Hen Harrier

Figure 1: 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 1) and for ten of the 19 NHZ regions (Table 2) 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 10).

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 1, Figure 2).

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 1, Figure 3).

Clutch size of Hen Harrier in Orkney decreased (Table 1, Figure 4), while brood showed no significant change (Table 1, Figure 5). Clutch size in Tayside & Fife also showed no significant change (Table 1, Figure 4). No trends for Hen Harrier are available for the number of fledglings (Table 1).

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 2, Figure 6).

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 2, Figure 7).

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 2, Figures 8-9). No trends in number of fledglings are available for any region (Table 2).

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 5).

References

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 1: 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 2: 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.

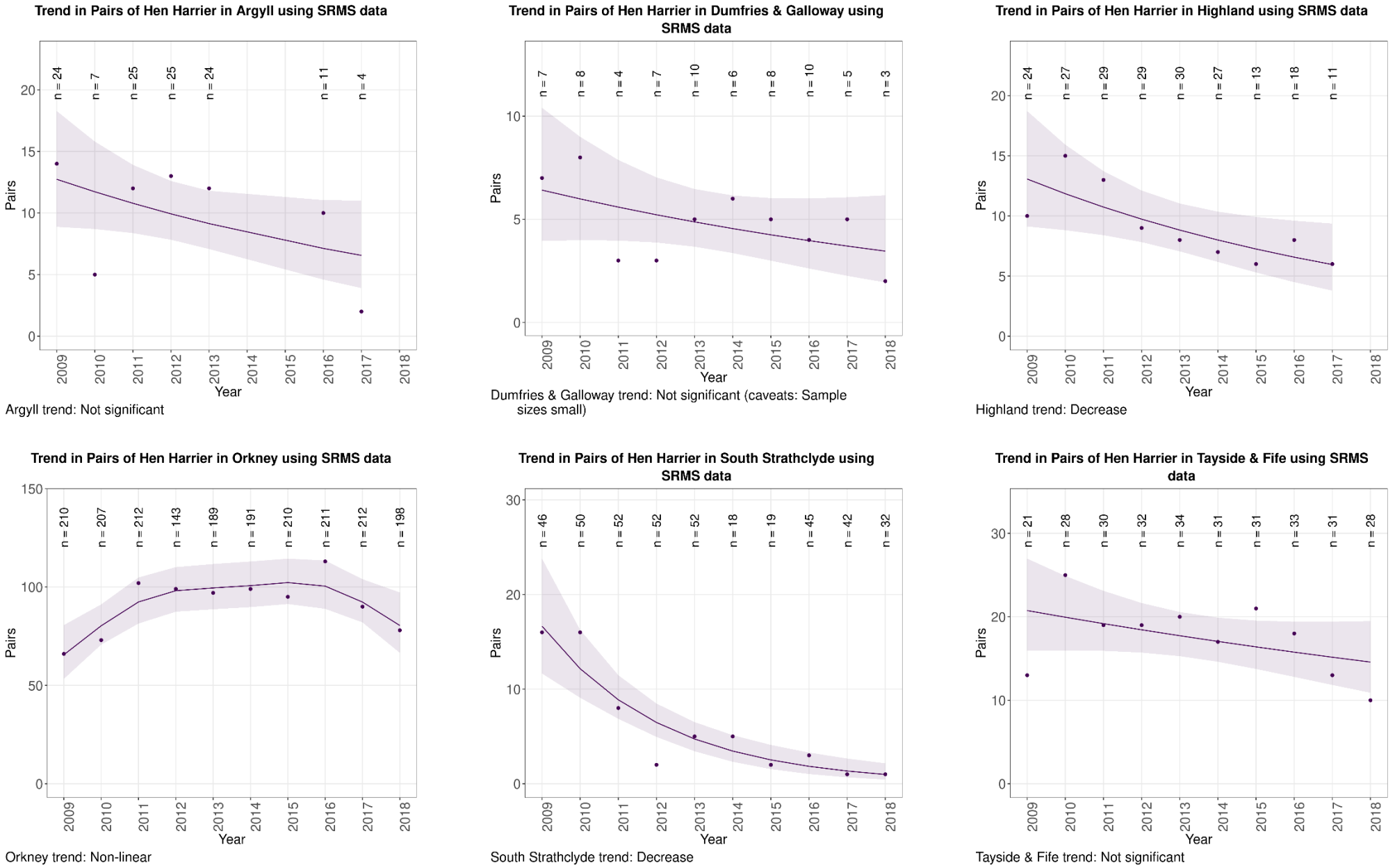
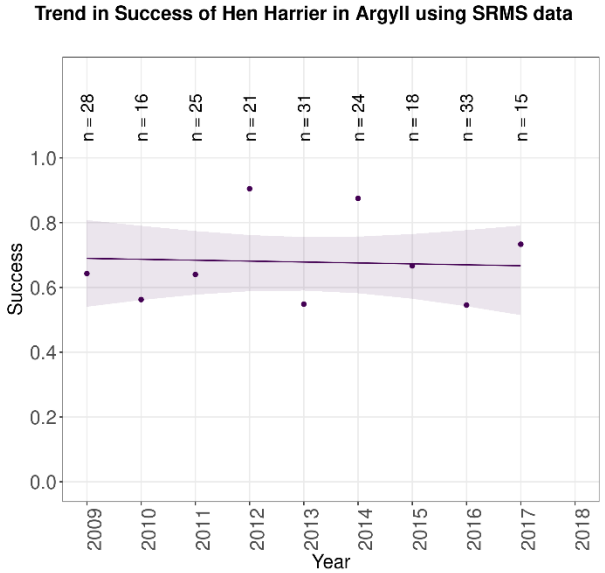
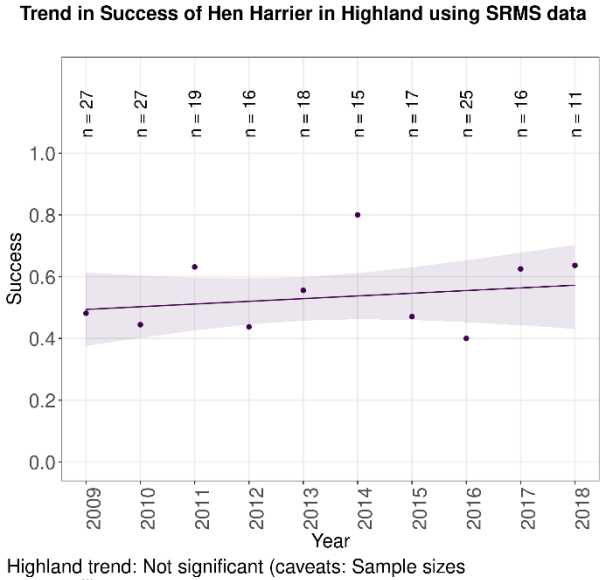


