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Monitoring five decades of change in the UK's rarest breeding birds through citizen science: the Rare Breeding Birds Panel

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Monitoring populations of our rarest breeding birds has contributed to some of conservation's greatest success stories, such as the revival of the Bittern in British wetlands. Kit Day/Alamy Stock Photo

Most naturalists are fascinated by rare species. By definition, these are not encountered often by the majority of observers, and the thrill of finding and learning more about them is a strong driving force in natural history. To many, 'rare' birds means vagrants on windswept headlands, contributing to the British bird list which currently stands at 628 species (BOU 2022). Rare *breeding* birds are something very different. Of the 210 native species that nest in the UK regularly, a surprising number are rare breeders, with fewer than 2,000 pairs, and many have populations of only tens of pairs. Some of these birds are common at other times of year, but a few are genuinely rare all year. Finding and monitoring them takes a great deal of effort and expertise, and perhaps thousands of birdwatchers across the country participate annually. By tradition, however, much secrecy is involved in the process and

observations of rare breeding birds may not be put into recording systems, rather being left imprecise or generalised as to location. The notion that 'you must not tell anyone about this' is a long-standing tenet of monitoring rare birds' nests. But in a world of conservation threats and prioritised funding for action, good knowledge of where such species are and how well they are doing has never been more important.

When the UK Rare Breeding Birds Panel (RBBP) was set up in 1973 (Sharrock 1973; Sharrock *et al.* 1975), the reporting of rare breeding birds was haphazard and badly organised, dominated by rumour and hearsay. A strong need to improve the situation was clear. Now 50 years old, the RBBP has transformed the recording of many of our rarest nesting species and plays a major part in assessing the status and trends of a substantial fraction of all our breeding birds. The Panel is supported

financially by the Joint Nature Conservation Committee (JNCC, on behalf of the UK's statutory nature conservation agencies), the Royal Society for the Protection of Birds (RSPB) and the British Trust for Ornithology (BTO), and, in addition to its Secretary, is composed currently of nine members, including several who are independent of these funding bodies. Its membership has evolved over time, but the RBBP is one of the UK's longest-running bird-monitoring partnerships, and one of the longest established of any multi-species, annual, UK-wide wildlife-recording scheme.

The RBBP's two main functions are to maintain the definitive archive of all rare breeding birds in the UK and to publish an annual report on numbers, distribution and trends; this report appears in the journal *British Birds*. Across the island of Ireland, the Irish Rare Breeding Birds Panel (IRBBP) performs a similar role, though with a different species list. Rare breeding birds in Northern Ireland are thus monitored by both RBBP and IRBBP (with data exchanged between schemes). Since 1996, the Panel's list has also included the rarer non-native bird species breeding in the UK under separate reporting (most recently by Holling *et al.* 2017).

The principal source of RBBP data (approximately 70% by volume) is the network of 80 county and regional recorders across England, Scotland, Wales, Northern Ireland, Isle of Man and the Channel Islands. Birders and other members of the public are encouraged to submit their breeding bird observations directly to these recorders; increasingly this is done by using online systems such as the BirdTrack portal. In turn, recorders assemble relevant data on all RBBP species within their area and send a detailed annual list of species, sites and breeding evidence to the RBBP Secretary. Information is also received directly from other sources, including RSPB reserves, Schedule 1 licence returns, ringing and nest-recording schemes, raptor- and seabird-monitoring, and species studies (Stroud *et al.* 2023). All data collated are treated as confidential and stored on a secure database accessible

only by the Panel Secretary, security that is vital for trust and to reduce threats to very rare nesting birds. The great majority of data received, estimated as 85–90% of recent volumes, come from volunteers partaking in activities such as birdwatching, surveying, nest-recording and ringing; like much biological recording, this is truly citizen science. Further detailed information about the RBBP can be found at www.rbbp.org.uk.

The RBBP and the role it plays, particularly its focus on a subset of rare breeding species, may be unique among all recording systems for wildlife taxa in the UK. Its development reflects the extent of bird-recording compared with other species groups in terms of data volumes, participation, longevity, and possibly politics and egos! This article explores some of the findings over the last 50 years and also considers its primary underlying *raison d'être*: contributing to the conservation of our rarest nesting bird species.

