIAN & BORDERS	NORTH EAST SCOTLAND	ORKNEY	SHETLAND	SOUTH STRATHCLYDE	TAYSIDE & FIFE	UIST	Total
2009	67	9	2	148	21	3	20			3	34	22	329
2010	45	10	2	172	38	3	0			0	24	23	317
2011	61	5	2	174	32	3	0			0	31	14	322
2012	66	12	2	173	28	3	17			0	27	22	350
2013	76	9	2	170	24	3	1			0	33	18	336
2014	77	11	1	189	21	3	2			1	34	22	361
2015	105	12	6	327	73	3	37			7	49	28	647
2016	71	11	2	202	31	1	26			2	46	26	418
2017	54	8	2	171	29	3	0			0	36	23	326
2018	51	7	2	168	32	3	1			0	33	19	316
A: Mean home range checks	**71.6**	**9.8**	**2.6**	**211.4**	**37.2**	**2.6**	**13.2**	**Absent**	**Absent**	**2.0**	**39.6**	**23.6**	**413.6**
B: Proportion of estimated Scottish population	18	1	1	49	14	0	4	0	0	0	7	6	100

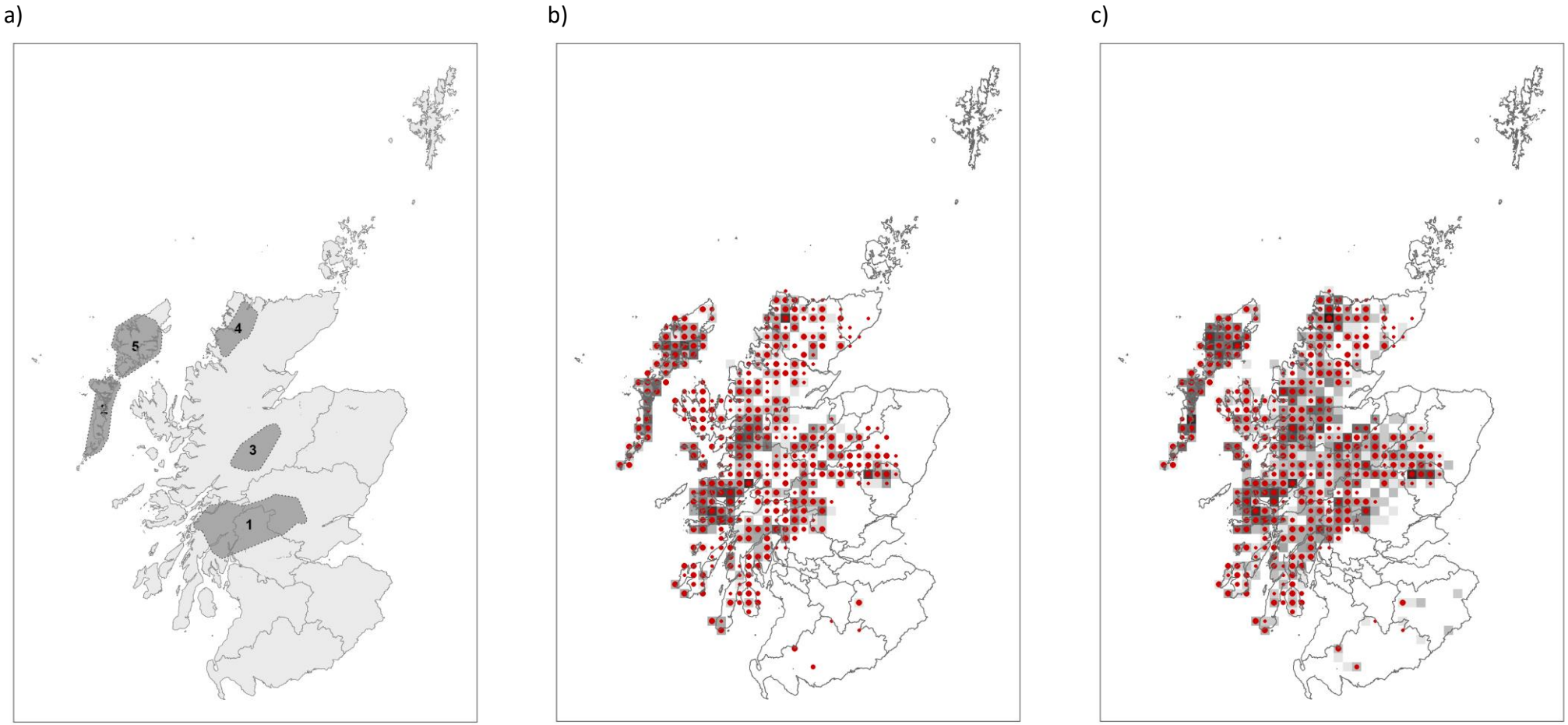


Figure 24: Areas corresponding to the clusters of home ranges from which sufficient data were reported to attempt to derive population trends for Golden Eagle between 2009 and 2018 (a) together with maps showing variation in the number of Golden Eagle records reported to SRMS during 2009-2013 (b) and 2014-2018 (c), in the context of the known Golden Eagle breeding distribution taken from the 2007-2011 Bird Atlas. SRMS data are depicted as grey squares with darker shading indicating more records while Bird Atlas data are depicted as red dots with the size of dot positively related to probability of breeding.

Sparrowhawk

Figure 25: Sparrowhawk (Photo: Ian Todd).

The Scottish Sparrowhawk population is poorly represented by existing SRMS data.

Our latest analysis of SRMS Sparrowhawk data for the period 2009-2018 has produced no national trends in breeding number or productivity at a national level or for any SRMS regions, but has produced a single breeding success trend for one of the 17 NHZ regions for which the SRMS holds records for Sparrowhawk (Table 13, Figure 26).

Users of the published trends should be aware that few records were available for production of trends in breeding numbers. These are drawn from between 20 to 40 monitored pairs per year, mostly from sites in Central Scotland. There are very few records representing areas in the north or south of Scotland. The coverage of different regions, as well as the balance of rural versus urban records, varies between years.

National trends

No trends in breeding numbers or breeding productivity are available for Sparrowhawk at a national level.

SRMS regional trends

Trends in breeding numbers or productivity of Sparrowhawk are not available for any of the 12 SRMS regions for which the SRMS holds records for Sparrowhawk.

NHZ regional trends

Breeding success in NHZ 16 did not change significantly (Table 13, Figure 26).

No trends for Sparrowhawk are available for the number of breeding pairs, clutch size, brood size or number of fledglings (Table 13).

Trends for this species are not yet available for NHZs 01-03, 05-07, 10-12, 14-15 and 17-21.

Details of contributing records

1,385 (87 to 173 per year, mean: 139 records) from 2009-2018 contributed to this trends analysis (Table 15).

Table 13: Summary of NHZ regional trends for Sparrowhawk during 2009-2018. Non-significant changes are highlighted in grey. '—' indicates where the species occurs but no trend is available. 'No SRMS data' indicates where the SRMS does not hold any records for the region of interest. 'Absent' indicates where the species is not known to breed.

NHZ Region	Pairs	Success	Clutch size	Brood size	Number of fledglings
01. Shetland	—	—	—	—	—
02. North Caithness and Orkney	—	—	—	—	—
03. Coll, Tiree and the Western Isles	—	—	—	—	—
04. North West Seaboard	No SRMS data	No SRMS data	No SRMS data	No SRMS data	No SRMS data
05. The Peatlands of Caithness and Sutherland	—	—	—	—	—
06. Western Seaboard	—	—	—	—	—
07. Northern Highlands	—	—	—	—	—
08. Western Highlands	No SRMS data	No SRMS data	No SRMS data	No SRMS data	No SRMS data
09. North East Coastal Plain	No SRMS data	No SRMS data	No SRMS data	No SRMS data	No SRMS data
10. Central Highlands	—	—	—	—	—
11. Cairngorm Massif	—	—	—	—	—
12. North East Glens	—	—	—	—	—
13. East Lochaber	No SRMS data	No SRMS data	No SRMS data	No SRMS data	No SRMS data
14. Argyll West and Islands	—	—	—	—	—
15. Loch Lomond, The Trossachs and Breadalbane	—	—	—	—	—
16. Eastern Lowlands	—	Not significant [sv]	—	—	—
17. West Central Belt	—	—	—	—	—
18. Wigtown Machairs and Outer Solway Coast	—	—	—	—	—
19. Western Southern Uplands and Inner Solway	—	—	—	—	—
20. Border Hills	—	—	—	—	—
21. Moray Firth	—	—	—	—	—

[s] Sample sizes small, [v] Variable effort.

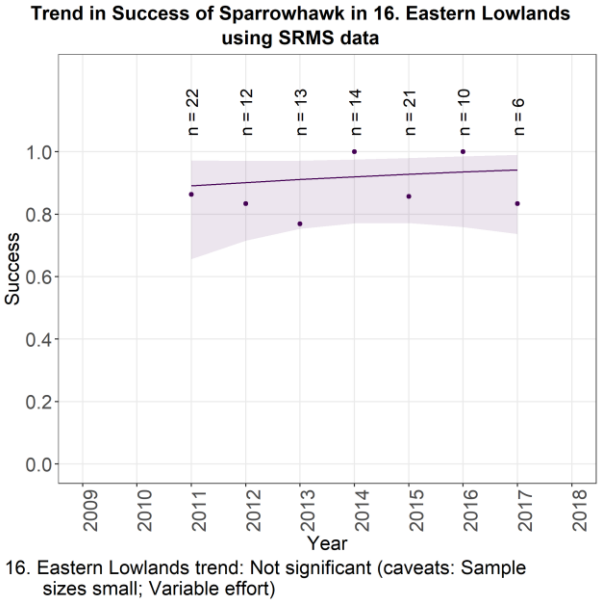


Figure 26: Trends in breeding success of Sparrowhawk by NHZ region during 2009-2018**.**

Table 14: Details of NHZ Regional trends for Sparrowhawk.

Parameter	Region	First year of trend	Last year of trend	Number of years	Mean number of home ranges across years	Mean parameter value (and 95% confidence limits)	Trend during the period	Caveats	Estimated % annual change (and 95% confidence limits)
Success	16. Eastern Lowlands	2011	2017	7	14	0.9 (0.8 to 0.9)	Not significant	Sample sizes small; Variable effort	1.2 (-2.7 to 4.1)

Table 15: Number of Sparrowhawk home range checks for occupancy reported to the SRMS during 2009-2018, in each of the 12 SRMS Regions, with approximate proportion of estimated population monitored. At the bottom of the table, row A is the mean number of home range checks over the most recent five years. Row B gives the estimated proportion of the national population in each region, based on Bird Atlas Timed Tetrad Visit (TTV) data. The depth of red shading indicates the relative importance of each region for this species. If survey effort was spread evenly across the whole population, the ratio of A:B would not vary much between regions.

Year	ARGYLL	CENTRAL SCOTLAND	DUMFRIES & GALLOWAY	HIGHLAND	LEWIS & HARRIS	LOTHIAN & BORDERS	NORTH EAST SCOTLAND	ORKNEY	SHETLAND	SOUTH STRATHCLYDE	TAYSIDE & FIFE	UIST	Total
2009	17	9	7	7	0	51	0	16	0	64	2	0	173
2010	14	6	1	6	1	1	0	0	0	55	1	2	87
2011	10	8	0	5	0	48	0	17	0	41	8	0	137
2012	11	29	0	12	0	37	0	20	0	29	0	2	140
2013	15	28	6	6	1	36	1	19	0	0	0	3	115
2014	9	33	6	11	0	34	2	11	0	8	2	7	123
2015	7	40	5	5	0	41	2	26	0	10	15	4	155
2016	10	46	12	2	0	12	3	29	0	10	24	5	153
2017	22	52	2	9	0	12	1	28	0	10	22	5	163
2018	23	37	2	11	0	12	0	29	1	10	12	2	139
A: Mean home range checks	**14.2**	**41.6**	**5.4**	**7.6**	**0.0**	**22.2**	**1.6**	**24.6**	**0.2**	**9.6**	**15.0**	**4.6**	**146.6**
B: Proportion of estimated Scottish population	7	7	15	25	1	10	11	1	0	11	12	0	100

Goshawk

Figure 27: Goshawk Highland in 2021 (Photo: Dave Pierce, Highland RSG).

Goshawk monitoring in Scotland is largely limited to three discreet study areas.

Our latest analysis of SRMS data for the period 2009-2018 showed that while no national trends in breeding number or productivity of Goshawk are available, trends are available for two of the seven (Table 16) SRMS regions and trends in productivity are available for three of the 14 NHZ regions (Table 17) for which the SRMS holds records for Goshawk.

Users of the published trends should be aware that few records were available for production of trends in breeding numbers, all coming from a single area which cannot be relied on to reflect regional or national trends (Figure 33). Records for productivity trends are mostly drawn from the south of Scotland, with no data from North East Scotland, and few records from north of Scottish Borders and Dumfries & Galloway.

National trends

No trends in breeding numbers or breeding productivity are available for Goshawk at a national level.

SRMS regional trends

Breeding numbers did not change significantly in Dumfries & Galloway (Table 16, Figure 28).

Breeding success of Goshawk decreased significantly in Dumfries & Galloway (-1.4%) and did not change significantly in Lothian & Borders (Table 16, Figure 29).

No trends for Goshawk are available for clutch size or brood size (Table 16). Number of fledglings in

Dumfries & Galloway and Lothian & Borders did not change significantly (Table 16, Figure 30).

Trends for this species are not yet available for Argyll, Central, Highland, North East Scotland, South Strathclyde or Tayside & Fife.

NHZ regional trends

Breeding success of Goshawk did not change significantly in two regions (NHZs 16 and 20) and showed non-linear variation in NHZ 19 (Table 17, Figure 31).

No trends are available for Goshawk the number of breeding pairs, clutch size or brood size (Table 17). Numbers of fledglings did not change significantly in three regions (NHZs 16, 19-20) (Table 17, Figure 32).

Trends for this species are not yet available for NHZs 05, 09-15, 17 and 21.

Details of contributing records

1,141 (86 to 139 per year, mean: 114 records) from 2009-2018 contributed to this trends analysis (Table 20).

Table 16: Summary of SRMS regional trends for Goshawk during 2009-2018. Figures in parentheses indicate the annual change, with significant decreases highlighted in blue and non-significant changes highlighted in grey. '—' indicates where the species occurs but no trend is available. 'No SRMS data' indicates where the SRMS does not hold any records for the region of interest. 'Absent' indicates where the species is not known to breed.

SRMS Region	Pairs	Success	Clutch size	Brood size	Number of fledglings
Argyll	Absent	Absent	Absent	Absent	Absent
Central	—	—	—	—	—
Dumfries & Galloway	Not significant [s]	**Decrease (-1.4%)**	—	—	Not significant
Highland	—	—	—	—	—
Lewis & Harris	Absent	Absent	Absent	Absent	Absent
Lothian & Borders	—	Not significant	—	—	Not significant
North East Scotland	—	—	—	—	—
Orkney	Absent	Absent	Absent	Absent	Absent
Shetland	Absent	Absent	Absent	Absent	Absent
South Strathclyde	—	—	—	—	—
Tayside & Fife	—	—	—	—	—
Uist	Absent	Absent	Absent	Absent	Absent

[s] *Sample sizes small.*

Table 17: Summary of NHZ regional trends for Goshawk during 2009-2018. Figures in parentheses indicate the annual change, with significant increases highlighted in green, significant decreases highlighted in blue and non-significant changes highlighted in grey. 'Non-linear' indicates non-linear trends. '—' indicates where the species occurs but no trend is available. 'No SRMS data' indicates where the SRMS does not hold any records for the region of interest. 'Absent' indicates where the species is not known to breed.

NHZ Region	Pairs	Success	Clutch size	Brood size	Number of fledglings
01. Shetland	Absent	Absent	Absent	Absent	Absent
02. North Caithness and Orkney	Absent	Absent	Absent	Absent	Absent
03. Coll, Tiree and the Western Isles	Absent	Absent	Absent	Absent	Absent
04. North West Seaboard	Absent	Absent	Absent	Absent	Absent
05. The Peatlands of Caithness and Sutherland	—	—	—	—	—
06. Western Seaboard	Absent	Absent	Absent	Absent	Absent
07. Northern Highlands	No SRMS data	No SRMS data	No SRMS data	No SRMS data	No SRMS data
08. Western Highlands	Absent	Absent	Absent	Absent	Absent
09. North East Coastal Plain	—	—	—	—	—
10. Central Highlands	—	—	—	—	—
11. Cairngorm Massif	—	—	—	—	—
12. North East Glens	—	—	—	—	—
13. East Lochaber	—	—	—	—	—
14. Argyll West and Islands	—	—	—	—	—
15. Loch Lomond, The Trossachs and Breadalbane	—	—	—	—	—
16. Eastern Lowlands	—	Not significant [sv]	—	—	Not significant [rs]
17. West Central Belt	—	—	—	—	—
18. Wigtown Machairs and Outer Solway Coast	Absent	Absent	Absent	Absent	Absent
19. Western Southern Uplands and Inner Solway	—	Non-linear	—	—	Not significant [rs]
20. Border Hills	—	Not significant [s]	—	—	Not significant [rs]
21. Moray Firth	—	—	—	—	—

[r] No home range random effect, [s] Sample sizes small, [v] Variable effort.

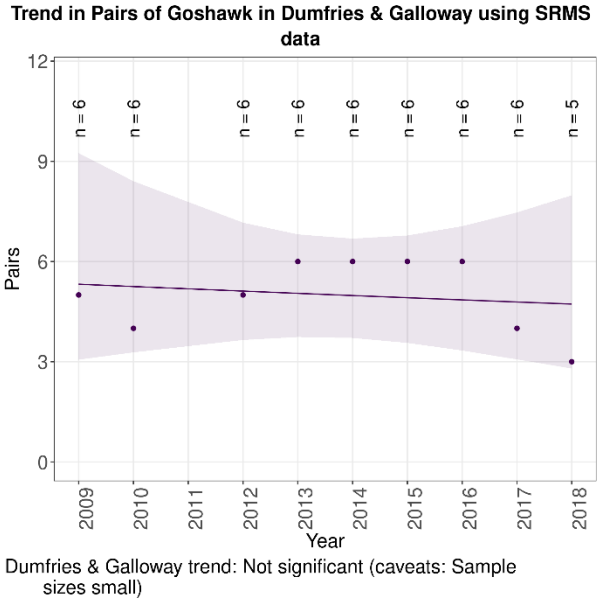
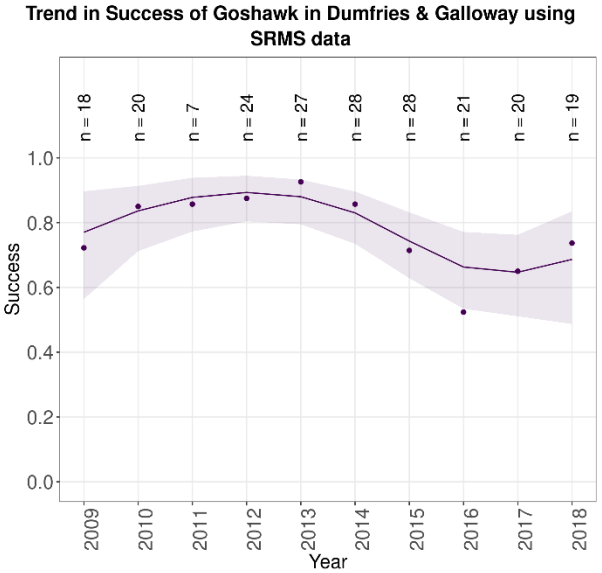
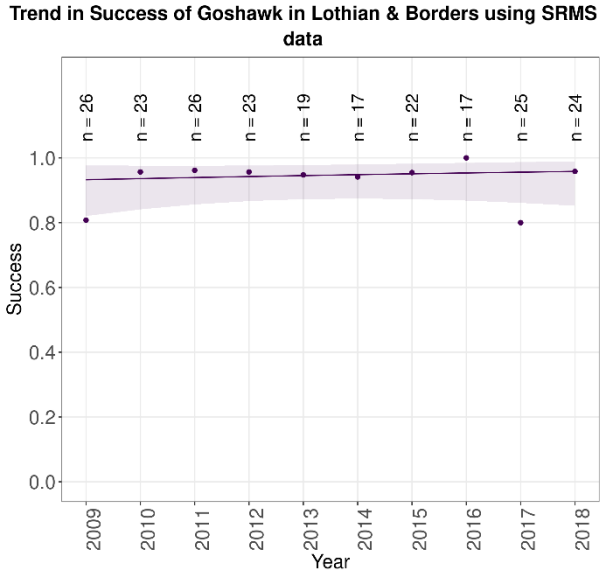


Figure 28: Trends in numbers of breeding pairs of Goshawk by SRMS region during 2009-2018.

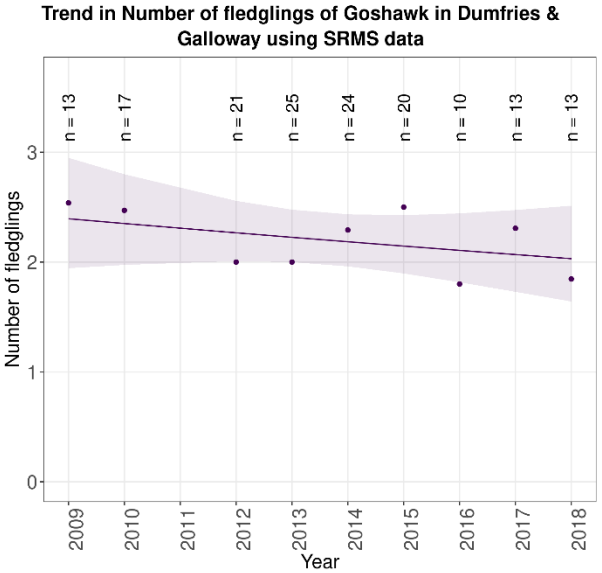


Dumfries & Galloway trend: Decrease

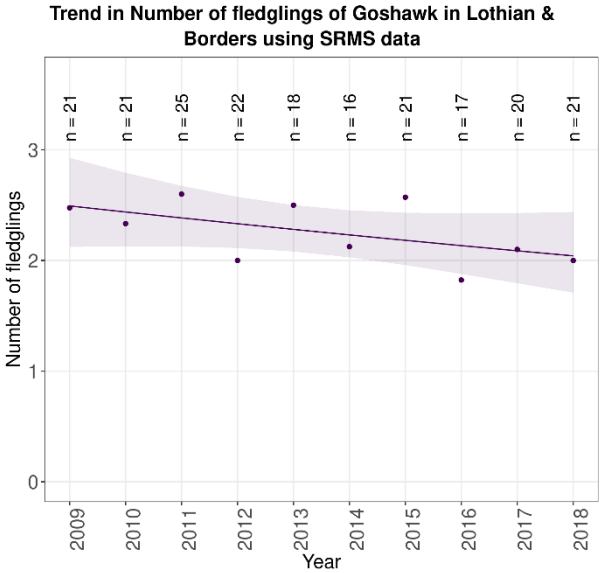


Lothian & Borders trend: Not significant

Figure 29: Trends in breeding success of Goshawk by SRMS region during 2009-2018.

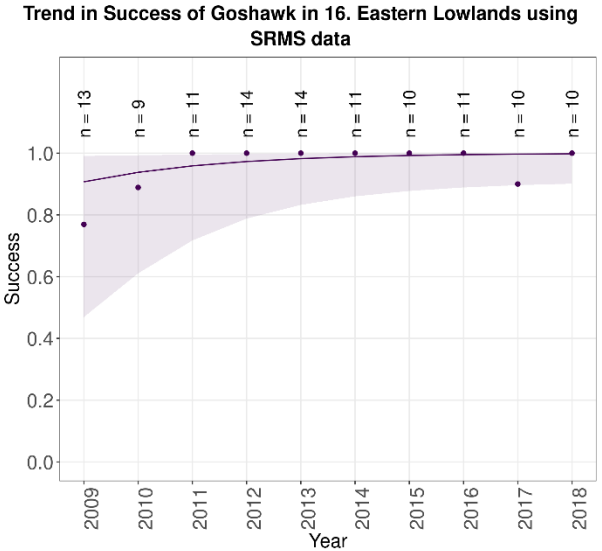


Dumfries & Galloway trend: Not significant

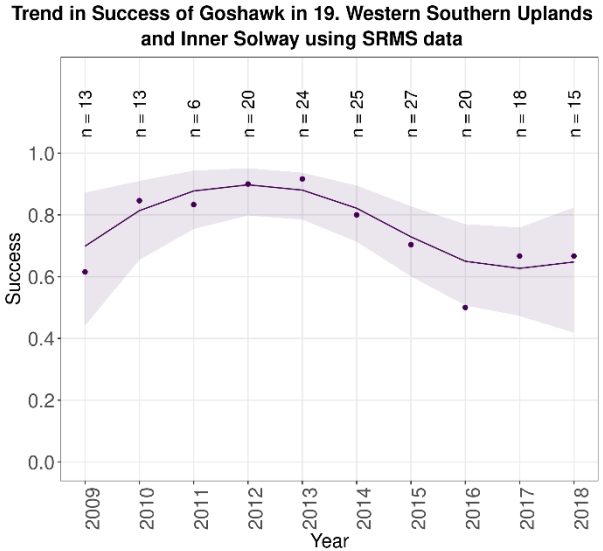


Lothian & Borders trend: Not significant

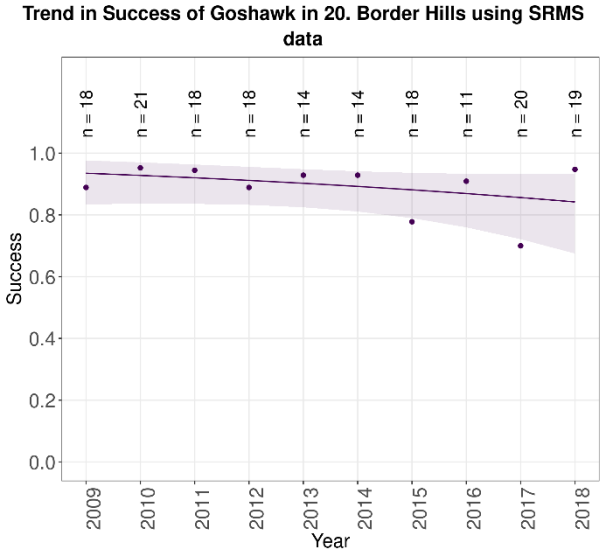
Figure 30: Trends in number of fledglings of Goshawk by SRMS region during 2009-2018.



16. Eastern Lowlands trend: Not significant (caveats: Sample sizes small; Variable effort)

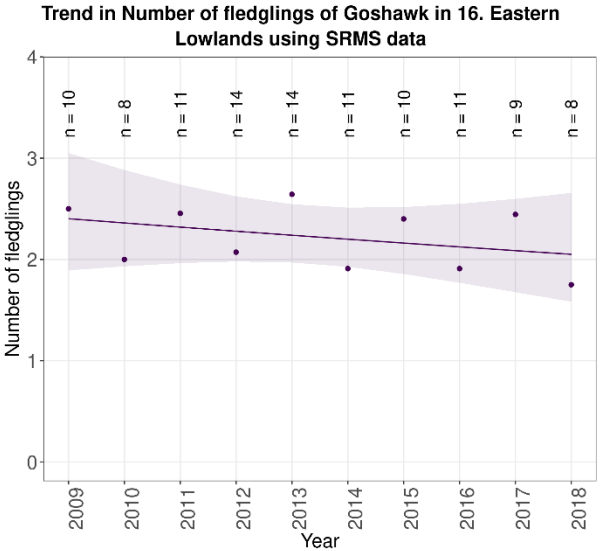


19. Western Southern Uplands and Inner Solway trend: Non-linear (caveats: Sample sizes small)

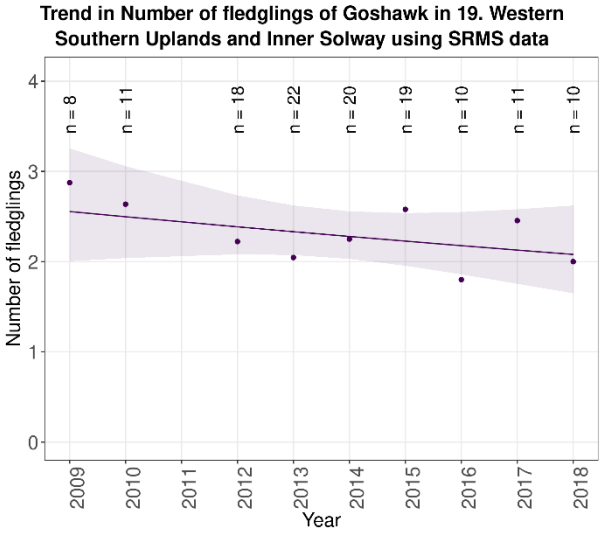


20. Border Hills trend: Not significant (caveats: Sample sizes small)

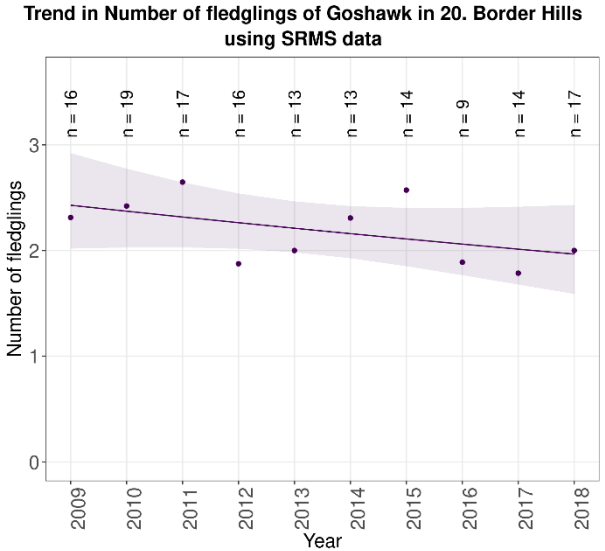
Figure 31: Trends in breeding success of Goshawk by NHZ region during 2009-2018.



16. Eastern Lowlands trend: Not significant (caveats: Sample sizes small; No home range random effect)



19. Western Southern Uplands and Inner Solway trend: Not significant (caveats: Sample sizes small; No home range random effect)



20. Border Hills trend: Not significant (caveats: Sample sizes small; No home range random effect)

Figure 32: Trends in number of fledglings of Goshawk by NHZ region during 2009-2018.

Table 18: Details of SRMS Regional trends for Goshawk.

Parameter	Region	First year of trend	Last year of trend	Number of years	Mean number of home ranges across years	Mean parameter value (and 95% confidence limits)	Trend during the period	Caveats	Estimated % annual change (and 95% confidence limits)
Pairs	Dumfries & Galloway	2009	2018	9	5.9	5.0 (4.1 to 5.9)	Not significant	Sample sizes small	-1.3 (-10.7 to 9.1)
Success	Dumfries & Galloway	2009	2018	10	21.2	0.8 (0.7 to 0.8)	Decrease		-1.4 (-2.9 to -0.1)
	Lothian & Borders	2009	2018	10	22.2	0.9 (0.9 to 1.0)	Not significant		0.4 (-0.9 to 1.4)
Number of fledglings	Dumfries & Galloway	2009	2018	9	17.3	2.2 (2.1 to 2.3)	Not significant		-1.8 (-5.7 to 2.2)
	Lothian & Borders	2009	2018	10	20.2	2.3 (2.1 to 2.4)	Not significant		-2.2 (-5.2 to 0.9)

Table 19: Details of NHZ Regional trends for Goshawk.

Parameter	Region	First year of trend	Last year of trend	Number of years	Mean number of home ranges across years	Mean parameter value (and 95% confidence limits)	Trend during the period	Caveats	Estimated % annual change (and 95% confidence limits)
Success	16. Eastern Lowlands	2009	2018	10	11.3	1.0 (0.9 to 1.0)	Not significant	Sample sizes small; Variable effort	4.3 (-0.4 to 7.6)
	19. Western Southern Uplands and Inner Solway	2009	2018	10	18.1	0.7 (0.7 to 0.8)	Non-linear	Sample sizes small	Non-linear
	20. Border Hills	2009	2018	10	17.1	0.9 (0.8 to 0.9)	Not significant	Sample sizes small	-0.6 (-1.7 to 0.3)
Number of fledglings	16. Eastern Lowlands	2009	2018	10	10.6	2.2 (2.1 to 2.4)	Not significant	Sample sizes small; No home range random effect	-1.7 (-6.3 to 3.0)
	19. Western Southern Uplands and Inner Solway	2009	2018	9	14.33333	2.3 (2.1 to 2.5)	Not significant	Sample sizes small; No home range random effect	-2.3 (-6.7 to 2.4)
	20. Border Hills	2009	2018	10	14.8	2.2 (2.1 to 2.3)	Not significant	Sample sizes small; No home range random effect	-2.3 (-5.9 to 1.4)

Table 20: Number of Goshawk home range checks for occupancy reported to the SRMS during 2009-2018, in each of the 12 SRMS Regions, with approximate proportion of estimated population monitored. At the bottom of the table, row A is the mean number of home range checks over the most recent five years. Row B gives the estimated proportion of the national population in each region, based on Bird Atlas Timed Tetrad Visit (TTV) data. The depth of red shading indicates the relative importance of each region for this species. If survey effort was spread evenly across the whole population, the ratio of A:B would not vary much between regions.

Year	ARGYLL	CENTRAL SCOTLAND	DUMFRIES & GALLOWAY	HIGHLAND	LEWIS & HARRIS	LOTHIAN & BORDERS	NORTH EAST SCOTLAND	ORKNEY	SHETLAND	SOUTH STRATHCLYDE	TAYSIDE & FIFE	UIST	Total
2009		0	26	0		49	41			0	0		116
2010		0	25	2		52	0			2	5		86
2011		0	10	4		56	0			1	17		88
2012		4	35	3		47	0			2	12		103
2013		5	34	1		46	0			3	9		98
2014		4	35	5		49	0			7	9		109
2015		0	37	6		51	4			11	21		130
2016		4	35	12		50	5			18	15		139
2017		8	36	10		46	0			11	26		137
2018		7	38	12		44	1			11	22		135
A: Mean home range checks	**Absent**	**4.6**	**36.2**	**9.0**	**Absent**	**48.0**	**2.0**	**Absent**	**Absent**	**11.6**	**18.6**	**Absent**	**130.0**
B: Proportion of estimated Scottish population	0	0	18	24	0	21	24	0	0	9	3	0	100

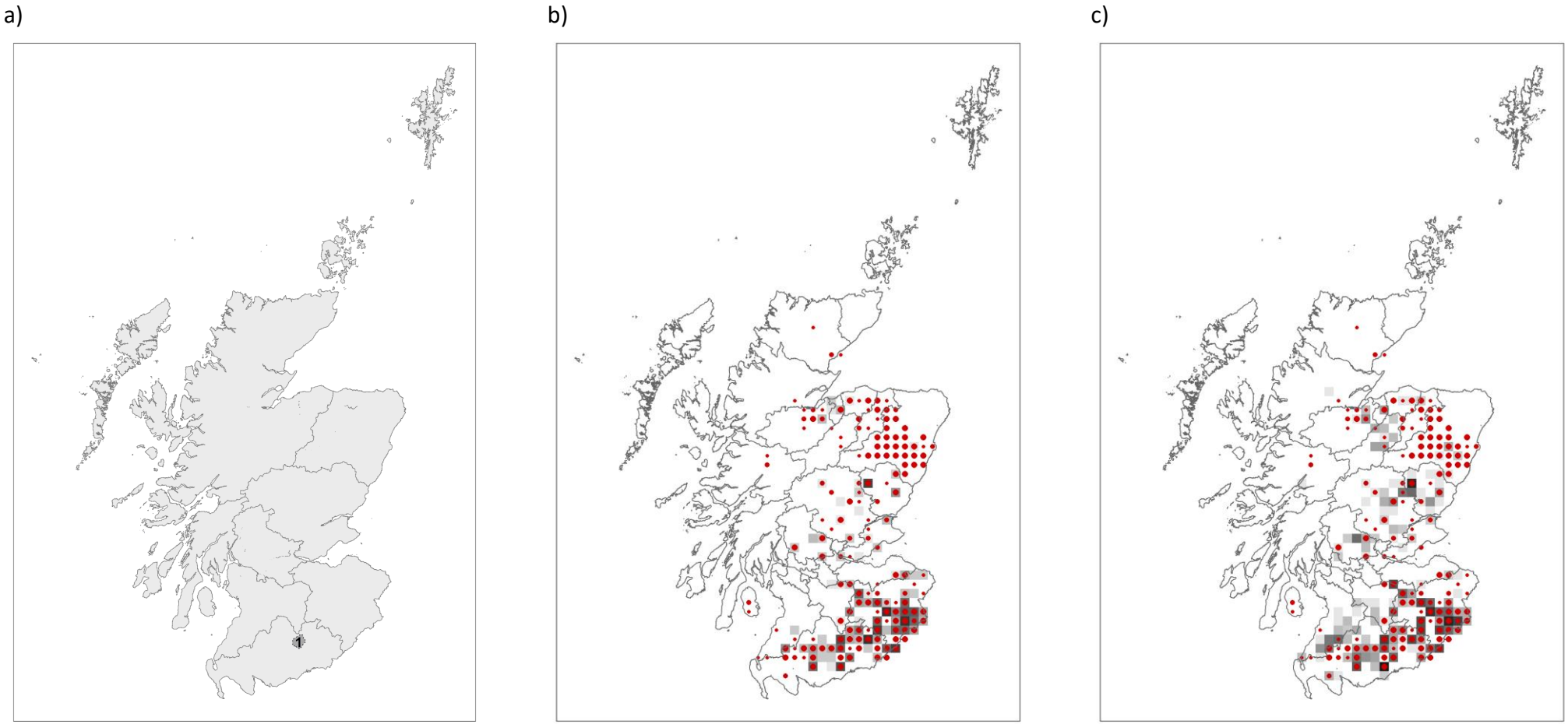


Figure 33: Areas corresponding to the clusters of home ranges from which sufficient data were reported to attempt to derive population trends for Goshawk between 2009 and 2018 (a) together with maps showing variation in the number of Goshawk records reported to SRMS during 2009-2013 (b) and 2014-2018 (c), in the context of the known Goshawk breeding distribution taken from the 2007-2011 Bird Atlas. SRMS data are depicted as grey squares with darker shading indicating more records while Bird Atlas data are depicted as red dots with the size of dot positively related to probability of breeding.

Hen Harrier

Figure 34: Hen Harrier brood (Photo: Adam Ritchie, Highland RSG).

Hen Harrier is monitored widely across Scotland by SRMS data contributors.

Hen Harrier has also been subject to periodic national survey via The Statutory Conservation Agency/RSPB Annual Breeding Bird Scheme (SCARABBS) programme. Population trends are available from four SCARABBS surveys: 1988/89 (Bibby & Etheridge 1993) 479 territorial pairs (95% confidence intervals 350-622); 1998 (Sim *et al.* 2001) 436 pairs (95% confidence intervals 365-506); 2004 (Sim *et al.* 2007) 633 pairs (95% confidence intervals 563-717; 32% significant increase from 1998); 2010 (Hayhow *et al.* 2013) 505 pairs (95% confidence intervals 417-612; 20% but non-significant decline from 2004), and 2016 (Wotton *et al.* 2018) 460 (95% confidence intervals 359–573 but a non-significant 8.9% decline from 2010).

Our latest analysis of SRMS Hen Harrier data for the period 2009-2018 has produced no national trends in breeding number or productivity at a national level, but has produced trends for six of the 11 SRMS regions (Table 21) and for ten of the 19 NHZ regions (Table 22) for which the SRMS holds Hen Harrier records.

Users of the published trends should be aware that while records for trends production have been drawn from a large enough area to be considered representative, there are some gaps in coverage (e.g. Caithness and east Sutherland populations are poorly represented) (Figure 43).

National trends

No trends in breeding numbers or breeding productivity are available for Hen Harrier at a national level.

SRMS regional trends

The six trends in breeding numbers of Hen Harrier include decreases in two regions (Highland and South Strathclyde), no significant change in three regions (Argyll, Dumfries & Galloway and Tayside & Fife) and non-linear variation in breeding numbers of Hen Harrier in Orkney (Table 21, Figure 35).

Breeding success of Hen Harrier decreased in Tayside & Fife, did not change significantly in two regions (Argyll and Highland) and showed non-linear variation in Orkney (Table 21, Figure 36).

Clutch size of Hen Harrier in Orkney decreased (Table 21, Figure 37), while brood showed no significant change (Table 21, Figure 38). Clutch size in Tayside & Fife also showed no significant change (Table 21, Figure 37). No trends for Hen Harrier are available for the number of fledglings (Table 21).

Trends for this species are not yet available for Central, Lewis & Harris, Lothian & Borders, North East Scotland or Uist.

NHZ regional trends

The eight trends in breeding numbers of Hen Harrier include a significant decrease in NHZ 19, no significant change in six regions (NHZs 10-12, 15, 17 and 20) and non-linear variation in breeding numbers in NHZ 02 (Table 22, Figure 39).

The four trends in breeding success of Hen Harrier include no significant change in three regions (NHZ 06 and 14-15) and non-linear variation in breeding success in NHZ 02 (Table 22, Figure 40).

Trends in clutch size and brood size are only available for a single region (NHZ 02), with a significant decrease and no significant change in each parameter, respectively (Table 22, Figures 41-42). No trends in number of fledglings are available for any region (Table 22).

Trends for this species are not yet available for NHZs 03, 05-09, 13-14, 16, 18 and 21.

Details of contributing records

6,027 (520 to 911 per year, mean: 603 records) from 2009-2018 contributed to this trends analysis (Table 25).

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C. J. Bibby & B. Etheridge (1993) Status of the Hen Harrier *Circus cyaneus* in Scotland in 1988–89, Bird Study, 40:1, 1-11, DOI: 10.1080/00063659309477123

Daniel B. Hayhow, Mark A. Eaton, Stephen Bladwell, Brian Etheridge, Steven R. Ewing, Marc Ruddock, Richard Saunders, Chris Sharpe, Innes M.W. Sim & Andrew Stevenson (2013) The status of the Hen Harrier, *Circus cyaneus*, in the UK and Isle of Man in 2010, Bird Study, 60:4, 446-458, DOI: 10.1080/00063657.2013.839621

I.M.W. Sim, D.W. Gibbons, I.P. Bainbridge & W.A. Mattingley (2001) Status of the Hen Harrier *Circus cyaneus* in the UK and the Isle of Man in 1998, Bird Study, 48:3, 341-353, DOI: 10.1080/00063650109461233

Innes M.W. Sim, Ian A. Dillon, Mark A. Eaton, Brian Etheridge, Patrick Lindley, Helen Riley, Richard Saunders, Chris Sharpe & Matthew Tickner (2007) Status of the Hen Harrier *Circus cyaneus* in the UK and Isle of Man in 2004, and a comparison with the 1988/89 and 1998 surveys, Bird Study, 54:2, 256-267, DOI: 10.1080/00063650709461482

Simon R. Wotton, Stephen Bladwell, Wendy Mattingley, Neil G. Morris, David Raw, Marc Ruddock, Andrew Stevenson & Mark A. Eaton (2018) Status of the Hen Harrier *Circus cyaneus* in the UK and Isle of Man in 2016, Bird Study, 65:2, 145-160, DOI: 10.1080/00063657.2018.1476462

Table 21: Summary of SRMS regional trends for Hen Harrier during 2009-2018. Figures in parentheses indicate the annual change, with significant decreases highlighted in blue and non-significant changes highlighted in grey. 'Non-linear' indicates non-linear trends. '—' indicates where the species occurs but no trend is available. 'No SRMS data' indicates where the SRMS does not hold any records for the region of interest. 'Absent' indicates where the species is not known to breed.

SRMS Region	Pairs	Success	Clutch size	Brood size	Number of fledglings
Argyll	Not significant	Not significant	—	—	—
Central	—	—	—	—	—
Dumfries & Galloway	Not significant [s]	—	—	—	—
Highland	**Decrease (-9.4%)**	Not significant [s]	—	—	—
Lewis & Harris	—	—	—	—	—
Lothian & Borders	—	—	—	—	—
North East Scotland	—	—	—	—	—
Orkney	Non-linear	Non-linear	**Decrease (-2.2%)**	Not significant	—
Shetland	Absent	Absent	Absent	Absent	Absent
South Strathclyde	**Decrease (-27%)**	—	—	—	—
Tayside & Fife	Not significant	**Decrease (-3.9%)**	Not significant [s]	—	—
Uist	—	—	—	—	—

[s] *Sample sizes small.*

Table 22: Summary of NHZ regional trends for Hen Harrier during 2009-2018. Figures in parentheses indicate the annual change, with significant decreases highlighted in blue and non-significant changes highlighted in grey. 'Non-linear' indicates non-linear trends. '—' indicates where the species occurs but no trend is available. 'No SRMS data' indicates where the SRMS does not hold any records for the region of interest. 'Absent' indicates where the species is not known to breed.

NHZ Region	Pairs	Success	Clutch size	Brood size	Number of fledglings
01. Shetland	Absent	Absent	Absent	Absent	Absent
02. North Caithness and Orkney	Non-linear	Non-linear	**Decrease** [r] **(-2.2%)**	Not significant [r]	—
03. Coll, Tiree and the Western Isles	—	—	—	—	—
04. North West Seaboard	Absent	Absent	Absent	Absent	Absent
05. The Peatlands of Caithness and Sutherland	—	—	—	—	—
06. Western Seaboard	—	Not significant [s]	—	—	—
07. Northern Highlands	—	—	—	—	—
08. Western Highlands	—	—	—	—	—
09. North East Coastal Plain	—	—	—	—	—
10. Central Highlands	Not significant [sv]	—	—	—	—
11. Cairngorm Massif	Not significant [s]	—	—	—	—
12. North East Glens	Not significant [sv]	—	—	—	—
13. East Lochaber	—	—	—	—	—
14. Argyll West and Islands	—	Not significant [sv]	—	—	—
15. Loch Lomond, The Trossachs and Breadalbane	Not significant [s]	Not significant [s]	—	—	—
16. Eastern Lowlands	—	—	—	—	—
17. West Central Belt	Not significant [s]	—	—	—	—
18. Wigtown Machairs and Outer Solway Coast	—	—	—	—	—
19. Western Southern Uplands and Inner Solway	**Decrease (-22.5%)**	—	—	—	—
20. Border Hills	Not significant [s]	—	—	—	—
21. Moray Firth	—	—	—	—	—

[r] No home range random effect, [s] Sample sizes small, [v] Variable effort.

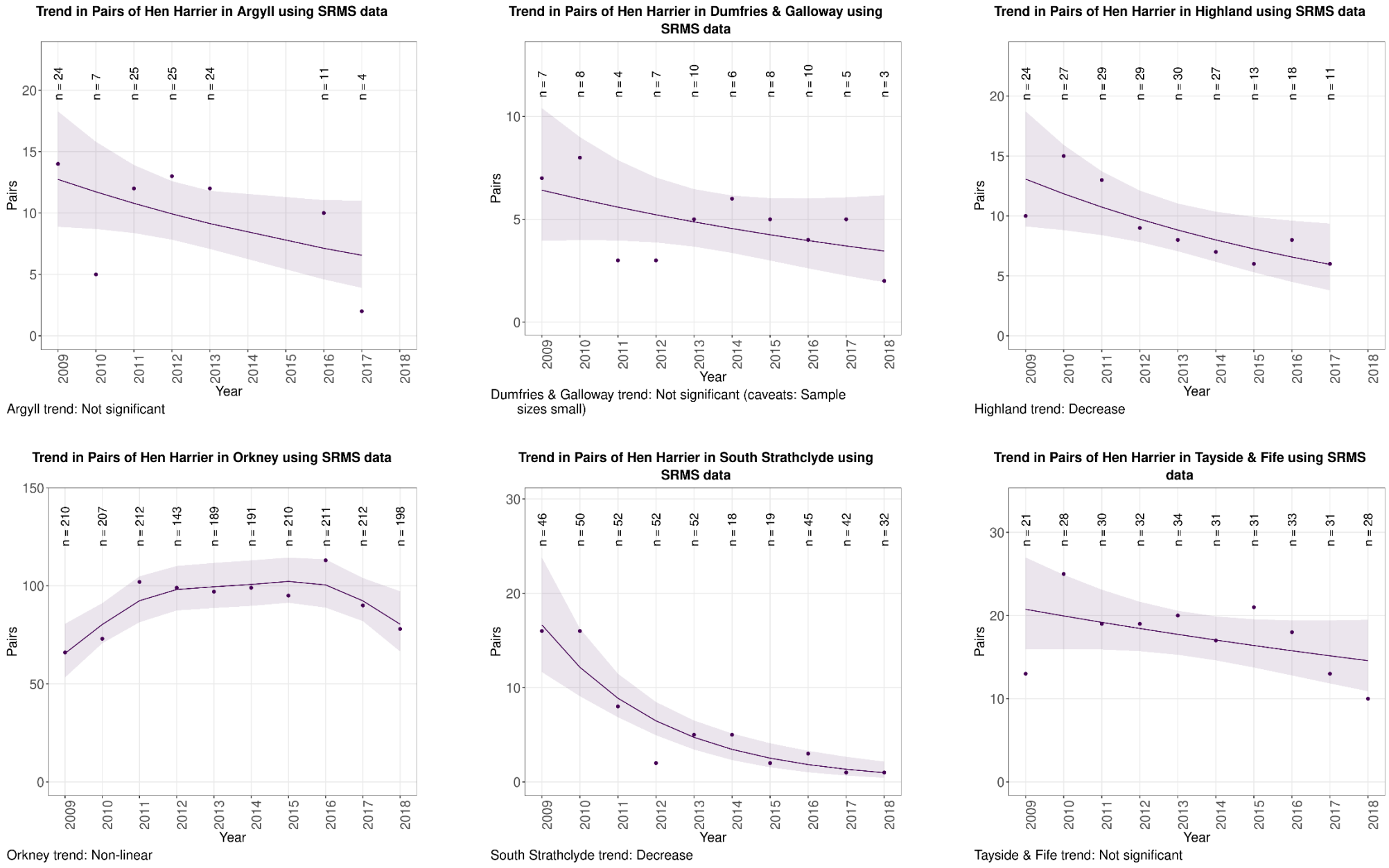


Figure 35: Trends in numbers of breeding pairs of Hen Harrier by SRMS region during 2009-2018.

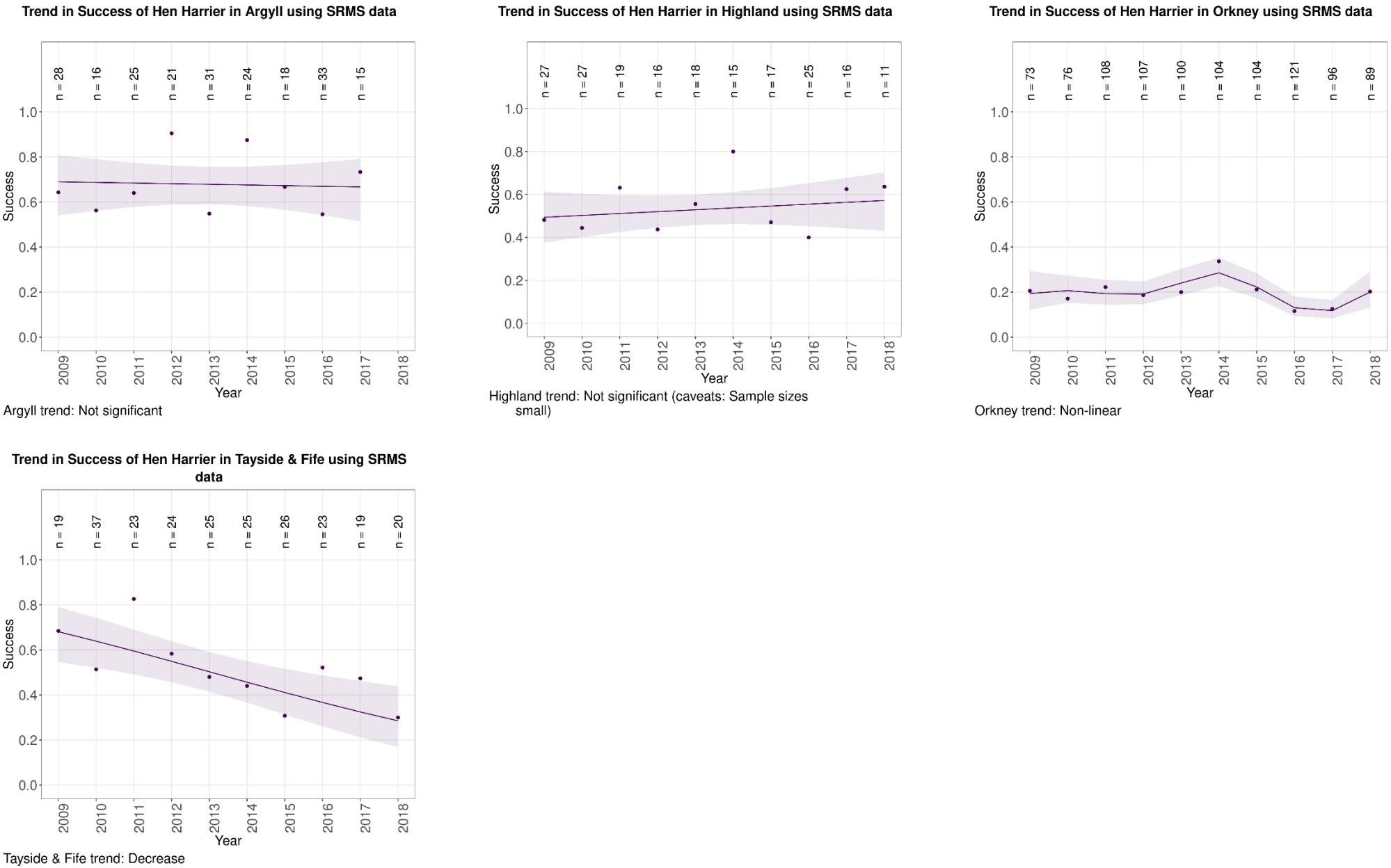
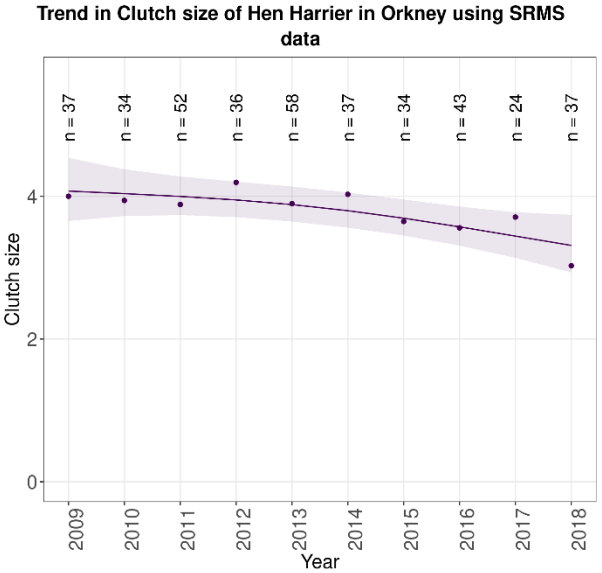
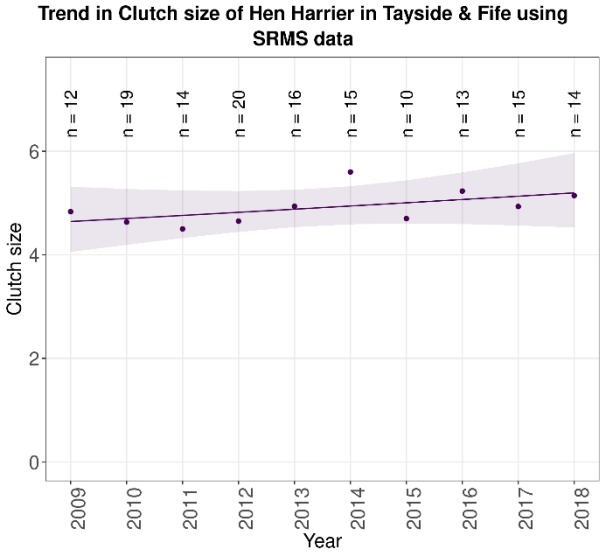


Figure 36: Trends in breeding success of Hen Harrier by SRMS region during 2009-2018.



Orkney trend: Decrease



Tayside & Fife trend: Not significant (caveats: Sample sizes small)

Figure 37: Trends in clutch size of Hen Harrier by SRMS region during 2009-2018.

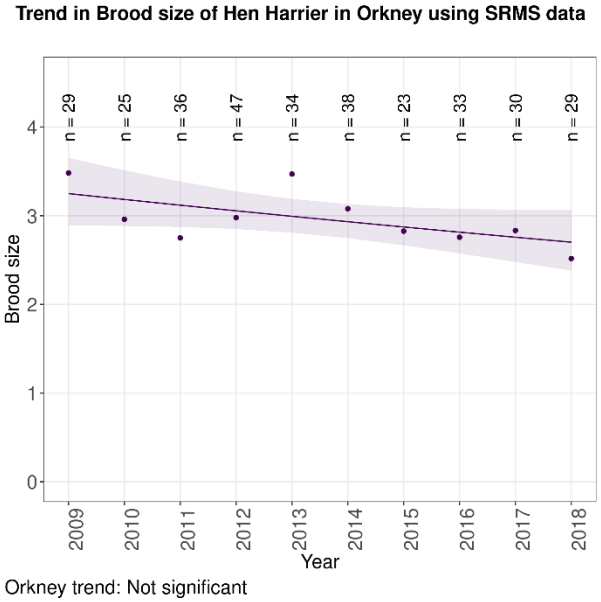
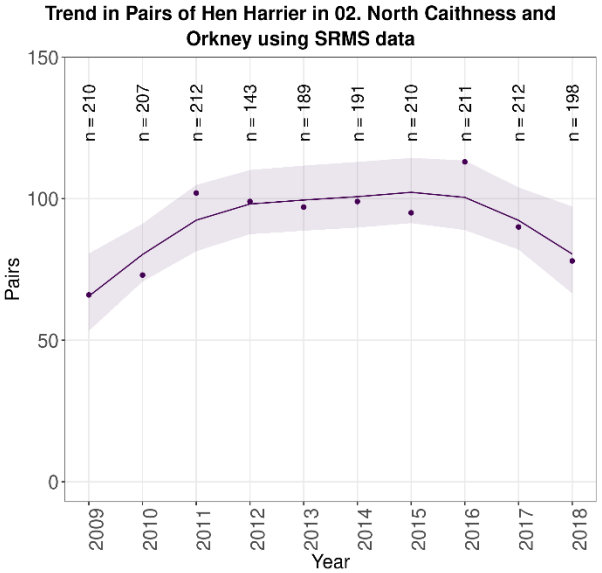
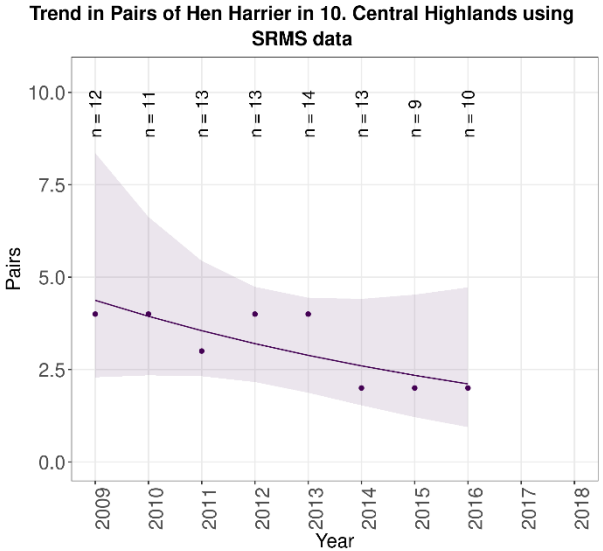


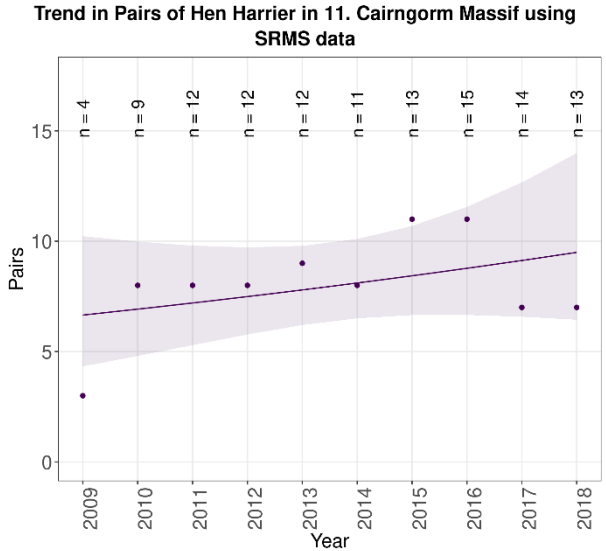
Figure 38: Trends in brood size of Hen Harrier by SRMS region during 2009-2018.



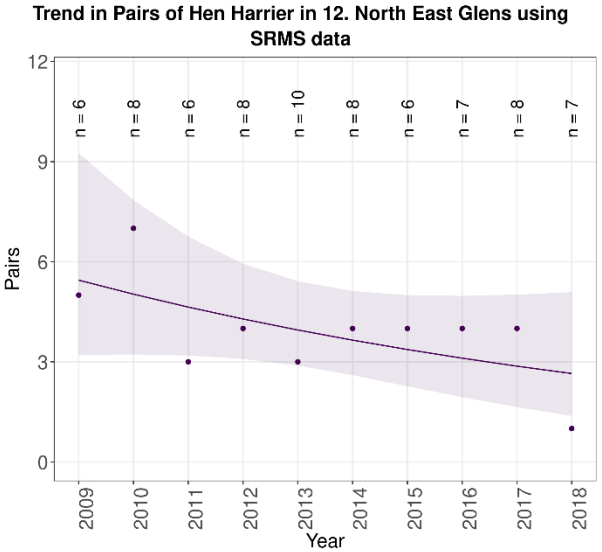
02. North Caithness and Orkney trend: Non-linear



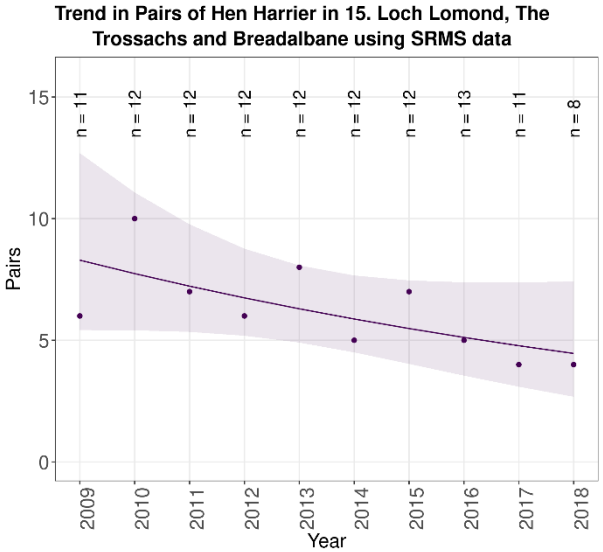
10. Central Highlands trend: Not significant (caveats: Sample sizes small; Variable effort)



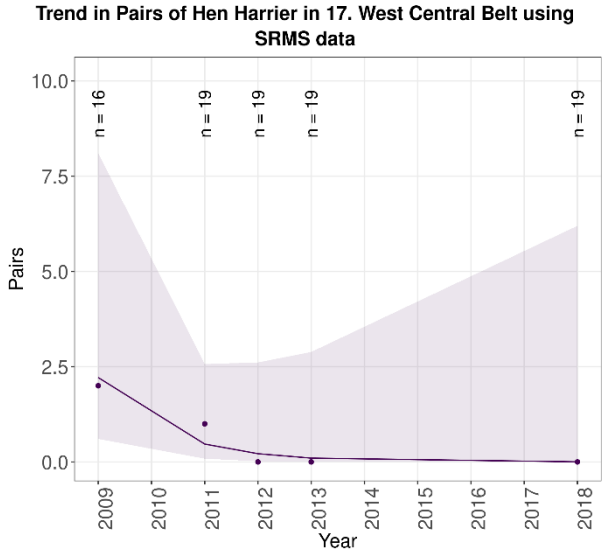
11. Cairngorm Massif trend: Not significant (caveats: Sample sizes small)



12. North East Glens trend: Not significant (caveats: Sample sizes small; Variable effort)

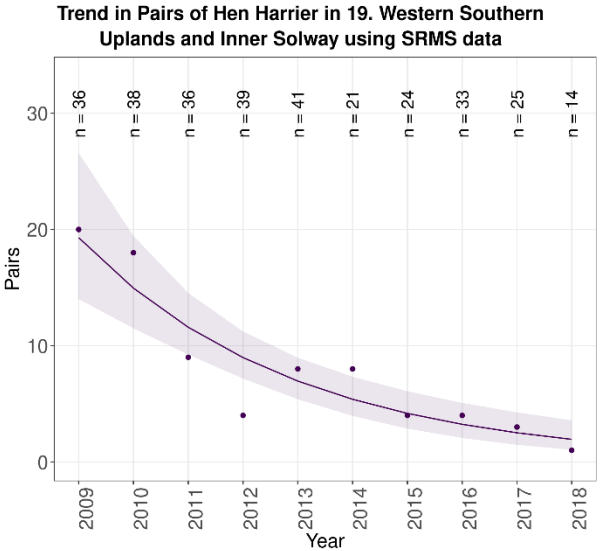


15. Loch Lomond, The Trossachs and Breadalbane trend: Not significant (caveats: Sample sizes small)

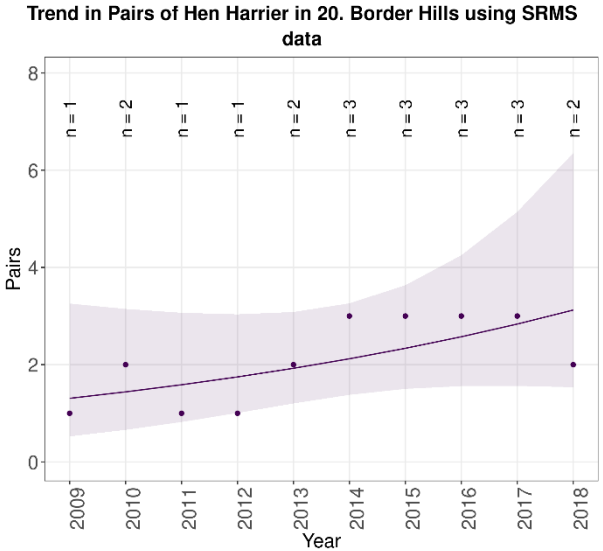


17. West Central Belt trend: Not significant (caveats: Sample sizes small)

Figure 39: Trends in numbers of breeding pairs of Hen Harrier by NHZ region during 2009-2018.