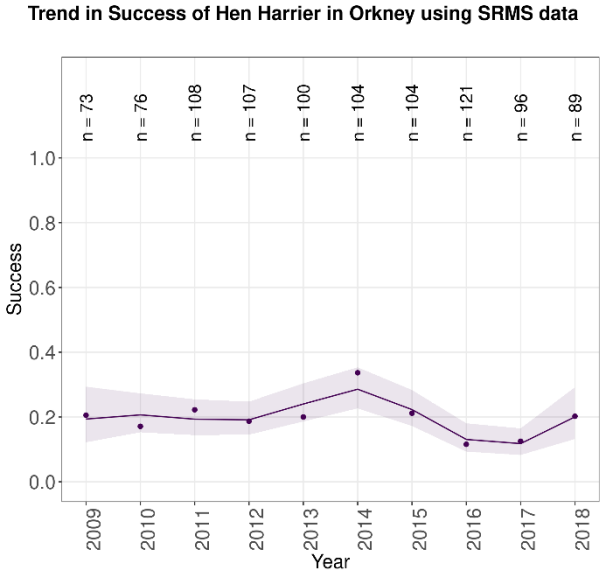
Figure 2: Trends in numbers of breeding pairs of Hen Harrier by SRMS region during 2009-2018.



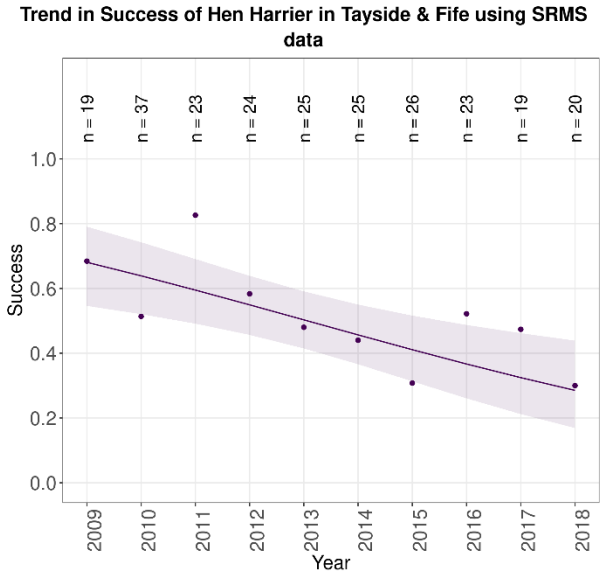
Argyll trend: Not significant



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



Orkney trend: Non-linear



Tayside & Fife trend: Decrease

Figure 3: Trends in breeding success of Hen Harrier by SRMS region during 2009-2018.

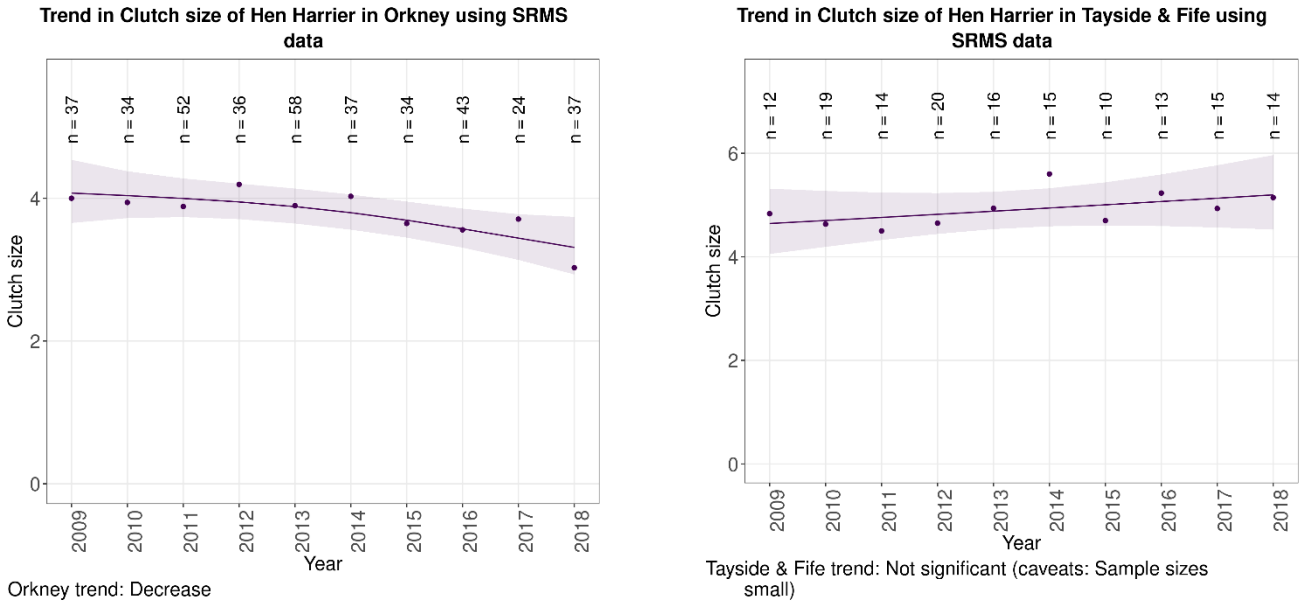


Figure 4: Trends in clutch size of Hen Harrier by SRMS region during 2009-2018.

