The status of the UK's breeding seabirds: an addendum to 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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Abstract This paper provides updated status assessments for 28 species of current or former breeding seabird in the United Kingdom by way of a two-stage addendum to Birds of Conservation Concern 5: firstly, a pre-H5N1 Highly Pathogenic Avian Influenza (HPAI) baseline and, secondly, an examination of apparent HPAI impacts to date. Two species were classed as former breeders. Of the currently occurring species, ten (38%) were placed on the Red list, 14 (54%) on the Amber list and two (8%) on the Green list. The full UK *BoCC* list now contains 73 species (30%) on the Red list, 99 (40%) on the Amber list and 73 (30%) on the Green list.

The overall status of seabirds has deteriorated since the last comprehensive UK *BoCC* assessment in 2015. Leach's Storm-petrel *Hydrobates leucorhous*, Common Gull *Larus canus*, Great Black-backed Gull *Larus marinus* and Arctic Tern *Sterna paradisaea* have been added to the Red list owing to pre-HPAI population declines. Great Skua *Stercorarius skua* has joined the Red list owing to severe HPAI impacts. On a more positive note, European Shag *Gulosus aristotelis* and Black Guillemot *Cepphus grylle* have moved from the Red to Amber and Amber to Green lists, respectively.

A two-stage addendum to the second International Union for Conservation of Nature (IUCN) Red List review of extinction risk for breeding seabird species in Great Britain is also presented in this paper. This, too, shows an overall decrease in

the status of seabirds since 2017, with 18 (69%) of 26 regularly occurring breeding seabird species assessed as being threatened with extinction from Great Britain. Updating the full species list reveals that 115 (49%) of 235 regularly occurring species are assessed as threatened with extinction from Great Britain.

The UK remains internationally important for breeding seabirds but many populations are under severe pressure, raising concerns around their resilience. There remains uncertainty regarding the scale of the population-level effects of HPAI on some species. All species will be assessed again in *BoCC6* and GB IUCN3, currently scheduled for publication in 2027.

Introduction

Regular stocktakes of species' population status are important for nature conservation. They play a crucial role in prioritising conservation action, evaluating the effectiveness of interventions, and measuring progress towards national and global goals aimed at halting and reversing biodiversity loss. Two distinct procedures are employed to evaluate the status of birds in the UK. Firstly, the periodic UK Birds of Conservation Concern (*BoCC*) reviews have helped to prioritise bird conservation for nearly 30 years (e.g. Stanbury *et al.* 2017) and use a traffic-light system, with Green, Amber and Red lists denoting increasing levels of conservation concern. Secondly, species extinction risk in Great Britain is assessed using the International Union for Conservation of Nature Red List of Threatened Species (IUCN Red List) methodology (IUCN 2012). This enables bird species to be evaluated, at least in theory, on a level playing field with other taxonomic groups, and therefore added to multi-taxa status assessments.

Owing to a delay in the publication of the results from the most recent census of breeding seabirds in Britain and Ireland, *Seabirds Count* (Burnell *et al.* 2023), due to the outbreak of Covid-19, it was not possible to update the breeding seabird species status assessments in 2021's *BoCC5* paper (Stanbury *et al.* 2021), with the exception of the status assessment for Leach's Storm-petrel *Hydrobates leucorhous*. The results from Burnell *et al.* (2023) are now available and provide the first comprehensive information on national trends and population size of breeding seabird species since *Seabird 2000* (Mitchell *et al.* 2004). This has allowed the production of this addendum to update both the 5th Birds of Conservation Concern review for the UK, Channel Islands and Isle of Man (hereafter, *BoCC5a*) and the 2nd IUCN Regional Red List assessment of extinction risk for Great Britain (hereafter, *IUCN2a*).

David Tipling

358 Great Black-backed Gull *Larus marinus*, Fife, June 2006. Great Black-backed Gull moved to the Red list in UK *BoCC5a* owing to a severe population decline of 56% since *Operation Seafarer* (1969–70). It was Green-listed in the first two *BoCC* assessments and Amber-listed in *BoCC3* and *BoCC4*. In the GB *IUCN2a* assessment it moved from Least Concern in *IUCN1* to Critically Endangered. *Seabirds Count* reported a 43% decline since *Seabird 2000*.

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359. Arctic Tern *Sterna paradisaea*, Northumberland, May 2014.

The UK holds an internationally important assemblage of breeding seabirds, but many of these populations face pressures, including reduced prey availability due to commercial fishing, incidental bycatch, non-native and native predators, offshore renewable energy development, climate change and the outbreak of the H5N1 strain of Highly Pathogenic Avian Influenza (HPAI), which began in 2021. Importantly for our status assessments, the impact of HPAI occurred after the completion of *Seabirds Count* fieldwork. The new assessments were therefore conducted in two stages. Firstly, all species were assessed against a pre-HPAI baseline which used the results from *Seabirds Count* and other relevant information. This represented roughly the same time period used in *BoCC5*. The assessments were then updated for several species to take into account known apparent HPAI impacts to date (Tremlett *et al.* 2024).

Methods

This section provides an overview of the methods; see Stanbury *et al.* (2021) and its accompanying Supplementary Online Material (SOM) (https://doi.org/10.5061/dryad.cc2fqz672) for further details.

