

Golden Eagle



Figure 1: 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 SCARABBS 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 2). 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 9). 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 1). A trend for breeding success showed no significant change (Table 1, Figure 2). Trends for clutch size, brood size and number of fledglings all showed no significant change (Table 1, Figure 2).

SRMS regional trends

Breeding numbers of Golden Eagle in four regions (Central, Highland, Tayside & Fife and Uist) did not change significantly (Table 2, Figure 3).

Breeding success of Golden Eagle in five regions (Argyll, Highland, Lewis & Harris, Tayside & Fife and Uist) did not change significantly (Table 2, Figure 4).

No trends are available for clutch size or brood size (Table 2). Number of fledglings in three regions (Argyll, Highland and Tayside & Fife) did not change significantly (Table 2, Figure 5).

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 3, Figure 6).

Breeding success of Golden Eagle in nine regions (NHZs 03-04, 06-08, 10-11 and 14-15) did not change significantly (Table 3, Figure 7).

No trends are available for clutch size or brood size (Table 3). The number of fledglings in NHZ 03 did not change significantly (Table 3, Figure 8).

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 6).

References

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 1: 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 2: 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}	—	—	—

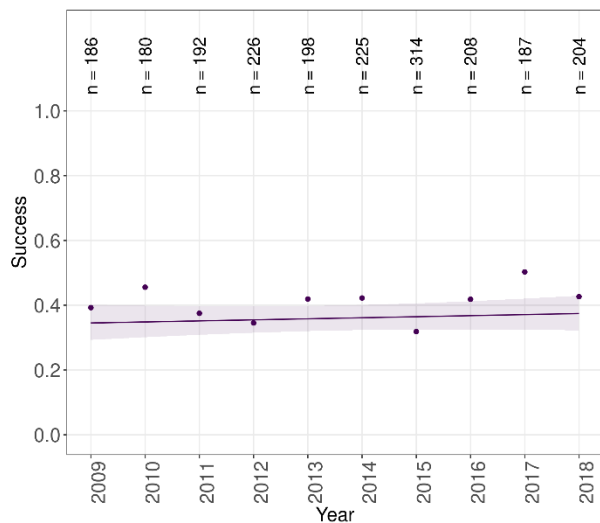
^s Sample sizes small, ^v Variable effort.

Table 3: 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

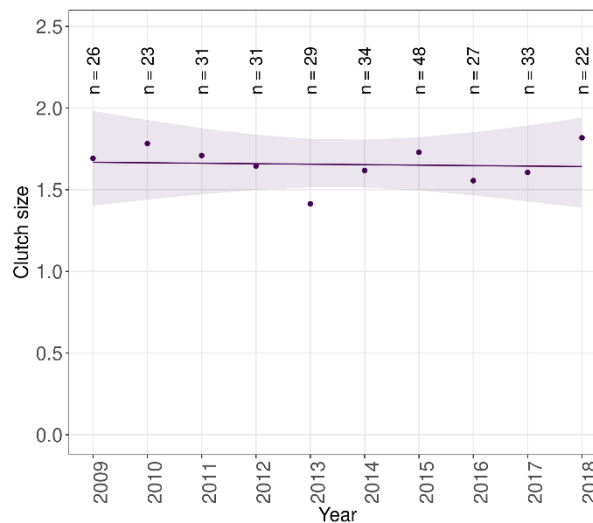
^r No home range random effect, ^s Sample sizes small, ^v Variable effort.