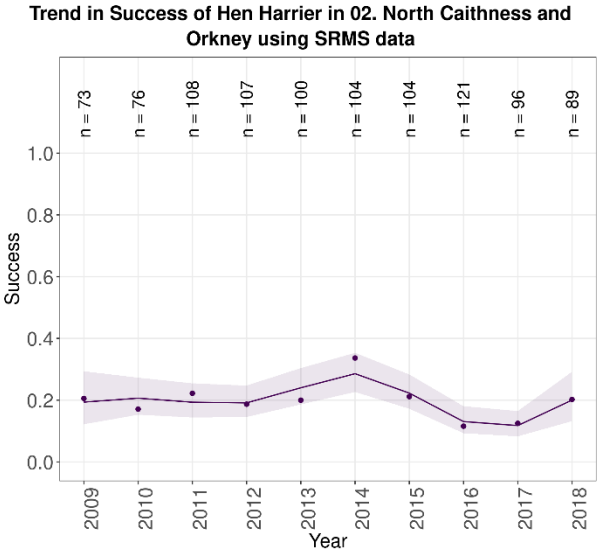


19. Western Southern Uplands and Inner Solway trend: Decrease

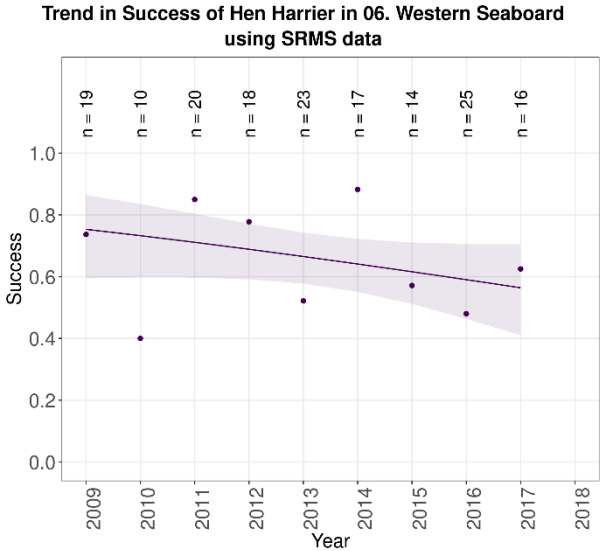


20. Border Hills trend: Not significant (caveats: Sample sizes small)

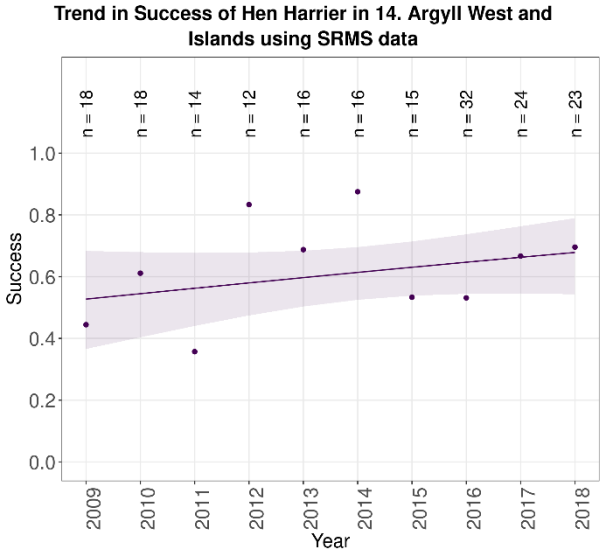
Figure 39 continued: Trends in numbers of breeding pairs of Hen Harrier by NHZ region during 2009-2018.



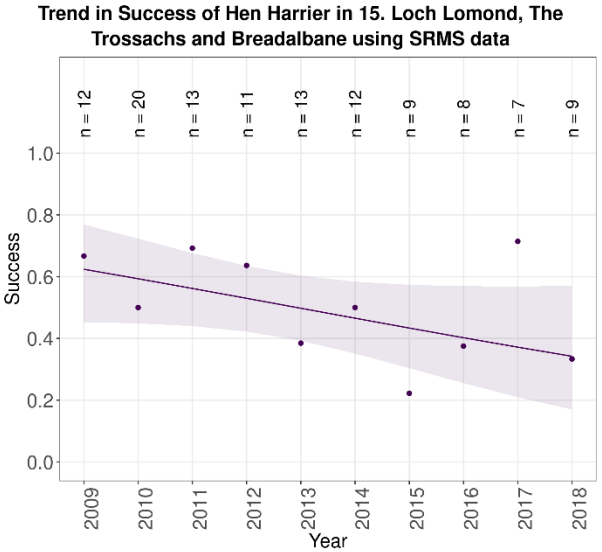
02. North Caithness and Orkney trend: Non-linear (caveats: No home range random effect;)



06. Western Seaboard trend: Not significant (caveats: Sample sizes small;)



14. Argyll West and Islands trend: Not significant (caveats: Sample sizes small; Variable effort;)



15. Loch Lomond, The Trossachs and Breadalbane trend: Not significant (caveats: Sample sizes small)

Figure 40: Trends in breeding success of Hen Harrier by NHZ region during 2009-2018.

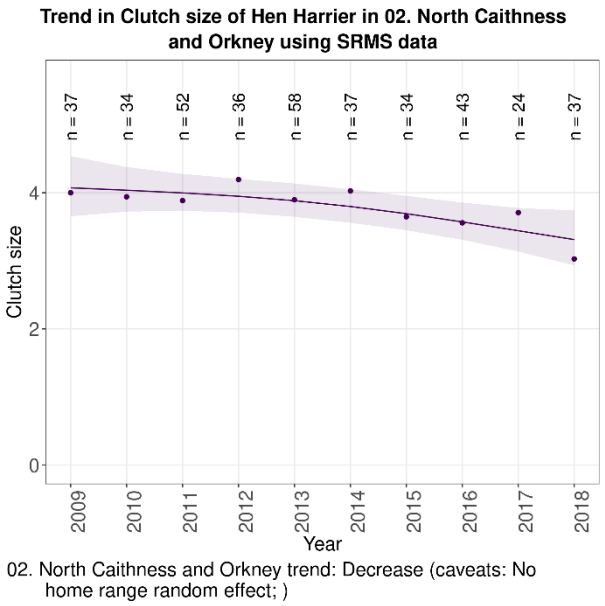


Figure 41: Trends in clutch size of Hen Harrier by NHZ region during 2009-2018.

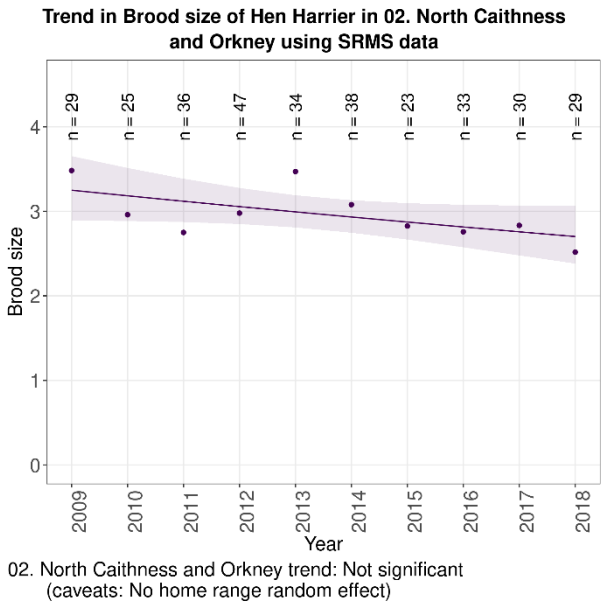


Figure 42: Trends in brood size of Hen Harrier by NHZ region during 2009-2018.

Table 23: Details of SRMS Regional trends for Hen Harrier.

Parameter	Region	First year of trend	Last year of trend	Number of years	Mean number of home ranges across years	Mean parameter value (and 95% confidence limits)	Trend during the period	Caveats	Estimated % annual change (and 95% confidence limits)
Pairs	Argyll	2009	2017	7	17.1	9.7 (5.6 to 13.9)	Not significant		-8.0 (-16.0 to 0.9)
	Dumfries & Galloway	2009	2018	10	6.8	4.8 (3.5 to 6.1)	Not significant	Sample sizes small	-6.6 (-15.5 to 3.1)
	Highland	2009	2017	9	23.1	9.1 (6.7 to 11.5)	Decrease		-9.4 (-16.8 to -1.3)
	Orkney	2009	2018	10	198.3	91.2 (80.8 to 101.6)	Non-linear		Non-linear
	South Strathclyde	2009	2018	10	40.8	5.9 (1.8 to 10.0)	Decrease		-27.0 (-34.6 to -18.5)
	Tayside & Fife	2009	2018	10	29.9	17.5 (14.3 to 20.7)	Not significant		-3.8 (-8.7 to 1.3)
Success	Argyll	2009	2017	9	23.4	0.7 (0.6 to 0.7)	Not significant		-0.3 (-3.1 to 2.4)
	Highland	2009	2018	10	19.1	0.5 (0.5 to 0.6)	Not significant	Sample sizes small	0.9 (-1.6 to 3.3)
	Orkney	2009	2018	10	97.8	0.2 (0.2 to 0.2)	Non-linear		Non-linear
	Tayside & Fife	2009	2018	10	24.1	0.5 (0.4 to 0.6)	Decrease		-3.9 (-6.4 to -1.5)
Clutch size	Orkney	2009	2018	10	39.2	3.8 (3.7 to 3.9)	Decrease		-2.2 (-4.0 to -0.4)
	Tayside & Fife	2009	2018	10	14.8	4.9 (4.7 to 5.1)	Not significant	Sample sizes small	1.3 (-1.3 to 3.9)
Brood size	Orkney	2009	2018	10	32.4	3.0 (2.8 to 3.1)	Not significant		-2.0 (-4.3 to 0.3)

Table 24: Details of NHZ Regional trends for Hen Harrier.

Parameter	Region	First year of trend	Last year of trend	Number of years	Mean number of home ranges across years	Mean parameter value (and 95% confidence limits)	Trend during the period	Caveats	Estimated % annual change (and 95% confidence limits)
Pairs	02. North Caithness and Orkney	2009	2018	10	198.3	91.2 (80.8 to 101.6)	Non-linear		Non-linear
	10. Central Highlands	2009	2016	8	11.875	3.1 (2.3 to 4.0)	Not significant	Sample sizes small; Variable effort	-9.9 (-24.3 to 7.3)
	11. Cairngorm Massif	2009	2018	10	11.5	8.0 (6.4 to 9.6)	Not significant	Sample sizes small	4.0 (-3.6 to 12.3)
	12. North East Glens	2009	2018	10	7.4	3.9 (2.8 to 5.0)	Not significant	Sample sizes small; Variable effort	-7.7 (-17.4 to 3.1)
	15. Loch Lomond, The Trossachs and Breadalbane	2009	2018	10	11.5	6.2 (4.9 to 7.5)	Not significant	Sample sizes small	-6.7 (-14.5 to 1.9)
	17. West Central Belt	2009	2018	5	18.4	0.6 (-0.5 to 1.7)	Not significant	Sample sizes small	-54.0 (-82.2 to 19.2)
	19. Western Southern Uplands and Inner Solway	2009	2018	10	30.7	7.9 (3.3 to 12.5)	Decrease		-22.5 (-29.1 to -15.3)
	20. Border Hills	2009	2018	10	2.1	2.1 (1.5 to 2.7)	Not significant	Sample sizes small	10.2 (-5.4 to 28.3)
Success	02. North Caithness and Orkney	2009	2018	10	97.8	0.2 (0.2 to 0.2)	Non-linear	No home range random effect;	Non-linear
	06. Western Seaboard	2009	2017	9	18	0.7 (0.6 to 0.7)	Not significant	Sample sizes small;	-1.9 (-4.7 to 0.6)
	14. Argyll West and Islands	2009	2018	10	18.8	0.6 (0.5 to 0.7)	Not significant	Sample sizes small; Variable effort;	1.8 (-1.0 to 4.5)
	15. Loch Lomond, The Trossachs and Breadalbane	2009	2018	10	11.4	0.5 (0.4 to 0.6)	Not significant	Sample sizes small	-3.0 (-6.7 to 0.6)

Parameter	Region	First year of trend	Last year of trend	Number of years	Mean number of home ranges across years	Mean parameter value (and 95% confidence limits)	Trend during the period	Caveats	Estimated % annual change (and 95% confidence limits)
Clutch size	02. North Caithness and Orkney	2009	2018	10	39.2	3.8 (3.7 to 3.9)	Decrease	No home range random effect;	-2.2 (-4.0 to -0.4)
Brood size	02. North Caithness and Orkney	2009	2018	10	32.4	3.0 (2.8 to 3.1)	Not significant	No home range random effect	-2.0 (-4.3 to 0.3)

Table 25: Number of Hen Harrier home range checks for occupancy reported to the SRMS during 2009-2018, in each of the 12 SRMS Regions, with approximate proportion of estimated population monitored. At the bottom of the table, row A is the mean number of home range checks over the most recent five years. Row B gives the estimated proportion of the national population in each region, based on Bird Atlas Timed Tetrad Visit (TTV) data. The depth of red shading indicates the relative importance of each region for this species. If survey effort was spread evenly across the whole population, the ratio of A:B would not vary much between regions.

Year	ARGYLL	CENTRAL SCOTLAND	DUMFRIES & GALLOWAY	HIGHLAND	LEWIS & HARRIS	LOTHIAN & BORDERS	NORTH EAST SCOTLAND	ORKNEY	SHETLAND	SOUTH STRATHCLYDE	TAYSIDE & FIFE	UIST	Total
2009	72	10	9	63	0	5	7	234		69	39	16	524
2010	44	19	11	58	0	2	0	227		74	76	19	530
2011	79	13	11	72	0	3	5	236		73	79	8	579
2012	89	15	8	66	0	4	4	156		73	92	13	520
2013	85	16	21	76	0	5	11	214		69	92	27	616
2014	85	16	19	72	0	5	5	216		31	79	37	565
2015	74	13	18	46	0	14	10	236		35	76	31	553
2016	143	44	33	132	4	16	40	237		109	104	49	911
2017	74	7	17	61	1	16	12	240		101	69	30	628
2018	28	5	16	81	5	12	15	228		89	74	48	601
A: Mean home range checks	**80.8**	**17.0**	**20.6**	**78.4**	**2.0**	**12.6**	**16.4**	**231.4**	**Absent**	**73.0**	**80.4**	**39.0**	**651.6**
B: Proportion of estimated Scottish population	29	3	4	23	0	0	1	13	0	6	8	12	100

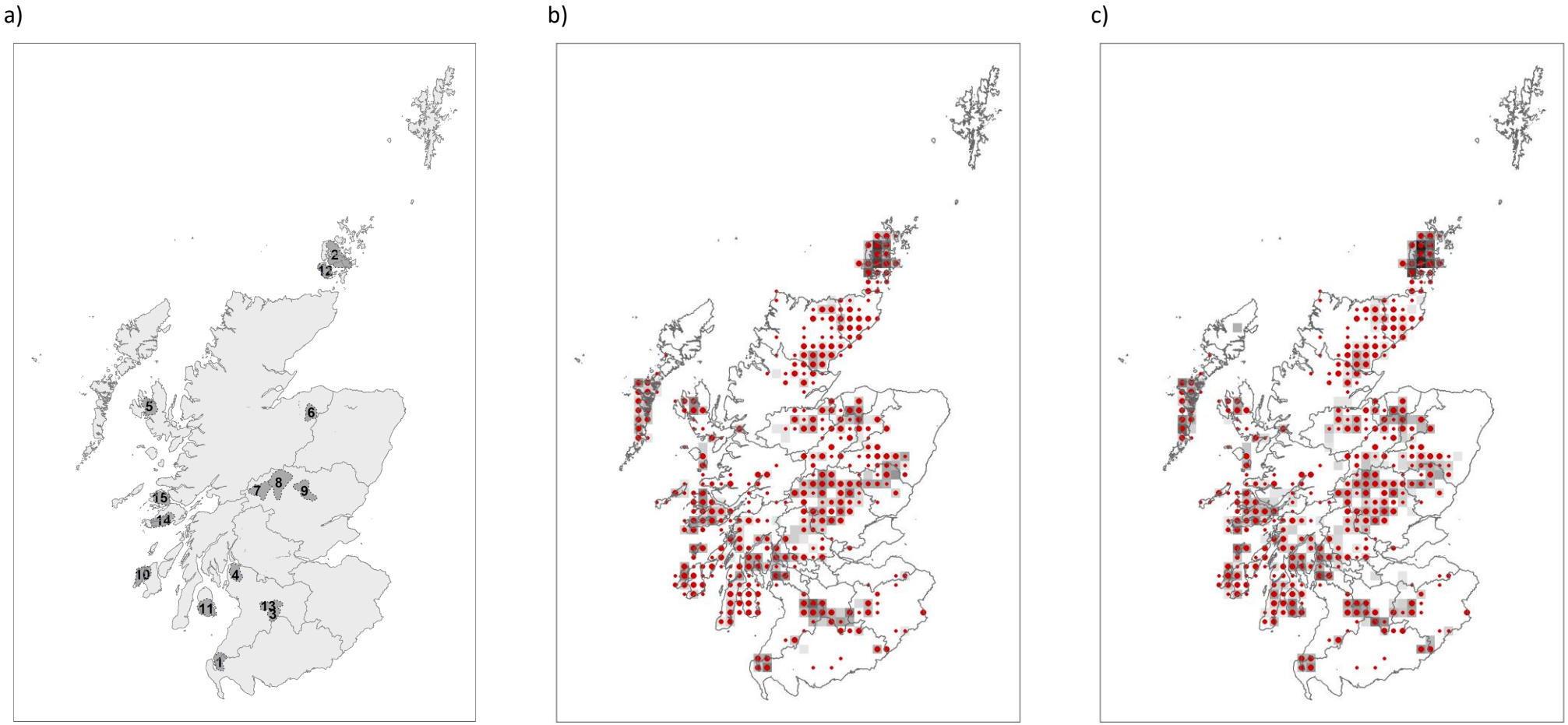


Figure 43: Areas corresponding to the clusters of home ranges from which sufficient data were reported to attempt to derive population trends for Hen Harrier between 2009 and 2018 (a) together with maps showing variation in the number of Hen Harrier records reported to SRMS during 2009-2013 (b) and 2014-2018 (c), in the context of the known Hen Harrier breeding distribution taken from the 2007-2011 Bird Atlas. SRMS data are depicted as grey squares with darker shading indicating more records while Bird Atlas data are depicted as red dots with the size of dot positively related to probability of breeding.

Red Kite

Figure 44: Red Kite chick in Perthshire in 2019 (Photo: Chris Baker, Tayside & Fife RSG).

Red Kite is monitored widely across Scotland by SRMS data contributors.

Red Kite has also been subject to national survey via The Statutory Conservation Agency/RSPB Annual Breeding Bird Scheme (SCARABBS) programme. There has been just one survey in 2000 (Wotton *et al*. 2000) and this estimated a population of 40 pairs 'in Scotland', although numbers have increased considerably since, aided by the release of birds elsewhere in Scotland (North Scotland, Dumfries & Galloway, Central Scotland and Aberdeen). Red Kite is no longer on the SCARABBS list due to huge increases in England and Wales.

Our latest analysis of SRMS Red Kite data for the period 2009-2018 has produced no national trends in breeding number or productivity, but has produced trends for five of the eight SRMS regions (Table 26) and for six of the 13 NHZ regions (Table 27).

Users of the published trends should be aware that Red Kite received comprehensive monitoring up to the last few years of the trend period, when survey effort in many areas decreased. The continued expansion of Scottish populations probably means little or no monitoring is ongoing in some areas where the population is growing rapidly. Productivity information is drawn from the majority of the Scottish breeding population, but productivity parameters for unmonitored birds (being on the frontiers of an expanding range) may differ systematically from those of most monitored pairs. Consultation with data contributors has shown that variation in trends between different areas coupled with limited available monitoring effort could lead to a misleading regional trend (e.g.

there are variable population trajectories and monitoring coverage/effort for Red Kites within Angus).

National trends

No trends in breeding numbers or breeding productivity are available for Red Kite at a national level.

SRMS regional trends

Breeding numbers of Red Kite in Highland decreased, while those in Dumfries & Galloway increased. Breeding numbers in Tayside & Fife showed non-linear variation, while those in Central and North East Scotland did not change significantly (Table 26, Figure 45).

Breeding success of Red Kite did not change significantly in Central, Dumfries & Galloway, Highland, North East Scotland and Tayside & Fife (Table 26, Figure 46).

Clutch size, brood size and number of fledglings did not change significantly for North East Scotland (Table 26, Figures 47-49). Number of fledglings decreased in Dumfries & Galloway but did not change significantly in Central, Highland and Tayside & Fife (Table 26, Figure 49).

Trends are not yet available for Lothian & Borders or South Strathclyde.

NHZ regional trends

Breeding numbers of Red Kite increased in NHZ 19, but did not change significantly in NHZs 07, 09, 15 and 16 (Table 27, Figure 50).

Breeding success of Red Kite did not change significantly in NHZs 09, 15, 16, 19 or 21) for which trends could be produced (Table 27, Figure 51).

No trends in clutch size or brood size are available for any region (Table 27). Number of fledglings decreased in NHZ 19 and did not change significantly in the remaining three regions (NHZs 15, 16 and 21) (Table 27, Figure 52).

Trends are not yet available for NHZs 05, 10-12, 17-18 and 20.

Details of contributing records

3,044 (232 to 390 per year, mean: 304 records) from 2009-2018 contributed to this trends analysis (Table 30).

References

S.R. Wotton, I. Carter, A.V. Cross, B. Etheridge, N. Snell, K. Duffy, R. Thorpe & R.D. Gregory (2002) Breeding status of the Red Kite *Milvus milvus* in Britain in 2000, Bird Study, 49:3, 278-286, DOI: 10.1080/00063650209461276

Table 26: Summary of SRMS regional trends for Red Kite during 2009-2018. Figures in parentheses indicate the annual change, with significant increases highlighted in green, significant decreases highlighted in blue and non-significant changes highlighted in grey. 'Non-linear' indicates non-linear trends. '—' indicates where the species occurs but no trend is available. 'No SRMS data' indicates where the SRMS does not hold any records for the region of interest. 'Absent' indicates where the species is not known to breed.

SRMS Region	Pairs	Success	Clutch size	Brood size	Number of fledglings
Argyll	No SRMS data	No SRMS data	No SRMS data	No SRMS data	No SRMS data
Central	Not significant [x]	Not significant [x]	—	—	Not significant [s]
Dumfries & Galloway	**Increase [x] (4%)**	Not significant [x]	—	—	**Decrease (-5.4%)**
Highland	**Decrease (-10.8%)**	Not significant [x]	—	—	Not significant
Lewis & Harris	Absent	Absent	Absent	Absent	Absent
Lothian & Borders	—	—	—	—	—
North East Scotland	Not significant [sx]	Not significant [sx]	Not significant [s]	Not significant [s]	Not significant [s]
Orkney	Absent	Absent	Absent	Absent	Absent
Shetland	Absent	Absent	Absent	Absent	Absent
South Strathclyde	—	—	—	—	—
Tayside & Fife	Non-linear	Not significant [x]	—	—	Not significant
Uist	Absent	Absent	Absent	Absent	Absent

[s] Sample sizes small, [x] Expanding population.

Table 27: Summary of NHZ regional trends for Red Kite during 2009-2018. Figures in parentheses indicate the annual change, with significant increases highlighted in green, significant decreases highlighted in blue and non-significant changes highlighted in grey. '—' indicates where the species occurs but no trend is available. 'No SRMS data' indicates where the SRMS does not hold any records for the region of interest. 'Absent' indicates where the species is not known to breed.

NHZ Region	Pairs	Success	Clutch size	Brood size	Number of fledglings
01. Shetland	Absent	Absent	Absent	Absent	Absent
02. North Caithness and Orkney	Absent	Absent	Absent	Absent	Absent
03. Coll, Tiree and the Western Isles	Absent	Absent	Absent	Absent	Absent
04. North West Seaboard	Absent	Absent	Absent	Absent	Absent
05. The Peatlands of Caithness and Sutherland	—	—	—	—	—
06. Western Seaboard	Absent	Absent	Absent	Absent	Absent
07. Northern Highlands	Not significant [svx]	—	—	—	—
08. Western Highlands	Absent	Absent	Absent	Absent	Absent
09. North East Coastal Plain	Not significant [sx]	Not significant [rsvx]	—	—	—
10. Central Highlands	—	—	—	—	—
11. Cairngorm Massif	—	—	—	—	—
12. North East Glens	—	—	—	—	—
13. East Lochaber	Absent	Absent	Absent	Absent	Absent
14. Argyll West and Islands	Absent	Absent	Absent	Absent	Absent
15. Loch Lomond, The Trossachs and Breadalbane	Not significant	Not significant [svx]	—	—	Not significant [sx]
16. Eastern Lowlands	Not significant	Not significant [vx]	—	—	Not significant [rx]
17. West Central Belt	—	—	—	—	—
18. Wigtown Machairs and Outer Solway Coast	—	—	—	—	—
19. Western Southern Uplands and Inner Solway	**Increase (3.8%)**	Not significant [vx]	—	—	**Decrease [rx] (-5.4%)**
20. Border Hills	—	—	—	—	—
21. Moray Firth	—	Not significant [vx]	—	—	Not significant [rx]

[r] No home range random effect, [s] Sample sizes small, [v] Variable effort, [x] Expanding population.

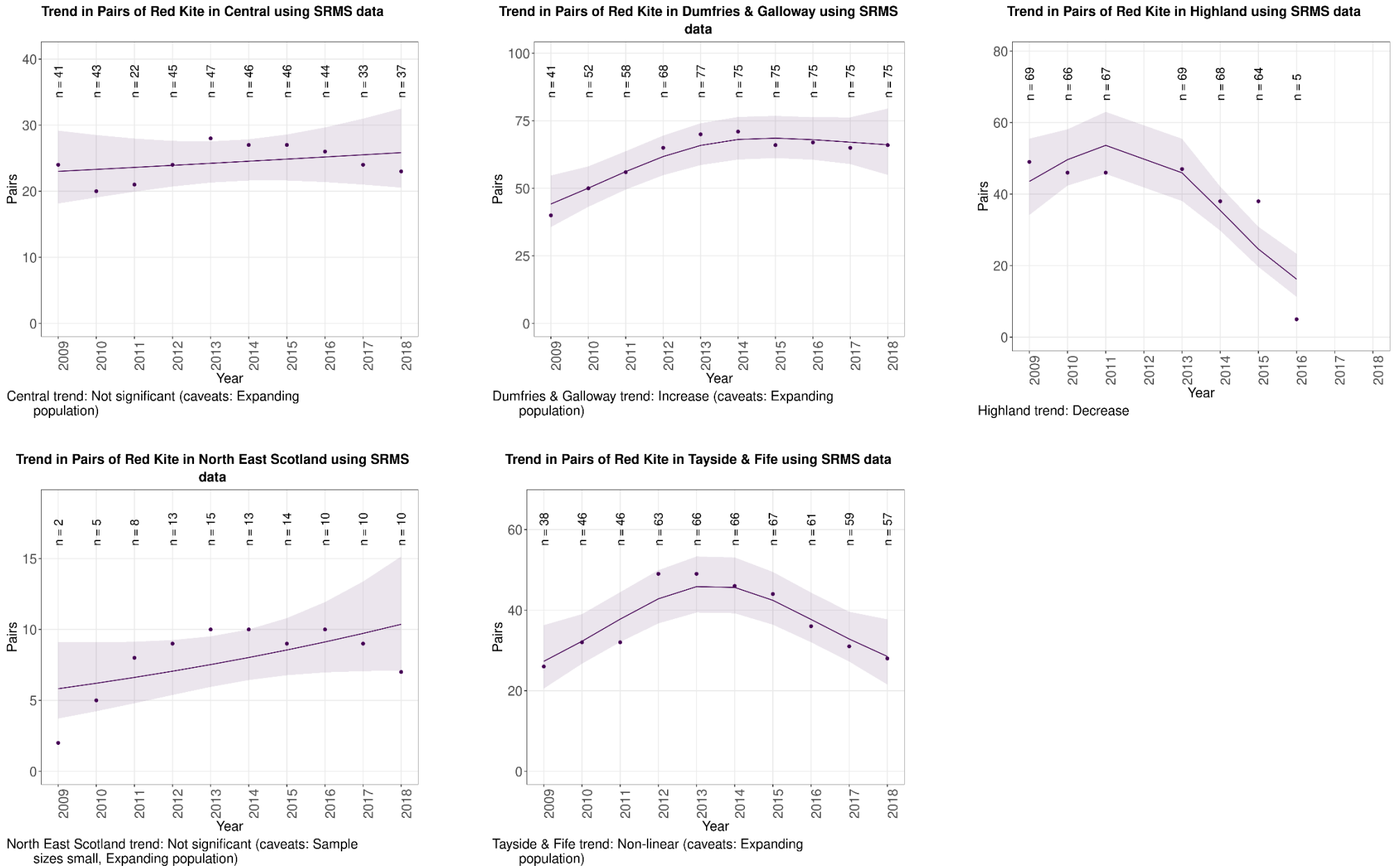


Figure 45: Trends in numbers of breeding pairs of Red Kite by SRMS region during 2009-2018.

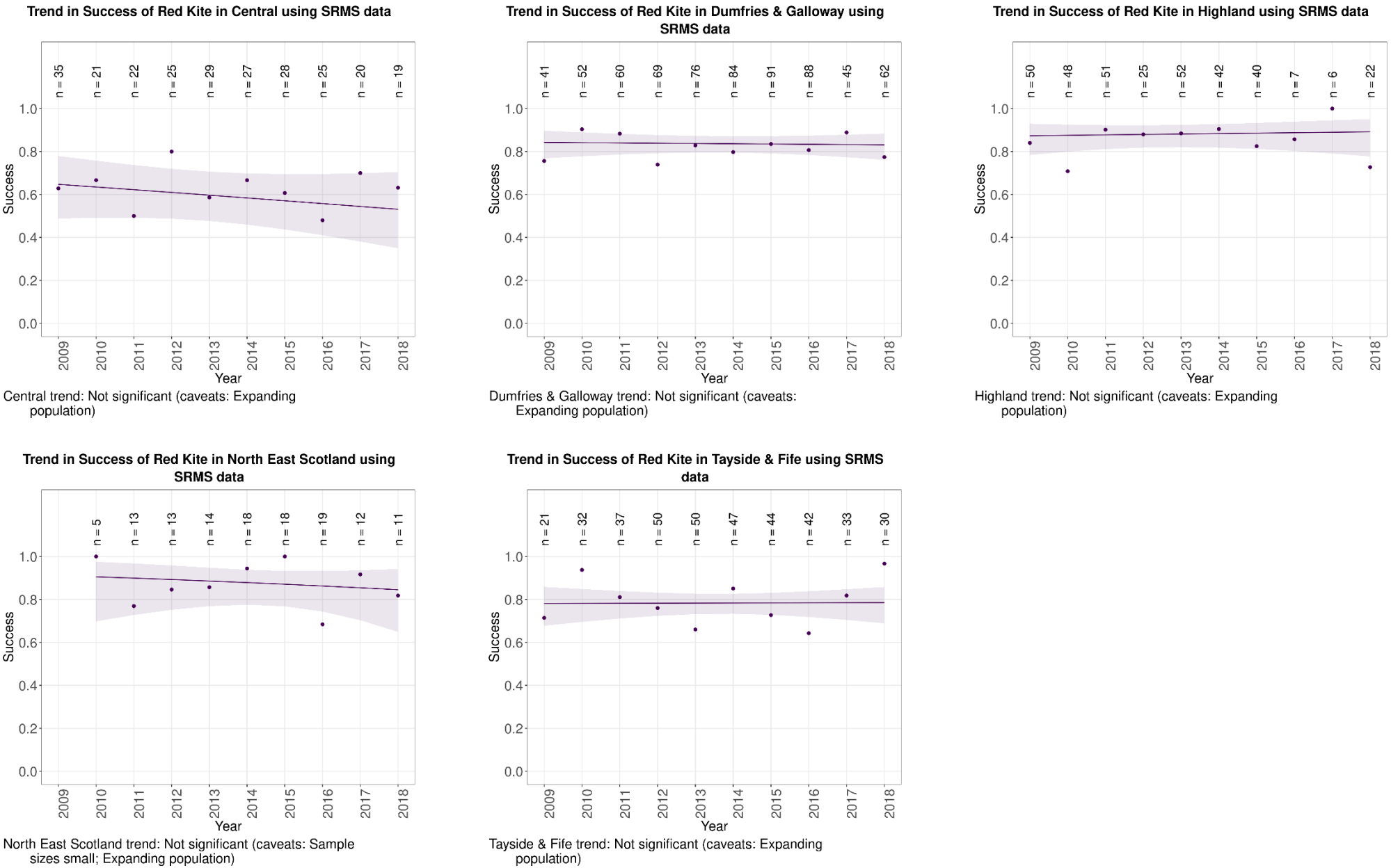


Figure 46: Trends in breeding success of Red Kite by SRMS region during 2009-2018.

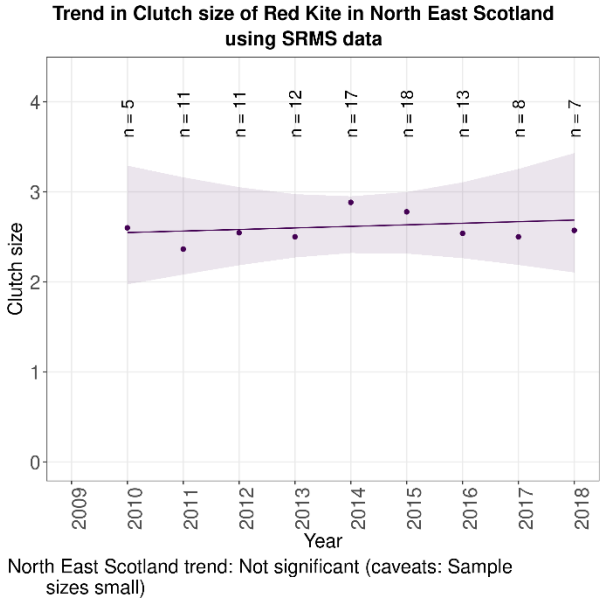


Figure 47: Trends in clutch size of Red Kite by SRMS region during 2009-2018.

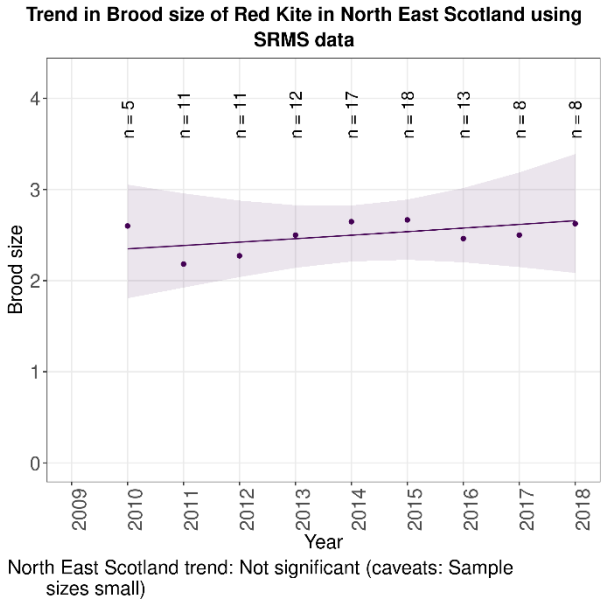
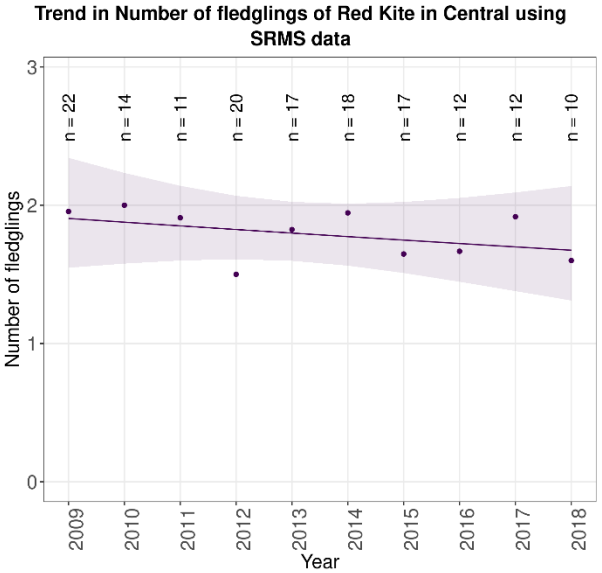
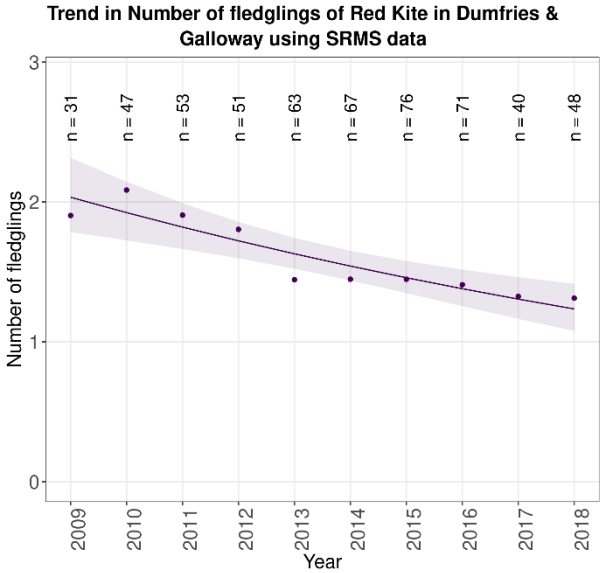


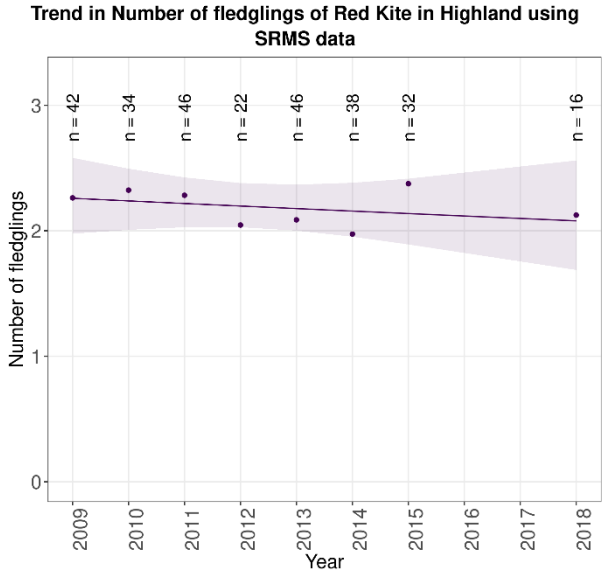
Figure 48: Trends in brood size of Red Kite by SRMS region during 2009-2018.



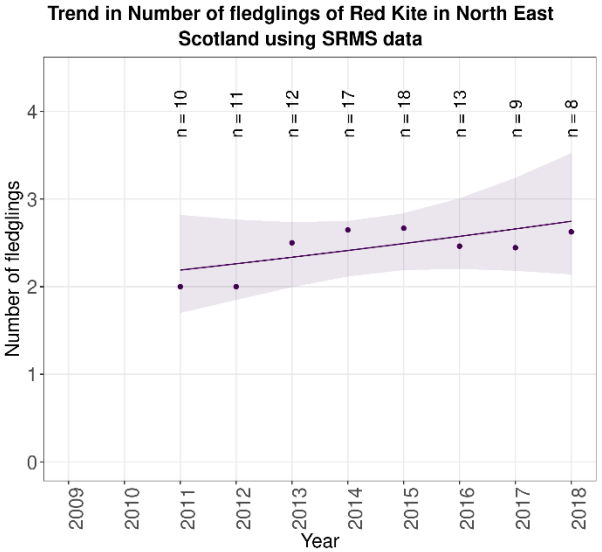
Central trend: Not significant (caveats: Sample sizes small)



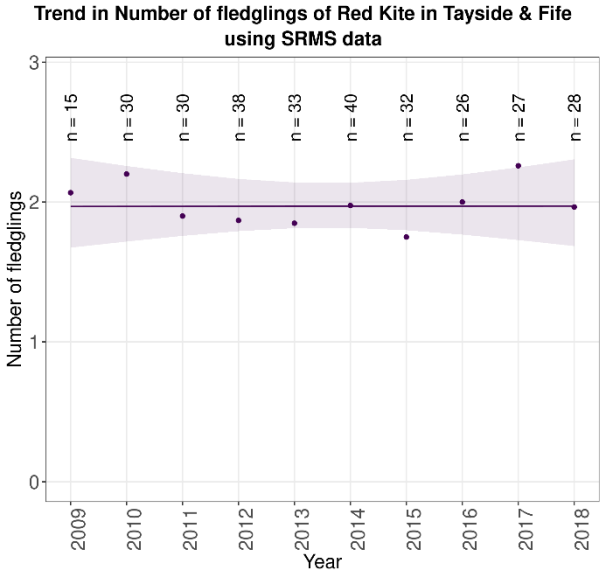
Dumfries & Galloway trend: Decrease



Highland trend: Not significant

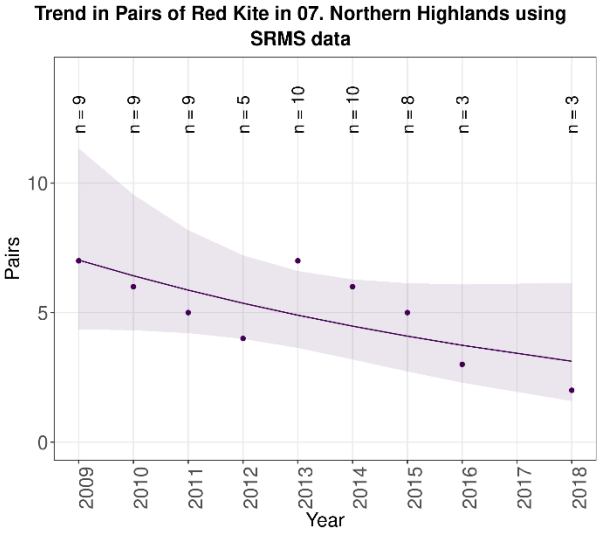


North East Scotland trend: Not significant (caveats: Sample sizes small)

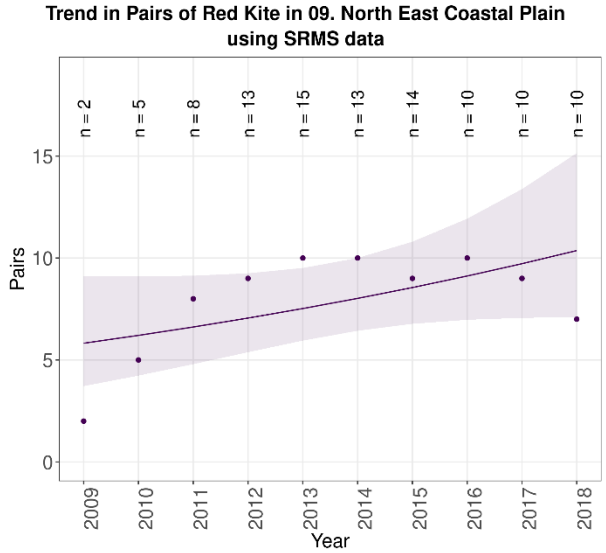


Tayside & Fife trend: Not significant

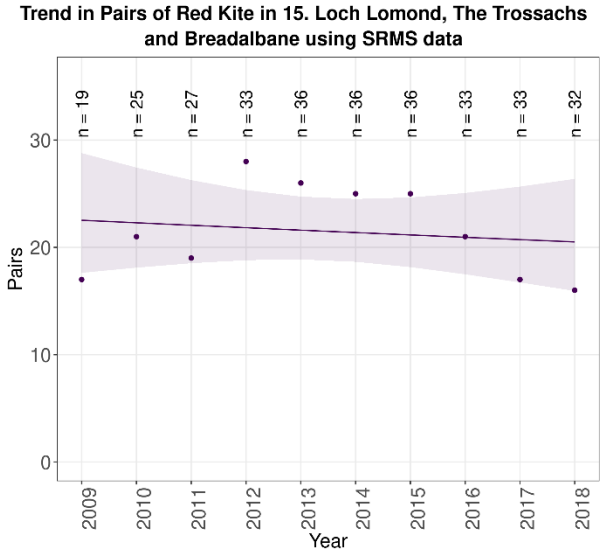
Figure 49: Trends in number of fledglings of Red Kite by SRMS region during 2009-2018.



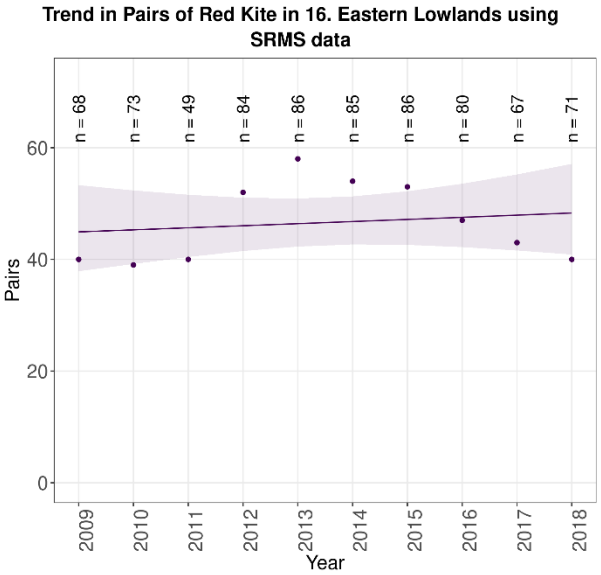
07. Northern Highlands trend: Not significant (caveats: Expanding population, Sample sizes small, Variable effort)



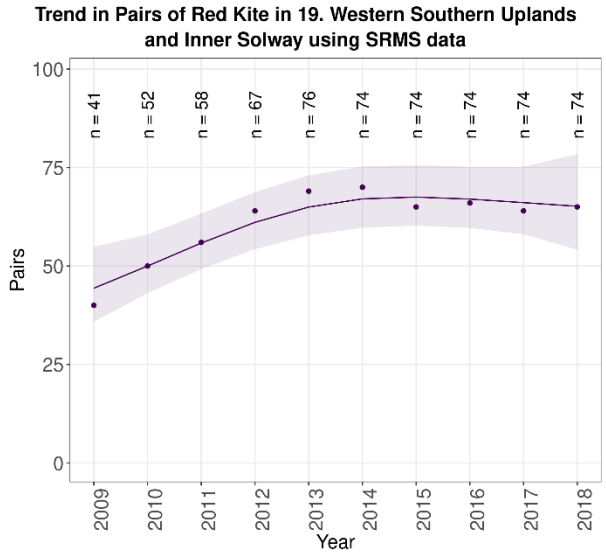
09. North East Coastal Plain trend: Not significant (caveats: Expanding population, Sample sizes small)



15. Loch Lomond, The Trossachs and Breadalbane trend: Not significant

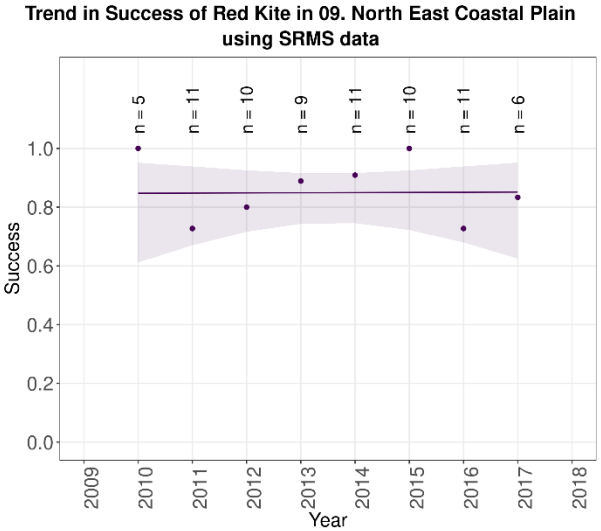


16. Eastern Lowlands trend: Not significant

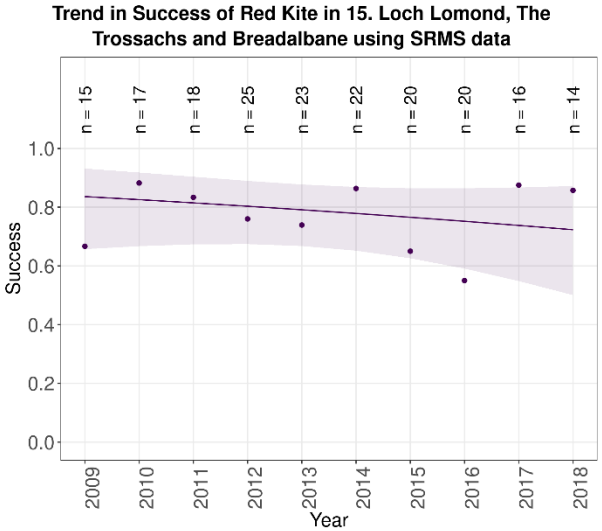


19. Western Southern Uplands and Inner Solway trend: Increase

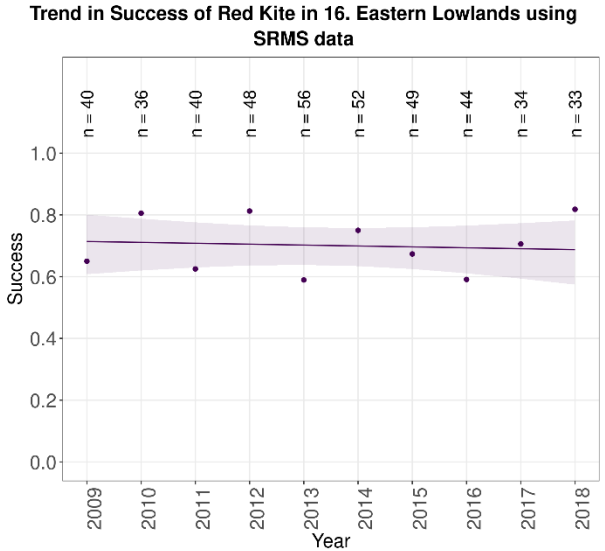
Figure 50: Trends in numbers of breeding pairs of Red Kite by NHZ region during 2009-2018.



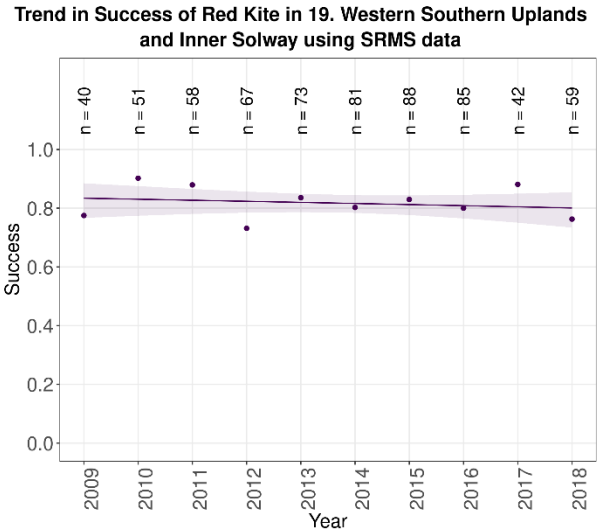
09. North East Coastal Plain trend: Not significant (caveats: Sample sizes small; Variable effort; Expanding population; No home range random effect)



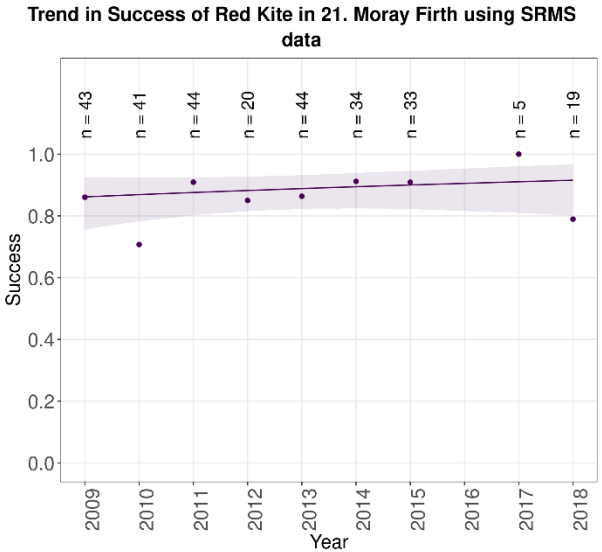
15. Loch Lomond, The Trossachs and Breadalbane trend: Not significant (caveats: Sample sizes small; Variable effort; Expanding population)



16. Eastern Lowlands trend: Not significant (caveats: Variable effort; Expanding population)

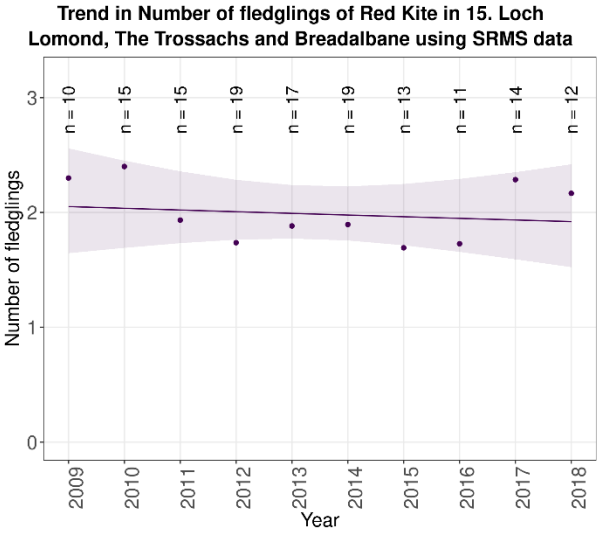


19. Western Southern Uplands and Inner Solway trend: Not significant (caveats: Variable effort; Expanding population)

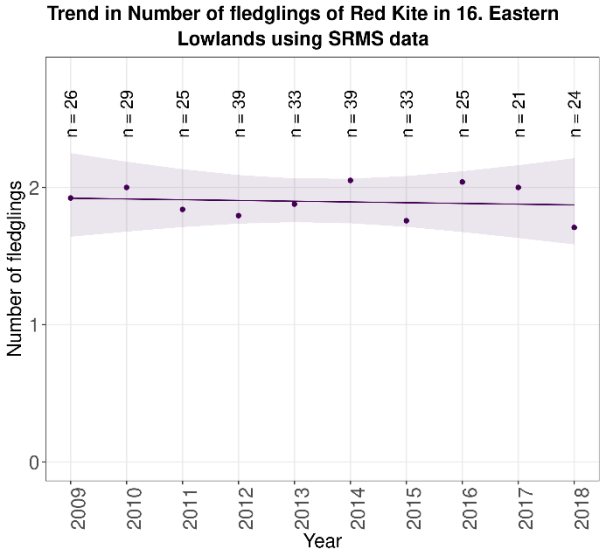


21. Moray Firth trend: Not significant (caveats: Variable effort; Expanding population)

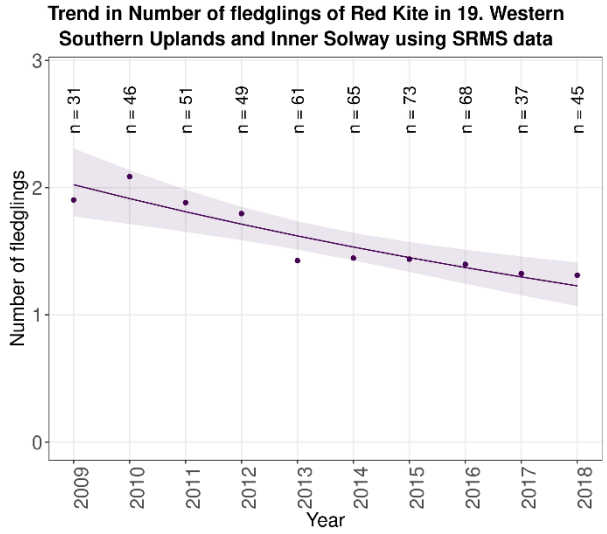
Figure 51: Trends in breeding success of Red Kite by NHZ region during 2009-2018.



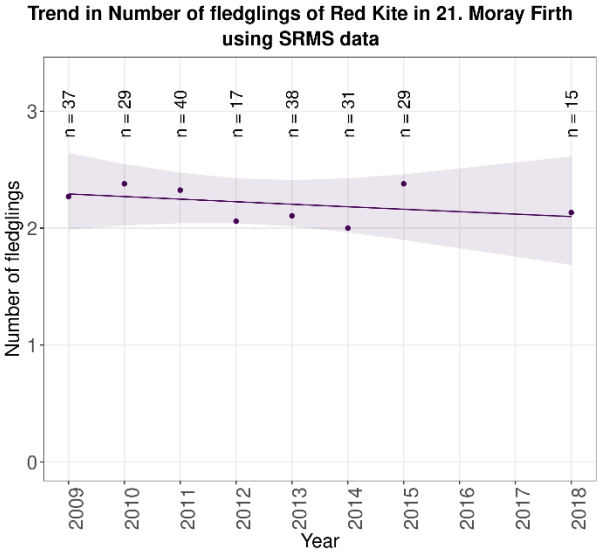
15. Loch Lomond, The Trossachs and Breadalbane trend: Not significant (caveats: Expanding population; Sample sizes small)



16. Eastern Lowlands trend: Not significant (caveats: Expanding population; No home range random effect)



19. Western Southern Uplands and Inner Solway trend: Decrease (caveats: Expanding population; No home range random effect)



21. Moray Firth trend: Not significant (caveats: Expanding population; No home range random effect)

Figure 52: Trends in number of fledglings of Red Kite by NHZ region during 2009-2018.

Table 28: Details of SRMS Regional trends for Red Kite.

Parameter	Region	First year of trend	Last year of trend	Number of years	Mean number of home ranges across years	Mean parameter value (and 95% confidence limits)	Trend during the period	Caveats	Estimated % annual change (and 95% confidence limits)
Pairs	Central	2009	2018	10	40.4	24.4 (22.5 to 26.3)	Not significant	Expanding population	1.3 (-3.0 to 5.8)
	Dumfries & Galloway	2009	2018	10	67.1	61.6 (54.5 to 68.7)	Increase	Expanding population	4.0 (1.2 to 6.9)
	Highland	2009	2016	7	58.3	38.4 (24.2 to 52.6)	Decrease		-10.8 (-15.1 to -6.2)
	North East Scotland	2009	2018	10	10.0	7.9 (6.0 to 9.8)	Not significant	Sample sizes small, Expanding population	6.6 (-1.3 to 15.2)
	Tayside & Fife	2009	2018	10	56.9	37.3 (31.0 to 43.6)	Non-linear	Expanding population	Non-linear
Success	Central	2009	2018	10	25.1	0.6 (0.6 to 0.7)	Not significant	Expanding population	-1.2 (-3.8 to 1.3)
	Dumfries & Galloway	2009	2018	10	66.8	0.8 (0.8 to 0.8)	Not significant	Expanding population	-0.1 (-1.2 to 0.9)
	Highland	2009	2018	10	34.3	0.8 (0.8 to 0.9)	Not significant	Expanding population	0.2 (-1.2 to 1.6)
	North East Scotland	2010	2018	9	13.7	0.9 (0.8 to 0.9)	Not significant	Sample sizes small; Expanding population	-0.6 (-3.0 to 1.4)
	Tayside & Fife	2009	2018	10	38.6	0.8 (0.7 to 0.8)	Not significant	Expanding population	0.0 (-1.7 to 1.7)
Clutch size	North East Scotland	2010	2018	9	11.3	2.6 (2.5 to 2.8)	Not significant	Sample sizes small	0.7 (-4.7 to 6.3)
Brood size	North East Scotland	2010	2018	9	11.4	2.5 (2.4 to 2.7)	Not significant	Sample sizes small	1.6 (-3.9 to 7.3)
Number of fledglings	Central	2009	2018	10	15.3	1.8 (1.7 to 1.9)	Not significant	Sample sizes small	-1.4 (-5.5 to 2.9)
	Dumfries & Galloway	2009	2018	10	54.7	1.6 (1.5 to 1.6)	Decrease		-5.4 (-7.8 to -2.9)
	Highland	2009	2018	8	34.5	2.2 (2.1 to 2.3)	Not significant		-0.9 (-4.2 to 2.4)
	North East Scotland	2011	2018	8	12.3	2.4 (2.3 to 2.6)	Not significant	Sample sizes small	3.3 (-2.9 to 9.9)
	Tayside & Fife	2009	2018	10	29.9	2.0 (1.9 to 2.0)	Not significant		0.0 (-3.0 to 3.1)

Table 29: Details of NHZ Regional trends for Red Kite.

Parameter	Region	First year of trend	Last year of trend	Number of years	Mean number of home ranges across years	Mean parameter value (and 95% confidence limits)	Trend during the period	Caveats	Estimated % annual change (and 95% confidence limits)
Pairs	07. Northern Highlands	2009	2018	9	7.3333	5.0 (3.7 to 6.3)	Not significant	Expanding population, Sample sizes small, Variable effort	-8.6 (-18.1 to 2.0)
	09. North East Coastal Plain	2009	2018	10	10	7.9 (6.0 to 9.8)	Not significant	Expanding population, Sample sizes small	6.6 (-1.3 to 15.2)
	15. Loch Lomond, The Trossachs and Breadalbane	2009	2018	10	31	21.5 (18.4 to 24.6)	Not significant		-1.0 (-5.5 to 3.7)
	16. Eastern Lowlands	2009	2018	10	74.9	46.6 (41.5 to 51.7)	Not significant		0.8 (-2.3 to 4.0)
	19. Western Southern Uplands and Inner Solway	2009	2018	10	66.4	60.9 (54.1 to 67.7)	Increase		3.8 (1.0 to 6.8)
Success	09. North East Coastal Plain	2010	2017	8	9.125	0.8 (0.7 to 0.9)	Not significant	Sample sizes small; Variable effort; Expanding population; No home range random effect	0.1 (-4.3 to 3.6)
Success	15. Loch Lomond, The Trossachs and Breadalbane	2009	2018	10	19	0.8 (0.7 to 0.8)	Not significant	Sample sizes small; Variable effort; Expanding population	-1.0 (-3.4 to 1.1)
	16. Eastern Lowlands	2009	2018	10	43.2	0.7 (0.7 to 0.7)	Not significant	Variable effort; Expanding population	-0.3 (-2.1 to 1.4)
	19. Western Southern Uplands and Inner Solway	2009	2018	10	64.4	0.8 (0.8 to 0.8)	Not significant	Variable effort; Expanding population	-0.3 (-1.4 to 0.7)

Parameter	Region	First year of trend	Last year of trend	Number of years	Mean number of home ranges across years	Mean parameter value (and 95% confidence limits)	Trend during the period	Caveats	Estimated % annual change (and 95% confidence limits)
	21. Moray Firth	2009	2018	9	31.444	0.9 (0.8 to 0.9)	Not significant	Variable effort; Expanding population	0.7 (-1.1 to 2.4)
Number of fledglings	15. Loch Lomond, The Trossachs and Breadalbane	2009	2018	10	14.5	2.0 (1.9 to 2.1)	Not significant	Expanding population; Sample sizes small	-0.7 (-4.9 to 3.6)
Number of fledglings	16. Eastern Lowlands	2009	2018	10	29.4	1.9 (1.8 to 2.0)	Not significant	Expanding population; No home range random effect	-0.3 (-3.3 to 2.9)
	19. Western Southern Uplands and Inner Solway	2009	2018	10	52.6	1.6 (1.5 to 1.6)	Decrease	Expanding population; No home range random effect	-5.4 (-7.8 to -2.9)
	21. Moray Firth	2009	2018	8	29.5	2.2 (2.1 to 2.3)	Not significant	Expanding population; No home range random effect	-1.0 (-4.4 to 2.5)

Table 30: Number of Red Kite home range checks for occupancy reported to the SRMS during 2009-2018, in each of the 12 SRMS Regions, with approximate proportion of estimated population monitored. At the bottom of the table, row A is the mean number of home range checks over the most recent five years. Row B gives the estimated proportion of the national population in each region, based on Bird Atlas Timed Tetrad Visit (TTV) data. The depth of red shading indicates the relative importance of each region for this species. If survey effort was spread evenly across the whole population, the ratio of A:B would not vary much between regions.

Year	ARGYLL	CENTRAL SCOTLAND	DUMFRIES & GALLOWAY	HIGHLAND	LEWIS & HARRIS	LOTHIAN & BORDERS	NORTH EAST SCOTLAND	ORKNEY	SHETLAND	SOUTH STRATHCLYDE	TAYSIDE & FIFE	UIST	Total
2009		64	42	86		3	5			0	32		232
2010		47	54	81		0	10			0	55		247
2011		26	62	84		0	21			0	56		249
2012		51	73	40		0	23			0	77		264
2013		56	84	90		0	29			0	80		339
2014		54	91	99		0	31			0	83		358
2015		53	105	100		0	36			0	96		390
2016		56	120	11		0	28			0	87		302
2017		41	131	9		2	32			0	85		300
2018		48	139	50		3	32			0	91		363
A: Mean home range checks	**No SRMS data**	**50.4**	**117.2**	**53.8**	**Absent**	**1.0**	**31.8**	**Absent**	**Absent**	**0.0**	**88.4**	**Absent**	**342.6**
B: Proportion of estimated Scottish population	0	17	29	24	0	0	2	0	0	0	27	0	100

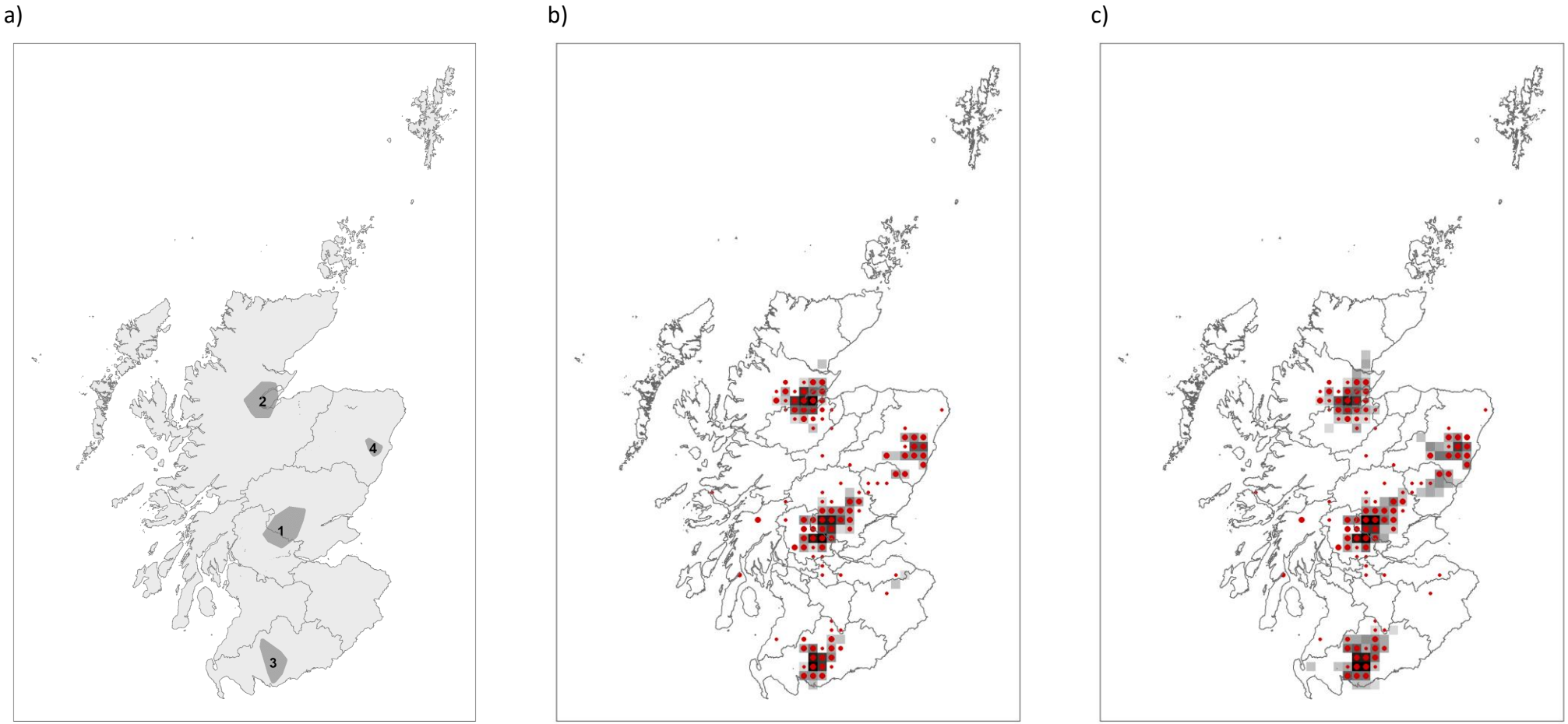


Figure 54: Areas corresponding to the clusters of home ranges from which sufficient data were reported to attempt to derive population trends for Red Kite between 2009 and 2018 (a) together with maps showing variation in the number of Red Kite records reported to SRMS during 2009-2013 (b) and 2014-2018 (c), in the context of the known Red Kite breeding distribution taken from the 2007-2011 Bird Atlas. SRMS data are depicted as grey squares with darker shading indicating more records while Bird Atlas data are depicted as red dots with the size of dot positively related to probability of breeding.