The RBBP species list: comings and goings

So, which species does the Panel consider? Since 1973, the RBBP has reported on a total of 180 native bird species, although the rationale for inclusion of a species on the list has changed over time. Initially, the Panel collected data only on species with fewer than 300 breeding pairs in the UK; in 1973, 33 species were reported on this basis. Subsequently, more were added, such as Bittern *Botaurus stellaris* in 1977 and Garganey

Figure 1. Number of rare breeding bird species in the UK, 1973–2020.

Confirmed breeding (green line) is defined as an attempt in which eggs were laid, even if breeding was not successful. All breeding records (blue line) include possible and probable records defined through various classes of breeding behaviour; see rbbp.org.uk for further details.

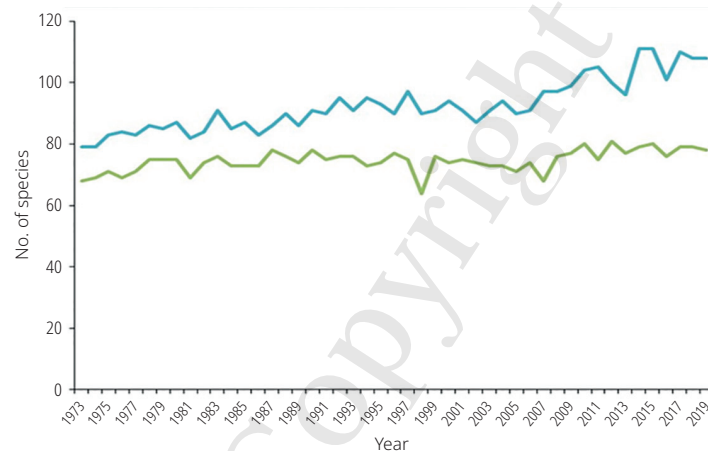


Table 1. New colonists and reintroductions that have established populations in the UK since 1973.

Species	Year of first confirmed breeding
Mediterranean Gull <i>Ichthyaeetus melanocephalus</i>	1976
Whooper Swan <i>Cygnus cygnus</i>	1978
Common Crane <i>Grus grus</i>	1981
Black-winged Stilt <i>Himantopus himantopus</i>	1983
White-tailed Eagle <i>Haliaeetus albicilla</i>	1983
Parrot Crossbill <i>Loxia pytyopsittacus</i>	1983
Little Bittern <i>Ixobrychus minutus</i>	1984
Spoonbill <i>Platalea leucorodia</i>	1989
Yellow-legged Gull <i>Larus michahellis</i>	1995
Little Egret <i>Egretta garzetta</i>	1996
Green Sandpiper <i>Tringa ochropus</i>	1999
Common Redpoll <i>Acanthis flammea</i>	2004
Cattle Egret <i>Bubulcus ibis</i>	2008
Great White Egret <i>Ardea alba</i>	2012

Spatula querquedula in 1980, and the threshold for inclusion was gradually pushed out to 2,000 pairs.

A substantial change came in 1996, when the Panel's remit expanded to include all the birds listed on Schedule 1 of the Wildlife & Countryside Act 1981, thus adding a range of less rare species such as Red-throated Diver *Gavia stellata*, Peregrine *Falco peregrinus* and Bearded Tit *Panurus biarmicus*. Other species have been included as increased knowledge of their population sizes has led the Panel to believe that they may be scarcer than previously supposed (e.g. Long-eared Owl *Asio otus* in 2010), or because population declines have led to their becoming rare breeding birds (e.g. Turtle Dove *Streptopelia turtur* in 2018).

For the purposes of describing patterns of occurrence and change in rare breeding birds, we have attempted to correct for changes in the RBBP's species list by using available non-RBBP data to incorporate the less rare and scarce species not included from the outset. We can presume, for example, that such species were present and breeding every year before they were added to the Panel's list, and in some cases we have information about their trends for earlier periods.

