The status of our bird populations: the fifth Birds of Conservation Concern in the United Kingdom, Channel Islands and Isle of Man and second IUCN Red List assessment of extinction risk for Great Britain

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Common Swifts *Apus apus*

Abstract The fifth review of *Birds of Conservation Concern* (*BoCC5*) in the UK, Channel Islands and Isle of Man assessed and assigned 245 species to updated Red, Amber and Green lists of conservation concern and showed a continuing decline in the status of our bird populations. In total, 70 species (29% of those assessed) are now on the Red list, up from 36 species in the first review in 1996. Since the last review, in 2015, Golden Oriole *Oriolus oriolus* has been lost as a breeding species. Eleven species have been moved to the Red list, while only six species moved from Red to Amber. Newly Red-listed species include Common Swift *Apus apus*, House Martin *Delichon urbicum*, Greenfinch *Chloris chloris* and the globally threatened Leach's Storm-petrel *Oceanodroma leucorhoa*. There has been no

improvement in the overall status of species associated with farmland and upland, or Afro-Palearctic migrants; indeed, more such species have been Red-listed. Concerns over the status of our wintering wildfowl and wader populations have also increased. As a direct result of targeted conservation action, White-tailed Eagle *Haliaeetus albicilla* has been moved from Red to Amber.

We also present the separate, and distinct, second IUCN Regional Red List assessment of extinction risk for Great Britain, which shows that 46% of 235 regularly occurring species, and 43% of 285 separate breeding and non-breeding populations, are assessed as being threatened with extinction from Great Britain.

Introduction

Regular assessments of status are crucial aids in identifying species and habitat conservation priorities, enabling us to target finite resources most effectively. The first formal assessment for UK birds listed 117 species (*Red Data Birds in Britain*, Batten *et al.* 1990). Since then, a process for identifying priority species has become well established: *Birds of Conservation Concern* (*BoCC*), which uses quantitative assessments against standardised criteria to allocate species to Red, Amber or Green lists depending on their level of conservation concern. Gibbons *et al.* (1996a; *BoCC1*) were the first to adopt this traffic-light system. Since then, the *BoCC* process has been repeated at regular intervals, by Gregory *et al.* (2002; *BoCC2*), Eaton *et al.* (2009; *BoCC3*) and Eaton *et al.* (2015; *BoCC4*). All of these reviews have used the same approach to establish priorities, although there have been some changes in the details of methodology to reflect growing experience and changes in data availability.

These reviews have documented the declining status of UK bird populations, with a progressive lengthening of the Red list, from 36 species in *BoCC1* to 67 in *BoCC4*. *BoCC1* raised the profile of the widespread decline of farmland birds, while subsequent reviews have highlighted other topics of concern, such as the plight of woodland birds in *BoCC2*, Afro-Palearctic migrants in *BoCC3* and upland birds in *BoCC4*. The reviews have also showcased conservation success stories, such as the recovery, or partial recovery, of some raptor species and Eurasian Bittern *Botaurus stellaris*.

We are extremely fortunate in the UK to have many thousands of dedicated volunteer birdwatchers, coordinated by professional research and conservation organisations, collecting information on our bird populations. As a result, an impressive repository of robust data, including regularly updated species' trends, population estimates and range maps, allow us to undertake detailed assessments such as *BoCC*. This level of information is rarely available for birds elsewhere, or for other taxonomic groups in the UK or beyond. Although similar exercises are carried out in Ireland (Gilbert *et al.* 2021), Wales (Johnstone & Bladwell 2016) and the Isle of Man (Morris & Sharpe 2021), the *BoCC* concept is not widely used elsewhere, so our reviews can rarely be viewed in a quantitative context beyond birds in the UK.

A more recently developed but now well-established approach, with many parallels to our own, is the International Union for Conservation of Nature (IUCN) Red List process. In contrast to *BoCC*, which concerns conservation in a broad sense, the IUCN assessment solely concerns extinction risk, using standardised criteria that can be applied to assess any plant or animal taxon. IUCN Red Lists are used to assess the global status of species (IUCN 2019; www.iucnredlist.org), but can also be applied at regional, national or local scales (IUCN 2012), including the *European Red List of Birds* (BirdLife International 2021). The IUCN approach is used to assess the status of a broad suite of our native wildlife and, to date, c. 12,000 species from around 40 taxonomic groups have been assessed Britain-wide, providing an increasingly detailed context within which to view the changing status of our birds. Recognising this, we conducted the first IUCN assessment of bird

populations in Britain in 2017 (*IUCN1*, Stanbury *et al.* 2017).

BoCC thus embraces factors such as change over longer periods than IUCN (notably including a historical context) and the international importance of UK bird populations. On the other hand, the IUCN approach allows different taxonomic groups to be assessed on a more level playing field, using the same well-established, internationally recognised criteria. This allows changes in status to be tracked and the potential creation of multi-taxa indicators (e.g. *Red List Index*, Butchart *et al.* 2005).

Here, we present the fifth *Birds of Conservation Concern* review for the UK, Channel Islands and Isle of Man (*BoCC5*), alongside the second IUCN Regional Red List assessment of extinction risk for Great Britain (*IUCN2*), thereby harmonising the timings of these two assessments. Our focus is on the current status of species (up to 2019 or winter 2019/20). The factors that are driving change in species' status are covered in detail elsewhere, such as in the *State of Nature* reports (e.g. Hayhow *et al.* 2019).

We had hoped to incorporate the results from the latest seabird census, *Seabirds Count*, in this review but, owing to delays to fieldwork caused by Covid-19, this has not been possible. As there are currently uncertainties around the status of some of our seabirds, we decided against the inclusion of most of these species and we shall publish an addendum after the census results become available. Thus, the assessment for breeding seabirds from previous reviews (Eaton *et al.* 2015; Stanbury *et al.* 2017) are transcribed here. The exception to this is Leach's Storm-petrel *Oceanodroma leucorhoa*, as most of the relevant data for this species are already available (Deakin *et al.* in press).

Luke Seitz

461. Leach's Storm-petrel *Oceanodroma leucorhoa*, Massachusetts, USA, August 2015. The St Kilda archipelago, off the coast of northwest Scotland, holds the vast majority of the UK breeding population of Leach's Storm-petrel. Recent surveys here have highlighted a decline of 68% between 2000 and 2019, likely in part due to predation by Great Skuas *Stercorarius skua*. This, along with Leach's Storm-petrel being classed as Vulnerable globally, has resulted in the species being added to the Red list and qualifying as Critically Endangered in Great Britain.

Methods

The *BoCC* assessment process

The *BoCC5* process followed those of previous reviews, whereby each bird species was assessed against a set of standardised Red- and Amber-list criteria, which remained unchanged since *BoCC4* (see below). Species were placed on the highest priority list for which they satisfied any criteria. If they met none of these criteria, they were placed on the Green list. Breeding species were placed on the list of 'former breeders' if they had not bred in any of the five most recent years for which data were available.

Red- and Amber-list criteria – colours denote which list the criterion is applicable to.

IUCN: Global IUCN Red List status. Species that are globally threatened (Critically Endangered, Endangered and Vulnerable, but not Near Threatened) under IUCN guidelines, as assessed by BirdLife International, the IUCN Red List Authority for birds in 2021 (www.iucnredlist.org).

ERLOB: European Red List status. Species that are threatened (Critically Endangered, Endangered and Vulnerable, but not Near Threatened) in Europe under IUCN guidelines, as assessed by BirdLife International, the IUCN Red List Authority for birds, in 2021 (BirdLife International 2021).

HD: Historical decline in breeding populations. Species judged to have declined severely between 1800 and 1995, from an assessment conducted by Gibbons *et al.* (1996b), and which have not recovered subsequently. Species that are deemed to have recovered partially are Amber-listed (see below), or Green-listed if they have recovered completely.

HDrec: Historical decline – recovery. Species previously Red-listed for historical decline, followed by an increase of at least 100% over 25 years or the longer-term period. If, following a move to HDrec, a species increases by at least 167% from its HDrec level, it no longer qualifies as HDrec (e.g. would move to Green if not qualifying under other criteria). Further explanation of this process is given in Eaton *et al.* (2015).

BDp/**BDMp**: Breeding population decline. Defined as a severe decline of >50% (**BDp**), or moderate decline (>25% but <50% **BDMp**) in the UK breeding population size over either of two assessment periods: 25 years (**BDp**[1]/**BDMp**[1]) or the longer term (**BDp**[2]/**BDMp**[2]). The latter is defined as the entire period used for assessments starting in 1969.

WDp/**WDMp**: Non-breeding population decline. Defined as a severe decline of >50% (**WDp**), or moderate decline (>25% but <50% **WDMp**) in the UK population size over either of two assessment periods: 25 years (**WDp**[1]/**WDMp**[1]) or the longer term (**WDp**[2]/**WDMp**[2]). Non-breeding trends were assessed only if a species has substantially independent breeding and non-breeding populations, otherwise only the breeding population was assessed. The same was true for other criteria which could be applied to both breeding and non-breeding populations.

BDr/**BDMr**: Breeding range decline. Defined as a severe decline in UK range of >50% (**BDr**) or moderate decline (>25% but <50% **BDMr**) between the breeding bird atlases in 1988–91 and 2007–11 (**BDr**[1]/**BDMr**[1]) or 1968–71 and 2007–11 (**BDr**[2]/**BDMr**[2]), as measured by the calculated change in the number of occupied 10-km squares.

WDr/**WDMr**: Non-breeding range decline. Defined as a severe decline in UK range of >50% (**WDr**[1]) or moderate decline (>25% but <50% **WDMr**[1]) between the wintering bird atlases 1981–84 and 2007–11, as measured by the calculated change in the number of occupied 10-km squares. Since there are only two wintering bird atlases, it was not possible to measure range change over a longer time period.

BR & **WR**: Breeding and non-breeding rarity. Species qualified as rare breeders (BR) if the UK breeding population was <300 pairs, and as rare non-breeders (WR) if the UK non-breeding population was <900 individuals.

BL & **WL**: Breeding and non-breeding localisation. Species were considered localised if more than 50% of the UK population was found at ten or fewer sites in either the breeding (BL) or the non-breeding (WL) season. Sites were defined as either Special Protection Areas (SPAs; Stroud *et al.* 2016) or Important Bird Areas (IBAs; Heath & Evans 2000). Rare breeders or rare non-breeders (see above) were not assessed against this criterion, as their small population sizes predispose them to be restricted to a small number of sites.

BI & **WI**: Breeding and non-breeding international importance. Species were considered of international importance if the UK holds at least 20% of the European population in either the breeding (BI) or the non-breeding (WI) season. European estimates were derived from data collated as part of the ERLOB assessments, but for non-breeding waterbirds we used estimates for the flyway populations for northwest Europe (wildfowl) or East Atlantic (waders) (CSR8; Wetlands International 2021).

The IUCN Regional Red List assessment process

We followed the IUCN's guidelines for the application of Red List criteria at regional and national levels. This regional process comprises three stages: 1) identify the taxa to be assessed; 2) assess the extinction risk faced by regional populations of each taxon as if in isolation using the global Red List criteria (IUCN 2019); and 3) consider the influence of potential interactions with populations outside the region. It is worth noting that the time periods used for the assessments differ between *BoCC* and IUCN. The IUCN assessments are based around the generation length, mainly multiplied by three, of each individual species, while those of *BoCC*, for all species, are based on the last 25 years and a longer time period (which is determined by data availability). Generation lengths for species were obtained directly from BirdLife International (Ian Burfield pers. comm.). These were recently reassessed by BirdLife International (e.g. Bird *et al.* 2020), so our assessment differs in this respect from *IUCN1*.

