

Status of the Hen Harrier *Circus cyaneus* in Wales in 2023

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Abstract

The sixth national survey of Hen Harrier in 2023 revealed a non-significant increase in the UK and Isle of Man population since 2016, but with variation between and within the constituent countries. This paper presents the population estimate of breeding Hen Harriers in Wales and changes in the number of territorial pairs since the fifth UK survey in 2016.

The Welsh Hen Harrier population was estimated at 40 territorial pairs, a non-significant 14.3% increase since 2016 but a significant 29.8% decline since 2010. In Wales, the mean density of territorial pairs was 3.4 per 100-km² of suitable breeding habitat. This represented the highest mean density of territorial pairs recorded across the four UK countries in 2023.

There were an estimated 26 territorial pairs within the two Welsh Special Protection Areas (SPA) designated for breeding Hen Harrier (Berwyn SPA and Migneint–Arenig–Dduallt SPA); representing 65% of the Welsh population. There was an encouraging population increase on the Berwyn SPA, such that the number of territorial pairs increased from 10 in 2016 to 16 in 2023. There was no change in the number of territorial pairs in the Migneint–Arenig–Dduallt SPA; 10 territorial pairs were recorded in both 2016 and 2023.

Most Welsh territorial pairs and ‘possible’ records were observed on heather-dominated moorland (83%). Only one of the 40 pairs in 2023 was found on moorland managed for Red Grouse (2.5%), compared to four (of 35 territorial pairs) in 2016.

Crynodeb

Dangosodd y chweched arolwg cenedlaethol o’r Boda Tinwyn yn 2023 gynnydd bychan heb fod yn arwyddocaol ym mhoblogaeth y DU ac Ynys Manaw ers 2016, ond gydag amrywiaeth rhwng ac o fewn y gwledydd unigol. Mae’r papur yma yn cyflwyno amcangyfrif o boblogaeth y Boda Tinwyn sy’n nythu yng Nghymru a’r newidiadau yn nifer y parau yn dal tiriogaeth ers pumed arolwg y DU yn 2016.

Amcangyfrifwyd fod poblogaeth y Boda Tinwyn yng Nghymru yn 40 pâr yn dal tiriogaeth, cynnydd heb fod yn arwyddocaol o 14.3% ers 2016 ond lleihad arwyddocaol o 29.8% ers 2010. Yng Nghymru roedd 3.4 pâr yn dal tiriogaeth am bob 100-km² o gynefin nythu addas. Dyma’r dwysedd cymedrig uchaf o barau yn dal tiriogaeth a gofnodwyd ym mhedair gwlad y DU yn 2023.

Amcangyfrifwyd fod 26 pâr yn dal tiriogaeth o fewn y ddwy Ardal Gwarchodaeth Arbennig (AGA) a ddynodwyd ar gyfer Boda Tinwyn yn nythu (AGA Berwyn ac AGA Migneint–Arenig–Dduallt); sef 65% o boblogaeth Cymru. Roedd cynnydd calonogol yn AGA Berwyn, gyda’r nifer o barau yn dal tiriogaeth yn cynyddu o 10 yn 2016 i 16 yn 2023. Nid oedd newid yn y nifer o barau yn dal tiriogaeth yn AGA Migneint–

Arenig–Dduallt; cofnodwyd 10 pâr yn dal tiriogaeth yn 2016 a 2023.

Gwelwyd y rhan fwyaf o barau yn dal tiriogaeth a chofnodion ‘posibl’ yng Nghymru ar rostir grugog (83%). Dim ond un o’r 40 pâr yn 2023 oedd ar rostir a reolwyd ar gyfer y Grugiar Goch (2.5%), sy’n cymharu â phedwar (o 35 pâr yn dal tiriogaeth) yn 2016.

Introduction

The Hen Harrier *Circus cyaneus* is a conspicuous, sexually dimorphic, diurnal raptor, typically associated with upland habitats of heather and grass moorland and young conifer forests (up to an altitude of 700 masl) across its breeding range in the UK. Nests are normally placed on the ground in deep vegetation with egg-laying beginning in mid-April and fledging in mid-July, although young from late nests or re-lays may not start to disperse from breeding sites until mid-late August (Hardey *et al.* 2013). Though Hen Harriers can be highly dispersive after breeding, with instances of first winter males overwintering in continental Europe, most UK birds move only relatively short distances to low-lying inland and coastal regions (Etheridge and Summers 2006; Pritchard *et al.* 2021).