Trend in Success of Golden Eagle in Scotland using SRMS data



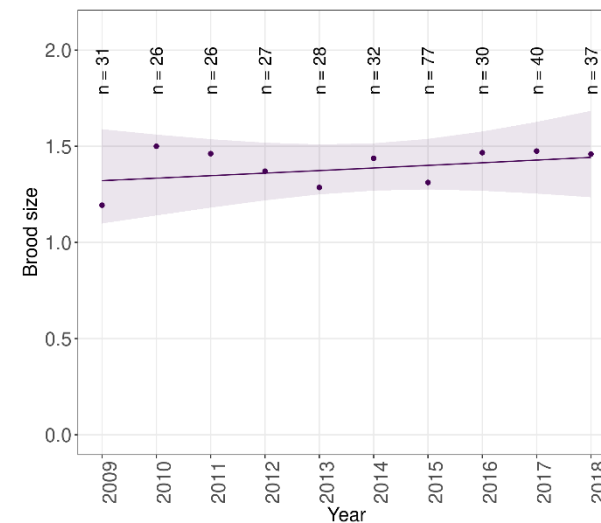
Scotland trend: Not significant

Trend in Clutch size of Golden Eagle in Scotland using SRMS data



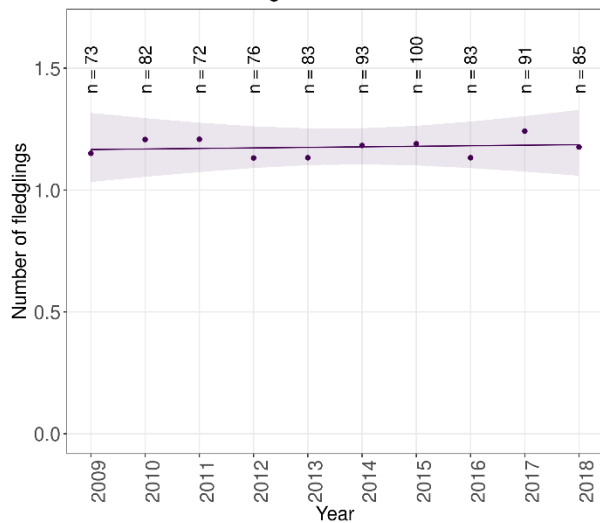
Scotland trend: Not significant

Trend in Brood size of Golden Eagle in Scotland using SRMS data



Scotland trend: Not significant

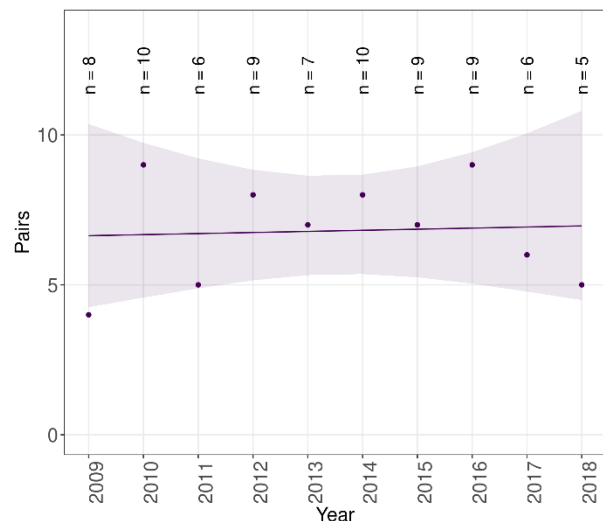
Trend in Number of fledglings of Golden Eagle in Scotland using SRMS data



Scotland trend: Not significant

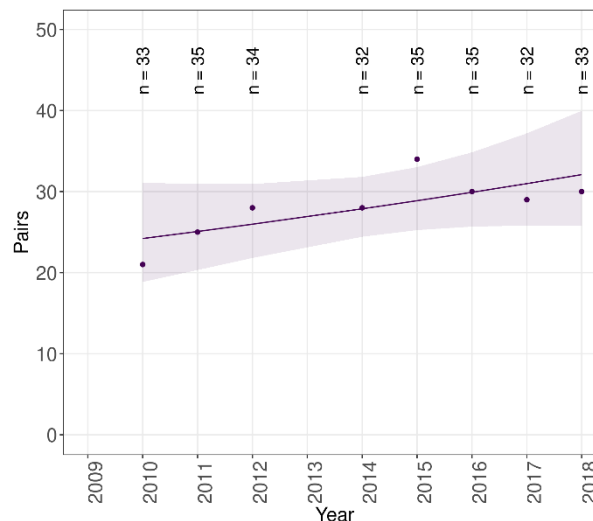
Figure 2: Trends in breeding success, clutch size, brood size and number of fledglings of Golden Eagle in Scotland during 2009-2018.

Trend in Pairs of Golden Eagle in Central using SRMS data



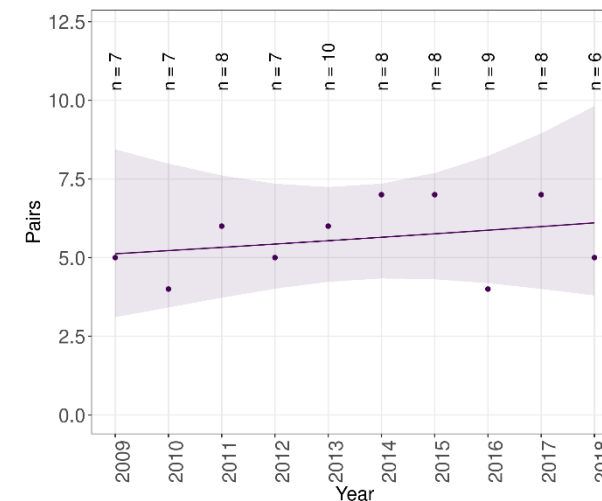
Central trend: Not significant (caveats: Sample sizes small)

Trend in Pairs of Golden Eagle in Highland using SRMS data



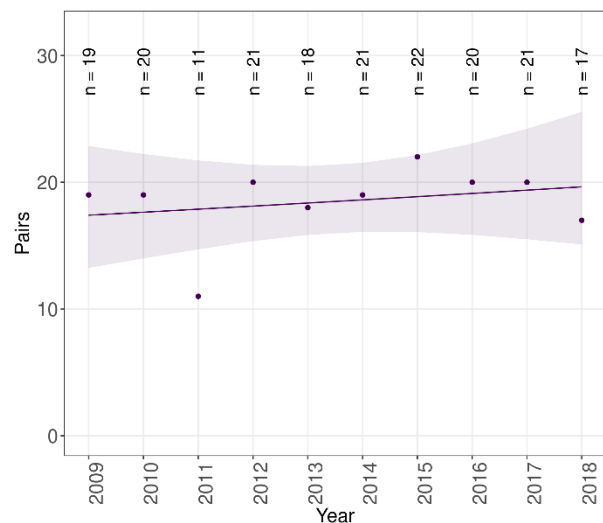
Highland trend: Not significant

Trend in Pairs of Golden Eagle in Tayside & Fife using SRMS data



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

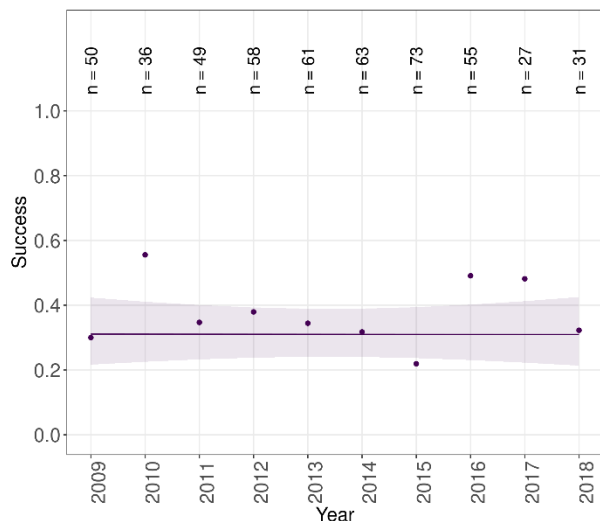
Trend in Pairs of Golden Eagle in Uist using SRMS data