IUCN Red List criteria

Each species was assessed against the five standard IUCN Red List criteria (summarised below). See IUCN (2019) for full details.

- Criterion A: Reduction in the size (either abundance or range) of the population, measured over ten years or three generations, whichever is longer.
- Criterion B: Restricted geographical range in conjunction with fragmentation, continuing decline, or extreme population fluctuations.
- Criterion C: Small population size and continuing decline.
- Criterion D: Very small population or very restricted distribution.
- Criterion E: Quantitative analysis of extinction risk.

Each species was assessed against thresholds for each criterion and its subcriteria, which, if met or exceeded, qualified it for one of the standard IUCN Red List threat categories: Extinct, Regionally Extinct, Critically Endangered, Endangered, Vulnerable, Near Threatened and Least Concern. Data Deficient was used to indicate that a species was evaluated using available data but this was found to be insufficient to place the species into a category. For the Near Threatened category, which identifies species not considered formally threatened with extinction but sufficiently close to be likely to become so in the near future, we followed the examples in the guidelines (IUCN 2019; see Supplementary Online Material (SOM) https://doi.org/10.5061/dryad.cc2fqz672).

For species that have substantial and at least partially distinct breeding and non-breeding populations in Britain (defined as having a population in the non-breeding season that is more than twice the size of the breeding population), notably waterbirds, we assessed breeding and wintering populations separately.

The final stage of the Regional IUCN Red List process examines the extent to which neighbouring populations of the same species, outside the region, may affect extinction risk within the region by, for example, providing a 'rescue effect'. Under favourable conditions, such as a continuing or even increasing flow of immigrants into the region, it might be appropriate to downlist the threat category.

Populations qualifying as Critically Endangered, Endangered or Vulnerable after this final stage were collectively termed as 'threatened with extinction'. Where both breeding and non-breeding assessments were carried out, we followed the first *European Red List of Birds* (BirdLife International 2015) and the previous Great Britain assessments (Stanbury *et al.* 2017) and assigned the highest threat status from either population assessment to the species. Further details of the IUCN assessments are given in the SOM.

Species list

As in previous *BoCC* reviews (see Eaton *et al.* 2015), we considered only naturally occurring species with self-sustaining populations, with filters to exclude vagrants, defined as species assessed by the British Birds Rarities Committee (www.bbrc.org.uk), or species occurring only as scarce migrants (see e.g. White & Kehoe 2020a,b). Breeding species were considered only if they had been proven (or strongly suspected) to have bred for a period of at least five consecutive years within

the most recent 25 years for which data are available. Updating the list on the basis of these criteria resulted in the addition of Little Bittern *Ixobrychus minutus*, Cattle Egret *Bubulcus ibis*, Great White Egret *Ardea alba* and Black-winged Stilt *Himantopus himantopus* (all appear to have become, or are in the process of becoming, established regular breeders), and Yellow-browed Warbler *Phylloscopus inornatus* (no longer considered a scarce migrant). Unlike *BoCC4*, we did not include globally threatened species (www.iucnredlist.org) that have occurred in the UK in each of the last 25 years, regardless of scarcity in the UK, resulting in the removal of Aquatic Warbler *Acrocephalus paludicola* (assessed in *BoCC1* to *BoCC4*).

Note that some species were excluded from assessment as breeding species, but were assessed because they have larger or better-established non-breeding populations (e.g. Red-necked Grebe *Podiceps grisegena*).

The selection criteria used for *IUCN2* were similar to those for *BoCC5*, but differed in the following respects: i) we followed the Regional Red List recommendation (IUCN 2012) to exclude colonising species unless they have bred for ten consecutive years; ii) as with *IUCN1*, we applied an optional filter to exclude species that appear only on passage; iii) spatial differences between the UK and Great Britain. As a result, ten species assessed for *BoCC5* were excluded from the *IUCN2* assessment: Sooty Shearwater *Ardenna grisea*, Great Shearwater *A. gravis*, Black-winged Stilt, Curlew Sandpiper *Calidris ferruginea*, Little Stint *C. minuta*, Little Gull *Hydrocoloeus minutus*, Long-tailed Skua *Stercorarius longicaudus*, Pomarine Skua *S. pomarinus*, Snowy Owl *Bubo scandiacus* and Short-toed Treecreeper *Certhia brachydactyla*.

As with *BoCC3* and *4*, we conducted a parallel assessment of the *BoCC* status of regularly occurring races of birds in the UK. The process was as described in Eaton *et al.* (2009 & 2015) and mirrored the species-level assessment. As before, the lack of some data sources at a subspecific level (e.g. Global and European IUCN assessments, and monitoring data at the race level) required us to create new estimates of populations, trends and status outside the UK as best we could with existing data sources. For the first time, we carried out IUCN assessments for all of the relevant *BoCC* races.

Taxonomy in *BoCC5* follows HBW & BirdLife International (2020). Thus, Taiga Bean *Anser fabalis* and Tundra Bean Geese *A. serrirostris*, Carrion *Corvus corone* and Hooded Crows *C. cornix* and Common *Acanthis flammea* and Lesser Redpolls *A. cabaret* are treated as single species, with races assessed separately. For the crows and redpolls, this represents a change in status since their assessment in *BoCC4*. Further details and results of race assessments in *BoCC5* are given in the SOM.

Data sources

The principal sources of data were the same as for previous assessments and described in Eaton *et al.* (2009 & 2015), Stanbury *et al.* (2017), and in further detail in the SOM. Trend data was used up to summer 2019, winter 2019/20, or the most recently available year before then. The main data sources accessed were:

- The BTO/JNCC Common Birds Census (CBC) and BTO/JNCC/RSPB Breeding Bird Survey (BBS) (to 2019).
- The BTO Waterways Bird Survey (WBS) and BTO/JNCC/RSPB Waterways Breeding Bird Survey (WBBS) (to 2019).
- BTO/RSPB/JNCC Wetland Bird Survey (WeBS) and WWT/JNCC/NatureScot Goose and Swan Monitoring Programme (to 2019/20).
- The Rare Breeding Birds Panel database (to 2018).
- Periodic species surveys run under the Statutory Conservation Agency and RSPB Annual Breeding Birds Scheme (SCARABBS), BTO species surveys and the GWCT/BTO Woodcock survey.
- The three breeding bird atlases (Sharrock 1976; Gibbons *et al.* 1993; Balmer *et al.* 2013) and two wintering bird atlases (Lack 1986; Balmer *et al.* 2013).
- Two sources for seabird monitoring: the three complete censuses conducted in 1969–70 (Cramp *et al.* 1974), 1985–88 (Lloyd *et al.* 1991) and 1998–2001 (Mitchell *et al.* 2004), and the Seabird Monitoring Programme that has monitored a UK-wide sample of colonies since 1986. These data remained unchanged from *BoCC4* for most of the breeding seabirds.

- Population estimates from the Avian Population Estimates Panel (Woodward *et al.* 2020a).
- GWCT's National Gamebag Census (Aebischer 2019).

The process adopted the voluntary application of the National Statistics Code of Practice (https://code.statisticsauthority.gov.uk/voluntary-application). A statement of compliance is shown in the SOM.

Results

BoCC5

Former breeders

The two preceding *BoCC* reviews (Eaton *et al.* 2009, 2015) presented a list of former regularly breeding species in the UK. All eight species identified as such in *BoCC4* remain as former breeders in *BoCC5* (table 1). In addition, Golden Oriole *Oriolus oriolus* is now added to this list, as there have been no confirmed breeding records since 2009. All but one of the former breeders were not considered further and removed from the Red, Amber and Green list process. Black Tern *Chlidonias niger* remained as it was assessed for its passage population.

The updated Red, Amber and Green species lists

We assessed 245 species for the Red, Amber and Green lists in *BoCC5*. We placed 70 (29%) species on the Red list, 103 (42%) on the Amber list and 72 (29%) on the Green list (table 2).

A total of 29 species (12%) have moved lists since *BoCC4*: 11 species joined the Red list, with Ptarmigan *Lagopus muta* and Greenfinch *Chloris chloris* moving straight from Green to Red, and Bewick's Swan *Cygnus columbianus*, Common Goldeneye *Bucephala clangula*, Smew *Mergellus albellus*, Common Swift *Apus apus*, Dunlin *Calidris alpina*, Purple Sandpiper *C. maritima*, Leach's Storm-petrel, Montagu's Harrier *Circus pygargus* and House Martin *Delichon urbicum* moving from Amber to Red.

James Kennerley

462. Golden Oriole *Oriolus oriolus*, Uzbekistan, April 2018. With the last confirmed breeding in 2009, Golden Oriole moves to the list of former breeding species in *BoCC5*.

Table 1. Former regularly breeding species in the UK, with status from previous *BoCC* reviews. Species are placed on the Red (R) or Amber (A) lists, or identified as a former breeder (FB).

	Previous *BoCC* reviews				Last confirmed breeding attempt
	1 (1996)	2 (2002)	3 (2009)	4 (2015)	
Great Bustard *Otis tarda**	FB	FB	FB	FB	c.1833
Kentish Plover *Charadrius alexandrinus*	FB	FB	FB	FB	1979
Temminck's Stint *Calidris temminckii*	A	A	R	FB	1993
Black Tern *Chlidonias niger*	FB	FB	FB	FB	1975
Great Auk *Pinguinus impennis*	FB	FB	FB	FB	c.1812
Snowy Owl *Bubo scandiacus*	FB	FB	FB	FB	1975
Wryneck *Jynx torquilla*	R	R	R	FB	2002
Golden Oriole *Oriolus oriolus*	A	A	R	R	2009
European Serin *Serinus serinus*	A	A	A	FB	2006

* Although a Great Bustard reintroduction project has been under way since 2004, the population is not yet considered self-sustaining (BOU 2017) and was therefore not assessed for *BoCC5*.

Ptarmigan

BOX 1

In Britain, the Ptarmigan is restricted to the arctic-alpine heaths of the Scottish Highlands, with a population estimated at 2,000–15,000 pairs. The wide range in the estimate reflects cyclical fluctuations and a lack of formal surveys. As a quarry species, it may be hunted between 12th August and 10th December. The numbers shot and reported by Highland estates to GWCT's National Gamebag Census represent the only source of continuous long-term data on Ptarmigan in Scotland. Analysed in a similar way to standard avian monitoring data (Aebischer 2019), shooting returns ('bags') can be converted into annual indices to reveal the trend over time from 1961 to 2019 (fig. 1). The indices fluctuate considerably from year to year but show an overall decline from start to end (58 years) of 81% (95% confidence limits 39–94% decline). Interpreting trends in bag data is complicated because they reflect the effects of both abundance and shooting effort. Bags have, however, been found to be a good surrogate for abundance of Red Grouse *Lagopus lagopus* (Cattadori *et al.* 2003) and have been used to infer population fluctuations in Ptarmigan elsewhere (Nielsen & Pétursson 1995). The decline is consistent with the likely sensitivity of Ptarmigan to a northwards and upwards contraction of montane habitat caused by climate change (Moss 1998); the species has already been lost from lower marginal areas, especially in the southwest (Balmer *et al.* 2013), and 75% of estates reported declines across its southern range (Fletcher *et al.* 2013). Dedicated surveys of abundance, distribution and habitat are urgently needed to corroborate the trends in bags and monitor future change.