White-tailed Eagle

Figure 55: White-tailed Eagle in Wester Ross (Photo: Justin Grant, Highland RSG).

White-tailed Eagle is monitored widely across Scotland by SRMS data contributors.

Trends in breeding numbers and breeding productivity of White-tailed Eagle have previously been published for the period 1983-2015 (Roos *et. al*. 2015). This analysis showed that the population increased nationally and regionally showing a steady population growth and range expansion. There were no significant between-year differences detected for any of the breeding productivity parameters considered at a national or regional scale.

Sansom *et al*. (2016) predicts strong population growth and spread nationally and that the population could continue to grow to over 200 pairs by 2025.

Our latest analysis of SRMS White-tailed Eagle data for the period 2009-2018 has produced national trends in breeding number and productivity at a national level (Table 31), as well as for four of the seven SRMS regions (Table 32) and four of the 14 NHZ regions (Table 33) for which the SRMS holds White-tailed Eagle records.

Users of the published trends should be aware that White-tailed Eagle numerical trends make use of all records we received for the trend period, not just those drawn from clusters. This species was monitored quite comprehensively up to the last few years of the trend period, from which time an increasing number of pairs have been breeding outside of intensively monitored areas. Productivity

information is drawn from the majority of the Scottish breeding population, though trends drawn from these data may not be representative of pairs in less intensively monitored areas where there may be a higher proportion of young breeders. Consultation with data contributors has highlighted that existing monitoring is likely to under-represent growth of rapidly expanding colonist populations (e.g. in Argyll).

National trends

Nationally, breeding numbers of White-tailed Eagle have increased significantly while breeding success of White-tailed Eagle has shown no significant change (Table 31, Figure 56).

National trends for clutch size, brood size and number of fledglings all showed no significant change overall (Table 31, Figure 56).

SRMS regional trends

Breeding numbers of White-tailed Eagle increased in Argyll, with non-significant changes in the remaining three regions (Highland, Lewis & Harris and Uist) for which trends could be produced (Table 32, Figure 57).

Breeding success of White-tailed Eagle has not changed significantly in any of the three regions (Argyll, Highland and Lewis & Harris) for which trends could be produced (Table 32, Figure 58).

Trends in clutch size, brood size and number of fledglings are available for Highland (Table 32, Figures 59-61), while trends in brood size and number of fledglings are also available for Argyll (Table 32, Figures 60-61). None of these trends showed a significant change in the relevant parameters.

Trends for this species are not yet available for North East Scotland, Orkney or Tayside & Fife.

NHZ regional trends

Breeding numbers of White-tailed Eagle increased in two regions (NHZs 03 and 06), with non-significant increases in the remaining two regions (NHZs 08 and 14) for which trends could be produced (Table 33, Figure 62).

Breeding success of White-tailed Eagle did not change significantly in NHZs 03 and 06 (Table 33, Figure 63).

Clutch size, brood size and number of fledglings in NHZ 06 (Table 33, Figures 64-66), as well as clutch size and number of fledglings in NHZ 03 (Table 33, Figure 64, Figure 66), did not change significantly.

Trends for this species are not yet available for NHZs 02, 04-05, 07, 10-13 or 15-16.

Details of contributing records

896 (49 to 128 per year, mean: 90 records) from 2009-2018 contributed to this trends analysis (Table 36).

References

Roos, S., Dobson, A., Noble, D., Haworth, P., Fielding, A., Carrington-Cotton, A., Etheridge, B. & Wernham, C. 2015. Raptors in Scotland – a methodology for developing trends and indicators. Scottish Natural Heritage Commissioned Report No. 542.

Sansom, A., Evans, R. & Roos, S. 2016. Population and future range modelling of reintroduced Scottish White-tailed Eagles (*Haliaeetus albicilla*). Scottish Natural Heritage Commissioned Report No. 898.

Table 31: Summary of SRMS national trends for White-tailed Eagle during 2009-2018. Figures in parentheses indicate the annual change, with significant increases highlighted in green, significant decreases highlighted in blue and non-significant changes highlighted in grey. '—' indicates where the species occurs but no trend is available. 'No SRMS data' indicates where the SRMS does not hold any records for the region of interest.

	Pairs	Success	Clutch size	Brood size	Number of fledglings
Scotland	**Increase [a x] (5.4%)**	Not significant [x]	Not significant [s]	Not significant [x]	Not significant [x]

[a] All data used, [s] Sample sizes small, [x] Expanding population

Table 32: Summary of SRMS regional trends for White-tailed Eagle during 2009-2018. Figures in parentheses indicate the annual change, with significant increases highlighted in green and non-significant changes highlighted in grey. '—' indicates where the species occurs but no trend is available. 'No SRMS data' indicates where the SRMS does not hold any records for the region of interest. 'Absent' indicates where the species is not known to breed.

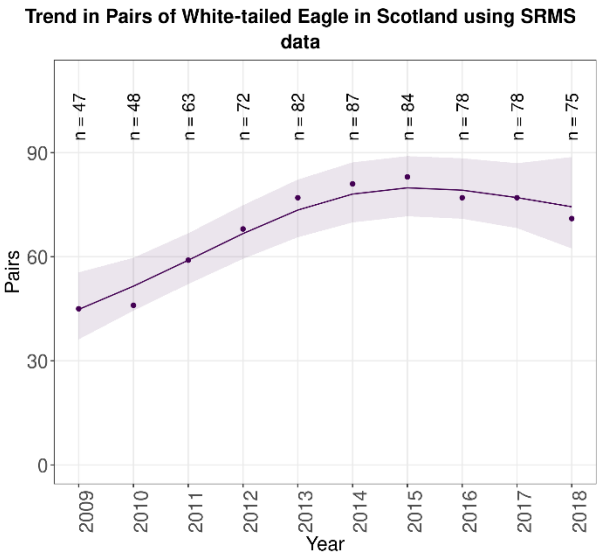
SRMS Region	Pairs	Success	Clutch size	Brood size	Number of fledglings
Argyll	**Increase [a,x] (5.8%)**	Not significant [x]	—	Not significant [s]	Not significant [s]
Central	Absent	Absent	Absent	Absent	Absent
Dumfries & Galloway	Absent	Absent	Absent	Absent	Absent
Highland	Not significant [a,x]	Not significant [x]	Not significant [s]	Not significant [s]	Not significant [s]
Lewis & Harris	Not significant [a,s,x]	Not significant [s,x]	—	—	—
Lothian & Borders	Absent	Absent	Absent	Absent	Absent
North East Scotland	—	—	—	—	—
Orkney	—	—	—	—	—
Shetland	Absent	Absent	Absent	Absent	Absent
South Strathclyde	Absent	Absent	Absent	Absent	Absent
Tayside & Fife	—	—	—	—	—
Uist	Not significant	—	—	—	—

[a] All data used, [s] Sample sizes small, [x] Expanding population.

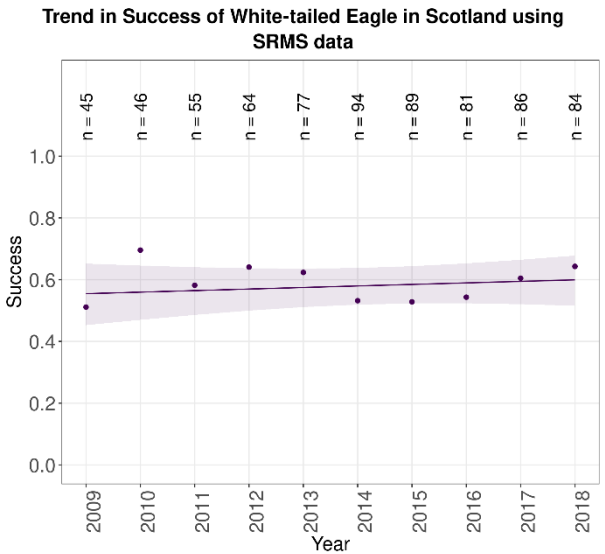
Table 33: Summary of NHZ regional trends for White-tailed Eagle during 2009-2018. Figures in parentheses indicate the annual change, with significant increases highlighted in green and non-significant changes highlighted in grey. '—' indicates where the species occurs but no trend is available. 'No SRMS data' indicates where the SRMS does not hold any records for the region of interest. 'Absent' indicates where the species is not known to breed.

NHZ Region	Pairs	Success	Clutch size	Brood size	Number of fledglings
01. Shetland	Absent	Absent	Absent	Absent	Absent
02. North Caithness and Orkney	—	—	—	—	—
03. Coll, Tiree and the Western Isles	**Increase [a x] (6.4%)**	Not significant [x]	Not significant [r s x]	—	Not significant [s x]
04. North West Seaboard	—	—	—	—	—
05. The Peatlands of Caithness and Sutherland	—	—	—	—	—
06. Western Seaboard	**Increase [a x] (4.9%)**	Not significant [x]	Not significant [r s x]	Not significant [r s x]	Not significant [s x]
07. Northern Highlands	—	—	—	—	—
08. Western Highlands	Not significant [a x]	—	—	—	—
09. North East Coastal Plain	Absent	Absent	Absent	Absent	Absent
10. Central Highlands	—	—	—	—	—
11. Cairngorm Massif	—	—	—	—	—
12. North East Glens	—	—	—	—	—
13. East Lochaber	—	—	—	—	—
14. Argyll West and Islands	Not significant [a x]	—	—	—	—
15. Loch Lomond, The Trossachs and Breadalbane	—	—	—	—	—
16. Eastern Lowlands	—	—	—	—	—
17. West Central Belt	Absent	Absent	Absent	Absent	Absent
18. Wigtown Machairs and Outer Solway Coast	Absent	Absent	Absent	Absent	Absent
19. Western Southern Uplands and Inner Solway	Absent	Absent	Absent	Absent	Absent
20. Border Hills	Absent	Absent	Absent	Absent	Absent
21. Moray Firth	Absent	Absent	Absent	Absent	Absent

[a] All data used, [r] No home range random effect, [s] Sample sizes small, [x] Expanding population.



Scotland trend: Increase (caveats: Expanding population; All data used)



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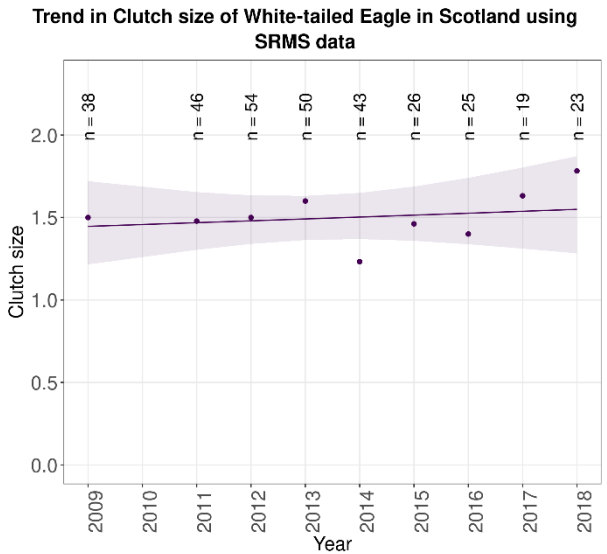

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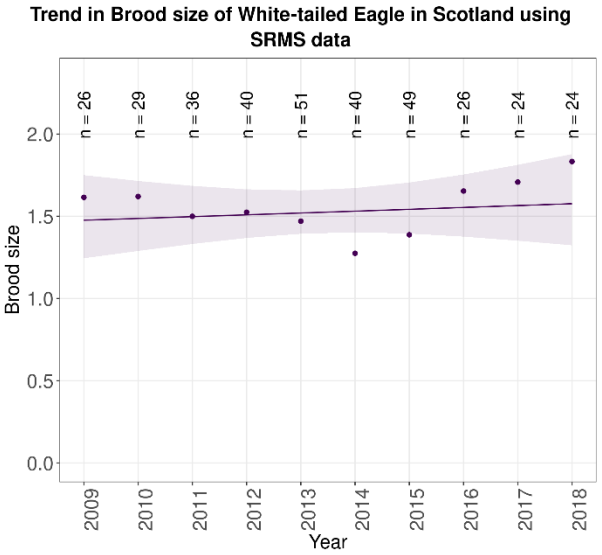
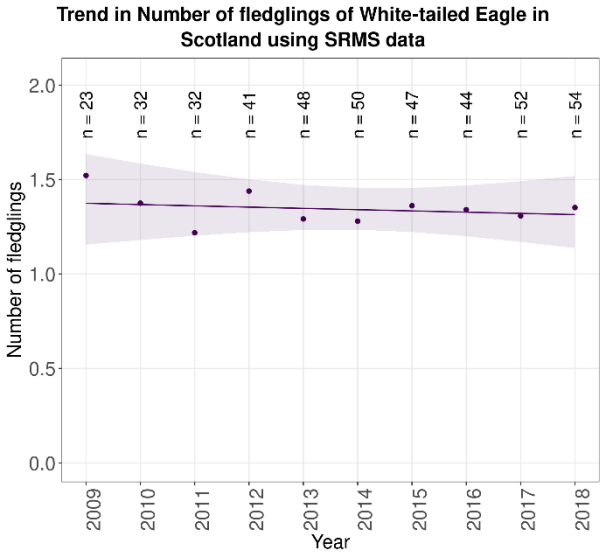
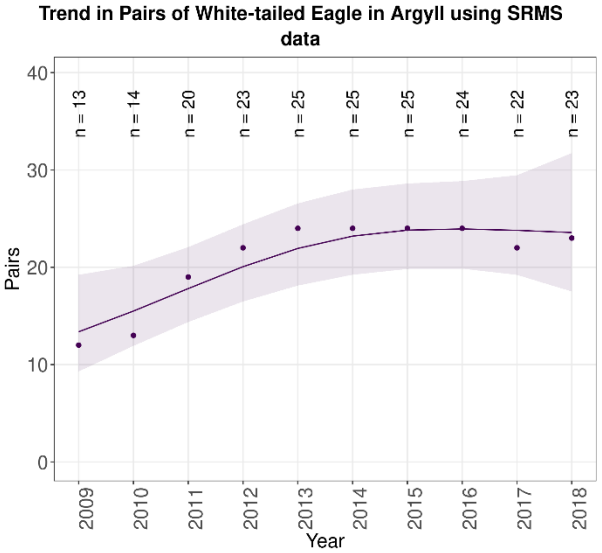


Scotland trend: Not significant (caveats: Expanding population)

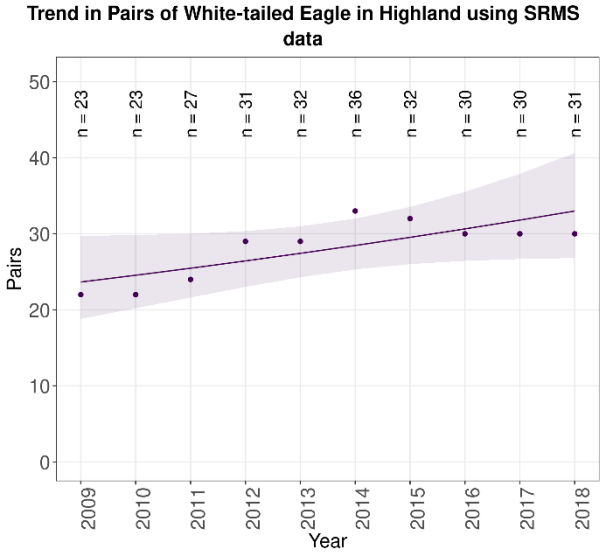


Scotland trend: Not significant (caveats: Expanding population)

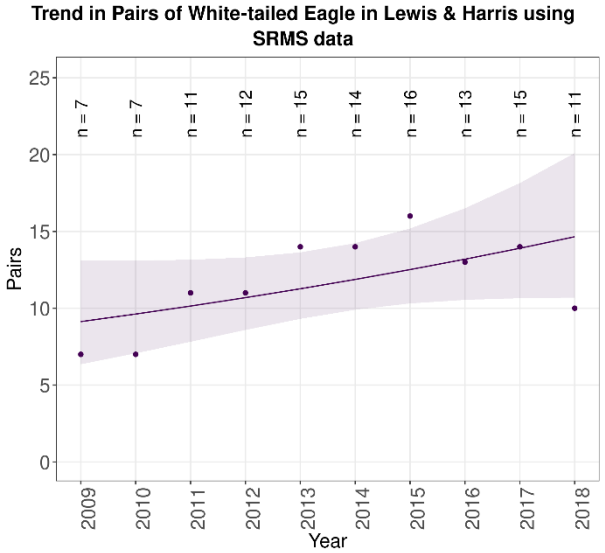
Figure 56: Trends in breeding pairs, success, clutch size, brood size and number of fledglings of White-tailed Eagle in Scotland during 2009-2018.



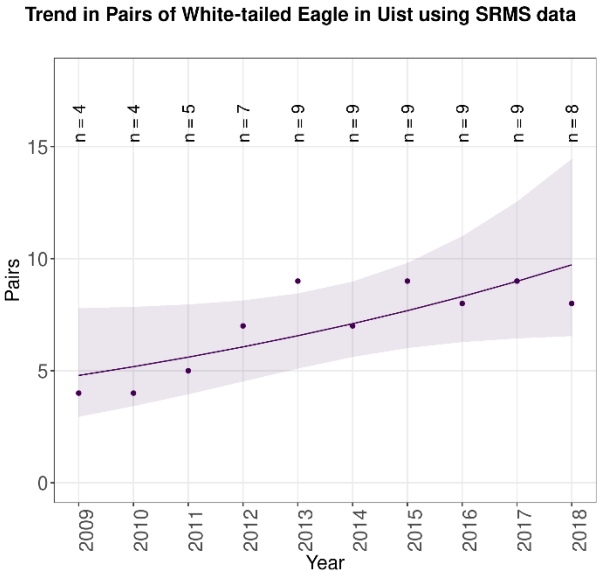
Argyll trend: Increase (caveats: Expanding population, All data used)



Highland trend: Not significant (caveats: Expanding population, All data used)

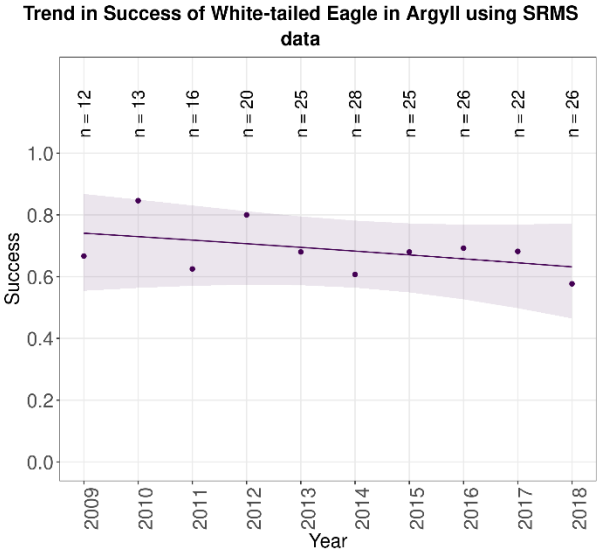


Lewis & Harris trend: Not significant (caveats: Expanding population, Sample sizes small, All data used)

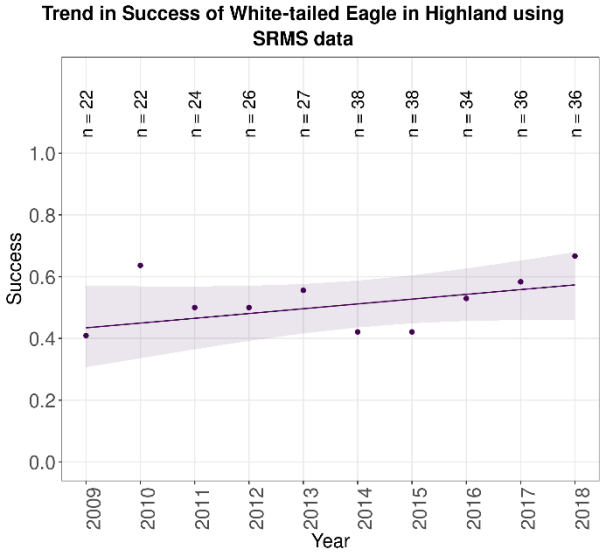


Uist trend: Not significant

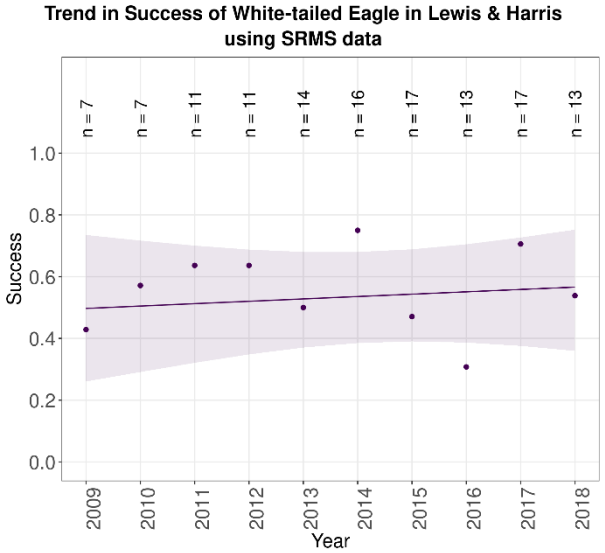
Figure 57: Trends in numbers of breeding pairs of White-tailed Eagle by SRMS region during 2009-2018.



Argyll trend: Not significant (caveats: Expanding population)



Highland trend: Not significant (caveats: Expanding population)



Lewis & Harris trend: Not significant (caveats: Sample sizes small; Expanding population)

Figure 58: Trends in breeding success of White-tailed Eagle by SRMS region during 2009-2018.

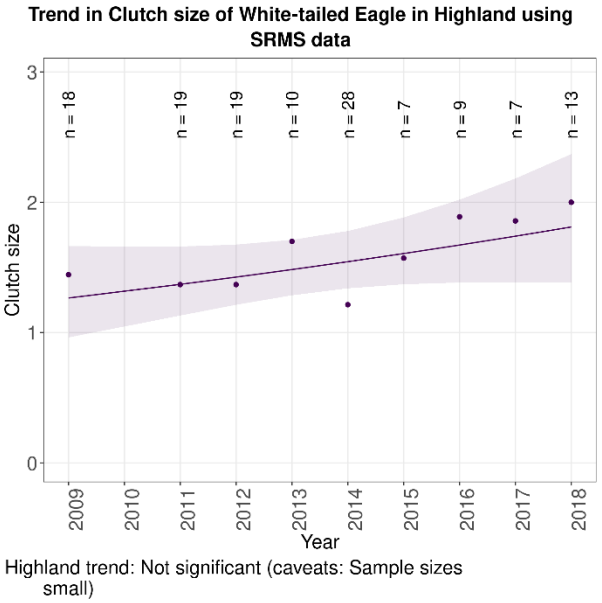
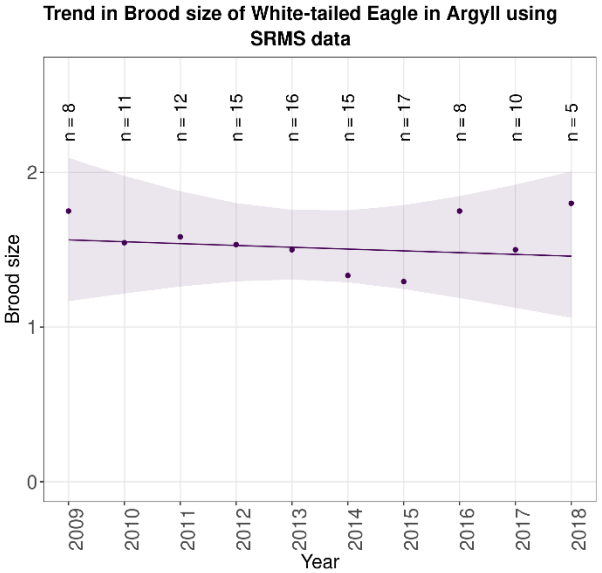
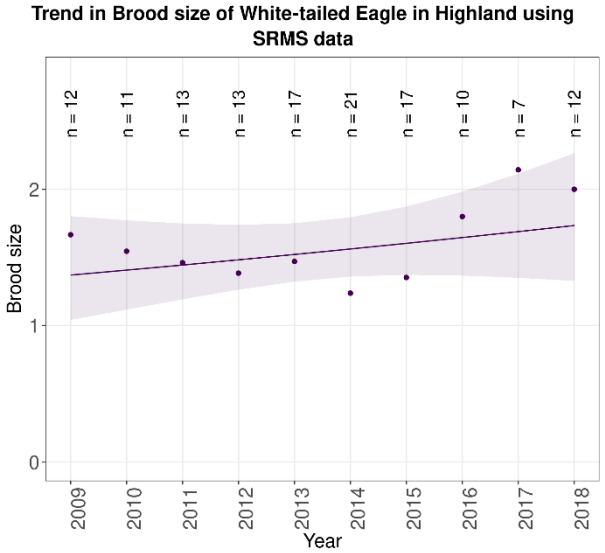


Figure 59: Trends in clutch size of White-tailed Eagle by SRMS region during 2009-2018.

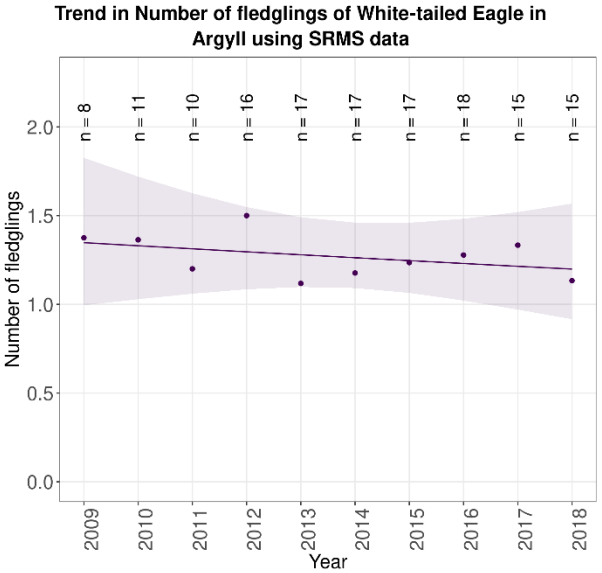


Argyll trend: Not significant (caveats: Sample sizes small)

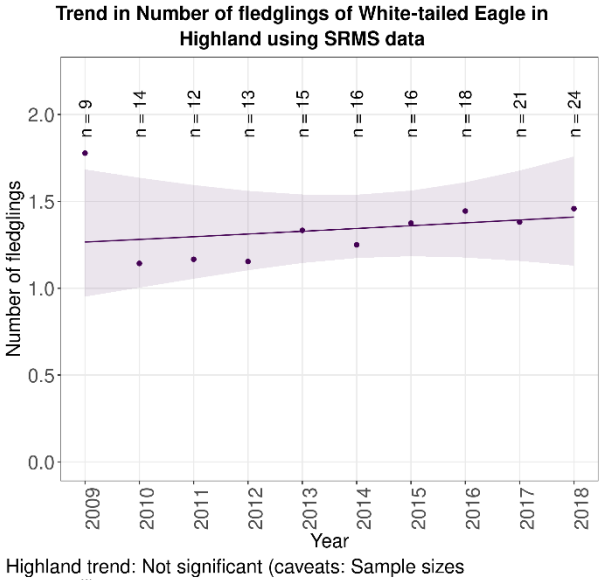


Highland trend: Not significant (caveats: Sample sizes small)

Figure 60: Trends in brood size of White-tailed Eagle by SRMS region during 2009-2018.

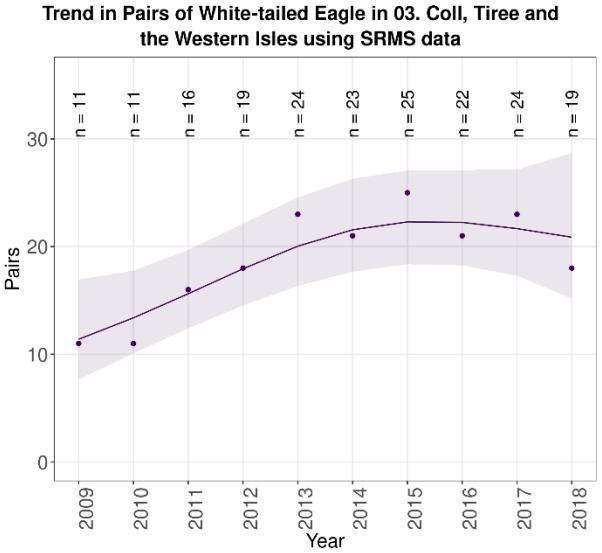


Argyll trend: Not significant (caveats: Sample sizes small)

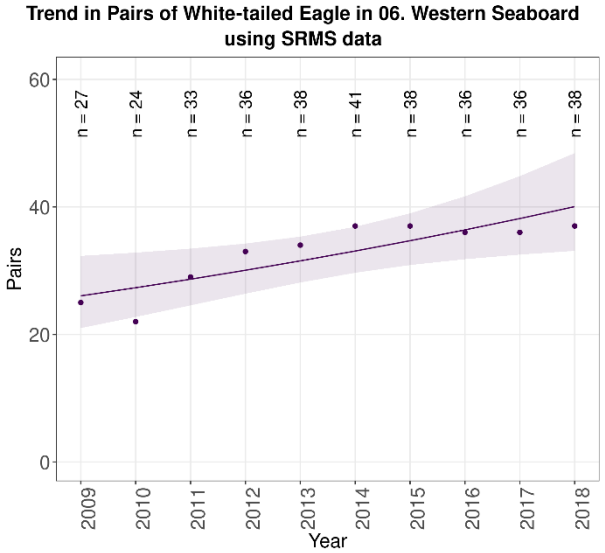


Highland trend: Not significant (caveats: Sample sizes small)

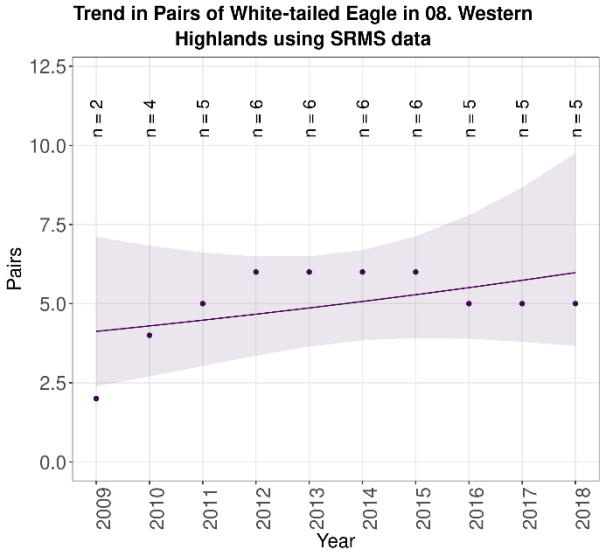
Figure 61: Trends in number of fledglings of White-tailed Eagle by SRMS region during 2009-2018.



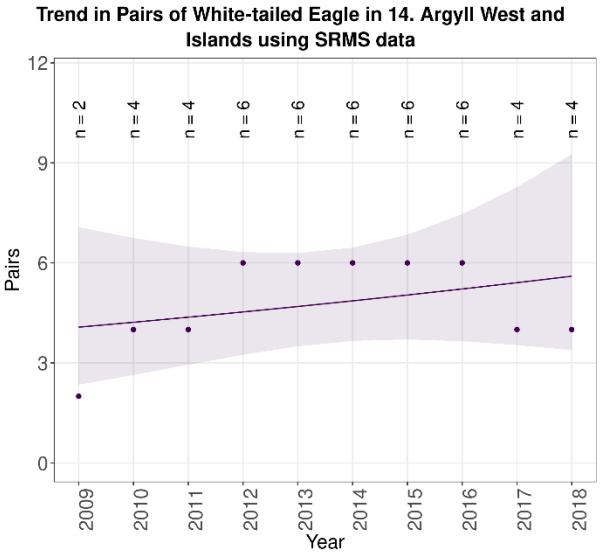
03. Coll, Tiree and the Western Isles trend: Increase (caveats: Expanding population, All data used)



06. Western Seaboard trend: Increase (caveats: Expanding population, All data used)

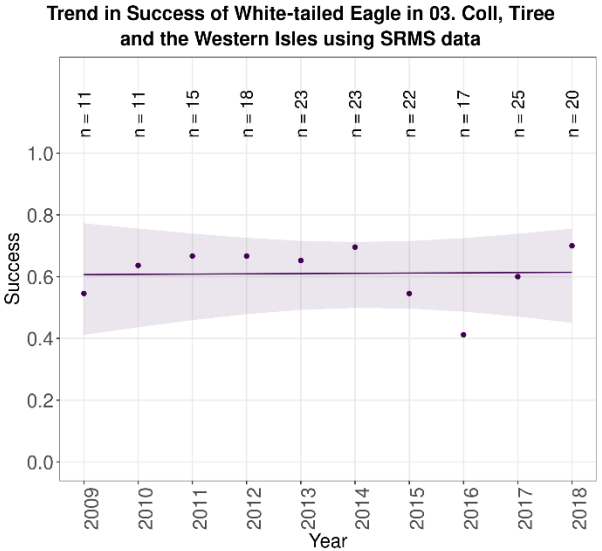


08. Western Highlands trend: Not significant (caveats: Expanding population, All data used)

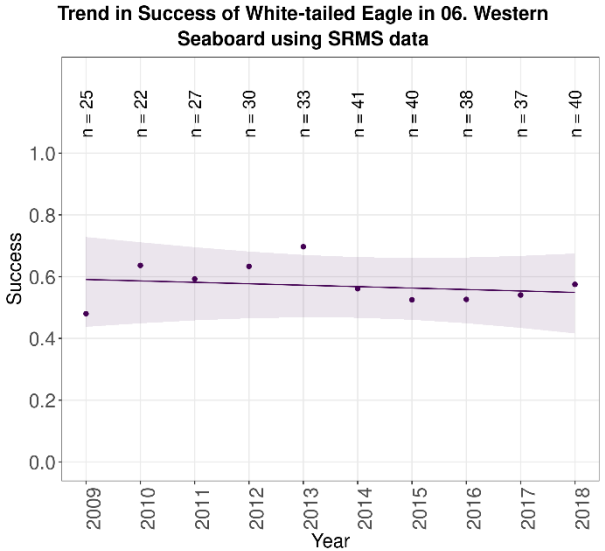


14. Argyll West and Islands trend: Not significant (caveats: Expanding population, All data used)

Figure 62: Trends in breeding pairs of White-tailed Eagle by NHZ region during 2009-2018

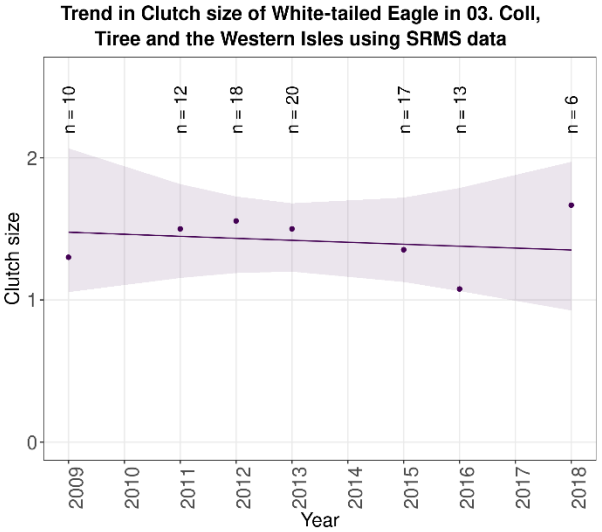


03. Coll, Tiree and the Western Isles trend: Not significant (caveats: Expanding population)

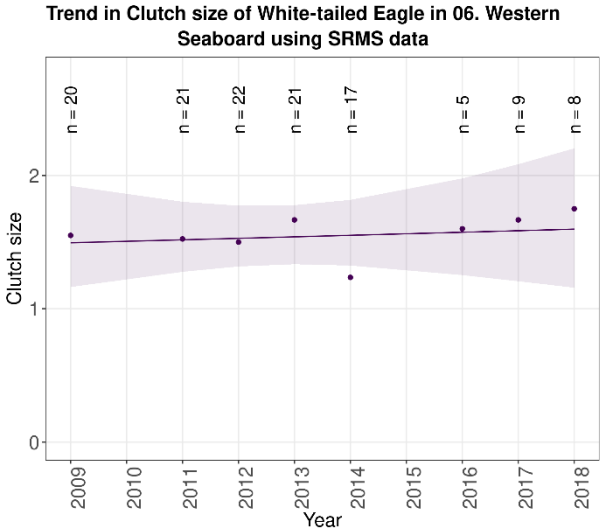


06. Western Seaboard trend: Not significant (caveats: Expanding population)

Figure 63: Trends in breeding success of White-tailed Eagle by NHZ region during 2009-2018.

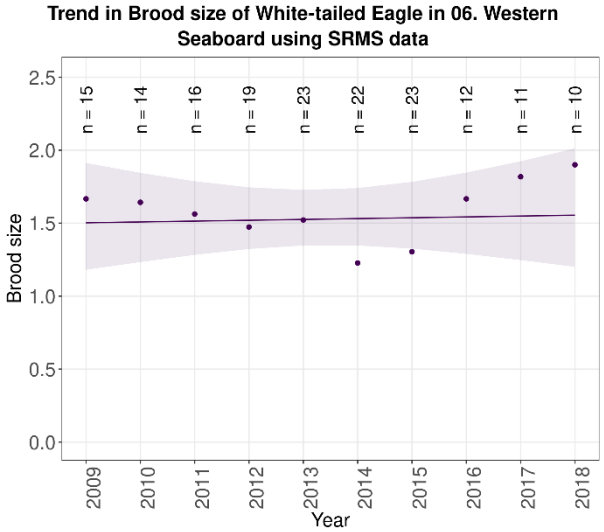


03. Coll, Tiree and the Western Isles trend: Not significant (caveats: Expanding population; Sample sizes small; No home range random effect)



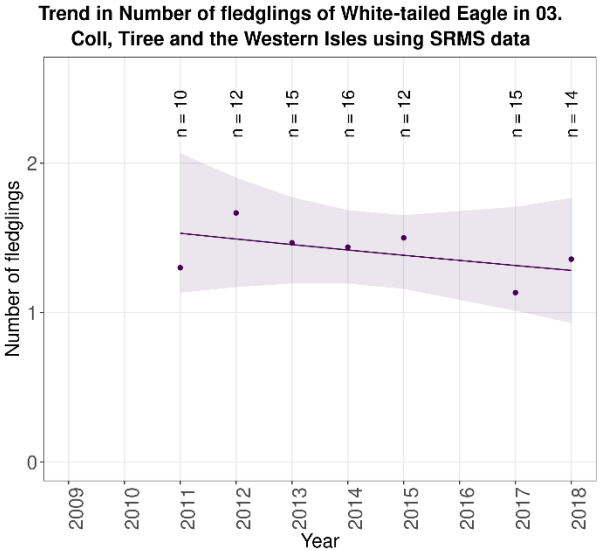
06. Western Seaboard trend: Not significant (caveats: Expanding population; Sample sizes small; No home range random effect)

Figure 64: Trends in clutch size of White-tailed Eagle by NHZ region during 2009-2018.

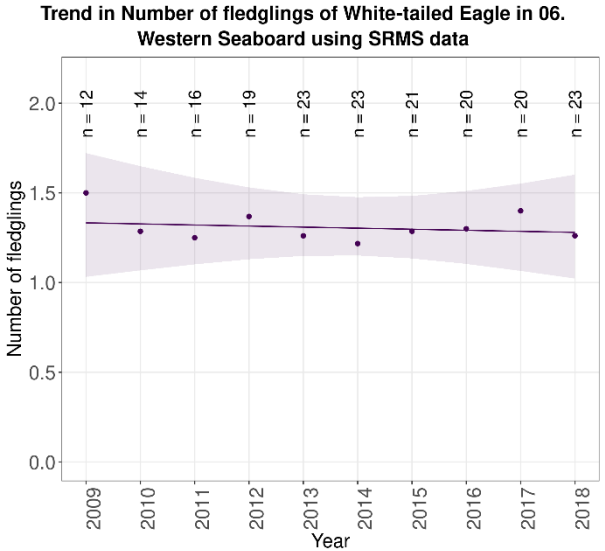


06. Western Seaboard trend: Not significant (caveats: Expanding population; Sample sizes small; No home range random effect)

Figure 65: Trends in brood size of White-tailed Eagle by NHZ region during 2009-2018.



03. Coll, Tiree and the Western Isles trend: Not significant (caveats: Expanding population; Sample sizes small)



06. Western Seaboard trend: Not significant (caveats: Expanding population; Sample sizes small)

Figure 66: Trends in number of fledglings of White-tailed Eagle by NHZ region during 2009-2018.

Table 34: Details of SRMS Regional trends for White-tailed Eagle.

Parameter	Region	First year of trend	Last year of trend	Number of years	Mean number of home ranges across years	Mean parameter value (and 95% confidence limits)	Trend during the period	Caveats	Estimated % annual change (and 95% confidence limits)
Pairs	Scotland	2009	2018	10	71.4	68.4 (58.5 to 78.3)	Increase	Expanding population; All data used	5.4 (2.7 to 8.2)
	Argyll	2009	2018	10	21.4	20.7 (17.4 to 24.0)	Increase	Expanding population, All data used	5.8 (0.9 to 11.0)
	Highland	2009	2018	10	29.5	28.1 (25.2 to 31.0)	Not significant	Expanding population, All data used	3.8 (-0.4 to 8.1)
	Lewis & Harris	2009	2018	10	12.1	11.7 (9.5 to 13.9)	Not significant	Expanding population, Sample sizes small, All data used	5.4 (-1.1 to 12.3)
	Uist	2009	2018	10	7.3	7.0 (5.6 to 8.4)	Not significant		8.2 (-0.4 to 17.5)
Success	Scotland	2009	2018	10	72.1	0.6 (0.5 to 0.6)	Not significant	Expanding population	0.5 (-1.0 to 2.0)
	Argyll	2009	2018	10	21.3	0.7 (0.6 to 0.7)	Not significant	Expanding population	-1.1 (-3.5 to 1.2)
	Highland	2009	2018	10	30.3	0.5 (0.5 to 0.6)	Not significant	Expanding population	1.5 (-0.6 to 3.7)
	Lewis & Harris	2009	2018	10	12.6	0.6 (0.5 to 0.7)	Not significant	Sample sizes small; Expanding population	0.8 (-3.1 to 4.7)
Clutch size	Scotland	2009	2018	9	36.0	1.5 (1.4 to 1.5)	Not significant	Sample sizes small	0.8 (-2.7 to 4.4)
	Highland	2009	2018	9	14.4	1.5 (1.4 to 1.6)	Not significant	Sample sizes small	4.1 (-1.2 to 9.6)
Brood size	Scotland	2009	2018	10	34.5	1.5 (1.5 to 1.6)	Not significant	Expanding population	0.7 (-2.6 to 4.1)
Brood size	Argyll	2009	2018	10	11.7	1.5 (1.4 to 1.6)	Not significant	Sample sizes small	-0.8 (-6.5 to 5.3)
	Highland	2009	2018	10	13.3	1.5 (1.5 to 1.6)	Not significant	Sample sizes small	2.6 (-2.5 to 8.1)
Number of fledglings	Scotland	2009	2018	10	42.3	1.3 (1.3 to 1.4)	Not significant	Expanding population	-0.5 (-3.5 to 2.6)
	Argyll	2009	2018	10	14.4	1.3 (1.2 to 1.3)	Not significant	Sample sizes small	-1.3 (-6.5 to 4.3)
	Highland	2009	2018	10	15.8	1.3 (1.3 to 1.4)	Not significant	Sample sizes small	1.2 (-3.5 to 6.1)

Table 35: Details of NHZ Regional trends for White-tailed Eagle.

Parameter	Region	First year of trend	Last year of trend	Number of years	Mean number of home ranges across years	Mean parameter value (and 95% confidence limits)	Trend during the period	Caveats	Estimated % annual change (and 95% confidence limits)
Pairs	Scotland	2009	2018	10	71.4	68.4 (58.5 to 78.3)	Increase	Expanding population; All data used	5.4 (2.7 to 8.2)
	03. Coll, Tiree and the Western Isles	2009	2018	10	19.4	18.7 (15.2 to 22.2)	Increase	Expanding population, All data used	6.4 (1.2 to 11.9)
	06. Western Seaboard	2009	2018	10	34.7	32.6 (28.7 to 36.5)	Increase	Expanding population, All data used	4.9 (1.0 to 9.0)
	08. Western Highlands	2009	2018	10	5	5.0 (4.1 to 5.9)	Not significant	Expanding population, All data used	4.2 (-5.4 to 14.8)
	14. Argyll West and Islands	2009	2018	10	4.8	4.8 (3.8 to 5.8)	Not significant	Expanding population, All data used	3.6 (-6.1 to 14.4)
Success	Scotland	2009	2018	10	72.1	0.6 (0.5 to 0.6)	Not significant	Expanding population	0.5 (-1.0 to 2.0)
	03. Coll, Tiree and the Western Isles	2009	2018	10	18.5	0.6 (0.5 to 0.7)	Not significant	Expanding population	0.1 (-3.0 to 3.0)
	06. Western Seaboard	2009	2018	10	33.3	0.6 (0.5 to 0.6)	Not significant	Expanding population	-0.5 (-2.7 to 1.7)
Clutch size	Scotland	2009	2018	9	36	1.5 (1.4 to 1.5)	Not significant		0.8 (-2.7 to 4.4)
	03. Coll, Tiree and the Western Isles	2009	2018	7	13.714	1.4 (1.3 to 1.5)	Not significant	Expanding population; Sample sizes small; No home range random effect	-1.0 (-7.7 to 6.2)
	06. Western Seaboard	2009	2018	8	15.375	1.5 (1.4 to 1.6)	Not significant	Expanding population; Sample sizes small; No home range random effect	0.7 (-4.6 to 6.4)
Brood size	Scotland	2009	2018	10	34.5	1.5 (1.5 to 1.6)	Not significant		0.7 (-2.6 to 4.1)
	06. Western Seaboard	2009	2018	10	16.5	1.5 (1.4 to 1.6)	Not significant	Expanding population; Sample sizes small; No home range random effect	0.4 (-4.3 to 5.3)
Number of fledglings	Scotland	2009	2018	10	42.3	1.3 (1.3 to 1.4)	Not significant		-0.5 (-3.5 to 2.6)

Parameter	Region	First year of trend	Last year of trend	Number of years	Mean number of home ranges across years	Mean parameter value (and 95% confidence limits)	Trend during the period	Caveats	Estimated % annual change (and 95% confidence limits)
	03. Coll, Tiree and the Western Isles	2011	2018	7	13.429	1.4 (1.3 to 1.5)	Not significant	Expanding population; Sample sizes small	-2.5 (-9.5 to 5.0)
	06. Western Seaboard	2009	2018	10	19.1	1.3 (1.2 to 1.4)	Not significant	Expanding population; Sample sizes small	-0.5 (-4.9 to 4.2)

Table 36: Number of White-tailed Eagle home range checks for occupancy reported to the SRMS during 2009-2018, in each of the 12 SRMS Regions, with approximate proportion of estimated population monitored. At the bottom of the table, row A is the mean number of home range checks over the most recent five years. Row B gives the estimated proportion of the national population in each region, based on Bird Atlas Timed Tetrad Visit (TTV) data. The depth of red shading indicates the relative importance of each region for this species. If survey effort was spread evenly across the whole population, the ratio of A:B would not vary much between regions.

Year	ARGYLL	CENTRAL SCOTLAND	DUMFRIES & GALLOWAY	HIGHLAND	LEWIS & HARRIS	LOTHIAN & BORDERS	NORTH EAST SCOTLAND	ORKNEY	SHETLAND	SOUTH STRATHCLYDE	TAYSIDE & FIFE	UIST	Total
2009	13			24	8		0	0			0	5	50
2010	14			23	8		0	0			0	4	49
2011	20			27	11		0	0			0	6	64
2012	23			30	12		0	0			0	7	72
2013	26			32	15		0	0			2	9	84
2014	31			47	17		0	1			4	9	109
2015	31			44	19		0	1			3	9	107
2016	29			47	16		0	1			3	10	106
2017	33			54	25		1	1			3	10	127
2018	37			53	22		1	1			3	11	128
A: Mean home range checks	**32.2**	**Absent**	**Absent**	**49.0**	**19.8**	**Absent**	**0.4**	**1.0**	**Absent**	**Absent**	**3.2**	**9.8**	**115.4**
B: Proportion of estimated Scottish population	32	0	0	48	15	0	0	0	0	0	0	6	100

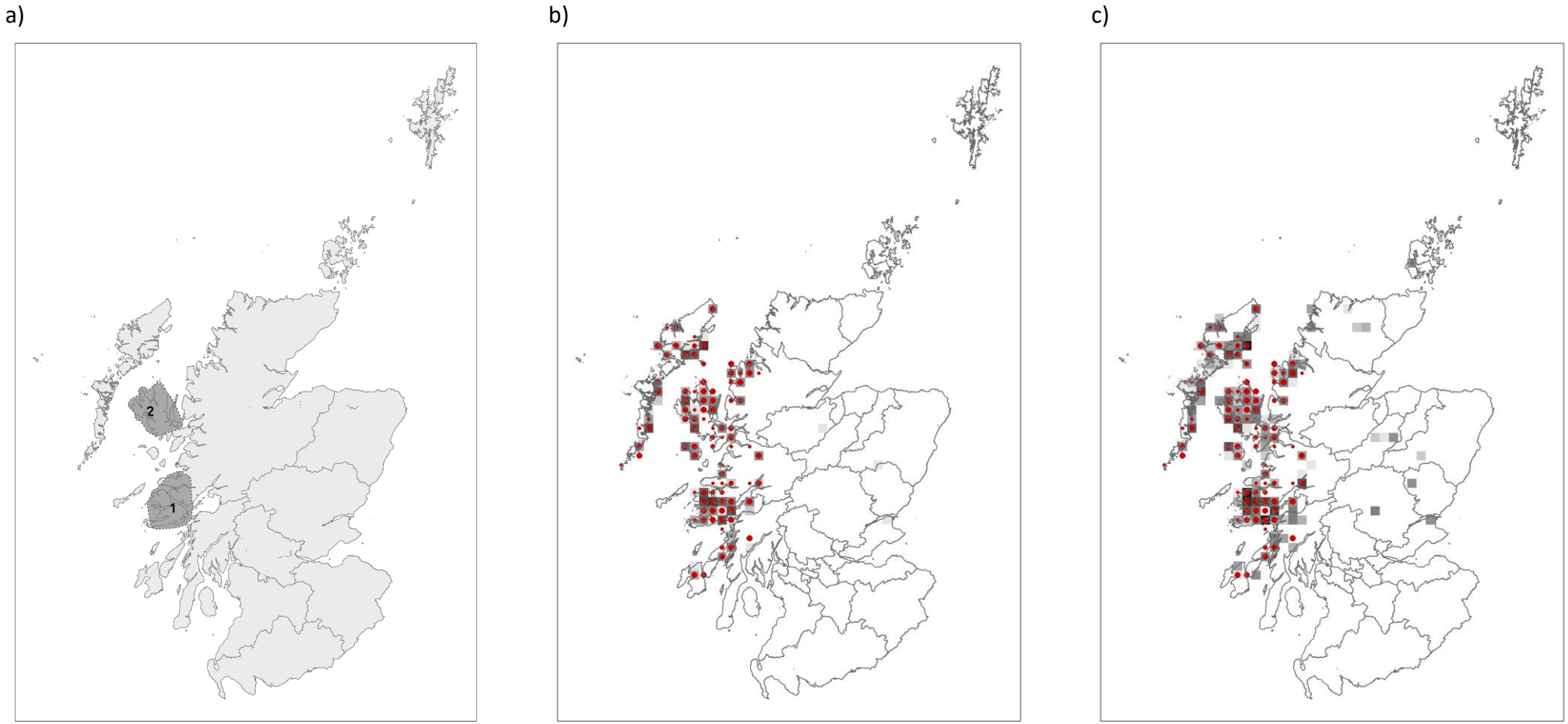


Figure 67: Areas corresponding to clusters of home ranges for White-tailed Eagle between 2009 and 2018 (a) together with maps showing variation in the number of White-tailed Eagle records reported to SRMS during 2009-2013 (b) and 2014-2018 (c), in the context of the known White-tailed Eagle breeding distribution taken from the 2007-2011 Bird Atlas. SRMS data are depicted as grey squares with darker shading indicating more records while Bird Atlas data are depicted as red dots with the size of dot positively related to probability of breeding. In contrast to other species for which trends have been produced, numerical trends for White-tailed Eagle are drawn from all available data, not just from home ranges within the clusters shown in map a).

Buzzard

Figure 68: Buzzard in Fife (Photo: Harry Bell, Tayside & Fife RSG).

The Scottish Buzzard population is poorly represented by existing SRMS data, though these include data from some high quality local studies.

Our latest analysis of SRMS data for the period 2009-2018 has produced no national trends in breeding number or productivity at a national level or for any SRMS regions, but has produced trends for seven of the 11 SRMS regions (Table 37) and for eight of the 20 NHZ regions (Table 38) for which the SRMS holds Buzzard records.

Users of the published trends should be aware that trends in breeding numbers are drawn from a very small, well-monitored fraction of the Buzzard's range (e.g. there are no records available from south of the Central Belt, from Angus, or from North East Scotland, all areas where Buzzards are abundant) (Figure 79). Productivity trends are based on records from a wider spread of areas, but much of the Buzzard's Scottish range is still unrepresented (e.g. there are no records from the North East, and few from the south-west, the west Highlands, and north and west Tayside).

National trends

No trends in breeding numbers or breeding productivity are available for Buzzard at a national level.

BBS data for Scotland showed no significant change at a national level over the period 2008-2018 (Harris *et al*. 2020), though the longer term trend shows a 30% increase over the period 1995-2020.

SRMS regional trends

Breeding numbers of Buzzard decreased in two regions (Argyll and Tayside & Fife) and did not change significantly in Highland (Table 37, Figure 69).

Breeding success of Buzzard showed non-linear variation in Argyll and did not change significantly in Central, Dumfries & Galloway, Highland, Lothian & Borders, Tayside & Fife and Uist (Table 37, Figure 70).

Clutch size, brood size and number of fledglings did not change significantly in Highland and Lothian & Borders (Table 37, Figures 71-73). Number of fledglings in a further four regions (Argyll, Central, Dumfries & Galloway and Tayside & Fife) did not change significantly (Table 37, Figure 73).

Trends for this species are not yet available for Lewis & Harris, North East Scotland, Orkney or South Strathclyde.

NHZ regional trends

Breeding numbers of Buzzard decreased in NHZ 14 and did not change significantly in two regions (NHZ 15 and 21) (Table 38, Figure 74).

Breeding success of Buzzard showed non-linear variation in three regions (NHZs 14 and 16-17) and did not change significantly in five more (NHZs 03, 15 and 19-21) (Table 38, Figure 75).

Clutch size, brood size and number of fledglings did not change significantly in two regions (NHZs 16 and 21) (Table 38, Figures 76-78). Number of fledglings in a further four regions (NHZs 03, 14, 17 and 20) did not change significantly (Table 38, Figure 78).

Trends for this species are not yet available for NHZs 02, 04-13 and 18.

Details of contributing records

8,257 (661 to 994 per year, mean: 826 records) from 2009-2018 contributed to this trends analysis (Table 41). References

Harris, S.J., Massimino, D., Balmer, D.E., Eaton, M.A., Noble, D.G., Pearce-Higgins, J.W., Woodcock, P. & Gillings, S. (2020) The Breeding Bird Survey 2019.

Table 37: Summary of SRMS regional trends for Buzzard during 2009-2018. Figures in parentheses indicate the annual change, with significant decreases highlighted in blue and non-significant changes highlighted in grey. 'Non-linear' indicates non-linear trends. '—' indicates where the species occurs but no trend is available. 'No SRMS data' indicates where the SRMS does not hold any records for the region of interest. 'Absent' indicates where the species is not known to breed.

SRMS Region	Pairs	Success	Clutch size	Brood size	Number of fledglings
Argyll	**Decrease (-4.2%)**	Non-linear	—	—	Not significant
Central	—	Not significant [v]	—	—	Not significant
Dumfries & Galloway	—	Not significant [rs]	—	—	Not significant [s]
Highland	Not significant	Not significant [r]	Not significant	Not significant	Not significant
Lewis & Harris	—	—	—	—	—
Lothian & Borders	—	Not significant [r]	Not significant	Not significant	Not significant
North East Scotland	—	—	—	—	—
Orkney	—	—	—	—	—
Shetland	Absent	Absent	Absent	Absent	Absent
South Strathclyde	—	—	—	—	—
Tayside & Fife	**Decrease (-4.5%)**	Not significant	—	—	Not significant
Uist	—	Not significant	—	—	—

[r] No home range random effect, [s] Sample sizes small, [v] Variable effort.

Table 38: Summary of NHZ regional trends for Buzzard during 2009-2018. Figures in parentheses indicate the annual change, with significant increases highlighted in green, significant decreases highlighted in blue and non-significant changes highlighted in grey. 'Non-linear' indicates non-linear trends. '—' indicates where the species occurs but no trend is available. 'No SRMS data' indicates where the SRMS does not hold any records for the region of interest. 'Absent' indicates where the species is not known to breed.

NHZ Region	Pairs	Success	Clutch size	Brood size	Number of fledglings
01. Shetland	Absent	Absent	Absent	Absent	Absent
02. North Caithness and Orkney	—	—	—	—	—
03. Coll, Tiree and the Western Isles	—	Not significant [s]	—	—	Not significant [rs]
04. North West Seaboard	—	—	—	—	—
05. The Peatlands of Caithness and Sutherland	—	—	—	—	—
06. Western Seaboard	—	—	—	—	—
07. Northern Highlands	—	—	—	—	—
08. Western Highlands	—	—	—	—	—
09. North East Coastal Plain	—	—	—	—	—
10. Central Highlands	—	—	—	—	—
11. Cairngorm Massif	—	—	—	—	—
12. North East Glens	—	—	—	—	—
13. East Lochaber	—	—	—	—	—
14. Argyll West and Islands	**Decrease (-4.2%)**	Non-linear	—	—	Not significant [r]
15. Loch Lomond, The Trossachs and Breadalbane	Not significant [s]	Not significant	—	—	—
16. Eastern Lowlands	—	Non-linear	Not significant [r]	Not significant [r]	Not significant
17. West Central Belt	—	Non-linear	—	—	Not significant [r]
18. Wigtown Machairs and Outer Solway Coast	—	—	—	—	—
19. Western Southern Uplands and Inner Solway	—	Not significant [rs]	—	—	—
20. Border Hills	—	Not significant [rs]	—	—	Not significant [rs]
21. Moray Firth	Not significant	Not significant	Not significant [r]	Not significant [s]	Not significant [r]

[r] No home range random effect, [s] Sample sizes small.

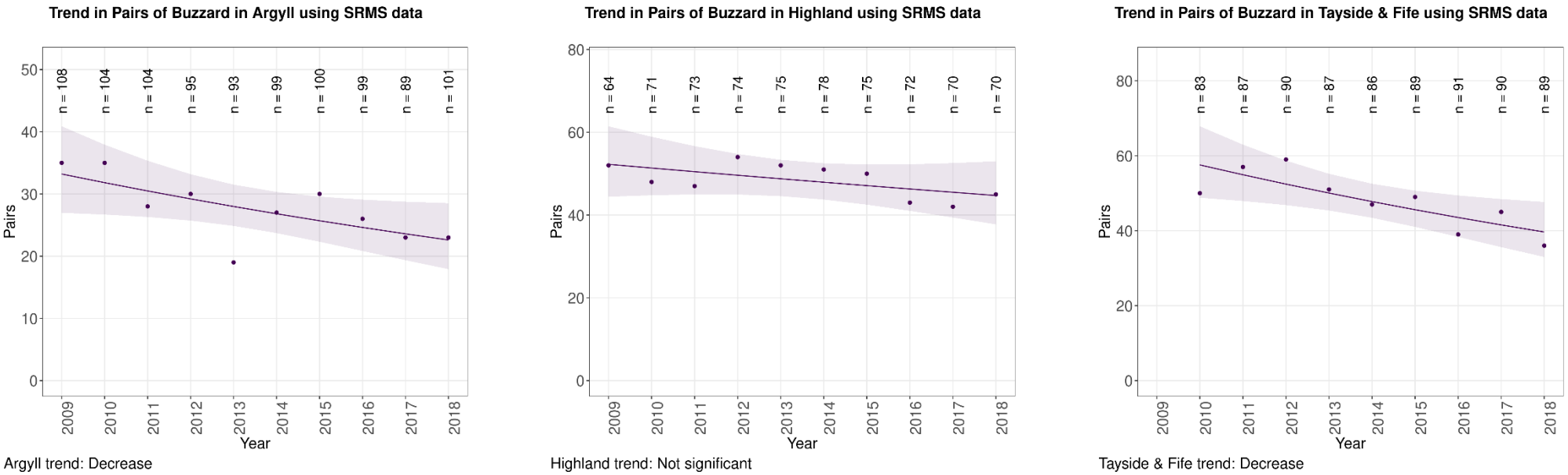


Figure 69: Trends in numbers of breeding pairs of Buzzard by SRMS region during 2009-2018.

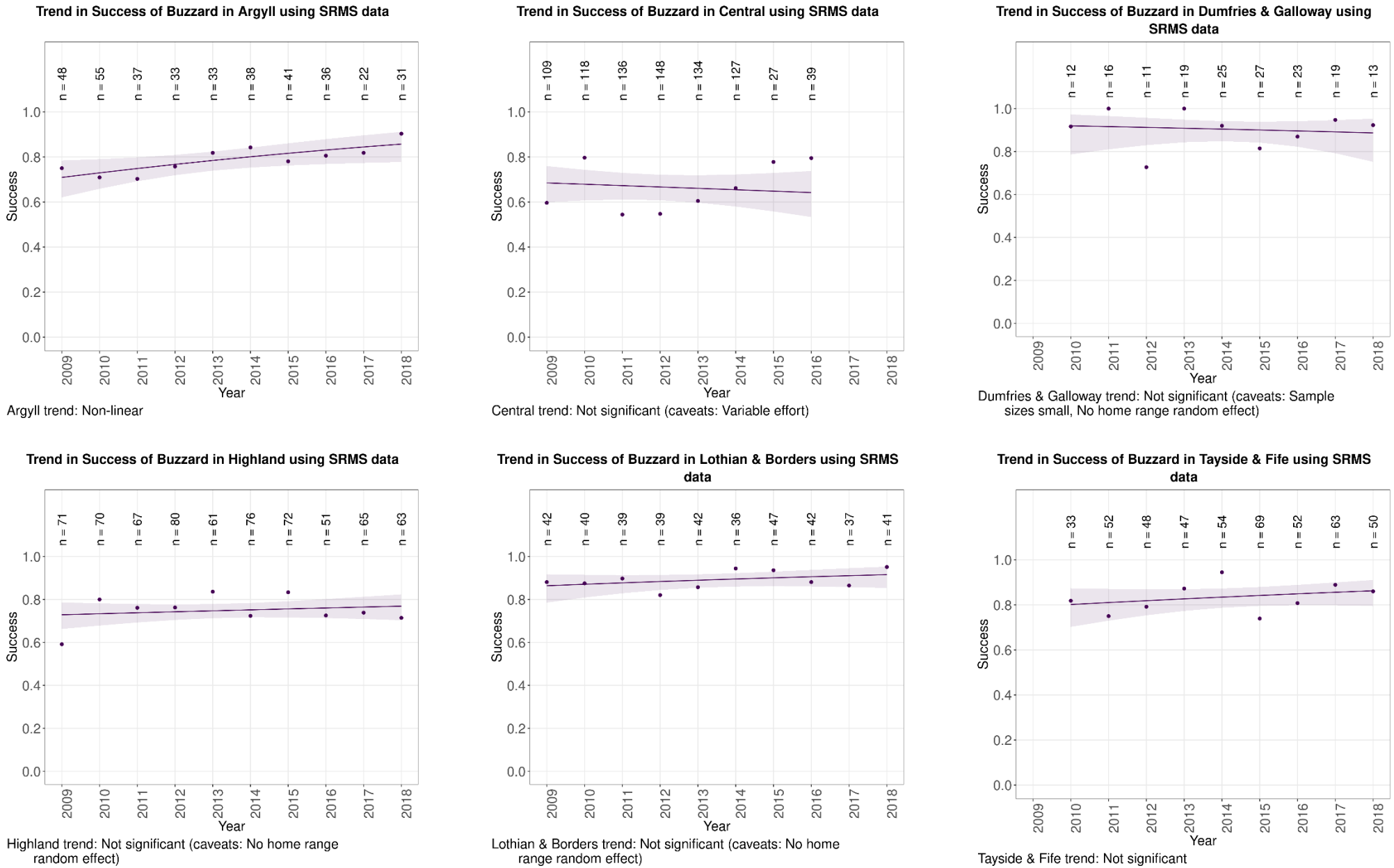


Figure 70: Trends in breeding success of Buzzard by SRMS region during 2009-2018.

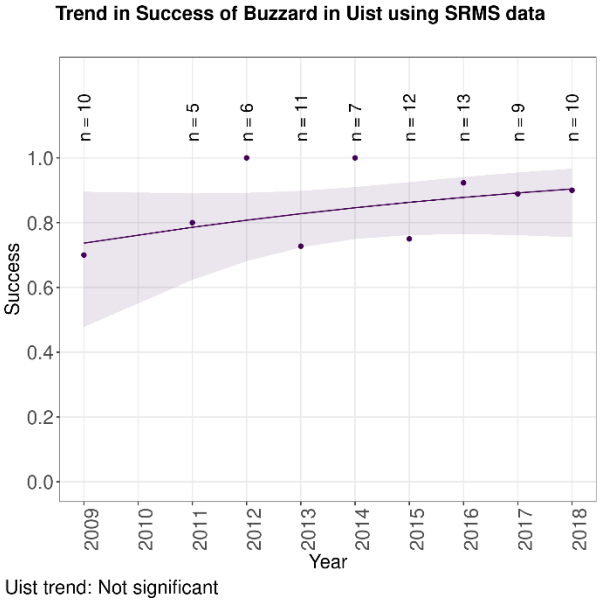


Figure 70 continued: Trends in breeding success of Buzzard by SRMS region during 2009-2018.

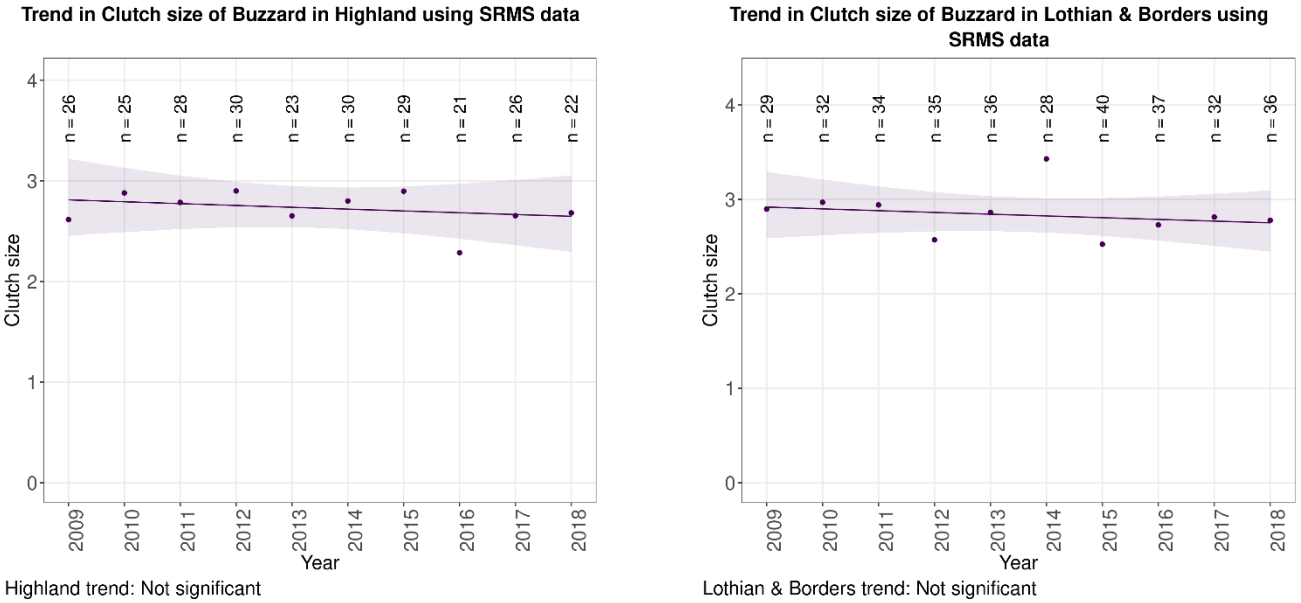
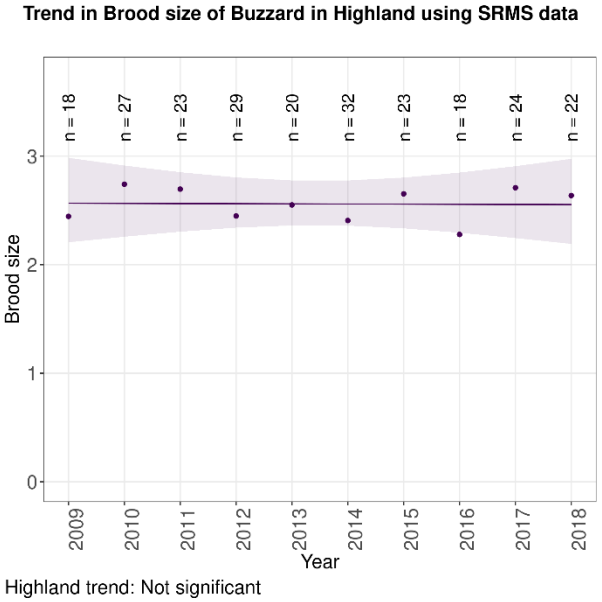


Figure 71: Trends in clutch size of Buzzard by SRMS region during 2009-2018.