The number of species recorded by year has fluctuated since 1973. Reporting has been influenced by changes in inclusion criteria, but

even if we correct for that, respectively applying current inclusion criteria across the entire period, we can see (Figure 1) how the number of rare breeding bird species in the UK has risen over the last five decades, although there is considerable fluctuation between years (caused largely by variation in the occurrence of vagrant species and other occasional breeding species). The cumulative total has risen steadily, although many of the newly added species have not become established as breeders in the UK – they may, for instance, be due to just one-off occurrences of single singing males straying a long way from their species' typical range.

The increase in the number of rare breeding species in the UK has been driven by the combination of species declining, and thus becoming rare, and colonising species arriving – and the numbers of these exceeding those of species that have moved off the list by becoming more abundant or by going extinct. In total, 14 species have become

Long-eared Owl is a relatively recent inclusion on the list of birds covered by the RBBP. Laurie Campbell/Alamy Stock Photo



The changing RBBP species list: Turtle Dove

If birdwatchers half a century ago had been told that Turtle Dove would become a rare breeding bird, they would surely have demurred: there were estimated to be around 125,000 pairs at the time of the first bird atlas in 1968–72 (Sharrock 1976). They would soon have realised, though, that the species was in freefall, with a relentless decline perhaps most vividly shown in the results of the BTO Atlas 2007–11 (Balmer *et al.* 2013), which found few left outside eastern English counties (Yorkshire, Lincolnshire, East Anglia, Kent and Hampshire). This is the fastest-declining species, with 98% of Britain's Turtle Doves lost between 1970 and 2021; the sample found

within BBS squares is now too small to enable robust monitoring. In response, the species was added to the RBBP list from 2018 onwards, as we suspected that the population was falling towards, or even below, our upper threshold of 2,000 pairs.

Moreover, the RBBP collaborated in the first national survey of Turtle Dove in 2021, led by the RSPB with support from the BTO and co-funding from Natural England, in order to establish a robust baseline for future monitoring. The results from this survey suggest a population of 2,095 territories (95% confidence limits, 1556–2786) (Stanbury *et al.* in prep.), confirming fears about the rarity of this species.

The decline – which is Europe-wide – is believed to have been driven by loss of breeding habitat, and also by unsustainable hunting along the migration route and on African wintering grounds. A partnership project, Operation Turtle Dove, is working with landowners and farmers to restore and create breeding habitat in eastern England, while an International Action Plan driven by the EU has led to a hunting ban along the western flyway (France, Spain, Portugal). We hope that ongoing RBBP monitoring will see the recovery of the species, so that it is no longer considered a rare breeding bird.

Since 1972, Turtle Dove has gone from being a common farmland bird, with c. 125,000 pairs, to a species so scarce that it is now monitored by the RBBP. Kit Day/Alamy Stock Photo



regular breeding species in the UK since the Panel commenced recording in 1973, and all are currently still rare breeding birds (Table 1); an additional two species, Great Bustard *Otis tarda* and White Stork *Ciconia ciconia*, are now reported upon from the initial stages of reintroduction projects.

The drivers behind the establishment of new or (in the case of Common Crane *Grus grus*, Spoonbill

Platalea leucorodia and White-tailed Eagle *Haliaeetus albicilla*) returning populations vary. Many have been attributed to climate-related expansion of ranges in continental Europe leading to spill-over to Britain (Keller *et al.* 2020), although the role of increased protection and conservation action across Europe has also played a significant part in the recovery of species such as Common Crane and



An increase in the number of rare breeding bird species is not all bad news; some of the new additions, such as Spoonbill, are the result of colonisation from mainland Europe, while others are testament to successful reintroduction projects. David Tipling Photo Library/Alamy Stock Photo

Great White Egret *Ardea alba*. Of the 14 colonists in Table 1, 13 have shown range expansion across Europe as a whole since the 1980s. Furthermore, since 1973 eight species have been reintroduced either to the UK (e.g. White-tailed Eagle and Great Bustard) or to parts of their former range within Britain (e.g. Common Crane, and extant species such as Corncrake *Crex crex*).