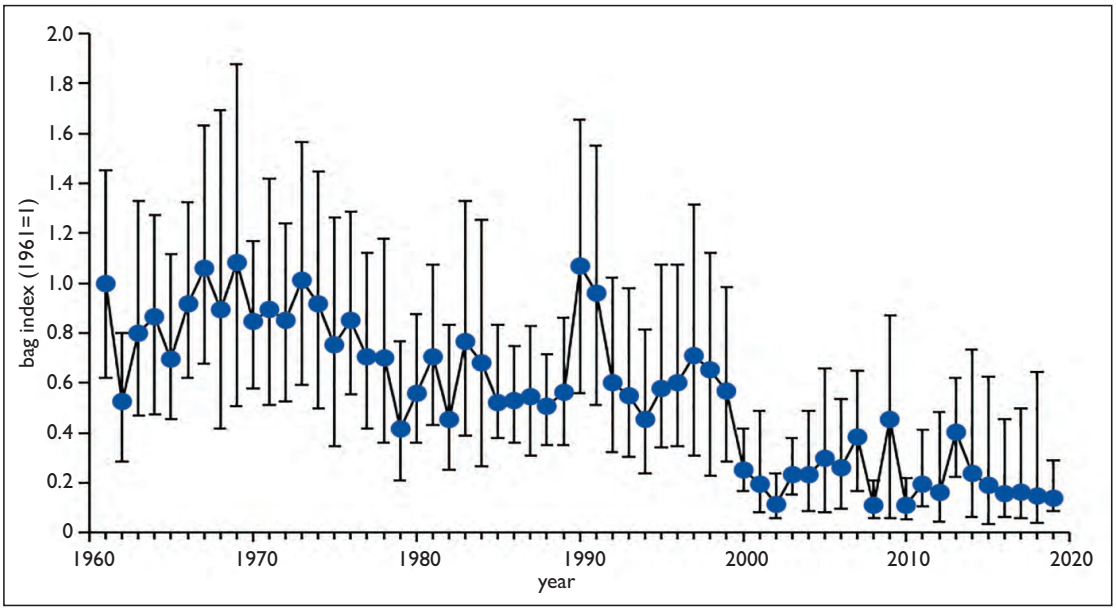

Fig. 1. Annual bag index (± 95% confidence limits) for Ptarmigan *Lagopus muta* in Scotland, 1961–2019, from GWCT's National Gamebag Census.

Six species moved from Green to Amber owing to increasing rates of decline in breeding or non-breeding populations: Red-breasted Merganser *Mergus serrator*, Moorhen *Gallinula chloropus*, Eurasian Sparrowhawk *Accipiter nisus*, Sedge Warbler *Acrocephalus schoenobaenus*, Common Whitethroat *Curruca communis* and Northern Wheatear *Oenanthe oenanthe*. A further three species moved from Green to Amber owing to other criteria: Rook *Corvus frugilegus* is now classed as Vulnerable at a European scale; and, in recognition of the significance of the UK population in a European context (now >20% of the breeding population), Wood Pigeon *Columba palumbus* and Wren *Troglodytes troglodytes* also move up to Amber.

The status of nine species has improved. Five species moved from Red to Amber owing to less severe declines: Song Thrush *Turdus philomelos*, Redwing *T. iliacus*, Pied Flycatcher *Ficedula hypoleuca*, Black Redstart *Phoenicurus*

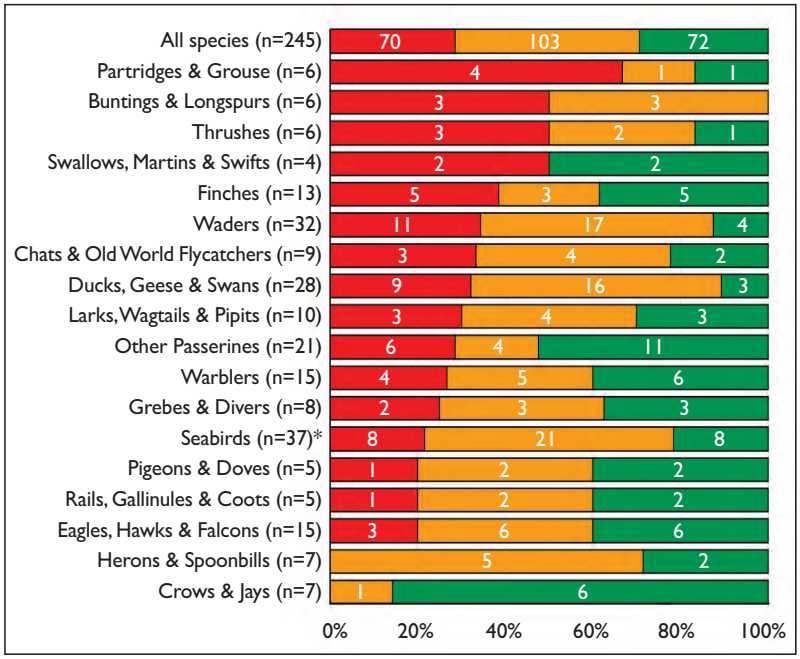

Fig. 2. Proportion of species allocated to the Red, Amber and Green lists in *BoCC5*, overall and split into different groupings. Groupings largely based around HBW & BirdLife International (2020) families.

n = number of species.

* Breeding seabird assessments were the same as in *BoCC4*.

ochruros and Grey Wagtail *Motacilla cinerea*. White-tailed Eagle *Haliaeetus albicilla* moved from Red to Amber as it no longer qualifies for Historical Decline (now HD recovering; see also box 5). Red Grouse *Lagopus lagopus*, Mute Swan *Cygnus olor* and Common Kingfisher *Alcedo atthis* moved from the Amber to the Green list.

Native partridges and grouse had the highest proportion of Red-listed species in *BoCC5* (fig. 2), followed by: buntings; thrushes; swallows, martins and swifts; finches; waders; chats and flycatchers; and wildfowl. No herons and spoonbills or crows and jays were Red-listed. Further details of the *BoCC* assessments, along with race-level results, can be found in the SOM.

IUCN2 overview

The second IUCN Regional Red List review of extinction risk for Great Britain assessed 243 species, making 293 individual assessments (210 breeding, 83 non-breeding). Fifty species were assessed for both breeding and non-breeding populations. One species (Great Auk *Pinguinus impennis*) qualified as Extinct and seven as Regionally Extinct (all the former breeding species shown in table 1, with the exception of Snowy Owl, which was not evaluated as the species had never bred for ten consecutive years and therefore never qualified as a colonising species under the IUCN guidelines (IUCN 2012)). Golden Oriole was assessed as Regionally Extinct, having been classed as Critically Endangered (Possibly Extinct) in the previous review (Stanbury *et al.* 2017).

The final assessments for the 235 regularly occurring, or extant, species is presented in table 2. Of these 235 species, 108 (46%) had at least one population (breeding and/or non-breeding) that qualified as threatened with extinction (21 Critically Endangered, 41 Endangered, 46 Vulnerable).

Of the 285 separate assessments of breeding and non-breeding populations, 21 qualified as Critically Endangered, 43 as Endangered, 58 as Vulnerable, 33 as Near Threatened, 127 as of Least Concern and three as Data Deficient. Hence, an estimated 43% of currently occurring populations qualified as threatened with extinction. The corresponding figure was greater for non-breeding assessments (50%) than breeding assessments (41%).

The recent reassessment of generation lengths by BirdLife International (Bird *et al.* 2020) resulted in the time window examined for the assessments changing for 225 of the 243 species when compared with those used for *IUCN1*. On this basis, coupled with it being only four years since Stanbury *et al.* (2017), we do not present a detailed assessment of change. However, there were some notable differences between the assessments. Both Spotted Crake *Porzana porzana* and Leach's Storm-petrel move to Critically Endangered, from Endangered and Least Concern respectively. Ten other populations, all previously assessed as Near Threatened or of Least Concern, move to a higher threat status by at least two categories. Breeding

Table 2. Species assessments from the UK *BoCC5*[a] and *IUCN2*[b], with qualifying criteria. Species order follows HBW & BirdLife International (2020)[e]. In *BoCC*, species were placed on the Red (R), Amber (A) or Green (G) lists. Previous versions shown for context (n = not assessed). IUCN threat status categories: Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT), Least Concern (LC), Data Deficient (DD) and Not Evaluated (NE).

Species	Previous *BoCC* reviews				*BoCC5* species assessment	*BoCC5* Red- & Amber-list qualifying criteria[a]	*IUCN2* species assessment	*IUCN2* population assessment with qualifying criteria[b] (br = breeding; n-br = non-breeding)
	1 (1996)	2 (2002)	3 (2009)	4 (2015)				
Common Quail *Coturnix coturnix*	R	R	A	A	Amber	HDrec, BDMp$^{1/2}$	EN	EN C1+2a(ii) (br)
Grey Partridge *Perdix perdix*	R	R	R	R	Red	BDp$^{1/2}$; BDMr^{2}	VU	VU A2b+3b+4b (br)
Red Grouse *Lagopus lagopus*	G	A	A	A	Green		LC	LC (br)
Ptarmigan *Lagopus muta*	G	G	G	G	Red	BDp$^{1/2}$	VU	VU C1+2a(ii) (br)
Capercaillie *Tetrao urogallus*	R	R	R	R	Red	BDp^{2}, BDr^{2}, WDr^{1}; BDMp^{1}	EN	EN C1 (br)
Black Grouse *Lyrurus tetrix*	R	R	R	R	Red	HD, BDp^{2}; BDMp^{1}, BDMr^{2}	VU	VU C1 (br)
Mute Swan *Cygnus olor*	G	A	G	A	Green		LC	LC (br); LC (n-br)
Whooper Swan *Cygnus cygnus*	A	A	A	A	Amber	BR, WL	EN	EN^{o} D (br); LC (n-br)
Bewick's Swan *Cygnus columbianus*	A	A	A	A	Red	WDp^{1}; ERLOB, WDMp^{2}, WL, WI	CR	CR A2b+3b+4b (n-br)
Brent Goose *Branta bernicla*	A	A	A	A	Amber	WL, WI	LC	LC (n-br)
Barnacle Goose *Branta leucopsis*	A	A	A	A	Amber	WL	LC	LC (n-br)
Greylag Goose *Anser anser*	A	A	A	A	Amber	WL, WI	LC	LC (br); LC (n-br)
'Bean Goose' *Anser fabalis*[c]	A	A	A	A	Amber	WDMp^{1}, WR	EN	EN A4b+C1 (n-br)
Pink-footed Goose *Anser brachyrhynchus*	A	A	A	A	Amber	WL, WI	LC	LC (n-br)
White-fronted Goose *Anser albifrons*	A	A	G	R	Red	WDp$^{1/2}$	EN	EN A2b+3b+4b (n-br)
Long-tailed Duck *Clangula hyemalis*	G	A	G	R	Red	IUCN	NT	NT C1+2a(ii) (n-br)
Common Eider *Somateria mollissima*	A	A	A	A	Amber	ERLOB, WDMp$^{1/2}$	EN	EN A4b (n-br)
Velvet Scoter *Melanitta fusca*	A	A	A	R	Red	IUCN; ERLOB, WL	VU	VU C1+2a(ii) (n-br)
Common Scoter *Melanitta nigra*	R	R	R	R	Red	BDp^{2}, BDr$^{1/2}$; BDMp^{1}, BR, WL	CR	CR C2a(ii) (br); LC (n-br)
Common Goldeneye *Bucephala clangula*	A	A	A	A	Red	WDp^{1}; BR	VU	VU D1 (br); VU A2b+3b+4b (n-br)
Smew *Mergellus albellus*	G	G	A	A	Red	WDp^{1}; WDMp^{2}, WR	CR	CR A4b+C1+2a(ii) (n-br)
Goosander *Mergus merganser*	G	G	G	G	Green		LC	LC (n-br)
Red-breasted Merganser *Mergus serrator*	G	G	G	G	Amber	WDMp^{1}	VU	NT A2c+3c+4c (br); VU A2b+3b+4b (n-br)
Common Shelduck *Tadorna tadorna*	A	A	A	A	Amber	BDMp^{1}, WDMp^{1}, WL	EN	EN A4b (br); VU A2b+3b+4b (n-br)
Common Pochard *Aythya ferina*	A	A	A	R	Red	IUCN, WDp^{1}; ERLOB, WDMp^{2}, BDMr$^{1/2}$	EN	VU A2c+3c+4c (br); EN A2b+3b+4b (n-br)