To capture a full picture of the status of all current and former breeding seabird species, this addendum encompasses 28 seabird species and 23 associated subspecies (see Stanbury *et al.* 2021 for details on taxonomy). This includes all assessments that were deferred in *BoCC5*/GB *IUCN2*, plus those for Leach's Storm-petrel (assessed in *BoCC5*), Black Tern *Chlidonias niger* (a former breeder; see Eaton *et al.* 2015) and Great Auk *Pinguinus impennis* (a globally Extinct former breeder). The addendum assesses both breeding and non-breeding populations separately, where applicable, but excludes species found in the UK only during the non-breeding season or on passage.

The species status assessments were treated as a two-stage process, with a pre-HPAI baseline and updated assessments for species for which there was sufficient data to assess apparent HPAI impacts to date.

Stage one: *Seabirds Count*, pre-HPAI baseline

The *BoCC5a* addendum followed the same process as previous reviews, whereby each bird species was assessed against a set of standardised *BoCC* Red- and Amber-list criteria, which have remained unchanged since *BoCC4* (Eaton *et al.* 2015; summarised 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.

Different colours denote different Red- and Amber-list criteria:

- **Global IUCN Red List status (IUCN)** Species that are globally threatened (Critically Endangered, Endangered and Vulnerable, but not Near Threatened) with extinction under IUCN guidelines (www.iucnredlist.org).
- **European Red List status (ERLOB)** Species that are threatened (Critically Endangered, Endangered and Vulnerable, but not Near Threatened) with extinction from Europe under IUCN guidelines (BirdLife International 2021).
- **Historical decline (HD)/Historical decline recovering (HDrec)** Note, no seabird species were classed as undergoing a historical decline in previous *BoCCs*, so these criteria were not applied.
- **Breeding population decline (BDp/BDMp)** 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]).
- **Non-breeding population decline (WDp/WDMp)** Defined as a severe decline of >50% (WDp), or moderate decline (>25% but <50% WDMp) in the UK non-breeding population size over either of two assessment periods: 25 years (WDp[1]/WDMp[1]) or the longer term (WDp[2]/WDMp[2]).
- **Breeding range decline (BDr/BDMr)** Defined as a severe decline of >50% (BDr) or moderate decline (>25% but <50% BDMr), in the UK breeding range size over either the last 25 years (BDr[1]/BDMr[1]) or longer-term (BDr[2]/BDMr[2]).
- **Non-breeding range decline (WDr/WDMr)** Defined as a severe decline of >50% (WDr[1]), or moderate decline (>25% but <50% WDMr[1]), in the UK non-breeding range size over the last 25 years.
- **Breeding and non-breeding rarity (BR/WR)** 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.
- **Localised breeding/non-breeding (BL/WL)** Species are Amber-listed if more than 50% of the UK population is found at ten or fewer sites (defined as, and calculated separately for, Special Protections Areas (SPAs) and Important Bird Areas (IBAs).
- **Breeding and non-breeding international importance (BI/WI)** Species were considered of international importance if the UK holds at least 20% of the European breeding population (BI) or non-breeding flyway population (WI).

The IUCN Regional Red List assessment process and criteria

The IUCN's guidelines for the application of Red List criteria at regional and national levels (IUCN 2012) were followed. Each species was assessed against the five standard IUCN Red List criteria (IUCN 2022; summarised below).

- 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.

The IUCN Red List guidelines encourage the use of projected, inferred or suspected future trends (see supplementary Box 1). For species that have substantial and at least partially distinct breeding and non-breeding populations in Great Britain (defined as having a non-breeding-season population that is more than twice the size of the breeding population), notably waterbirds, breeding and wintering populations were assessed separately.

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 or Least Concern. Populations assessed as Critically Endangered, Endangered

Considering future trends and dealing with uncertainty

It is extremely fortunate that robust data are available on species trends, population estimates and range for most UK birds. This wealth of information enables species to be assessed against various criteria, probably more robustly than is possible for other taxonomic groups; however, uncertainties remain.

The criteria used to assess range and population change in the *BoCC* reviews are purely retrospective and consider only past trends, but IUCN Red List guidelines encourage the use of projected, inferred or suspected future trends. IUCN Red List assessments are based on species-specific generation lengths and, owing to long generation lengths, trends for many seabird species can be projected up to, in the case of Northern Fulmar, 76 years into the future. It is important to adhere to the principles of the IUCN Red List approach while recognising and acknowledging the considerable scientific uncertainty of predicting future trends. The rationale of how and when such projections were made are outlined in SOM although, owing to considerable uncertainty, the future impacts of HPAI were not predicted.

Climate change poses a significant threat to seabird species and was considered for the first time in *IUCN2a* when predicting their future population trends. Predictions of seabird abundance at the scale of Great Britain in 2050 were used (Davies *et al.* 2023; J. Davies pers. comm.). These were based on projected atmospheric climate and oceanographic data under the greenhouse gas concentration scenario that is equivalent to approximately 2°C global warming by 2050 compared with 1986–2005 levels. This resulted in the threat status of four seabirds being uplisted within the IUCN Red List assessments (Herring Gull, Puffin, Black Guillemot and Razorbill). Many predictions had a high degree of uncertainty associated with them (Appendix 1), so median predictions were used rather than the worst-case scenarios.

and Vulnerable are collectively referred to as being threatened with extinction at the scale of Great Britain. Where both breeding and non-breeding populations were assessed, the highest threat status was assigned to the species.