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

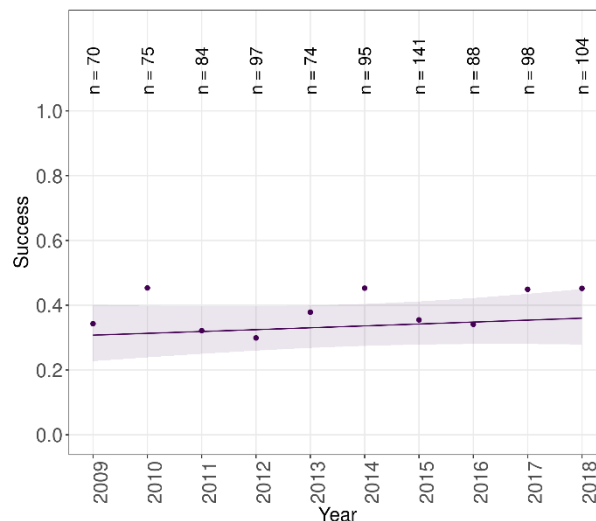
Figure 3: Trends in numbers of breeding pairs of Golden Eagle by SRMS region during 2009-2018.

Trend in Success of Golden Eagle in Argyll using SRMS data



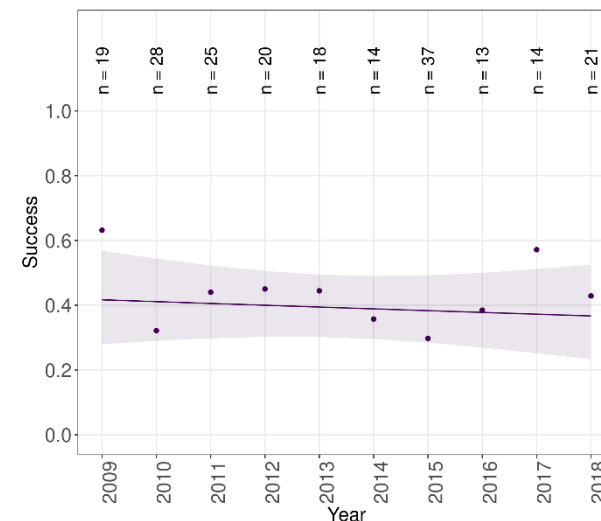
Argyll trend: Not significant (caveats: Variable effort)

Trend in Success of Golden Eagle in Highland using SRMS data



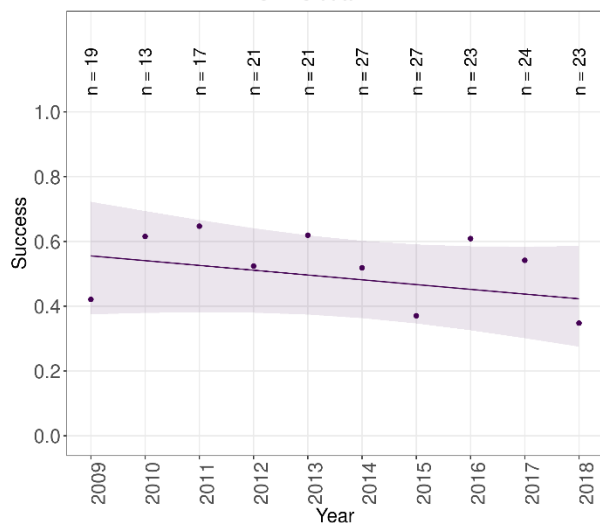
Highland trend: Not significant

Trend in Success of Golden Eagle in Lewis & Harris using SRMS data



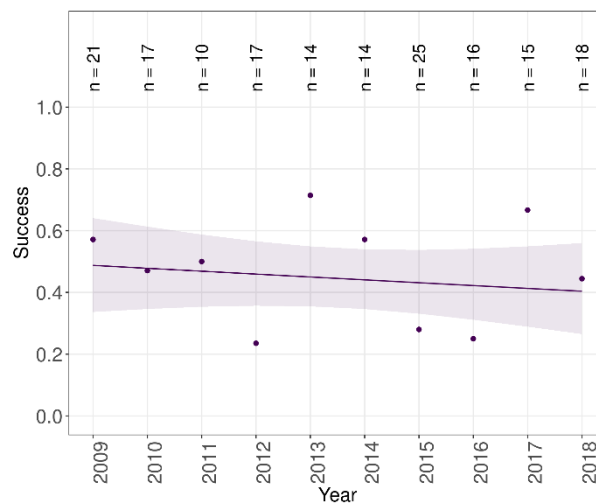
Lewis & Harris trend: Not significant

Trend in Success of Golden Eagle in Tayside & Fife using SRMS data



Tayside & Fife trend: Not significant

Trend in Success of Golden Eagle in Uist using SRMS data



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

Figure 4: Trends in breeding success of Golden Eagle by SRMS region during 2009-2018.