Firecrest has been removed from the RBBP list owing to a rapid increase in breeding range and numbers over recent decades. Nature Picture Library/Alamy Stock Photo



In addition to the arrival of new breeding species, improving fortunes of rare breeding birds have also been demonstrated by four species being removed from the RBBP's list as populations have increased: Gadwall *Anas strepera* (removed in 2009), Red Kite *Milvus milvus* (2012), Cetti's Warbler *Cettia cetti* (2016) and Firecrest *Regulus ignicapilla* (2017).

The recent increases in Avocet *Recurvirostra avosetta* and Mediterranean Gull *Ichthyaetus melanocephalus* numbers may mean that they are next in line for removal; however, the Panel has to be confident that the increase will be sustained, and that populations are unlikely to decline subsequently owing to, for example, disease or colony loss to weather impacts.

Of greater conservation concern are the species that have dwindled to extinction, or near extinction, during the period of RBBP coverage. The list of 'former breeders' in the most recent Birds of Conservation Concern assessment (Stanbury *et al.* 2021) includes seven that have ceased breeding since 1973, namely Snowy Owl *Bubo*

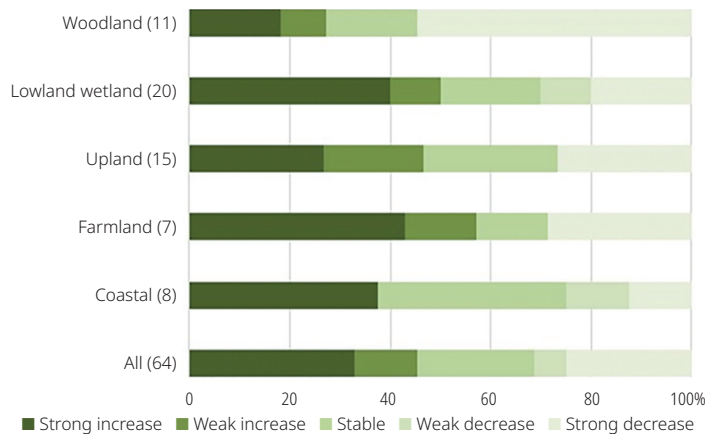


Figure 2. Trends in regularly breeding RBBP species by broad category, for all species and broken down by major habitat. Trends cover a period of 25 years, derived from five-year means for 1990–94 and 2015–19, although for a few species (recent colonists, or additions to the RBBP list) they cover a shorter 15-year period. In total, trends considered sufficiently robust are available for 64 species. Thresholds for categories of trend are given in Eaton *et al.* 2022.

scandiacus (last bred 1975), Black Tern *Chlidonias niger* (1975), Kentish Plover *Charadrius alexandrinus* (1979), Temminck's Stint *Calidris temminckii* (1993), Wryneck *Jynx torquilla* (2002), European Serin *Serinus serinus* (2006) and Golden Oriole *Oriolus oriolus* (2009), although our report for 2021 will document the possible return of one of these species. For the most part, these are birds of which the UK has never held a sizeable breeding population. The obvious exception is the Wryneck, which has been recorded breeding in over 50 UK counties (Holloway 1996) and was once so numerous in southern counties that the RSPB sold nestboxes to attract the species to gardens. There are also species the populations of which have dwindled to come very close to extinction; numbers of breeding pairs of Montagu's Harrier *Circus pygargus*, Purple Sandpiper *Calidris maritima*, Fieldfare *Turdus pilaris* and Red-backed Shrike *Lanius collurio* have been very low in recent years, although the resurgence of populations of the last-mentioned species on the near Continent may give some hope that extinction could be avoided. Our report for 2020 (Eaton *et al.* 2022) revealed the first absence of confirmed breeding of Montagu's Harriers since 1975.

Ups and downs: trends in rare breeding birds

Analyses of changes in the overall number of species are one metric of the state of rare breeding birds in the UK (and from which inferences can be made,

with caution, about the status of birds and biodiversity more widely). The balance between colonisation and extinction, however, is a crude measure of change and can be influenced by fluctuations in the fortunes of just a few individual birds at the margin of species' ranges. It is perhaps more informative to look at fluctuations in populations.