The principal sources of data for stage one were the four seabird censuses: 1969–70 (Cramp *et al.* 1974), 1985–88 (Lloyd *et al.* 1991), 1998–2002 (Mitchell *et al.* 2004) and 2015–21 (Burnell *et al.* 2023). Annual trend data, where available, were sourced from the BTO/JNCC Seabird Monitoring Programme, in association with RSPB (Harris *et al.* in prep.), the Rare Breeding Birds Panel (e.g. Eaton *et al.* 2023) and the BTO/RSPB/JNCC Wetland Bird Survey (for non-breeding). Winter Gull Roost Surveys (WinGS) 2003/04–2005/06 (Banks *et al.* 2007) were used to assess non-breeding gull populations. Trends were used up to summer 2018 (mid-year of *Seabirds Count*) and winter 2018/19 for stage one.

Stage two: apparent HPAI impacts to date

In stage two, the *BoCC* and IUCN assessments were updated as fully as possible using the evi-

dence available to date in order to assess the apparent impact of HPAI on the status of UK/GB breeding-seabird populations. Limited data availability prevented updates to assessments against the *BoCC* and IUCN criteria that related to international importance, localisation and range change. A combination of data and expert opinion was used to assess whether a species had likely crossed a *BoCC* or IUCN Red List criterion threshold. Owing to uncertainties around the impacts of HPAI on particular species, only the assessments which resulted in a change in species status between the *BoCC* Red, Amber, Green lists or IUCN threat categories were updated. In such cases, stage two assessments superseded those from stage one.

The principal additional data sources for stage two were Tremlett *et al.* (2024) and Harris *et al.* (in prep.), with trends used up to either summer 2022 or summer 2023 and winter 2021/22. Mortality data gathered during the HPAI outbreak (Phil Atkinson pers. comm.) were also used to inform the assessment process. Data sources used for individual species and the criteria against which they qualified can be found in the SOM.

Where changes in status were due to population declines over the time window for stage two, but not due to apparent HPAI impacts, these were treated as pre-HPAI baseline assessments. Changes in species status were determined by comparing them to the last time all breeding seabirds were comprehensively assessed in *BoCC4* (Eaton *et al.* 2015) and *IUCN1* (Stanbury *et al.* 2017).

Results

BoCC5a overview

Pre-HPAI UK BoCC5a *seabird status*

Two seabird species remain classed as former breeders: the Great Auk (last confirmed UK breeding attempt c. 1833 and now globally Extinct) and Black Tern (last confirmed UK breeding attempt in 1978). These species were not considered further within this addendum, although Black Tern occurs on passage so is included within the all-species assessments.

A total of 26 currently occurring breeding seabird species were assessed for inclusion in the Red, Amber, and Green lists in UK *BoCC5a*. At the pre-HPAI baseline stage, nine (35%) were categorised as Red, 14 (54%) as Amber and three (12%) as Green (table 1). Since the last comprehensive assessment of all breeding seabirds in 2015 (*BoCC4*, Eaton *et al.* 2015), seven species have moved between *BoCC* lists, with four showing deteriorations at stage one and three improvements in status. Leach's Storm-petrel moved to the Red list in *BoCC5* (Stanbury *et al.* 2021) because its global status was uplisted to Vulnerable to extinction, along with severe declines noted in the main UK breeding colony on St Kilda, Outer Hebrides (Deakin *et al.* 2021). Burnell *et al.* (2023) estimated a 79% decline in the UK population between the last two seabird censuses in 1998–2002 and 2015–21.

During stage one of this addendum, Great Black-backed Gull *Larus marinus* and Arctic Tern *Sterna paradisaea* moved from Amber to Red, owing to severe population declines of 56% over the longer-term and 50% over the 25-year time window, respectively. The advancement of the 25-year time window (criterion BDp[1]) during stage two also resulted in Common Gull *Larus canus* moving from Amber to Red. This was again due to a severe population decline rather than HPAI impacts. The UK population declined

Table 1. Species assessments for breeding seabirds for UK *BoCC5a* and GB *IUCN2a* addendum, with qualifying criteria. Those shown in brackets represent stage one pre-HPAI assessments that have been superseded owing to apparent HPAI impacts. 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) and Least Concern (LC). Species qualifying as threatened with extinction (CR, EN, VU) from Great Britain are shaded.