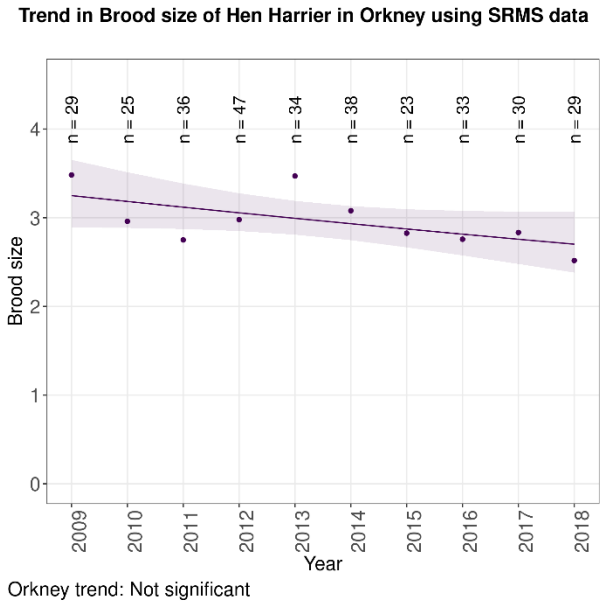
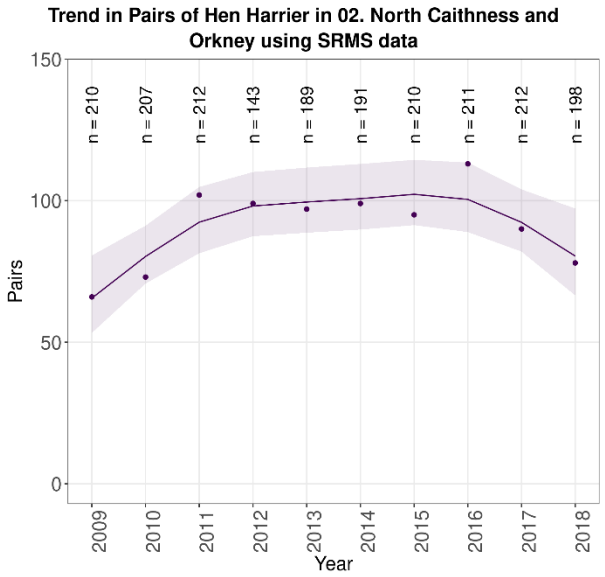
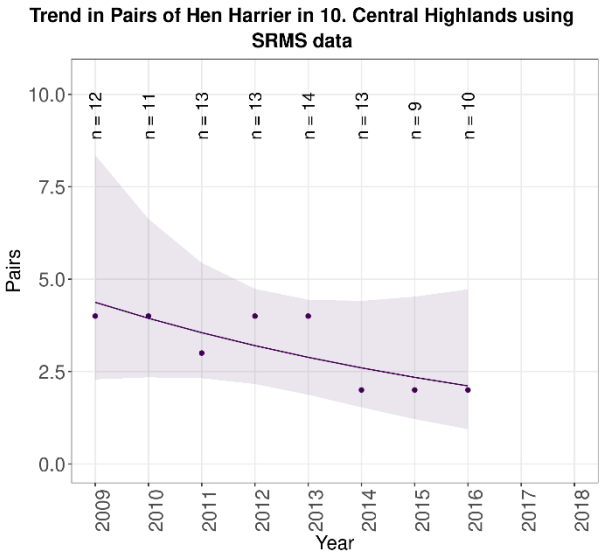


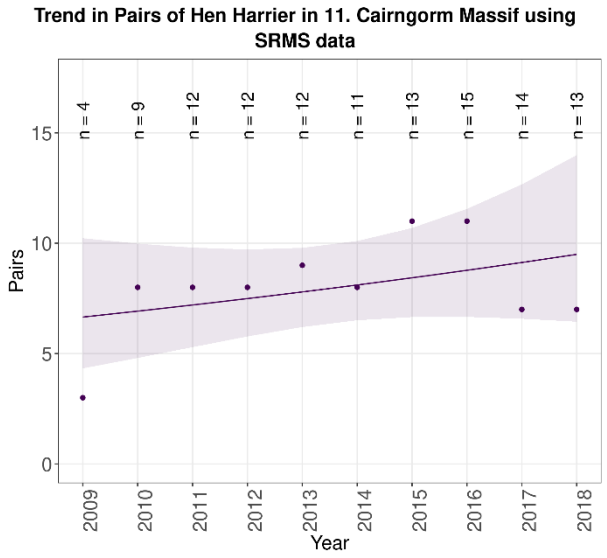
Figure 5: Trends in brood size of Hen Harrier by SRMS region during 2009-2018.