Figure 2 shows trends by major habitat (as defined by Gibbons *et al.* 1993; note that the sample sizes are small for some habitats). Overall, for the period 1994–2019, about 30% of rare breeding species have shown a strong increase, contrasted with about a quarter undergoing a

strong decline. Over half of rare woodland breeders have shown a strong decrease, whereas, perhaps surprisingly, over half of rare farmland species show increases – undoubtedly the result of conservation measures targeted at a few 'flagship' farmland birds such as Corncrake, Stone-curlew *Burhinus oedicephalus* and Cirl Bunting *Emberiza cirlus*.

Changing conservation provision for rare breeding birds

The 'landscape' of conservation provision for rare breeding birds has altered dramatically over half a century, in both how it is delivered and by whom and in what the drivers of change are in bird populations. Organisationally, the main actors in the early 1970s were the Nature Conservancy Council (NCC; for the government), the RSPB and, with more local presence, the Wildlife Trusts. The sole species-focused legislation was the Protection of Birds Act 1954, Schedule 1 of which, while providing special protection to 48 species, conspicuously lacked any such measures for many other rare breeders.

Threats to rare breeding birds were seen as coming particularly from direct persecution, especially of raptors, and the impacts of egg-collecting, although widespread loss of wetlands had stimulated the recently adopted Ramsar Convention in 1971 (Stroud *et al.* 2022), and the consequences of wide use of persistent pesticides were becoming apparent across Europe.

The changing RBBP species list: Red Kite



When the RBBP's first report was published, in 1973, just ten successful breeding pairs of Red Kite were recorded. Philip Jones/Alamy Stock Photo

Fifty years ago, Red Kite was an archetypal rare breeding bird. Formerly widespread in Britain, the species had been reduced to about four pairs by the early 20th century, before increasing slowly to about 20 pairs in the late 1960s. The Panel's first report, in 1973, recorded breeding in five counties, but with only ten pairs successful, rearing 14 young.

The Kite Committee, funded by the NCC, monitored the Welsh population as it gradually increased to 50 breeding pairs by the late 1980s, albeit with low productivity (usually limited by poor availability of prey and wet spring weather). This coincided with international measures to conserve Red Kites in Europe and the start of a joint

NCC/RSPB programme to reintroduce this species to England and Scotland with chicks from Sweden and Spain (Evans *et al.* 1997). First releases in 1989 resulted in the first successful breeding for over a century in England and Scotland in 1992, and in that year the Welsh population exceeded 100 pairs.

By 1998, 200 pairs in Wales reared 174 young, and at least 100 breeding pairs from released stock in England and Scotland fledged 195 young. Into the 2000s, birds from the six main introduction sites – the Chilterns, Northamptonshire and Yorkshire in England, and Highland, Upper Forth and Dumfries & Galloway in Scotland – were gradually spreading out to breed. Further

reintroductions in Gateshead, Aberdeen and Northern Ireland took place during the following ten years. It was noticeable, however, that some Scottish birds were dying from eating poisoned rats, and persecution by game interests was impeding the rate of population growth compared with birds in England (Smart *et al.* 2010).

In 2012, the RBBP noted that the species exceeded the Panel's inclusion threshold and was sufficiently widespread as to be adequately monitored by the BTO/JNCC/RSPB Breeding Bird Survey (BBS). Thus, in the first four decades of the RBBP, as a triumph of conservation action, Red Kite has gone from being one of Britain's scarcest breeding birds to being no longer reported by the Panel.

The 1970s and 1980s saw the progressive expansion of both the statutory and the non-statutory conservation sectors (Sheail 1998), as well as a massive growth in the popularity of recreational birdwatching. International conservation policy developed very significantly, with the 1979 EEC Directive on the conservation of wild birds providing an overarching European

framework for bird conservation. The obligations assumed by the UK government through such treaties stimulated the current generation of national legislation, notably the Wildlife and Countryside Act 1981 (which was enacted to implement the Birds Directive), the Schedule 1 of which includes a more comprehensive list of 87 rare breeders (although still lacking others, including

more recent arrivals such as Common Crane, Great White Egret and Great Bustard).

Today's threats come less from direct mortality – though these persist for raptors, notably from illegal persecution by upland game interests – but more from the population-level consequences of massive changes in land-use of both farmed and unfarmed landscapes, and climate change, which will be familiar to readers for their impacts on all of the UK's biodiversity. Against the background of such changes, the motivation for the Panel's work has perhaps shifted but has never been more relevant.