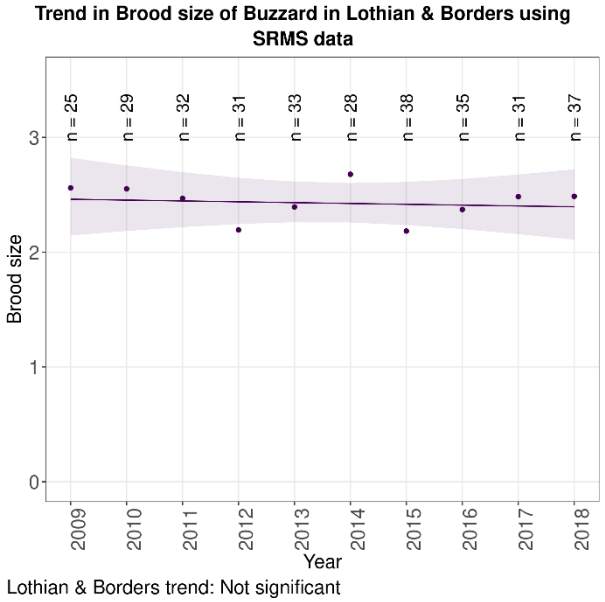


Figure 72: Trends in brood size of Buzzard by SRMS region during 2009-2018.

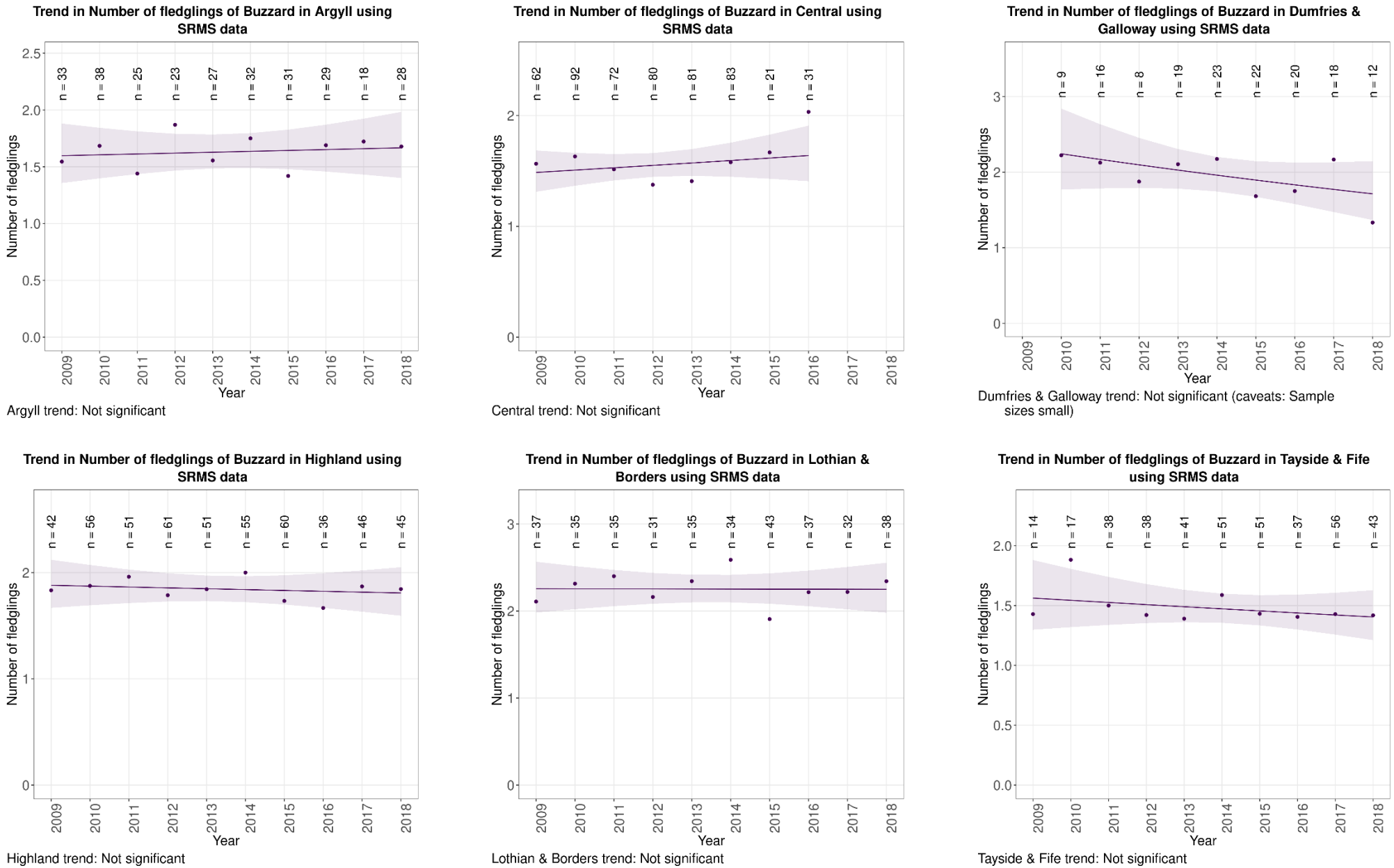
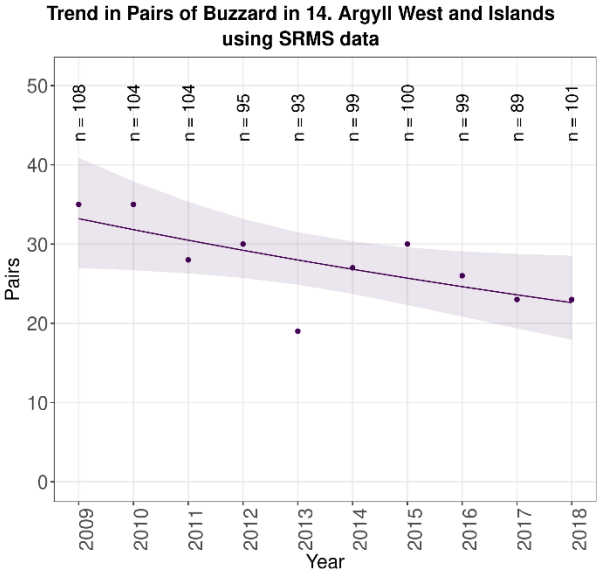
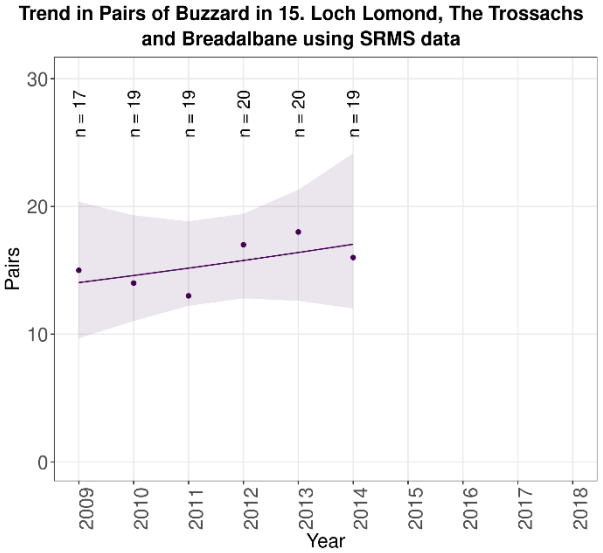


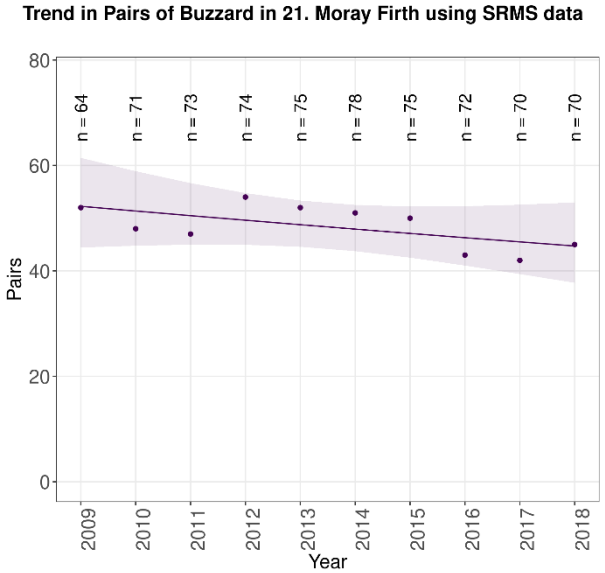
Figure 73: Trends in number of fledglings of Buzzard by SRMS region during 2009-2018.



14. Argyll West and Islands trend: Decrease

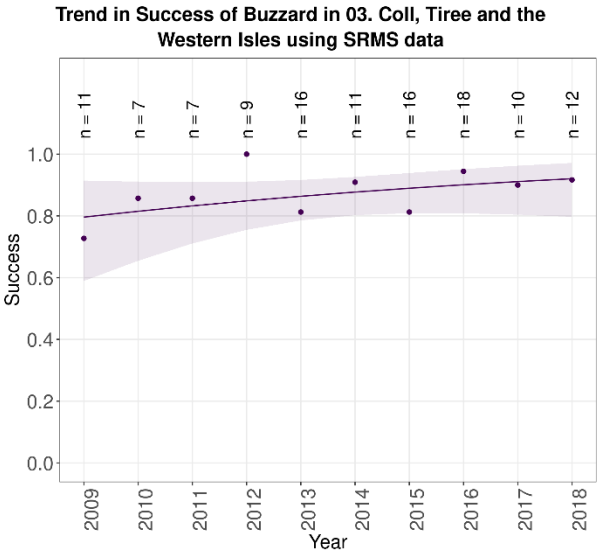


15. Loch Lomond, The Trossachs and Breadalbane trend: Not significant (caveats: Sample sizes small)

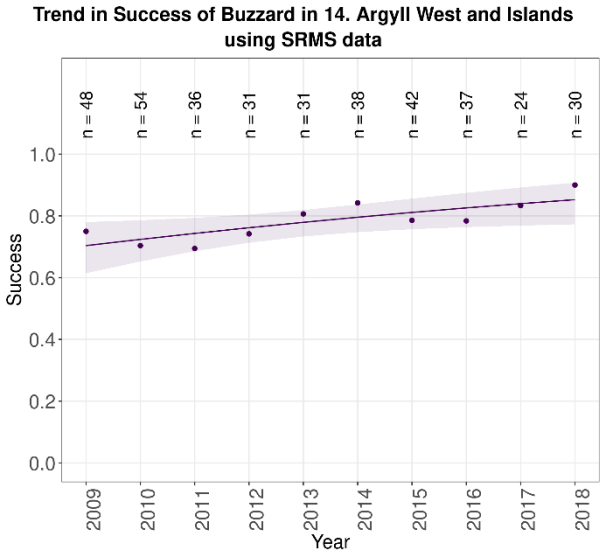


21. Moray Firth trend: Not significant

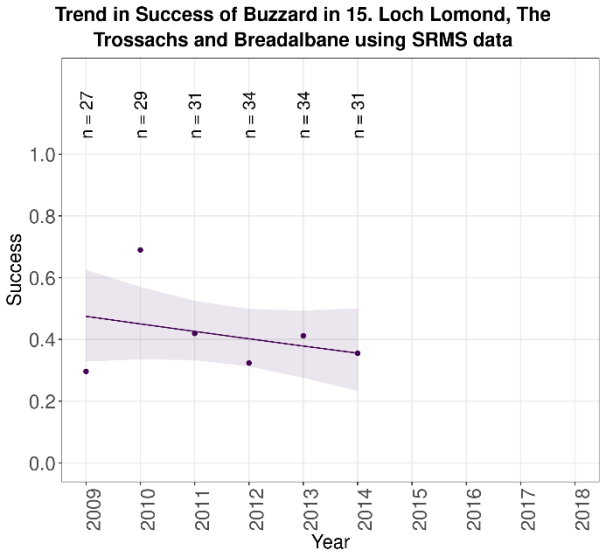
Figure 74: Trends in breeding pairs of Buzzard by NHZ region during 2009-2018.



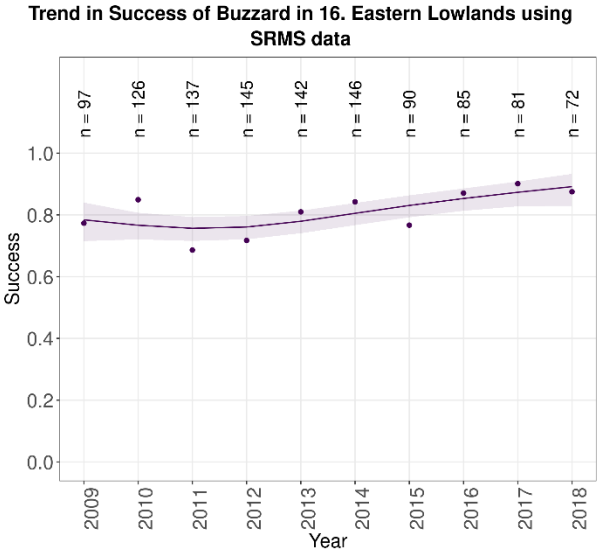
03. Coll, Tiree and the Western Isles trend: Not significant (caveats: Sample sizes small)



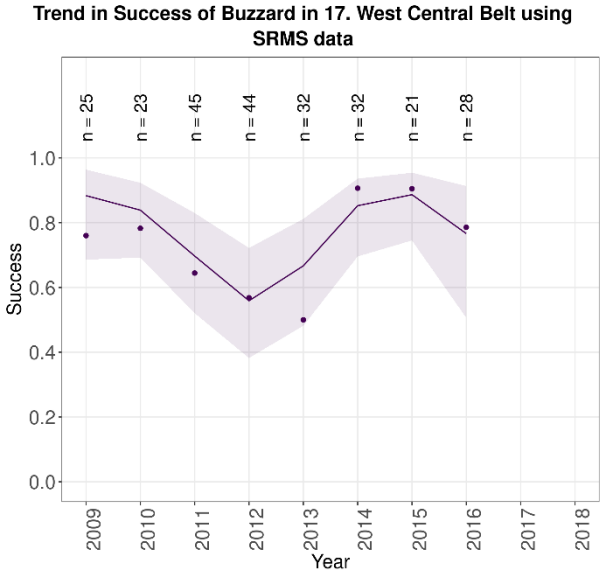
14. Argyll West and Islands trend: Non-linear (caveats: Variable effort)



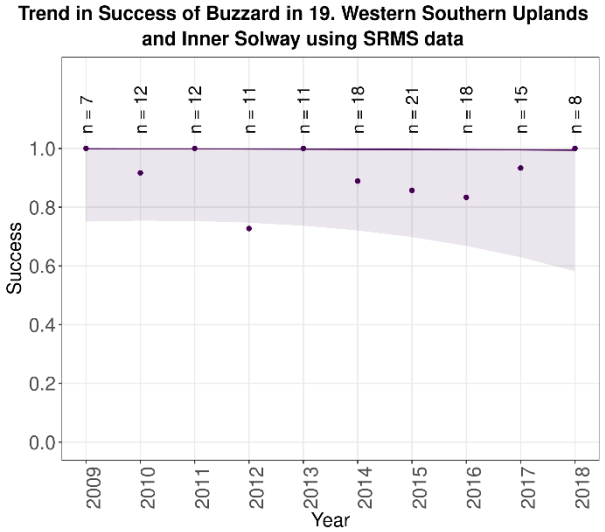
15. Loch Lomond, The Trossachs and Breadalbane trend: Not significant



16. Eastern Lowlands trend: Non-linear (caveats: Variable effort)

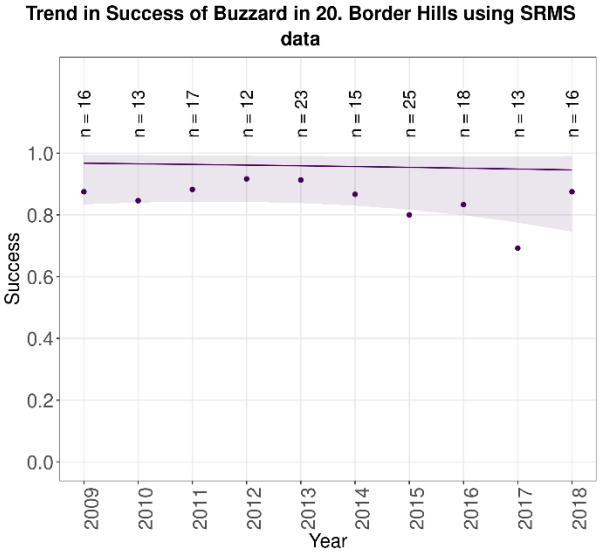


17. West Central Belt trend: Non-linear

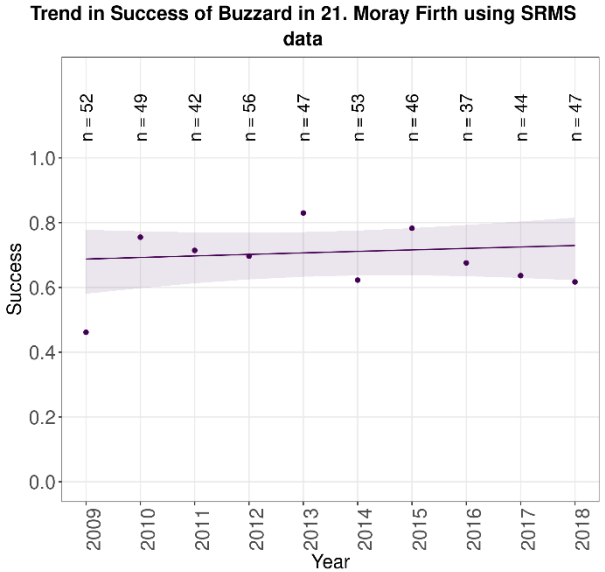


19. Western Southern Uplands and Inner Solway trend: Stable (<5% change) (caveats: Sample sizes small, No home range random effect)

Figure 75: Trends in breeding success of Buzzard by NHZ region during 2009-2018.

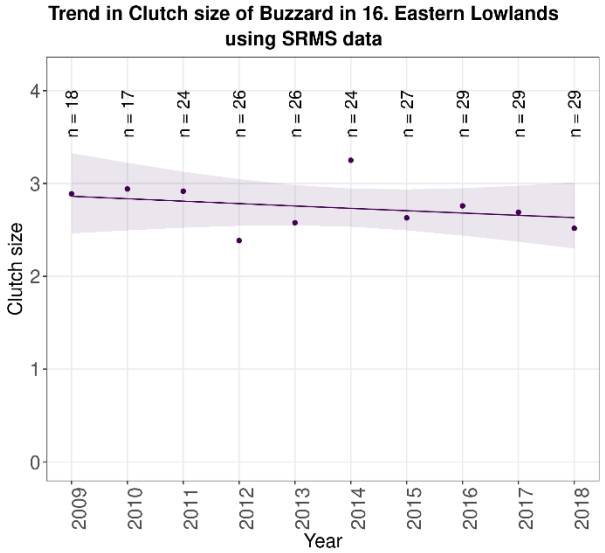


20. Border Hills trend: Not significant (caveats: Sample sizes small, No home range random effect)

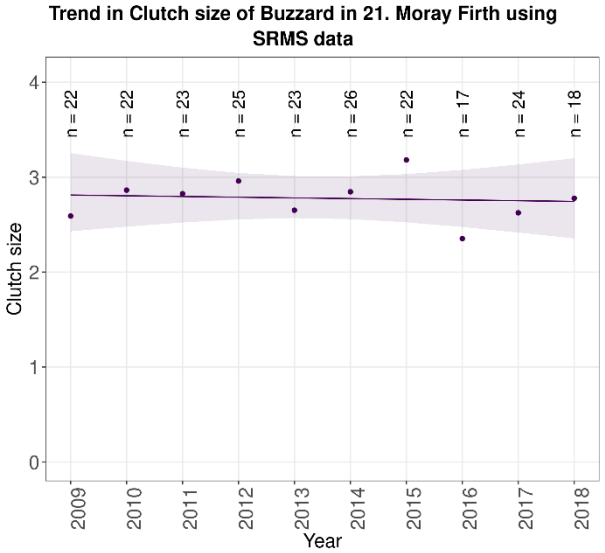


21. Moray Firth trend: Not significant

Figure 75 continued: Trends in breeding success of Buzzard by NHZ region during 2009-2018.

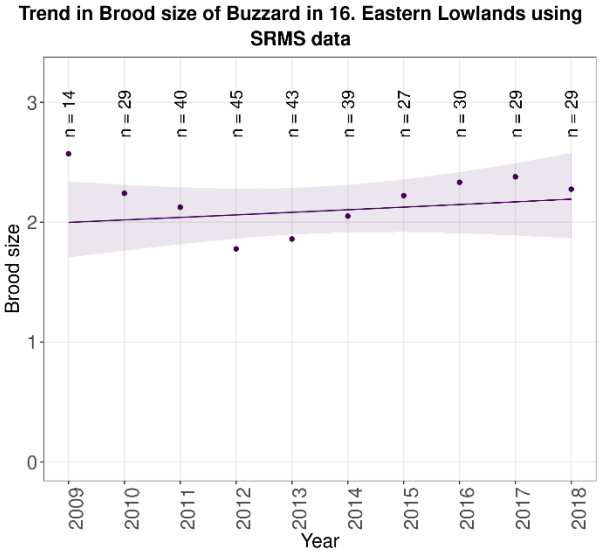


16. Eastern Lowlands trend: Not significant (caveats: No home range random effect)

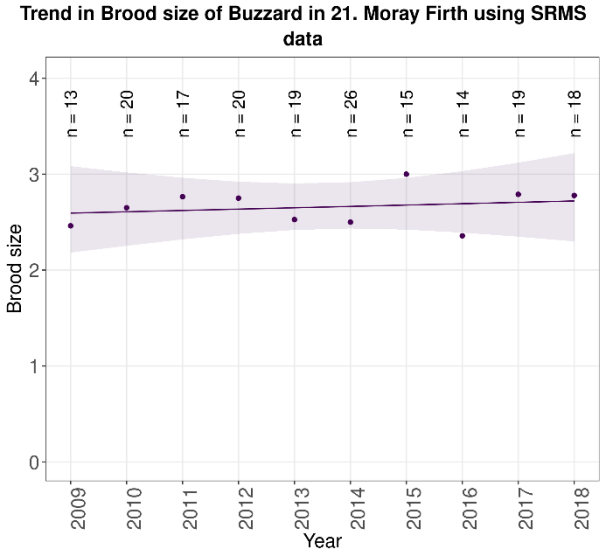


21. Moray Firth trend: Not significant (caveats: No home range random effect)

Figure 76: Trends in clutch size of Buzzard by NHZ region during 2009-2018.

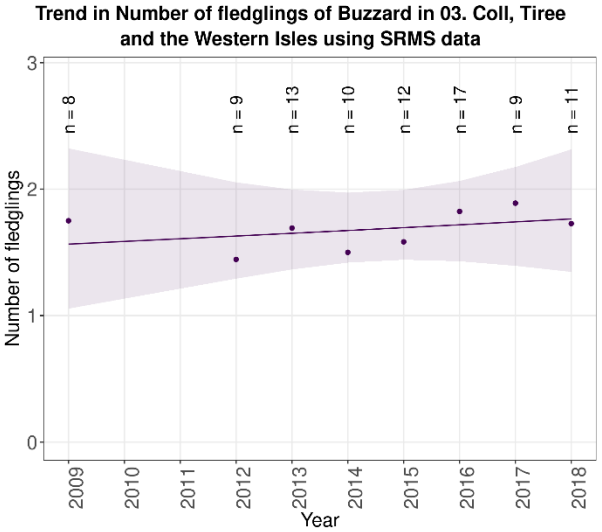


16. Eastern Lowlands trend: Not significant (caveats: No home range random effect)

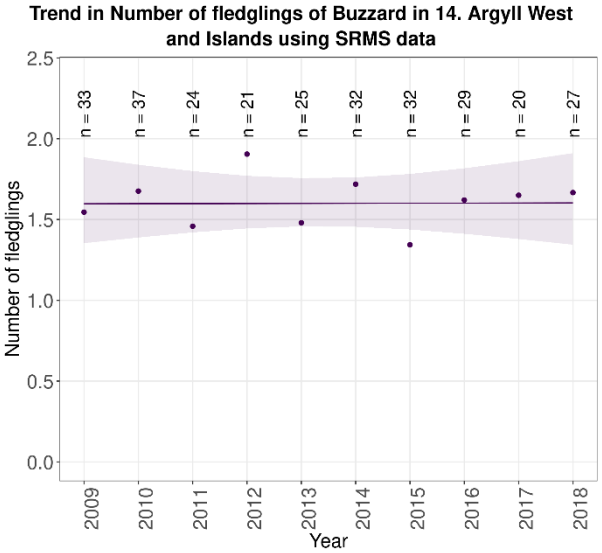


21. Moray Firth trend: Not significant (caveats: Sample sizes small)

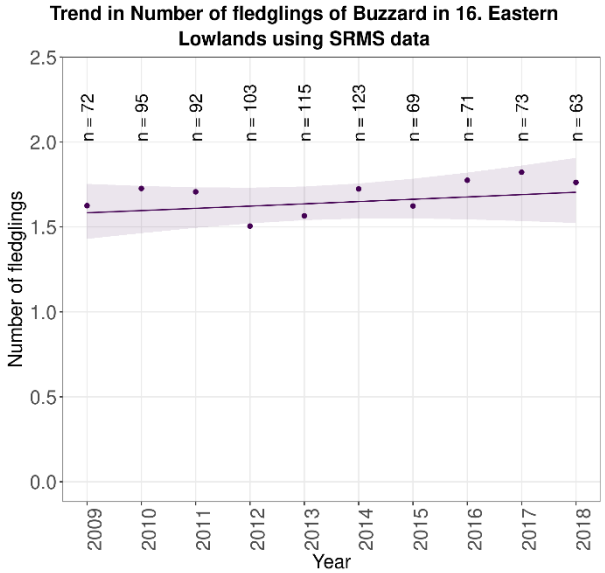
Figure 77: Trends in brood size of Buzzard by NHZ region during 2009-2018.



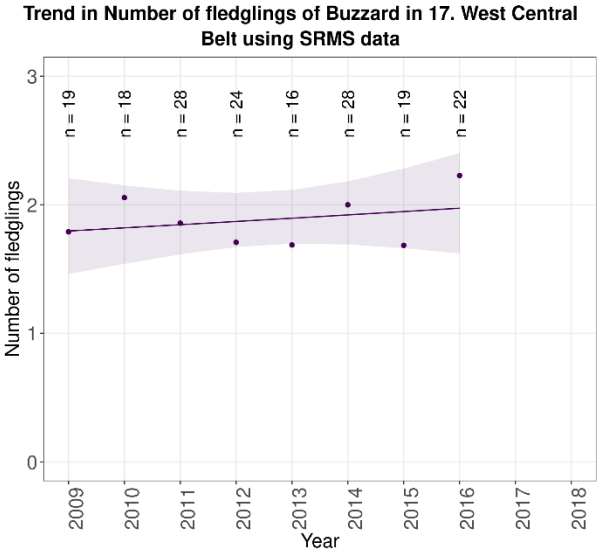
03. Coll, Tiree and the Western Isles trend: Not significant (caveats: Sample sizes small; No home range random effect)



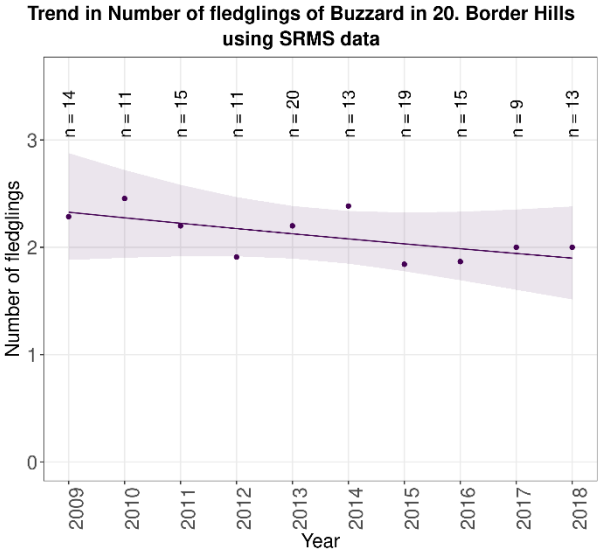
14. Argyll West and Islands trend: Not significant (caveats: No home range random effect)



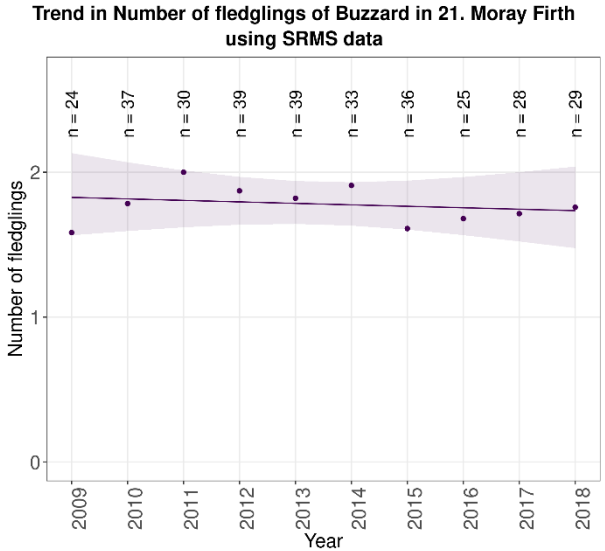
16. Eastern Lowlands trend: Not significant



17. West Central Belt trend: Not significant (caveats: No home range random effect)



20. Border Hills trend: Not significant (caveats: Sample sizes small; No home range random effect)



21. Moray Firth trend: Not significant (caveats: No home range random effect)

Figure 78: Trends in number of fledglings of Buzzard by NHZ region during 2009-2018.

Table 39: Details of SRMS Regional trends for Buzzard.

Parameter	Region	First year of trend	Last year of trend	Number of years	Mean number of home ranges across years	Mean parameter value (and 95% confidence limits)	Trend during the period	Caveats	Estimated % annual change (and 95% confidence limits)
Pairs	Argyll	2009	2018	10	99.2	27.6 (23.9 to 31.3)	Decrease		-4.2 (-8.1 to -0.1)
	Highland	2009	2018	10	72.2	48.4 (45.5 to 51.3)	Not significant		-1.7 (-4.7 to 1.4)
	Tayside & Fife	2010	2018	9	88.0	48.1 (42.3 to 53.9)	Decrease		-4.5 (-8.0 to -1.0)
Success	Argyll	2009	2018	10	37.4	0.8 (0.7 to 0.8)	Non-linear		Non-linear
	Central	2009	2016	8	104.8	0.6 (0.6 to 0.7)	Not significant	Variable effort	-0.6 (-2.6 to 1.4)
	Dumfries & Galloway	2010	2018	9	18.3	0.9 (0.8 to 0.9)	Not significant	Sample sizes small, No home range random effect	-0.3 (-2.2 to 1.2)
	Highland	2009	2018	10	67.6	0.7 (0.7 to 0.8)	Not significant	No home range random effect	0.5 (-0.8 to 1.7)
	Lothian & Borders	2009	2018	10	40.5	0.9 (0.9 to 0.9)	Not significant	No home range random effect	0.7 (-0.6 to 2.0)
	Tayside & Fife	2010	2018	9	52.0	0.8 (0.8 to 0.9)	Not significant		0.9 (-0.8 to 2.5)
	Uist	2009	2018	9	9.2	0.8 (0.7 to 0.9)	Not significant		2.7 (-1.6 to 6.6)
Clutch size	Highland	2009	2018	10	26.0	2.7 (2.6 to 2.8)	Not significant		-0.7 (-3.2 to 2.0)
	Lothian & Borders	2009	2018	10	33.9	2.8 (2.8 to 2.9)	Not significant		-0.7 (-2.8 to 1.6)
Brood size	Highland	2009	2018	10	23.6	2.6 (2.5 to 2.7)	Not significant		-0.1 (-2.9 to 2.9)
	Lothian & Borders	2009	2018	10	31.9	2.4 (2.4 to 2.5)	Not significant		-0.3 (-2.7 to 2.2)
Number of fledglings	Argyll	2009	2018	10	28.4	1.6 (1.6 to 1.7)	Not significant		0.5 (-2.6 to 3.7)
	Central	2009	2016	8	65.3	1.5 (1.5 to 1.6)	Not significant		1.4 (-2.0 to 4.9)
	Dumfries & Galloway	2010	2018	9	16.3	1.9 (1.8 to 2.1)	Not significant	Sample sizes small	-3.3 (-8.0 to 1.6)
	Highland	2009	2018	10	50.3	1.8 (1.8 to 1.9)	Not significant		-0.4 (-2.7 to 1.9)
	Lothian & Borders	2009	2018	10	35.7	2.3 (2.2 to 2.3)	Not significant		0.0 (-2.4 to 2.4)
	Tayside & Fife	2009	2018	10	38.6	1.5 (1.4 to 1.5)	Not significant		-1.2 (-4.3 to 2.0)

Table 40: Details of NHZ Regional trends for Buzzard.

Parameter	Region	First year of trend	Last year of trend	Number of years	Mean number of home ranges across years	Mean parameter value (and 95% confidence limits)	Trend during the period	Caveats	Estimated % annual change (and 95% confidence limits)
Pairs	14. Argyll West and Islands	2009	2018	10	99.2	27.6 (23.9 to 31.3)	Decrease		-4.2 (-8.1 to -0.1)
	15. Loch Lomond, The Trossachs and Breadalbane	2009	2014	6	19	15.5 (13.5 to 17.5)	Not significant	Sample sizes small	4.0 (-7.7 to 17.1)
	21. Moray Firth	2009	2018	10	72.2	48.4 (45.5 to 51.3)	Not significant		-1.7 (-4.7 to 1.4)
Success	03. Coll, Tiree and the Western Isles	2009	2018	10	11.7	0.9 (0.8 to 0.9)	Not significant	Sample sizes small	2.0 (-1.4 to 5.0)
	14. Argyll West and Islands	2009	2018	10	37.1	0.8 (0.7 to 0.8)	Non-linear	Variable effort	Non-linear
	15. Loch Lomond, The Trossachs and Breadalbane	2009	2014	6	31	0.4 (0.3 to 0.5)	Not significant		-2.5 (-7.1 to 2.2)
Success	16. Eastern Lowlands	2009	2018	10	112.1	0.8 (0.8 to 0.8)	Non-linear	Variable effort	Non-linear
	17. West Central Belt	2009	2016	8	31.25	0.7 (0.6 to 0.8)	Non-linear		Non-linear
	19. Western Southern Uplands and Inner Solway	2009	2018	10	13.3	0.9 (0.8 to 0.9)	Stable (<5% change)	Sample sizes small, No home range random effect	0.0 (-0.1 to 0.0)
	20. Border Hills	2009	2018	10	16.8	0.9 (0.8 to 0.9)	Not significant	Sample sizes small, No home range random effect	-0.2 (-0.9 to 0.4)

Parameter	Region	First year of trend	Last year of trend	Number of years	Mean number of home ranges across years	Mean parameter value (and 95% confidence limits)	Trend during the period	Caveats	Estimated % annual change (and 95% confidence limits)
	21. Moray Firth	2009	2018	10	47.3	0.7 (0.6 to 0.7)	Not significant		0.5 (-1.2 to 2.1)
Clutch size	16. Eastern Lowlands	2009	2018	10	24.9	2.7 (2.6 to 2.8)	Not significant	No home range random effect	-0.9 (-3.6 to 1.8)
	21. Moray Firth	2009	2018	10	22.2	2.8 (2.7 to 2.9)	Not significant	No home range random effect	-0.3 (-3.0 to 2.6)
Brood size	16. Eastern Lowlands	2009	2018	10	32.5	2.1 (2.0 to 2.2)	Not significant	No home range random effect	1.0 (-1.9 to 4.0)
	21. Moray Firth	2009	2018	10	18.1	2.7 (2.5 to 2.8)	Not significant	Sample sizes small	0.5 (-2.7 to 3.8)
Number of fledglings	03. Coll, Tiree and the Western Isles	2009	2018	8	11.125	1.7 (1.6 to 1.8)	Not significant	Sample sizes small; No home range random effect	1.3 (-5.0 to 8.1)
	14. Argyll West and Islands	2009	2018	10	28	1.6 (1.5 to 1.7)	Not significant	No home range random effect	0.0 (-3.1 to 3.3)
	16. Eastern Lowlands	2009	2018	10	87.6	1.7 (1.6 to 1.7)	Not significant		0.8 (-1.1 to 2.8)
	17. West Central Belt	2009	2016	8	21.75	1.9 (1.8 to 2.0)	Not significant	No home range random effect	1.4 (-3.4 to 6.4)
	20. Border Hills	2009	2018	10	14	2.1 (2.0 to 2.2)	Not significant	Sample sizes small; No home range random effect	-2.2 (-6.2 to 1.9)
	21. Moray Firth	2009	2018	10	32	1.8 (1.7 to 1.9)	Not significant	No home range random effect	-0.6 (-3.5 to 2.5)

Table 41: Number of Buzzard home range checks for occupancy reported to the SRMS during 2009-2018, in each of the 12 SRMS Regions, with approximate proportion of estimated population monitored. At the bottom of the table, row A is the mean number of home range checks over the most recent five years. Row B gives the estimated proportion of the national population in each region, based on Bird Atlas Timed Tetrad Visit (TTV) data. The depth of red shading indicates the relative importance of each region for this species. If survey effort was spread evenly across the whole population, the ratio of A:B would not vary much between regions.

Year	ARGYLL	CENTRAL SCOTLAND	DUMFRIES & GALLOWAY	HIGHLAND	LEWIS & HARRIS	LOTHIAN & BORDERS	NORTH EAST SCOTLAND	ORKNEY	SHETLAND	SOUTH STRATHCLYDE	TAYSIDE & FIFE	UIST	Total
2009	156	215	14	110	7	54	33	5		4	46	17	661
2010	173	193	19	122	23	58	0	9		13	103	12	725
2011	172	252	39	130	9	56	2	10		21	128	7	826
2012	156	284	22	110	5	67	154	13		1	175	7	994
2013	159	282	63	117	8	61	4	13		1	121	16	845
2014	156	288	58	134	6	74	4	12		19	156	26	933
2015	167	72	62	140	4	80	3	11		12	182	22	755
2016	168	127	55	128	3	72	33	14		14	241	20	875
2017	118	58	58	134	4	59	6	17		22	294	23	793
2018	170	31	55	160	3	69	11	18		9	301	23	850
A: Mean home range checks	**155.8**	**115.2**	**57.6**	**139.2**	**4.0**	**70.8**	**11.4**	**14.4**	**Absent**	**15.2**	**234.8**	**22.8**	**841.2**
B: Proportion of estimated Scottish population	11	6	12	21	1	11	13	0	0	9	16	1	100

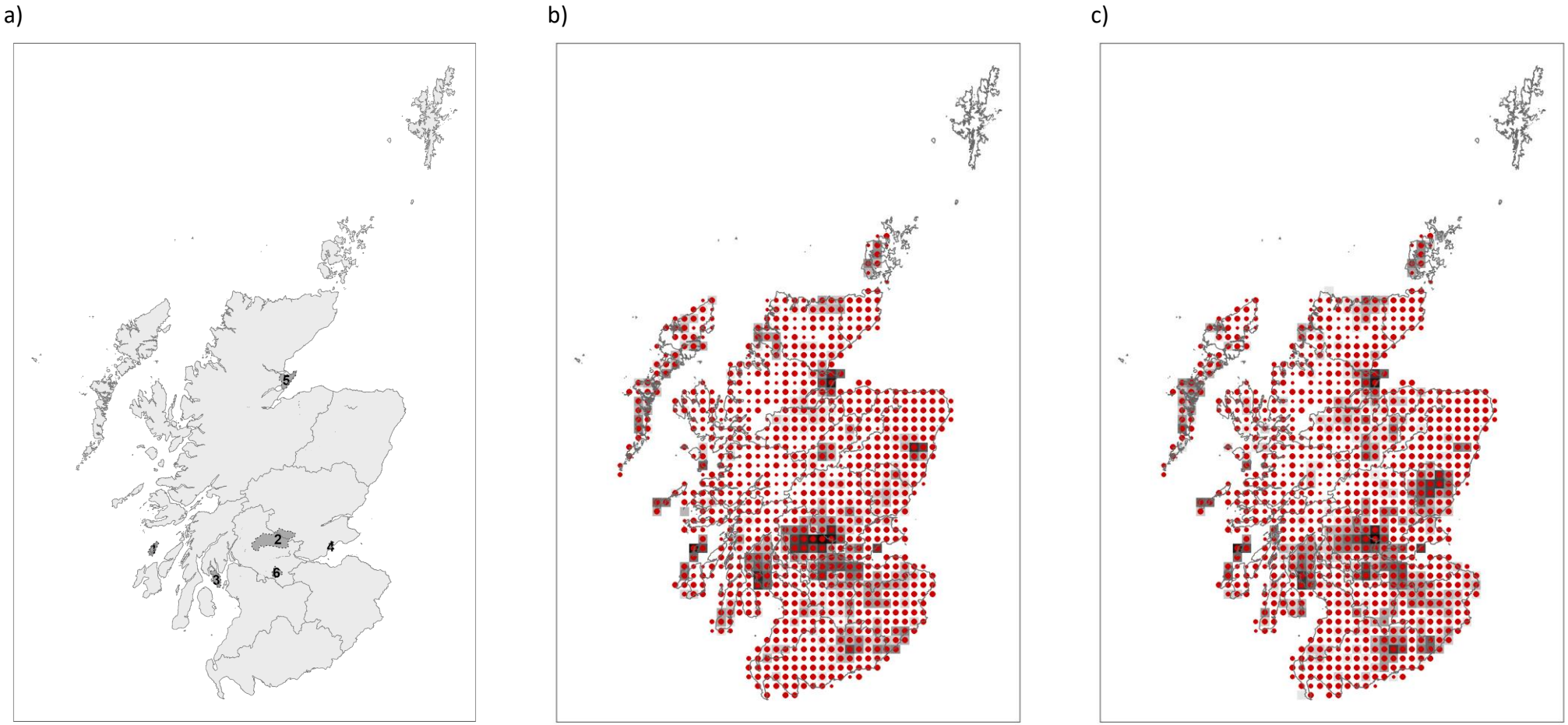


Figure 79: Areas corresponding to the clusters of home ranges from which sufficient data were reported to attempt to derive population trends for Buzzard between 2009 and 2018 (a) together with maps showing variation in the number of Buzzard records reported to SRMS during 2009-2013 (b) and 2014-2018 (c), in the context of the known Buzzard breeding distribution taken from the 2007-2011 Bird Atlas. SRMS data are depicted as grey squares with darker shading indicating more records while Bird Atlas data are depicted as red dots with the size of dot positively related to probability of breeding.

Barn Owl

Figure 80: Barn Owl (Photo: Zul Bhatia, South Strathclyde RSG).

Barn Owl monitoring is concentrated within a relatively small number of discrete study areas across Scotland.

Our latest analysis of SRMS Barn Owl data for the period 2009-2018 produced no national trends in breeding number or productivity. Trends were produced for five of the eight SRMS regions (Table 42) and for six of the 20 NHZ regions (Table 43) for which the SRMS holds Barn Owl records.

Users of the published trends users should be aware that Barn Owl trends for both breeding numbers and productivity are under-represented by records in the east and north of its range, particularly in Highland, North East Scotland, Tayside & Fife, Scottish Borders and Argyll (Figure 91). Nearly all monitored pairs are based in nest boxes. Trends for cyclically varying metrics like Barn Owl productivity can, especially over short periods, be sensitive to where in the cycle the trend period starts and ends. Breeding success in South Strathclyde is much higher here than in other regions (at or near 100% in many years) and is probably an artefact due to lack of early visits.

National trends

No trends in breeding numbers or breeding productivity are available for Barn Owl at a national level.

SRMS regional trends

Breeding numbers of Barn Owl decreased in Central and Dumfries & Galloway, but showed no significant change in South Strathclyde (Table 42, Figure 81).

Breeding success of Barn Owl decreased in Central and Dumfries & Galloway, and showed no significant change in three regions (Argyll, Lothian &

Borders and South Strathclyde) (Table 42, Figure 82).

Clutch size, brood size and number of fledglings showed no significant change in Dumfries & Galloway (Table 42, Figures 83-85). Brood size decreased in Central (Table 42, Figure 83), but clutch size and number of fledglings showed no significant change (Table 42, Figure 83, Figure 85).

Trends for this species are not yet available for Highland, North East Scotland or Tayside & Fife.

NHZ regional trends

Breeding numbers of Barn Owl decreased in NHZs 16 and 18 (Table 43, Figure 86).

Breeding success of Barn Owl decreased in NHZ 16, did not change significantly in four regions (NHZs 14, 17 and 19-20) and showed non-linear variation in NHZ 18 (Table 43, Figure 87).

Clutch size, brood size and number of fledglings showed no significant change in NHZs 18-19 (Table 43, Figures 88-90). Clutch size in NHZ 20 and brood size in NHZ 16 both also showed no significant change (Table 43, Figure 88, Figure 90). Number of fledglings increased in NHZ 14, decreased in NHZs 17 and 20, and showed no significant change in NHZ 16 (Table 43, Figure 90).

Trends are not yet available for NHZs 02, 04-13, 15 and 21.

Details of contributing records

6,580 (462 to 756 per year, mean: 658 records) from 2009-2018 contributed to this trends analysis (Figure 46).

Table 42: Summary of SRMS regional trends for Barn Owl during 2009-2018. Figures in parentheses indicate the annual change, with significant increases highlighted in green, significant decreases highlighted in blue and non-significant changes highlighted in grey. '—' indicates where the species occurs but no trend is available. 'No SRMS data' indicates where the SRMS does not hold any records for the region of interest. 'Absent' indicates where the species is not known to breed.

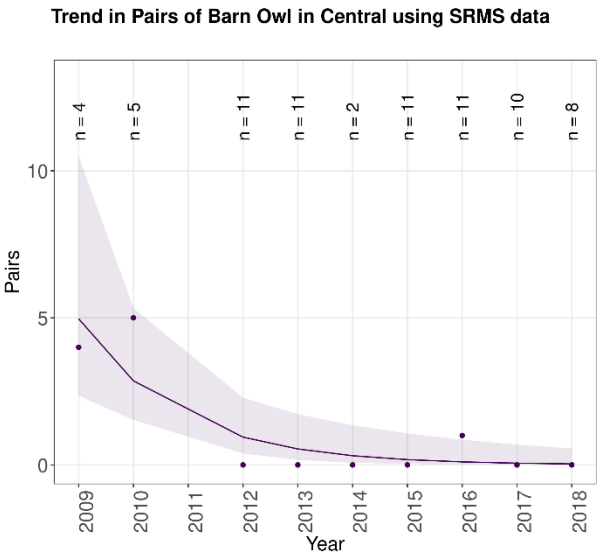
SRMS Region	Pairs	Success	Clutch size	Brood size	Number of fledglings
Argyll	—	Not significant [n]	—	—	**Increase (3.5%)**
Central	**Decrease [ns] (-42.5%)**	**Decrease [n] (-0.7%)**	Not significant	**Decrease (-2.4%)**	Not significant
Dumfries & Galloway	**Decrease [n] (-5.9%)**	**Decrease [n] (-0.8%)**	Not significant	Not significant	Not significant
Highland	—	—	—	—	—
Lewis & Harris	Absent	Absent	Absent	Absent	Absent
Lothian & Borders	—	Not significant [n]	—	—	**Decrease (-3.4%)**
North East Scotland	—	—	—	—	—
Orkney	Absent	Absent	Absent	Absent	Absent
Shetland	Absent	Absent	Absent	Absent	Absent
South Strathclyde	Not significant [ns]	Not significant [nrs]	—	—	Not significant [s]
Tayside & Fife	—	—	—	—	—
Uist	Absent	Absent	Absent	Absent	Absent

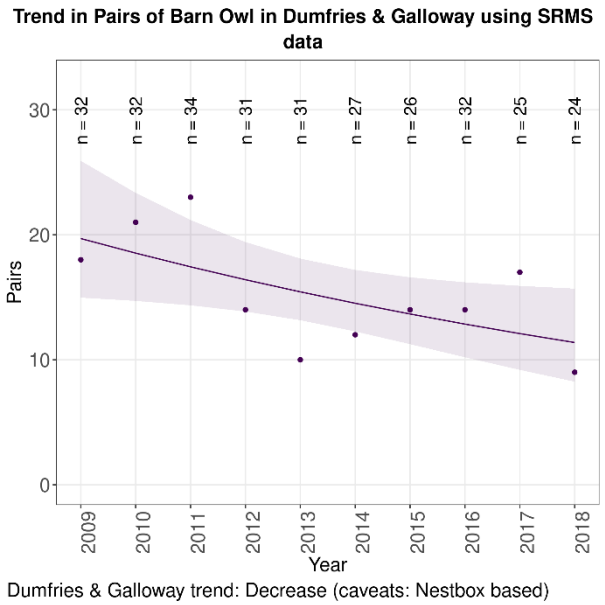
[n] Nestbox based, [r] No home range random effect, [s] Sample sizes small.

Table 43: Summary of NHZ regional trends for Barn Owl during 2009-2018. Figures in parentheses indicate the annual change, with significant increases highlighted in green, significant decreases highlighted in blue and non-significant changes highlighted in grey. 'Non-linear' indicates non-linear trends. '—' indicates where the species occurs but no trend is available. 'No SRMS data' indicates where the SRMS does not hold any records for the region of interest. 'Absent' indicates where the species is not known to breed.

NHZ Region	Pairs	Success	Clutch size	Brood size	Number of fledglings
01. Shetland	Absent	Absent	Absent	Absent	Absent
02. North Caithness and Orkney	—	—	—	—	—
03. Coll, Tiree and the Western Isles	Absent	Absent	Absent	Absent	Absent
04. North West Seaboard	—	—	—	—	—
05. The Peatlands of Caithness and Sutherland	—	—	—	—	—
06. Western Seaboard	—	—	—	—	—
07. Northern Highlands	—	—	—	—	—
08. Western Highlands	—	—	—	—	—
09. North East Coastal Plain	—	—	—	—	—
10. Central Highlands	—	—	—	—	—
11. Cairngorm Massif	—	—	—	—	—
12. North East Glens	—	—	—	—	—
13. East Lochaber	—	—	—	—	—
14. Argyll West and Islands	—	Not significant [nr]	—	—	**Increase [nr] (3.6%)**
15. Loch Lomond, The Trossachs and Breadalbane	—	—	—	—	—
16. Eastern Lowlands	**Decrease [s] (-42.5%)**	**Decrease [nv] (-0.5%)**	—	Not significant [nr]	Not significant [nr]
17. West Central Belt	—	Not significant [nv]	—	—	**Decrease [nr] (-3%)**
18. Wigtown Machairs and Outer Solway Coast	**Decrease (-5.9%)**	Non-linear	Not significant [nr]	Not significant [nr]	Not significant [nr]
19. Western Southern Uplands and Inner Solway	—	Not significant [n]	Not significant [nr]	Not significant [nr]	Not significant [n]
20. Border Hills	—	Not significant [n]	Not significant [nrs]	—	**Decrease [nr] (-3%)**
21. Moray Firth	—	—	—	—	—

[n] Nestbox based, [r] No home range random effect, [s] Sample sizes small, [v] Variable effort.





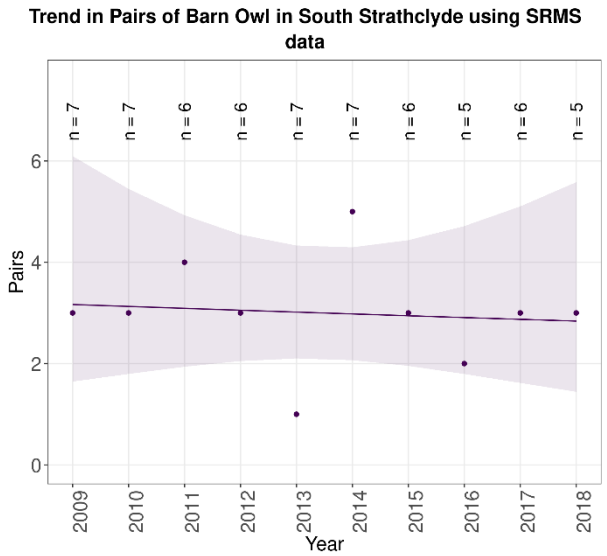
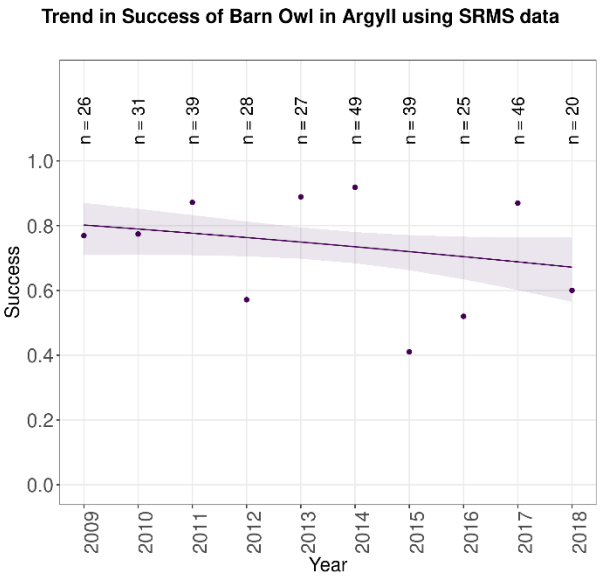
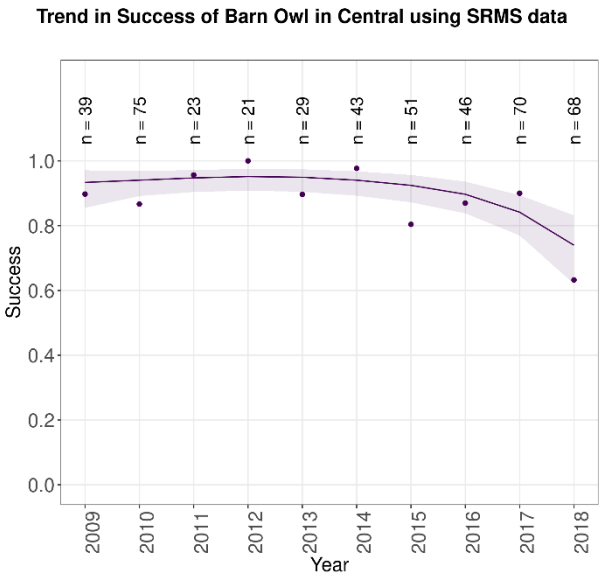


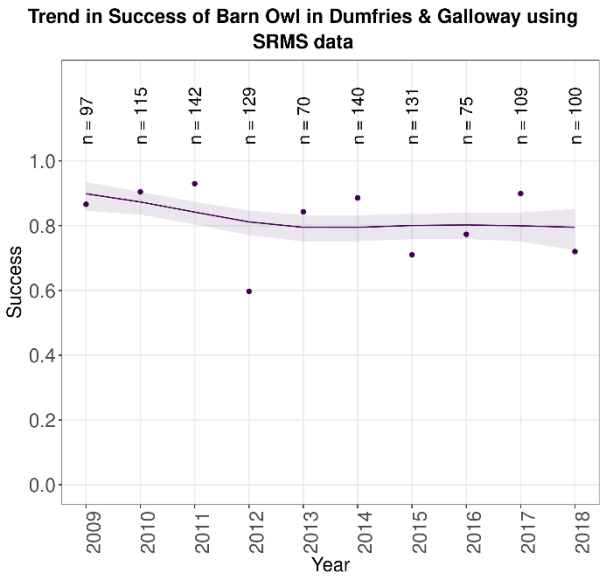
Figure 81: Trends in numbers of breeding pairs of Barn Owl by SRMS region during 2009-2018.



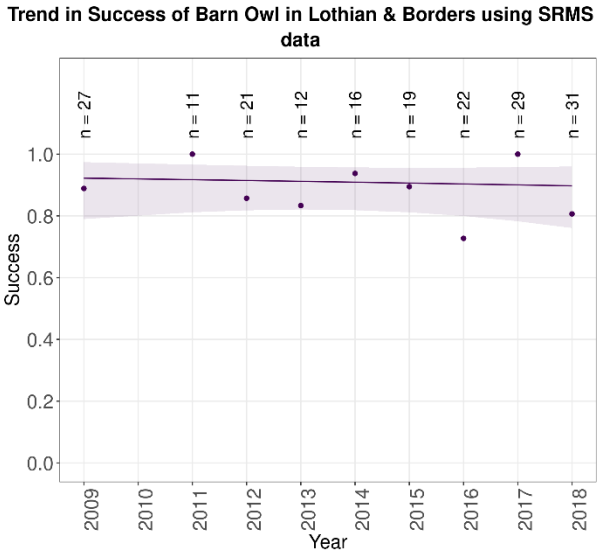
Argyll trend: Not significant (caveats: Nestbox based)



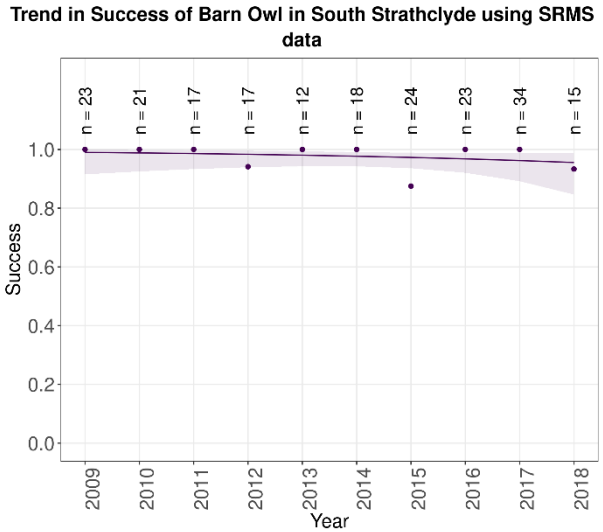
Central trend: Decrease (caveats: Nestbox based)



Dumfries & Galloway trend: Decrease (caveats: Nestbox based)



Lothian & Borders trend: Not significant (caveats: Nestbox based)



South Strathclyde trend: Stable (<5% change) (caveats: Sample sizes small, No home range random effect; Nestbox based)

Figure 82: Trends in breeding success of Barn Owl by SRMS region during 2009-2018.

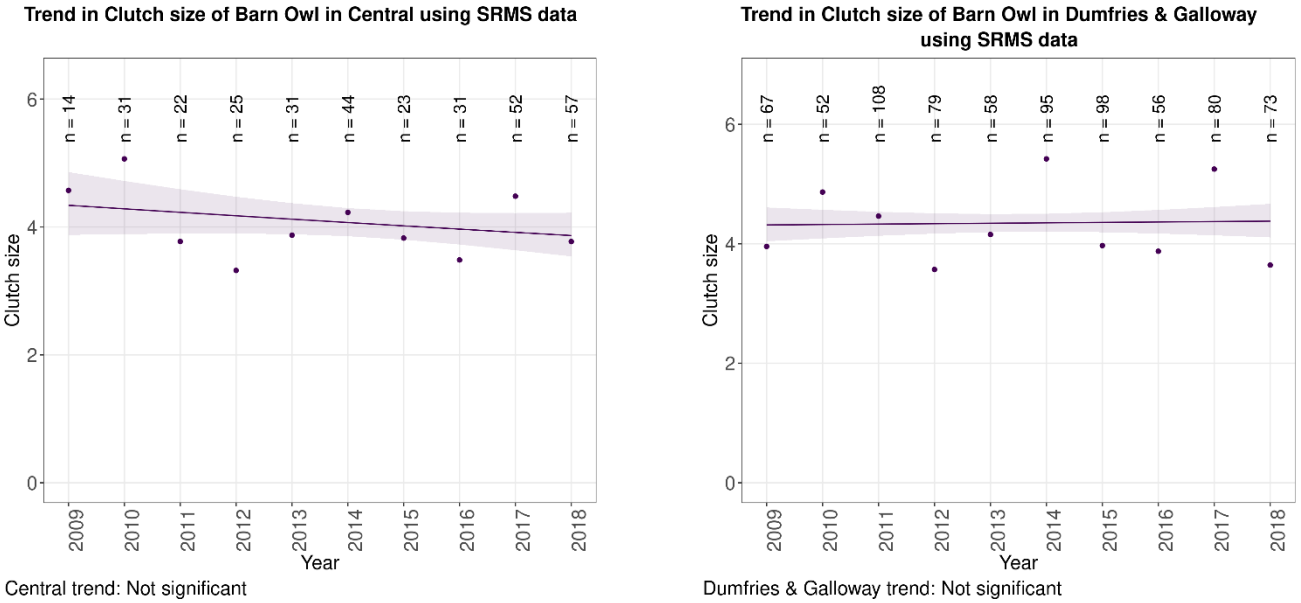


Figure 83: Trends in clutch size of Barn Owl by SRMS region during 2009-2018.

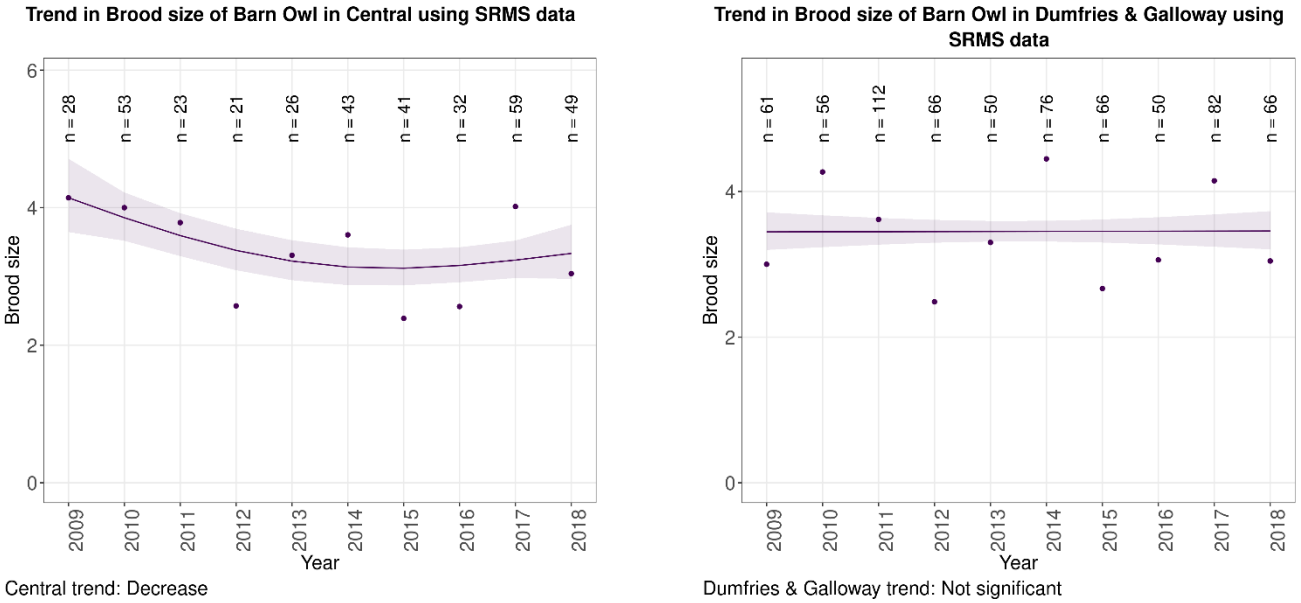
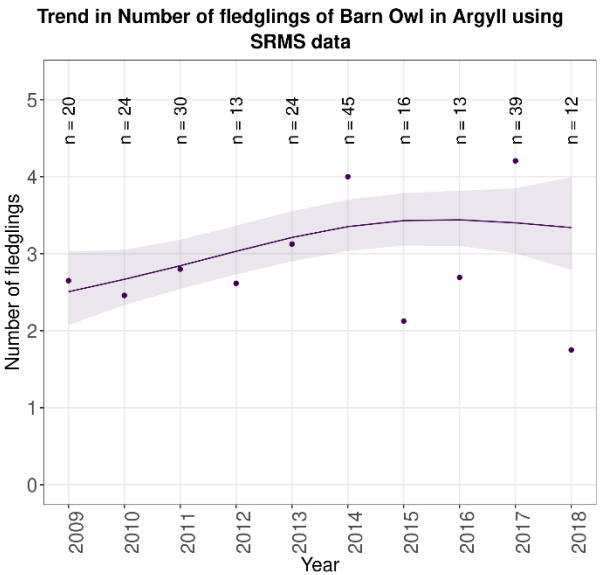
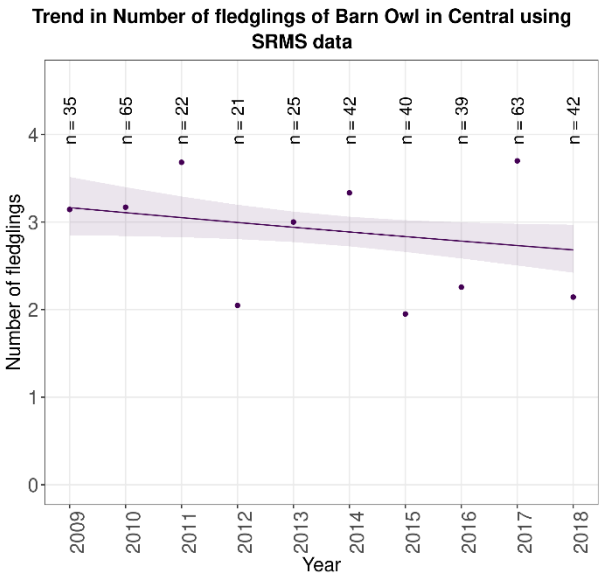


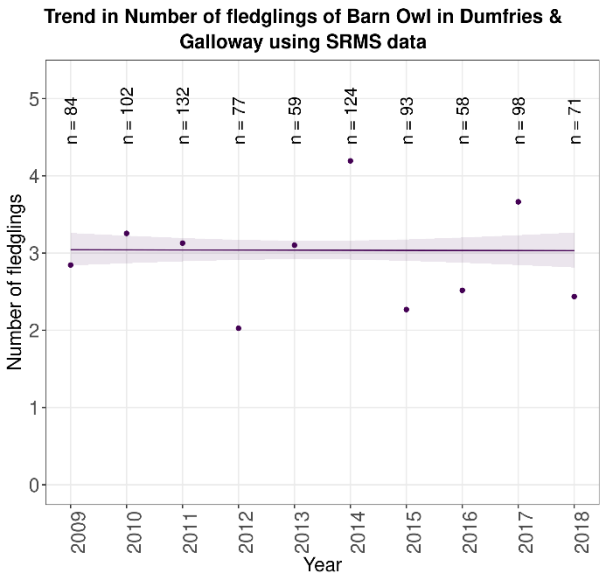
Figure 84: Trends in brood size of Barn Owl by SRMS region during 2009-2018.