Table 2. *cont.*

Tufted Duck *Aythya fuligula*	G	G	A	G	Green		VU	VU A4b (br); LC (n-br)
Greater Scaup *Aythya marila*	A	A	R	R	Red	WDp[2]; WDMp[1], WL	EN	EN A2b+3b+4b (n-br)
Garganey *Spatula querquedula*	A	A	A	A	Amber	BR	EN	EN D (br)
Shoveler *Spatula clypeata*	A	A	A	A	Amber	WI	LC	LC (br); LC (n-br)
Gadwall *Mareca strepera*	A	A	A	A	Amber	WI	LC	LC (br); LC (n-br)
Eurasian Wigeon *Mareca penelope*	A	A	A	A	Amber	WL, WI	VU	VU D1 (br); NT A4b (n-br)
Mallard *Anas platyrhynchos*	G	G	A	A	Amber	WDMp[1/2]	VU	LC (br); VU A4b (n-br)
Pintail *Anas acuta*	A	A	A	A	Amber	ERLOB, BDMp[1], BDMr[1/2], BR, WL, WI	CR	CR C2a(ii) (br); VU A2b+3b+4b (n-br)
Eurasian Teal *Anas crecca*	A	A	A	A	Amber	WI	LC	LC (br); LC (n-br)
Little Grebe *Tachybaptus ruficollis*	G	G	A	G	Green		LC	LC (br); LC (n-br)
Red-necked Grebe *Podiceps grisegena*	A	A	A	R	Red	WDp[1]; ERLOB, WR	CR	CR C2a(ii) (n-br)
Great Crested Grebe *Podiceps cristatus*	G	G	G	G	Green		LC	LC (br); LC (n-br)
Slavonian Grebe *Podiceps auritus*	A	A	A	R	Red	IUCN, BDp[1/2]; BDMr[1], BR, WI	CR	CR C2a(ii) (br); VU D1 (n-br)
Black-necked Grebe *Podiceps nigricollis*	A	A	A	A	Amber	ERLOB, BR, WR	EN	EN D (br); EN D (n-br)
Rock Dove/Feral Pigeon *Columba livia*	G	G	G	G	Green		NT	NT A2b+3b+4b (br)
Stock Dove *Columba oenas*	A	A	A	A	Amber	BI	LC	LC (br)
Wood Pigeon *Columba palumbus*	G	G	G	G	Amber	BI	LC	LC (br)
Turtle Dove *Streptopelia turtur*	R	R	R	R	Red	IUCN, BDp[1/2], BDr[2]; ERLOB, BDMr[1]	CR	CR A2b+3b+4b (br)
Collared Dove *Streptopelia decaocto*	G	G	G	G	Green		NT	NT[o] A4b (br)
European Nightjar *Caprimulgus europaeus*	R	R	R	A	Amber	BDMr[2]	LC	LC (br)
Common Swift *Apus apus*	G	G	A	A	Red	BDp[1]	EN	EN A2b+3b+4b (br)
Common Cuckoo *Cuculus canorus*	G	A	R	R	Red	BDp[2]; BDMp[1]	LC	LC (br)
Water Rail *Rallus aquaticus*	A	A	G	G	Green		LC	LC (br)
Corn Crake *Crex crex*	R	R	R	R	Red	BDp[2], BDr[2]; HDrec	LC	LC (br)
Spotted Crake *Porzana porzana*	A	A	A	A	Amber	BR	CR	CR C2a(ii) (br)
Moorhen *Gallinula chloropus*	G	G	G	G	Amber	BDMp[2]	VU	VU A4b (br)
Common Coot *Fulica atra*	G	G	G	G	Green		VU	VU A4b (br); VU A4b (n-br)
Common Crane *Grus grus*	A	A	A	A	Amber	BR, WR	VU	VU[o] D (br)
Red-throated Diver *Gavia stellata*	A	A	A	G	Green		NT	NT A2c+3c+4c (br); LC (n-br)
Black-throated Diver *Gavia arctica*	A	A	A	A	Amber	BR, WR	VU	VU D1 (br)
Great Northern Diver *Gavia immer*	A	A	A	A	Amber	WI	LC	LC (n-br)
European Storm-petrel *Hydrobates pelagicus**	A	A	A	A	Amber	BL	LC	LC (br)
Leach's Storm-petrel *Oceanodroma leucorhoa*[e]	A	A	A	A	Red	IUCN, BDp[1]; BL, BI	CR	CR A4b (br)
Fulmar *Fulmarus glacialis**	G	A	A	A	Amber	ERLOB, BL	LC	LC (br)

Table 2. *cont.*

Sooty Shearwater *Ardenna grisea*	G	G	A	G	Green		NE	NE
Great Shearwater *Ardenna gravis*	G	G	G	G	Green		NE	NE
Manx Shearwater *Puffinus puffinus**	A	A	A	A	Amber	BDMr[2], BL, BI	LC	LC (br)
Balearic Shearwater *Puffinus mauretanicus*	n	n	R	R	Red	IUCN; ERLOB, WI	VU	VU D1 (n-br)
Eurasian Spoonbill *Platalea leucorodia*	n	A	A	A	Amber	BR, WR	VU	VU[o] D (br); VU[o] D (n-br)
Eurasian Bittern *Botaurus stellaris*	R	R	R	A	Amber	HDrec, BR, WR	VU	VU D1 (br); NT[o] D1 (n-br)
Little Bittern *Ixobrychus minutus*	n	n	n	n	Amber	BR	CR	CR D (br)
Cattle Egret *Bubulcus ibis*	n	n	n	n	Amber	BR	VU	VU[o] D (n-br)
Grey Heron *Ardea cinerea*	G	G	G	G	Green		VU	VU A4b (br); LC (n-br)
Great White Egret *Ardea alba*	n	n	n	n	Amber	BR, WR	EN	EN[o] D (br); VU[o] D (n-br)
Little Egret *Egretta garzetta*	n	A	A	G	Green		LC	LC (br); LC (n-br)
Northern Gannet *Morus bassanus**	A	A	A	A	Amber	BL, BI	LC	LC (br)
Shag *Phalacrocorax aristotelis*[e]*	A	A	A	R	Red	BDp[1]; BDMp[2], BI	EN	EN A2b+3b+4b (br)
Great Cormorant *Phalacrocorax carbo**	G	A	G	G	Green		NT	NT[o] A4b (br); LC (n-br)
Stone-curlew *Burhinus oedicnemus*	R	R	A	A	Amber	BDMr[2], BL	VU	VU A2c+3c+4c+D1 (br)
Oystercatcher *Haematopus ostralegus*	A	A	A	A	Amber	ERLOB, WL, WI, BI	VU	VU A4b (br)
Avocet *Recurvirostra avosetta*	A	A	A	A	Amber	BL, WL	LC	LC (br); LC (n-br)
Black-winged Stilt *Himantopus himantopus*	A	n	n	n	Amber	BR	NE	NE
Grey Plover *Pluvialis squatarola*	A	A	A	A	Amber	WDMp[1], WL	VU	VU A2b+3b+4b (n-br)
European Golden Plover *Pluvialis apricaria*	A	G	A	G	Green		LC	LC (br); LC (n-br)
Dotterel *Charadrius morinellus*[e]	A	A	A	R	Red	BDp[1]	VU	VU A2b+3b+4b+C1+2a(ii)+D1 (br)
Ringed Plover *Charadrius hiaticula*	A	A	A	R	Red	WDp[1]; BDMp[1], WDMp[2], WI	VU	NT A2b+3b+4b+C1+2a(ii) (br); VU A2b+3b+4b (n-br)
Little Ringed Plover *Charadrius dubius*	G	G	G	G	Green		LC	LC (br)
Northern Lapwing *Vanellus vanellus*	A	A	R	R	Red	BDp[2]; ERLOB, BDMp[1], WDMp[1]	VU	VU A2b+3b+4b (br); VU A2b+3b+4b (n-br)
Whimbrel *Numenius phaeopus*	A	A	R	R	Red	BDp[1], BDr[1]; BDMr[2], WR	EN	EN A2bc+3bc+4bc+C1+2a(ii) (br)
Eurasian Curlew *Numenius arquata*	A	A	A	R	Red	BDp[2]; BDMp[1], WDMp[1], BI	EN	EN A4b (br)
Bar-tailed Godwit *Limosa lapponica*	A	A	A	A	Amber	WL, WI	VU	VU A4b (n-br)
Black-tailed Godwit *Limosa limosa*	R	R	R	R	Red	HD; BDMr[1], BR, WL	EN	EN C2a(i)+D (br); LC (n-br)
Turnstone *Arenaria interpres*	A	A	A	A	Amber	WDMp[1]	VU	VU A4b (n-br)
Red Knot *Calidris canutus*	A	A	A	A	Amber	WL, WI	LC	LC (n-br)
Ruff *Calidris pugnax*	A	A	R	R	Red	BDr[1]; BDMp[1/2], BR	CR	CR D (br); EN A4b+C2a(ii) (n-br)
Curlew Sandpiper *Calidris ferruginea*	G	G	G	A	Amber	ERLOB	NE	NE
Sanderling *Calidris alba*	G	G	G	A	Amber	WL	LC	LC (n-br)