The Hen Harrier was widespread in the UK before the 19th Century but declined due to habitat loss and persecution (Watson 1977), and by the end of the 19th Century, regular breeding was reported only in parts of Scotland (Orkney and the Western Isles) and west Ireland (Holloway 1996). There was some recovery of the population on mainland Britain during the 20th Century. Due to similar pressures in the rest of Britain, by 1910 the species was a scarce breeding bird in Wales with only sporadic reports of breeding attempts (Lindley *et al.* 2006, Pritchard *et al.* 2021). It was not until the late 1970s that both Hen Harrier numbers and range increased in Wales, with an estimated 27–30 territorial pairs, predominantly in the upland blocks of north-east Wales: the Berwyn and Migneint (Pritchard *et al.* 2021).

Hen Harriers have been protected by law since 1954 but, in common with other UK raptors, they have been subjected to illegal killing of adults and fledged birds, and the destruction of nests, eggs and chicks (‘persecution’), particularly on moorland managed for game birds. Levels of illegal persecution of Hen Harrier in Wales since the late 1990s onwards appear to be relatively low. Hughes *et al.* (2021) suggests illegal persecution of fledged birds in Wales may be a key driver of low first year survival rates.

The Hen Harrier is a species of high conservation concern and is Red-listed on both the UK and Wales assessments of Birds of Conservation Concern (Stanbury *et al.* 2021, Johnstone *et al.* 2023). The species is listed as Endangered in the 2nd GB IUCN assessment due to historic decline (Stanbury *et al.* 2021). The species is also on Annex 1 of the EU Birds Directive (2009/147/EC) based on its vulnerability in Europe. The Hen Harrier has been identified as a UK Government priority species in terms of combating wildlife crime and is the subject of a UK Conservation Framework that considers population level constraints, regionally and nationally, and assesses influencing policies (Fielding *et al.* 2011). Although the Hen Harrier is widespread across Europe, populations have been declining in both abundance and range, but the species is still considered Least Concern (BirdLife International 2021).

While the species exists in small numbers on other Welsh upland areas (e.g. Elenydd and Mynydd Hiraethog) there are currently two Special Protection Areas (SPAs) with Hen Harrier classified as features, these are the Berwyn SPA (24,540ha) and the Migneint–Arenig–Dduallt SPA (19,968ha). Collectively these two designated sites represented 5% of the Great Britain (GB) population at the time of classification.

The Hen Harrier is a species of long-standing conservation concern and given the pressures on breeding populations they are frequently monitored at a UK scale. The first UK and Isle of Man Hen Harrier survey was in 1988–89 and suggested a Welsh population estimate of 27 pairs (Bibby and Etheridge 1993). Since

then, there have been four UK and Isle of Man repeat surveys, including Wales, which were: in 1998, giving an estimate for Wales of 28 territorial pairs (Sim *et al.* 2001); in 2004 suggesting 43 territorial pairs (Sim *et al.* 2007); in 2010 an estimated 57 territorial pairs, an increase of 33% since 2004 (Hayhow *et al.* 2013); and in 2016 that suggested a breeding population of 35 territorial pairs, a significant decline of 44% since 2010 but a non-significant decline of 24% since 2004 (Wotton *et al.* 2018). The 2007–11 Bird Atlas highlighted the 2010 gains in Wales compared to losses and contraction elsewhere in the UK (Balmer *et al.* 2013). The increase in the Welsh Hen Harrier population during this period was likely driven by improved breeding success as a result of warmer spring weather bolstering prey populations, as well as a concurrent reduction in illegal persecution and disturbance (Whitfield *et al.* 2008). In contrast the fifth Hen Harrier survey in 2016 represented a decline of 39% between 2010 and 2016. The species retained its range in Wales during this period with the bulk of the population still within the two Hen Harrier SPAs (Wotton *et al.* 2018). The cause of this decline was likely a combination of factors; the period between the 2010 and 2016 surveys had been plagued by colder springs, that when combined with low prey availability likely impacted overall breeding success (Wotton *et al.* 2018; Wotton, 2019).