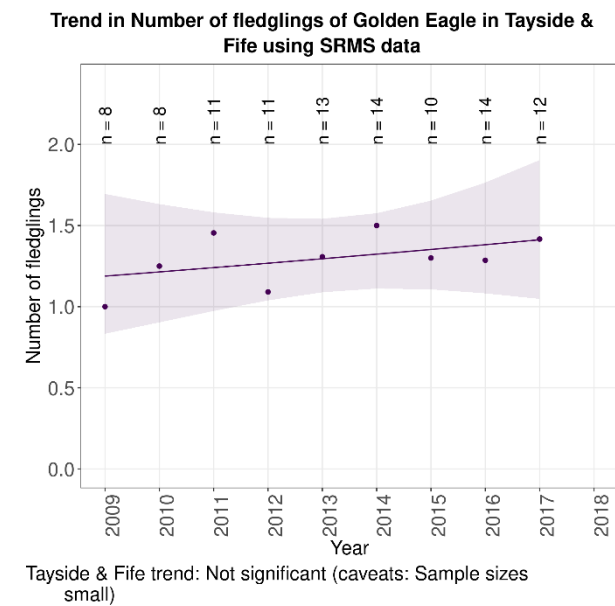
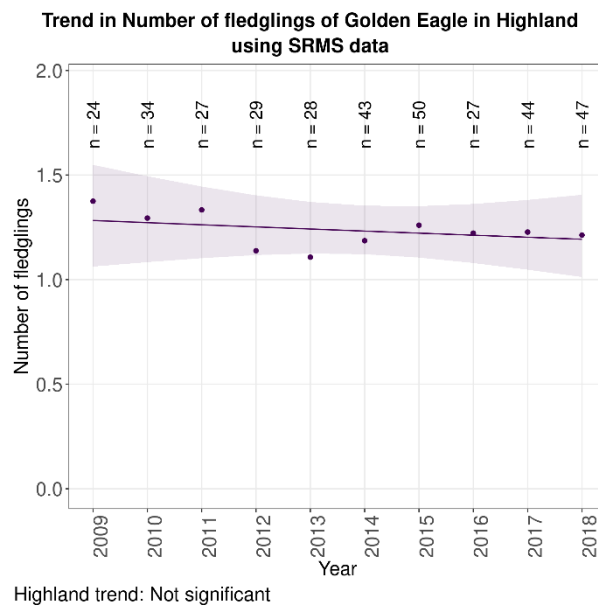
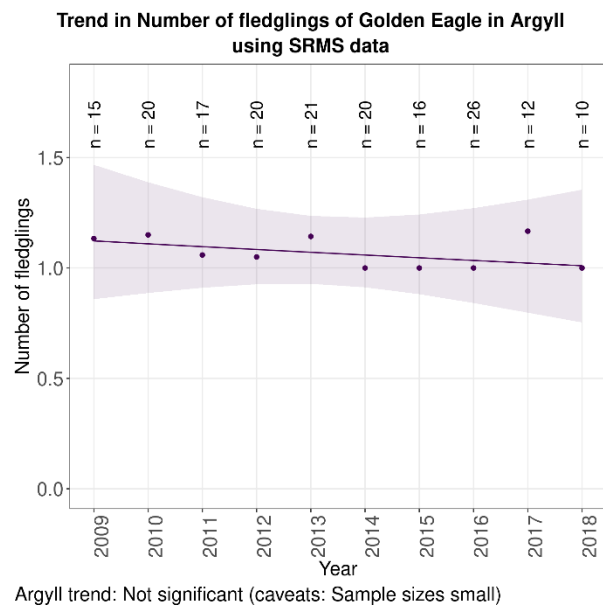
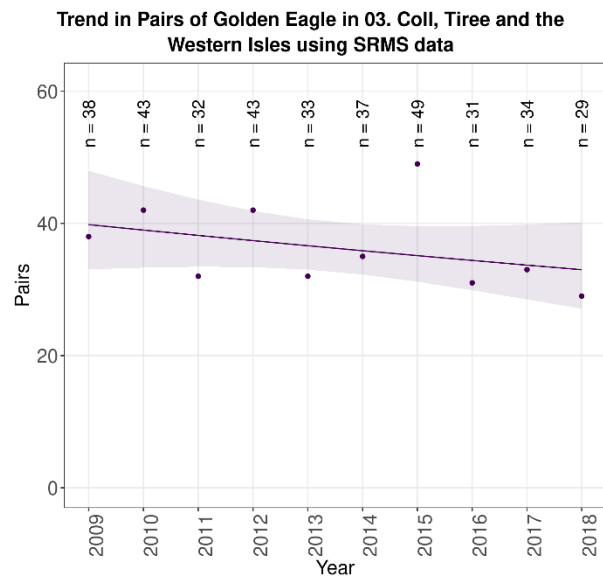
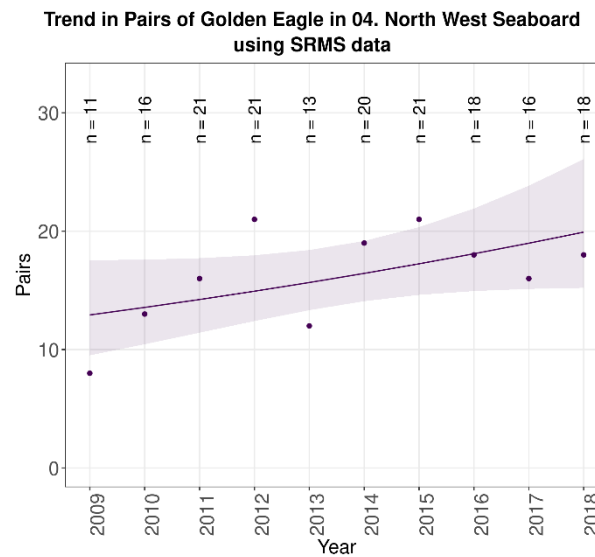