Table 2. *cont.*

Dunlin *Calidris alpina*	A	A	R	A	Red	WDp[2]; WDMp[1], BDMr[1], BL, WL	VU	VU A2c+3c+4c (br); VU A2b+3b+4b (n-br)
Purple Sandpiper *Calidris maritima*	A	A	A	A	Red	BDp[1]; WDMp[1], BDMr[1], BR	CR	CR B2ab(ii,iv,v)+C2a(i,ii)+D (br); VU A2b+3b+4b+C1+2a(ii) (n-br)
Little Stint *Calidris minuta*	G	G	G	G	Green		NE	NE
Woodcock *Scolopax rusticola*	A	A	A	R	Red	BDr[2]; BDMr[1]	VU	VU A2c+3c+4c (br); NT A2b+3b+4b (n-br)
Common Snipe *Gallinago gallinago*	A	A	A	A	Amber	ERLOB, WDMp[1], BDMr[2]	VU	LC (br); VU A4b (n-br)
Jack Snipe *Lymnocryptes minimus*	A	G	A	G	Green		LC	LC (n-br)
Red-necked Phalarope *Phalaropus lobatus*	R	R	R	R	Red	HD; BR	EN	EN D (br)
Common Sandpiper *Actitis hypoleucos*	G	G	A	A	Amber	BDMp[1/2], WR	NT	NT A2b+3b+4b (br)
Green Sandpiper *Tringa ochropus*	G	A	A	A	Amber	BDMr[1], BR, WR	CR	CR C1+D (br); VU D1 (n-br)
Spotted Redshank *Tringa erythropus*	G	A	A	A	Amber	WR	EN	EN D (n-br)
Greenshank *Tringa nebularia*	A	G	G	A	Amber	BL	LC	LC (br)
Common Redshank *Tringa totanus*	A	A	A	A	Amber	ERLOB, BDMp[1], BDMr[1/2], WI	VU	VU A2bc+3bc+4bc (br); NT A2b+3b+4b (n-br)
Wood Sandpiper *Tringa glareola*	A	A	A	A	Amber	BR, WR	EN	EN D (br)
Little Gull *Hydrocoloeus minutus*	A	G	A	G	Green		NE	NE
Kittiwake *Rissa tridactyla**	G	A	A	R	Red	BDp[1/2]; ERLOB	CR	CR A4b (br)
Black-headed Gull *Chroicocephalus ridibundus*[e]*	G	A	A	A	Amber	WDMp[1], WI	VU	LC (br); VU A2b+3b+4b (n-br)
Mediterranean Gull *Ichthyaetus melanocephalus*[e]*	A	A	A	A	Amber	BL	LC	LC (br)
Common Gull *Larus canus**	A	A	A	A	Amber	WI	LC	LC (br); LC (n-br)
Lesser Black-backed Gull *Larus fuscus**	A	A	A	A	Amber	BL, BI	DD	DD (br)
Herring Gull *Larus argentatus**	A	A	R	R	Red	BDp[2], WDp[1]; BI, WI	EN	DD (br); EN A2b+3b+4b (n-br)
Yellow-legged Gull *Larus michahellis**	n	n	A	A	Amber	BR	EN	EN[o] D (br); LC[o] (n-br)
Caspian Gull *Larus cachinnans*	n	n	n	A	Amber	WR	VU	VU[o] D (n-br)
Iceland Gull *Larus glaucoides*	G	G	A	A	Amber	WR	NT	NT[o] D1 (n-br)
Glaucous Gull *Larus hyperboreus*	G	G	A	A	Amber	WR	VU	VU[o] D (n-br)
Great Black-backed Gull *Larus marinus**	G	G	A	A	Amber	BDMp[2], WDMp[1]	EN	LC (br); EN A2b+3b+4b (n-br)
Little Tern *Sternula albifrons**	A	A	A	A	Amber	BDMr[2], BL	VU	VU A2c+3c+4c (br)
Black Tern *Chlidonias niger (passage only)*	G	G	A	G	Green		NE	
Roseate Tern *Sterna dougallii**	R	R	R	R	Red	BDp[1/2], BDr[2]; BDMr[1], BR	EN	EN[o] A2b+C2a(ii) (br)
Common Tern *Sterna hirundo**	G	G	A	A	Amber	BL	NT	NT A2b+3b+4b (br)
Arctic Tern *Sterna paradisaea**	A	A	A	A	Amber	BDMp[1], BDMr[1]	VU	VU A2c+3c+4c (br)
Sandwich Tern *Thalasseus sandvicensis**	A	A	A	A	Amber	BDMp[1], BL	LC	LC (br)
Long-tailed Skua *Stercorarius longicaudus*	G	G	G	G	Green		NE	NE
Arctic Skua *Stercorarius parasiticus**	G	G	R	R	Red	BDp[1]; BDMp[2]	CR	CR A4b (br)

Table 2. *cont.*

Pomarine Skua *Stercorarius pomarinus*	G	G	G	G	Green		NE	NE
Great Skua *Stercorarius skua*[e*]	A	A	A	A	Amber	BI, BL	LC	LC (br)
Puffin *Fratercula arctica**	A	A	A	R	Red	IUCN; ERLOB, BDMr^{2}, BL	LC	LC (br)
Black Guillemot *Cepphus grylle*[e*]	A	A	A	A	Amber	BDMr^{1}	LC	LC (br)
Razorbill *Alca torda**	A	A	A	A	Amber	BL, BI	LC	LC (br)
Little Auk *Alle alle*	G	G	G	G	Green		DD	DD (n-br)
Common Guillemot *Uria aalge**	A	A	A	A	Amber	BL, BI	LC	LC (br)
Barn Owl *Tyto alba*	A	A	A	G	Green		LC	LC (br)
Long-eared Owl *Asio otus*	G	G	G	G	Green		LC	LC (br)
Short-eared Owl *Asio flammeus*	A	A	A	A	Amber	BDMr$^{1/2}$	EN	EN A2c+3c+4c (br)
Tawny Owl *Strix aluco*	G	G	G	A	Amber	BDMp$^{1/2}$	NT	NT A2b+3b+4b (br)
Osprey *Pandion haliaetus*	R	A	A	A	Amber	HDrec, BR	NT	NT^{o} D1 (br)
Honey-buzzard *Pernis apivorus*	A	A	A	A	Amber	BR	EN	EN D (br)
Golden Eagle *Aquila chrysaetos*	A	A	A	G	Green		NT	NT D1 (br)
Marsh Harrier *Circus aeruginosus*	R	A	A	A	Amber	BL	LC	LC^{o} (br)
Hen Harrier *Circus cyaneus*	R	R	R	R	Red	HD; BDMp^{1}	EN	EN C1 (br)
Montagu's Harrier *Circus pygargus*	A	A	A	A	Red	BDp^{1}; BDMr^{2}, BR	CR	CR A4b+C1+2a(ii)+D (br)
Eurasian Sparrowhawk *Accipiter nisus*	G	G	G	G	Amber	BDMp^{1}	VU	VU A4b (br)
Northern Goshawk *Accipiter gentilis*	G	G	G	G	Green		NT	NT D1 (br)
White-tailed Eagle *Haliaeetus albicilla*	R	R	R	R	Amber	HDrec, BR	EN	EN D (br)
Red Kite *Milvus milvus*	R	A	A	G	Green		LC	LC (br)
Common Buzzard *Buteo buteo*	G	G	G	G	Green		LC	LC (br)
Common Kingfisher *Alcedo atthis*	A	A	A	A	Green		VU	VU C1+2a(ii) (br)
Green Woodpecker *Picus viridis*	A	A	A	G	Green		NT	NT A2b+3b+4b (br)
Lesser Spotted Woodpecker *Dryobates minor*	G	R	R	R	Red	BDp$^{1/2}$; BDMr$^{1/2}$	EN	EN A2b+3b+4b+C1+2a(ii) (br)
Great Spotted Woodpecker *Dendrocopos major*	G	G	G	G	Green		LC	LC (br)
Common Kestrel *Falco tinnunculus*	A	A	A	A	Amber	BDMp$^{1/2}$	VU	VU A4b (br)
Merlin *Falco columbarius*	R	A	A	R	Red	HD; ERLOB	EN	EN C2a(ii) (br)
Hobby *Falco subbuteo*	G	G	G	G	Green		NT	NT A4b (br)
Peregrine Falcon *Falco peregrinus*	A	A	G	G	Green		LC	LC (br)
Red-backed Shrike *Lanius collurio*	R	R	R	R	Red	HD, BDp$^{1/2}$, BDr^{2}; BR	CR	CR D (br)
Red-billed Chough *Pyrrhocorax pyrrhocorax*	A	A	A	G	Green		VU	VU D1 (br)
Eurasian Jay *Garrulus glandarius*	G	G	G	G	Green		LC	LC (br)
Magpie *Pica pica*	G	G	G	G	Green		LC	LC (br)

Table 2. *cont.*

Jackdaw *Coloeus monedula*[e]	G	G	G	G	Green		LC	LC (br)
Rook *Corvus frugilegus*	G	G	G	G	Amber	ERLOB	NT	NT A2b+3b+4b (br)
Common Raven *Corvus corax*	G	G	G	G	Green		LC	LC (br)
'Carrion/Hooded Crow' *Corvus corone*[c,d]	G	G	G	G	Green		LC	LC (br)
Coal Tit *Periparus ater*	G	G	G	G	Green		LC	LC (br)
Crested Tit *Lophophanes cristatus*	A	G	A	G	Green		LC	LC (br)
Marsh Tit *Poecile palustris*	A	R	R	R	Red	BDp^2; $BDMp^1$	NT	NT A2b+3b+4b (br)
Willow Tit *Poecile montanus*	A	R	R	R	Red	$BDp^{1/2}$, BDr^2; $BDMr^1$, $WDMr^1$	EN	EN A2c+3c+4c (br)
Blue Tit *Cyanistes caeruleus*	G	G	G	G	Green		LC	LC (br)
Great Tit *Parus major*	G	G	G	G	Green		LC	LC (br)
Shore Lark *Eremophila alpestris*	n	n	A	A	Amber	WR	EN	EN D (n-br)
Woodlark *Lullula arborea*	R	R	A	G	Green		LC	LC (br)
Skylark *Alauda arvensis*	R	R	R	R	Red	BDp^2	LC	LC (br); LC (n-br)
Bearded Tit *Panurus biarmicus*	A	A	A	G	Green		LC	LC (br)
Sedge Warbler *Acrocephalus schoenobaenus*	G	G	G	G	Amber	$BDMp^2$	NT	NT A4b (br)
Marsh Warbler *Acrocephalus palustris*	R	R	R	R	Red	$BDp^{1/2}$; BR	CR	D (br)
Reed Warbler *Acrocephalus scirpaceus*	G	G	G	G	Green		LC	LC (br)
Savi's Warbler *Locustella luscinioides*	A	R	R	R	Red	$BDp^{1/2}$; $BDMr^1$, BR	CR	CR D (br)
Grasshopper Warbler *Locustella naevia*	A	R	R	R	Red	BDp^2	LC	LC (br)
House Martin *Delichon urbicum*	G	A	A	A	Red	BDp^2	NT	NT A2b+3b+4b (br)
Barn Swallow *Hirundo rustica*	A	A	A	G	Green		VU	VU A2b+3b+4b (br)
Sand Martin *Riparia riparia*	A	A	A	G	Green		LC	LC (br)
Wood Warbler *Phylloscopus sibilatrix*	G	A	R	R	Red	BDp^1; $BDMr^{1/2}$	VU	VU A2c+3c+4bc (br)
Yellow-browed Warbler *Phylloscopus inornatus*	n	n	n	n	Amber	WR	EN	EN[o] D (n-br)
Willow Warbler *Phylloscopus trochilus*	G	A	A	A	Amber	$BDMp^2$	LC	LC (br)
Common Chiffchaff *Phylloscopus collybita*	G	G	G	G	Green		LC	LC (br)
Cetti's Warbler *Cettia cetti*	A	G	G	G	Green		LC	LC (br)
Long-tailed Tit *Aegithalos caudatus*	G	G	G	G	Green		LC	LC (br)
Blackcap *Sylvia atricapilla*	G	G	G	G	Green		LC	LC (br)
Garden Warbler *Sylvia borin*	G	G	G	G	Green		LC	LC (br)
Lesser Whitethroat *Curruca curruca*[e]	G	G	G	G	Green		LC	LC (br)
Common Whitethroat *Curruca communis*[e]	G	G	A	G	Amber	$BDMp^2$	LC	LC (br)
Dartford Warbler *Curruca undata*[e]	R	A	A	A	Amber	HDrec, BL	LC	LC (br)
Short-toed Treecreeper *Certhia brachydactyla*	G	G	A	A	Amber	BR	NE	NE