	previous *BoCC* reviews 1 (1996)	2 (2002)	3 (2009)	4 (2015)	UK *BoCC5a* assessments	UK *BoCC5a* qualifying criteria[a]	GB *IUCN2a* species assessment	GB *IUCN2a* population assessment with qualifying criteria[b] (br = breeding; n-br = non-breeding)
European Storm-petrel *Hydrobates pelagicus*	A	A	A	A	Amber	BL	LC	
Leach's Storm-petrel *Hydrobates leucorhous*	A	A	A	A	Red	IUCN, BDp[1]; BL, BI	CR	CR A4b (br)
Northern Fulmar *Fulmarus glacialis*	G	A	A	A	Amber	ERLOB, BDMp[1]	CR	CR A4b (br)
Manx Shearwater *Puffinus puffinus*	A	A	A	A	Amber	BDMr[2], BL, BI	LC	
Northern Gannet *Morus bassanus*	A	A	A	A	Amber	BL, BI	LC	
Great Cormorant *Phalacrocorax carbo*	G	A	G	G	Green		LC	
European Shag *Gulosus aristotelis*	A	A	A	R	Amber	BDMp[1/2], BI	VU	VU A2b+3b+4b (br)
Kittiwake *Rissa tridactyla*	G	A	A	R	Red	IUCN, BDp[1]; ERLOB, BDMp[2], BL	EN	EN A2b+3b+4b (br)
Black-headed Gull *Chroicocephalus ridibundus*[c]	G	A	A	A	Amber	BDMp[1], WDMp[1], WI	VU	VU A2b+3b+4b (br, n-br)
Mediterranean Gull *Ichthyaetus melanocephalus*[c]	A	A	A	A	Amber	BL	LC	
Common Gull *Larus canus*	A	A	A	A	Red*	BDp[1]; WI	EN	EN A4b (br), LC (n-br)
Great Black-backed Gull *Larus marinus*	G	G	A	R	Red	BDp[2]; BDMp[1], WDMp[1]	CR	CR A4b (br), EN A2b+3b+4b (n-br)
Herring Gull *Larus argentatus*	A	A	R	R	Red	WDp[1]; BI, WI	EN	NT A4b (br), EN A2b+3b+4b (n-br)
Yellow-legged Gull *Larus michahellis*	n	n	A	A	Amber	BR, WR	EN	EN° C1+D (br); VU D1 (n-br)
Lesser Black-backed Gull *Larus fuscus*	A	A	A	A	Amber	BI	LC	
Sandwich Tern *Thalasseus sandvicensis*	A	A	A	A	Amber	BDMr[2], WR, BL	LC	
Little Tern *Sternula albifrons*	A	A	A	A	Amber	BDMp[1], BDMr[2], BL	VU	VU A2b+3b+4b, C1 (br)
Roseate Tern *Sterna dougallii*	R	R	R	R	Red	BDp[2], BDr[2]; BDMr[1], BR	[EN]; CR	[EN C2a(ii)]; CR C2a(ii) (br)
Common Tern *Sterna hirundo*	G	G	A	A	[Green] Amber	BDMp[1]	[NT]; VU	[NT A4c, B2b(v)]; VU A2b (br)
Arctic Tern *Sterna paradisaea*	A	A	A	A	Red	BDp[1]; BDMp[2], BDMr[2]	EN	EN A2b+3b+4b (br)
Arctic Skua *Stercorarius parasiticus*	G	G	R	R	Red	BDp[1]; ERLOB, BDMp[2]	CR	CR A4b (br)
Great Skua *Stercorarius skua*[c]	A	A	A	A	[Amber] Red	BDp[1]; BL, BI	[LC]; VU	VU A2b, C1 (br)
Puffin *Fratercula arctica*	A	A	A	R	Red	IUCN; ERLOB, BL	CR	CR A4b (br)
Black Guillemot *Cepphus grylle*	A	A	A	A	Green		NT	NT A4b (br)
Razorbill *Alca torda*	A	A	A	A	Amber	BL, BI	VU	VU A4b (br)
Common Guillemot *Uria aalge*	A	A	A	A	Amber	BL, BI	VU	VU A4b (br)

* Common Gull qualified for the *BoCC* Red list owing to population decline over the stage two 25-year time window, but this was not due to apparent HPAI impacts.

[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. 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] Scientific names in HBW & BirdLife International (2024) differ from those used here for Black-headed Gull (*Larus ridibundus*), Mediterranean Gull (*Larus melanocephalus*) and Great Skua (*Catharacta skua*).

360. Black Guillemots *Cepphus grylle*, Shetland, June 2016. Black Guillemot moved to the Green list in UK *BoCC5a*. The species was previously Amber-listed owing to range decline but *Seabirds Count* suggests little range change over the last 50 years. The species qualified as Near Threatened in GB *IUCN2a*, owing to predicted future declines under a 2°C global warming scenario by 2050.

by 52% between *Seabird 2000* and *Seabirds Count* (Burnell *et al.* 2023) and there is no evidence of recovery since then.

On a positive note, European Shag *Gulosus aristotelis* moved from Red to Amber as the *Seabirds Count* census (Burnell *et al.* 2023) revealed a lower magnitude of decline than previously identified (Eaton *et al.* 2015). Additionally, Common Tern *Sterna hirundo* and Black Guillemot *Cepphus grylle* moved from Amber to Green at stage one. Common Tern no longer qualified as a localised breeder, while *Seabirds Count* showed minimal change in the UK breeding range of Black Guillemot (Burnell *et al.* 2023).

Apparent HPAI impacts on UK BoCC5a *status*
Two additional changes occurred to the *BoCC* lists caused by apparent HPAI impacts to date (table 1). Great Skua *Stercorarius skua* moved from Amber to Red with Tremlett *et al.* (2024) showing that colony counts in 2023, which represented 83% of the UK population, had decreased by 76% compared to *Seabirds Count*. While uncertainty remains regarding the exact magnitude of the total population-level effect, HPAI impacts have undoubtedly been very severe. Despite the previous increase in the UK's Great Skua

population, the recent decline is highly likely to have exceeded the Red list's 50% threshold for the 25-year abundance trend criterion.