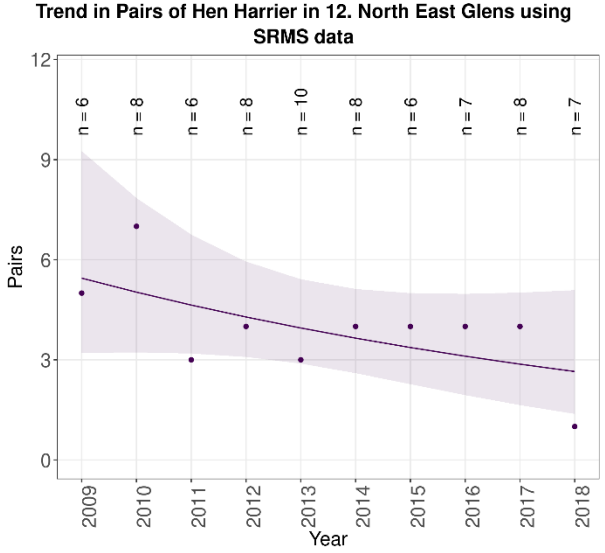
02. North Caithness and Orkney trend: Non-linear



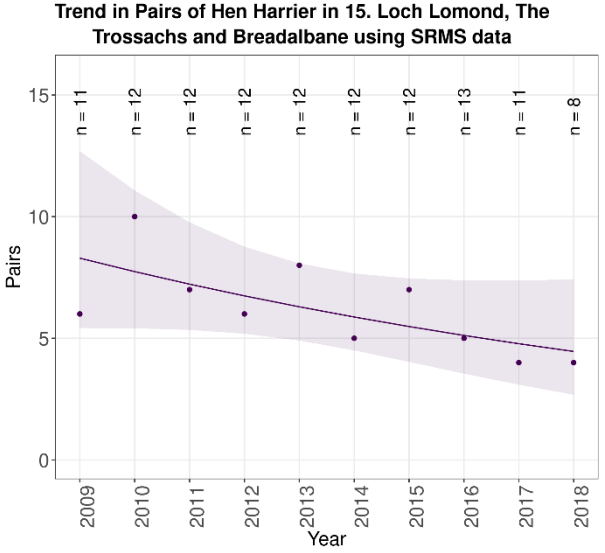
10. Central Highlands trend: Not significant (caveats: Sample sizes small; Variable effort)



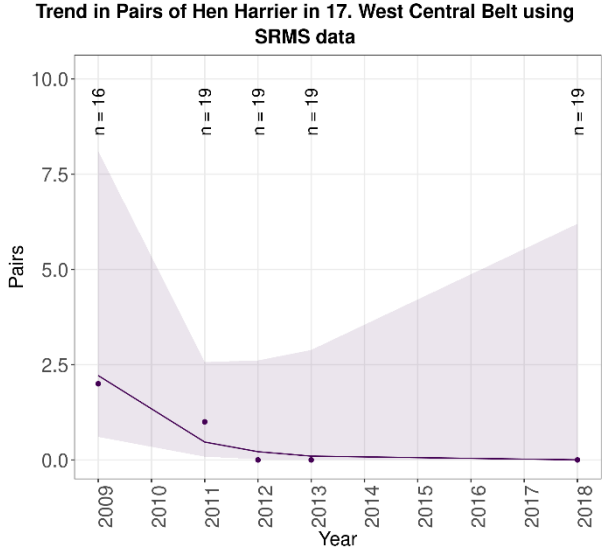
11. Cairngorm Massif trend: Not significant (caveats: Sample sizes small)