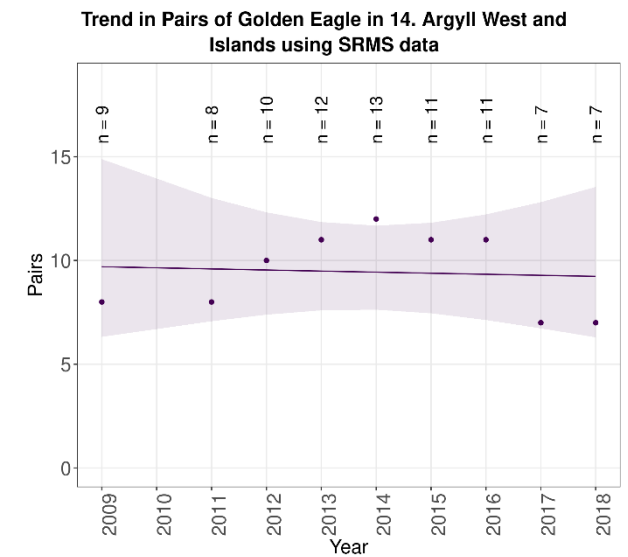
Figure 5: Trends in number of fledglings of Golden Eagle by SRMS region during 2009-2018.



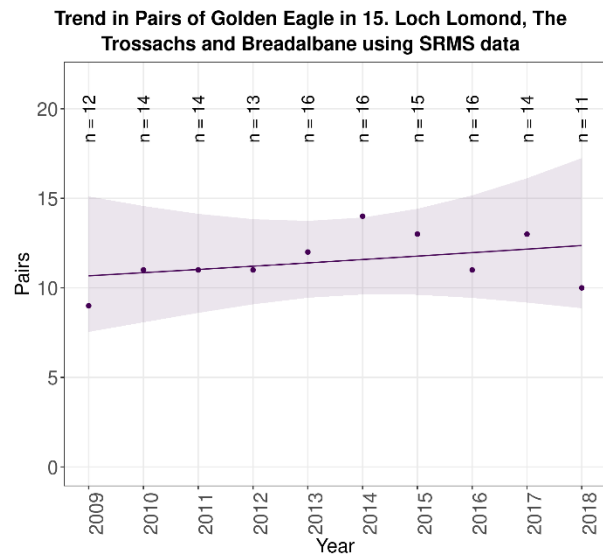
03. Coll, Tiree and the Western Isles trend: Not significant



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



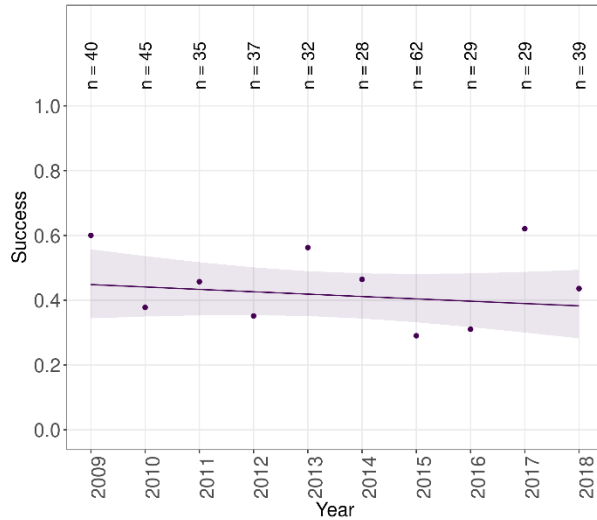
14. Argyll West and Islands trend: Not significant (caveats: Sample sizes small)



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

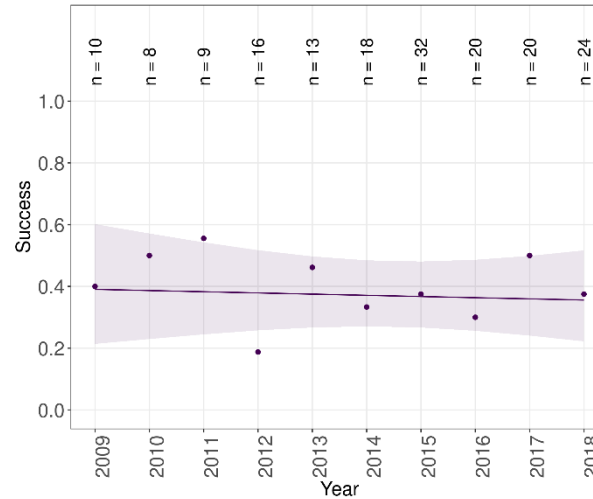
Figure 6: Trends in breeding pairs of Golden Eagle by NHZ region during 2009-2018.