Common Tern moved from Amber to Green during stage one but moved back to Amber at stage two. Tremlett *et al.* (2024) showed that UK colony counts in 2023, representing 40% of the UK *Seabirds Count* population, decreased by 42% when compared to pre-HPAI levels. Given the magnitude of the decline, it was deemed highly likely that the UK population had declined by more than 25% over the last 25 years.

Final UK BoCC5a *seabird status*
When the results from both stages are taken together, ten (38%) of the currently occurring seabird species met Red list criteria, 14 (54%) Amber and two (8%) Green (fig. 1). The length of the seabird Red list has increased by four since *BoCC4* in 2015, and ten-fold since *BoCC1* in 1996, when Roseate Tern *Sterna dougallii* was the only Red-listed breeding seabird species (Gibbons *et al.* 1996). Of the 14 Amber-listed species, six qualify owing to international importance or breeding locali-sation, rather than changes in population or range. Race-level assessments for all relevant species can be found in the SOM.
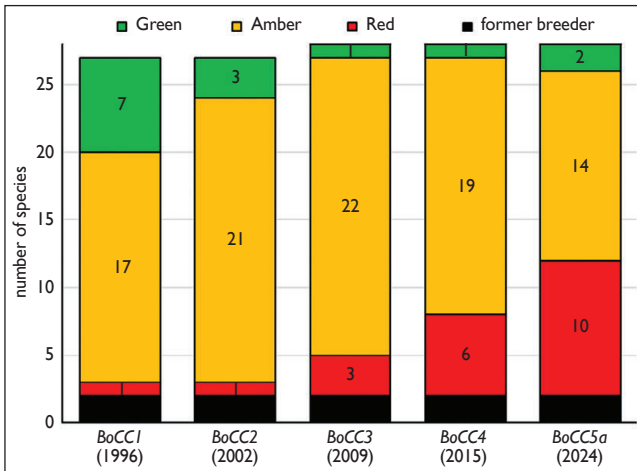
Fig. 1. Length of the Red, Amber and Green lists across the five *BoCC* reviews for the 28 UK breeding seabird species. Note that the assessment process has developed over time and this figure does not take account of changes to criteria. Yellow-legged Gull *Larus michahellis* was added to the species list in *BoCC3*.

BoCC *status of all UK birds*
In *BoCC5*, the Red list comprised 70 species, the Amber list 103 and the Green list 72 (Stanbury *et al.* 2021). After applying the findings from this addendum, the UK *BoCC* Red list now stands at 73 species (30%), with 99 (40%) on the Amber list and 73 (30%) on the Green list (see SOM).

GB *IUCN2a* addendum overview
The addendum to the second IUCN Regional Red List assessment of extinction risk for Great Britain assessed breeding populations for all 28 species and provided additional assessments of non-breeding populations for six of these.

At stage one, one species (Great Auk) qualified as globally Extinct and one (Black Tern) as Regionally Extinct. Among the remaining regularly occurring seabird populations (including both breeding and non-breeding), five qualified as Critically Endangered, seven as Endangered, seven as Vulnerable, three as Near Threatened and ten as Least Concern (table 1).

Since all seabird species were last assessed in GB *IUCN1* (Stanbury *et al.* 2017), 11 have shown a deterioration in breeding status: Leach's Storm-petrel (assessed as Critically Endangered in GB *IUCN2*), Northern Fulmar *Fulmarus glacialis,* Black-headed Gull *Chroicocephalus ridibundus*, Common Gull, Yellow-legged Gull *Larus michahellis*, Great Black-backed Gull, Arctic Tern, Puffin *Fratercula arctica,* Black Guillemot, Razorbill *Alca torda* and Common Guillemot *Uria aalge.* The status of European Shag and Kittiwake *Rissa tridactyla* has improved, while breeding populations of Herring Gull *Larus argentatus* and Lesser Black-backed Gull *Larus fuscus* moved from Data Deficient to Near Threatened and Least Concern, respectively.

The breeding status of a further three species – Roseate Tern, Common Tern and Great Skua – showed deterioration at stage two due to apparent HPAI impacts (table 1).

361. Great Skua *Stercorarius skua*, Shetland, June 2012. Britain and Ireland hold 64–67% of the global population of Great Skuas. HPAI has had a devastating effect on the population in recent years, with 2023 colony counts, representing 83% of the UK *Seabirds Count* population, down 76% as a result of the outbreak. This has led to this species moving from the *BoCC* Amber to Red list. The species qualified as Vulnerable in GB *IUCN2a*.

When the results from both stages are taken together, they show that, of the 26 extant seabird species, 18 (69%) had at least one population (breeding or non-breeding) that qualified as threatened with extinction from Great Britain (six Critically Endangered, five Endangered and seven Vulnerable). Of the 32 separate breeding or non-breeding populations, 21 (66%) qualified as threatened, six as Critically Endangered, six as Endangered, nine as Vulnerable, plus two as Near Threatened and nine as Least Concern. Race-level assessments can be found in the SOM.

IUCN status of all GB birds

Of 235 currently occurring species assessed in *IUCN2*, 108 (46%) had at least one population (breeding or non-breeding) that qualified as threatened with extinction from Great Britain (Stanbury *et al.* 2021). The assessments from this addendum update this to 115 (49%) species.