This report presents the findings of the sixth survey of Hen Harriers in the UK and Isle of Man (undertaken in 2023) in a Welsh context. More specifically, the report presents: i) updated population estimates as the number of territorial pairs for Wales and the Welsh Hen Harrier SPA suite (Berwyn and Migneint-Arenig-Dduallt SPAs); ii) changes since the last survey at both the Welsh and SPA level and iii) possible drivers of change in breeding Hen Harriers in the Wales.

Method

Survey planning

Planning for the survey in Wales began in October 2022 and involved RSPB, Natural Resources Wales (NRW) and the NE Wales Raptor Study Group (NEWRSRG).

Survey design

In Wales, the survey design followed methods adopted in the five previous surveys (Wotton *et al.* 2018, Wotton 2019). As per the 2016 survey, the breeding range map, comprising pre-2016 records from the previous national surveys and the three bird atlases (Sharrock 1976; Gibbons *et al.* 1993; Balmer *et al.* 2013), was updated using recent data sources (including the 2016 survey and records from Raptor Study workers and RSPB databases since 2016) and habitat suitability (Fielding *et al.* 2011), for each 10-km national grid square. Survey work was conducted by RSPB contract fieldworkers, Welsh raptor fieldworkers, other volunteers and staff from NRW, RSPB and other conservation bodies.

Wales coverage

In Wales, the aim was for complete coverage of all suitable habitat within the identified known range, defined by 10-km squares. The survey area in Wales was defined using the following criteria:

- 10-km squares surveyed in 2016;
- 10-km squares covering the two SPAs designated for Hen Harriers in Wales (Migneint–Arenig–Dduallt and Berwyn SPAs);
- 10-km squares with breeding season records of Hen Harriers since 2016; squares with breeding season records of Hen Harriers from Bird Atlas 2007–11;
- 10-km squares of two other important Hen Harrier upland sites covering the Elenydd-Mallaen SPA and the Mynydd Hiraethog SSSI.

Survey methods

The survey followed the standard methods adopted in previous national surveys. Surveys were carried out in suitable weather conditions from the beginning of April to the end of July. A minimum of two visits were made to each 10-km square. If breeding was not confirmed during the two visits, a third visit

was recommended between late June and the end of July. Each visit was separated by a minimum of two to three weeks if only two visits were undertaken.

All suitable habitat within each 10-km square was surveyed, with suitable habitat defined as moorland, both heather and grass dominated, upland young forest and native woodland regeneration. In particular, observers were alerted to the possibility of birds nesting within closed mature coniferous forest, and to consider such areas as suitable habitat. Surveys were conducted through a combination of searches and scanning suitable habitat from appropriate vantage points. When Hen Harriers were observed, information was collected on the location: six-figure grid reference; the number and sex of birds; the behaviour of the bird(s); the dominant habitat within 100m of each sighting; and any evidence of nesting. As Hen Harriers can be polygynous, observers were advised to continue searching in the vicinity of confirmed pairs for additional nests. On subsequent visits, all suitable habitat was searched again, and attempts were made to confirm breeding at all locations where birds were recorded on the previous visit. Fieldworkers worked under Schedule 1 Licences (issued under the Wildlife & Countryside Act 1981, as amended) from NRW. Surveyors completed national survey forms for each 10km square and mapped any Hen Harrier records on to a 1:50,000 map of the survey square.

Classification	Criteria			
Proven breeding	Food passing between two adults Adult carrying prey Used nest or eggshells found Nest with eggs Nest with young Recently fledged young	Proven territories	Territorial pairs	Territorial pairs plus possible records
Probable breeding	A pair seen in breeding season in potential breeding habitat A bird or pair apparently holding territory Courtship/display/agitated behaviour Bird(s) nest building Bird(s) visiting probable nest site			
Possible breeding	A single bird seen in breeding season in potential breeding habitat			

Table 1. Classification criteria for Hen Harrier survey records, based on Sharrock (1976), but adapted for the Wales/UK Hen Harrier survey.