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

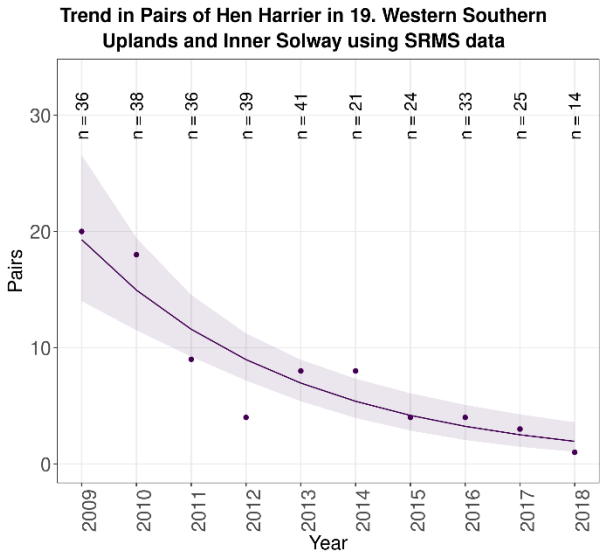


15. Loch Lomond, The Trossachs and Breadalbane trend: Not significant (caveats: Sample sizes small)

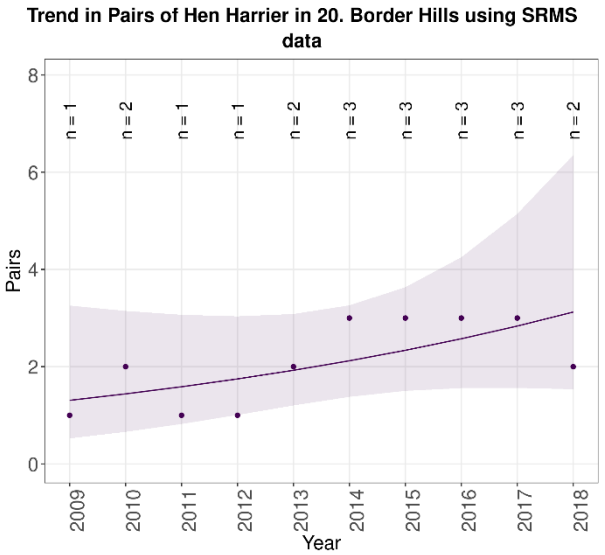


17. West Central Belt trend: Not significant (caveats: Sample sizes small)

Figure 6: Trends in numbers of breeding pairs of Hen Harrier by NHZ region during 2009-2018.

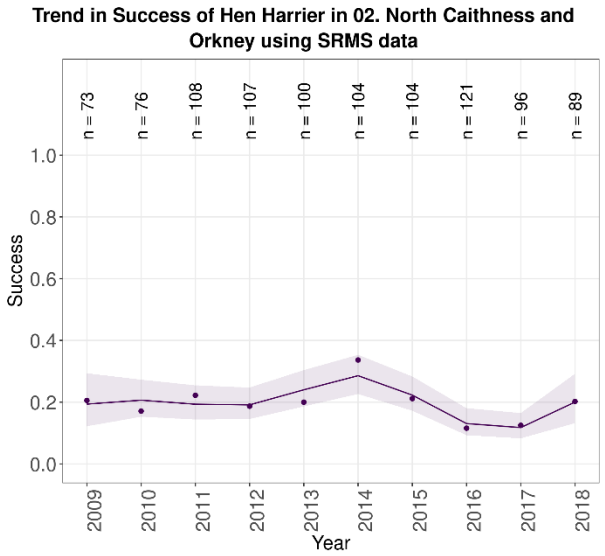


19. Western Southern Uplands and Inner Solway trend: Decrease

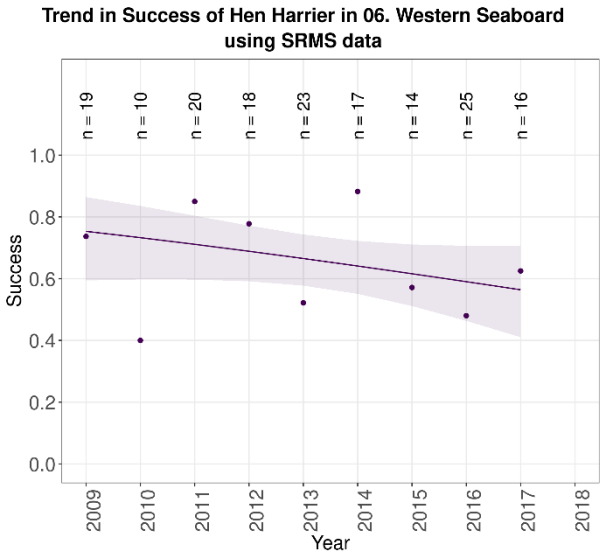


20. Border Hills trend: Not significant (caveats: Sample sizes small)

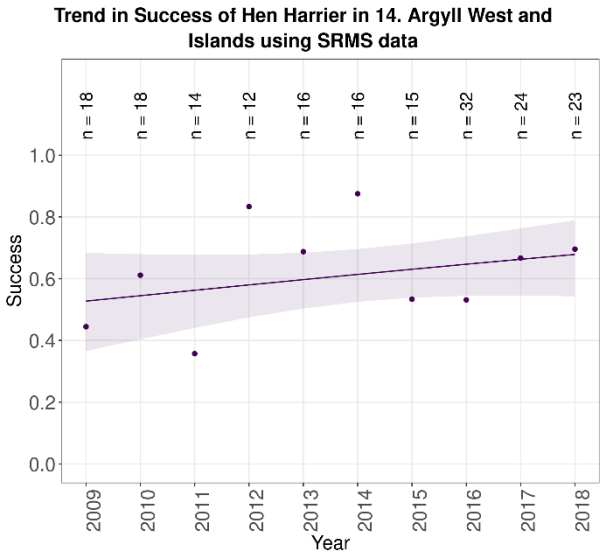
Figure 6 continued: Trends in numbers of breeding pairs of Hen Harrier by NHZ region during 2009-2018.