Of the 285 separate breeding or non-breeding populations, the proportion assessed as threatened in Great Britain has increased from 43% in GB *IUCN2* (Stanbury *et al.* 2021) to 46%, with 24 qualifying as Critically Endangered, 44 as Endangered, 64 as Vulnerable, plus 33 as Near Threatened, 119 as Least Concern and one as Data Deficient (see SOM).

Discussion

The deteriorating status of breeding seabirds

Over the past 30 years, *BoCC* reviews have consistently shown a continuing decline in the status of UK bird populations and the Red list has grown accordingly (Stanbury *et al.* 2021). This seabird-specific addendum to *BoCC5* continues this trend, revealing yet further deterioration in the overall status of the UK's breeding seabirds since the last comprehensive assessments in *BoCC4*. Four species had moved onto the *BoCC* Red list (Leach's Storm-petrel (Red-listed in *BoCC5*), Common Gull, Great Black-backed Gull and Arctic Tern) even before considering the impacts of the HPAI outbreak that started in 2021, with only one species, Shag, moving in the opposite direction. Kittiwake, Herring Gull, Roseate Tern, Arctic Skua *Stercorarius parasiticus* and Puffin all remain Red-listed (table 1).

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362. Puffin *Fratercula arctica*, Northumberland, July 2006.

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363. Manx Shearwaters *Puffinus puffinus* gathering at dusk off Skomer, Pembrokeshire, August 2009. Manx Shearwater is the second most numerous breeding seabird in Britain and Ireland (after Common Guillemot *Uria aalge*), with an estimated 921,618 Apparently Occupied Sites. Britain and Ireland hold around 96% of the global population and, although there remain uncertainties around the magnitude of the change, the population has probably increased since *Seabird 2000*. Manx Shearwater remains Amber-listed in *BoCC5a* and of Least Concern in GB *IUCN2a*.

Seabirds Count identified five species that showed increases of at least 10% in breeding population size since *Seabird 2000* (Burnell *et al.* 2023). Populations of at least three of these species, Northern Gannet *Morus bassanus*, Roseate Tern and Great Skua, have been severely impacted by HPAI in recent years, and this has resulted in the last being added to the Red list. Roseate Tern was already Red-listed, while more evidence is needed to assess the HPAI impacts on the status of Northern Gannet.

The UK breeding populations of all seabird species that are classed either as globally threatened with extinction (Leach's Storm-petrel, Kittiwake and Puffin) or as threatened within Europe (Northern Fulmar and Arctic Skua) are currently in decline (Burnell *et al.* 2023).

The full *BoCC* Red list now stands at 73 species, which is an increase of three when compared to *BoCC5*, and more than double the length in *BoCC1* (36 species). For the first time, the full *BoCC* Red list has the same number of species as on the Green list.

BoCC reviews have traditionally split breeding species according to different habitat types, based on classification in Gibbons *et al.* (1993), to help identify themes. The coastal category (31 species, including 23 species covered in this addendum) now contains ten (32%) on the Red list, which is just above the average across all species (30%). The only habitat categories to show a higher proportion of Red-listed species are farmland (26 species, 54%) and upland (37 species, 38%).

It is, however, important to note that the UK remains internationally important for its breeding seabird assemblage. A total of 15 species qualified for the international breeding importance *BoCC* criterion (BI; at least 20% of the European population), within Stanbury *et al.* (2021) or this addendum; of these, nine (60%) are seabirds. Britain, Ireland, the Isle of Man and Channel Islands together support the majority of the global population of Manx Shearwater *Puffinus puffinus* (around 96%), Northern Gannet (estimated at 70%) and Great Skua (estimated at 64–67%), in addition to a large proportion of the North Atlantic biogeographical populations (>30%) of another seven seabirds: Roseate Tern, European Storm-petrel *Hydrobates pelagicus*, Shag, Common Guillemot, Razorbill, Lesser Black-backed Gull and Herring Gull (Burnell *et al.* 2023).

An updated assessment of seabird extinction risk in Great Britain

Assessing species against the IUCN Red List criteria alongside *BoCC* brings benefits and allows UK birds to be compared with other taxonomic groups and their integration into multi-taxa assessments and biodiversity indicators. This addendum has highlighted a notable deterioration in the IUCN Red List status of Great Britain's breeding seabird populations. The majority of our currently occurring seabirds – 18 out of 26 species (69%) – now have at least one population (breeding or non-breeding) that qualifies as being threatened with extinction from Great Britain, up from ten (38%) in 2017 (Stanbury *et al.* 2017). Four species have moved from Least Concern in GB *IUCN1* to Critically Endangered: Leach's Storm-petrel, Northern Fulmar, Great Black-backed Gull and Puffin.

There are many similarities between the results of GB *IUCN2a* and UK *BoCC5a*. However, two species assessed as Critically Endangered or Endangered at a Great Britain scale do not currently appear on the *BoCC* Red list; Yellow-legged Gull is on the edge of its European range here and Northern Fulmar showed a 36% decline in abundance between *Seabird 2000* and *Seabirds Count*. *BoCC* is purely retrospective, with the decline qualifying Northern Fulmar as an Amber-listed species, whereas IUCN promotes assessments which project current trends into the future. The annual rate of Northern Fulmar decline since *Seabird 2000* is equivalent to an 85% decrease over three generations (75.7 years), therefore qualifying it as Critically Endangered under criterion A4. The species is also predicted to be heavily impacted by climate change (Davies *et al.* 2023).