Calculation of population estimates

Hen Harrier records were classified according to the criteria of previous national surveys, these were proven, probable or possible breeding categories (Table 1). As with previous national surveys, three population estimates were calculated: the number of proven breeding territories, the number of territorial pairs (proven plus probable), and the number of territorial pairs plus possible breeding records. This third estimate was calculated as a proportion of the population that do not attempt to breed annually due to factors such as lack of suitable nest sites, lack of prey (Newton 1979), and early breeding season disturbance or displacement (Rooney and Ruddock 2021; Ruddock *et al.* 2024), as for most raptor species. In some areas polygyny is known to occur, in these areas the survey count was the number of territorial pairs (i.e. a breeding male and female). Possible records were included in a separate estimate as it was considered that most of these records were unlikely to be breeding or territorial pairs. To test for significant change between 2016 and 2023, a randomization test was used, following the procedure used in three previous Hen Harrier surveys. The observed difference between the estimates from each year is referred to as D. Using bootstrap estimates of population size from the previous surveys, 999 differences, d1 to d999, between paired estimates were calculated. Each of these differences was subtracted from D, to give d*1 to d*999. The proportion of d* values with an absolute value greater

than D was taken as an estimate of the chance occurrence (P-value) of the observed difference, D (Sim *et al.* 2007; Hayhow *et al.* 2013 and Wotton *et al.* 2018). Numbers presented are territorial pairs (proven plus probable records), unless stated otherwise (see Table 1 for definitions).

The population estimates for Wales and the Welsh SPAs were calculated as the sum of the counts made in census squares.

SPA occupancy

Within the SPAs designated for breeding Hen Harrier in Wales the number of territorial pairs in 2023 was assessed and compared with 2016, as well as the SPA citation and third UK SPA network review assessment (Stroud *et al.* 2016). This information contributes to the assessment of feature condition for these SPAs by NRW.

Results

Survey coverage

In Wales, good coverage was achieved (72.4% of the 76 squares identified for potential coverage); non-surveyed squares were considered to have little or no suitable breeding habitat. In total, 54 10-km squares were surveyed with returned data (Fig. 1a), compared to 49 10-km squares surveyed in 2016 (Fig. 1b).

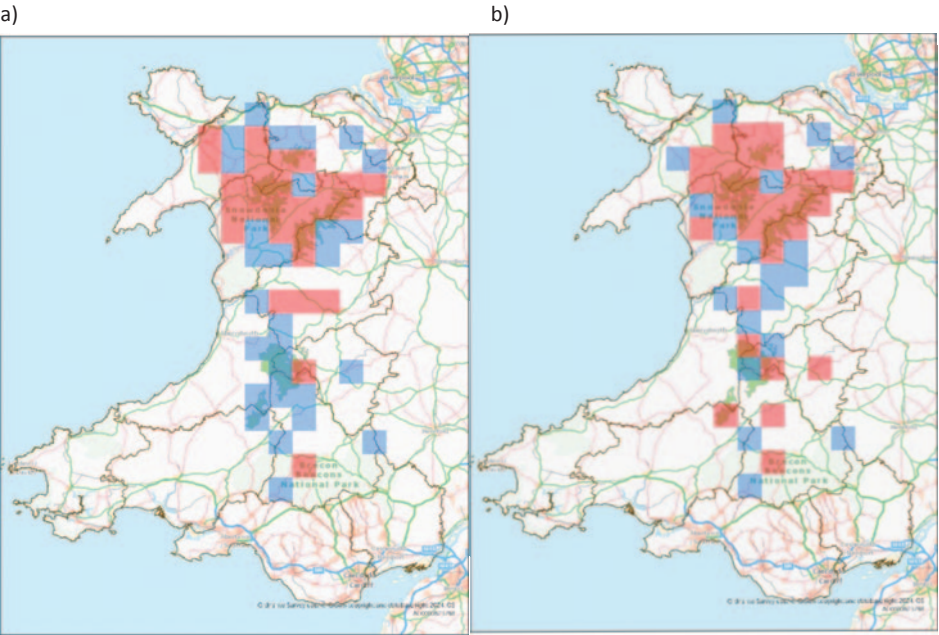


Figure 1. Survey coverage in Wales in a) 2023 and b) 2016. The 10km-squares with Hen Harrier records (confirmed, probable or possible breeding attempts) are shaded red and the squares with no records are shaded blue.

