Assessing vagrants from translocated populations and defining self-sustaining populations of non-native, naturalized and translocated avian species

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Introduction

The British List of birds (BOU 2022) managed by the British Ornithologists' Union Records Committee (BOURC) comprises those species which fall into the Categories A, B or C where:

A Species that have been recorded in an apparently natural state at least once since 1 January 1950.

B Species that were recorded in an apparently natural state at least once between 1 January 1800 and 31 December 1949, but have not been recorded subsequently.

C Species that derive from translocation(s) (i.e. human-mediated movement and release (IUCN/SCC 2013)) resulting in the establishment of self-sustaining populations within Britain and vagrants from self-sustaining populations outside of Britain which have derived as a result of translocation(s).

- **C1** – Naturalized translocated species – species that have occurred only as a result of translocation(s).
- **C2** – Naturalized established species – species with established populations resulting from translocation(s), but which also occur in an apparently natural state.
- **C3** – Naturalized re-established species – species with populations successfully re-established in areas of former occurrence following a conservation translocation(s).
- **C4** – Naturalized feral species – species which have been domesticated which now have populations established in the wild.
- **C5** – Vagrant species from populations outside of Britain which derive from translocation(s).

    - **C5.1** – A vagrant from a re-established population – individuals from a population established from a conservation translocation(s) in order to re-establish a species within its former range but for which there is no evidence of Britain being part of its former range.
    - **C5.2** – A vagrant from a naturalized population – individuals from established naturalized populations outside of Britain that are a result of translocation(s) and that are outside the normal range of the species.
- **C6** – Former naturalized species – species formerly placed in C1 whose naturalized populations are either no longer self-sustaining or are considered extinct.

In the case of Category C a clear and workable definition is required of what constitutes a 'self-sustaining population'.

In 2005 as part of a wide-ranging review of Category C, BOURC adopted a definition of a self-sustaining population as 'one that survives at, or increases beyond, what is assessed to be a viable stable level in a natural state in the wild' (Dudley 2005). However, explicit guidelines to assess what constitutes a self-sustaining population were never produced. In addition, there seems to be much variation between European national bird committees on what is required to admit a species into Category C, resulting in inconsistencies between different countries. As exotic, non-native species are an increasing conservation concern in Europe (White *et al.* 2019), widely adopted guidelines supporting consistent assessment and treatment of naturalized populations across the continent would constitute a significant step forward and stimulate improved monitoring of translocated avian populations across Europe, and beyond.

Furthermore, a prerequisite for an individual vagrant from a translocated population in another country to be accepted to Category C5.1 of the British List is to originate from a population that is treated as Category C or established in its area of origin. However, this is not enough for Category C populations that contain a mixture of wild and released or escaped (translocated) individuals. We discuss here as a 'case study' the recent records of Bearded Vulture *Gypaetus barbatus* in Britain and the translocation programmes of the species in the Alps, but BOURC hopes that this paper will be of use when considering other non-native, naturalized and translocated bird species across the continent.

Bearded Vulture and vagrants from translocated populations

The appearance of an immature Bearded Vulture in Belgium and Britain during May 2016, apparently derived from a population created by a

translocation programme in the Alps in continental Europe, prompted a reappraisal of the existing definition of a ‘self-sustaining’ population and its refinement by BOURC (McInerny & Stoddart 2019). If the Alps translocated population was deemed ‘self-sustaining’ this immature bird would potentially be eligible to be added to Category C5.1 of the British List as a ‘species from established naturalized populations abroad’.

Although the origin and pedigree of this bird was unknown it was decided that it derived from the Alps, the same source as a large number of other recent extra-limital records of Bearded Vultures seen elsewhere in north-west Europe (McInerny & Stoddart 2019). However, evidence suggested that the Alps population was not self-sustaining, hence the record was not placed in Category C5, but instead placed in Category E (https://bou.org.uk/british-list/category-e-species/), an approach taken by all other countries in north-west Europe where vagrant Bearded Vultures have been observed (McInerny & Stoddart 2019) apart from Norway which subsequently moved their single record from Category D to Category E (Olsen 2021).

Criteria to judge whether a translocated population can be regarded as self-sustaining were published by Seddon (1999), discussed and agreed at *The 7th World Conference on Breeding Endangered Species*, held in Cincinnati, USA during May 1999. They comprise a sequence of three objectives:

1. The survival of the released generation.
2. Breeding by both the released generation and their offspring.
3. The long-term persistence of the translocated population.