Trend in Success of Golden Eagle in 03. Coll, Tirie and the Western Isles using SRMS data



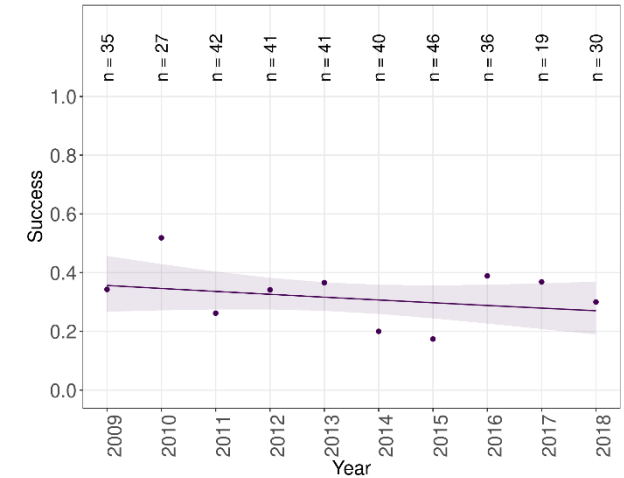
03. Coll, Tirie and the Western Isles trend: Not significant

Trend in Success of Golden Eagle in 04. North West Seaboard using SRMS data



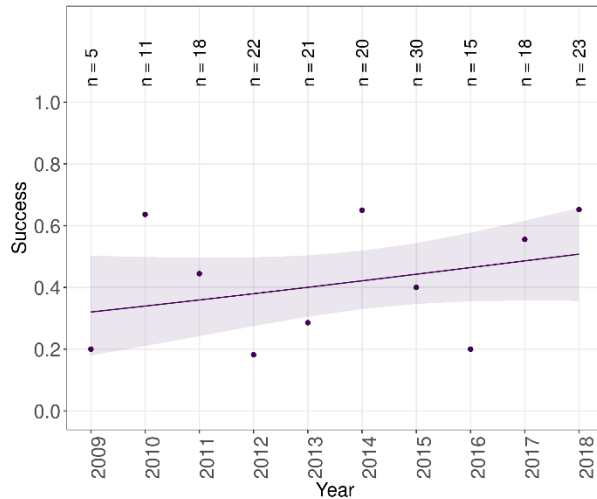
04. North West Seaboard trend: Not significant (caveats: Sample sizes small; Variable effort)

Trend in Success of Golden Eagle in 06. Western Seaboard using SRMS data



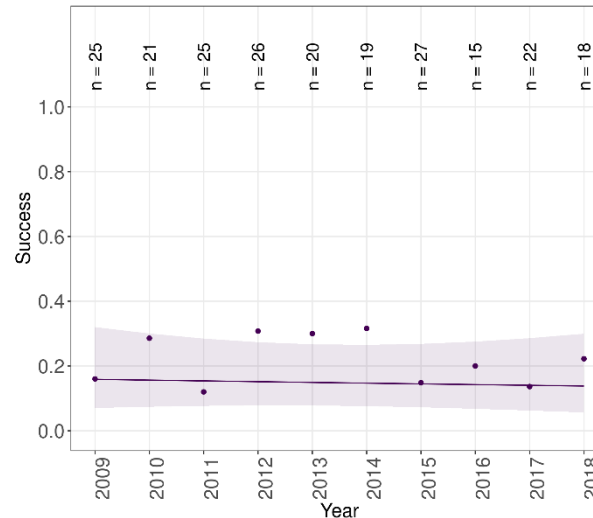
06. Western Seaboard trend: Not significant (caveats: Sample sizes small; Variable effort; No home range random effect)

Trend in Success of Golden Eagle in 07. Northern Highlands using SRMS data



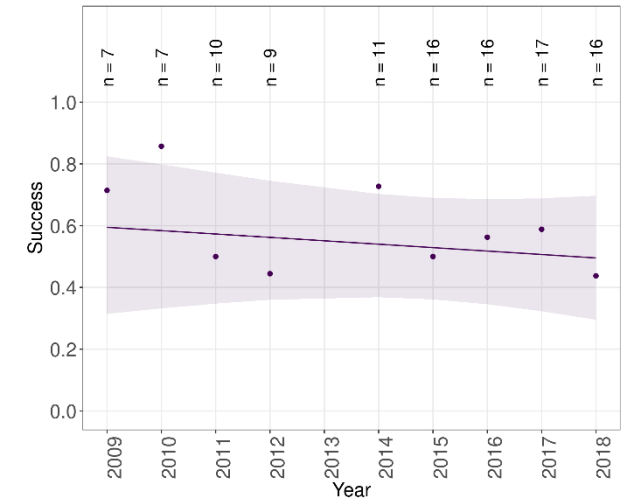
07. Northern Highlands trend: Not significant (caveats: Sample sizes small)

Trend in Success of Golden Eagle in 08. Western Highlands using SRMS data



08. Western Highlands trend: Not significant

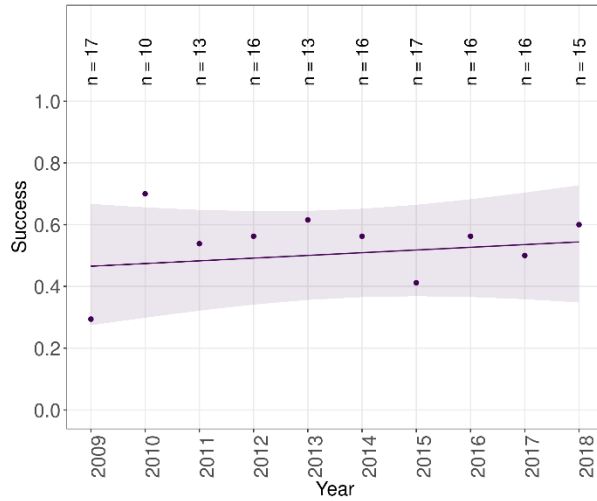
Trend in Success of Golden Eagle in 10. Central Highlands using SRMS data