Population estimates in 2023

The survey data found 38 proven and 2 probable territorial pairs (Table 2) in 18 10-km squares. This gives a Welsh estimate of 40 territorial pairs in 2023, an increase of 14.3% compared to 35 territorial pairs found in 2016 (Table 2). In addition, seven possible territorial pairs were reported (Table 2). Overall, this points to an increase in the Welsh population since the first Hen Harrier survey in 1988/89 but only a partial recovery towards the high of 57 territorial pairs in 2010 (Fig. 2). The extent of suitable breeding habitat within each surveyed square, as estimated by Fielding *et al.* (2011), was used to produce estimates of the density of breeding pairs per 100-km² of suitable breeding habitat. In Wales, the mean density of territorial pairs was 3.4 per 100-km² of suitable breeding habitat. This represented the highest mean density of territorial pairs of any UK country surveyed in 2023 (Kelly *et al.* 2025).

Survey Year:	2023	2016	2010
Territorial pairs	40	35	56
Proven pairs	30	24	40
Probable pairs	2	11	17
Possible pairs	7	11	19

Table 2. The number of proven, probable and possible territorial pairs of Hen Harriers recorded in 54 10-km square in Wales in 2023. Comparable figures from the 2016 and 2010 surveys are also shown.

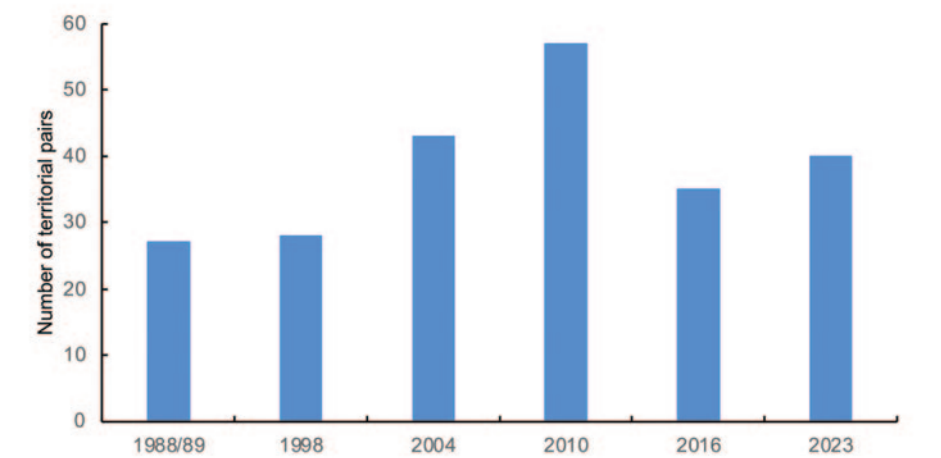


Figure 2. Change in the numbers of territorial pairs in Wales over the six UK surveys between 1988/89 and 2023.

The Hen Harrier range in Wales remained broadly similar between 2016 and 2023 (Figs 1a-b). However, there were changes in the number of occupied 10-km squares between 2010 and 2023 (Fig. 3a) and 2016 and 2023 (Fig. 3b). In the 2023 survey, breeding Hen Harriers were not recorded in four squares where they had previously been recorded in 2010. Overall, there was a general trend towards decline in occupancy in the south of the species range (Fig. 1 and Figs 3a-b).