Use of RBBP data for conservation

The RBBP dataset and archive is the only one that combines all available sources of data on rare breeding birds, as described above. This means that it is the only comprehensive UK resource for informing conservation initiatives involving these species. Uses include compiling population figures and trends, scientific research, contribution to government-level reporting on protected areas and international treaties, and designing national surveys (see Stroud *et al.* 2019). RBBP data are a major component of 'Birds of Conservation Concern' (BoCC, see below) assessments (most recently Stanbury *et al.* 2021), which provide major underpinning for UK bird conservation.

More specifically, Panel data can contribute towards the condition assessment of Sites of Special Scientific Interest, or the assessment of sufficiency of populations contained within other protected networks such as Special Protection Areas (Stroud *et al.* 2016).

RBBP information has contributed to 15 UK Biodiversity Action Plans and 12 international species action plans. It has allowed the targeting of habitat restoration (such as for Bitterns), fed directly into the plans for species reintroductions (such as Common Crane, White-tailed Eagle and Red Kite) and also helped to build the spatial and numerical case for conservation

management at site level (such as for Corncrake and Cirl Bunting). Analyses of RBBP data have been valuable in supporting conservation policy. For example, Hiley *et al.* (2013) used Panel data to explore the locations at which colonising wetland species first bred, revealing the crucial importance of protected areas.

For all these uses, and more, RBBP provides a one-stop shop for information aiding conservation initiatives at all levels, while the systems to enable this are being refined constantly.

National conservation status

There are multiple ways through which the conservation of species can be assessed, but, for UK birds, BoCC assessments integrate multiple metrics and are accepted by government as the basis for relevant priority-setting. The results for RBBP-listed species since 1996 are shown in Figure 3. An increasing proportion are now either classed as former breeder (e.g. Wryneck) or assessed as 'red', while those assessed as 'green' have remained fairly constant in the long term. The proportion of rare breeding species that are red-listed (30%) is similar to that for all bird species assessed (29% across all 245 species assessed in BoCC5). It is notable, however, that the rate of increase in the proportion of red-listed rare breeders is considerably slower than that for all species: while the percentage of all

Figure 3. Birds of Conservation Concern: status of rare breeding-bird species.

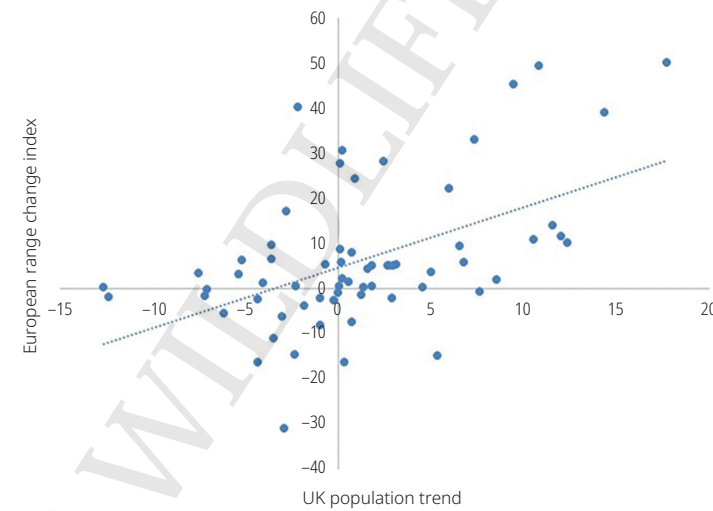
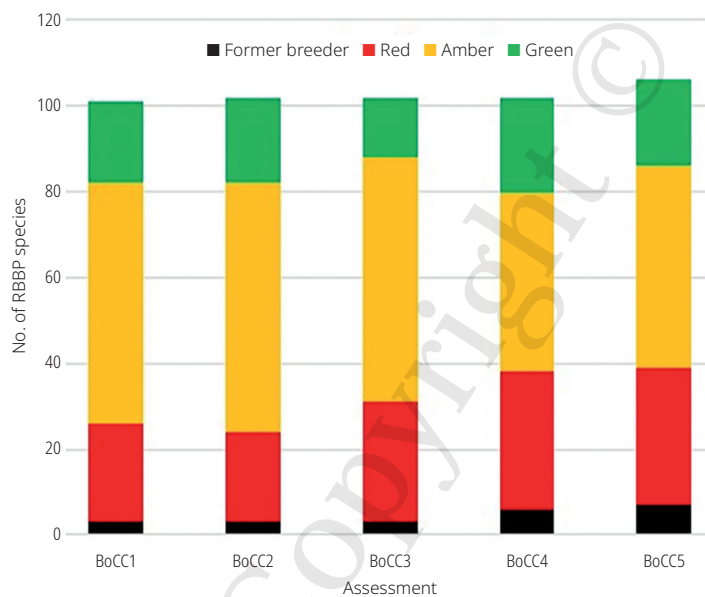