Table 2. *cont.*

Eurasian Treecreeper *Certhia familiaris*	G	G	G	G	Green		LC	LC (br)
Eurasian Nuthatch *Sitta europaea*	G	G	G	G	Green		LC	LC (br)
Wren *Troglodytes troglodytes*	G	G	G	G	Amber	BI	LC	LC (br)
Dipper *Cinclus cinclus*	G	G	G	A	Amber	$BDMp^{2}$	LC	LC (br)
Common Starling *Sturnus vulgaris*	A	R	R	R	Red	$BDp^{1/2}$	VU	VU A2b+3b+4b (br); LC (n-br)
Mistle Thrush *Turdus viscivorus*	G	A	A	R	Red	BDp^{2}; $BDMp^{1}$	NT	NT A2b+3b+4b (br)
Song Thrush *Turdus philomelos*	R	R	R	R	Amber	$BDMp^{2}$	LC	LC (br)
Redwing *Turdus iliacus*	A	A	R	R	Amber	$BDMr^{1/2}$, BR	CR	CR D (br); LC (n-br)
Blackbird *Turdus merula*	A	G	G	G	Green		LC	LC (br)
Fieldfare *Turdus pilaris*	A	A	R	R	Red	$BDp^{1/2}$, BDr^{1}; $BDMr^{2}$, BR	CR	CR A2c+3c+4c+C2a(i,ii)+D (br); LC (n-br)
Ring Ouzel *Turdus torquatus*	A	R	R	R	Red	BDp^{2}; $BDMr^{2}$	NT	NT A2c+3c+4c (br)
Spotted Flycatcher *Muscicapa striata*	R	R	R	R	Red	$BDp^{1/2}$	NT	NT A4b (br)
Robin *Erithacus rubecula*	G	G	G	G	Green		LC	LC (br)
Common Nightingale *Luscinia megarhynchos*	A	A	A	R	Red	$BDp^{1/2}$; $BDMr^{2}$	VU	VU A4b (br)
Pied Flycatcher *Ficedula hypoleuca*	G	G	A	R	Amber	$BDMp^{1}$, $BDMr^{1}$	NT	NT A2c+3c+4c (br)
Black Redstart *Phoenicurus ochruros*	A	A	A	R	Amber	BR, WR	VU	VU^{o} D (br); NT^{o} D1 (n-br)
Common Redstart *Phoenicurus phoenicurus*	A	A	A	A	Amber	$BDMr^{2}$	LC	LC (br)
Whinchat *Saxicola rubetra*	G	G	A	R	Red	BDp^{1}; $BDMr^{1/2}$	NT	NT A2c+3c+4bc (br)
European Stonechat *Saxicola rubicola*	A	A	G	G	Green		LC	LC (br)
Northern Wheatear *Oenanthe oenanthe*	G	G	A	G	Amber	$BDMp^{1}$	EN	EN A4b (br)
Goldcrest *Regulus regulus*	G	A	G	G	Green		LC	LC (br)
Firecrest *Regulus ignicapilla*	A	A	A	G	Green		LC	LC (br)
Waxwing *Bombycilla garrulus*	G	G	G	G	Green		LC	LC (n-br)
Dunnock *Prunella modularis*	A	A	A	A	Amber	$BDMp^{2}$	LC	LC (br)
House Sparrow *Passer domesticus*	G	R	R	R	Red	BDp^{2}	LC	LC (br)
Tree Sparrow *Passer montanus*	R	R	R	R	Red	BDp^{2}; $BDMr^{2}$	VU	VU A2c+3c+4c (br)
Tree Pipit *Anthus trivialis*	G	A	R	R	Red	BDp^{2}; $BDMr^{2}$	LC	LC (br)
Meadow Pipit *Anthus pratensis*	G	A	A	A	Amber	$BDMp^{2}$	LC	LC (br)
Water Pipit *Anthus spinoletta*	G	G	A	A	Amber	WR	EN	EN D (n-br)
Rock Pipit *Anthus petrosus*	G	G	G	G	Green		LC	LC (br)
Yellow Wagtail *Motacilla flava*	G	A	R	R	Red	BDp^{2}; $BDMp^{1}$, $BDMr^{1/2}$	NT	NT A2c+3c+4c (br)
Grey Wagtail *Motacilla cinerea*	G	A	A	R	Amber	$BDMp^{2}$	NT	NT A2b+3b+4b (br)
White/Pied Wagtail *Motacilla alba*	G	G	G	G	Green		LC	LC (br)
Common Chaffinch *Fringilla coelebs*	G	G	G	G	Green		EN	EN A4b (br)

Table 2. *cont.*

Brambling *Fringilla montifringilla*	A	G	G	G	Green		LC	LC (n-br)
Hawfinch *Coccothraustes coccothraustes*	A	A	R	R	Red	BDp[1], BDr[1/2]	EN	EN A2bc+3bc+4bc+C1+2a(ii) (br)
Bullfinch *Pyrrhula pyrrhula*	R	R	A	A	Amber	BDMp[2]	LC	LC (br)
Greenfinch *Chloris chloris*	G	G	G	G	Red	BDp[1/2]	EN	EN A2b+3b+4b (br)
Twite *Linaria flavirostris*	R	R	R	R	Red	HD, BDp[1]	EN	EN A2b+3b+4b (br)
Linnet *Linaria cannabina*	R	R	R	R	Red	BDp[2]	LC	LC (br)
'Redpoll' *Acanthis flammea*[c,d]	G	A	R	R	Red	BDp[2]	LC	LC (br)
Parrot Crossbill *Loxia pytyopsittacus*	A	A	A	A	Amber	BR	EN	EN D (br)
Scottish Crossbill *Loxia scotica*	R	R	A	A	Amber	BI	LC	LC (br)
Common Crossbill *Loxia curvirostra*	G	G	G	G	Green		LC	LC (br)
Goldfinch *Carduelis carduelis*	A	G	G	G	Green		LC	LC (br)
Siskin *Spinus spinus*	G	G	G	G	Green		LC	LC (br)
Lapland Bunting *Calcarius lapponicus*	G	G	A	A	Amber	WR	VU	VU D1 (n-br)
Snow Bunting *Plectrophenax nivalis*	A	A	A	A	Amber	BR	EN	EN D (br); LC (n-br)
Corn Bunting *Emberiza calandra*	R	R	R	R	Red	HD, BDp[2], BDr[2]; BDMp[1], BDMr[1], WDMr[1]	NT	NT A2c+3c+4c (br)
Cirl Bunting *Emberiza cirlus*	R	R	R	R	Red	BDr[2]	LC	LC (br)
Yellowhammer *Emberiza citrinella*	G	R	R	R	Red	BDp[2]; BDMp[1]	LC	LC (br)
Reed Bunting *Emberiza schoeniclus*	R	R	A	A	Amber	BDMp[2]	LC	LC (br)

[a] ***BoCC* Red-list criteria** IUCN: Globally threatened; HD: historical decline in the breeding population; BDp[1/2]: severe breeding population decline over 25 years/longer term; WDp[1/2]: severe non-breeding population decline over 25 years/longer term; BDr[1/2]: severe breeding range decline over 25 years/longer term; WDr[1]: severe non-breeding range decline over 25 years. ***BoCC* Amber-list criteria** ERLOB: Threatened in Europe; HDrec: historical decline – recovery; BDMp[1/2]: moderate breeding population decline over 25 years/longer term; WDMp[1/2]: moderate non-breeding population decline over 25 years/longer term; BDMr[1/2]: moderate breeding range decline over 25 years/longer term; WDMr[1]: moderate non-breeding range decline over 25 years; BR/WR: breeding/non-breeding rarity; BL/WL: breeding/non-breeding localisation; BI/WI: breeding/non-breeding international importance.

[b] **IUCN main criteria** A = population size reduction; B = restricted geographic range; C = small population size and decline; D = very small or restricted population. Details on subcriteria can be found at www.iucnredlist.org. [o] denotes that the taxa was downlisted during the regional stage of the IUCN process owing to potential rescue effects.

[c] The assessments follow HBW & BirdLife International (2020) taxonomy. The following six taxa, recognised as species by Gill *et al.* (2020) but as races by HBW & BirdLife International, were assessed at race level (with *BoCC5* and *IUCN2* assessments in parentheses): Taiga Bean Goose *Anser f. fabalis* (Red, CR); Tundra Bean Goose *A. f. rossicus* (Amber, VU); Carrion Crow *Corvus c. corone* (Green, LC); Hooded Crow *C. c. cornix* (Green, EN); Common Redpoll *Acanthis f. flammea* (Amber, EN); Lesser Redpoll *A. f. cabaret* (Red, LC).

[d] Species-level taxonomic changes since *BoCC4*/*IUCN1*.

[e] Scientific names in HBW & BirdLife International (2020) differ from those used here. The HBW & BirdLife International scientific names are as follows: Leach's Storm-petrel *Hydrobates leucorhous*; Shag *Gulosus aristotelis*; Dotterel *Eudromias morinellus*; Black-headed Gull *Larus ridibundus*; Mediterranean Gull *L. melanocephalus*; Great Skua *Catharacta skua*; Jackdaw *Corvus monedula*; Lesser Whitethroat *Sylvia curruca*; Common Whitethroat *S. communis*; Dartford Warbler *S. undata*.

* Seabird assessments based on those from Eaton *et al.* (2015) and Stanbury *et al.* (2017).

Common Quail *Coturnix coturnix*, Northern Wheatear, Common Chaffinch *Fringilla coelebs* and Twite *Linaria flavirostris* move to Endangered, while breeding Ptarmigan, Tufted Duck *Aythya fuligula*, Oystercatcher *Haematopus ostralegus,* Common Kingfisher, Barn Swallow *Hirundo rustica* and non-breeding Bar-tailed Godwit *Limosa lapponica* move to Vulnerable. Conversely, breeding populations of Great Crested Grebe *Podiceps cristatus*, Woodlark *Lullula arborea* and Dartford Warbler *Curruca undata* move from Vulnerable in *IUCN1* to being of Least Concern. Further details of the IUCN assessments, along with race-level results, can be found in the SOM.

Discussion

The continued long-term decline in the status of UK bird populations

All previous *BoCC* assessments have highlighted a continuing decline in the status of UK bird populations, with an ever-growing Red list. Unfortunately, this trend continues with the results from *BoCC5*. We have now placed 70 species (28.6% of those assessed) on the Red list, and the length of the Red list has grown by three species since *BoCC4*, with 11 species moving on and six moving off to Amber. Two other species were not assessed for the Red, Amber and Green lists in *BoCC5*: Golden Oriole, a species that never had more than a toehold in the UK, has now been lost as a regular breeding species and joins the list of former breeders, while Aquatic Warbler (Red-listed in *BoCC1* to *BoCC4*) was removed in *BoCC5* owing to change in species selection criteria. Newly Red-listed species include some of our more familiar birds, such as Common Swift, House Martin and Greenfinch. Two rare breeders, Montagu's Harrier and Purple Sandpiper, are close to being lost from the UK, with just two and one breeding pair, respectively, reported in 2019 (Eaton *et al.* 2021). The length of the Amber list has also grown, by seven species. It is important to note that there were no changes in assessment criteria between *BoCC4* and *BoCC5*, and any movements between lists were as a direct result of changes in species status.