These criteria were adopted by BOURC (McInerny & Stoddart 2019) and applied to the translocated Bearded Vulture population in the Alps with some of the objectives fulfilled:

1. The released generation(s) are surviving, with modeling of numbers indicating that that population has been growing, without the need for more releases, since 2006 (Schaub *et al.* 2009), although new birds continue to be released.
2. Many first-generation young have been produced in the wild by the released birds.

However, the fact that Bearded Vultures do not breed until about ten years of age (Margalida *et al.* 2020) means that just a few second-generation young had been hatched in the Alps, and that more time will be required before many second-generation young are established within the population.

Furthermore, the long-term persistence of the translocated population still

demands confirmation by continued monitoring (Schwarzenberger *et al.* 2013). Data from such monitoring requires independent assessment with the results published to confirm the long-term persistence of the population.

Based on the information discussed above, the Alps population might still not be classified as 'self-sustaining', hence not qualifying for Category C3 of this framework where the species now breeds in its former ranges, and Category C5.1 in the case of vagrants in other countries derived from the translocated population. However, currently consensus is lacking within relevant countries on the status of the species in the Alps: it is admitted into Category C in both Switzerland and Italy, but not in Austria, Germany or France. We suggest that the adoption of these guidelines could promote a consistent treatment within the Alps and for other European countries visited by wandering individuals from the Alps population.

BOURC believes that the test case of Bearded Vulture validates the use of the Seddon (1999) criteria to assess and judge a self-sustaining population. BOURC also suggests that these criteria can be applied to individual birds from such populations. BOURC recommends that for *an individual to be acceptable to Category C it needs to be derived from a Category C population where both its parents are wild-hatched.* In contrast, first-generation individuals, produced in the wild by released birds, are not eligible to Category C. This can be extended to vagrants from a naturalized Category C population in another country: these can only be accepted to Category C5.1 if they are pure second- or subsequent-generation wild-hatched i.e. both their parents are wild-hatched. Often the exact parentage of vagrant individuals will be unknown, in which case decisions must be based on the balance of probability that the vagrant is derived from wild parents or released birds. Information on the relative proportions of wild versus released breeders in established populations can therefore be informative in this context. In the case of the Bearded Vulture, for example, the current Alps breeding population is heavily skewed towards pairs where one or both of the adults are released birds.

The appearance of another immature Bearded Vulture in Britain during 2020, which remained for over four months reignited the debate. Genetic analysis of recovered feathers confirmed that this individual was a second-calendar-year female fledged on 6th July 2019 from the Bargy BIS territory in the Bargy Massif in the Haute-Savoie region, France (Phipps *et al.* 2021, Vulture Conservation Foundation 2021). Her father (GT0099) was a wild-hatched bird that fledged from the same Bargy territory, but her mother (BG493) was instead captive reared in La Garenne Zoo, Switzerland, and released as a fledgling in 2006, in Martell, South Tyrol, Italy. So, this individual was first

generation wild-hatched through her mother and second generation wild-hatched through her father.

In 2020 it remained unclear if the Alps population was self-sustaining, with very small numbers of second-generation bird produced. Furthermore, the 2020 individual was not pure second-generation wild-hatched. So, both regarding the Alps population and the individual, this record does not fulfil the criteria of Seddon (1999).

Self-sustaining populations – refining criteria and definitions

In a few cases self-sustaining bird populations have been evaluated based on specific viability analyses. However, where such viability analyses have not been completed, BOURC and the Association of European Rarities Committees (AERC) suggest the following additions/refinements to broaden and enhance the Seddon criteria for bird species populations and situations defined as self-sustaining, with some based on Bauer & Woog (2008):

Trends and numbers

1. For populations that show significantly increasing population trends and clear geographic range expansion a minimum of 10 years and two generations[+] (which ever is longer) is required (as is the proposed case with Bearded Vulture), starting from when the species first breeds in the wild in the relevant population.