a) 2010 & 2023

b) 2016 & 2023

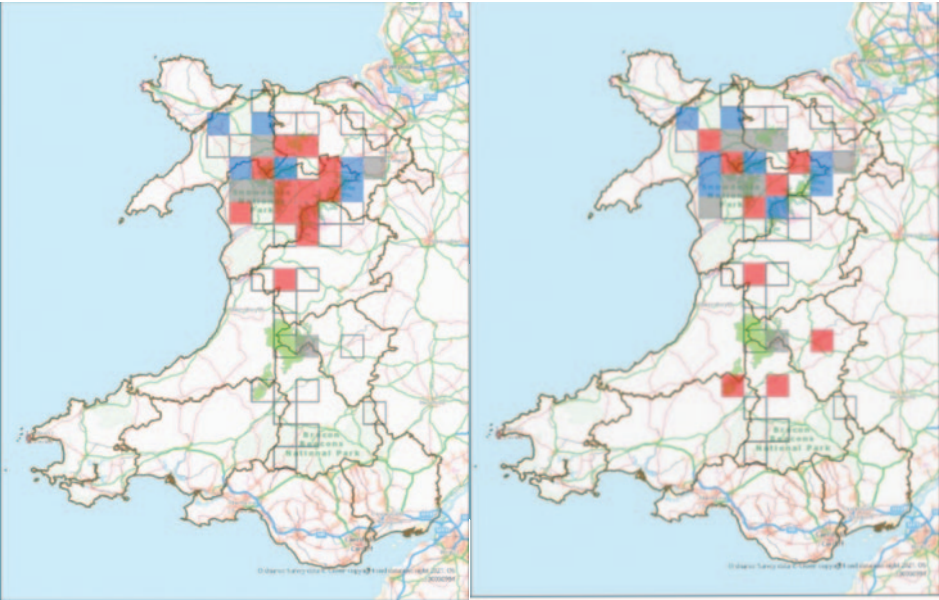


Figure 3. Changes in 10-km square occupancy in Wales between the 2010, 2016 and 2023 national surveys, shown as: red = decline in occupancy; blue = increase in occupancy; clear = no change in occupancy; grey = absent in both surveys.

Habitat

Most territorial pairs plus possible records in Wales were observed on heather-dominated moorland (83%), with only one of the 40 territorial pairs in 2023 found on moorland managed for grouse (2.1%), compared to four of the 35 territorial pairs in 2016 (Table 3). 81% were found on heather moor not managed for grouse (Table 3). The proportion of records on grass moor remained relatively stable between 2016 (20%) and 2023 (17%). This is a minor change from 2016, when 86% were on heather moorland and the remainder on grass moorland (Wotton *et al.* 2018).

SPA occupancy

Habitat	2023 number	2023 % of total	2016 number	2016% of total	% change 2016-2023
Grouse moor	1	2.1	4	8.7	-75.0
Other heather moor	38	80.9	32	69.6	+18.8
Grass moor	8	17.0	9	19.6	-11.1
Young coniferous forest	0	0	0	0	/
Mature coniferous forest	0	0	0	0	/
Native woodland restoration	0	0	0	0	/
Scrub/brash	0	0	0	0	/

Table 3. The number of Hen Harriers (territorial pairs and possible records) recorded in each land management class, and the percentage of the national total, in 2016 and 2023 for Wales.

classified for breeding Hen Harrier (Berwyn and Migneint–Arenig–Ddualt SPAs), representing 65% of the Welsh population (Fig. 1b). There was an encouraging increase on the Berwyn SPA with the number of territorial pairs increasing from 10 in 2016 to 16 in 2023 (Table 4). However, there was no change in the numbers of territorial pairs on the Migneint– Arenig–Ddualt SPA with 10 territorial pairs being recorded both in 2016 and 2023 (Table 4).

SPA	2023 territorial pairs	% surveyed in 2023	% 2023 UK population (Wales)	2016 territorial pairs	% surveyed in 2023	2010 territorial pairs	SPA citation pairs	SPA area (ha)
Berwyn	16	100	2.5 (40.0)	10	100	13	14	24,272
Migneint-Arenig-Ddualt	10	100	1.5 (25.0)	10	100	16	10	19,868
Wales SPA Network Total	26	100	4.0 (65.0)	20	100	29	24	44,140

Table 4. Occupancy by territorial pairs, as well as the percentage surveyed, of the Special Protection Areas (SPAs) designated for breeding Hen Harriers within Wales in 2010, 2016 and 2023. The percentage of the total Wales population found within each SPA in 2023 is also provided (percentage of each national 2023 population in parentheses). The current SPA population assessment (see “2010 territorial pairs”, third UK SPA network review) by JNCC is shown, as number of pairs or females (depending on the site) within each SPA (Stroud *et al.* 2016), as well as the number of territorial pairs at SPA classification and the SPA area.