The importance of new data

These comprehensive status updates have only been possible thanks to invaluable new data. Publications such as the most recent breeding census, *Seabirds Count* (Burnell *et*

Combined urban and natural nesting populations of Herring Gull and Lesser Black-backed Gull

BOX 2

Herring Gull remained Red-listed in UK *BoCC5a* because of its non-breeding population decline and also qualified for two Amber criteria (internationally important breeding and non-breeding populations), while Lesser Black-backed Gull remained Amber-listed solely because of the international importance of its breeding population. Britain, Ireland, the Isle of Man and Channel Islands are estimated to support between 55–60% and 40–45% of the North Atlantic biogeographical populations of Lesser Black-backed Gull and Herring Gull, respectively (Burnell *et al.* 2023).

Differences in census methods meant that a comparison with urban gull data from 20 years ago (Mitchell *et al.* 2004) to obtain a robust short-term assessment was not possible. Longer-term comparisons between *Operation Seafarer* (1969–70) and *Seabirds Count* (2015–21) show that the combined urban and natural nesting population of Lesser Black-backed Gulls has probably increased, while that of Herring Gulls is likely to have declined over the same period, although the magnitude of the decrease is probably less than 25%. Censusing urban nesters is difficult, but *Seabirds Count* provides a comparative baseline for the next seabird census. Both species now have a higher proportion of their UK breeding population nesting in urban (includes coastal and inland) than natural-nesting sites (Burnell *et al.* 2023).

Gulls are subject to multiple pressures including disease, predation, disturbance, legal and illegal control, and changes in food availability (including from fishing practices and landfill activities). The movement of these species to more urbanised environments may be influenced by these pressures, as they often provide safer nesting sites and plentiful food (Burnell *et al.* 2023).

Apparent impacts from HPAI have led to a decrease of 7% and 25% in the Herring Gull and Lesser Black-backed Gull breeding populations at selected UK natural-nesting sites respectively, according to a comparison of pre- and post-HPAI counts (Tremlett *et al.* 2024). The extent to which HPAI has affected their winter populations is unknown. Their non-breeding status will be updated following the publication of the results from the 2023/24 and 2024/25 Winter Gull Surveys.

364. Lesser Black-backed Gull *Larus fuscus*, Northumberland, July 2019.

al. 2023), as well as results from the BTO/JNCC Seabird Monitoring Programme, have provided updated information on national population estimates, distribution, trends and their international significance. The examination of apparent HPAI impacts on seabird populations was possible thanks to data from repeat UK seabird colony counts conducted in 2023 for a list of prioritised species (Tremlett *et al.* 2024). New insights from climate change scenarios outlined in Davies *et al.* (2023) have been instrumental in refining our understanding of the potential impacts of a warming climate. Moreover, surveys focusing on urban gull populations have shed light on the status of Herring Gull and Lesser Black-backed Gull, although knowledge gaps remain (see Box 2).

Conclusions

The UK remains internationally important for its breeding seabirds, supporting most of the global population of three species (Manx Shearwater, Northern Gannet and Great Skua). Sadly, the status of many of the breeding populations continues to deteriorate and this addendum has emphasised the severity of the situation. Ten (38%) regularly occurring breeding seabird species now appear on the UK *BoCC* Red list and 18 (69%) are formally classed as being threatened with extinction from Great Britain. Seabird populations are exposed to a growing list of threats and pressures that include reduction in prey availability due to overfishing, incidental bycatch, non-native and native predators and offshore renewable energy development. In addition, there is the growing threat from climate change and the emergence of epizootic diseases such as HPAI across large geographical areas (see Box 3 & Burnell *et al.* 2023). The severe impact of HPAI over just the last few years, since the start of the current outbreak in 2021, raises further concerns about the resilience of UK seabird populations. Many of these populations are long-lived, slow to reproduce, breed within colonies and are concentrated within a relatively small number of sites.

There remains uncertainty regarding the scale of the population-level effects of HPAI on some species. This addendum used colony count data collected in 2023, largely before further HPAI mortalities that year (Tremlett *et al.* 2024), which appeared to particularly affect Black-headed Gulls and Common Terns. Furthermore, uncertainty persists regarding the long-term impacts of HPAI and the

capacity of populations to recover. Further research and monitoring of HPAI is planned in 2024 and beyond, and these results will be integrated into future reviews, including the comprehensive *BoCC6* and GB *IUCN3* that are scheduled for publication in 2027.

Other threats and pressures

Seabirds face a wide range of pressures, some of which will drive population change depending on species sensitivity and exposure. Food availability was most frequently cited as a key pressure for breeding seabird species in Burnell *et al.* (2023), affecting 23 of 25 species considered. Reductions in food availability were driven primarily by commercial fisheries and climate change, with changes in waste and farm management, and habitat loss from offshore wind developments also contributing. Surface-feeding seabird species, like Kittiwake, have fared worst (https://oap.ospar.org/en/ospar-assessments/quality-status-reports/qsr-2023/indicator-assessments/marine-bird-abundance). Predation, by both non-native and native species, was cited as an important pressure for 21 species, with non-native species such as rats, cats, ferret *Mustela putorius furo* and American Mink *Neovison vison* having significant impacts (Burnell *et al.* 2023). Predator management has been shown to be an effective recovery action, with eradication and subsequent maintenance of predator-free colonies especially impactful. Severe weather, in part due to climate change, is increasingly important and can have direct impact at a regional scale and can also amplify other pressures such as reduced prey availability. The expansion of offshore windfarms over the last 20 years has been estimated to impact around 15 species by causing direct mortality through collision and loss of foraging areas via displacement (Burnell *et al.* 2023). Other pressures include loss of nesting habitats, pollution, exploitation, persecution, disease, natural toxins and fisheries bycatch.