BoCC4 saw the addition of 20 species to the Red list with only three species moving off to Amber. The magnitude of the changes reported here in *BoCC5* is less, but overall more species still qualified for the Red list than ever before (fig. 3). Since *BoCC1* (25 years ago), and notwithstanding some minor changes to taxonomy and the details of some of our criteria, the number of former

The declining status of swifts and hirundines

BOX 2

Many of our aerial insectivores are in trouble. Both Common Swift and House Martin move from the Amber to Red list in *BoCC5* owing to severe population declines of 58% (1995 to 2018) and 57% (1969 to 2018) respectively. The former is IUCN Endangered, the latter Near Threatened. The causes of Common Swift decline are unclear and more robust evidence is needed, but the loss of traditional nest sites is likely to be a contributory factor. Conservation action has so far focused on protecting existing sites and providing artificial nest sites, by erecting nestboxes and promoting the installation of Swift bricks within new housing developments. Similarly, House Martins prefer to use existing nests remaining from the previous year, and house owners are encouraged to leave them in place. The causes of the House Martin decline also remain unclear, but several factors on their breeding grounds and in Africa have been suggested, including climate and land-use changes (Woodward *et al.* 2020b; Kettel *et al.* 2021). Another aerial insectivore to show recent declines is the Barn Swallow, with a 31% decrease between 2008 and 2018 (Harris *et al.* 2020). Although it does not currently exceed a *BoCC* threshold over either assessment period, the recent decline led to Barn Swallow being classified as Vulnerable to extinction within the *IUCN2* assessment. All three species spend the non-breeding season in the sub-Saharan humid and southern zones (Vickery *et al.* 2014). This is in contrast to Sand Martin *Riparia riparia*, which is currently Green-listed, winters farther north in the arid zone, and shows a 28% increase over the last 25 years (Harris *et al.* 2020).

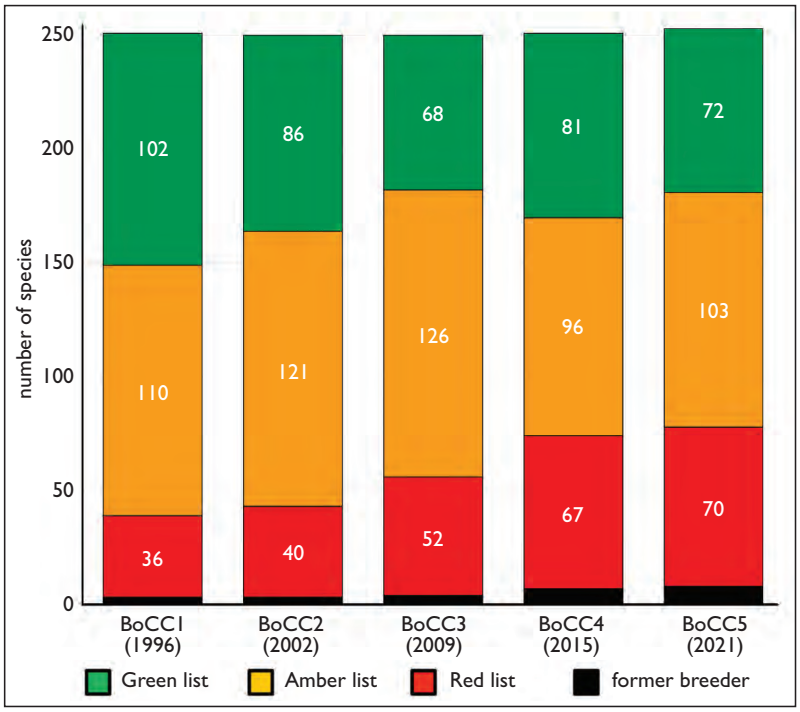

Fig. 3. Length of the Red, Amber and Green lists across all five *BoCC* reviews. Note that the assessment process has developed over time and this figure does not take account of changes to criteria, taxonomy or species joining or being omitted. Some changes in Red-, Amber- and Green-list lengths have been as a consequence of these changes. For example, the move from using the Species of European Conservation Concern (SPEC) assessments to the European Red List of Birds to determine the wider regional concern for a species in *BoCC4* resulted in a reduction in the length of the Amber list.

breeders has increased by four and the number of Red-listed species has nearly doubled (36 to 70), while the number of species on the Green list has decreased by almost a third, from 102 to 72.

Criteria affecting the length of the lists

Much of the increase in the length of the Red and Amber lists arises because more species qualify by virtue of more severe declines in their breeding population. In *BoCC5*, 77 species showed breeding-abundance declines that exceeded at least the Amber-list threshold (54 for 25-year decline and 57 for longer-term decline), up from 29 in *BoCC1* (25-year decline only).

No species qualified for the Red or Amber list through non-breeding population declines in *BoCC1* but 23 species, primarily wildfowl and waders, exceeded at least the Amber list threshold in this review. The publication of the most recent atlas (Balmer *et al.* 2013) saw the number of species qualifying for the breeding range criteria ($BDr^{1/2}$/$BDMr^{1/2}$) more than double, from 21 in *BoCC1* to 46 in *BoCC4* (these data remained unchanged in *BoCC5*). The number of species qualifying for the Historical Decline (HD), localisation (BL/WL) and international importance (BI/WI) criteria shows a small reduction over time, with eight, 38 and 34 species qualifying in *BoCC5*, respectively.

There has been a worrying trend towards more of the UK's regularly occurring species being classed as threatened with global extinction by the IUCN (www.iucnredlist.org); with the addition of Leach's Storm-petrel and Kittiwake *Rissa tridactyla*, there are now nine.

Existing and emerging themes

Previous *BoCC* reviews have highlighted the plight of bird communities breeding in farmland, the uplands and woodland. In *BoCC5*, we found no improvement in the overall status of the first two of these groupings (as defined by Gibbons *et al.* 1993 and Eaton *et al.* 2015); indeed, more species have been Red-listed. Since *BoCC4*, the number of Red-listed farmland species increased from 12 to 14, with the addition of Montagu's Harrier and Greenfinch, while Common Whitethroat moved from Green to Amber. It is a similar story among species associated with uplands, where the number of Red-listed species increased from 12 to 14, with the addition of Ptarmigan (see also box 1), Purple Sandpiper and Dunlin, while Grey Wagtail showed a positive move back to Amber. Furthermore, Northern Wheatear and Red-breasted Merganser moved from Green to Amber. Note, however, that both Dunlin and Red-breasted Merganser moved lists owing to declines in non-breeding population; we do not have robust breeding

David Tipling

463. Greenfinch *Chloris chloris*, Norfolk, November 2008. In *BoCC5*, the Greenfinch has moved directly from the Green to the Red list due to a dramatic population crash caused by a severe outbreak of trichomonosis. As of 2019, the decline shows no sign of abating.

Afro-Palearctic long-distance migrants

BOX 3

The populations of many species of long-distance, European-breeding Afro-Palearctic migrants are in sharp decline. Potential causes are diverse and occur across widely separated breeding, migration and wintering sites. Degradation of breeding habitat as well as the interactions between habitat degradation and climatic factors in their non-breeding areas, such as Sahel zone droughts, are believed to be key factors (Vickery *et al.* 2014).

The worrying plight of our Afro-Palearctic migrants in the UK was raised in *BoCC3* when Common Cuckoo, Whimbrel *Numenius phaeopus*, Golden Oriole, Wood Warbler *Phylloscopus sibilatrix* and Tree Pipit *Anthus trivialis* were all added to the Red list. These were joined by Common Nightingale *Luscinia megarhynchos*, Pied Flycatcher and Whinchat *Saxicola rubetra* in *BoCC4*. The status of these long-distance migrants continues to decline, with Common Swift and House Martin moving to the Red list, and Sedge Warbler, Common Whitethroat and Northern Wheatear going from the Green to Amber list in this review. Hewson & Noble (2009) were the first to note differing trends between those that spend the non-breeding season in the arid northern zone and those that spend it in the humid southern areas. Although the status of the arid-zone species continues to decline (fig. 4a), it is the species that winter farther south that are of higher conservation concern (fig. 4b). Only Pied Flycatcher shows a positive move from the Red list back to Amber, but the trend for this species remains close to the Red-list threshold. Wryneck *Jynx torquilla* and Golden Oriole joined the list of former breeders in *BoCC4* and *BoCC5* respectively.

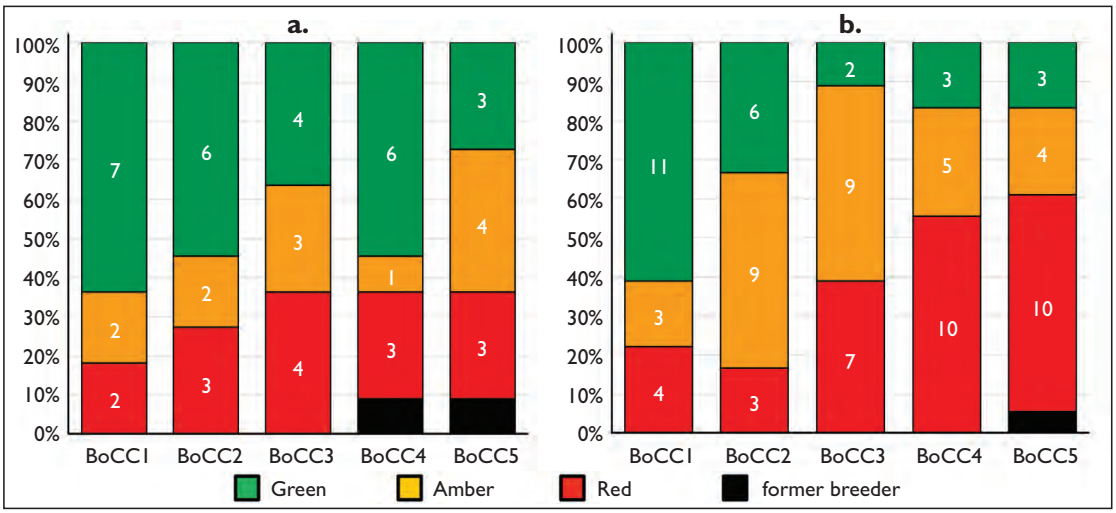

Fig. 4. The changing status between *BoCC1* and *BoCC5* of long-distance Afro-Palearctic migrants that spend the non-breeding season in the (a) arid zone (11 species) and (b) humid and southern zone (18 species). Species groups and wintering zones defined by Vickery *et al.* (2014).

Wintering waterbirds in decline

BOX 4

In this *BoCC* review, we highlight the declining status of non-breeding waterbird populations. The UK holds internationally important assemblages of wintering wildfowl and waders, as demonstrated by 20 species meeting our Amber-list non-breeding international importance criterion. No wintering trends exceeded Red-list thresholds in *BoCC1* and *BoCC2* (fig. 5), but this has changed. *BoCC3* and *BoCC4* highlighted the plight of White-fronted Goose *Anser albifrons*, Greater Scaup *Aythya marila*, Common Pochard *A. ferina* and Ringed Plover *Charadrius hiaticula*. A further four species have now joined the Red list owing to declines in non-breeding populations: Bewick's Swan, Common Goldeneye, Dunlin and Smew, while Red-breasted Merganser moved from Green to Amber. Pressures are wide-ranging, from threats on migration, illegal hunting, ingestion of lead ammunition to the impacts of climate change. Assessing drivers is further complicated by the fact that many wintering waterbird populations in the UK have been affected by 'short-stopping', whereby species have shifted their wintering grounds northeastwards in response to increased temperatures.