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

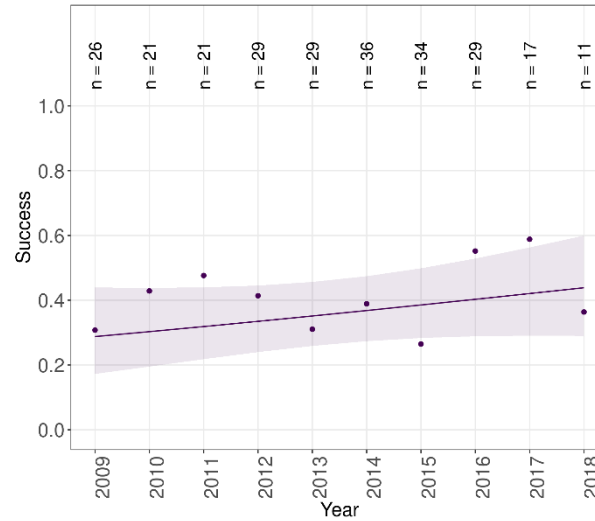
Figure 7: Trends in breeding success of Golden Eagle by NHZ region during 2009-2018.

Trend in Success of Golden Eagle in 11. Cairngorm Massif using SRMS data



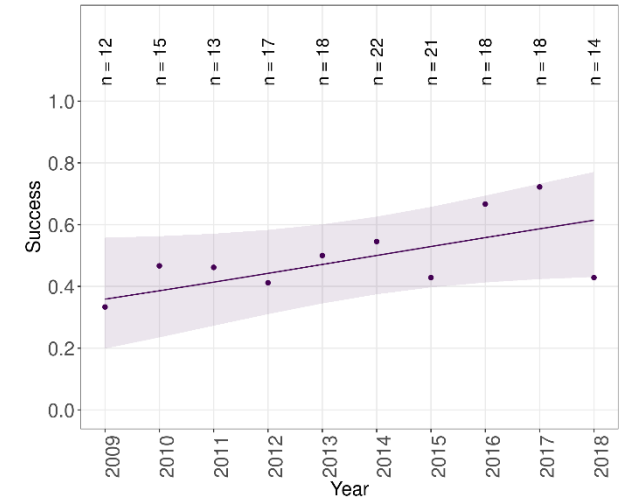
11. Cairngorm Massif trend: Not significant (caveats: Sample sizes small; Variable effort)

Trend in Success of Golden Eagle in 14. Argyll West and Islands using SRMS data



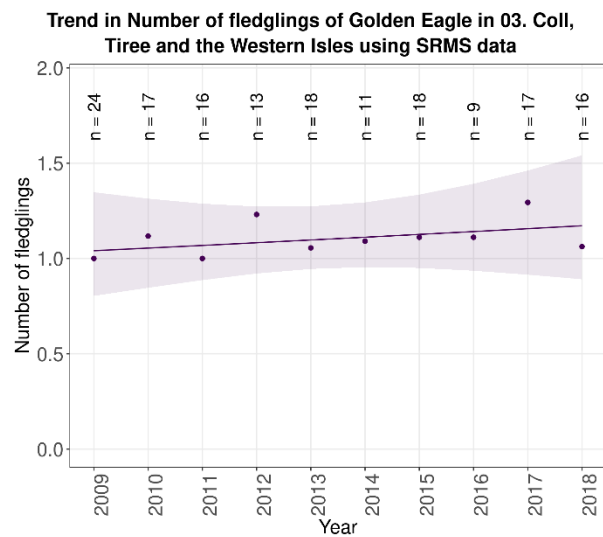
14. Argyll West and Islands trend: Not significant

Trend in Success of Golden Eagle in 15. Loch Lomond, The Trossachs and Breadalbane using SRMS data



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

Figure 7 continued: Trends in breeding success of Golden Eagle 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)

Figure 8: Trends in number of fledglings of Golden Eagle by NHZ region during 2009-2018.

Table 4: 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 5: Details of NHZ Regional trends for Golden Eagle.

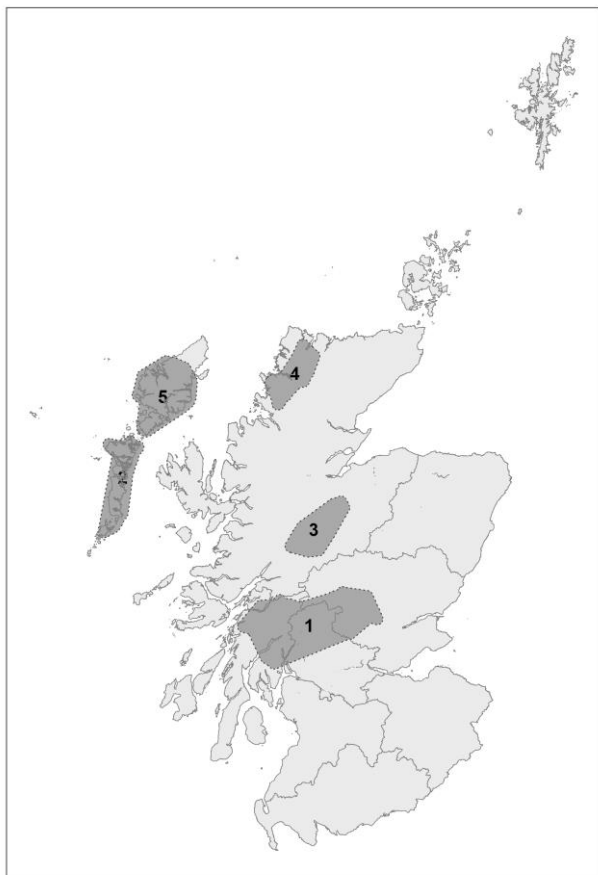
Parameter	Region	First year of trend	Last year of trend	Number of years	Mean number of home ranges across years	Mean parameter value (and 95% confidence limits)	Trend during the period	Caveats	Estimated % annual change (and 95% confidence limits)
Pairs	03. Coll, Tiree and the Western Isles	2009	2018	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)