Discussion

Population changes

The results of the 2023 survey for Hen Harrier presents a mixed picture for the species in Wales. There is a welcome increase of 14.3% since the 2016 survey, and the figure of 40 territorial pairs represents an increase in numbers since the first UK Hen Harrier survey in 1988/89. However, the species has yet to reach the number of territorial pairs recorded in 2010 (Fig. 2). The results from Wales complement the findings for the rest of the UK, where the population of 691 territorial pairs (95% CL: 593-802) (Kelly *et al.* 2025) is now similar to the 2010 national survey of 662 territorial pairs (95% CL, 576-770; Hayhow *et al.* 2013). In Wales, a slight population increase since 2016 represents an increase in the proportion of the population breeding on heather moor but a decrease on moorland managed for Red Grouse *Lagopus lagopus*. Such changes could be associated with beneficial upland management; for example,



Hen Harrier: Tony Pope

management for other breeding species such as Curlew *Numenius arquata*, or the restoration of peat ecosystems through initiatives such as the National Peatland Action Programme (see Natural Resources Wales / The National Peatland Action Programme). Such initiatives could have increased habitat quality and heterogeneity, favouring Hen Harriers by increasing the availability of prey and nest sites.

SPA occupancy

The results of the 2023 survey continue to demonstrate the importance of the protected sites network in the maintenance of Hen Harrier in Wales. The Berwyn SPA and Migneint–Arenig–Dduallt SPA cover an area of 44,000ha and hold 65% of the Welsh breeding Hen Harrier population. The populations on both SPAs increased a little between their designation in the 1990s and the 2016 survey; by two and four pairs respectively (Table 4). Of particular note is that the increase in the population in the Berwyn SPA from 10 to 16 territorial pairs is itself sufficient to account for the overall increase in the Welsh Hen Harrier population between the 2016 and 2023 surveys. This positive result is in contrast to findings elsewhere in the UK where SPAs designated for breeding Hen Harrier are largely failing to maintain sufficient numbers. Kelly *et al.* (2025) reports the overall number of territorial pairs within SPAs designated for breeding Hen Harriers is circa 47% lower than when they were classified.

A number of factors could explain the increases in the Berwyn SPA and the stability of the Migneint–Arenig–Dduallt SPA, compared to the wider Hen Harrier population in Wales. First, avian prey – particularly Meadow Pipit *Anthus pratensis* – are an important component of Hen Harrier diet (Madders 2003; Nota *et al.* 2019; McCarthy *et al.* 2021). The population density of this important prey species in the two SPAs remained relatively stable between the 1988–1991 and 2007–2011 BirdAtlas periods, in contrast to declining elsewhere in Wales (Balmer *et al.* 2013). On the Berwyn SPA itself there was a 103% increase in Meadow Pipit between 1988 and 2002 (Warren and Baines 2014). Second, Hen Harrier productivity is affected by spring temperatures, with warmer spring temperatures resulting in high productivity as a result of increased food supply (Whitfield *et al.* 2008). The mean spring temperature (April to May inclusive) in Wales was higher during the period 2017–2023 than during 2011–2016; while mean spring temperature between 2017 and 2023 was higher in five of the seven years than the mean spring temperature in the preceding 15 years (2023–2016) (Met Office 2024). The combination of favourable weather conditions (across Wales) with the stable or increasing prey base in the SPA network, could help explain the differences between Hen Harrier trajectories in the SPA's and those in wider Wales.

Constraints on Hen Harrier in Wales

Persecution

Whitfield *et al.* (2008) noted that anthropogenic activity can reduce Hen Harrier productivity, and this may be more prevalent in some landscape types. For example, illegal persecution has been identified as a factor influencing distribution, abundance and breeding success of Hen Harriers in the UK (Ewing *et al.* 2023; Murgatroyd *et al.* 2019; Redpath *et al.* 2010) particularly on areas associated with grouse moor management (Etheridge *et al.* 1997; Fielding *et al.* 2011). Preliminary analyses of a small cohort of GPS tagged birds in Wales suggests that survival of Welsh birds is significantly lower than in England and Scotland (RSPB unpublished data). In Wales, while confirmed cases of persecution are rare, anecdotal evidence indicates that it may occur (Hughes *et al.* 2021); and birds tagged at breeding sites in Wales were not immune to illegal persecution (Hughes *et al.* 2021). Outside the breeding season, Welsh birds also travel to other upland areas of Britain where exposure to illegal persecution is more likely. Nonetheless, provisional assessments suggest illegal persecution of Hen Harrier may not be a limiting factor in population numbers and distribution in Wales (Ewing *et al.* 2023; Hughes *et al.* 2021). Rotational burning is an important management technique that provides a heterogeneous mosaic of vegetation height and composition on heather moorland, where mosaics of young and old heather are preferred by nesting and foraging Red Grouse (Pritchard *et al.*, 2021). However, frequent and widespread

management (*e.g.* burning) may reduce the availability of deep heather which provides preferred nesting sites for Hen Harrier in some areas. Of the 40 Welsh territorial pairs located in 2023, only one pair (2.5%), was found on moorland managed for grouse in contrast to four Welsh pairs (11.4%) in the 2016 national survey (Wotton *et al.* 2018).