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365. Northern Gannets *Morus bassanus*, Shetland, June 2014.

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Appendix 1.

Incorporating climate change scenarios into the IUCN Red List assessments

Climate change poses a significant threat to seabird species, as they are highly sensitive to its adverse effects. For the first time, this addendum considered climate change scenarios when predicting future population trends. Davies *et al.* (2023) predicted seabird abundance, in the UK and Ireland combined, in 2050, using projected atmospheric climate and oceanographic data for 2050 under the greenhouse gas concentration scenario Representative Concentration Pathway (RCP) 8.5, and then compared that to seabird abundance in 2000 (Mitchell *et al.* 2004) to estimate magnitude of predicted change. RCP8.5 represents a scenario that is equivalent to approximately 2°C global warming by 2050 compared to 1986–2005 levels. It should be noted that many of the predictions within Davies *et al.* (2023) had a generally high degree of uncertainty associated with them, with 95% confidence intervals often overlapping with abundance in 2000. Predictions for Great Cormorant, Herring Gull, Black Guillemot and Arctic Tern should also be caveated as the colonisation of new areas may make true net abundance changes less negative for these species.

Site-level projections from Davies *et al.* (2023) were used to create GB-scale predictions for 2050 (J. Davies pers. comm.; table 2). For the IUCN Red List assessments, we calculated the mean annual rate of change based on the median prediction, and then used this value to predict population size three generation lengths into the future from the year 2000 and compared it to the population level in the year 2000 to calculate proportional change. In all but two cases, this was less than 50 years. For Northern Fulmar and Puffin, we projected the trend forward beyond 2050 to 2076 and 2051, respectively.

Table 2. Projected future abundance change for 15 seabird species under RCP8.5 climate change scenario, which is equivalent to approximately 2°C global warming by 2050 compared to 1986−2005 levels, at a Great Britain scale (J. Davies pers. comm.). No predictions were available for European Storm-petrel *Hydrobates pelagicus*, Leach's Storm-petrel *H. leucorhous*, Manx Shearwater *Puffinus puffinus*, Northern Gannet *Morus bassanus*, Mediterranean Gull *Ichthyaetus melanocephalus*, Yellow-legged Gull *Larus michahellis*, Sandwich Tern *Thalasseus sandvicensis*, Little Tern *Sternula albifrons*, Roseate Tern *Sterna dougallii*, Black Tern *Chlidonias niger*, Arctic Skua *Stercorarius parasiticus* and Great Skua *S. skua*.

	species generation lengths (years)	*Seabird 2000* GB population estimate (Mitchell *et al*. 2004)	median predicted species abundance in 2050	2.5th percentile of predicted species abundance in 2050	97.5th percentile of predicted species abundance in 2050	% change between observed species abundance at *Seabird 2000* and median predicted species abundance in 2050	estimated three-generation-length future trend from 2000
Northern Fulmar *Fulmarus glacialis*	25.2	495,614	126,720	30,312	457,770	-74.4%	-87.3%
Great Cormorant *Phalacrocorax carbo*	8.8	8,221	7,154	1,220	36,493	-13.0%	-7.1%
European Shag *Gulosus aristotelis*	8.9	26,264	37,983	6,230	184,842	44.6%	21.8%
Kittiwake *Rissa tridactyla*	9.5	365,787	164,754	32,056	764,310	-55.0%	-36.6%
Black-headed Gull *Chroicocephalus ridibundus*	9.4	127,887	193,949	41,014	1,437,500	51.7%	26.3%
Common Gull *Larus canus*	10.9	48,106	49,358	14,444	175,938	2.6%	1.7%
Great Black-backed Gull *Larus marinus*	12.2	16,636	13,481	3,521	52,391	-19.0%	-14.3%
Herring Gull *Larus argentatus*	12.5	131,435	95,084	27,905	310,366	-27.7%	-21.5%
Lesser Black-backed Gull *Larus fuscus*	11	109,944	117,080	14,334	811,263	6.5%	4.2%
Common Tern *Sterna hirundo*	10.1	10,097	12,048	2,893	56,688	19.3%	11.3%
Arctic Tern *Sterna paradisaea*	11.3	46,366	12,013	2,439	64,677	-74.1%	-59.9%
Puffin *Fratercula arctica*	17	579,104	66,600	3,515	932,465	-88.5%	-89.0%
Black Guillemot *Cepphus grylle*	9.5	37,540	23,983	6,970	74,738	-36.1%	-22.6%
Razorbill *Alca torda*	14.4	162,945	87,566	16,142	422,152	-46.3%	-41.4%
Common Guillemot *Uria aalge*	15	1,317,788	706,230	94,207	4,610,520	-46.4%	-43.0%

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366. Common Guillemots *Uria aalge*, Northumberland, May 2014.

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