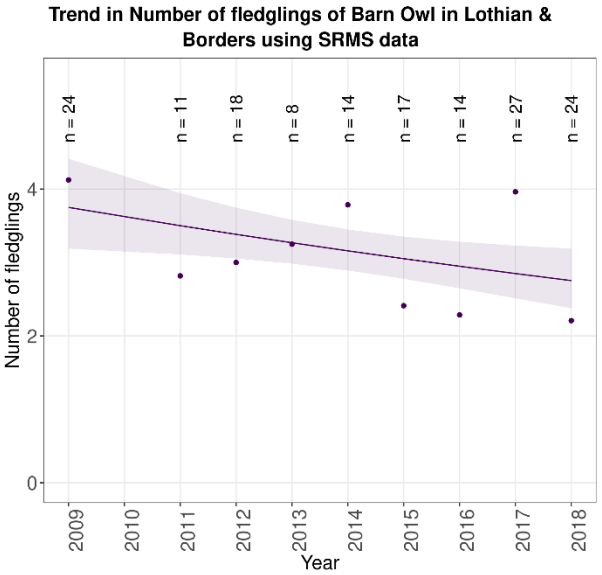
Argyll trend: Increase



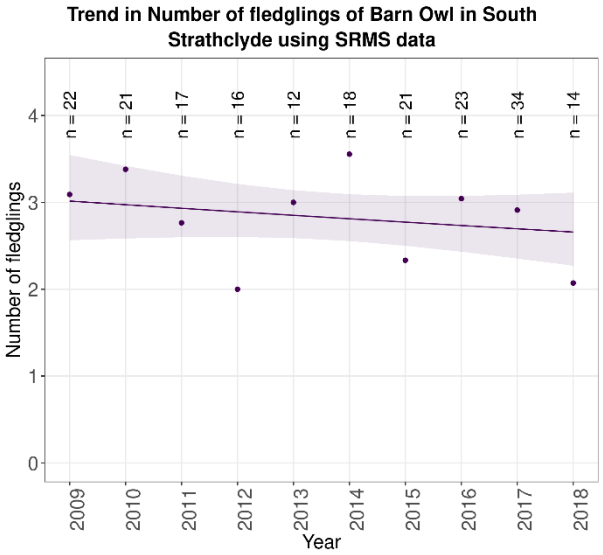
Central trend: Not significant



Dumfries & Galloway trend: Not significant

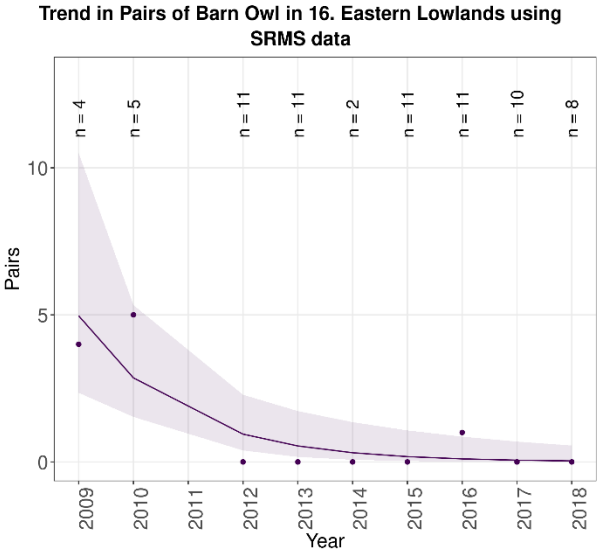


Lothian & Borders trend: Decrease

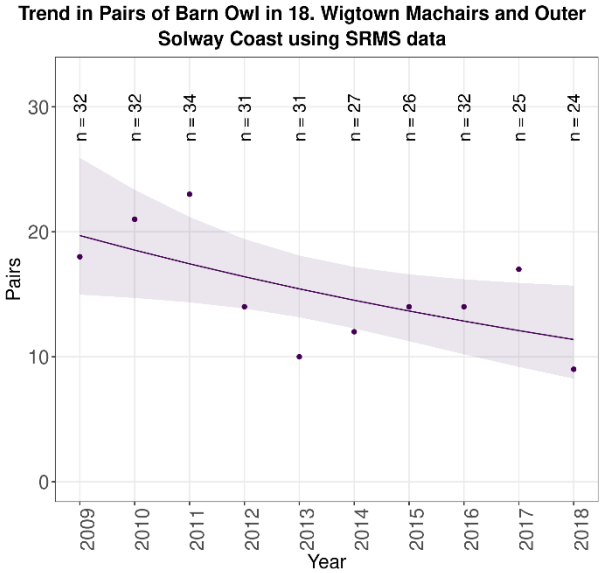


South Strathclyde trend: Not significant (caveats: Sample sizes small)

Figure 85: Trends in number of fledglings of Barn Owl by SRMS region during 2009-2018.

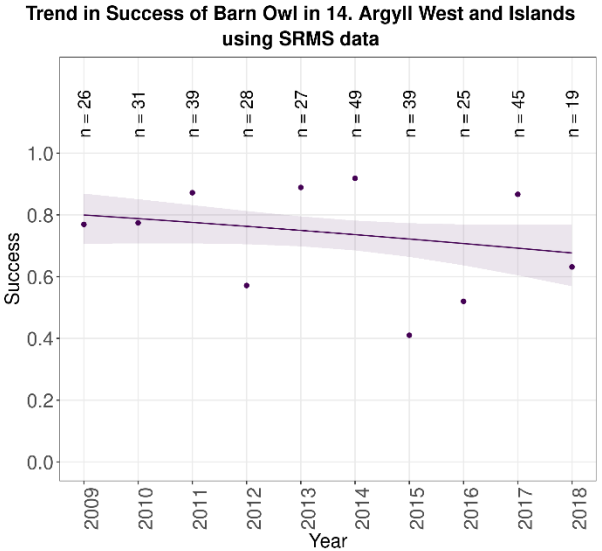


16. Eastern Lowlands trend: Decrease (caveats: Sample sizes small)

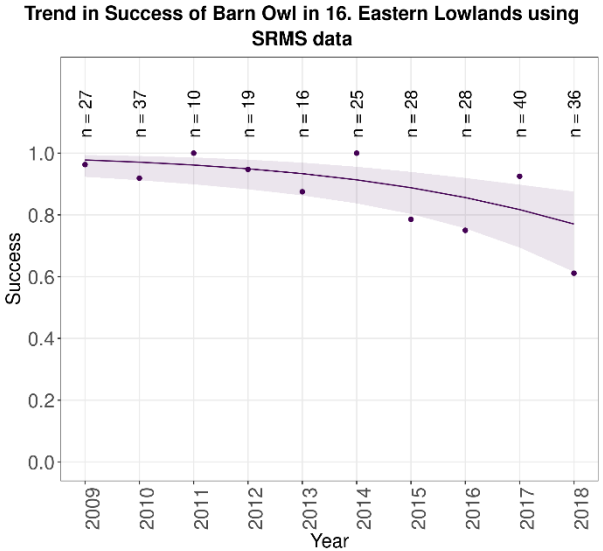


18. Wigtown Machairs and Outer Solway Coast trend: Decrease

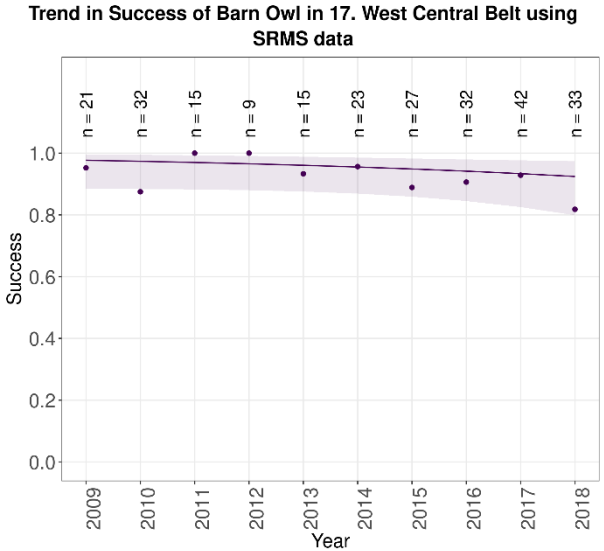
Figure 86: Trends in breeding pairs of Barn Owl by NHZ region during 2009-2018.



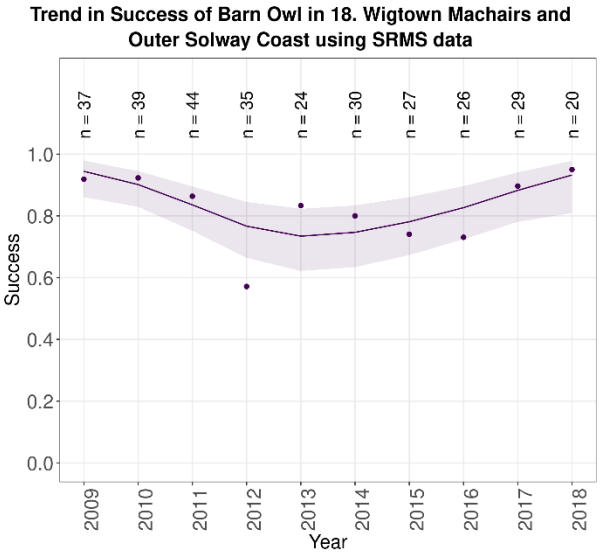
14. Argyll West and Islands trend: Not significant (caveats: Nestbox based; No home range random effect;)



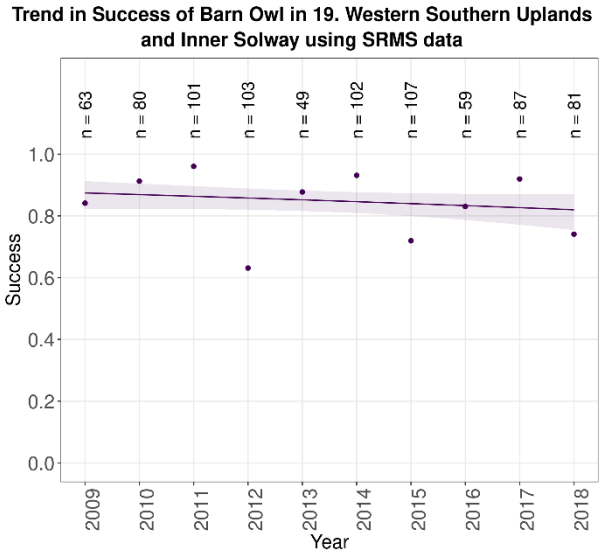
16. Eastern Lowlands trend: Decrease (caveats: Nestbox based; Variable effort;)



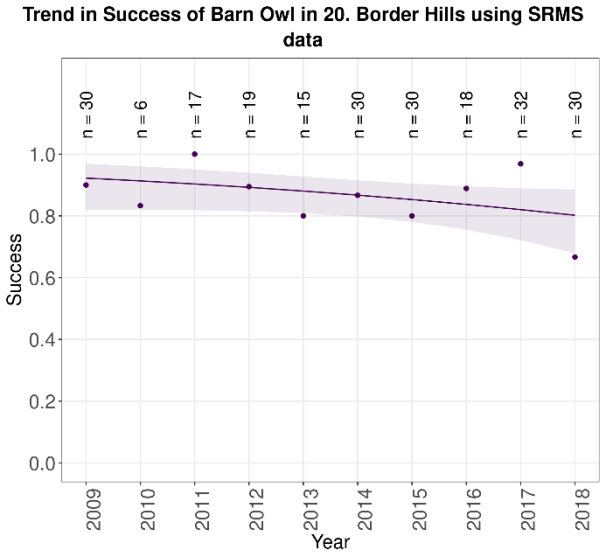
17. West Central Belt trend: Not significant (caveats: Nestbox based; Variable effort;)



18. Wigtown Machairs and Outer Solway Coast trend: Non-linear (caveats: Nestbox based;)

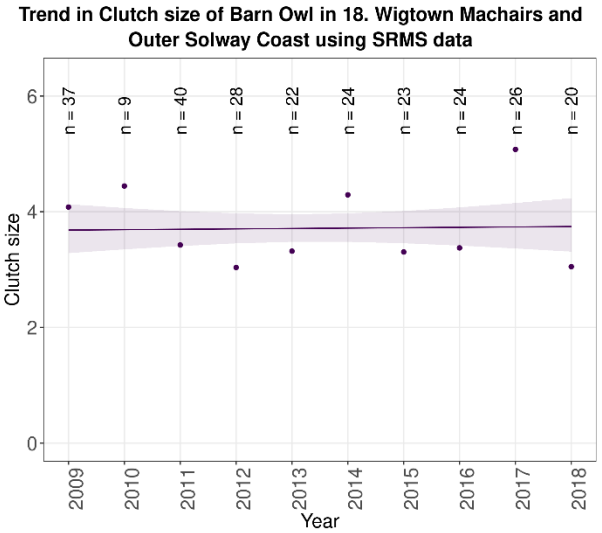


19. Western Southern Uplands and Inner Solway trend: Not significant (caveats: Nestbox based;)

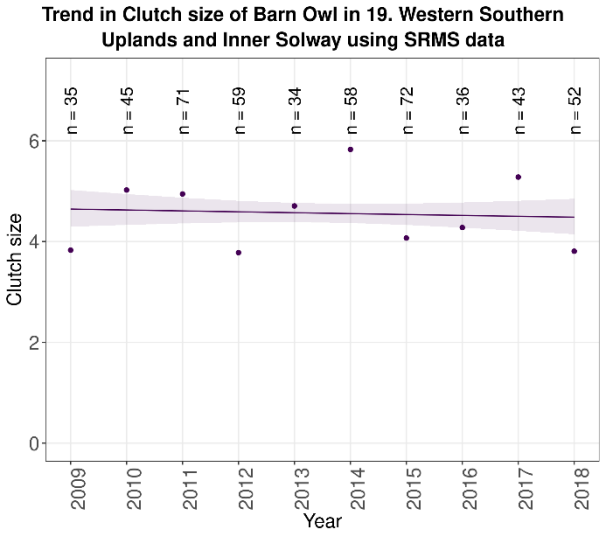


20. Border Hills trend: Not significant (caveats: Nestbox based;)

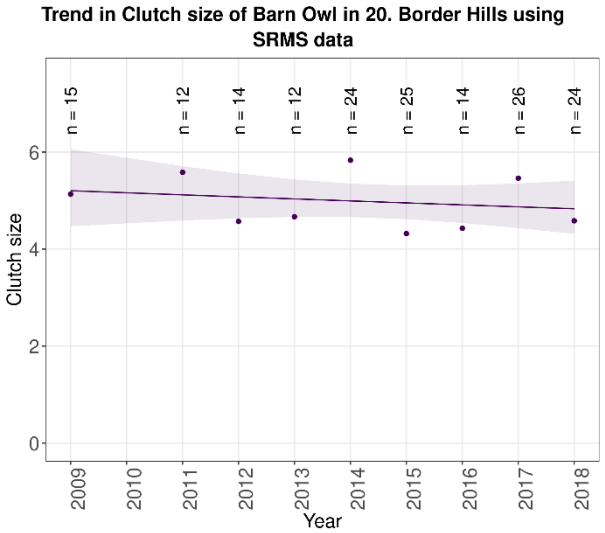
Figure 87: Trends in breeding success of Barn Owl by NHZ region during 2009-2018.



18. Wigtown Machairs and Outer Solway Coast trend: Not significant (caveats: Nestbox based; No home range random effect;)

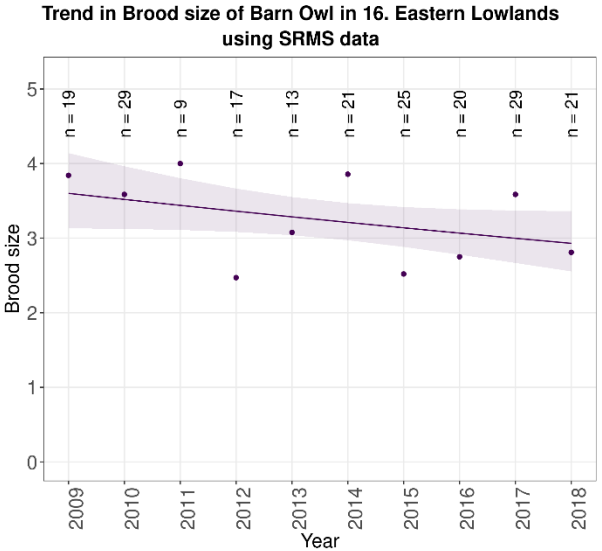


19. Western Southern Uplands and Inner Solway trend: Not significant (caveats: Nestbox based; No home range random effect;)

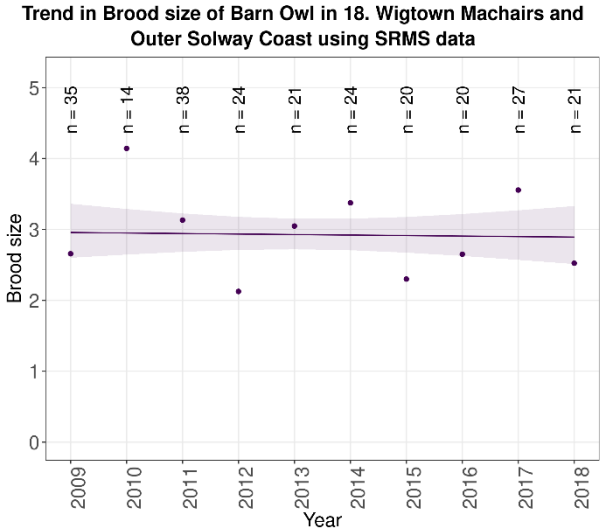


20. Border Hills trend: Not significant (caveats: Nestbox based; Sample sizes small; No home range random effect;)

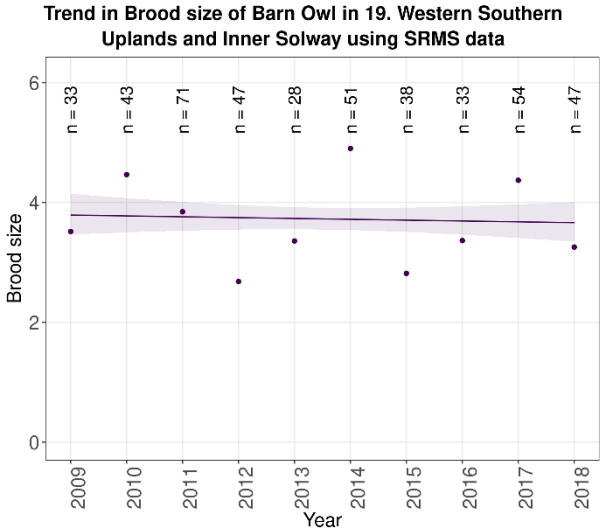
Figure 88: Trends in clutch size of Barn Owl by NHZ region during 2009-2018.



16. Eastern Lowlands trend: Not significant (caveats: Nestbox based; No home range random effect;)

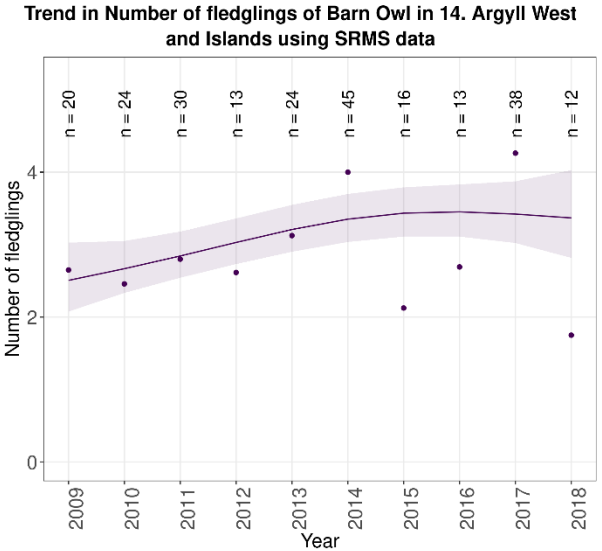


18. Wigtown Machairs and Outer Solway Coast trend: Not significant (caveats: Nestbox based; No home range random effect;)

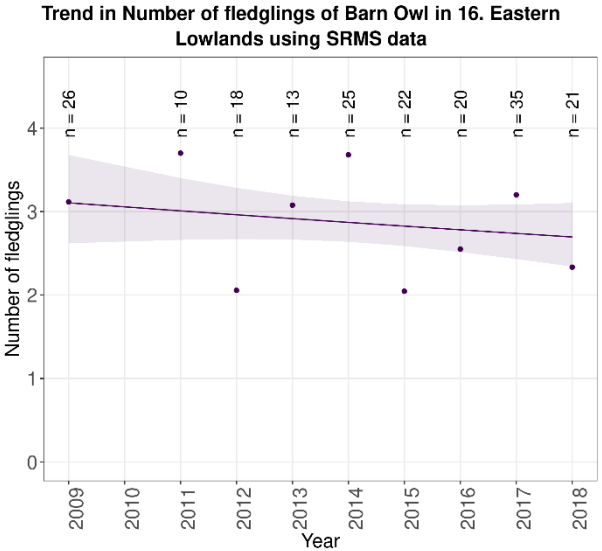


19. Western Southern Uplands and Inner Solway trend: Not significant (caveats: Nestbox based; No home range random effect;)

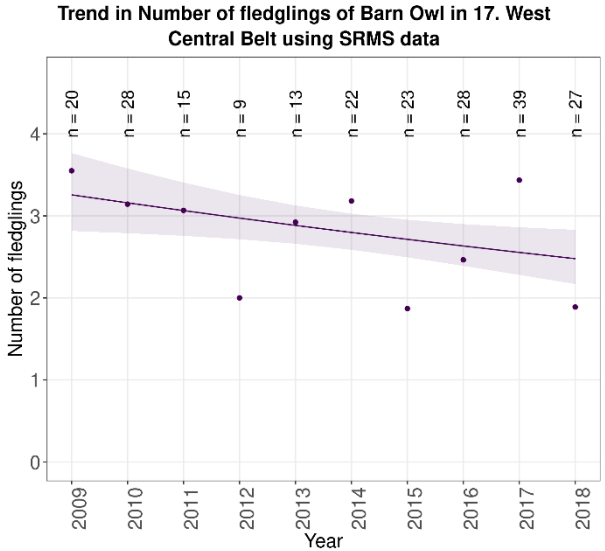
Figure 89: Trends in brood size of Barn Owl by NHZ region during 2009-2018.



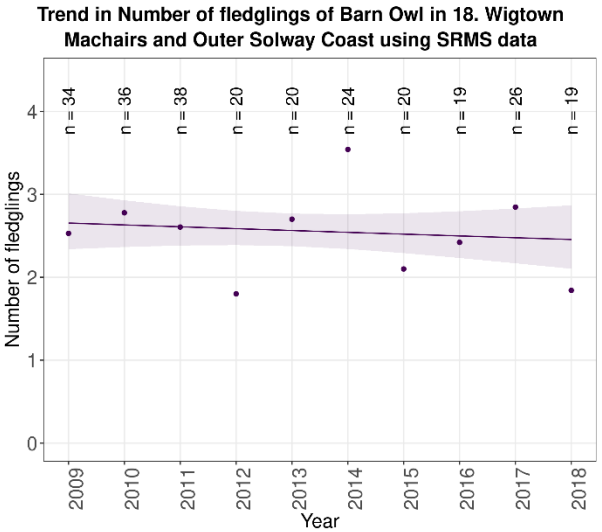
14. Argyll West and Islands trend: Increase (caveats: Nestbox based; No home range random effect;)



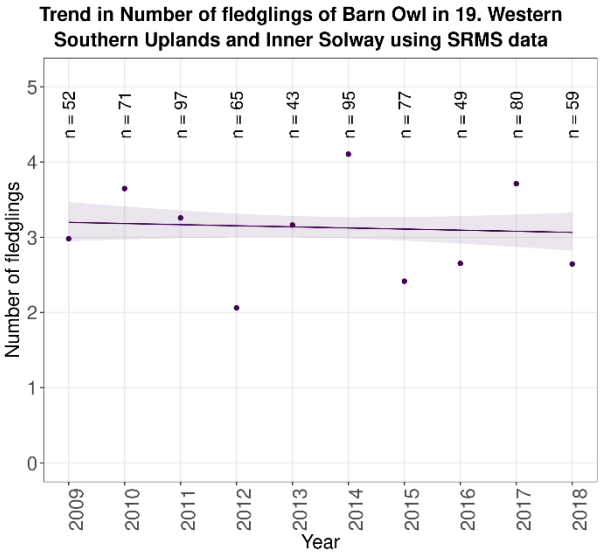
16. Eastern Lowlands trend: Not significant (caveats: Nestbox based; No home range random effect;)



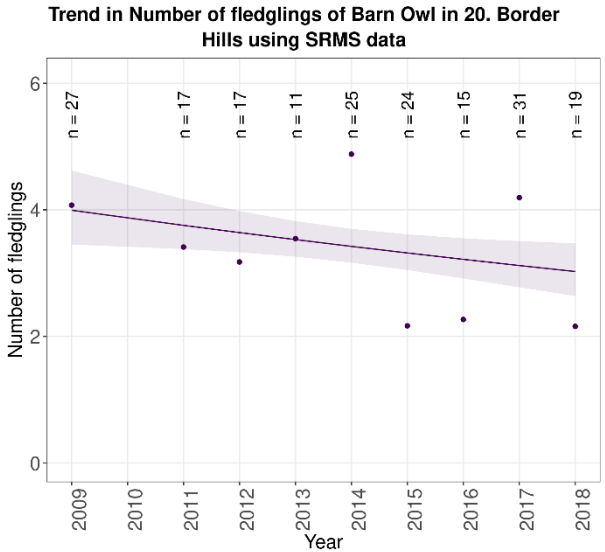
17. West Central Belt trend: Decrease (caveats: Nestbox based; No home range random effect;)



18. Wigtown Machairs and Outer Solway Coast trend: Not significant (caveats: Nestbox based; No home range random effect;)



19. Western Southern Uplands and Inner Solway trend: Not significant (caveats: Nestbox based;)



20. Border Hills trend: Decrease (caveats: Nestbox based; No home range random effect;)

Figure 90: Trends in number of fledglings of Barn Owl by NHZ region during 2009-2018.

Table 44: Details of SRMS Regional trends for Barn Owl.

Parameter	Region	First year of trend	Last year of trend	Number of years	Mean number of home ranges across years	Mean parameter value (and 95% confidence limits)	Trend during the period	Caveats	Estimated % annual change (and 95% confidence limits)
Pairs	Central	2009	2018	9	8.1	1.1 (-0.4 to 2.6)	Decrease	Sample sizes small, Nestbox based	-42.5 (-59.5 to -18.5)
	Dumfries & Galloway	2009	2018	10	29.4	15.2 (12.0 to 18.4)	Decrease	Nestbox based	-5.9 (-11.0 to -0.5)
	South Strathclyde	2009	2018	10	6.2	3.0 (2.2 to 3.8)	Not significant	Sample sizes small, Nestbox based	-1.2 (-12.8 to 11.9)
Success	Argyll	2009	2018	10	33.0	0.7 (0.7 to 0.8)	Not significant	Nestbox based	-1.2 (-2.7 to 0.2)
	Central	2009	2018	10	46.5	0.9 (0.8 to 0.9)	Decrease	Nestbox based	-0.7 (-1.1 to -0.3)
	Dumfries & Galloway	2009	2018	10	110.8	0.8 (0.8 to 0.8)	Decrease	Nestbox based	-0.8 (-1.5 to -0.2)
	Lothian & Borders	2009	2018	9	20.9	0.9 (0.8 to 0.9)	Not significant	Nestbox based	-0.2 (-1.5 to 0.8)
	South Strathclyde	2009	2018	10	20.4	1.0 (0.9 to 1.0)	Stable (<5% change)	Sample sizes small, No home range random effect; Nestbox based	-0.2 (-0.6 to 0.1)
Clutch size	Central	2009	2018	10	33.0	4.1 (3.9 to 4.2)	Not significant		-1.3 (-3.1 to 0.6)
	Dumfries & Galloway	2009	2018	10	76.6	4.3 (4.2 to 4.5)	Not significant		0.2 (-1.1 to 1.4)
Brood size	Central	2009	2018	10	37.5	3.4 (3.3 to 3.6)	Decrease		-2.4 (-4.1 to -0.6)
	Dumfries & Galloway	2009	2018	10	68.5	3.5 (3.3 to 3.6)	Not significant		0.0 (-1.4 to 1.5)
Number of fledglings	Argyll	2009	2018	10	23.6	3.1 (2.9 to 3.3)	Increase		3.5 (0.8 to 6.2)
	Central	2009	2018	10	39.4	2.9 (2.8 to 3.0)	Not significant		-1.8 (-3.7 to 0.1)
	Dumfries & Galloway	2009	2018	10	89.8	3.0 (2.9 to 3.1)	Not significant		0.0 (-1.4 to 1.3)
	Lothian & Borders	2009	2018	9	17.4	3.2 (2.9 to 3.4)	Decrease		-3.4 (-6.1 to -0.6)
	South Strathclyde	2009	2018	10	19.8	2.9 (2.7 to 3.0)	Not significant	Sample sizes small	-1.4 (-4.2 to 1.5)

Table 45: Details of NHZ Regional trends for Barn Owl.

Parameter	Region	First year of trend	Last year of trend	Number of years	Mean number of home ranges across years	Mean parameter value (and 95% confidence limits)	Trend during the period	Caveats	Estimated % annual change (and 95% confidence limits)
Pairs	16. Eastern Lowlands	2009	2018	9	8.1111	1.1 (-0.4 to 2.6)	Decrease	Sample sizes small	-42.5 (-59.5 to -18.5)
	18. Wigtown Machairs and Outer Solway Coast	2009	2018	10	29.4	15.2 (12.0 to 18.4)	Decrease		-5.9 (-11.0 to -0.5)
Success	14. Argyll West and Islands	2009	2018	10	32.8	0.7 (0.7 to 0.8)	Not significant	Nestbox based; No home range random effect;	-1.1 (-2.6 to 0.3)
	16. Eastern Lowlands	2009	2018	10	26.6	0.9 (0.8 to 0.9)	Decrease	Nestbox based; Variable effort;	-0.5 (-0.9 to -0.2)
	17. West Central Belt	2009	2018	10	24.9	0.9 (0.9 to 0.9)	Not significant	Nestbox based; Variable effort;	-0.3 (-0.7 to 0.1)
	18. Wigtown Machairs and Outer Solway Coast	2009	2018	10	31.1	0.8 (0.8 to 0.9)	Non-linear	Nestbox based;	Non-linear
	19. Western Southern Uplands and Inner Solway	2009	2018	10	83.2	0.8 (0.8 to 0.9)	Not significant	Nestbox based;	-0.5 (-1.3 to 0.2)
Success	20. Border Hills	2009	2018	10	22.7	0.9 (0.8 to 0.9)	Not significant	Nestbox based;	-0.8 (-1.9 to 0.1)
Clutch size	18. Wigtown Machairs and Outer Solway Coast	2009	2018	10	25.3	3.7 (3.5 to 3.9)	Not significant	Nestbox based; No home range random effect;	0.2 (-2.0 to 2.4)
	19. Western Southern Uplands and Inner Solway	2009	2018	10	50.5	4.6 (4.4 to 4.7)	Not significant	Nestbox based; No home range random effect;	-0.4 (-1.9 to 1.1)
	20. Border Hills	2009	2018	9	18.444	5.0 (4.8 to 5.2)	Not significant	Nestbox based; Sample sizes small; No home range random effect;	-0.8 (-3.3 to 1.7)
Brood size	16. Eastern Lowlands	2009	2018	10	20.3	3.2 (3.1 to 3.4)	Not significant	Nestbox based; No home range random effect;	-2.3 (-4.7 to 0.3)

Parameter	Region	First year of trend	Last year of trend	Number of years	Mean number of home ranges across years	Mean parameter value (and 95% confidence limits)	Trend during the period	Caveats	Estimated % annual change (and 95% confidence limits)
	18. Wigtown Machairs and Outer Solway Coast	2009	2018	10	24.4	2.9 (2.8 to 3.1)	Not significant	Nestbox based; No home range random effect;	-0.2 (-2.7 to 2.3)
Brood size	19. Western Southern Uplands and Inner Solway	2009	2018	10	44.5	3.7 (3.6 to 3.9)	Not significant	Nestbox based; No home range random effect;	-0.4 (-2.0 to 1.3)
Number of fledglings	14. Argyll West and Islands	2009	2018	10	23.5	3.1 (2.9 to 3.3)	Increase	Nestbox based; No home range random effect;	3.6 (0.8 to 6.3)
	16. Eastern Lowlands	2009	2018	10	21.111	2.9 (2.7 to 3.0)	Not significant	Nestbox based; No home range random effect;	-1.6 (-4.4 to 1.3)
	17. West Central Belt	2009	2018	10	22.4	2.8 (2.6 to 3.0)	Decrease	Nestbox based; No home range random effect;	-3.0 (-5.4 to -0.5)
	18. Wigtown Machairs and Outer Solway Coast	2009	2018	10	25.6	2.6 (2.4 to 2.7)	Not significant	Nestbox based; No home range random effect;	-0.9 (-3.4 to 1.8)
	19. Western Southern Uplands and Inner Solway	2009	2018	10	68.8	3.1 (3.0 to 3.2)	Not significant	Nestbox based;	-0.5 (-2.0 to 1.1)
Number of fledglings	20. Border Hills	2009	2018	9	20.667	3.4 (3.2 to 3.7)	Decrease	Nestbox based; No home range random effect;	-3.0 (-5.6 to -0.5)

Table 46: Number of Barn Owl home range checks for occupancy reported to the SRMS during 2009-2018, in each of the 12 SRMS Regions, with approximate proportion of estimated population monitored. At the bottom of the table, row A is the mean number of home range checks over the most recent five years. Row B gives the estimated proportion of the national population in each region, based on Bird Atlas Timed Tetrad Visit (TTV) data. The depth of red shading indicates the relative importance of each region for this species. If survey effort was spread evenly across the whole population, the ratio of A:B would not vary much between regions.

Year	ARGYLL	CENTRAL SCOTLAND	DUMFRIES & GALLOWAY	HIGHLAND	LEWIS & HARRIS	LOTHIAN & BORDERS	NORTH EAST SCOTLAND	ORKNEY	SHETLAND	SOUTH STRATHCLYDE	TAYSIDE & FIFE	UIST	Total
2009	46	50	236	36		136	36			90	22		652
2010	62	81	231	11		0	0			66	11		462
2011	78	31	277	10		53	1			76	4		530
2012	75	127	254	15		146	25			53	6		701
2013	78	145	249	11		54	22			54	4		617
2014	78	86	310	23		55	25			70	12		659
2015	81	160	279	27		48	24			59	19		697
2016	98	156	303	24		72	24			63	16		756
2017	118	177	273	29		74	1			59	21		752
2018	127	176	248	59		81	0			42	21		754
A: Mean home range checks	**100.4**	**151.0**	**282.6**	**32.4**	**Absent**	**66.0**	**14.8**	**Absent**	**Absent**	**58.6**	**17.8**	**Absent**	**723.6**
B: Proportion of estimated Scottish population	13	1	28	26	0	8	10	0	0	14	2	0	100

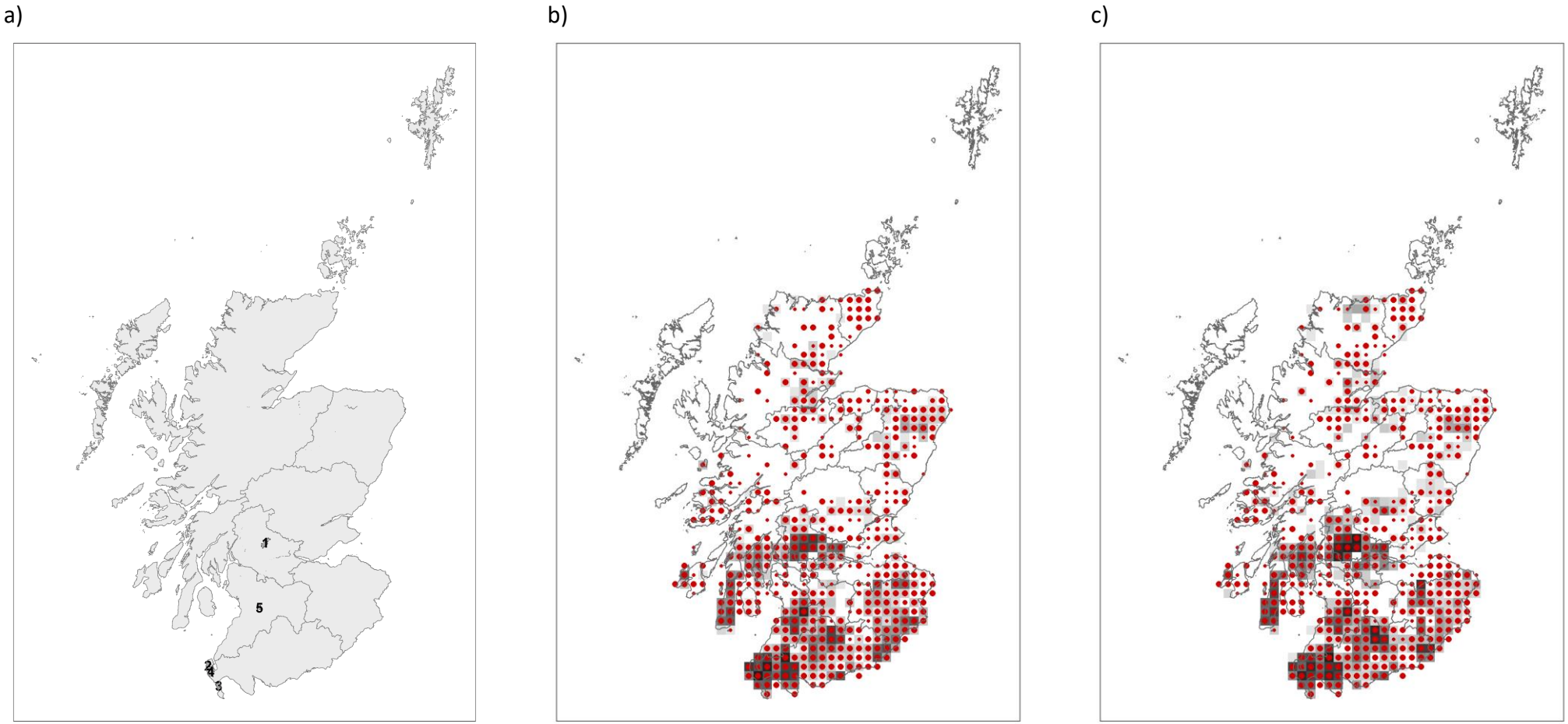


Figure 91: Areas corresponding to the clusters of home ranges from which sufficient data were reported to attempt to derive population trends for Barn Owl between 2009 and 2018 (a) together with maps showing variation in the number of Barn Owl records reported to SRMS during 2009-2013 (b) and 2014-2018 (c), in the context of the known Barn Owl breeding distribution taken from the 2007-2011 Bird Atlas. SRMS data are depicted as grey squares with darker shading indicating more records while Bird Atlas data are depicted as red dots with the size of dot positively related to probability of breeding.

Tawny Owl

Figure 92: Tawny Owl in a hollow tree in 2020 (Photo: Keith Brockie, Tayside & Fife RSG).

Tawny Owl monitoring is concentrated within a relatively small number of discrete study areas across Scotland.

Our latest analysis of SRMS Tawny Owl data for the period 2009-2018 produced no national trends in breeding number or productivity. Trends were produced for four of the eight SRMS regions (Table 47) and for two of the 16 NHZ regions (Table 48) for which the SRMS holds Tawny Owl records.

Users of the published trends users should be aware that suitable records for production of trends in breeding numbers are limited to a single nest box study in Highland (Figure 103). This sample, and the area it is drawn from, are too small to be able to generalise from these data to the rest of Scotland. Nearly all monitored pairs are nest box-based. Productivity records are drawn from a reasonably wide spread of areas, but much of the Scottish range is unrepresented (e.g. there are almost no data from eastern areas, the southwest, and most of

Highland). Consultation with data contributors has highlighted that the apparent decline of Tawny Owl in L&B, though probably real, could be contributed to by a decrease in monitoring effort.

National trends

No trends in breeding numbers or breeding productivity are available for Tawny Owl at a national level.

SRMS regional trends

Breeding numbers of Tawny Owl did not change significantly in Dumfries & Galloway or Highland (Table 47, Figure 93).

Breeding success of Tawny Owl increased in Central and Lothian & Borders and showed no significant change in Dumfries & Galloway and Highland 9Table 47, Figure 94).

Clutch size, brood size and number of fledglings of Tawny Owl did not change significantly in Highland (Table 47, Figures 95-97).

Trends for this species are not yet available for Argyll, North East Scotland, South Strathclyde or Tayside & Fife.

NHZ regional trends

Breeding numbers of Tawny Owl in NHZ 21 did not change significantly (Table 48, Figure 98).

Breeding success of Tawny Owl did not change significantly in NHZ 21 and showed non-linear variation in NHZ 20 (Table 48, Figure 99).

Clutch size, brood size and number of fledglings did not change significantly in either NHZ 20 or NHZ 21) (Table 48, Figures 100-102).

Trends for this species are not yet available for NHZs 04-07, 09-12 and 14-19.

Details of contributing records

2,635 (121 to 415 per year, mean: 264 records) from 2009-2018 contributed to this trends analysis (Table 51).

Table 47: Summary of SRMS regional trends for Tawny Owl during 2009-2018. Figures in parentheses indicate the annual change, with significant increases highlighted in green and non-significant changes highlighted in grey. '—' indicates where the species occurs but no trend is available. 'No SRMS data' indicates where the SRMS does not hold any records for the region of interest. 'Absent' indicates where the species is not known to breed.

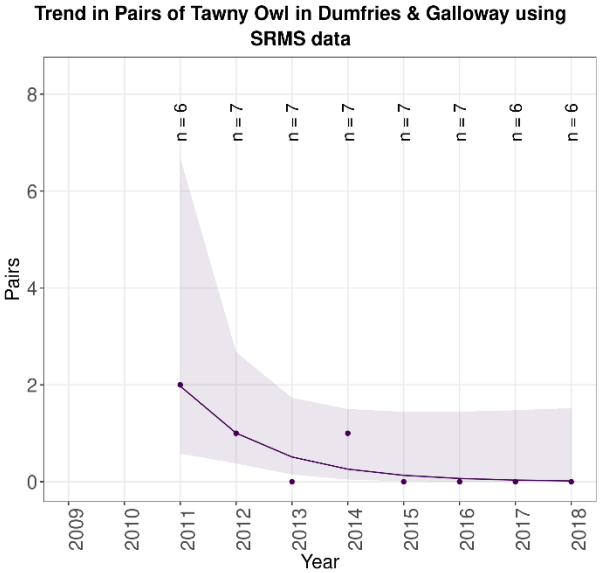
SRMS Region	Pairs	Success	Clutch size	Brood size	Number of fledglings
Argyll	—	—	—	—	—
Central	—	**Increase [n] (5.3%)**	—	—	—
Dumfries & Galloway	Not significant	Not significant [ns]	Not significant	—	—
Highland	Not significant [ns]	Not significant [n]	Not significant	Not significant [s]	Not significant [s]
Lewis & Harris	Absent	Absent	Absent	Absent	Absent
Lothian & Borders	—	**Increase [ns] (6.2%)**	Not significant	—	—
North East Scotland	—	—	—	—	—
Orkney	Absent	Absent	Absent	Absent	Absent
Shetland	Absent	Absent	Absent	Absent	Absent
South Strathclyde	—	—	—	—	—
Tayside & Fife	—	—	—	—	—
Uist	Absent	Absent	Absent	Absent	Absent

[n] Nestbox based, [s] Sample sizes small.

Table 48: Summary of NHZ regional trends for Tawny Owl during 2009-2018. Non-significant changes highlighted in grey. 'Non-linear' indicates non-linear trends. '—' indicates where the species occurs but no trend is available. 'No SRMS data' indicates where the SRMS does not hold any records for the region of interest. 'Absent' indicates where the species is not known to breed.

NHZ Region	Pairs	Success	Clutch size	Brood size	Number of fledglings
01. Shetland	Absent	Absent	Absent	Absent	Absent
02. North Caithness and Orkney	—	—	—	—	—
03. Coll, Tiree and the Western Isles	Absent	Absent	Absent	Absent	Absent
04. North West Seaboard	—	—	—	—	—
05. The Peatlands of Caithness and Sutherland	—	—	—	—	—
06. Western Seaboard	—	—	—	—	—
07. Northern Highlands	—	—	—	—	—
08. Western Highlands	—	—	—	—	—
09. North East Coastal Plain	—	—	—	—	—
10. Central Highlands	—	—	—	—	—
11. Cairngorm Massif	—	—	—	—	—
12. North East Glens	—	—	—	—	—
13. East Lochaber	—	—	—	—	—
14. Argyll West and Islands	—	—	—	—	—
15. Loch Lomond, The Trossachs and Breadalbane	—	—	—	—	—
16. Eastern Lowlands	—	—	—	—	—
17. West Central Belt	—	—	—	—	—
18. Wigtown Machairs and Outer Solway Coast	—	—	—	—	—
19. Western Southern Uplands and Inner Solway	—	—	—	—	—
20. Border Hills	—	Non-linear	Not significant [nrs]	Not significant [nrs]	Not significant [ns]
21. Moray Firth	Not significant	Not significant [n]	Not significant [nrs]	Not significant [nrs]	Not significant [ns]

[n] Nestbox based, [r] No home range random effect, [s] Sample sizes small.



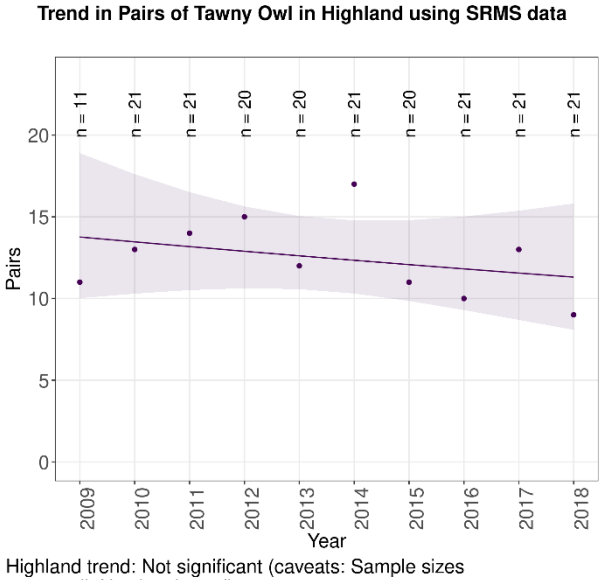
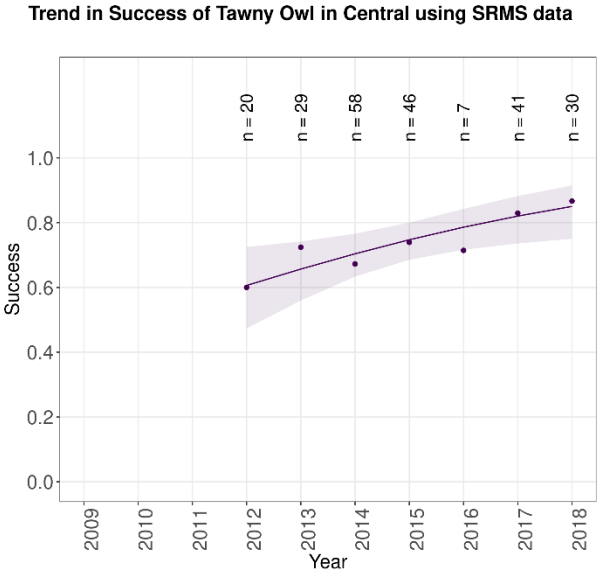
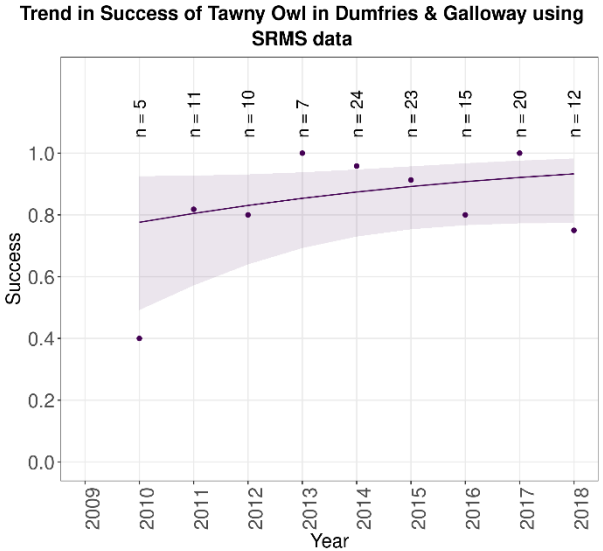


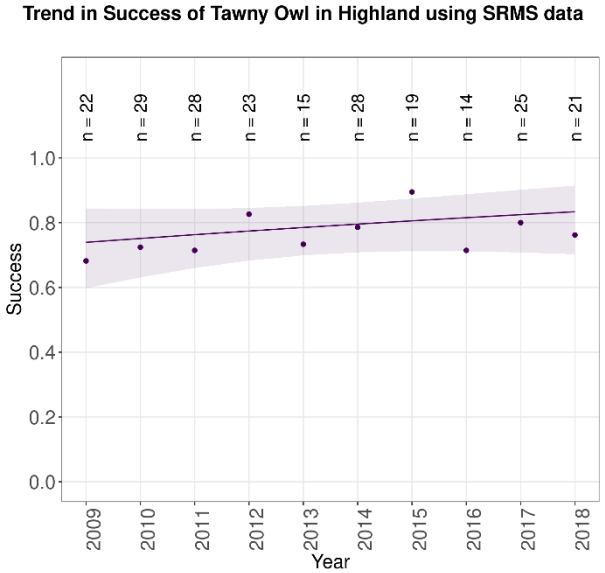
Figure 93: Trends in numbers of breeding pairs of Tawny Owl by SRMS region during 2009-2018.



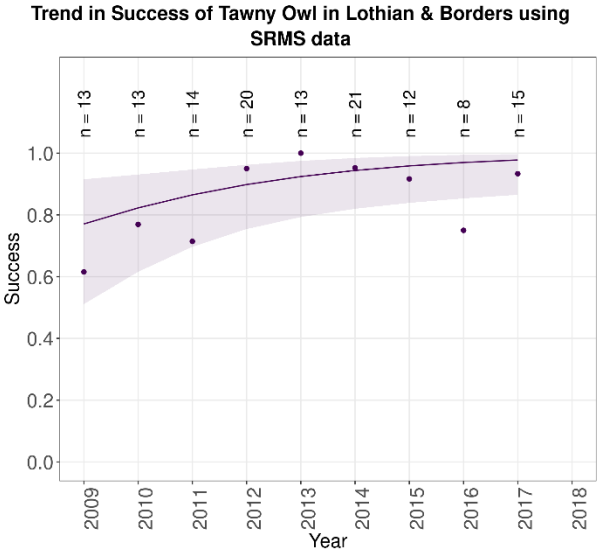
Central trend: Increase (caveats: Nestbox based)



Dumfries & Galloway trend: Not significant (caveats: Sample sizes small; Nestbox based)

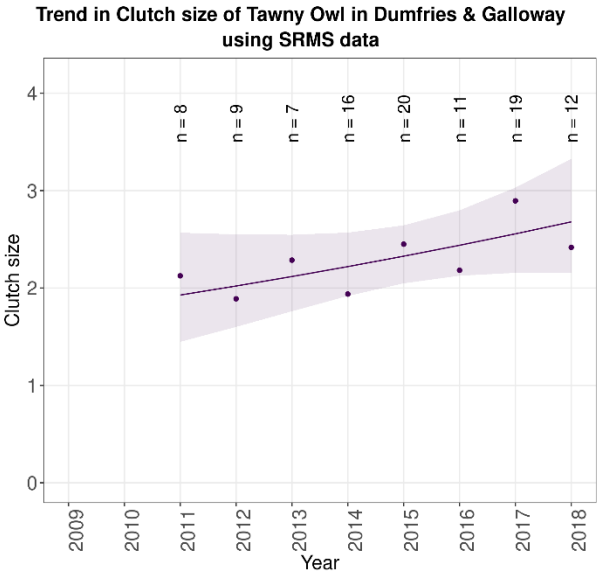


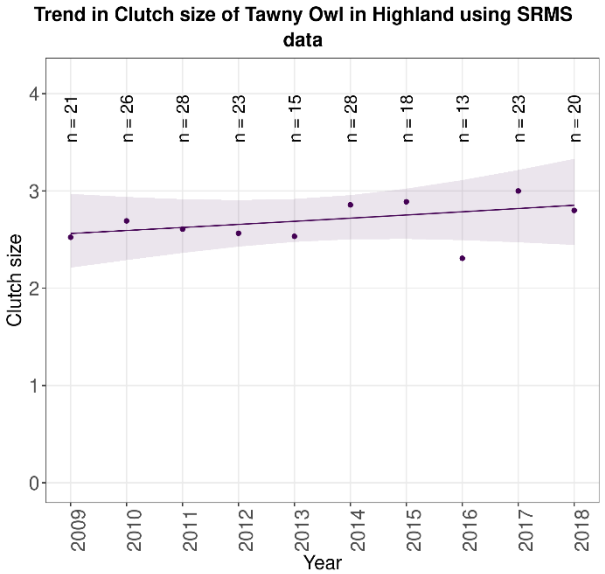
Highland trend: Not significant (caveats: Nestbox based)



Lothian & Borders trend: Increase (caveats: Sample sizes small; Nestbox based)

Figure 94: Trends in breeding success of Tawny Owl by SRMS region during 2009-2018.





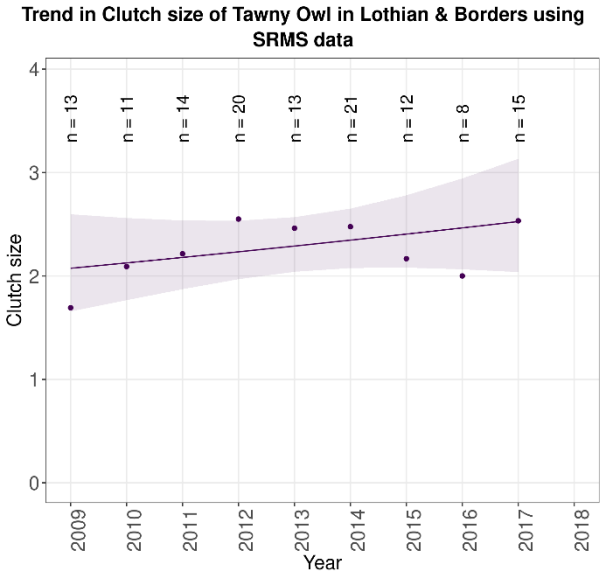


Figure 95: Trends in clutch size of Tawny Owl by SRMS region during 2009-2018.

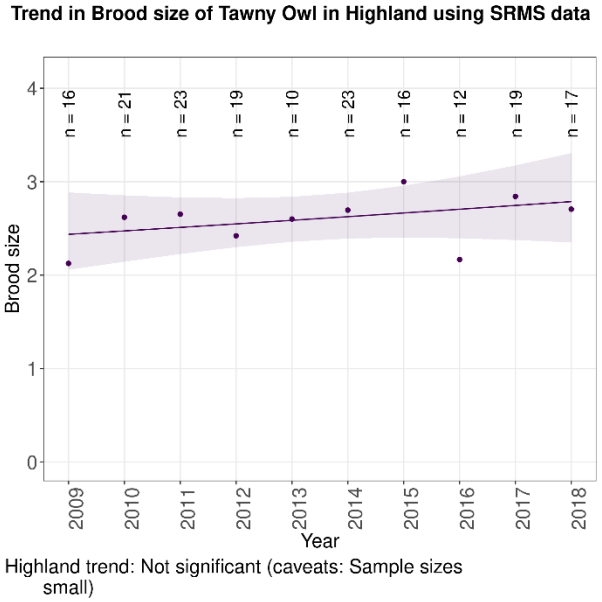


Figure 96: Trends in brood size of Tawny Owl by SRMS region during 2009-2018.

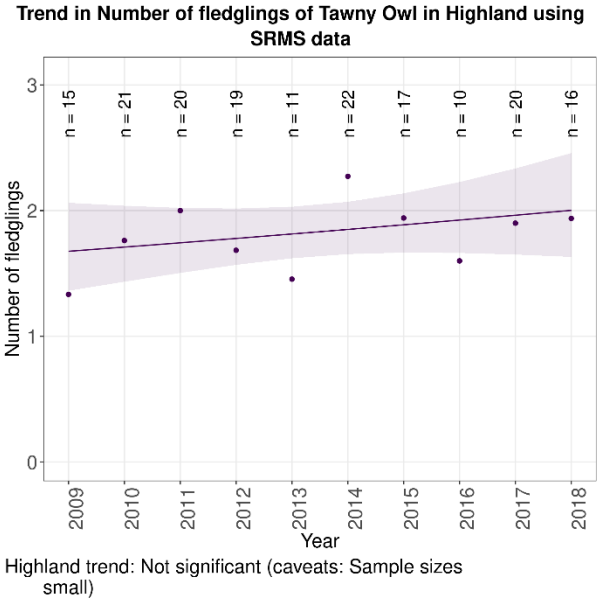


Figure 97: Trends in number of fledglings of Tawny Owl by SRMS region during 2009-2018.

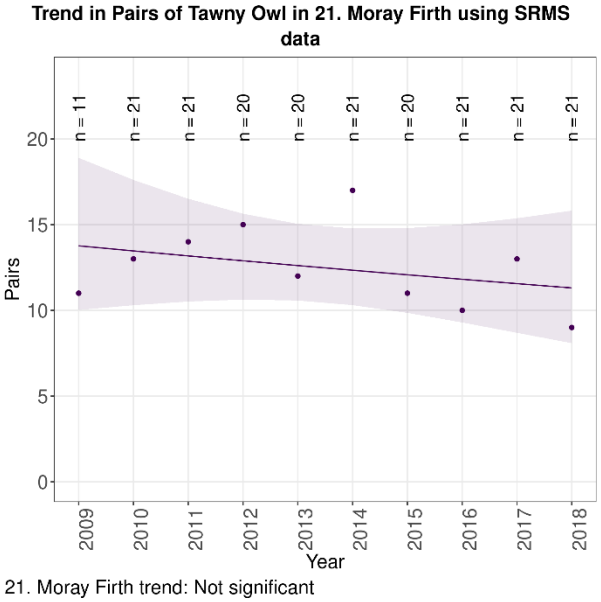
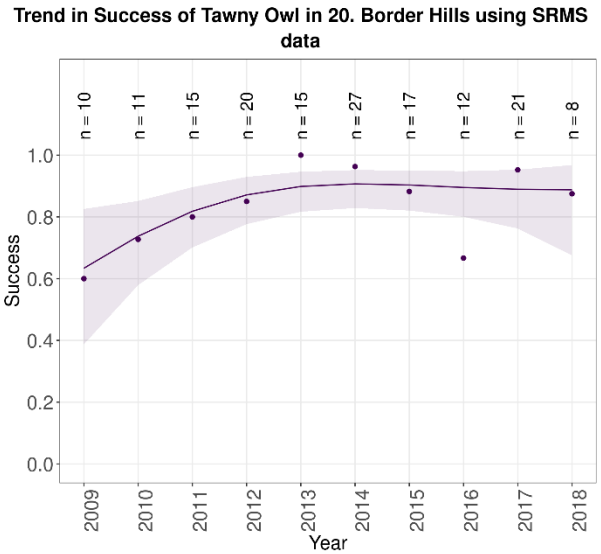
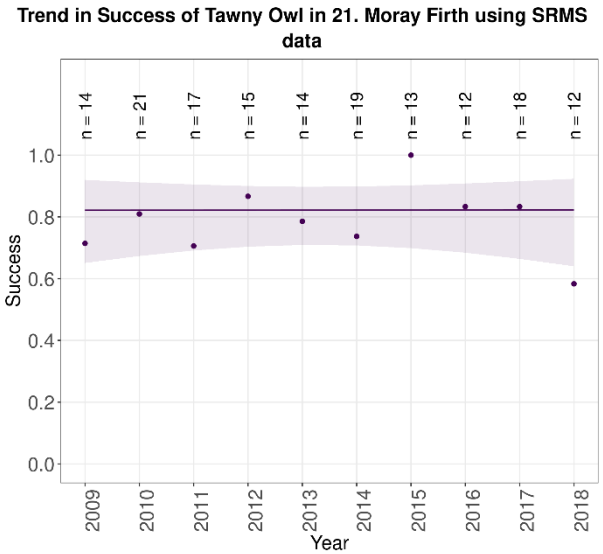


Figure 98: Trends in breeding pairs of Tawny Owl by NHZ region during 2009-2018.

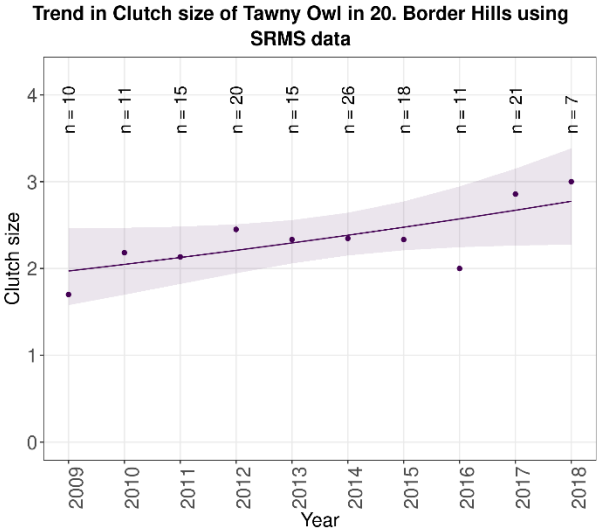


20. Border Hills trend: Non-linear (caveats: Sample-size small; Nestbox based;)

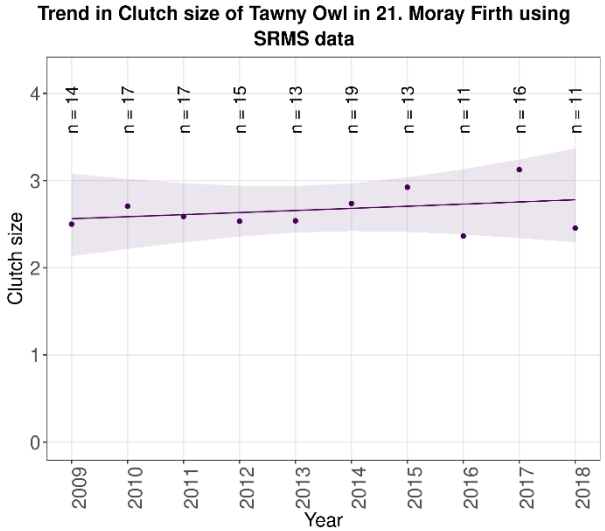


21. Moray Firth trend: Not significant (caveats: Sample-size small; Nestbox based;)

Figure 99: Trends in breeding success of Tawny Owl by NHZ region during 2009-2018.

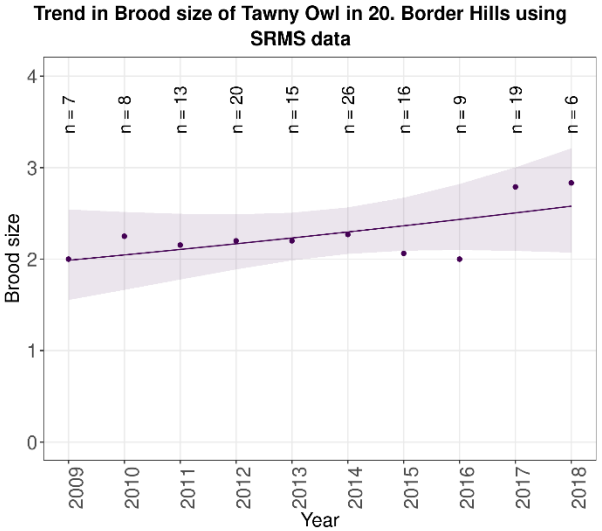


20. Border Hills trend: Not significant (caveats: Nestbox based; Sample sizes small; No home range random effect;)

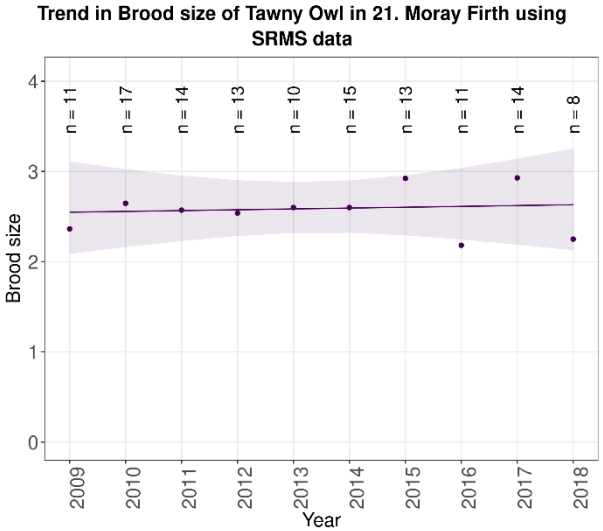


21. Moray Firth trend: Not significant (caveats: Nestbox based; Sample sizes small; No home range random effect;)

Figure 100: Trends in clutch size of Tawny Owl by NHZ region during 2009-2018.

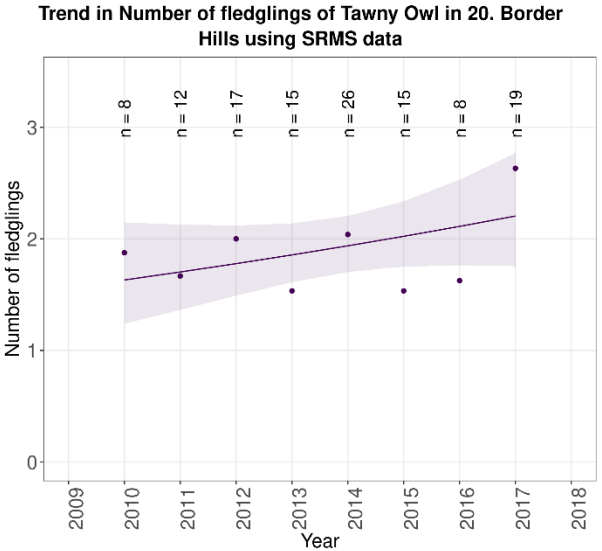


20. Border Hills trend: Not significant (caveats: Nestbox based; Sample sizes small; No home range random effect;)

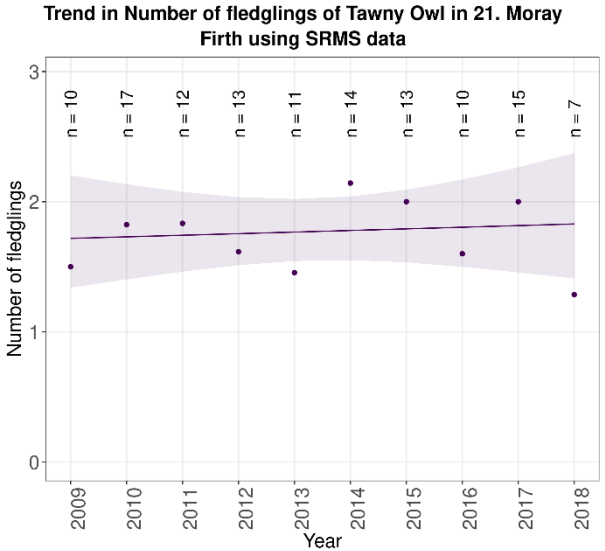


21. Moray Firth trend: Not significant (caveats: Nestbox based; Sample sizes small; No home range random effect;)

Figure 101: Trends in brood size of Tawny Owl by NHZ region during 2009-2018.