Prey availability

The principal prey of Hen Harriers are small mammals (microtine voles and lagomorphs), passerine birds and Red Grouse. Prey availability plays a vital role, such that the density of voles and Meadow Pipits appears to determine Hen Harrier clutch size and overall breeding success (Redpath *et al.* 2002; Redpath and Thirgood 1997). Studies on Orkney also suggest reduced prey availability negatively influences overall breeding success, but experimental provision of food increased the ratio of females per male (Amar and Redpath 2002). Meadow Pipit numbers have been shown to be greater in upland landscapes that provide a mosaic of habitats (Vanhinsberg and Chamberlain 2001), while density was negatively correlated with heather cover (Smith *et al.* 2001). In Wales, Meadow Pipits have declined to the extent that the species is red-listed as a result of a ≥50% decline over 25 years (Johnstone *et al.* 2023) with losses possibly more pronounced in mid and south Wales (Balmer *et al.* 2013). Such declines, particularly in south Wales, may result in a northward contraction in range of breeding Hen Harrier in Wales.

Declines in Meadow Pipit abundance may be linked to land management activities. For example, Evans *et al.* (2006) found that the breeding abundance of Meadow Pipits was lower in both un-grazed areas and areas grazed by sheep (even at low density), compared to low density, mixed grazing with cattle and sheep. Smith *et al.* (2001) found that Meadow Pipit abundance declined with increased heather burning, a management practice often associated with grouse-moor management. Intensive heather burning may also lead to reductions in other passerine prey, such as Skylark *Alauda arvensis* (Pearce-Higgins and Grant 2006).

Disease

Wildlife diseases can have significant and negative impacts on wild bird populations and wider biodiversity (Daszak *et al.* 2000). Highly pathogenic avian influenza (HPAI) is now a regular occurrence in the UK. Since 2021 there has been an expanded geographical distribution of HPAI with unprecedented numbers of infections in poultry flocks and wild bird populations (Harvey *et al.* 2023, Klaassen and Wille 2023). A record number of cases of avian influenza virus infections were confirmed through the summer months in 2022 in the UK, and incidence was at its highest level during the winter of 2022–2023 and the following summer in 2023. Although HPAI was historically a virus of *Anatidae* (Olsen *et al.* 2006), it is also known to affect birds of prey (Kleyheeg *et al.* 2017, Wilson *et al.* 2023) leading to conservation concerns, particularly to small, localised populations. In summer 2022, six Hen Harriers tested positive for HPAI in the UK, three of which had been found dead in Wales (APHA, 2022). Due to poor rates of detection, the actual rate of mortality in the Welsh population of Hen Harrier is not known but given the significant impact of HPAI on other wild bird populations, including birds of prey, it is important to acknowledge the vulnerability of Hen Harriers to future outbreaks.

Future considerations

The results of the 2023 survey show a broadly positive outlook for breeding Hen Harriers in Wales: the population has increased since the 2016 survey and the SPA network appears to be achieving its aims. However, these results also highlight the need for consideration on how best to continue to conserve this species in Wales, particularly in relation to maintaining geographic range.

The number of occupied 10-km squares has declined by 18%. This decline in range has occurred mainly in South Wales (Fig. 1) and the next national survey may find the Hen Harrier confined largely to North Wales (Figs 1 and 3). This range retraction places increasing emphasis on the SPA network, since in 2023,

65% of Wales' Hen Harrier breeding population was found within the Berwyn and Migneint-Arenig-Dduallt SPAs. Restoring or at least maintaining range may be a significant challenge for the conservation of Hen Harrier in Wales. It will require an understanding of the drivers of change and occupancy outwith the SPA network, to enable the population across Wales to increase whilst maintaining the conservation objectives of the Berwyn and Migneint-Arenig-Dduallt SPAs.

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Hen Harrier: Tony Pope