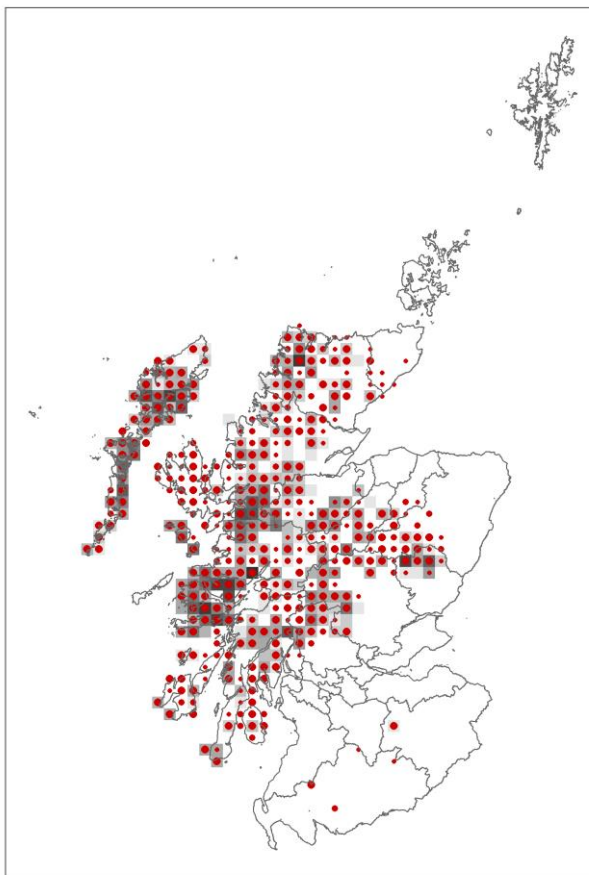
Table 6: Number of Golden Eagle home range checks for occupancy reported to the SRMS during 2009-2018, in each of the 12 SRMS Regions, with approximate proportion of estimated population monitored. At the bottom of the table, row A is the mean number of home range checks over the most recent five years. 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.

		ARGYLL	CENTRAL SCOTLAND	DUMFRIES & GALLOWAY	HIGHLAND	LEWIS & HARRIS	LOTHIAN & BORDERS	NORTH EAST SCOTLAND	ORKNEY	SHETLAND	SOUTH STRATHCLYDE	TAYSIDE & FIFE	UIST	Total
Year														
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

a)



b)



c)

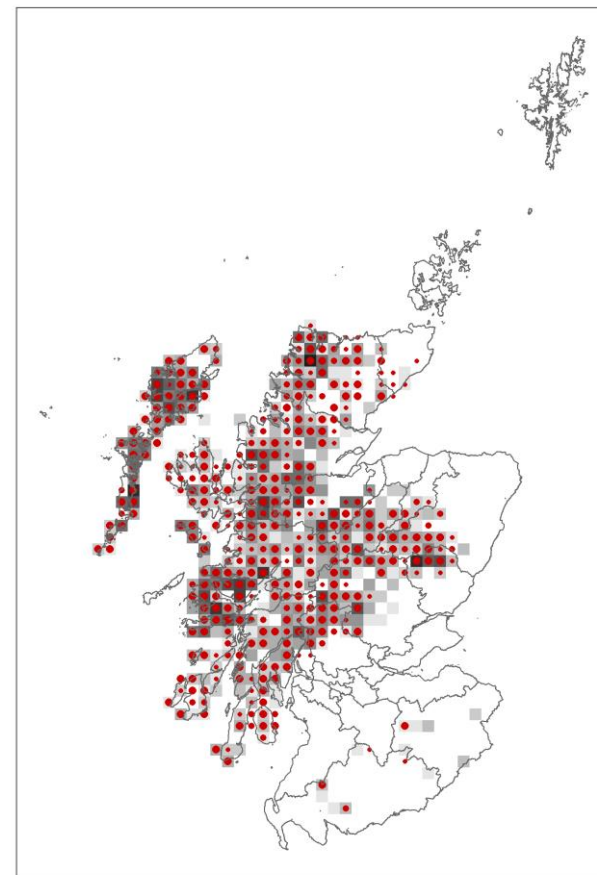


Figure 9: Areas corresponding to the clusters of home ranges from which sufficient data were reported to attempt to derive population trends for Golden Eagle between 2009 and 2018 (a) together with maps showing variation in the number of Golden Eagle records reported to SRMS during 2009-2013 (b) and 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.