20. Border Hills trend: Not significant (caveats: Nestbox based; Sample sizes small)



21. Moray Firth trend: Not significant (caveats: Nestbox based; Sample sizes small)

Figure 102: Trends in number of fledglings of Tawny Owl by NHZ region during 2009-2018.

Table 49: Details of SRMS Regional trends for Tawny Owl.

Parameter	Region	First year of trend	Last year of trend	Number of years	Mean number of home ranges across years	Mean parameter value (and 95% confidence limits)	Trend during the period	Caveats	Estimated % annual change (and 95% confidence limits)
Pairs	Dumfries & Galloway	2011	2018	8	6.6	0.5 (-0.1 to 1.1)	Not significant		-49.1 (-75.4 to 5.2)
	Highland	2009	2018	10	19.7	12.5 (10.8 to 14.2)	Not significant	Sample sizes small, Nestbox based	-2.2 (-8.0 to 4.0)
Success	Central	2012	2018	7	33.0	0.7 (0.7 to 0.8)	Increase	Nestbox based	5.3 (1.2 to 9.2)
	Dumfries & Galloway	2010	2018	9	14.1	0.9 (0.8 to 0.9)	Not significant	Sample sizes small; Nestbox based	3.2 (-1.2 to 7.0)
	Highland	2009	2018	10	22.4	0.8 (0.7 to 0.8)	Not significant	Nestbox based	1.2 (-1.1 to 3.5)
	Lothian & Borders	2009	2017	9	14.3	0.9 (0.8 to 0.9)	Increase	Sample sizes small; Nestbox based	6.2 (1.0 to 10.7)
Clutch size	Dumfries & Galloway	2011	2018	8	12.8	2.3 (2.2 to 2.5)	Not significant		4.8 (-1.5 to 11.5)
	Highland	2009	2018	10	21.5	2.7 (2.6 to 2.8)	Not significant		1.2 (-1.6 to 4.1)
	Lothian & Borders	2009	2017	9	14.1	2.3 (2.2 to 2.4)	Not significant		2.5 (-2.2 to 7.4)
Brood size	Highland	2009	2018	10	17.6	2.6 (2.5 to 2.7)	Not significant	Sample sizes small	1.5 (-1.7 to 4.8)
Number of fledglings	Highland	2009	2018	10	17.1	1.8 (1.7 to 1.9)	Not significant	Sample sizes small	2.0 (-1.9 to 6.0)

Table 50: Details of NHZ Regional trends for Tawny Owl.

Parameter	Region	First year of trend	Last year of trend	Number of years	Mean number of home ranges across years	Mean parameter value (and 95% confidence limits)	Trend during the period	Caveats	Estimated % annual change (and 95% confidence limits)
Pairs	21. Moray Firth	2009	2018	10	19.7	12.5 (10.8 to 14.2)	Not significant		-2.2 (-8.0 to 4.0)
Success	20. Border Hills	2009	2018	10	15.6	0.9 (0.8 to 0.9)	Non-linear	Sample-size small; Nestbox based;	Non-linear
	21. Moray Firth	2009	2018	10	15.5	0.8 (0.7 to 0.8)	Not significant	Sample-size small; Nestbox based;	0.0 (-2.3 to 2.1)
Clutch size	20. Border Hills	2009	2018	10	15.4	2.4 (2.2 to 2.5)	Not significant	Nestbox based; Sample sizes small; No home range random effect;	3.9 (-0.3 to 8.2)
	21. Moray Firth	2009	2018	10	14.6	2.7 (2.5 to 2.8)	Not significant	Nestbox based; Sample sizes small; No home range random effect;	0.9 (-2.6 to 4.5)
Brood size	20. Border Hills	2009	2018	10	13.9	2.3 (2.2 to 2.4)	Not significant	Nestbox based; Sample sizes small; No home range random effect;	2.9 (-1.6 to 7.7)
	21. Moray Firth	2009	2018	10	12.6	2.6 (2.4 to 2.7)	Not significant	Nestbox based; Sample sizes small; No home range random effect;	0.4 (-3.5 to 4.3)
Number of fledglings	20. Border Hills	2010	2017	8	15	1.9 (1.8 to 2.1)	Not significant	Nestbox based; Sample sizes small	4.4 (-1.8 to 11.0)
	21. Moray Firth	2009	2018	10	12.2	1.8 (1.6 to 1.9)	Not significant	Nestbox based; Sample sizes small	0.7 (-4.0 to 5.7)

Table 51: Number of Tawny Owl home range checks for occupancy reported to the SRMS during 2009-2018, in each of the 12 SRMS Regions, with approximate proportion of estimated population monitored. At the bottom of the table, row A is the mean number of home range checks over the most recent five years. Row B gives the estimated proportion of the national population in each region, based on Bird Atlas Timed Tetrad Visit (TTV) data. The depth of red shading indicates the relative importance of each region for this species. If survey effort was spread evenly across the whole population, the ratio of A:B would not vary much between regions.

Year	ARGYLL	CENTRAL SCOTLAND	DUMFRIES & GALLOWAY	HIGHLAND	LEWIS & HARRIS	LOTHIAN & BORDERS	NORTH EAST SCOTLAND	ORKNEY	SHETLAND	SOUTH STRATHCLYDE	TAYSIDE & FIFE	UIST	Total
2009	34	0	0	45		26	0			2	14		121
2010	0	3	8	73		28	0			3	19		134
2011	44	0	34	72		45	0			2	31		228
2012	3	66	37	41		71	0			0	16		234
2013	3	84	38	38		43	0			0	13		219
2014	9	110	59	40		50	0			1	21		290
2015	61	111	56	45		26	0			1	18		318
2016	61	113	58	43		19	2			4	14		314
2017	91	121	62	50		60	1			1	29		415
2018	71	100	63	52		55	0			1	20		362
A: Mean home range checks	**58.6**	**111.0**	**59.6**	**46.0**	**Absent**	**42.0**	**0.6**	**Absent**	**Absent**	**1.6**	**20.4**	**Absent**	**339.8**
B: Proportion of estimated Scottish population	13	4	13	24	0	11	19	0	0	6	10	0	100

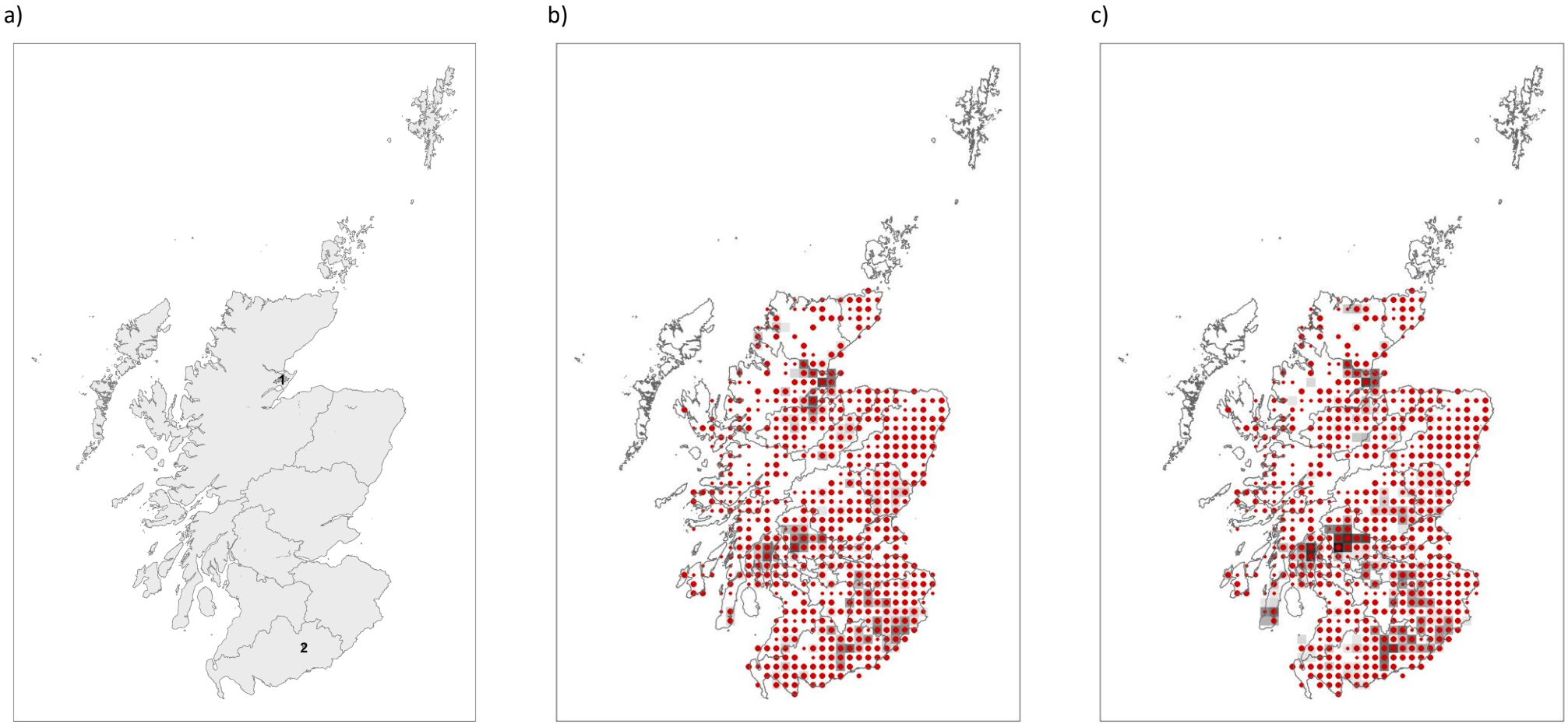


Figure 103: Areas corresponding to the clusters of home ranges from which sufficient data were reported to attempt to derive population trends for Tawny Owl between 2009 and 2018 (a) together with maps showing variation in the number of Tawny Owl records reported to SRMS during 2009-2013 (b) and 2014-2018 (c), in the context of the known Tawny Owl breeding distribution taken from the 2007-2011 Bird Atlas. SRMS data are depicted as grey squares with darker shading indicating more records while Bird Atlas data are depicted as red dots with the size of dot positively related to probability of breeding.

Kestrel

Figure 104: Juvenile Kestrel in Fife in 2017 (Photo: Robin Manson, Tayside & Fife RSG).

The Scottish Kestrel population is poorly represented by existing SRMS data, though these include data from some high quality local studies.

Our latest analysis of SRMS data for the period 2009-2018 produced no national trends in breeding number or productivity of Kestrel, however, trends are available for three of the 11 SRMS regions (Table 52) and for two of the 20 NHZ regions (Table 53) for which the SRMS holds records for Kestrel.

Users of the published trends users should be aware that few data are available for trends in breeding numbers, these coming from around 25 pairs based in two areas (Figure 110). Only ten of these pairs are on the mainland, and the increase in numbers from this area (in Lothian & Borders) is probably not representative of the wider population. Kestrel data are largely nest-box based. Annual productivity information for Kestrel is drawn from 30-80 pairs spread across much of the range, but with poor representation over much of the Highlands, North East Scotland and also much of Lothian & Borders.

National trends

No trends in breeding numbers or breeding productivity are available for Kestrel at a national level.

BBS data for Scotland showed a significant decline in the national Kestrel population over the period 2008-2018 (Harris *et al*., 2020).

SRMS regional trends

Breeding numbers of Kestrel showed non-linear variation in Orkney and no significant change in Lothian & Borders (Table 52, Figure 105).

Breeding success of Kestrel did not change significantly in either Orkney or South Strathclyde (Table 52, Figure 106).

No trends for Kestrel are available for clutch size, brood size or number of fledglings in any region (Table 52).

Trends for this species are not yet available for Argyll, Central, Dumfries & Galloway, Highland, Lewis & Harris, North East Scotland, Tayside & Fife or Uist.

NHZ regional trends

Breeding numbers of Kestrel decreased in NHZ 02 and did not change significantly in NHZ 20 (Table 53, Figure 107).

Breeding success of Kestrel did not change significantly in either NHZ 02 or NHZ 17 (Table 53, Figure 108).

No trends for Kestrel are available for clutch size or brood size (Table 53). Number of fledglings did not change significantly in NHZ 17 (Table 53, Figure 509).

Trends for this species are not yet available for NHZs 03-16, 18-19 and 21.

Details of contributing records

2,609 (104 to 394 per year, mean: 261 records) from 2009-2018 contributed to this trends analysis (Table 56).

References

Harris, S.J., Massimino, D., Balmer, D.E., Eaton, M.A., Noble, D.G., Pearce-Higgins, J.W., Woodcock, P. & Gillings, S. (2020) The Breeding Bird Survey 2019.

Table 52: Summary of SRMS regional trends for Kestrel during 2009-2018. Non-significant changes highlighted in grey. 'Non-linear' indicates non-linear trends. '—' indicates where the species occurs but no trend is available. 'No SRMS data' indicates where the SRMS does not hold any records for the region of interest. 'Absent' indicates where the species is not known to breed.

SRMS Region	Pairs	Success	Clutch size	Brood size	Number of fledglings
Argyll	—	—	—	—	—
Central	—	—	—	—	—
Dumfries & Galloway	—	—	—	—	—
Highland	—	—	—	—	—
Lewis & Harris	—	—	—	—	—
Lothian & Borders	—	—	—	—	—
North East Scotland	—	—	—	—	—
Orkney	Non-linear	Not significant	—	—	—
Shetland	Absent	Absent	Absent	Absent	Absent
South Strathclyde	—	Not significant [ns]	—	—	—
Tayside & Fife	—	—	—	—	—
Uist	—	—	—	—	—

[n] Nestbox based, [s] Sample sizes small.

Table 53: Summary of NHZ regional trends for Kestrel during 2009-2018. Figures in parentheses indicate the annual change, with significant decreases highlighted in blue and non-significant changes highlighted in grey. '—' indicates where the species occurs but no trend is available. 'No SRMS data' indicates where the SRMS does not hold any records for the region of interest. 'Absent' indicates where the species is not known to breed.

NHZ Region	Pairs	Success	Clutch size	Brood size	Number of fledglings
01. Shetland	Absent	Absent	Absent	Absent	Absent
02. North Caithness and Orkney	**Decrease [s] (-14.8%)**	Not significant [s]	—	—	—
03. Coll, Tiree and the Western Isles	—	—	—	—	—
04. North West Seaboard	—	—	—	—	—
05. The Peatlands of Caithness and Sutherland	—	—	—	—	—
06. Western Seaboard	—	—	—	—	—
07. Northern Highlands	—	—	—	—	—
08. Western Highlands	—	—	—	—	—
09. North East Coastal Plain	—	—	—	—	—
10. Central Highlands	—	—	—	—	—
11. Cairngorm Massif	—	—	—	—	—
12. North East Glens	—	—	—	—	—
13. East Lochaber	—	—	—	—	—
14. Argyll West and Islands	—	—	—	—	—
15. Loch Lomond, The Trossachs and Breadalbane	—	—	—	—	—
16. Eastern Lowlands	—	—	—	—	—
17. West Central Belt	—	Not significant [s]	—	—	Not significant [ns]
18. Wigtown Machairs and Outer Solway Coast	—	—	—	—	—
19. Western Southern Uplands and Inner Solway	—	—	—	—	—
20. Border Hills	Not significant [s]	—	—	—	—
21. Moray Firth	—	—	—	—	—

[n] Nestbox based, [s] Sample sizes small.

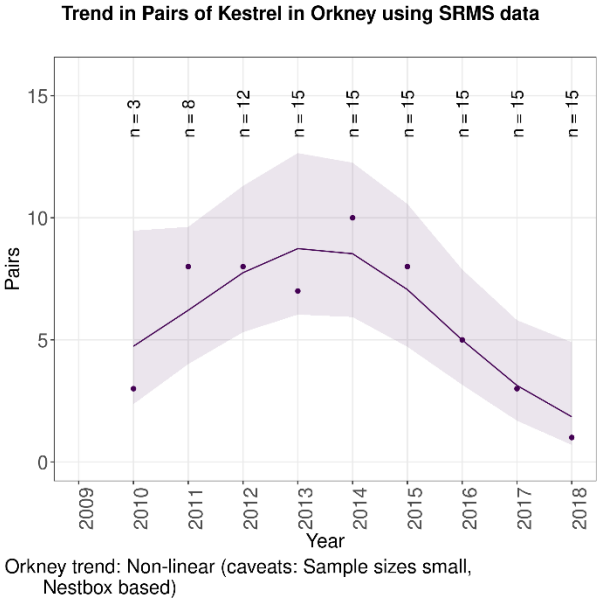
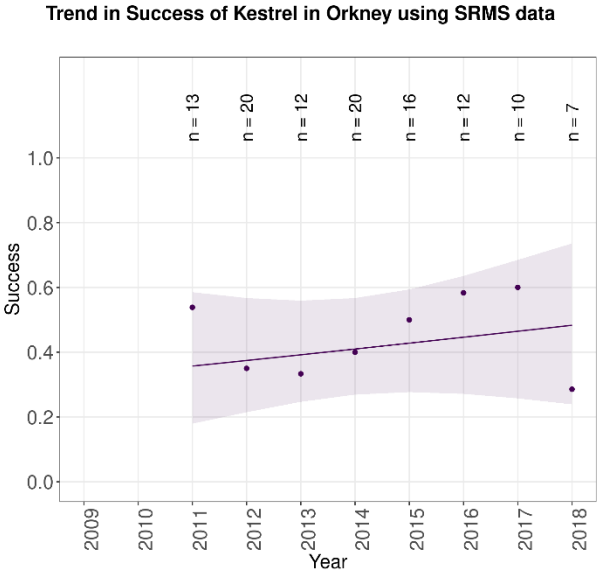
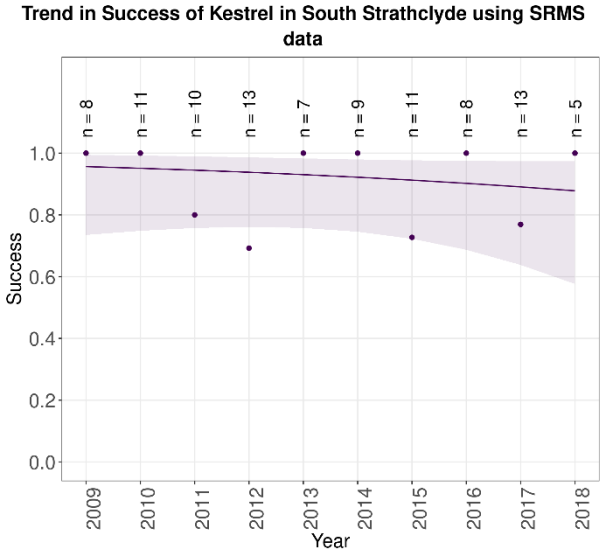


Figure 105: Trends in numbers of breeding pairs of Kestrel by SRMS region during 2009-2018.

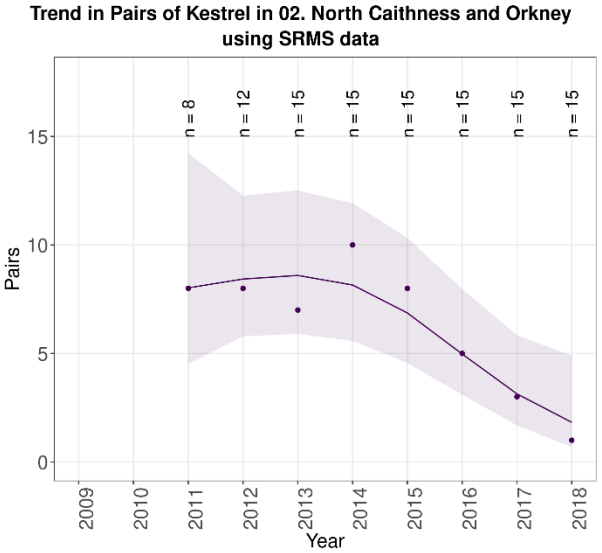


Orkney trend: Not significant

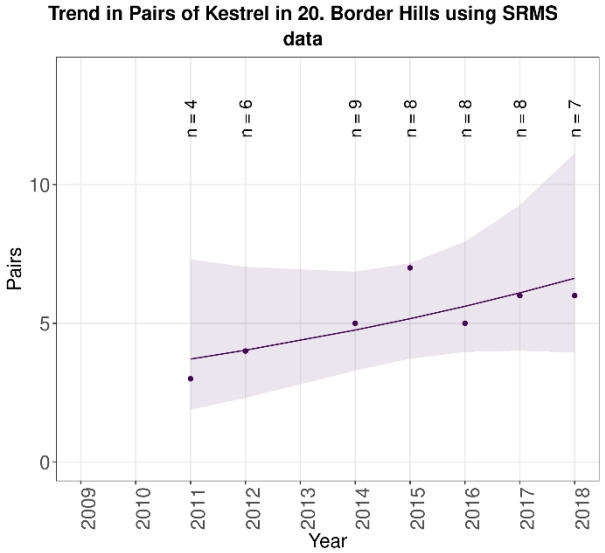


South Strathclyde trend: Not significant (caveats: Sample sizes small; Nestbox based)

Figure 106: Trends in breeding success of Kestrel by SRMS region during 2009-2018.

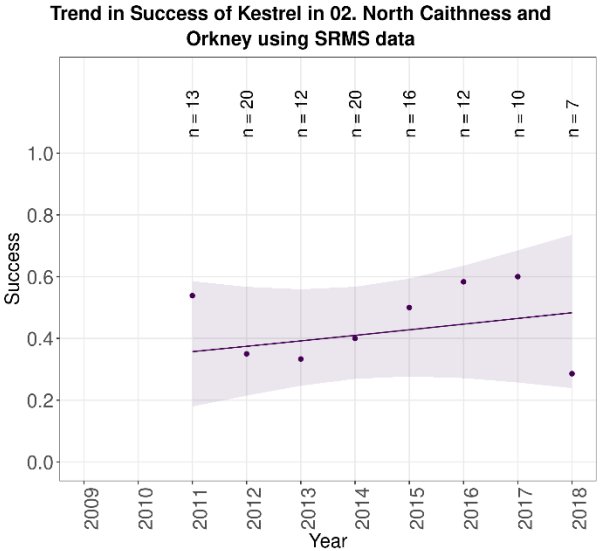


02. North Caithness and Orkney trend: Decrease (caveats: Sample sizes small)

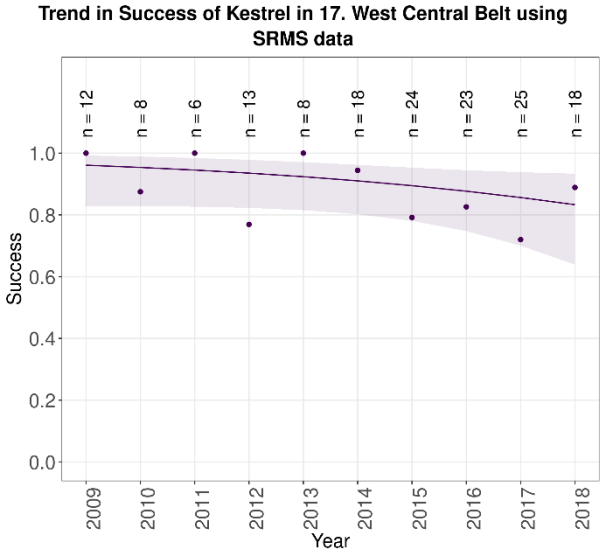


20. Border Hills trend: Not significant (caveats: Sample sizes small)

Figure 107: Trends in breeding pairs of Kestrel by NHZ region during 2009-2018.



02. North Caithness and Orkney trend: Not significant (caveats: Sample sizes small)



17. West Central Belt trend: Not significant (caveats: Sample sizes small)

Figure 108: Trends in breeding success of Kestrel by NHZ region during 2009-2018.

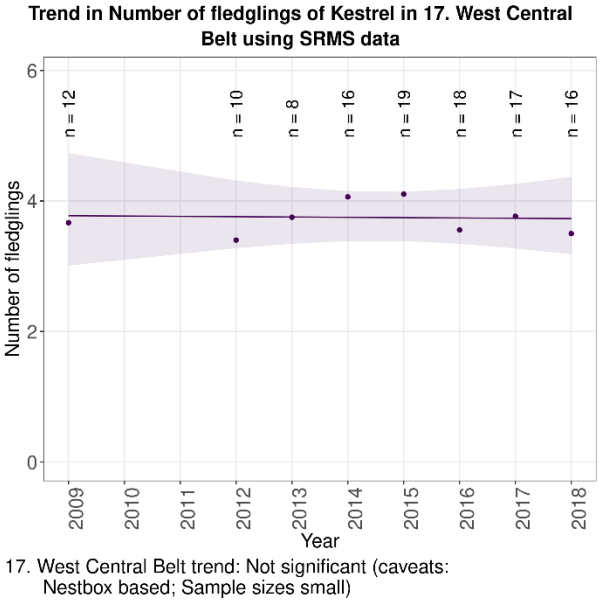


Figure 109: Trends in number of fledglings of Kestrel by NHZ region during 2009-2018.

Table 54: Details of SRMS Regional trends for Kestrel.

Parameter	Region	First year of trend	Last year of trend	Number of years	Mean number of home ranges across years	Mean parameter value (and 95% confidence limits)	Trend during the period	Caveats	Estimated % annual change (and 95% confidence limits)
Pairs	Orkney	2010	2018	9	12.6	5.9 (3.6 to 8.2)	Non-linear	Sample sizes small, Nestbox based	Non-linear
Success	Orkney	2011	2018	8	13.8	0.4 (0.4 to 0.5)	Not significant		1.7 (-3.3 to 7.0)
	South Strathclyde	2009	2018	10	9.5	0.9 (0.8 to 0.9)	Not significant	Sample sizes small; Nestbox based	-0.5 (-1.8 to 0.5)

Table 55: Details of NHZ Regional trends for Kestrel.

Parameter	Region	First year of trend	Last year of trend	Number of years	Mean number of home ranges across years	Mean parameter value (and 95% confidence limits)	Trend during the period	Caveats	Estimated % annual change (and 95% confidence limits)
Pairs	02. North Caithness and Orkney	2011	2018	8	13.75	6.2 (3.7 to 8.8)	Decrease	Sample sizes small	-14.8 (-24.9 to -3.4)
	20. Border Hills	2011	2018	7	7.1429	5.1 (3.9 to 6.4)	Not significant	Sample sizes small	8.6 (-5.8 to 25.3)
Success	02. North Caithness and Orkney	2011	2018	8	13.75	0.4 (0.4 to 0.5)	Not significant	Sample sizes small	1.7 (-3.3 to 7.0)
	17. West Central Belt	2009	2018	10	15.5	0.9 (0.8 to 0.9)	Not significant	Sample sizes small	-0.6 (-1.5 to 0.1)
Number of fledglings	17. West Central Belt	2009	2018	8	14.5	3.8 (3.5 to 4.0)	Not significant	Nestbox based; Sample sizes small	-0.1 (-3.7 to 3.6)

Table 56: Number of Kestrel home range checks for occupancy reported to the SRMS during 2009-2018, in each of the 12 SRMS Regions, with approximate proportion of estimated population monitored. At the bottom of the table, row A is the mean number of home range checks over the most recent five years. Row B gives the estimated proportion of the national population in each region, based on Bird Atlas Timed Tetrad Visit (TTV) data. The depth of red shading indicates the relative importance of each region for this species. If survey effort was spread evenly across the whole population, the ratio of A:B would not vary much between regions.

Year	ARGYLL	CENTRAL SCOTLAND	DUMFRIES & GALLOWAY	HIGHLAND	LEWIS & HARRIS	LOTHIAN & BORDERS	NORTH EAST SCOTLAND	ORKNEY	SHETLAND	SOUTH STRATHCLYDE	TAYSIDE & FIFE	UIST	Total
2009	30	9	16	15	0	0	0	0		25	6	3	104
2010	17	8	13	16	5	2	0	5		29	13	0	108
2011	18	7	26	16	0	19	0	15		35	57	5	198
2012	14	49	29	14	0	59	9	28		36	68	12	318
2013	13	56	28	14	0	7	9	30		37	33	13	240
2014	23	66	35	36	2	43	16	35		36	84	18	394
2015	23	47	30	26	0	32	0	46		39	97	13	353
2016	23	38	22	13	0	27	0	48		27	37	13	248
2017	31	42	25	20	2	47	0	42		34	59	15	317
2018	15	41	31	35	0	49	1	46		25	75	11	329
A: Mean home range checks	**23.0**	**46.8**	**28.6**	**26.0**	**0.8**	**39.6**	**3.4**	**43.4**	**Absent**	**32.2**	**70.4**	**14.0**	**328.2**
B: Proportion of estimated Scottish population	7	8	15	18	0	12	10	1	0	15	13	1	100

Figure 110: Areas corresponding to the clusters of home ranges from which sufficient data were reported to attempt to derive population trends for Kestrel between 2009 and 2018 (a) together with maps showing variation in the number of Kestrel records reported to SRMS during 2009-2013 (b) and 2014-2018 (c), in the context of the known Kestrel breeding distribution taken from the 2007-2011 Bird Atlas. SRMS data are depicted as grey squares with darker shading indicating more records while Bird Atlas data are depicted as red dots with the size of dot positively related to probability of breeding.

Merlin

Figure 111: Merlin chick in Perthshire in 2018 (Photo: Chris Baker, Tayside & Fife RSG).

Merlin is monitored widely across Scotland by SRMS data contributors.

Merlin has also been subject to periodic national surveys via The Statutory Conservation Agency/RSPB Annual Breeding Bird Scheme (SCARABBS) programme. Scottish breeding population estimates are available from three national surveys: a partial survey in 1983/84(Bibby & Nattrass 1986); 1993/94 (Rebecca & Bainbridge 1998) 785 (95% confidence limits 602–994) breeding pairs; and 2008 (Ewing *et al.* 2011) 733 (512–979) breeding pairs. There was an estimated -7% (non-significant) change in breeding population size between 1993/94 and 2008.

Our latest analysis of SRMS Merlin data for the period 2009-2018 produced no national trends in breeding number or productivity. Trends were produced for five of the 12 SRMS regions (Table 57) and for six of the 20 NHZ regions (Table 58) for which the SRMS holds Merlin records.

Users of the published trends users should be aware that no records contributing towards trends in breeding numbers are available from northern Scotland, Lewis or Uist (Figure 121). Productivity records are drawn from across the Merlin's Scottish range, but come predominantly from eastern areas with low monitoring coverage in Highland and in Lewis. Some Merlin records from Shetland that have only recently been made available to SRMS are not included in the current analysis.

National trends

No trends in breeding numbers or breeding productivity are available for Merlin at a national level.

SRMS regional trends

Breeding numbers of Merlin did not change significantly in Highland, Lothian & Borders, North East Scotland, Orkney and Tayside & Fife (Table 57, Figure 112).

Breeding success showed non-linear variation in North East Scotland and no significant change in Tayside & Fife (Table 57, Figure 113).

Clutch size, brood size and number of fledglings did not change significantly in North East Scotland (Table 57, Figures 114-116).

Trends for this species are not yet available for Argyll, Central, Dumfries & Galloway, Lewis & Harris, Shetland, South Strathclyde or Uist.

NHZ regional trends

Breeding numbers of Merlin decreased in NHZ 11 but did not change significantly in NHZs 02, 05, 10, 12 and 20 (Table 58, Figure 117).

Breeding success decreased in NHZs 11-12 and 20 (Table 58, Figure 118).

Clutch size and number of fledglings did not change significantly in NHZ 11 (Table 58, Figure 119). No trends in brood size are available (Table 58).

Trends for this species are not yet available for NHZs 01, 03-04, 06-09, 13-17, 19 and 21.

Details of contributing records

4,138 (292 to 514 per year, mean: 414 records) from 2009-2018 contributed to this trends analysis (Table 61).

References

Bibby, C.J. & Nattrass, M. (1986) Breeding status of the Merlin in Britain. Br. Birds, 79, 170-185.

Steven R. Ewing, Graham W. Rebecca, Alan Heavisides, Ian R. Court, Patrick Lindley, Marc Ruddock, Simon Cohen & Mark A. Eaton (2011) Breeding status of Merlins *Falco columbarius* in the UK in 2008, Bird Study, 58:4, 379-389, DOI: 10.1080/00063657.2011.606497

G.W. Rebecca & I.P. Bainbridge (1998) The breeding status of the Merlin *Falco columbarius* in Britain in 1993–94, Bird Study, 45:2, 172-187, DOI: 10.1080/00063659809461089

Table 57: Summary of SRMS regional trends for Merlin during 2009-2018. Non-significant changes are highlighted in grey. 'Non-linear' indicates non-linear trends. '—' indicates where the species occurs but no trend is available. 'No SRMS data' indicates where the SRMS does not hold any records for the region of interest. 'Absent' indicates where the species is not known to breed.

SRMS Region	Pairs	Success	Clutch size	Brood size	Number of fledglings
Argyll	—	—	—	—	—
Central	—	—	—	—	—
Dumfries & Galloway	—	—	—	—	—
Highland	Not significant	—	—	—	—
Lewis & Harris	—	—	—	—	—
Lothian & Borders	Not significant	—	—	—	—
North East Scotland	Not significant	Non-linear	Not significant	Not significant	Not significant
Orkney	Not significant	—	—	—	—
Shetland	—	—	—	—	—
South Strathclyde	—	—	—	—	—
Tayside & Fife	Not significant [sv]	Not significant [rs]	—	—	—
Uist	—	—	—	—	—

[r] No home range random effect, [s] Sample sizes small, [v] Variable effort.

Table 58: Summary of NHZ regional trends for Merlin during 2009-2018. Figures in parentheses indicate the annual change, with decreases highlighted in blue and non-significant changes highlighted in grey. '—' indicates where the species occurs but no trend is available. 'No SRMS data' indicates where the SRMS does not hold any records for the region of interest. 'Absent' indicates where the species is not known to breed.

NHZ Region	Pairs	Success	Clutch size	Brood size	Number of fledglings
01. Shetland	—	—	—	—	—
02. North Caithness and Orkney	Not significant	—	—	—	—
03. Coll, Tiree and the Western Isles	—	—	—	—	—
04. North West Seaboard	—	—	—	—	—
05. The Peatlands of Caithness and Sutherland	Not significant [s]	—	—	—	—
06. Western Seaboard	—	—	—	—	—
07. Northern Highlands	—	—	—	—	—
08. Western Highlands	—	—	—	—	—
09. North East Coastal Plain	—	—	—	—	—
10. Central Highlands	Not significant [s]	—	—	—	—
11. Cairngorm Massif	**Decrease (-6.7%)**	**Decrease (-1.3%)**	Not significant [r]	—	Not significant [r]
12. North East Glens	Not significant	**Decrease [s] (-1.4%)**	—	—	—
13. East Lochaber	—	—	—	—	—
14. Argyll West and Islands	—	—	—	—	—
15. Loch Lomond, The Trossachs and Breadalbane	—	—	—	—	—
16. Eastern Lowlands	—	—	—	—	—
17. West Central Belt	—	—	—	—	—
18. Wigtown Machairs and Outer Solway Coast	Absent	Absent	Absent	Absent	Absent
19. Western Southern Uplands and Inner Solway	—	—	—	—	—
20. Border Hills	Not significant	**Decrease [s] (-1.3%)**	—	—	—
21. Moray Firth	—	—	—	—	—

[r] No home range random effect, [s] Sample sizes small.

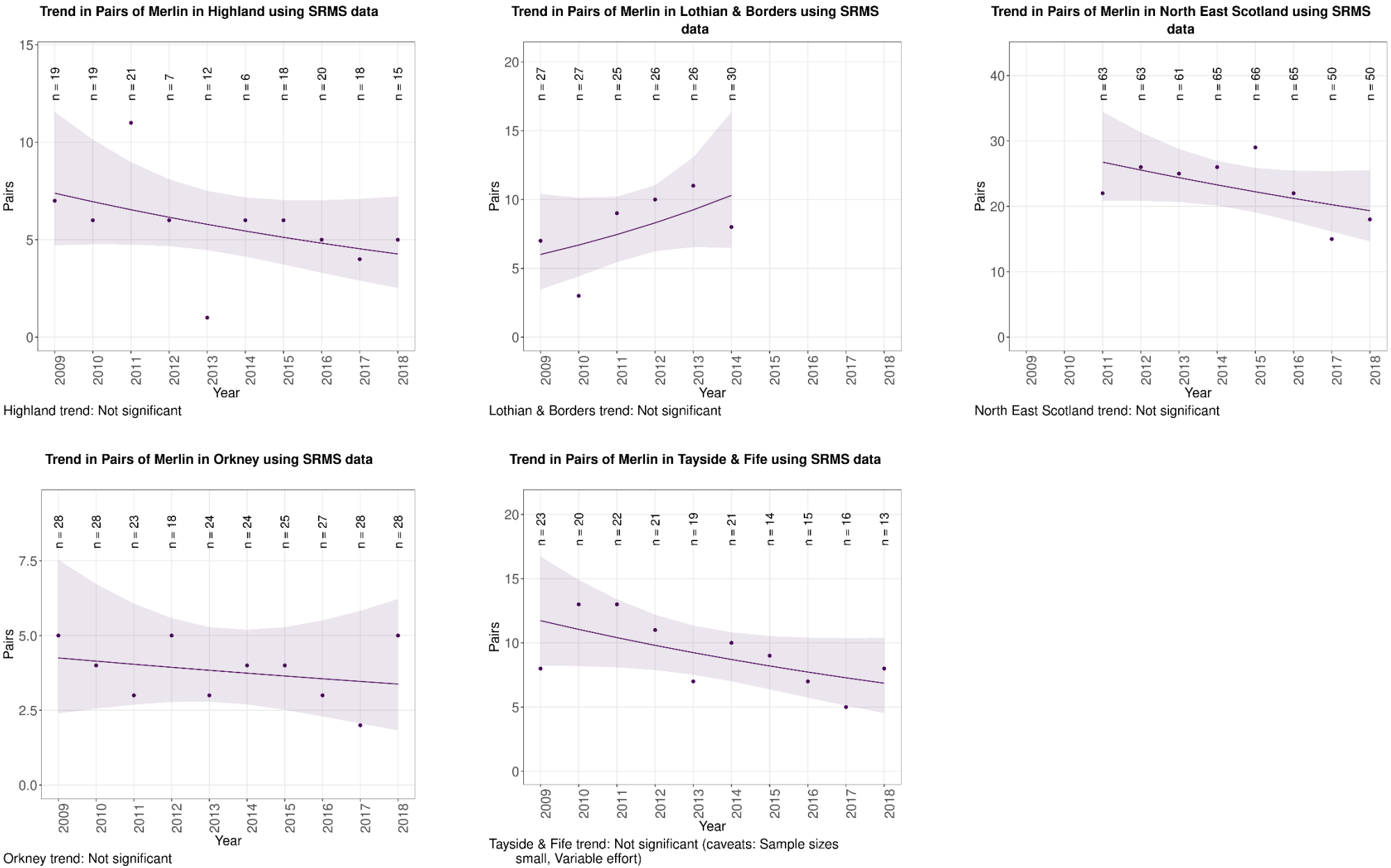
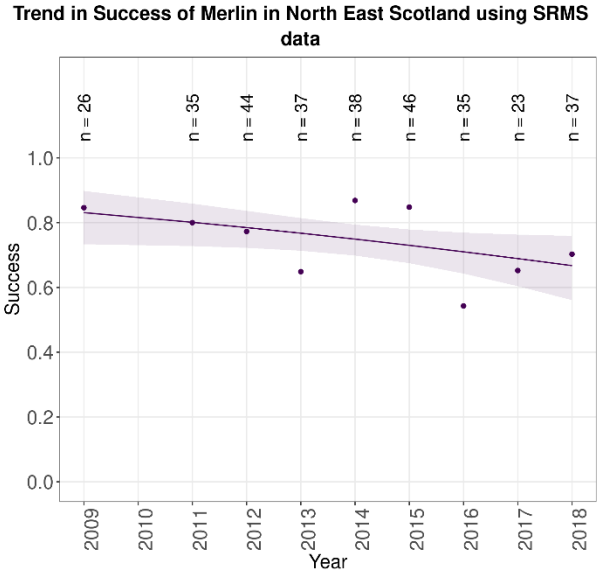
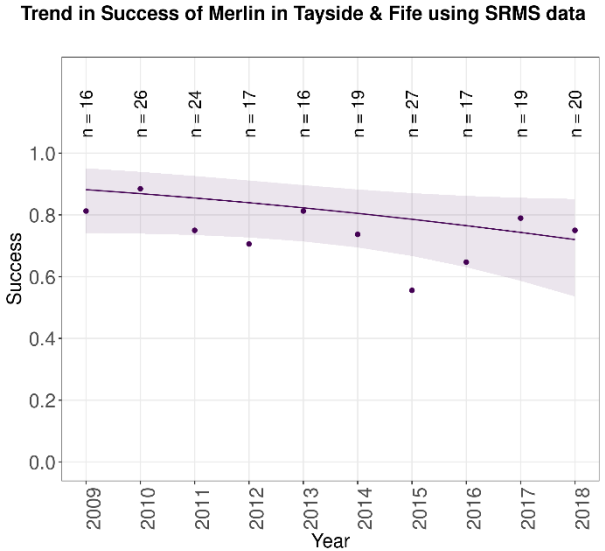


Figure 112: Trends in numbers of breeding pairs of Merlin by SRMS region during 2009-2018.



North East Scotland trend: Non-linear



Tayside & Fife trend: Not significant (caveats: Sample sizes small, No home range random effect)

Figure 113: Trends in breeding success of Merlin by SRMS region during 2009-2018.

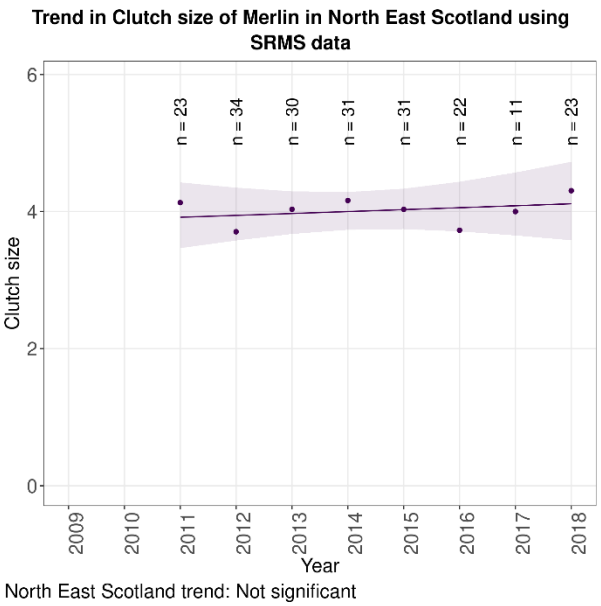


Figure 114: Trends in clutch size of Merlin by SRMS region during 2009-2018.

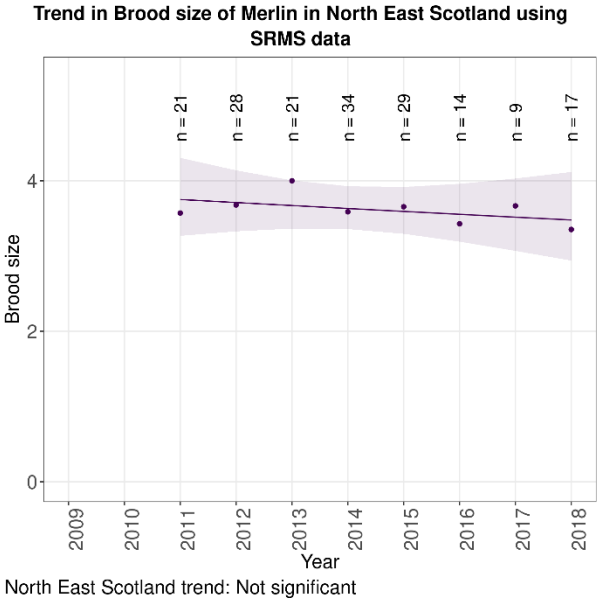


Figure 115: Trends in brood size of Merlin by SRMS region during 2009-2018.

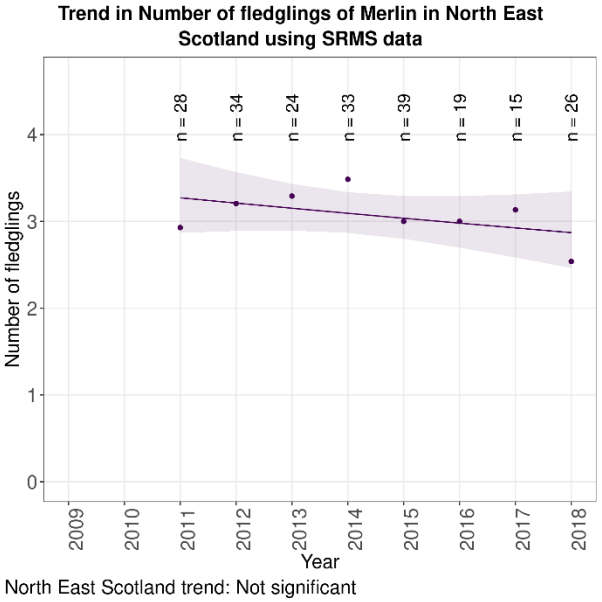
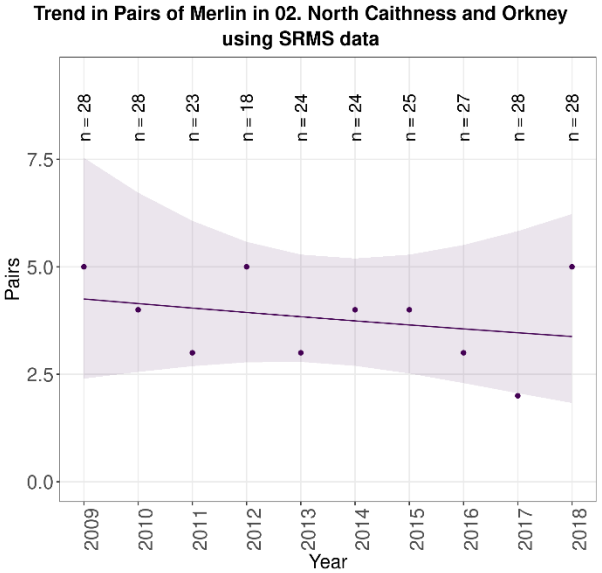
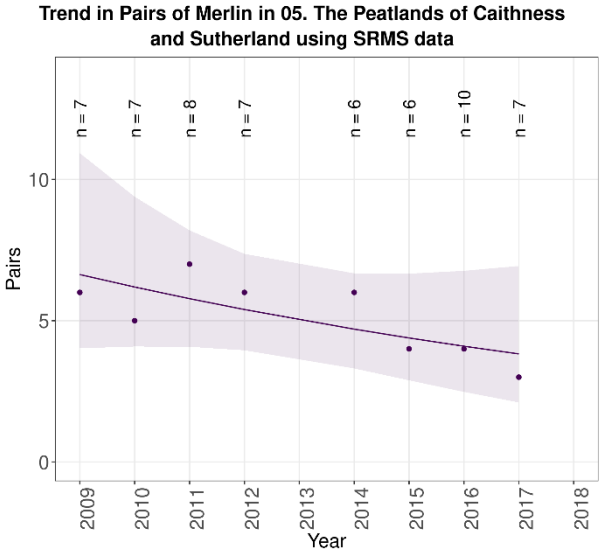


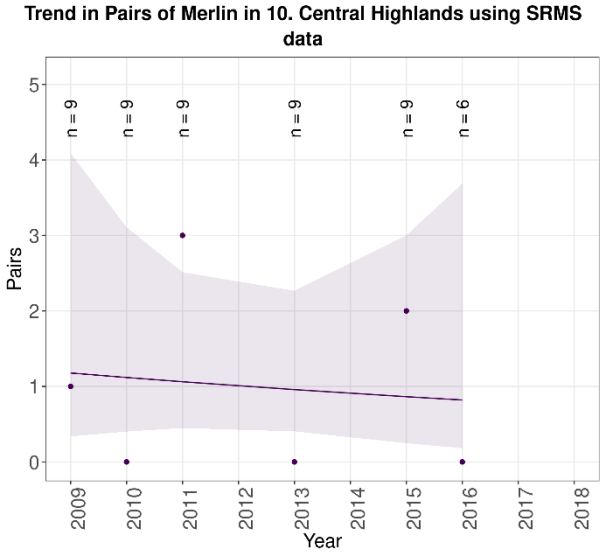
Figure 116: Trends in number of fledglings of Merlin by SRMS region during 2009-2018.



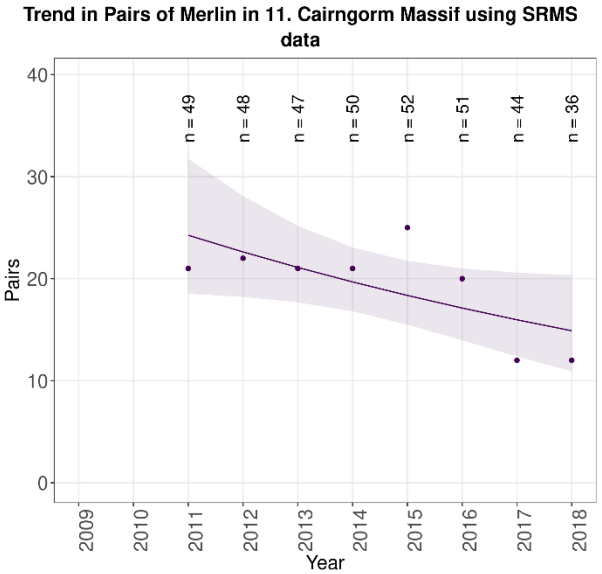
02. North Caithness and Orkney trend: Not significant



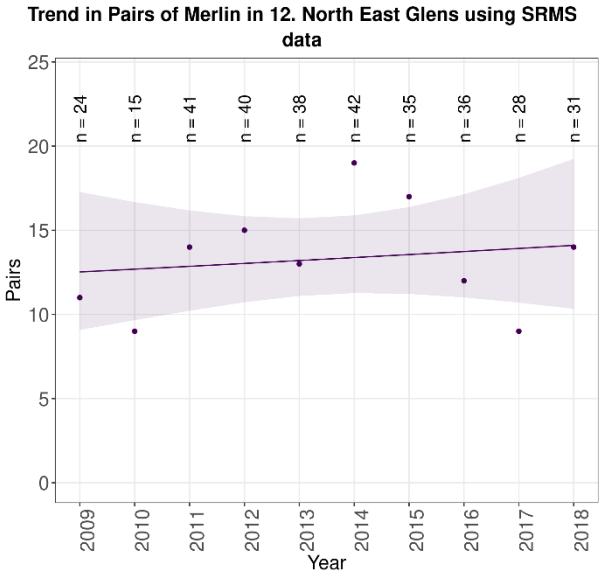
05. The Peatlands of Caithness and Sutherland trend: Not significant (caveats: Sample sizes small)



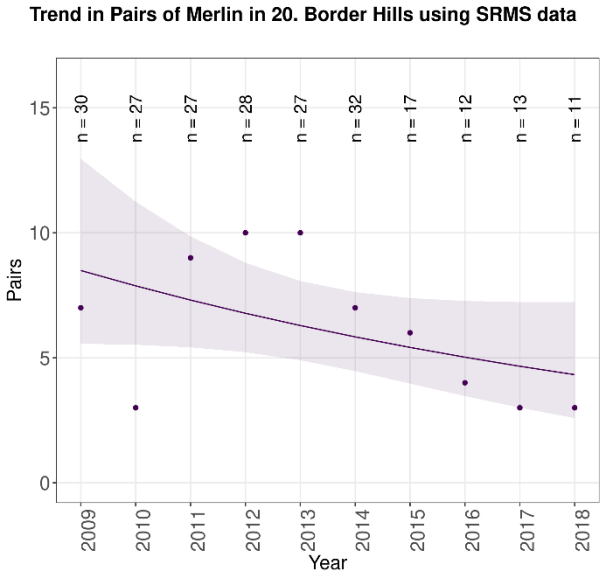
10. Central Highlands trend: Not significant (caveats: Sample sizes small)



11. Cairngorm Massif trend: Decrease

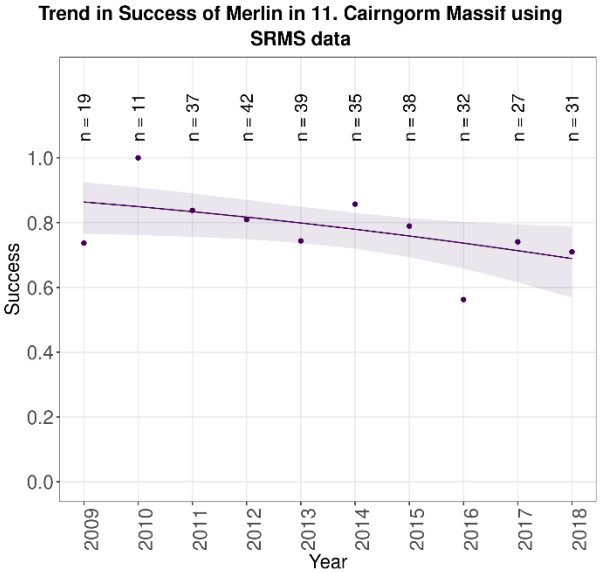


12. North East Glens trend: Not significant

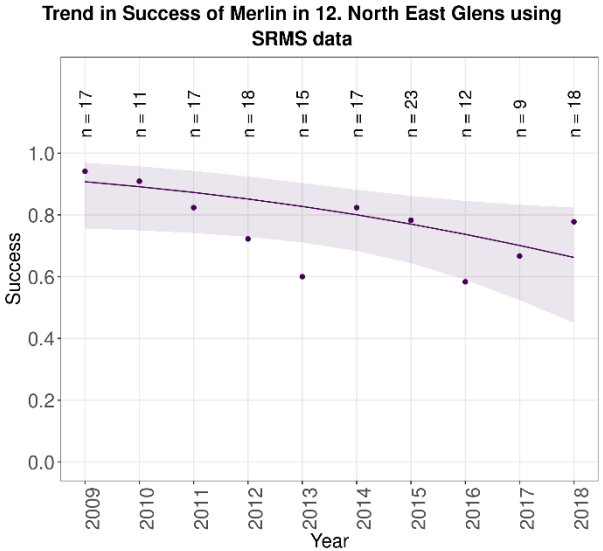


20. Border Hills trend: Not significant

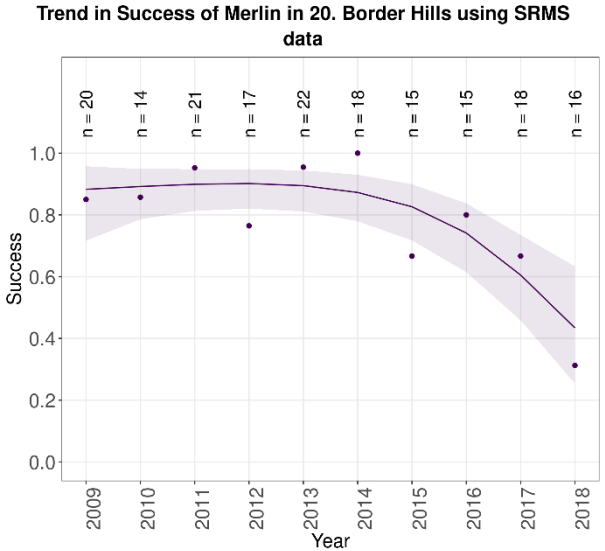
Figure 117: Trends in breeding pairs of Merlin by NHZ region during 2009-2018.



11. Cairngorm Massif trend: Decrease



12. North East Glens trend: Decrease (caveats: Sample sizes small)



20. Border Hills trend: Decrease (caveats: Sample sizes small)

Figure 118: Trends in breeding success of Merlin by NHZ region during 2009-2018.

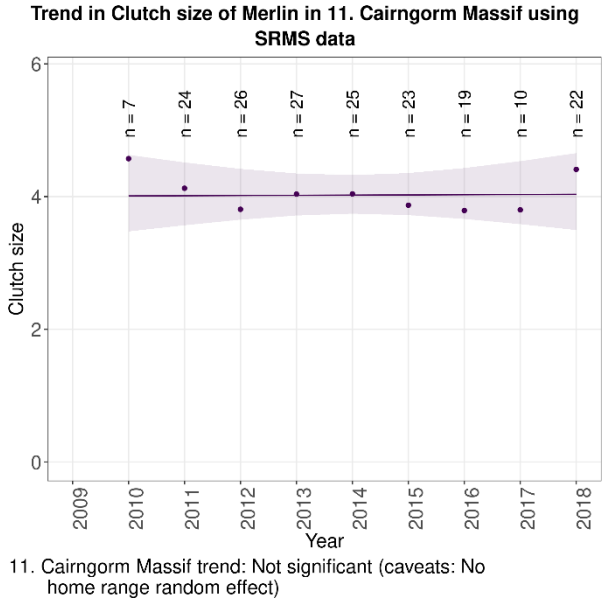


Figure 119: Trends in clutch size of Merlin by NHZ region during 2009-2018.

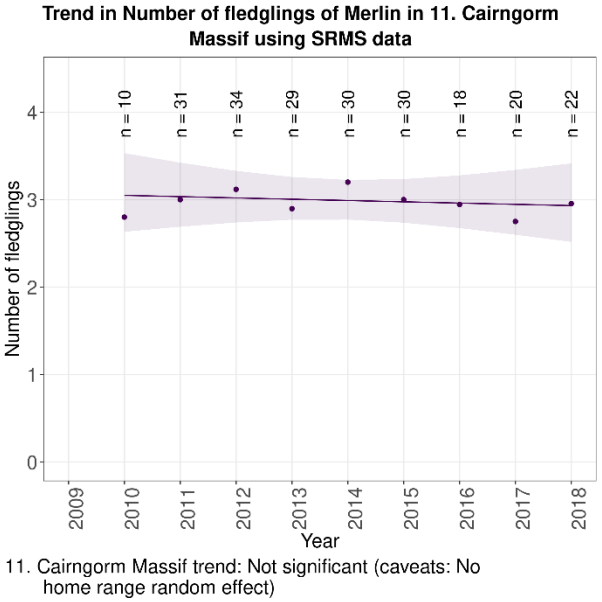


Figure 120: Trends in number of fledglings of Merlin by NHZ region during 2009-2018.

Table 59: Details of SRMS Regional trends for Merlin.

Parameter	Region	First year of trend	Last year of trend	Number of years	Mean number of home ranges across years	Mean parameter value (and 95% confidence limits)	Trend during the period	Caveats	Estimated % annual change (and 95% confidence limits)
Pairs	Highland	2009	2018	10	15.5	5.7 (3.9 to 7.5)	Not significant		-5.9 (-14.1 to 3.1)
	Lothian & Borders	2009	2014	6	26.8	8.0 (5.0 to 11.0)	Not significant		11.4 (-5.8 to 31.7)
	North East Scotland	2011	2018	8	60.4	22.9 (19.0 to 26.7)	Not significant		-4.5 (-10.4 to 1.7)
	Orkney	2009	2018	10	25.3	3.8 (3.1 to 4.5)	Not significant		-2.5 (-12.8 to 8.9)
	Tayside & Fife	2009	2018	10	18.4	9.1 (7.2 to 11.0)	Not significant	Sample sizes small, Variable effort	-5.8 (-12.3 to 1.3)
Success	North East Scotland	2009	2018	9	35.7	0.7 (0.7 to 0.8)	Non-linear		Non-linear
	Tayside & Fife	2009	2018	10	20.1	0.7 (0.7 to 0.8)	Not significant	Sample sizes small, No home range random effect	-1.2 (-2.7 to 0.2)
Clutch size	North East Scotland	2011	2018	8	25.6	4.0 (3.9 to 4.1)	Not significant		0.7 (-2.4 to 3.9)
Brood size	North East Scotland	2011	2018	8	21.6	3.6 (3.5 to 3.8)	Not significant		-1.1 (-4.7 to 2.7)
Number of fledglings	North East Scotland	2011	2018	8	27.3	3.1 (2.9 to 3.2)	Not significant		-1.9 (-5.2 to 1.6)

Table 60: Details of NHZ Regional trends for Merlin.

Parameter	Region	First year of trend	Last year of trend	Number of years	Mean number of home ranges across years	Mean parameter value (and 95% confidence limits)	Trend during the period	Caveats	Estimated % annual change (and 95% confidence limits)
Pairs	02. North Caithness and Orkney	2009	2018	10	25.3	3.8 (3.1 to 4.5)	Not significant		-2.5 (-12.8 to 8.9)
	05. The Peatlands of Caithness and Sutherland	2009	2017	8	7.25	5.1 (4.0 to 6.3)	Not significant	Sample sizes small	-6.7 (-16.6 to 4.5)
	10. Central Highlands	2009	2016	6	8.5	1.0 (-0.3 to 2.3)	Not significant	Sample sizes small	-5.0 (-30.9 to 30.5)
	11. Cairngorm Massif	2011	2018	8	47.125	19.2 (15.3 to 23.2)	Decrease		-6.7 (-13.0 to 0.0)
	12. North East Glens	2009	2018	10	33	13.3 (11.0 to 15.6)	Not significant		1.3 (-4.5 to 7.5)
	20. Border Hills	2009	2018	10	22.4	6.2 (4.2 to 8.2)	Not significant		-7.2 (-15.0 to 1.3)
Success	11. Cairngorm Massif	2009	2018	10	31.1	0.8 (0.7 to 0.8)	Decrease		-1.3 (-2.7 to -0.1)
	12. North East Glens	2009	2018	10	15.7	0.8 (0.7 to 0.8)	Decrease	Sample sizes small	-1.4 (-3.0 to 0.0)
	20. Border Hills	2009	2018	10	17.6	0.8 (0.7 to 0.9)	Decrease	Sample sizes small	-1.3 (-2.2 to -0.6)
Clutch size	11. Cairngorm Massif	2010	2018	9	20.333	4.0 (3.9 to 4.1)	Not significant	No home range random effect	0.1 (-3.0 to 3.2)
Number of fledglings	11. Cairngorm Massif	2010	2018	9	24.889	3.0 (2.8 to 3.1)	Not significant	No home range random effect	-0.5 (-3.6 to 2.8)

Table 61: Number of Merlin home range checks for occupancy reported to the SRMS during 2009-2018, in each of the 12 SRMS Regions, with approximate proportion of estimated population monitored. At the bottom of the table, row A is the mean number of home range checks over the most recent five years. Row B gives the estimated proportion of the national population in each region, based on Bird Atlas Timed Tetrad Visit (TTV) data. The depth of red shading indicates the relative importance of each region for this species. If survey effort was spread evenly across the whole population, the ratio of A:B would not vary much between regions.

Year	ARGYLL	CENTRAL SCOTLAND	DUMFRIES & GALLOWAY	HIGHLAND	LEWIS & HARRIS	LOTHIAN & BORDERS	NORTH EAST SCOTLAND	ORKNEY	SHETLAND	SOUTH STRATHCLYDE	TAYSIDE & FIFE	UIST	Total
2009	3	3	9	62	9	49	40	73	2	13	62	0	325
2010	5	5	11	62	11	48	0	75	0	19	56	0	292
2011	5	13	12	59	3	50	102	69	0	11	63	4	391
2012	2	8	7	38	3	52	110	46	0	13	75	7	361
2013	6	7	10	64	3	51	99	52	0	18	65	7	382
2014	3	7	12	46	1	55	101	64	47	12	60	15	423
2015	3	3	10	66	4	40	112	71	76	18	60	7	470
2016	10	0	15	92	2	30	110	67	74	17	63	9	489
2017	2	3	9	107	6	41	100	80	78	14	65	9	514
2018	1	8	11	97	2	37	105	75	89	5	53	8	491
A: Mean home range checks	**3.8**	**4.2**	**11.4**	**81.6**	**3.0**	**40.6**	**105.6**	**71.4**	**72.8**	**13.2**	**60.2**	**9.6**	**477.4**
B: Proportion of estimated Scottish population	6.3	2.5	2.8	34.8	3	4.8	11.1	2.8	8.3	1.5	10.9	11.1	100

Figure 121: Areas corresponding to the clusters of home ranges from which sufficient data were reported to attempt to derive population trends for Merlin between 2009 and 2018 (a) together with maps showing variation in the number of Merlin records reported to SRMS during 2009-2013 (b) and 2014-2018 (c), in the context of the known Merlin breeding distribution taken from the 2007-2011 Bird Atlas. SRMS data are depicted as grey squares with darker shading indicating more records while Bird Atlas data are depicted as red dots with the size of dot positively related to probability of breeding.

Peregrine

Figure 122: Juvenile Peregrines in South Ayrshire (Photo: Angus Hogg, South Strathclyde RSG).

Peregrine is one of the most comprehensively monitored raptor species in Scotland, with around 65-76% of the estimated breeding population surveyed each year. Monitoring coverage is not consistent across Scotland however. Despite much monitoring information being collected across the large Highland Region, which supports a substantial part of the Scottish population, the lack of consistency of coverage and effort across years in that region currently limits the production of representative national trends.

Peregrine has also been subject to periodic national survey via The Statutory Conservation Agency/RSPB Annual Breeding Bird Scheme (SCARABBS) programme. Scottish population estimates since the 1960s are available from six national surveys in: 1961/62 (Ratcliffe 1963) 388 pairs; 1971 (Ratcliffe 1972) 366 pairs; 1981 (Ratcliffe 1984) 442 pairs; 1991 (Crick & Ratcliffe 1995) 626 pairs; 2002 (Banks *et al.* 2010) 571 pairs; and 2014 (Wilson *et al.* 2018) 523 pairs.

Our latest analysis of SRMS Peregrine data for the period 2009-2018 has produced no national trends in breeding numbers or productivity, but has produced trends for eight of the 12 SRMS regions (Table 62) and for ten of the 21 NHZ regions (Table 63) for which the SRMS holds Peregrine records.

When interpreting the published trends, users should be aware that records for trends in breeding numbers are mostly drawn from upland areas, with lowland (and, particularly, urban areas) perhaps somewhat under-represented in comparison (Figure 133).

National trends

No SRMS trends in breeding numbers or breeding productivity are available for Peregrine at a national level.

SRMS regional trends

Breeding numbers of Peregrine decreased in two regions (Argyll and Tayside & Fife) and did not change significantly in the remaining six regions (Central, Dumfries & Galloway, Lothian & Borders, North-east Scotland, Orkney and South Strathclyde) (Table 62, Figure 123).

Breeding success of Peregrine decreased in Lothian & Borders and Orkney, increased in North East Scotland, did not change significantly in Argyll, Central Scotland, Dumfries & Galloway or Tayside & Fife), and showed non-linear variation in South Strathclyde (Table 62, Figure 124).

Clutch and brood size did not change significantly in either Dumfries & Galloway or Lothian & Borders (Table 62, Figures 125-126). Number of fledglings decreased in Dumfries & Galloway, but did not change significantly in Central, Dumfries & Galloway, Lothian & Borders, South Strathclyde or Tayside & Fife (Table 62, Figure 127).

Trends for this species are not yet available for Highland, Lewis & Harris, Shetland or Uist.

NHZ regional trends

Breeding numbers of Peregrine decreased in three regions (NHZs 11, 14 and 15) and did not change significantly in the remaining seven regions (NHZs 02, 12 and 16-20) (Table 63, Figure 128).

Breeding success of Peregrine decreased in NHZs 02 and 16, did not change significantly in NHZs 12, 14, 15 and 17-20, and showed non-linear variation in NHZ 11 (Table 63, Figure 129).

Clutch size, brood size and number of fledglings of Peregrine did not change significantly in NHZs 16 and 20 (Table 63, Figures 130-132). Number of fledglings did not change significantly in a further three regions (NHZs 17-19) (Table 63, Figure 132).

Trends for this species are not yet available for NHZs 01, 03-10, 13 and 21.

Details of contributing records

6,625 (534 to 1,072 per year, mean: 663 records per year) from 2009-2018 contributed to this trends analysis (Table 66).