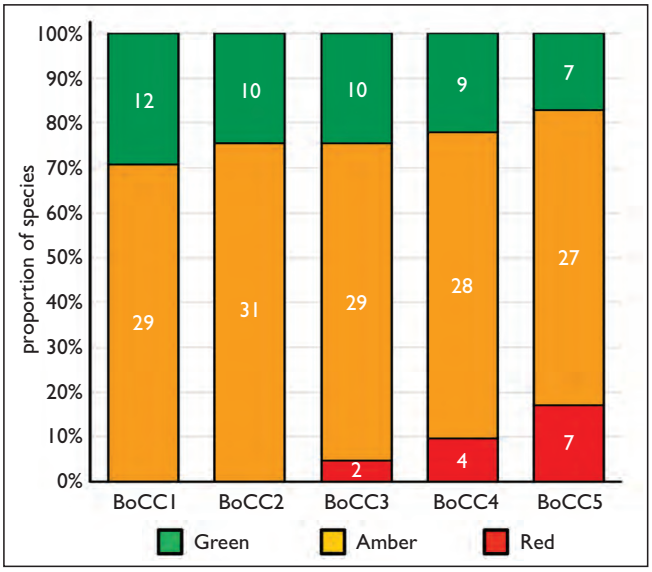

Fig. 5. The changing status of the 41 species within the UK wintering waterbird indicator (JNCC 2020). Number of species qualifying for the Red, Amber and Green list for either international status (IUCN, ERLOB) or criteria relating to non-breeding populations in the UK (WDP, WDMP, WDR, WDMR, WR, WL, WI). Within the IUCN assessment, 49% of these waterbird populations were classed as threatened. Note, Smew joined the Red list in *BoCC5* but is not included within the indicator.

trends for either species.

It is a mixed picture in woodlands. Three species – Pied Flycatcher, Song Thrush and Redwing – moved off the Red list to Amber; but we have lost Golden Oriole as a regular breeder and Eurasian Sparrowhawk moved from Green to Amber. It is also worth noting that some of the movements between lists documented in this review have been due to small variations in trend, rather than species showing dramatic changes in fortune. For example, Song Thrush and Pied Flycatcher, which moved from Red to Amber owing to trends of -49.9% and -43.4% respectively, remain (very) close to the -50% Red-list threshold.

The plight of Afro-Palearctic migrants was first highlighted in *BoCC3*, with further declines noted in *BoCC4* (see also box 3; fig. 4). The *BoCC5* review has identified continued declines in the status of this group, with two migrant aerial insectivores joining the Red list – Common Swift and House Martin – and others moving up to the Amber list (see also box 2). *BoCC4* highlighted declines in several wintering wildfowl and wader species and *BoCC5* gives us little cause for new optimism (see also box 4; fig. 5).

We need to wait for results of the current census to robustly assess the status of our seabird populations; however, Leach's Storm-petrel moved from Amber to Red based on the change in its global status – now globally Vulnerable – and the dramatic declines noted by recent surveys on St Kilda (Deakin *et al.* in press).

It is important to recognise and celebrate the few positive stories to come out of *BoCC5*. Following extensive conservation action, White-tailed Eagle has now moved from Red

White-tailed Eagle reintroduction

BOX 5

White-tailed Eagle moves from the Red to Amber list in *BoCC5*, as the species no longer qualifies for the Historical Decline criterion and is now classed as HD recovering. Its population remains small, however, and it is considered to be IUCN Endangered. The species' reintroduction into Scotland is a conservation success story. After the failure of two early attempts in 1959 and 1968, the release of 82 birds on Rum between 1975 and 1985, 58 birds in northwest Scotland between 1993 and 1998 and 86 birds in east Scotland from 2007 to 2012 brought a change in fortune, with successful breeding in Scotland recommencing in 1985. By 2002, a total of 25 territories were known, increasing to 52 in 2010, 100 in 2015, and 123 in 2019. The White-tailed Eagle's range has also expanded to the extent that birds are now breeding as far north as Orkney, south to southern Argyll and eastwards into much of eastern Scotland north of the Central Belt. The population has now reached a level at which monitoring is becoming increasingly challenging, and it is estimated that about ten new territories are being established annually, though this may be an under-estimate. A reintroduction project has now started in England in the Isle of Wight.

to Amber, as the species no longer qualifies for the Historical Decline criterion. In addition, the ongoing increase in the Marsh Harrier *Circus aeruginosus* population means that this species is now considered to have fully recovered from its historical decline, although it still qualifies for the Amber list through being a localised breeder. Other species that have increased sufficiently to move off the Red list are two rare breeders, Black Redstart and Redwing. These changes are as a direct consequence of recent population increases.

The UK has seen continued colonisation, particularly by waterbirds, and we added five new species to this review: breeding Great White Egret, Cattle Egret, Little Bittern and Black-winged Stilt, and non-breeding Yellow-browed Warbler. While we welcome these additions to our avifauna, we should simultaneously recognise that the arrival of new species here owes much to man-induced climate change, which may have an adverse effect elsewhere in their ranges.

The updated assessment of extinction risk in Great Britain

The benefit of undertaking the internationally recognised standardised IUCN Regional Red List process, in addition to *BoCC*, is that we can compare the status of our bird populations with other geographical areas as well as with other taxonomic groups in Great Britain, plus it allows birds to be incorporated into multi-taxa assessments and higher-level biodiversity indicators. *IUCN2* found that 46% of regularly occurring species and 43% of populations were assessed as being threatened with extinction from Great Britain. This is high compared with the equivalent figure for birds in Europe (13%, BirdLife International 2021) and most other taxonomic groups in Great Britain. The State of Nature report (Hayhow *et al.* 2019) showed that 15% of 8,431 species across 11 taxonomic groups in Great Britain were classified as threatened. Other groups showing relatively high proportions of threatened species are terrestrial mammals (26%, Mathews & Harrower 2020), vascular plants (22%, Cheffings & Farrell 2005) and butterflies (33%, Fox *et al.* 2010).

As noted by Stanbury *et al.* (2017), we believe there are good reasons why the proportion of threatened populations in birds in Great Britain is high. First, the risk of extinction tends to increase as the geographical area considered becomes smaller. Secondly, there are fundamental biological differences between taxonomic groups which have relevance to the IUCN criteria. Even scarce invertebrates or plants can still have populations in the thousands of individuals, and thus do not approach the IUCN's qualifying thresholds for small population size. Thirdly, data availability for birds far exceeds that of many other taxonomic groups thanks to the effort of volunteers, so species can be tested robustly against more criteria. We believe that, if similar data were available for other, similar-sized areas and for other taxonomic groups, levels of assessed extinction risk would be considerably higher than is esti-

mated currently. Therefore, although the IUCN Red-listing process is scalable between regions and taxa, it is not perfect, and, on this basis, it is fair to assume there are limits to our ability to make comparisons.

There is much commonality between the results of *IUCN2* and *BoCC5* (table 3). Of the 108 species to have a population qualifying as threatened (CR, EN, VU) through the IUCN process, all but seven are on the *BoCC* Red or Amber lists (50 on the Red list, 51 on the Amber list). Since the IUCN Regional Red List process focuses on extinction risk, assessments tend to identify species with extremely low numbers, restricted ranges and/or rapid recent declines; justifiably so, since these are the species most likely to become extinct. Similar criteria exist in the *BoCC* process, albeit with different thresholds and over different time periods. Of the seven exceptions (IUCN threatened species on the Green list), one qualified for criterion D (very small population size), one for criterion C (small population and decline) and five by virtue of criterion A4 (a projected future decline). The last highlights an important difference between the two processes: *BoCC* focuses on the current and past status, while IUCN focuses on current and likely future trends (for species where reliable data indicate that a trend is likely to continue), providing an early warning signal of trouble ahead. Both Common Chaffinch and Barn Swallow qualified under criterion A4, show recent changes in fortune (Woodward *et al.* 2020b) and may be worthy of additional conservation attention.

Unlike *BoCC*, the IUCN process does not consider the international significance of our populations or species showing severe declines prior to the three-generation-length assessment window; therefore, there is less commonality between *IUCN2* and *BoCC5* results than the other way around. Indeed, 49 Red- and Amber-listed species are assessed as of Least Concern. Examples of *BoCC* species whose past decline is of concern, but that are not IUCN threatened (because they are not currently declining to the extent they are threatened with extinction) include Common Cuckoo *Cuculus canorus*, Corn Crake *Crex crex* and Skylark *Alauda arvensis*, while some of our internationally significant (and hence *BoCC*-listed) seabird populations are not threatened with extinction.

Data gaps

We are extremely fortunate in the UK to have a large number of dedicated volunteers contributing data towards established biodiversity-monitoring schemes, such as BBS and WeBS. Without these data, our prioritisation and status assessments would not be possible. Notwithstanding the existence of these rich datasets, gaps in our knowledge do exist. Eaton *et al.* (2015) documented these in detail and many remain relevant: for example, we lacked robust trends for 20 breeding species including Short-eared Owl *Asio flammeus* and Scottish Crossbill *Loxia scotica*. The publication of results from the current seabird census will make a major contribution to our understanding of the status of this group and fill a large knowledge gap. It is the case though that, owing to less species/group-specific monitoring being undertaken (because of lower investment), we are increasingly reliant on ageing information. For example, the last national breeding survey of European Nightjar *Caprimulgus europaeus* was in 2004, of Red-

Table 3. Matrix showing the commonalities and differences between the *BoCC5* and *IUCN2* results. It excludes former breeding, Regionally Extinct and Extinct species. IUCN threat status categories: Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT), Least Concern (LC), Data Deficient (DD), Not Evaluated (NE). The highest threat status has been used when two different seasons were assessed for the same species.

		IUCN2 assessment							
		CR	EN	VU	NT	LC	DD	NE	Total
BoCC5 assessment	**Red**	16	19	15	9	11	0	0	70
	Amber	5	21	25	9	39	1	3	103
	Green	0	1	6	8	49	1	7	72
	Total	21	41	46	26	99	2	10	245

throated *Gavia stellata* and Black-throated Divers *G. arctica* in 2006, Ringed and Little Ringed Plovers *Charadrius dubius* in 2007, and Merlin *Falco columbarius* in 2008, while the most recent Winter Gull Roost Survey (WinGS) was undertaken during the winters of 2003/04 and 2005/06. We recommend that increased resources are made available to ensure timely monitoring of these and other species that may otherwise not receive the conservation attention they deserve.

Conclusion

The *BoCC* and IUCN processes provide a robust framework for targeting conservation actions for birds. Both allow us to track the effectiveness of our interventions for birds and the IUCN assessments offer the prospect of including birds in high-level, cross-taxa Red List-type biodiversity indicators which can help us measure overall conservation effectiveness and thus progress towards national and global targets to halt and reverse biodiversity loss.

These latest reviews, *BoCC5* and *IUCN2*, add to the already extensive weight of evidence that many of our bird populations are in trouble. Our findings reinforce previous reviews and are supported elsewhere. For example, the UK Government's own Biodiversity Indicators show long-term declines in farmland birds and more recent declines in wintering waterbirds (JNCC 2020). We highlight new species that should now be considered of high conservation concern, such as Leach's Storm-petrel, Common Swift, House Martin and Greenfinch, but we must not forget the 59 species already on the Red list. With nearly 30% of UK species now Red-listed, further prioritisation may be necessary unless nature conservation action becomes bolder, takes place over a greater scale and is much better resourced. Whilst the need for conservation action is obvious if we are to address the current biodiversity crisis, it is vital that we continue to monitor our bird populations and to make regular, periodic updates to our *BoCC* and IUCN assessments – we recommend a continuation of the six-year interval – so that we can measure progress towards relevant biodiversity targets and refresh our priorities.

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