Figure 4. The relationship between (population) trends of rare breeding-bird species in the UK and (range) trends in Europe.

species red-listed has nearly doubled in the period since the first assessment in 1996, it has risen by only 29% for rare breeding birds. This may be a consequence of the conservation attention which these species receive, but it could also be that the high-quality long-term monitoring meant that there was evidence to red-list them at the beginning of the BoCC process, which was lacking for other species.

Wider geographical contexts

Rare birds breeding in the UK are components of wider populations, typically distributed to the north (where the UK sustains populations of high-latitude breeders such as Dotterel *Charadrius morinellus* and Purple Sandpiper) or where we lie on the northern edge of southerly, continental distributions (such as for heathland species, including Dartford Warbler *Curruca undata*).

The *European Breeding Bird Atlas* (Keller *et al.* 2020) demonstrates the commonality of trends at wide scales. Figure 4 shows that species with an increasing European range trend also tend to be those UK rare breeders that are increasing in population size

(and range). Conversely, most doing poorly in the UK also have contracting European ranges.

What we don't know

Despite the substantial volume of data that has accumulated about rare breeders, there are still deficiencies in the system and there is still opportunity to improve how RBBP operates and how information on rare breeding birds flows. How complete are our data? For large conspicuous species, such as White-tailed Eagle (which until recently was the focus of funded surveys), we can be confident that population totals are complete or near complete. For other species, the Panel's assessments are likely to be incomplete: but to what extent and what are the implications?

In a comprehensive historical review of the status of Spotted Crake *Porzana porzana*, Stroud *et al.* (2012) undertook extensive literature searches for records. For the period 1973–2009 they found almost double the number of records held by RBBP.

Purple Sandpiper is one of a handful of species on the brink of disappearing as a breeding species in Britain. Matthew Scott/Alamy Stock Photo



Worryingly, nearly all these 'new' records were published yet had not been submitted to the Panel. (The authors of the study were unable to assess the extent of records still in notebooks but never submitted to recording systems, and indeed it will of course never be possible to assess those birds nesting but remaining unfound.) Reassuringly, however, while the Panel was clearly under-reporting absolute population size, across the years the enhanced population trend closely mirrored that of RBBP, indicating that under-reporting was constant across years and thus unlikely to result in erroneous conclusions on conservation status. Detailed assessments for other species would be valuable.

The species accounts of the Panel's annual reports give guidance as to the assessed degree of completeness of data. This varies between taxa (Figure 5), being most complete for the small number of rare seabirds and for waterbirds (notably influenced by the colonising herons and allies), and least complete for raptors (including owls). Overall, while data quality may be variable from one species to another, it remains the best available, and the Panel is explicit with regard to its assessments of completeness and is striving to improve data flow for all species.

Future prospects

This article has highlighted the constant change shown by our rare breeding birds and set out how we monitor this. Future change may be even more rapid. The recent appearance as British breeders of a suite of herons and egrets follows modelled impacts of climate change (Huntley *et al.* 2007), as does the slow dwindling in numbers of some northern and montane species. Recent-change maps in the *European Breeding Bird Atlas* (Keller *et al.* 2020) suggest other species that may arrive in Britain.