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M. W. Wilson, D. E. Balmer, K. Jones, V. A. King, D. Raw, C. J. Rollie, E. Rooney, M. Ruddock, G. D. Smith, A. Stevenson, P. K. Stirling-Aird, C. V. Wernham, J. M. Weston & D. G. Noble (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, 1-19, DOI: 10.1080/00063657.2017.1421610

Table 62: Summary of SRMS regional trends for Peregrine during 2009-2018. Figures in parentheses indicate the annual change, with significant increases highlighted in green, significant decreases highlighted in blue and non-significant changes highlighted in grey. 'Non-linear' indicates non-linear trends. '—' indicates where the species occurs but no trend is available. 'No SRMS data' indicates where the SRMS does not hold any records for the region of interest. 'Absent' indicates where the species is not known to breed.

SRMS Region	Pairs	Success	Clutch size	Brood size	Number of fledglings
Argyll	**Decrease [s] (-11%)**	Not significant [s]	—	—	—
Central	Not significant [s]	Not significant [s]	—	—	Not significant [s]
Dumfries & Galloway	Not significant	Not significant	Not significant [s]	Not significant [s]	**Decrease (-2.4%)**
Highland	—	—	—	—	—
Lewis & Harris	—	—	—	—	—
Lothian & Borders	Not significant	**Decrease (-2.1%)**	Not significant	Not significant [s]	Not significant
North East Scotland	Not significant	**Increase (8.3%)**	—	—	—
Orkney	Not significant [s]	**Decrease [s] (-2.4%)**	—	—	—
Shetland	—	—	—	—	—
South Strathclyde	Not significant	Non-linear	—	—	Not significant
Tayside & Fife	**Decrease (-4.1%)**	Not significant	—	—	Not significant
Uist	—	—	—	—	—

[s] *Sample sizes small.*

Table 63: Summary of NHZ regional trends for Peregrine during 2009-2018. Figures in parentheses indicate the annual change, with significant decreases highlighted in blue and non-significant changes highlighted in grey. 'Non-linear' indicates non-linear trends. '—' indicates where the species occurs but no trend is available. 'No SRMS data' indicates where the SRMS does not hold any records for the region of interest. 'Absent' indicates where the species is not known to breed.

NHZ Region	Pairs	Success	Clutch size	Brood size	Number of fledglings
01. Shetland	—	—	—	—	—
02. North Caithness and Orkney	Not significant [s]	**Decrease [s] (-2.4%)**	—	—	—
03. Coll, Tiree and the Western Isles	—	—	—	—	—
04. North West Seaboard	—	—	—	—	—
05. The Peatlands of Caithness and Sutherland	—	—	—	—	—
06. Western Seaboard	—	—	—	—	—
07. Northern Highlands	—	—	—	—	—
08. Western Highlands	—	—	—	—	—
09. North East Coastal Plain	—	—	—	—	—
10. Central Highlands	—	—	—	—	—
11. Cairngorm Massif	**Decrease (-6.7%)**	Non-linear	—	—	—
12. North East Glens	Not significant [s]	Not significant [s]	—	—	—
13. East Lochaber	—	—	—	—	—
14. Argyll West and Islands	**Decrease [s] (-11%)**	Not significant [s]	—	—	—
15. Loch Lomond, The Trossachs and Breadalbane	**Decrease (-11.1%)**	Not significant [rs]	—	—	—
16. Eastern Lowlands	Not significant	**Decrease (-1.3%)**	Not significant [rs]	Not significant [rs]	Not significant
17. West Central Belt	Not significant	Not significant	—	—	Not significant [rs]
18. Wigtown Machairs and Outer Solway Coast	Not significant	Not significant [s]	—	—	Not significant
19. Western Southern Uplands and Inner Solway	Not significant	Not significant	—	—	Not significant [r]
20. Border Hills	Not significant	Not significant	Not significant [rs]	Not significant [rs]	Not significant [rs]
21. Moray Firth	—	—	—	—	—

[r] No home range random effect, [s] Sample sizes small.

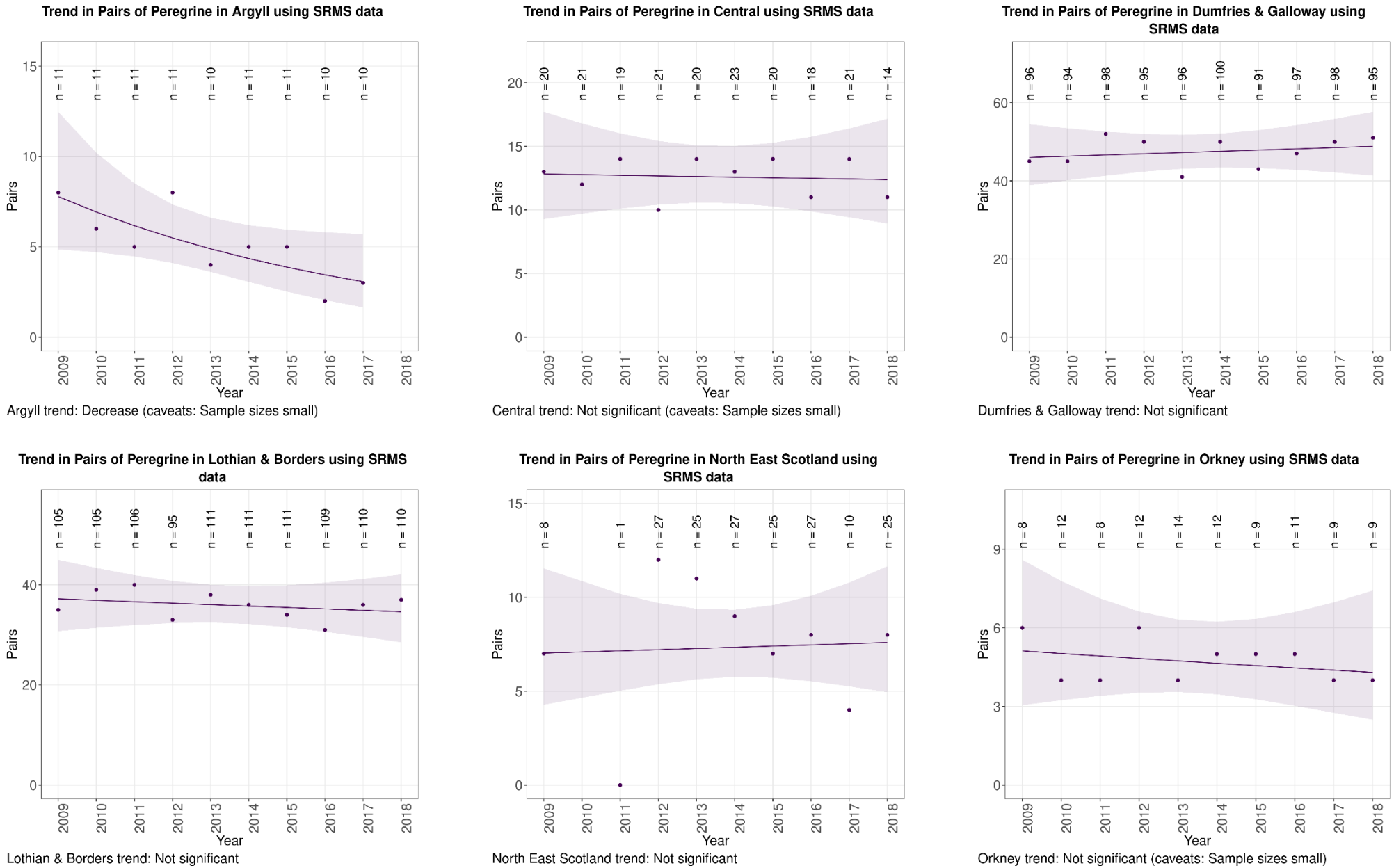
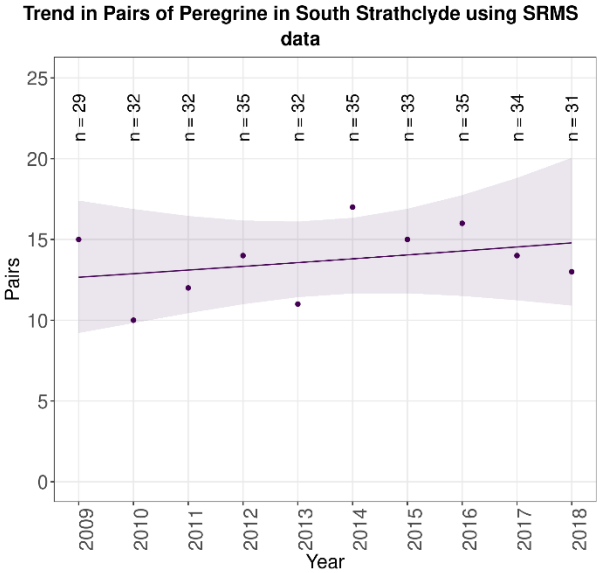


Figure 123: Trends in numbers of breeding pairs of Peregrine by SRMS region during 2009-2018.



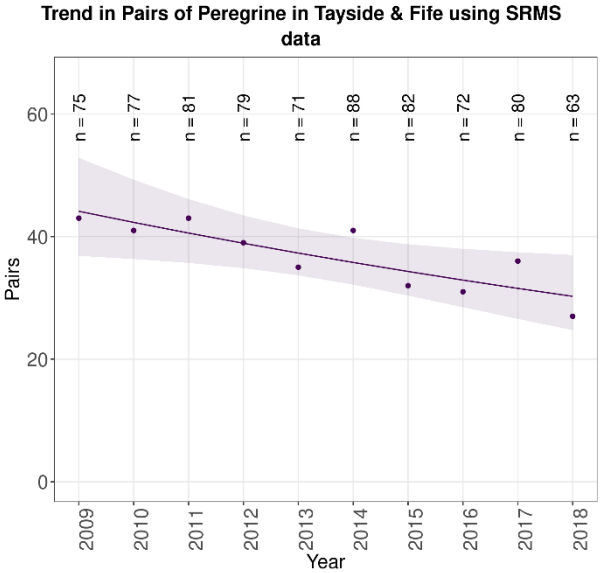


Figure 123 continued: Trends in numbers of breeding pairs of Peregrine by SRMS region during 2009-2018.

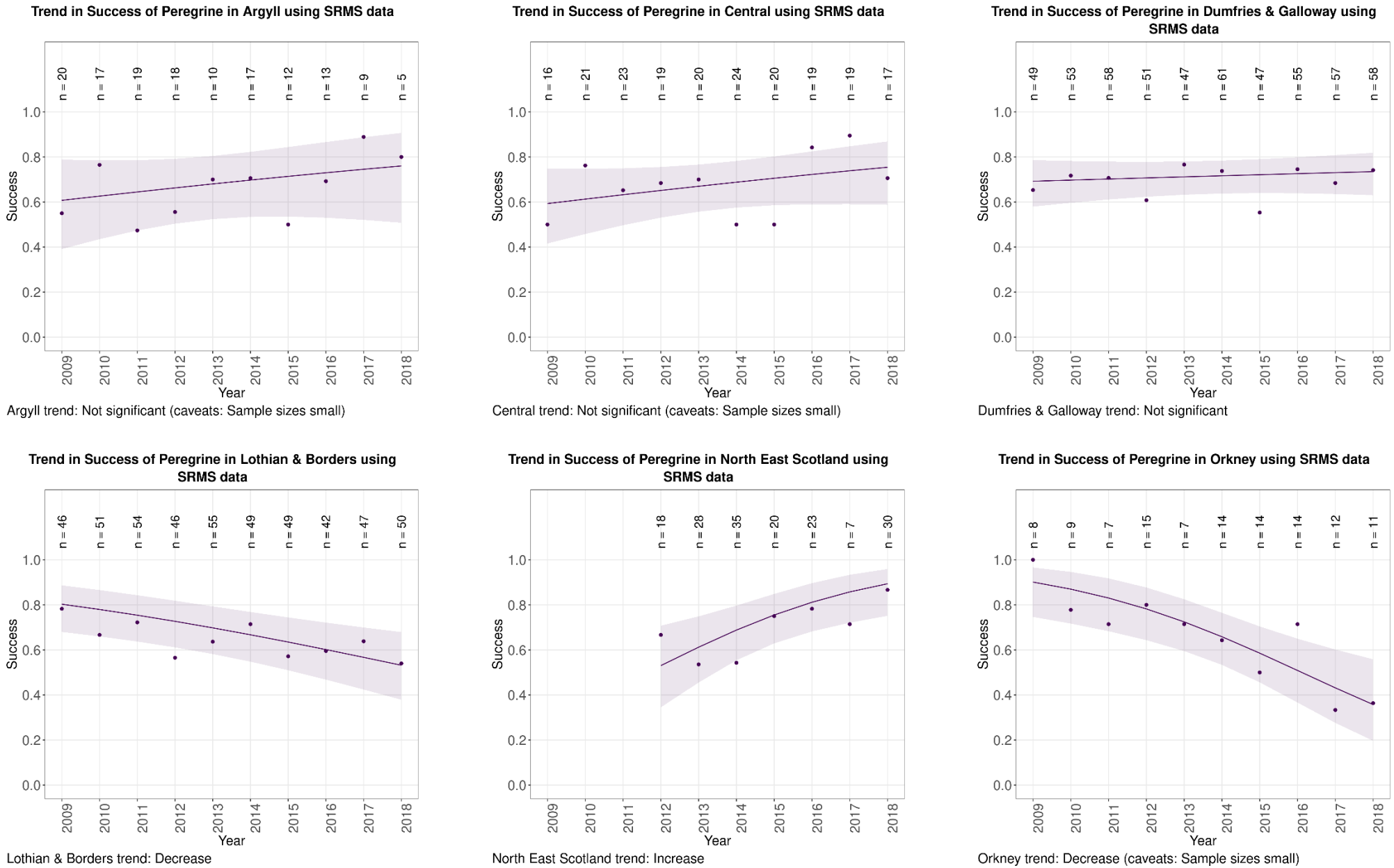
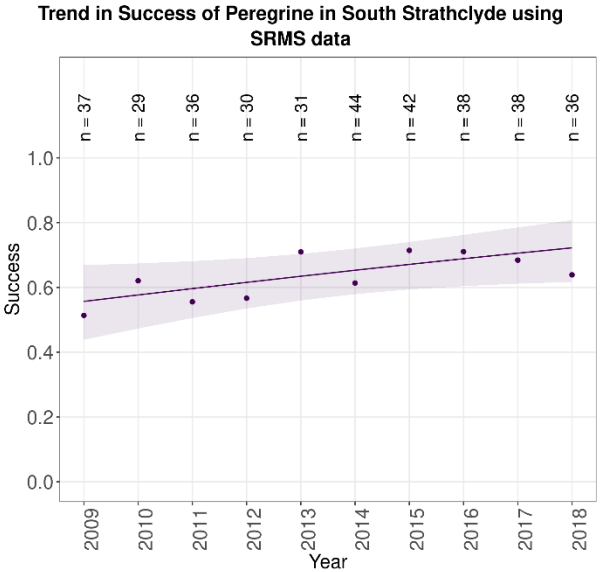
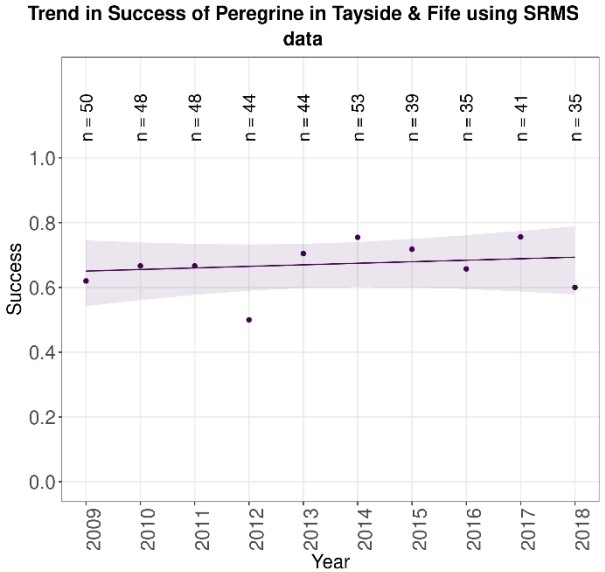


Figure 124: Trends in breeding success of Peregrine by SRMS region during 2009-2018.

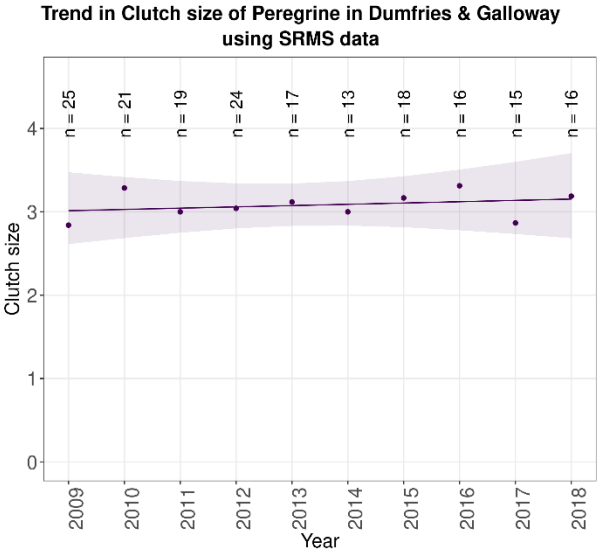


South Strathclyde trend: Non-linear

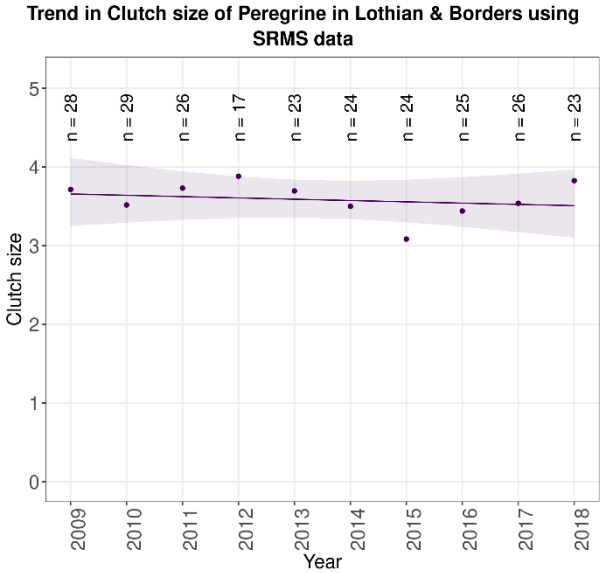


Tayside & Fife trend: Not significant

Figure 124 continued: Trends in breeding success of Peregrine by SRMS region during 2009-2018.

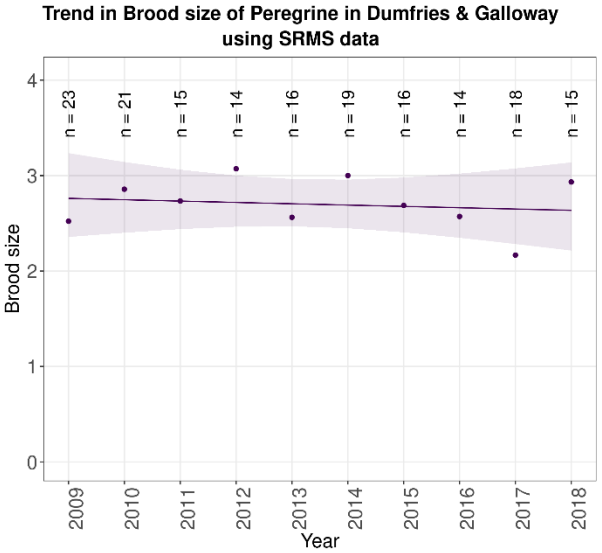


Dumfries & Galloway trend: Not significant (caveats: Sample sizes small)

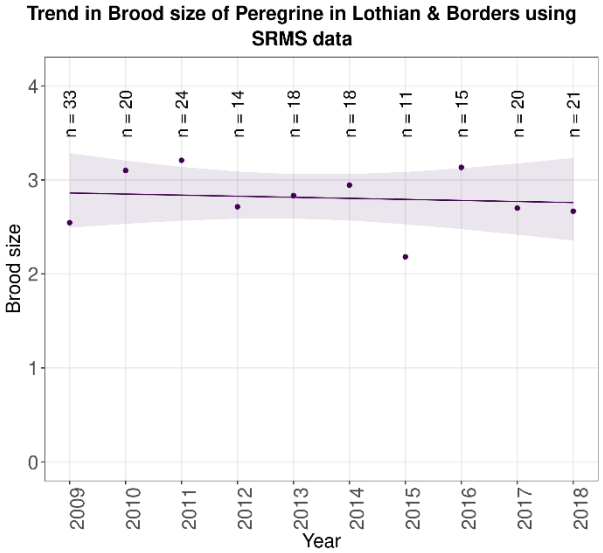


Lothian & Borders trend: Not significant

Figure 125: Trends in clutch size of Peregrine by SRMS region during 2009-2018.



Dumfries & Galloway trend: Not significant (caveats: Sample sizes small)



Lothian & Borders trend: Not significant (caveats: Sample sizes small)

Figure 126: Trends in brood size of Peregrine by SRMS region during 2009-2018.

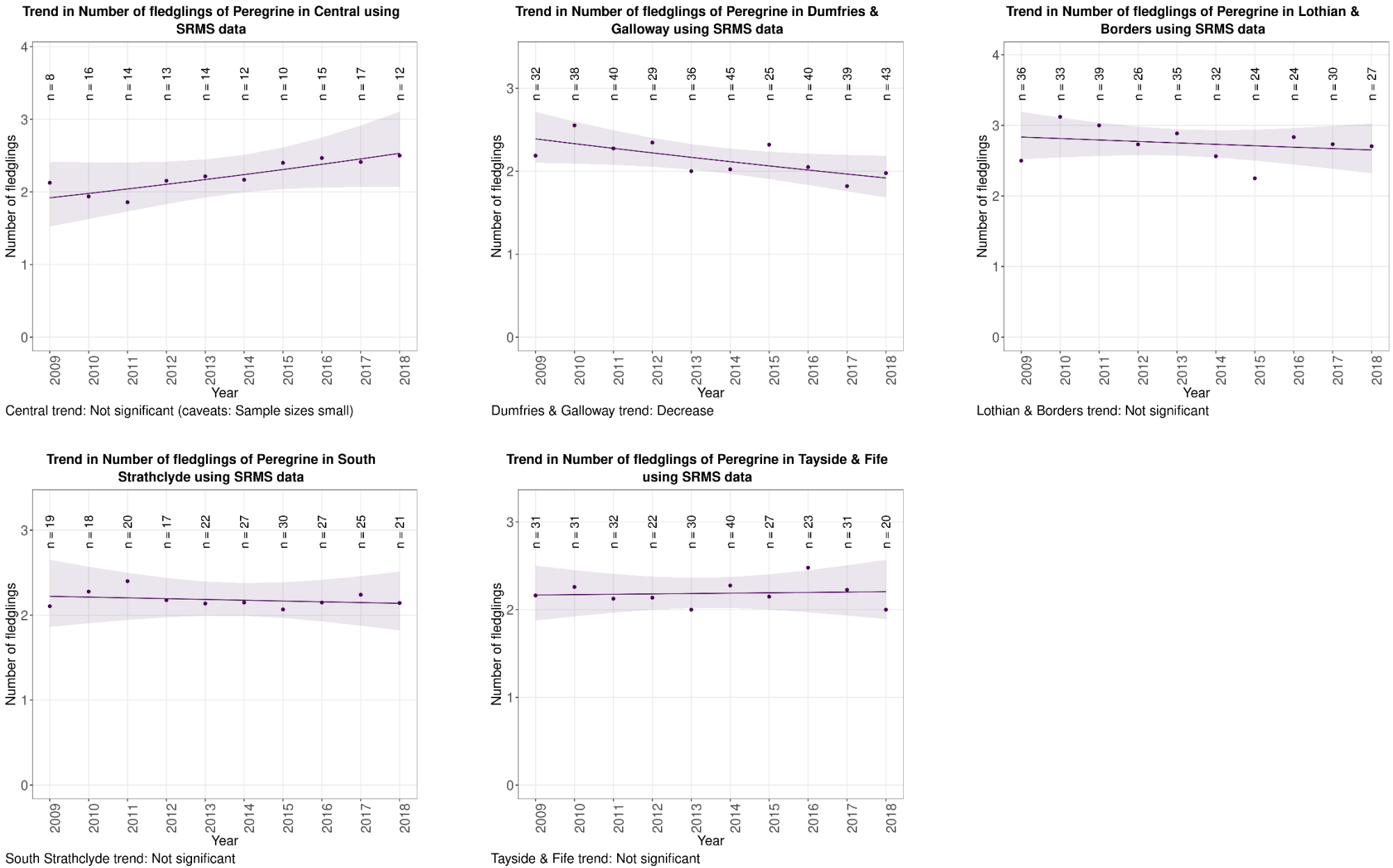
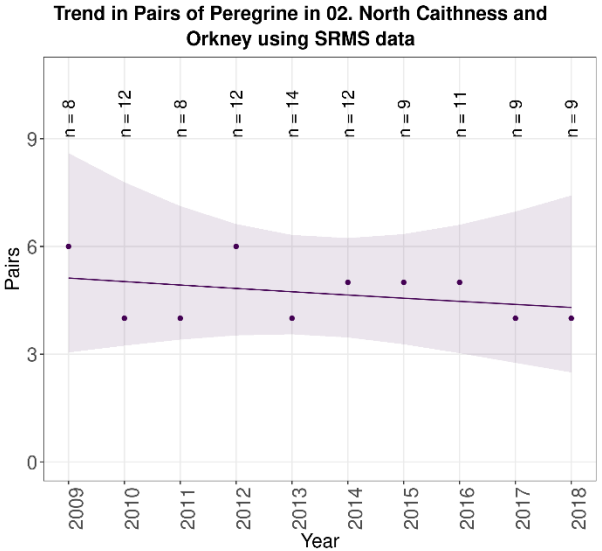
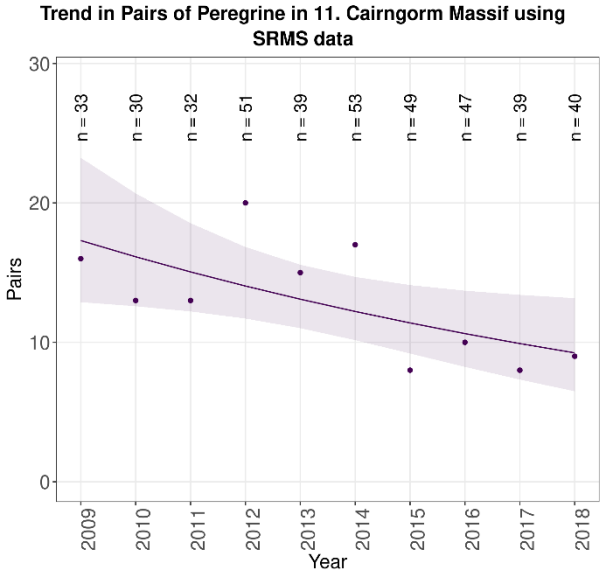


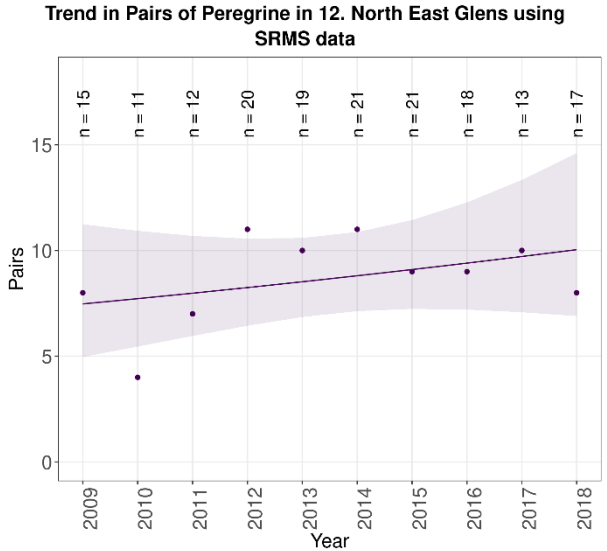
Figure 127: Trends in numbers of fledglings of Peregrine by SRMS region during 2009-2018.



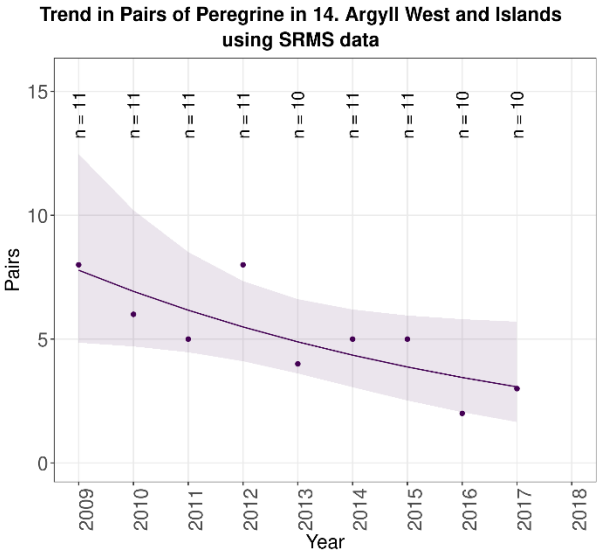
02. North Caithness and Orkney trend: Not significant (caveats: Sample sizes small)



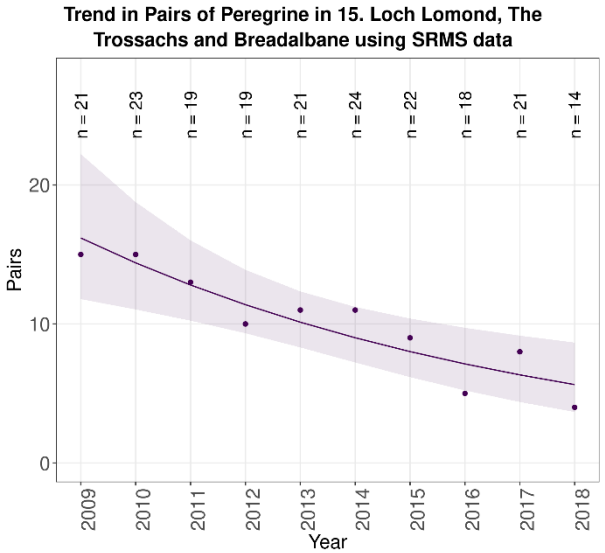
11. Cairngorm Massif trend: Decrease



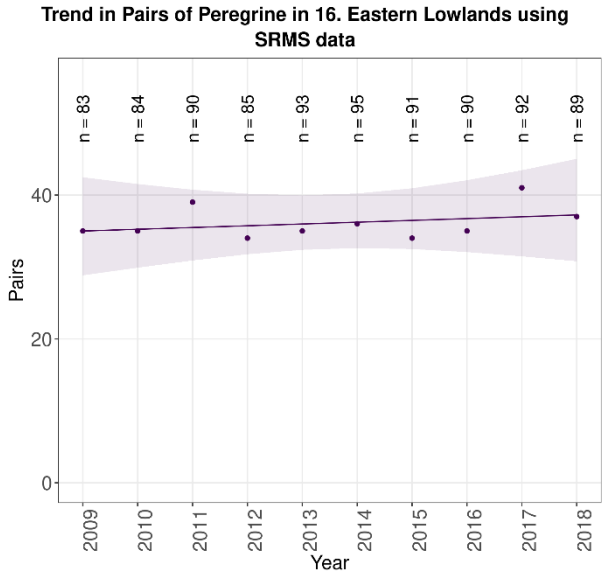
12. North East Glens trend: Not significant (caveats: Sample sizes small)



14. Argyll West and Islands trend: Decrease (caveats: Sample sizes small)

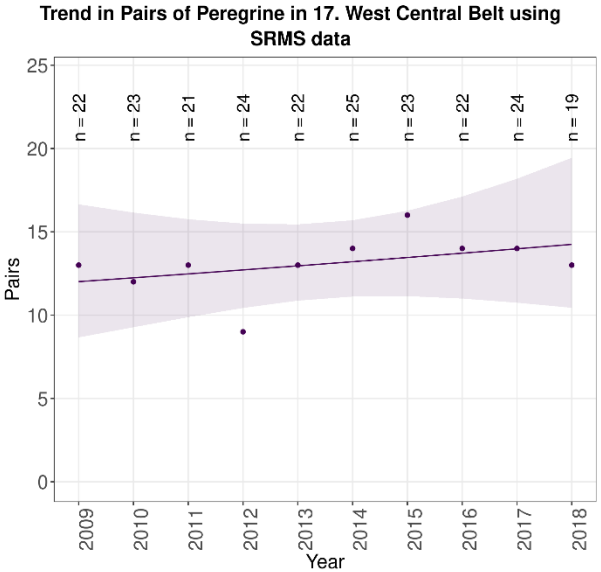


15. Loch Lomond, The Trossachs and Breadalbane trend: Decrease

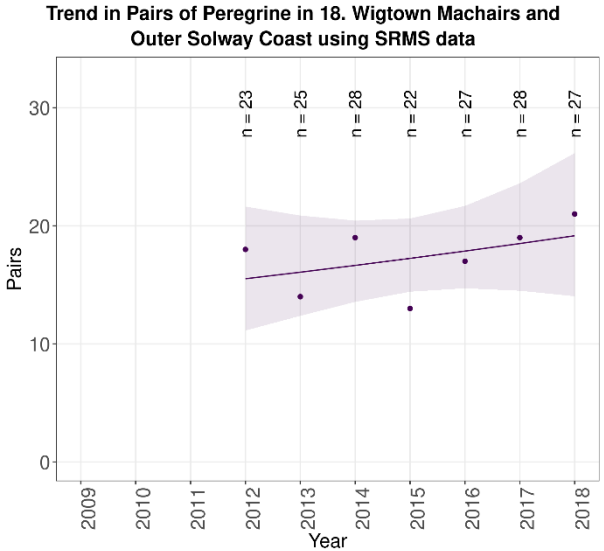


16. Eastern Lowlands trend: Not significant

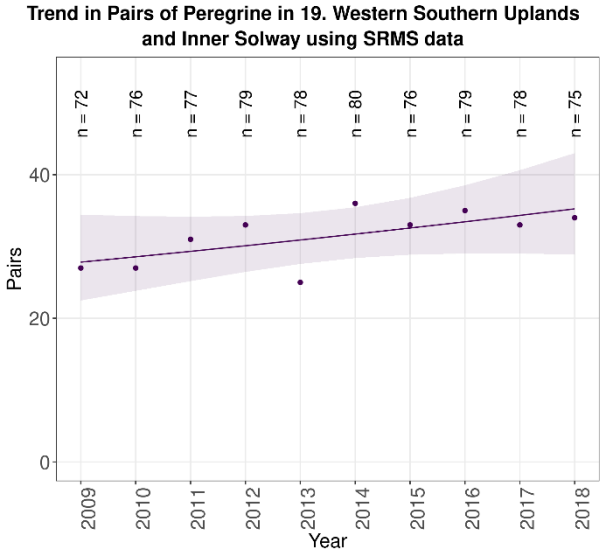
Figure 128: Trends in numbers of breeding pairs of Peregrine by NHZ region during 2009-2018.



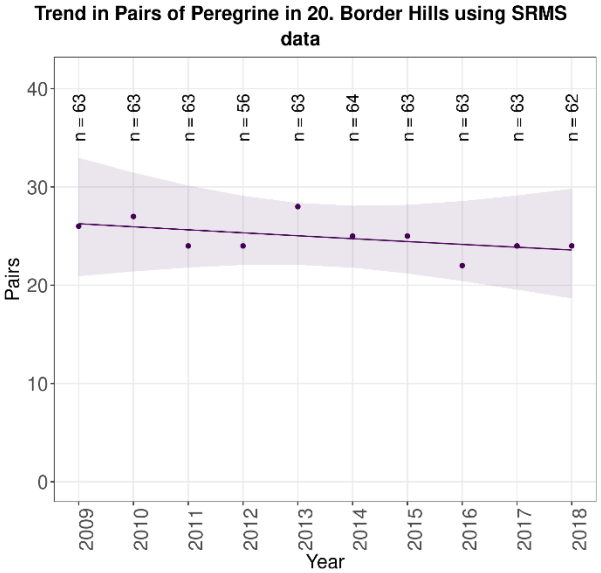
17. West Central Belt trend: Not significant



18. Wigtown Machairs and Outer Solway Coast trend: Not significant

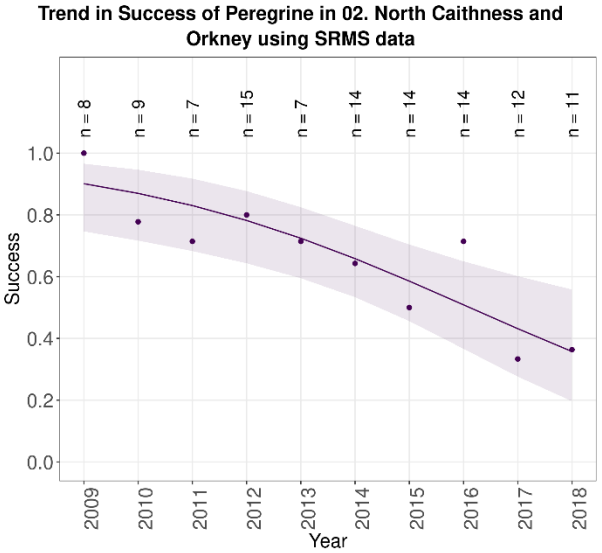


19. Western Southern Uplands and Inner Solway trend: Not significant

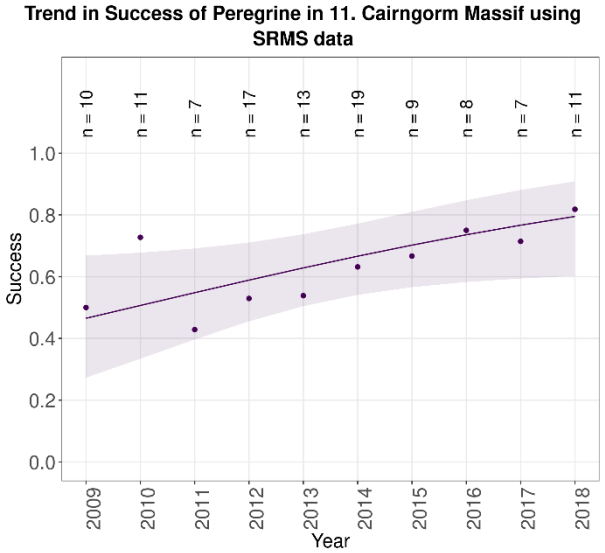


20. Border Hills trend: Not significant

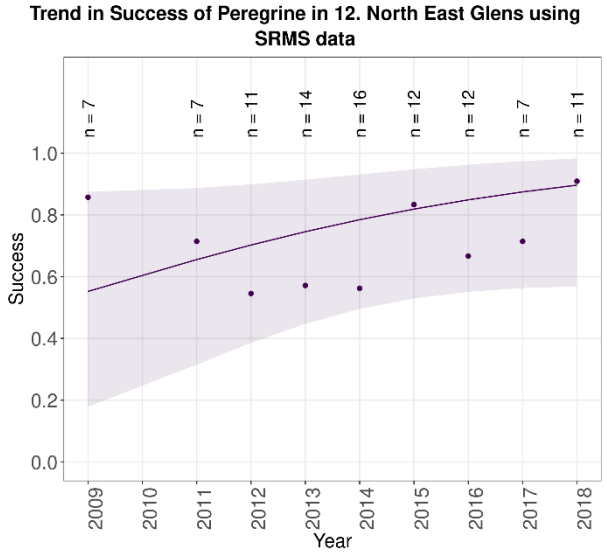
Figure 128 continued: Trends in numbers of breeding pairs of Peregrine by NHZ region during 2009-2018.



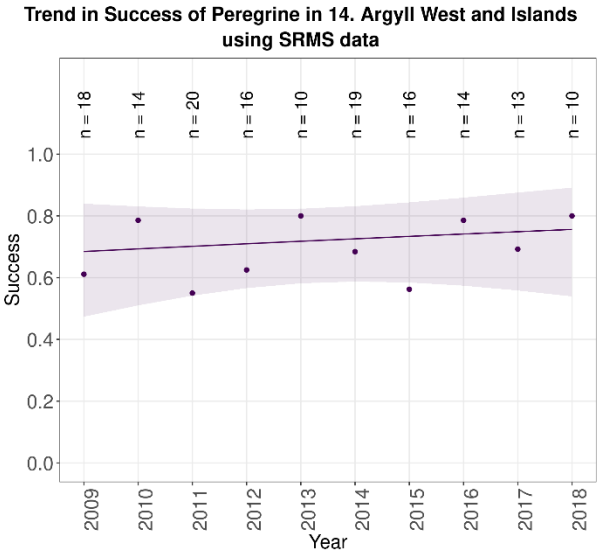
02. North Caithness and Orkney trend: Decrease (caveats: Sample sizes small)



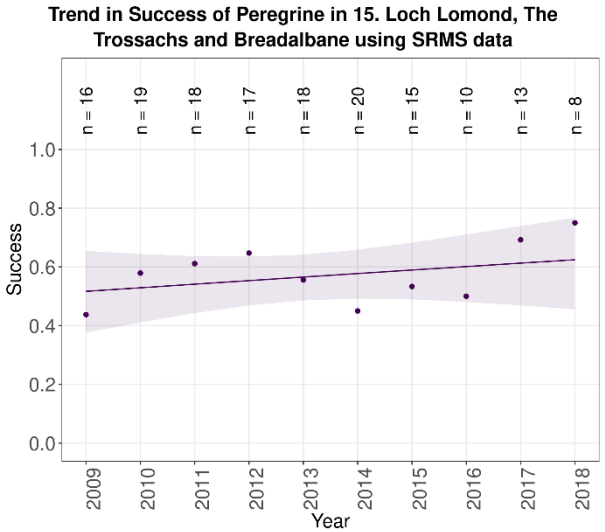
11. Cairngorm Massif trend: Non-linear (caveats: Sample sizes small)



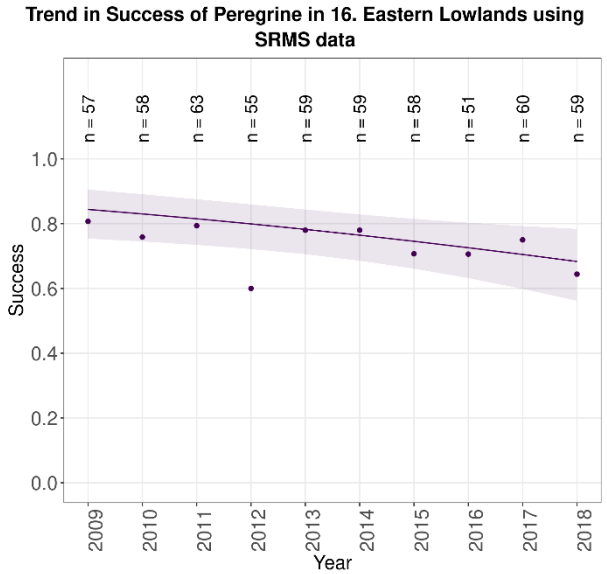
12. North East Glens trend: Not significant (caveats: Sample sizes small)



14. Argyll West and Islands trend: Not significant (caveats: Sample sizes small)

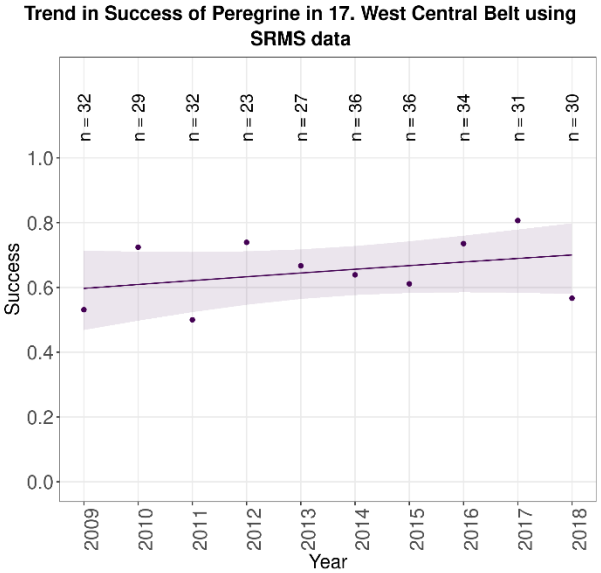


15. Loch Lomond, The Trossachs and Breadalbane trend: Not significant (caveats: Sample sizes small; No home range random effect)

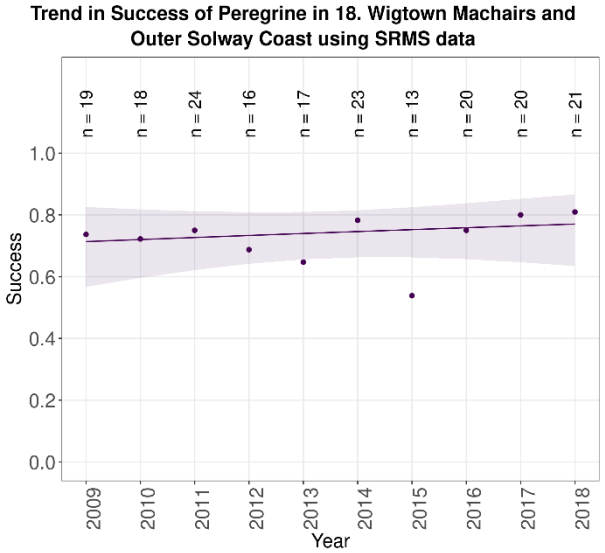


16. Eastern Lowlands trend: Decrease

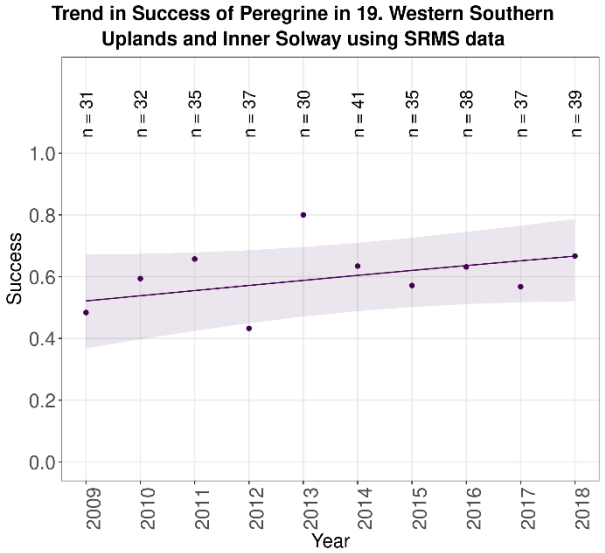
Figure 129: Trends in breeding success of Peregrine by NHZ region during 2009-2018.



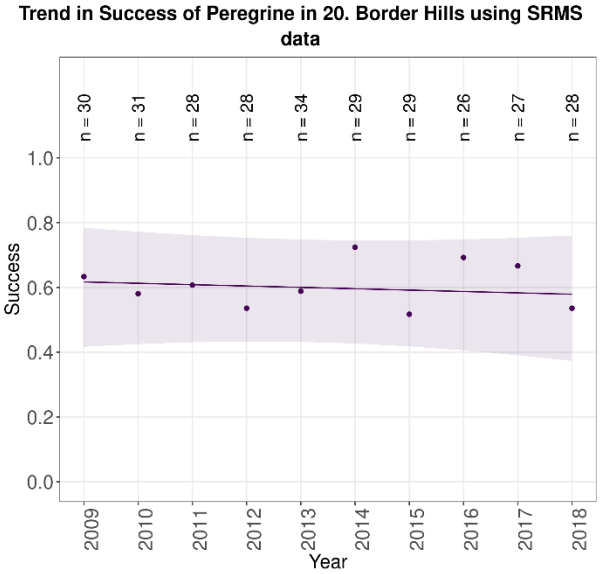
17. West Central Belt trend: Not significant



18. Wigtown Machairs and Outer Solway Coast trend: Not significant (caveats: Sample sizes small)

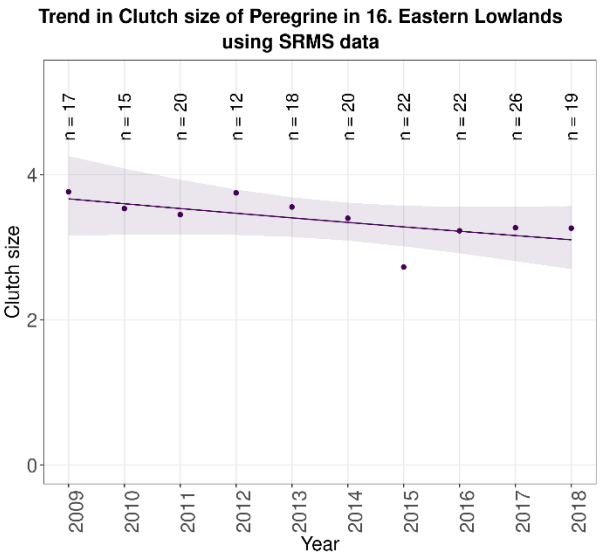


19. Western Southern Uplands and Inner Solway trend: Not significant

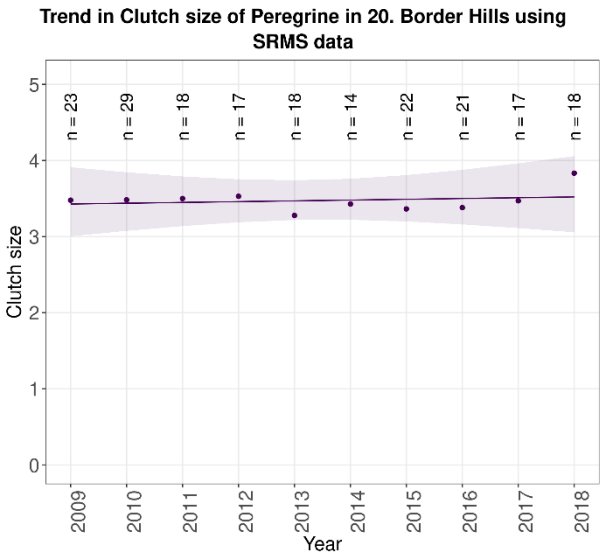


20. Border Hills trend: Not significant

Figure 129 continued: Trends in breeding success of Peregrine by NHZ region during 2009-2018.

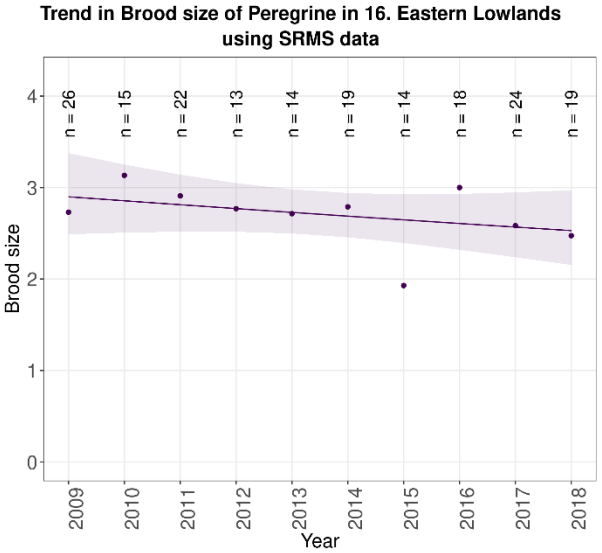


16. Eastern Lowlands trend: Not significant (caveats: Sample sizes small; No home range random effect)

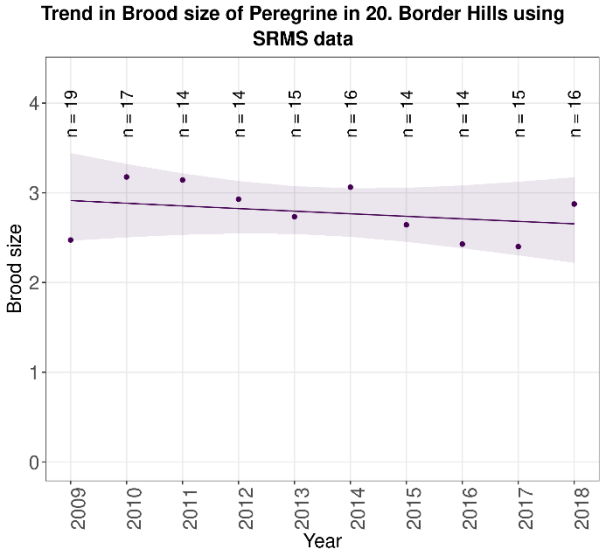


20. Border Hills trend: Not significant (caveats: Sample sizes small; No home range random effect)

Figure 130: Trends in clutch size of Peregrine by NHZ region during 2009-2018.

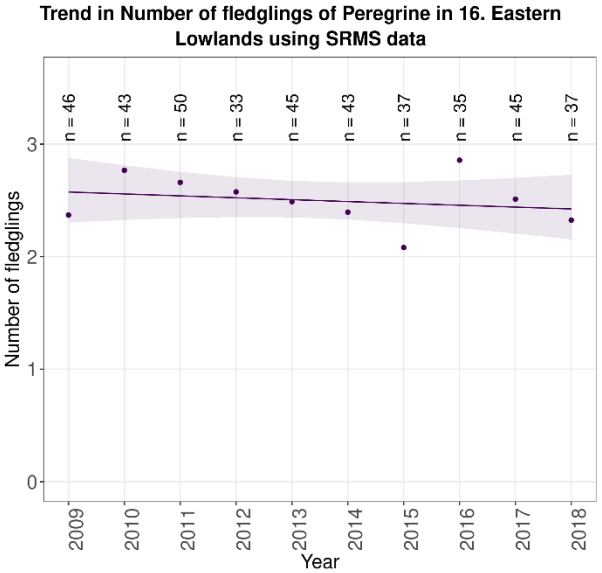


16. Eastern Lowlands trend: Not significant (caveats: Sample sizes small; No home range random effect)

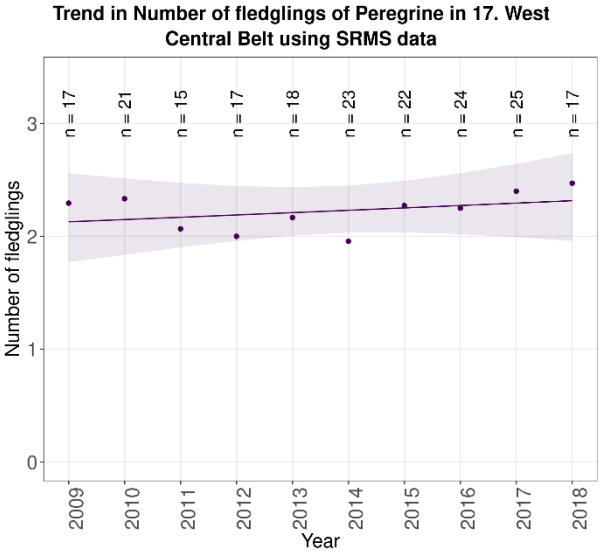


20. Border Hills trend: Not significant (caveats: Sample sizes small; No home range random effect)

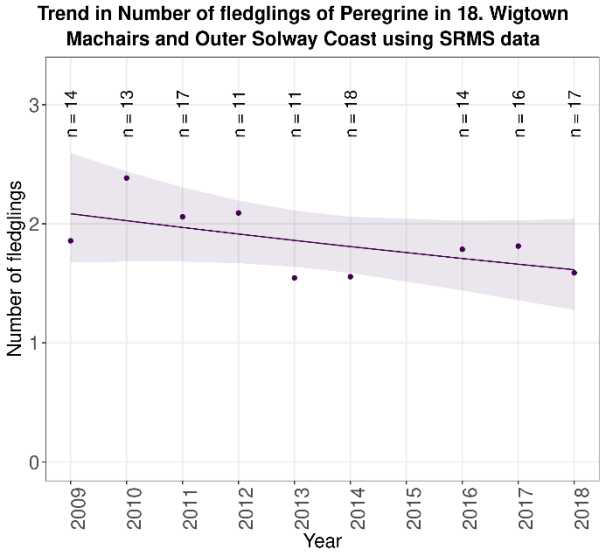
Figure 131: Trends in brood size of Peregrine by NHZ region during 2009-2018.



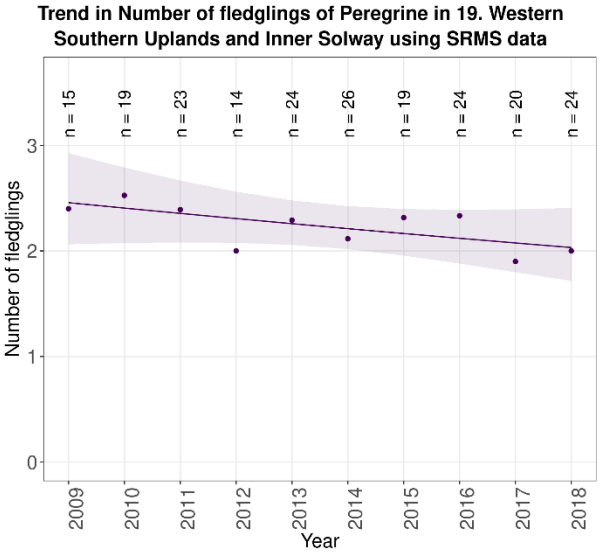
16. Eastern Lowlands trend: Not significant



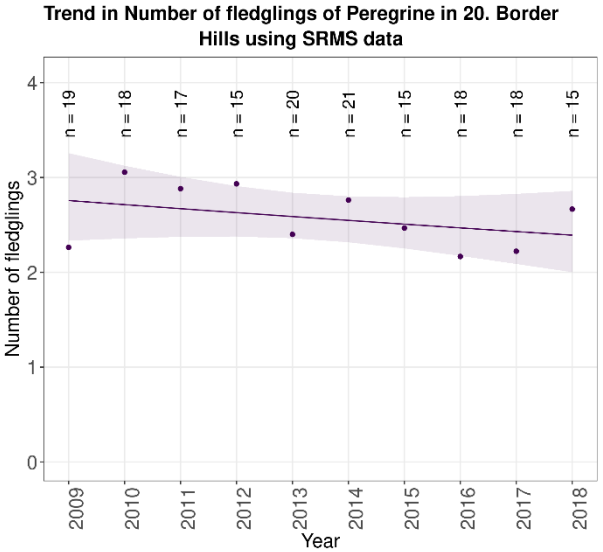
17. West Central Belt trend: Not significant (caveats: Sample sizes small; No home range random effect)



18. Wigtown Machairs and Outer Solway Coast trend: Not significant



19. Western Southern Uplands and Inner Solway trend: Not significant (caveats: No home range random effect)



20. Border Hills trend: Not significant (caveats: Sample sizes small; No home range random effect)

Figure 132: Trends in numbers of fledglings of Peregrine by NHZ region during 2009-2018.

Table 64: Details of SRMS Regional trends for Peregrine.

Parameter	Region	First year of trend	Last year of trend	Number of years	Mean number of home ranges across years	Mean parameter value (and 95% confidence limits)	Trend during the period	Caveats	Estimated % annual change (and 95% confidence limits)
Pairs	Argyll	2009	2017	9	10.7	5.1 (3.6 to 6.7)	Decrease	Sample sizes small	-11.0 (-20.6 to -0.1)
	Central	2009	2018	10	19.7	12.6 (11.5 to 13.7)	Not significant	Sample sizes small	-0.4 (-6.3 to 5.9)
	Dumfries & Galloway	2009	2018	10	96.0	47.4 (44.7 to 50.1)	Not significant		0.7 (-2.4 to 3.9)
	Lothian & Borders	2009	2018	10	107.3	35.9 (33.9 to 37.9)	Not significant		-0.8 (-4.3 to 2.8)
	North East Scotland	2009	2018	9	19.4	7.3 (4.6 to 10.1)	Not significant		0.9 (-7.6 to 10.1)
	Orkney	2009	2018	10	10.4	4.7 (4.1 to 5.3)	Not significant	Sample sizes small	-1.9 (-11.2 to 8.4)
	South Strathclyde	2009	2018	10	32.8	13.7 (12.1 to 15.3)	Not significant		1.7 (-4.0 to 7.9)
	Tayside & Fife	2009	2018	10	76.8	36.8 (32.9 to 40.7)	Decrease		-4.1 (-7.5 to -0.6)
Success	Argyll	2009	2018	10	14.0	0.6 (0.5 to 0.7)	Not significant	Sample sizes small	1.9 (-2.1 to 5.8)
	Central	2009	2018	10	19.8	0.7 (0.6 to 0.7)	Not significant	Sample sizes small	2.0 (-1.1 to 5.0)
	Dumfries & Galloway	2009	2018	10	53.6	0.7 (0.7 to 0.7)	Not significant		0.5 (-1.1 to 2.0)
	Lothian & Borders	2009	2018	10	48.9	0.6 (0.6 to 0.7)	Decrease		-2.1 (-3.6 to -0.8)
	North East Scotland	2012	2018	7	23.0	0.7 (0.6 to 0.8)	Increase		8.3 (2.7 to 13.9)
	Orkney	2009	2018	10	11.1	0.6 (0.5 to 0.7)	Decrease	Sample sizes small	-2.4 (-4.2 to -0.9)
	South Strathclyde	2009	2018	10	36.1	0.6 (0.6 to 0.7)	Non-linear		Non-linear
Success	Tayside & Fife	2009	2018	10	43.7	0.7 (0.6 to 0.7)	Not significant		0.5 (-1.4 to 2.3)
Clutch size	Dumfries & Galloway	2009	2018	10	18.4	3.1 (3.0 to 3.2)	Not significant	Sample sizes small	0.5 (-2.3 to 3.4)
	Lothian & Borders	2009	2018	10	24.5	3.6 (3.5 to 3.7)	Not significant		-0.5 (-2.7 to 1.8)
Brood size	Dumfries & Galloway	2009	2018	10	17.1	2.7 (2.6 to 2.8)	Not significant	Sample sizes small	-0.5 (-3.5 to 2.6)
	Lothian & Borders	2009	2018	10	19.4	2.8 (2.7 to 2.9)	Not significant	Sample sizes small	-0.4 (-3.1 to 2.3)
Number of fledglings	Central	2009	2018	10	13.1	2.2 (2.1 to 2.4)	Not significant	Sample sizes small	3.1 (-1.0 to 7.4)
	Dumfries & Galloway	2009	2018	10	36.7	2.1 (2.1 to 2.2)	Decrease		-2.4 (-4.7 to 0.0)

Parameter	Region	First year of trend	Last year of trend	Number of years	Mean number of home ranges across years	Mean parameter value (and 95% confidence limits)	Trend during the period	Caveats	Estimated % annual change (and 95% confidence limits)
	Lothian & Borders	2009	2018	10	30.6	2.7 (2.6 to 2.9)	Not significant		-0.7 (-3.0 to 1.6)
	South Strathclyde	2009	2018	10	22.6	2.2 (2.1 to 2.3)	Not significant		-0.4 (-3.6 to 2.8)
	Tayside & Fife	2009	2018	10	28.7	2.2 (2.1 to 2.3)	Not significant		0.2 (-2.6 to 3.0)

Table 65: Details of NHZ Regional trends for Peregrine.

Parameter	Region	First year of trend	Last year of trend	Number of years	Mean number of home ranges across years	Mean parameter value (and 95% confidence limits)	Trend during the period	Caveats	Estimated % annual change (and 95% confidence limits)
Pairs	02. North Caithness and Orkney	2009	2018	10	10.4	4.7 (4.1 to 5.3)	Not significant	Sample sizes small	-1.9 (-11.2 to 8.4)
	11. Cairngorm Massif	2009	2018	10	41.3	12.9 (10.0 to 15.8)	Decrease		-6.7 (-12.2 to -0.9)
	12. North East Glens	2009	2018	10	16.7	8.7 (7.2 to 10.2)	Not significant	Sample sizes small	3.3 (-4.0 to 11.2)
	14. Argyll West and Islands	2009	2017	9	10.667	5.1 (3.6 to 6.7)	Decrease	Sample sizes small	-11.0 (-20.6 to -0.1)
	15. Loch Lomond, The Trossachs and Breadalbane	2009	2018	10	20.2	10.1 (7.4 to 12.8)	Decrease		-11.1 (-17.1 to -4.6)
	16. Eastern Lowlands	2009	2018	10	89.2	36.1 (34.5 to 37.7)	Not significant		0.7 (-2.9 to 4.4)
	17. West Central Belt	2009	2018	10	22.5	13.1 (11.8 to 14.4)	Not significant		1.9 (-4.0 to 8.2)
	18. Wigtown Machairs and Outer Solway Coast	2012	2018	7	25.714	17.3 (14.6 to 19.9)	Not significant		3.6 (-5.3 to 13.2)
	19. Western Southern Uplands and Inner Solway	2009	2018	10	77	31.4 (28.7 to 34.1)	Not significant		2.7 (-1.2 to 6.7)
	20. Border Hills	2009	2018	10	62.3	24.9 (23.7 to 26.1)	Not significant		-1.2 (-5.4 to 3.2)
Success	02. North Caithness and Orkney	2009	2018	10	11.1	0.6 (0.5 to 0.7)	Decrease	Sample sizes small	-2.4 (-4.2 to -0.9)
	11. Cairngorm Massif	2009	2018	10	11.2	0.6 (0.5 to 0.7)	Non-linear	Sample sizes small	Non-linear
	12. North East Glens	2009	2018	9	10.778	0.7 (0.6 to 0.8)	Not significant	Sample sizes small	5.4 (-1.6 to 12.2)
	14. Argyll West and Islands	2009	2018	10	15	0.7 (0.6 to 0.7)	Not significant	Sample sizes small	0.9 (-2.6 to 4.1)
	15. Loch Lomond, The	2009	2018	10	15.4	0.6 (0.5 to 0.6)	Not significant	Sample sizes small; No home range random effect	1.2 (-1.8 to 4.2)

Parameter	Region	First year of trend	Last year of trend	Number of years	Mean number of home ranges across years	Mean parameter value (and 95% confidence limits)	Trend during the period	Caveats	Estimated % annual change (and 95% confidence limits)
	Trossachs and Breadalbane								
	16. Eastern Lowlands	2009	2018	10	57.9	0.7 (0.7 to 0.8)	Decrease		-1.3 (-2.4 to -0.2)
	17. West Central Belt	2009	2018	10	31	0.6 (0.6 to 0.7)	Not significant		1.2 (-0.9 to 3.3)
	18. Wigtown Machairs and Outer Solway Coast	2009	2018	10	19.1	0.7 (0.7 to 0.8)	Not significant	Sample sizes small	0.7 (-1.7 to 3.0)
	19. Western Southern Uplands and Inner Solway	2009	2018	10	35.5	0.6 (0.5 to 0.7)	Not significant		1.7 (-0.6 to 3.9)
	20. Border Hills	2009	2018	10	29	0.6 (0.5 to 0.7)	Not significant		-0.4 (-2.9 to 2.0)
Clutch size	16. Eastern Lowlands	2009	2018	10	19.1	3.4 (3.2 to 3.5)	Not significant	Sample sizes small; No home range random effect	-1.8 (-4.5 to 0.8)
	20. Border Hills	2009	2018	10	19.7	3.5 (3.4 to 3.6)	Not significant	Sample sizes small; No home range random effect	0.3 (-2.2 to 2.9)
Brood size	16. Eastern Lowlands	2009	2018	10	18.4	2.7 (2.6 to 2.8)	Not significant	Sample sizes small; No home range random effect	-1.5 (-4.3 to 1.4)
	20. Border Hills	2009	2018	10	15.4	2.8 (2.7 to 2.9)	Not significant	Sample sizes small; No home range random effect	-1.0 (-4.2 to 2.2)
Number of fledglings	16. Eastern Lowlands	2009	2018	10	41.4	2.5 (2.4 to 2.6)	Not significant		-0.7 (-2.7 to 1.5)
	17. West Central Belt	2009	2018	10	19.9	2.2 (2.1 to 2.3)	Not significant	Sample sizes small; No home range random effect	0.9 (-2.3 to 4.3)
	18. Wigtown Machairs and Outer Solway Coast	2009	2018	9	14.556	1.8 (1.7 to 2.0)	Not significant		-2.8 (-6.8 to 1.3)
	19. Western Southern Uplands and Inner Solway	2009	2018	10	20.8	2.2 (2.1 to 2.3)	Not significant	No home range random effect	-2.1 (-5.2 to 1.1)

Parameter	Region	First year of trend	Last year of trend	Number of years	Mean number of home ranges across years	Mean parameter value (and 95% confidence limits)	Trend during the period	Caveats	Estimated % annual change (and 95% confidence limits)
	20. Border Hills	2009	2018	10	17.6	2.6 (2.4 to 2.7)	Not significant	Sample sizes small; No home range random effect	-1.6 (-4.7 to 1.7)

Table 66: Number of Peregrine home range checks for occupancy reported to the SRMS during 2009-2018, in each of the 12 SRMS Regions, with approximate proportion of estimated population monitored. At the bottom of the table, row A is the mean number of home range checks over the most recent five years. Row B gives the estimated proportion of the national population in each region, based on Bird Atlas Timed Tetrad Visit (TTV) data. The depth of red shading indicates the relative importance of each region for this species. If survey effort was spread evenly across the whole population, the ratio of A:B would not vary much between regions.