[+] Generation time (GT) is here understood as a demographic term, being the average time between two consecutive generations in a population (Lande *et al.* 2003). This can be measured as the average distance in time between mothers and daughters, i.e. the average age of reproducing females in a population. In animal demography GT is usually estimated from demographic parameters and can be approximated knowing the age at first breeding (A) and the adult female survival rate (S) where GT = A + S/(1-S). For example, the Ring-necked Parakeet *Psittacula krameri*, that usually first breeds at three years and whose adult female survival is 0.87 (Senar *et al.* 2018), has a calculated GT of 9.7 years. Thus this species under the proposals presented here to be eligible for Category C, when it is defined as showing significantly increasing population trends and clear geographic range expansion, needs to persist for at least two generations, and so ~19 years. For larger species the GT is even longer: in the case of the Bearded Vulture A = 10.3 and S = 0.97 (Margalida *et al.* 2020) and so the GT is 42.6 years. As another significantly increasing population showing clear geographic range expansion it would thus takes ~85 years before the species can be considered as self-sustaining and so be eligible for Category C, in the absence of targeted viability analyses which exist for the species (see Schaub *et al.* 2009).

For many species precise demographic parameters are not known but GTs in birds are often similar among closely related species and with GTs strongly dependent on size, with larger species having higher survival and longer sexual maturity than smaller species. Thus, when the demography of the species is not known, a reasonable estimate can be obtained based on relevant parameters from similar or closely related species.

2. For populations that are instead either stable or fluctuating in numbers, instead a minimum of 25 years and three generations (which ever is longer) is required, starting from when the species first breeds in the wild in the relevant population.
3. A minimum number of wild-hatched mature individuals is required in the population, which we suggest as 250, corresponding with 'Endangered' using IUCN definitions (IUCN 2019).

Single breeding locations and international populations

1. Populations that remain confined to a single breeding location need to be at least stable, comprise >250 wild-hatched mature individuals and remain for more than 25 years and three generations to be deemed self-sustaining.
2. Breeding populations may not be restricted to one country but may cross borders. Where populations cross borders, individual national subpopulations may be small (<250 wild-hatched mature individuals), but as long as they are functionally part of an international cross-border population which is self-sustaining and contains >250 wild-hatched mature individuals, each subpopulation would be eligible for Category C1-4 under these criteria, which apply to populations as a whole rather than national subunits. Such international, cross-border populations should be reviewed every five years as a collaborative venture between the national bird records committees of the countries where the birds are found.

Stability of populations

1. Species placed in Category C should remain self-sustaining, and so stable or increasing, when the addition of captive bred individuals ceases as is predicted to be the case with Bearded Vulture (Schaub *et al*. 2009). This includes the situation where birds continue to be released but do not contribute to the stability of the population; however, where captive-bred (translocated) individuals still enter a population there should be compelling evidence that they are not responsible for the stability/increase or size of the population.
2. The corollary of this is that any declining population that has not been added to Category C should not be considered eligible as long as it declines, as it is demonstrably not self-sustaining.

Retention/removal of species in Category C

1. Self-sustaining species that become extinct through deliberate control (e.g. Ruddy Duck *Oxyura jamaicensis* in Britain and Sacred Ibis *Threskiornis aethiopicus* in France) or where habitat was destroyed by human activities. Such populations would have persisted without direct human interference and so the species should be placed in Category

C6. Similarly, species that were long established which become extinct due to non-direct anthropomorphic reasons (climate change, a novel invasive pathogen etc.) should also be placed in Category C6.

2. Species placed into Category C with the population becoming subsequently extinct without an increase in the level of human interference or apparent habitat change, e.g. Northern Bobwhite *Colinus virginianus* or Fisher's Lovebird *Agapornis fischeri* in France. In both cases it was concluded that the French populations had never been self-sustaining and so both species were removed from Category C and placed in Category E.

Conclusions

This document was considered by other European national bird committees under the auspices of AERC, with opinions and suggestions discussed and incorporated so that it reflects the consensus of both BOURC and AERC.

BOURC and AERC propose that these criteria be used to judge both populations and individual records of birds derived from such populations, the latter relevant to the assessment of extralimital birds found in other countries.

For the latter we suggest 1) the population should be considered self-sustaining in the countries which constitute the species' range, and that 2) the individual is deemed to be second- or subsequent-generation wild-hatched, following the criteria described above. The last feature will be decided by each national bird committee where the vagrant is recorded, but might be based on the presence/absence of leg rings/wing tags, DNA profiling, or the balance of probabilities if the self-sustaining population is well established having undergone a number of generations with relatively few or no translocated birds being added contemporaneous with the extralimital record.

Importantly, the adoption by BOURC and AERC of both the three Seddon (1999) objectives and the additions/refinements listed here will ensure conformity of approach across Europe to the issue of self-sustaining populations of bird species and extra-limital records of birds derived from such populations.

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