Along with these changes come probable new land-uses, from novel crops better attuned to climate and world markets to more afforestation

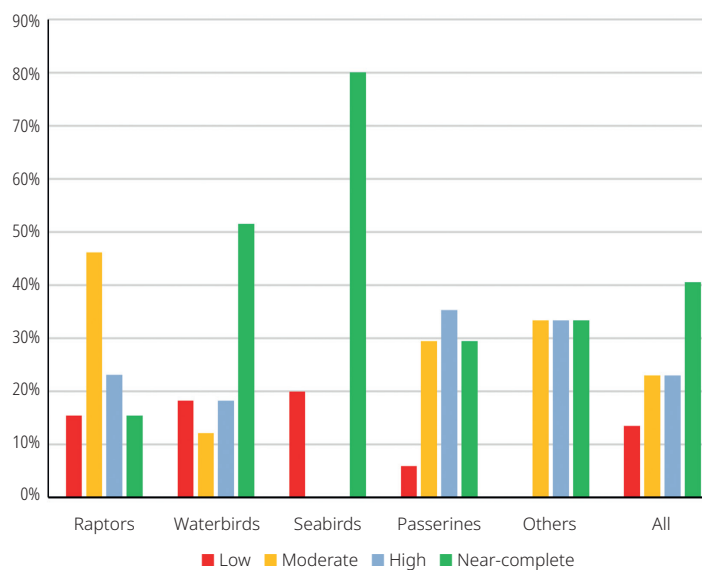


Figure 5. Assessed degree of completeness of population coverage of 74 taxa monitored by RBBP.

and wetlands for carbon sequestration and the spread of rewilding projects. Agricultural and land-use support systems will alter the nature of the landscape, while flood alleviation and climate adaptation will bring new habitats, as well as the loss of some others. We are likely to see even more striking shifts in our rare breeding birds, and the RBBP is well placed to monitor this as part of our attempts to understand, adapt to and mitigate rapid future environmental change.

Lessons learned and recommendations

The RBBP has, over its 50 years, succeeded in vastly improving the flow of information on rare breeding birds and allowed it to be used much more effectively for conservation; there is a stark contrast between the situation now and that in 1973. The Panel has learned much and built its operations carefully over time. Perhaps the most striking feature of the RBBP is its value for money in relation to the number of species covered: in the world of conservation finance, the annual national monitoring and reporting of over 170 species for less than £50,000 is a real bargain.

Of course, this is not the real cost. As with much of British natural history, so much depends on the large numbers of citizen-science volunteer birdwatchers who provide most of the underlying records, along with the voluntary county bird-recorder system, and there is also subsidy in the

form of records from conservation staff doing their annual work. This is a real strength of our recording systems, and the RBBP has capitalised on it to offer regular and comprehensive summary information.

Crucial to how the Panel operates is the security and veracity of records held, and the constant effort to ensure record accuracy, with avoidance of vagueness and duplication. Building trust underpins this, and the Panel's independence is widely recognised. It is very important to maintain this and extend good working relationships to those who still do not fully provide their records to the system. In order to do all this, continuity of funding is essential. Government agencies and key NGOs recognise that, and funding has thankfully been maintained, despite many pressures. As recognition of the biodiversity crisis grows, the value for money of this system, which reports on so many key species, and supports so much conservation activity, should continue to be a major advantage. Long-term participation by so many existing and new recorders is therefore also vital!

Is the RBBP system transferable to other wildlife groups? Clearly, the sheer size and complexity of the UK bird-recording system makes specialist processes more feasible. Disturbance threats to breeding birds are probably more likely than for most other vertebrates, given the different breeding biologies and difficulty of finding many non-avian species, but collecting and habitat disturbance can be real threats to some plants and invertebrates. Based on conservation threat status, it may be appropriate that an analogue to the RBBP be developed for some other targeted groups of British wildlife.

Acknowledgements

The collection of half a century's data on the UK's rarest breeding birds has been an extraordinary and huge collective endeavour, involving thousands of volunteer observers, hundreds of county recorders and other data-suppliers, and 24 past and present RBBP members. Critically, it is dependent on funding and/or in-kind support – past and present – from RSPB, NCC/JNCC (on behalf of the country conservation agencies since 1991), BTO and *British Birds*. We extend our deepest gratitude to all.

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