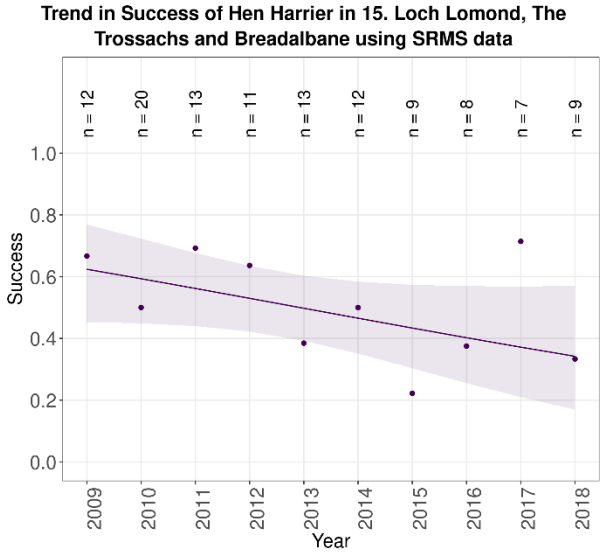
02. North Caithness and Orkney trend: Non-linear (caveats: No home range random effect;)



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

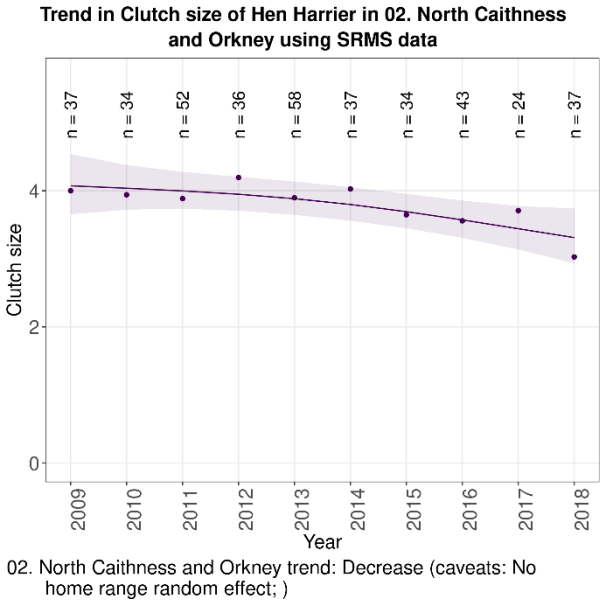


Figure 8: Trends in clutch size of Hen Harrier by NHZ region during 2009-2018.

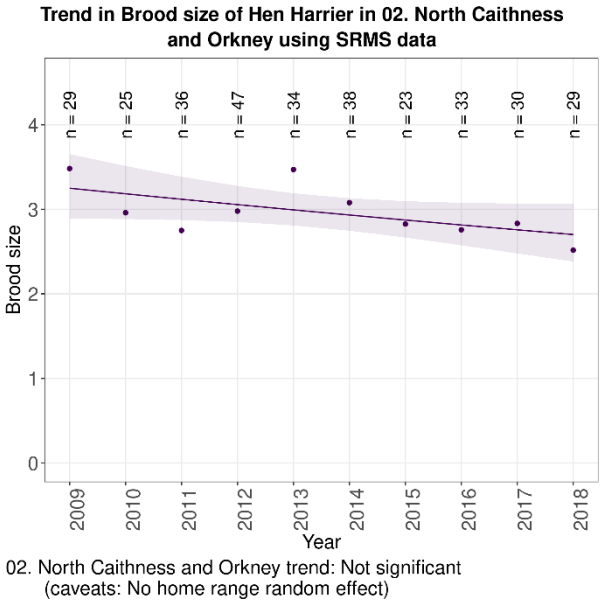


Figure 9: Trends in brood size of Hen Harrier by NHZ region during 2009-2018.

Table 3: 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 4: 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 5: 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 10: 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.