Year	ARGYLL	CENTRAL SCOTLAND	DUMFRIES & GALLOWAY	HIGHLAND	LEWIS & HARRIS	LOTHIAN & BORDERS	NORTH EAST SCOTLAND	ORKNEY	SHETLAND	SOUTH STRATHCLYDE	TAYSIDE & FIFE	UIST	Total
2009	27	33	116	23	1	132	15	20	0	58	101	8	534
2010	30	38	109	31	5	133	0	28	0	63	101	2	540
2011	30	37	111	21	3	134	1	12	0	67	113	5	534
2012	33	41	108	23	0	122	64	30	0	66	104	5	596
2013	35	34	111	31	1	141	76	33	0	68	98	5	633
2014	68	59	119	121	4	142	165	38	76	86	188	6	1072
2015	34	41	109	18	0	140	85	28	14	77	117	4	667
2016	40	38	115	20	3	138	99	35	11	78	103	4	684
2017	33	44	117	54	5	142	20	32	20	80	107	6	660
2018	19	28	112	88	2	143	86	29	20	75	99	4	705
A: Mean home range checks	**38.8**	**42.0**	**114.4**	**60.2**	**2.8**	**141.0**	**91.0**	**32.4**	**28.2**	**79.2**	**122.8**	**4.8**	**757.6**
B: Proportion of estimated Scottish population	18	3	14	17	0	11	17	3	0	4	9	1	100

Figure 133: Areas corresponding to the clusters of home ranges from which sufficient data were reported to attempt to derive population trends for Peregrine between 2009 and 2018 (a) together with maps showing variation in the number of Peregrine records reported to SRMS during 2009-2013 (b) and 2014-2018 (c), in the context of the known Peregrine breeding distribution taken from the 2007-2011 Bird Atlas. SRMS data are depicted as grey squares with darker shading indicating more records while Bird Atlas data are depicted as red dots with the size of dot positively related to probability of breeding.

Raven

Figure 134: Raven at nest site in Ayrshire (Photo: Angus Hogg, South Strathclyde RSG).

The Scottish Raven population is poorly represented by existing SRMS data, though these include data from some high quality local studies.

Our latest analysis of SRMS data for the period 2009-2018 showed that while no national trends in breeding number or productivity of Raven are available, trends are available for six of the 12 SRMS regions (Table 67) and eight of the 21 NHZ regions (Table 68) for which the SRMS holds records for Raven.

Users of the published trends users should be aware that, while trends in breeding numbers of Raven are based on a broadly representative range of locations across the southern half of Scotland, the relevant areas have not been covered consistently over time (Figure 142). The lack of data from Highland or any of the archipelagic regions means that trends may not be representative of northern populations. Records for productivity trends are drawn from across the Raven's Scottish range, but with relatively poor representation in the north and west, with the exception of Uist. Some Raven records from Shetland that have only recently been made available to SRMS are not included in the current analysis. Consultation with data contributors has highlighted that especially for an early breeding species like Raven - where 'monitored' pairs are reported on incidentally during monitoring of other species, early failures

will often be missed. Population expansion, including in-filling, may go undetected unless monitoring is area-based, with active searching for new pairs each year (e.g. Negative trend in abundance of Raven in L&B is due mainly to a reduction in available survey effort).

National trends

No trends in breeding numbers or breeding productivity are available for Raven at a national level.

BBS data for Scotland showed no significant change at a national level over the period 2008-2018 (Harris *et al*., 2020), though the longer term trend shows a 60% increase over the period 1995-2020.

SRMS regional trends

Breeding numbers of Raven increased in Dumfries & Galloway, but did not change significantly in Argyll, Lothian & Borders, South Strathclyde, Tayside & Fife or Uist (Table 67, Figure 135).

Breeding success of Raven decreased in South Strathclyde and did not change significantly in Argyll, Central, Dumfries & Galloway, Highland, Lothian & Borders, Tayside & Fife or Uist (Table 67, Figure 136).

No trends for Raven are available for clutch size or brood size (Table 67). Number of fledglings in Argyll, Central, Dumfries & Galloway, Highland, Lothian & Borders, South Strathclyde, Tayside & Fife and Uist did not change significantly (Table 67, Figure 137).

Trends for this species are not yet available for Central, Highland, Lewis & Harris, North East Scotland, Orkney or Shetland.

NHZ regional trends

Breeding numbers of Raven decreased in NHZ 11, increased in NHZ 19, and did not change significantly in a further six regions (NHZs 03, 14-17 and 19-20) (Table 68, Figure 138).

Breeding success of Raven in seven regions (NHZs 03, 14-17 and 19-20) did not change significantly (Table 68, Figure 139).

No trends for Raven are available for clutch size or brood size (Table 68). Number of fledglings in seven regions (NHZs 03, 14-17 and 19-20) did not change significantly (Table 68, Figure 140).

Trends for this species are not yet available for NHZs 01-02, 04-10, 12-13, 18 and 21.

Details of contributing records

5,109 (405 to 632 per year, mean: 511 records) from 2009-2018 contributed to this trends analysis (Table 71).

References

Harris, S.J., Massimino, D., Balmer, D.E., Eaton, M.A., Noble, D.G., Pearce-Higgins, J.W., Woodcock, P. & Gillings, S. (2020) The Breeding Bird Survey 2019.

Table 67: Summary of SRMS regional trends for Raven during 2009-2018. Figures in parentheses indicate the annual change, with significant increases highlighted in green, significant decreases highlighted in blue and non-significant changes highlighted in grey. '—' indicates where the species occurs but no trend is available. 'No SRMS data' indicates where the SRMS does not hold any records for the region of interest. 'Absent' indicates where the species is not known to breed.

SRMS Region	Pairs	Success	Clutch size	Brood size	Number of fledglings
Argyll	Not significant	Not significant [r]	—	—	Not significant
Central	—	Not significant [r]	—	—	Not significant
Dumfries & Galloway	**Increase (5.4%)**	Not significant [r]	—	—	Not significant
Highland	—	Not significant [s]	—	—	Not significant [s]
Lewis & Harris	—	—	—	—	—
Lothian & Borders	Not significant [s]	Not significant [r]	—	—	Not significant
North East Scotland	—	—	—	—	—
Orkney	—	—	—	—	—
Shetland	—	—	—	—	—
South Strathclyde	Not significant	**Decrease [r] (-1%)**	—	—	Not significant
Tayside & Fife	Not significant	Not significant	—	—	Not significant
Uist	Not significant [sv]	Not significant [s]	—	—	Not significant [s]

[r] No home range random effect, [s] Sample sizes small, [v] Variable effort.

Table 68: Summary of NHZ regional trends for Raven during 2009-2018. Figures in parentheses indicate the annual change, with significant increases highlighted in green, significant decreases highlighted in blue and non-significant changes highlighted in grey. '—' indicates where the species occurs but no trend is available. 'No SRMS data' indicates where the SRMS does not hold any records for the region of interest. 'Absent' indicates where the species is not known to breed.

NHZ Region	Pairs	Success	Clutch size	Brood size	Number of fledglings
01. Shetland	—	—	—	—	—
02. North Caithness and Orkney	—	—	—	—	—
03. Coll, Tiree and the Western Isles	Not significant [v]	Not significant	—	—	Not significant [rs]
04. North West Seaboard	—	—	—	—	—
05. The Peatlands of Caithness and Sutherland	—	—	—	—	—
06. Western Seaboard	—	—	—	—	—
07. Northern Highlands	—	—	—	—	—
08. Western Highlands	—	—	—	—	—
09. North East Coastal Plain	—	—	—	—	—
10. Central Highlands	—	—	—	—	—
11. Cairngorm Massif	**Decrease [s] (-8.4%)**	—	—	—	—
12. North East Glens	—	—	—	—	—
13. East Lochaber	—	—	—	—	—
14. Argyll West and Islands	Not significant [v]	Not significant	—	—	Not significant [r]
15. Loch Lomond, The Trossachs and Breadalbane	Not significant [v]	Not significant	—	—	Not significant [r]
16. Eastern Lowlands	Not significant [sv]	Not significant	—	—	Not significant [r]
17. West Central Belt	Not significant [v]	Not significant [r]	—	—	Not significant [r]
18. Wigtown Machairs and Outer Solway Coast	—	—	—	—	—
19. Western Southern Uplands and Inner Solway	**Increase [v] (4.9%)**	Not significant [r]	—	—	Not significant [rs]
20. Border Hills	Not significant [v]	Not significant [r]	—	—	Not significant [rs]
21. Moray Firth	—	—	—	—	—

[r] No home range random effect, [s] Sample sizes small, [v] Variable effort.

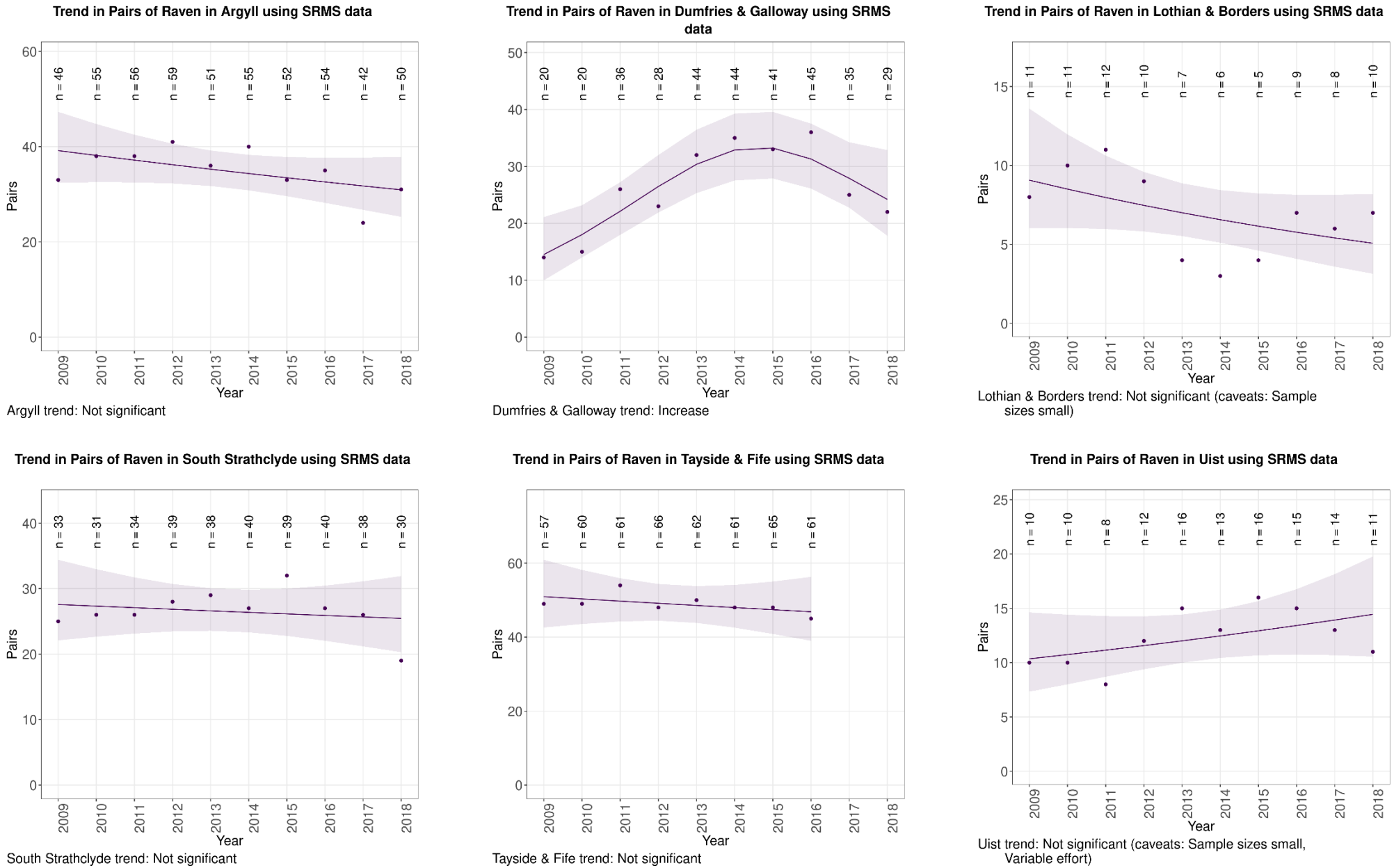
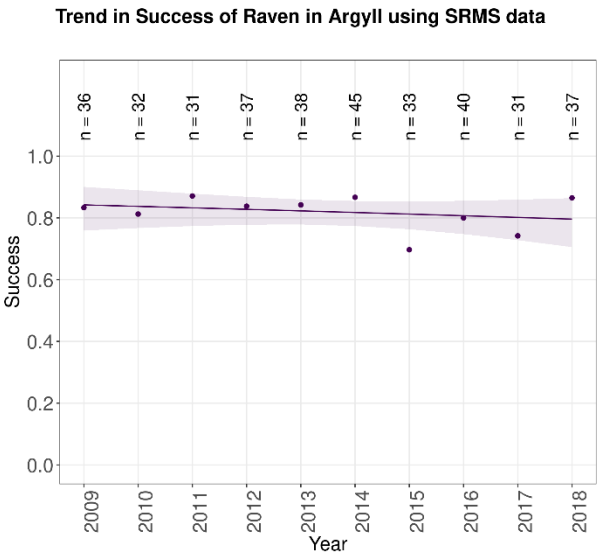
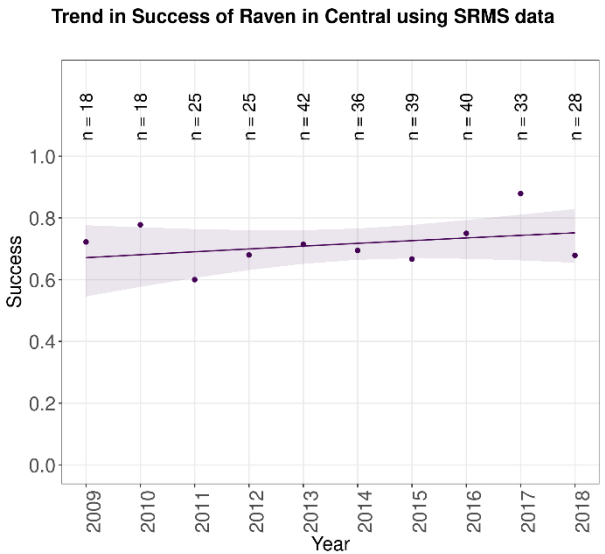


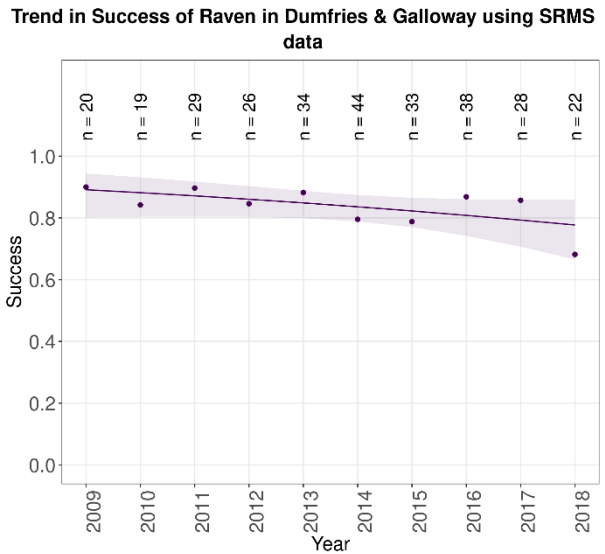
Figure 135: Trends in numbers of breeding pairs of Raven by SRMS region during 2009-2018.



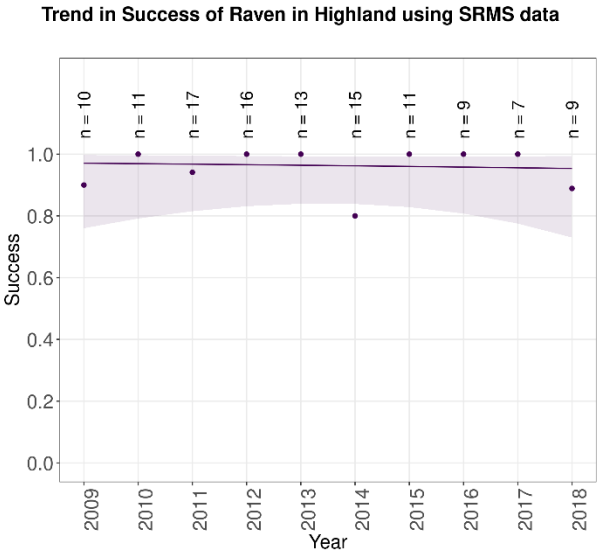
Argyll trend: Not significant (caveats: No home range random effect)



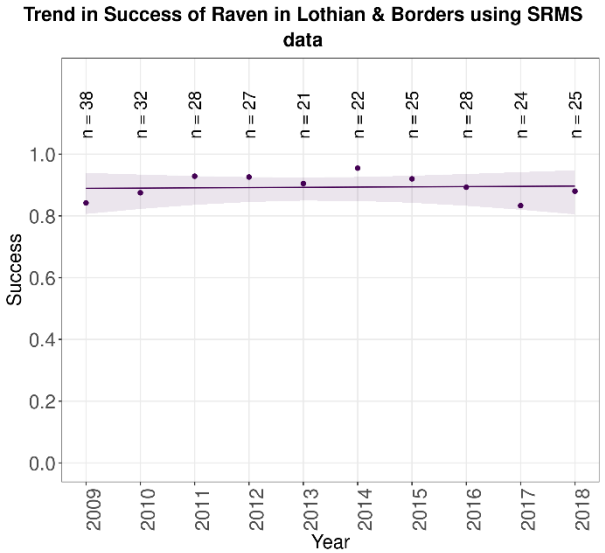
Central trend: Not significant (caveats: No home range random effect)



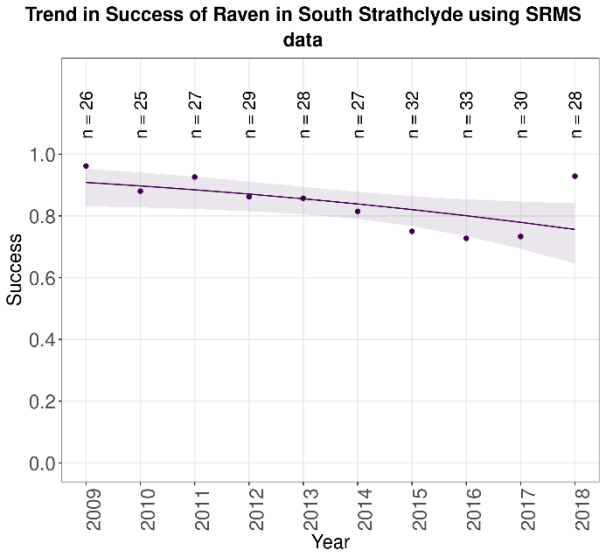
Dumfries & Galloway trend: Not significant (caveats: No home range random effect)



Highland trend: Not significant (caveats: Sample sizes small)

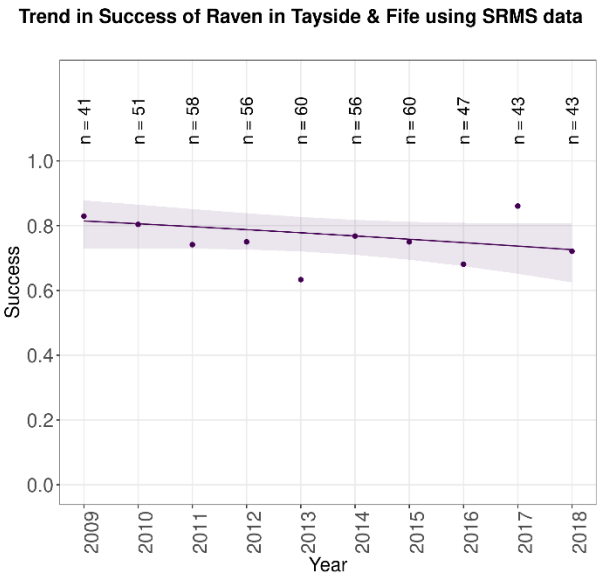


Lothian & Borders trend: Not significant (caveats: No home range random effect)

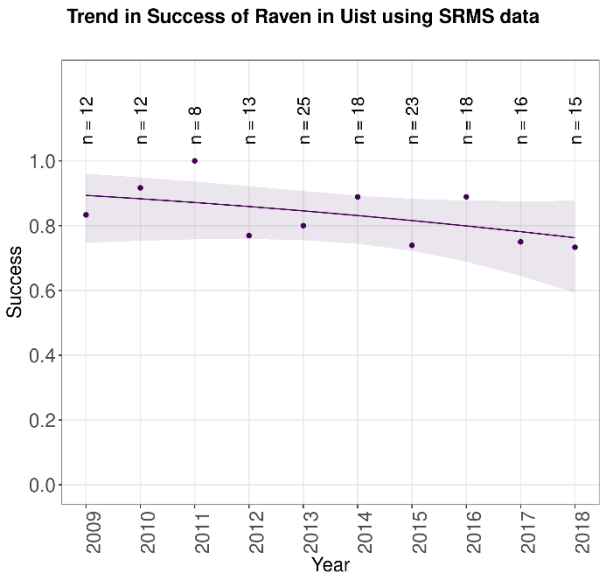


South Strathclyde trend: Decrease (caveats: No home range random effect)

Figure 136: Trends in breeding success of Raven by SRMS region during 2009-2018.

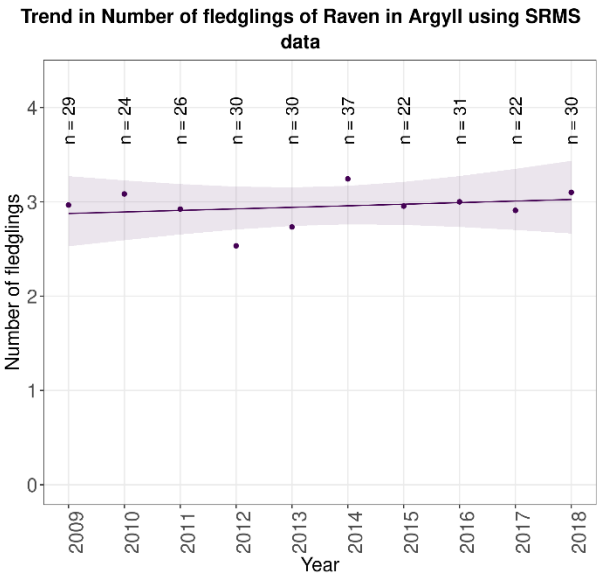


Tayside & Fife trend: Not significant

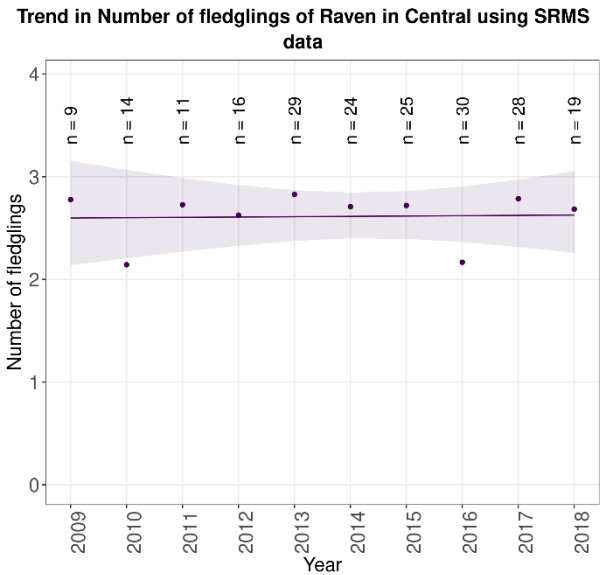


Uist trend: Not significant (caveats: Sample sizes small)

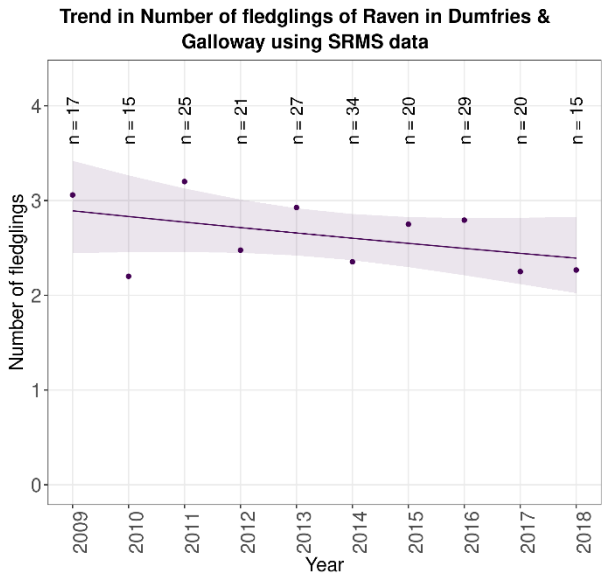
Figure 136 continued: Trends in breeding success of Raven by SRMS region during 2009-2018.



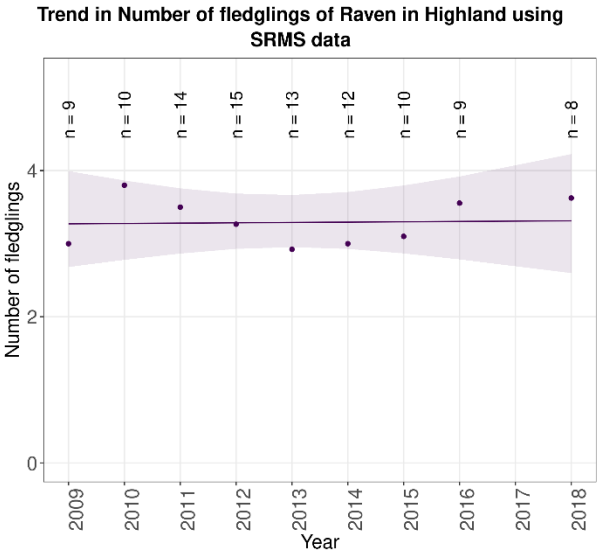
Argyll trend: Not significant



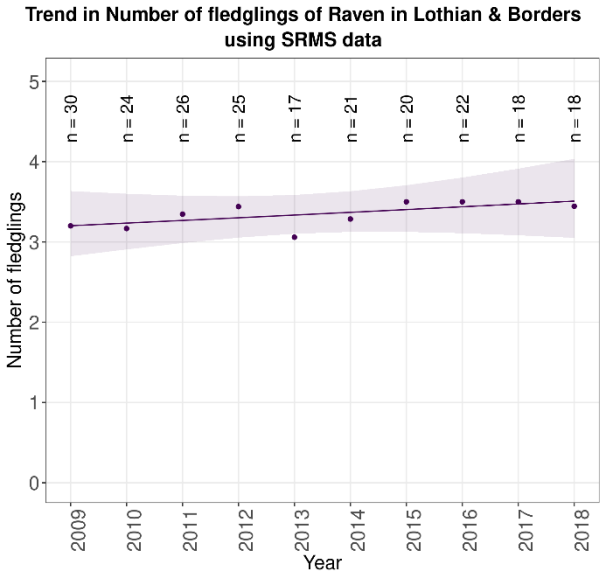
Central trend: Not significant



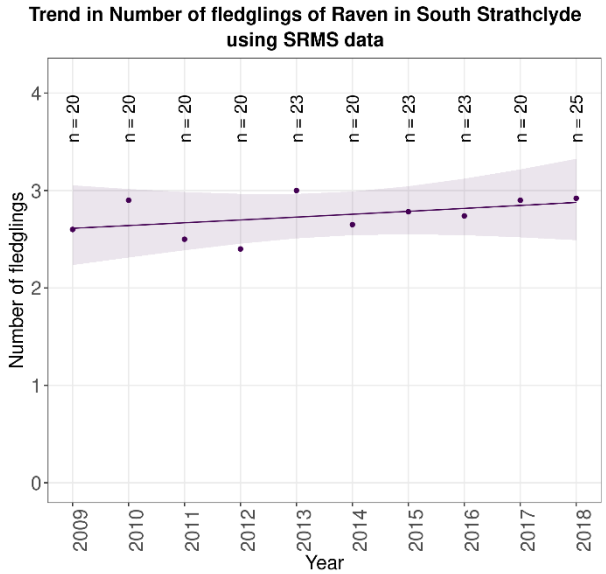
Dumfries & Galloway trend: Not significant



Highland trend: Not significant (caveats: Sample sizes small)

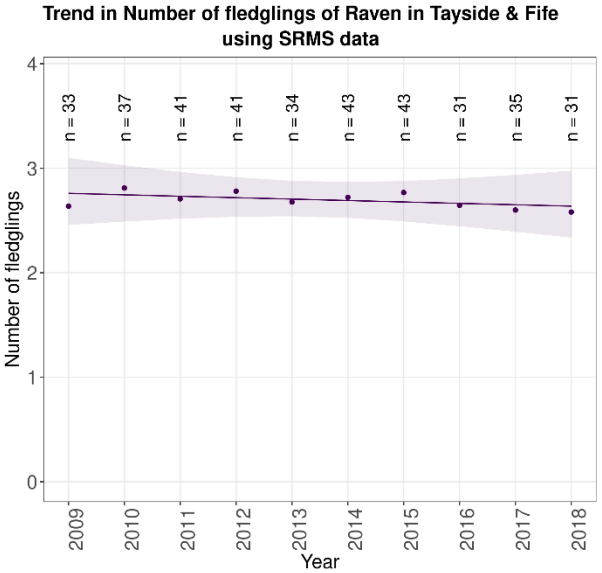


Lothian & Borders trend: Not significant

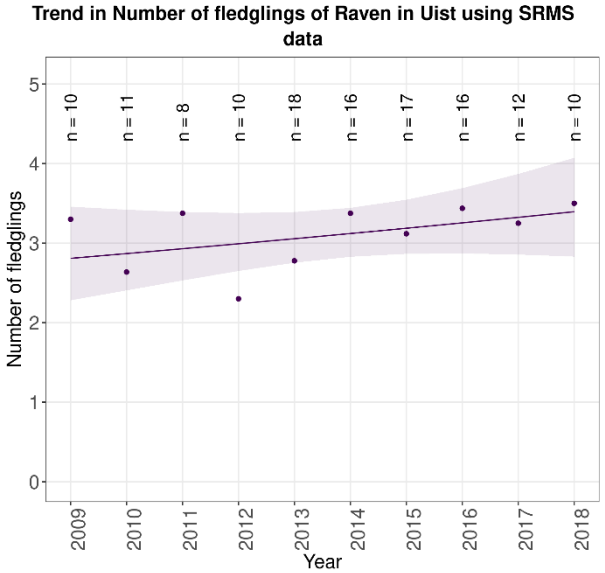


South Strathclyde trend: Not significant

Figure 137: Trends in numbers of fledglings of Raven by SRMS region during 2009-2018.

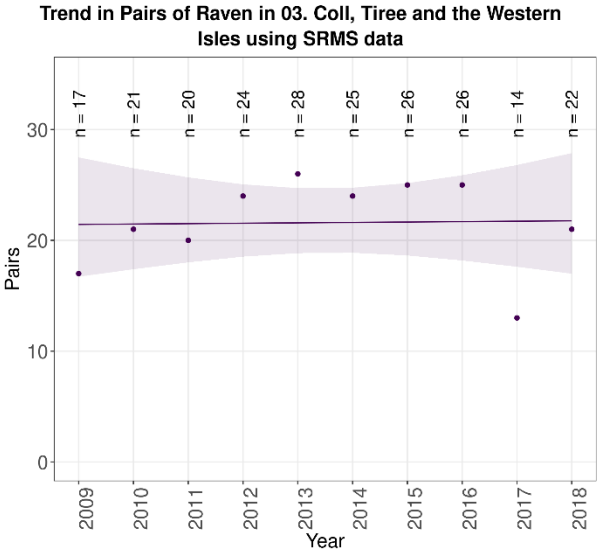


Tayside & Fife trend: Not significant

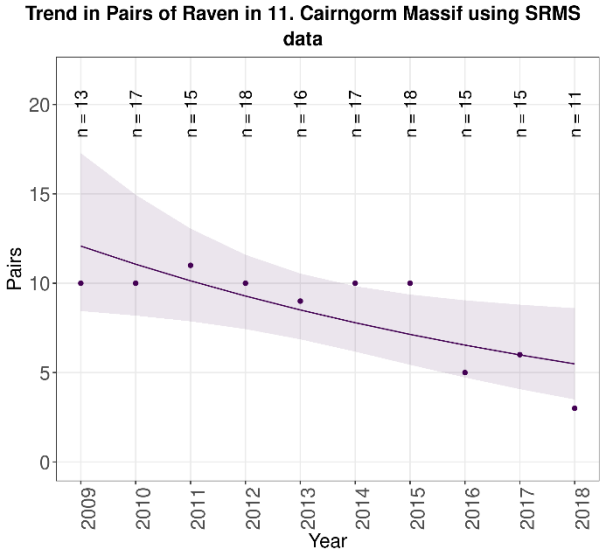


Uist trend: Not significant (caveats: Sample sizes small)

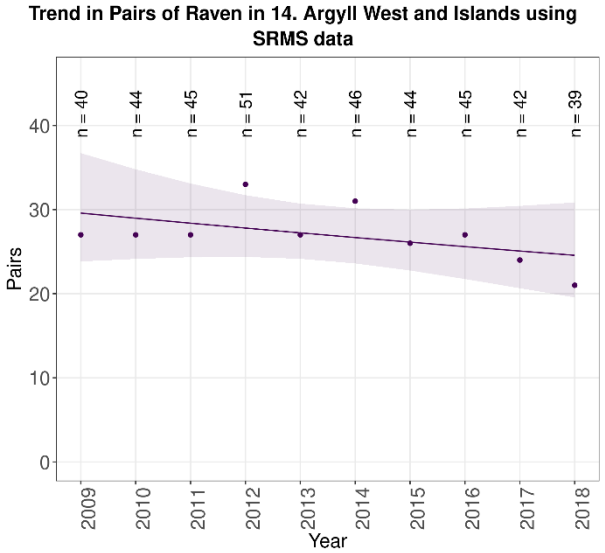
Figure 137 continued: Trends in numbers of fledglings of Raven by SRMS region during 2009-2018.



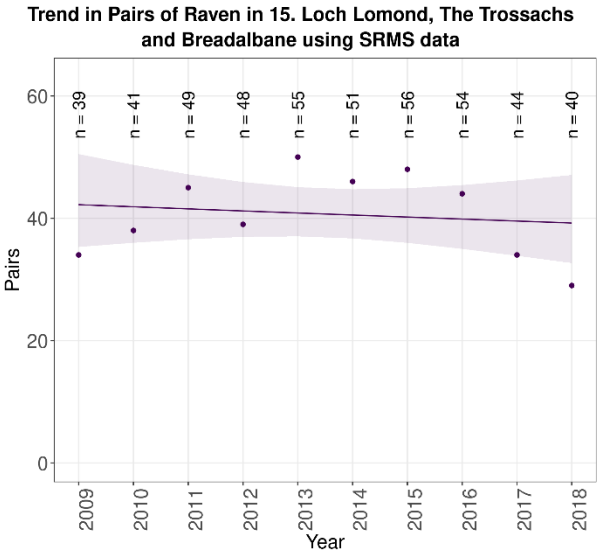
03. Coll, Tiree and the Western Isles trend: Not significant (caveats: Variable effort)



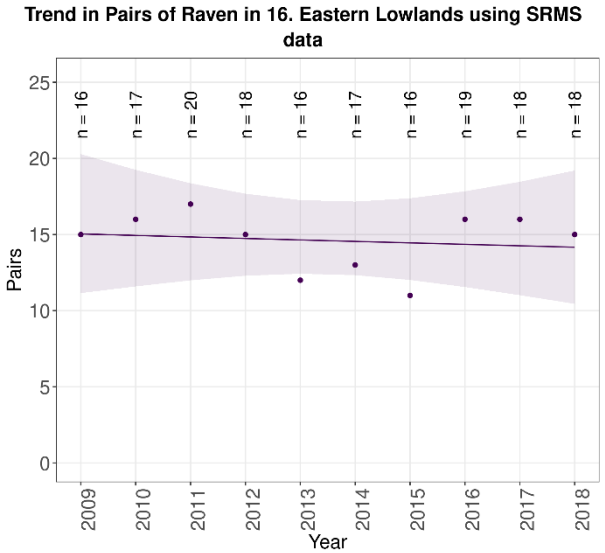
11. Cairngorm Massif trend: Decrease (caveats: Sample sizes small)



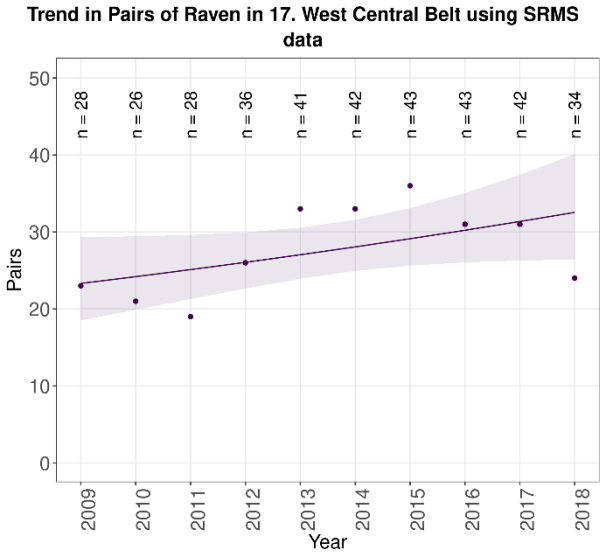
14. Argyll West and Islands trend: Not significant (caveats: Variable effort)



15. Loch Lomond, The Trossachs and Breadalbane trend: Not significant (caveats: Variable effort)

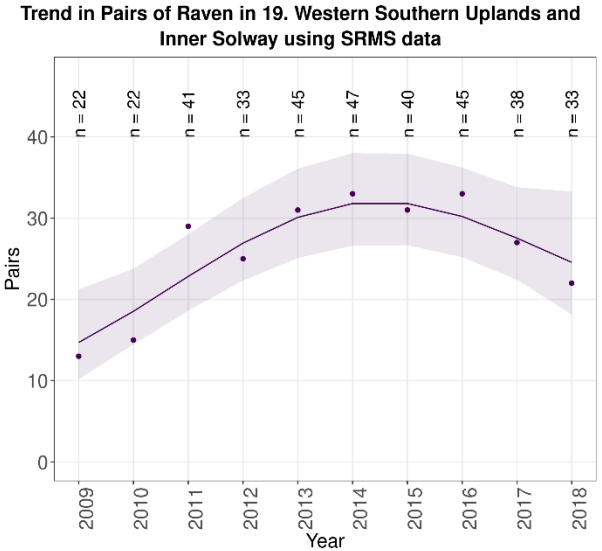


16. Eastern Lowlands trend: Not significant (caveats: Sample sizes small; Variable effort)

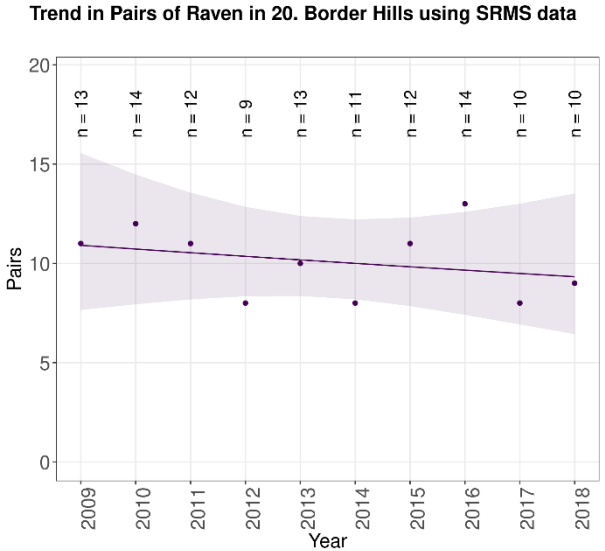


17. West Central Belt trend: Not significant (caveats: Variable effort)

Figure 138: Trends in numbers of breeding pairs of Raven by NHZ region during 2009-2018.

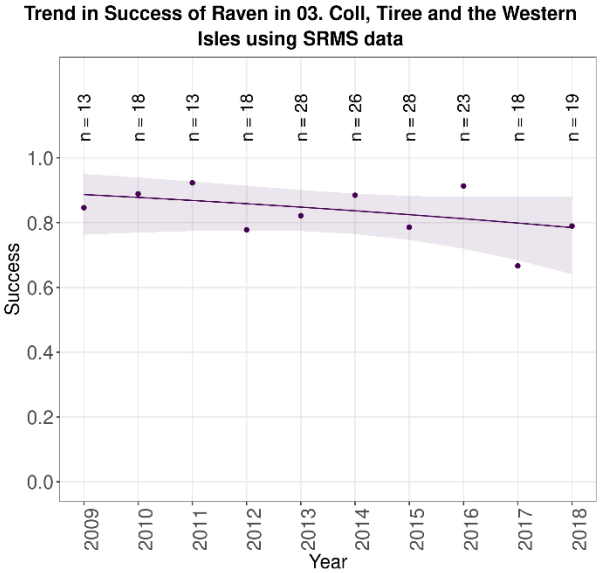


19. Western Southern Uplands and Inner Solway trend: Increase (caveats: Variable effort)

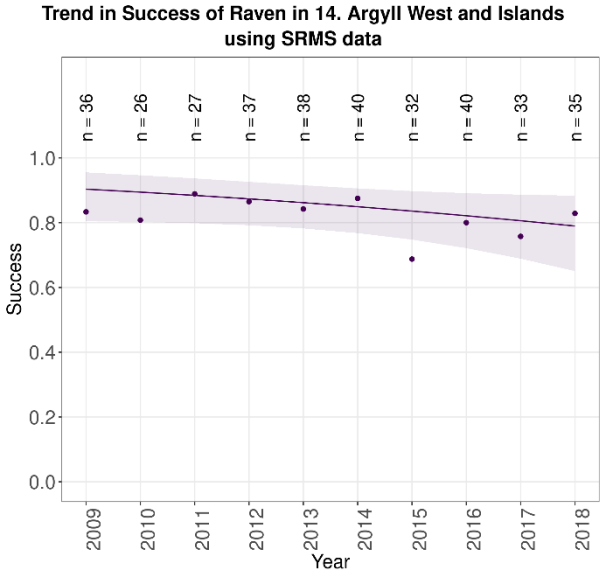


20. Border Hills trend: Not significant (caveats: Variable effort)

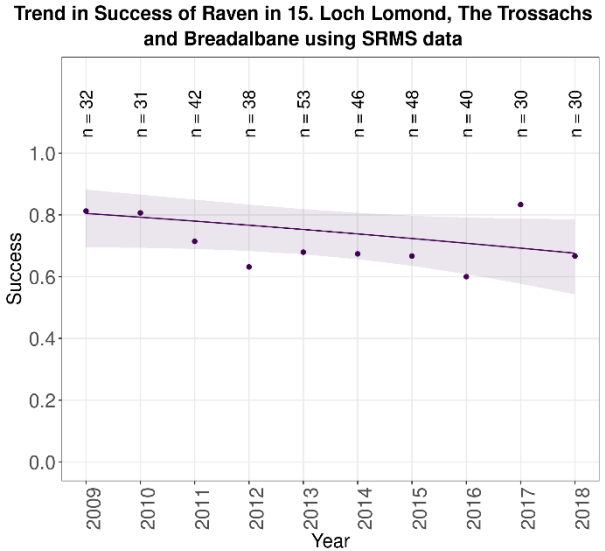
Figure 138 continued: Trends in numbers of breeding pairs of Raven by NHZ region during 2009-2018.



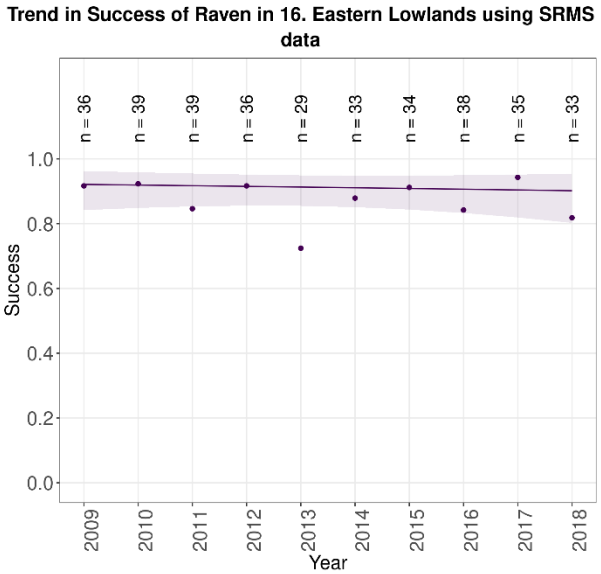
03. Coll, Tiree and the Western Isles trend: Not significant



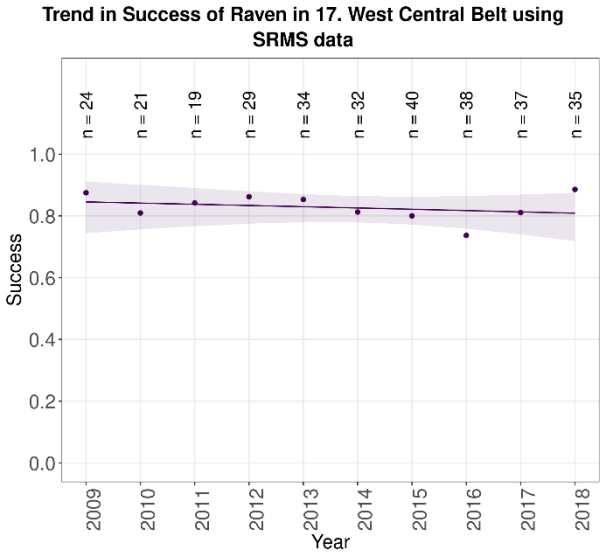
14. Argyll West and Islands trend: Not significant



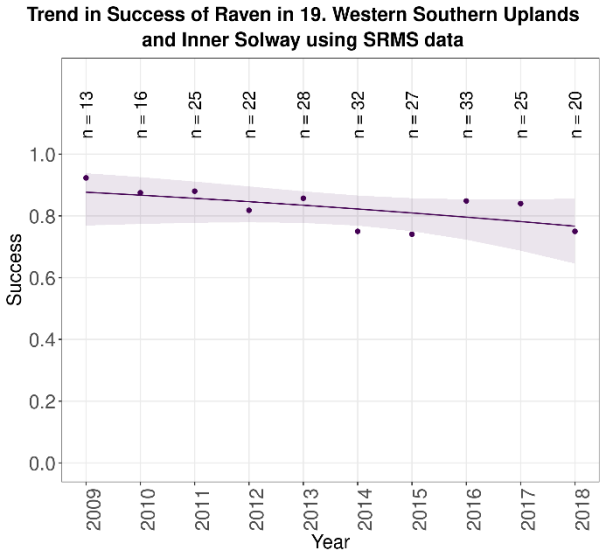
15. Loch Lomond, The Trossachs and Breadalbane trend: Not significant



16. Eastern Lowlands trend: Not significant

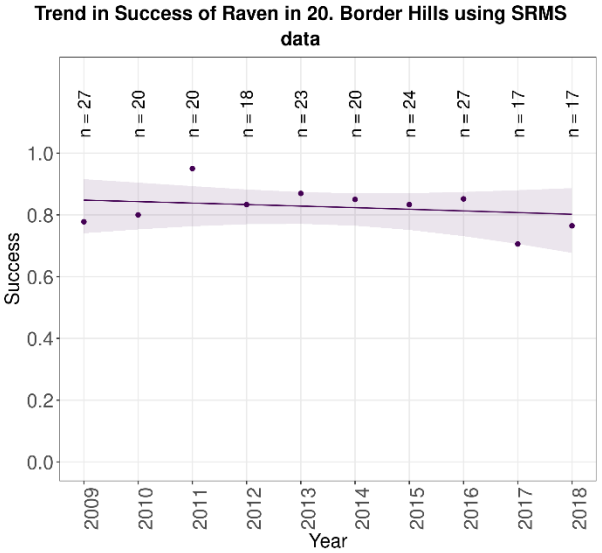


17. West Central Belt trend: Not significant (caveats: No home range random effect)



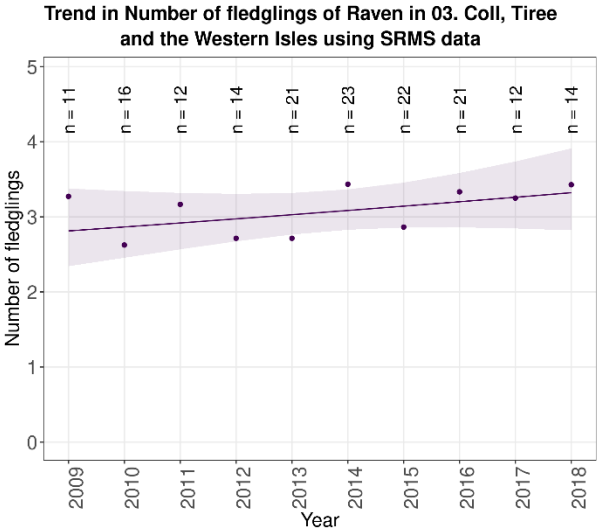
19. Western Southern Uplands and Inner Solway trend: Not significant (caveats: No home range random effect)

Figure 139: Trends in breeding success of Raven by NHZ region during 2009-2018.

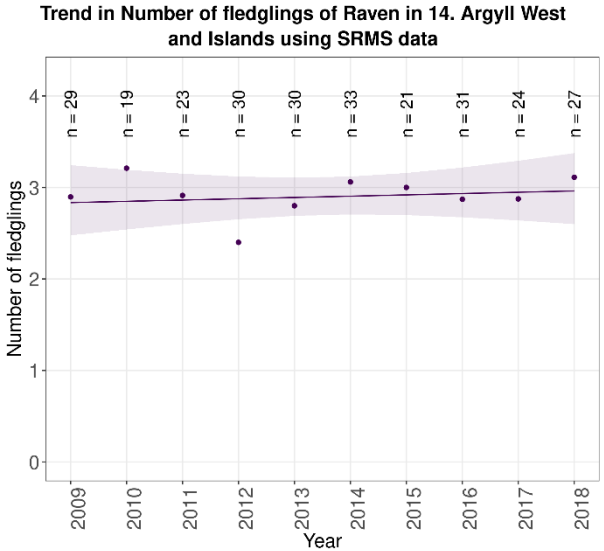


20. Border Hills trend: Not significant (caveats: No home range random effect)

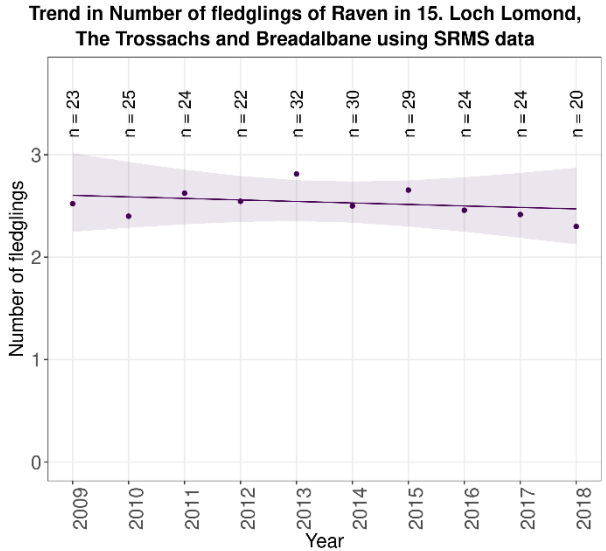
Figure 139 continued: Trends in breeding success of Raven by NHZ region during 2009-2018.



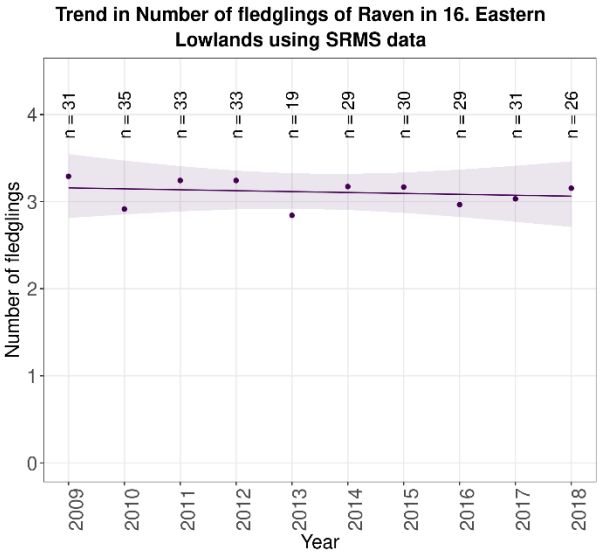
03. Coll, Tiree and the Western Isles trend: Not significant (caveats: Sample sizes small; No home range random effect)



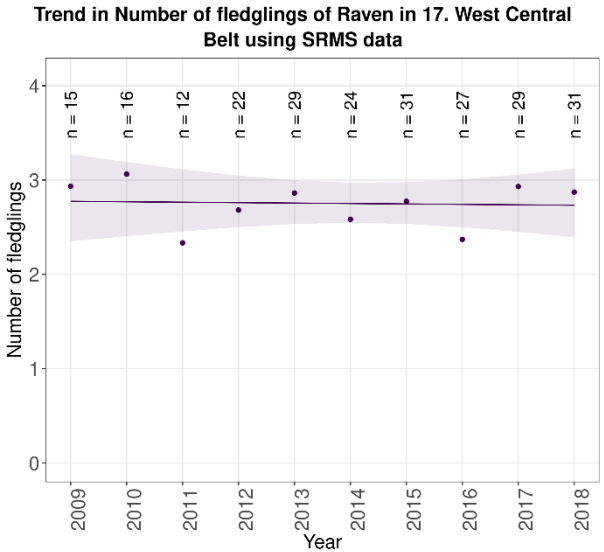
14. Argyll West and Islands trend: Not significant (caveats: No home range random effect)



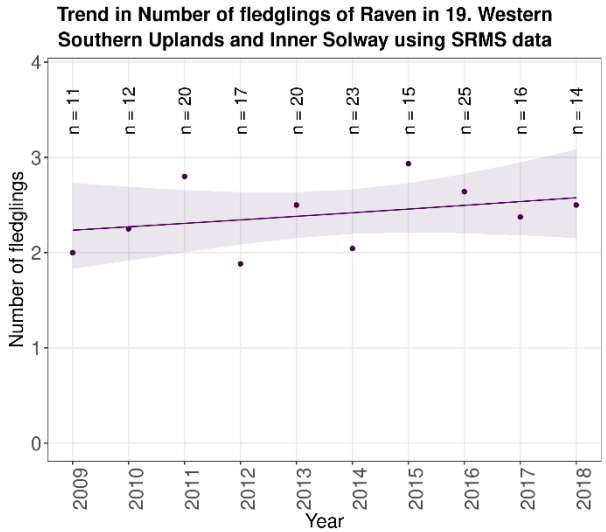
15. Loch Lomond, The Trossachs and Breadalbane trend: Not significant (caveats: No home range random effect)



16. Eastern Lowlands trend: Not significant (caveats: No home range random effect)



17. West Central Belt trend: Not significant (caveats: No home range random effect)



19. Western Southern Uplands and Inner Solway trend: Not significant (caveats: Sample sizes small; No home range random effect)

Figure 140: Trends in numbers of fledglings of Raven by NHZ region during 2009-2018.

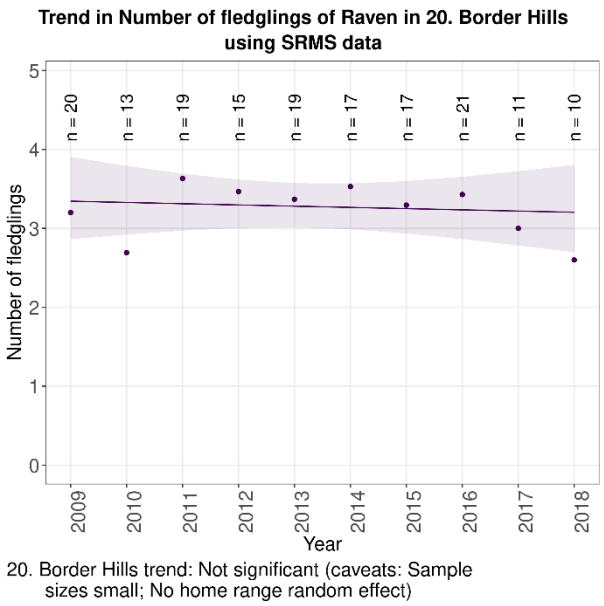


Figure 141: Trends in numbers of fledglings of Raven by NHZ region during 2009-2018.

Table 69: Details of SRMS Regional trends for Raven.

Parameter	Region	First year of trend	Last year of trend	Number of years	Mean number of home ranges across years	Mean parameter value (and 95% confidence limits)	Trend during the period	Caveats	Estimated % annual change (and 95% confidence limits)
Pairs	Argyll	2009	2018	10	52.0	34.9 (31.3 to 38.5)	Not significant		-2.6 (-6.1 to 1.0)
	Dumfries & Galloway	2009	2018	10	34.2	26.1 (20.5 to 31.7)	Increase		5.4 (1.0 to 10.0)
	Lothian & Borders	2009	2018	10	8.9	6.9 (5.0 to 8.8)	Not significant	Sample sizes small	-6.3 (-13.7 to 1.9)
	South Strathclyde	2009	2018	10	36.2	26.5 (24.1 to 28.9)	Not significant		-0.9 (-5.0 to 3.4)
	Tayside & Fife	2009	2016	8	61.6	48.9 (46.8 to 51.0)	Not significant		-1.2 (-5.4 to 3.2)
	Uist	2009	2018	10	12.5	12.3 (10.5 to 14.1)	Not significant	Sample sizes small, Variable effort	3.8 (-2.4 to 10.4)
Success	Argyll	2009	2018	10	36.0	0.8 (0.8 to 0.9)	Not significant	No home range random effect	-0.5 (-1.8 to 0.8)
	Central	2009	2018	10	30.4	0.7 (0.7 to 0.8)	Not significant	No home range random effect	1.0 (-1.2 to 3.1)
	Dumfries & Galloway	2009	2018	10	29.3	0.8 (0.8 to 0.9)	Not significant	No home range random effect	-0.9 (-2.1 to 0.2)
	Highland	2009	2018	10	11.8	0.9 (0.9 to 1.0)	Not significant	Sample sizes small	-0.1 (-1.3 to 0.7)
	Lothian & Borders	2009	2018	10	27.0	0.9 (0.8 to 0.9)	Not significant	No home range random effect	0.1 (-1.3 to 1.3)
	South Strathclyde	2009	2018	10	28.5	0.8 (0.8 to 0.9)	Decrease	No home range random effect	-1.0 (-2.0 to -0.1)
	Tayside & Fife	2009	2018	10	51.5	0.7 (0.7 to 0.8)	Not significant		-0.8 (-2.1 to 0.4)
	Uist	2009	2018	10	16.0	0.8 (0.7 to 0.9)	Not significant	Sample sizes small	-1.0 (-2.7 to 0.5)
Number of fledglings	Argyll	2009	2018	10	28.1	3.0 (2.8 to 3.1)	Not significant		0.6 (-1.8 to 3.0)
	Central	2009	2018	10	20.5	2.6 (2.5 to 2.8)	Not significant		0.1 (-3.2 to 3.5)
	Dumfries & Galloway	2009	2018	10	22.3	2.7 (2.5 to 2.8)	Not significant		-2.1 (-5.1 to 1.0)
	Highland	2009	2018	9	11.1	3.3 (3.1 to 3.5)	Not significant	Sample sizes small	0.1 (-4.1 to 4.5)
	Lothian & Borders	2009	2018	10	22.1	3.3 (3.2 to 3.5)	Not significant		1.0 (-1.5 to 3.6)

Parameter	Region	First year of trend	Last year of trend	Number of years	Mean number of home ranges across years	Mean parameter value (and 95% confidence limits)	Trend during the period	Caveats	Estimated % annual change (and 95% confidence limits)
	South Strathclyde	2009	2018	10	21.4	2.7 (2.6 to 2.9)	Not significant		1.1 (-1.7 to 4.0)
	Tayside & Fife	2009	2018	10	36.9	2.7 (2.6 to 2.8)	Not significant		-0.5 (-2.7 to 1.8)
	Uist	2009	2018	10	12.8	3.1 (2.9 to 3.3)	Not significant	Sample sizes small	2.1 (-1.6 to 6.0)

Table 70: Details of NHZ Regional trends for Raven.

Parameter	Region	First year of trend	Last year of trend	Number of years	Mean number of home ranges across years	Mean parameter value (and 95% confidence limits)	Trend during the period	Caveats	Estimated % annual change (and 95% confidence limits)
Pairs	03. Coll, Tiree and the Western Isles	2009	2018	10	22.3	21.6 (18.7 to 24.5)	Not significant	Variable effort	0.2 (-4.4 to 4.9)
	11. Cairngorm Massif	2009	2018	10	15.5	8.4 (6.5 to 10.3)	Decrease	Sample sizes small	-8.4 (-15.1 to -1.2)
	14. Argyll West and Islands	2009	2018	10	43.8	27.0 (24.6 to 29.4)	Not significant	Variable effort	-2.0 (-6.0 to 2.1)
	15. Loch Lomond, The Trossachs and Breadalbane	2009	2018	10	47.7	40.7 (35.7 to 45.7)	Not significant	Variable effort	-0.8 (-4.1 to 2.6)
	16. Eastern Lowlands	2009	2018	10	17.5	14.6 (13.2 to 16.0)	Not significant	Sample sizes small; Variable effort	-0.7 (-6.1 to 5.1)
	17. West Central Belt	2009	2018	10	36.3	27.7 (23.5 to 31.9)	Not significant	Variable effort	3.8 (-0.4 to 8.1)
	19. Western Southern Uplands and Inner Solway	2009	2018	10	36.6	25.9 (20.8 to 31.0)	Increase	Variable effort	4.9 (0.6 to 9.5)
	20. Border Hills	2009	2018	10	11.8	10.1 (8.8 to 11.4)	Not significant	Variable effort	-1.7 (-8.2 to 5.2)
Success	03. Coll, Tiree and the Western Isles	2009	2018	10	20.4	0.8 (0.8 to 0.9)	Not significant		-0.8 (-2.4 to 0.6)
	14. Argyll West and Islands	2009	2018	10	34.4	0.8 (0.8 to 0.9)	Not significant		-0.9 (-2.0 to 0.1)
	15. Loch Lomond, The Trossachs and Breadalbane	2009	2018	10	39	0.7 (0.7 to 0.7)	Not significant		-1.2 (-2.7 to 0.3)
	16. Eastern Lowlands	2009	2018	10	35.2	0.9 (0.8 to 0.9)	Not significant		-0.2 (-1.1 to 0.7)

Parameter	Region	First year of trend	Last year of trend	Number of years	Mean number of home ranges across years	Mean parameter value (and 95% confidence limits)	Trend during the period	Caveats	Estimated % annual change (and 95% confidence limits)
	17. West Central Belt	2009	2018	10	30.9	0.8 (0.8 to 0.9)	Not significant	No home range random effect	-0.4 (-1.8 to 1.0)
	19. Western Southern Uplands and Inner Solway	2009	2018	10	24.1	0.8 (0.8 to 0.9)	Not significant	No home range random effect	-0.9 (-2.4 to 0.4)
	20. Border Hills	2009	2018	10	21.3	0.8 (0.8 to 0.9)	Not significant	No home range random effect	-0.5 (-2.1 to 1.1)
Number of fledglings	03. Coll, Tiree and the Western Isles	2009	2018	10	16.6	3.1 (2.9 to 3.2)	Not significant	Sample sizes small; No home range random effect	1.9 (-1.5 to 5.3)
Number of fledglings	14. Argyll West and Islands	2009	2018	10	26.7	2.9 (2.8 to 3.0)	Not significant	No home range random effect	0.5 (-2.0 to 3.0)
	15. Loch Lomond, The Trossachs and Breadalbane	2009	2018	10	25.3	2.5 (2.4 to 2.7)	Not significant	No home range random effect	-0.6 (-3.3 to 2.3)
	16. Eastern Lowlands	2009	2018	10	29.6	3.1 (3.0 to 3.2)	Not significant	No home range random effect	-0.3 (-2.5 to 1.9)
	17. West Central Belt	2009	2018	10	23.6	2.8 (2.6 to 2.9)	Not significant	No home range random effect	-0.2 (-3.0 to 2.7)
	19. Western Southern Uplands and Inner Solway	2009	2018	10	17.3	2.4 (2.3 to 2.6)	Not significant	Sample sizes small; No home range random effect	1.6 (-2.0 to 5.4)
	20. Border Hills	2009	2018	10	16.2	3.3 (3.1 to 3.5)	Not significant	Sample sizes small; No home range random effect	-0.5 (-3.5 to 2.7)

Table 71: Number of Raven home range checks for occupancy reported to the SRMS during 2009-2018, in each of the 12 SRMS Regions, with approximate proportion of estimated population monitored. At the bottom of the table, row A is the mean number of home range checks over the most recent five years. Row B gives the estimated proportion of the national population in each region, based on Bird Atlas Timed Tetrad Visit (TTV) data. The depth of red shading indicates the relative importance of each region for this species. If survey effort was spread evenly across the whole population, the ratio of A:B would not vary much between regions.

Year	ARGYLL	CENTRAL SCOTLAND	DUMFRIES & GALLOWAY	HIGHLAND	LEWIS & HARRIS	LOTHIAN & BORDERS	NORTH EAST SCOTLAND	ORKNEY	SHETLAND	SOUTH STRATHCLYDE	TAYSIDE & FIFE	UIST	Total
2009	99	31	49	23	16	53	0	0	0	47	74	14	406
2010	77	29	65	26	50	58	0	0	0	45	75	14	439
2011	67	43	82	27	5	43	0	0	0	52	80	11	410
2012	67	45	47	29	8	34	8	0	0	60	92	15	405
2013	72	77	87	28	5	40	26	0	0	45	94	44	518
2014	83	71	106	40	8	41	28	0	0	57	105	38	577
2015	73	75	83	38	3	51	0	0	37	55	105	36	556
2016	92	78	94	23	7	62	1	34	38	60	105	38	632
2017	73	62	84	42	10	45	1	28	46	61	97	32	581
2018	103	53	84	39	9	56	0	1	49	50	108	33	585
A: Mean home range checks	**84.8**	**67.8**	**90.2**	**36.4**	**7.4**	**51.0**	**6.0**	**12.6**	**34.0**	**56.6**	**104.0**	**35.4**	**586.2**
B: Proportion of estimated Scottish population	19	3	7	25	7	3	2	8	8	7	5	6	100

Figure 142: Areas corresponding to the clusters of home ranges from which sufficient data were reported to attempt to derive population trends for Raven between 2009 and 2018 (a) together with maps showing variation in the number of Raven records reported to SRMS during 2009-2013 (b) and 2014-2018 (c), in the context of the known Raven breeding distribution taken from the 2007-2011 Bird Atlas. SRMS data are depicted as grey squares with darker shading indicating more records while Bird Atlas data are depicted as red dots with the size of dot positively related to probability of breeding.