Biological Conservation 172 (2014) 109–116

Contents lists available at ScienceDirect

Biological Conservation

journal homepage: www.elsevier.com/locate/biocon

Birds protected by national legislation show improved population trends in Eastern Europe

Jaroslav Koleček [a,b,c,*], Matthias Schleuning [c], Ian J. Burfield [d], András Báldi [e], Katrin Böhning-Gaese [c,f], Vincent Devictor [g], José María Fernández-García [h], David Hořák [i], Chris A.M. Van Turnhout [j,k], Oksana Hnatyna [l], Jiří Reif [a,m]

[a] Department of Zoology and Laboratory of Ornithology, Faculty of Science, Palacký University in Olomouc, 17. listopadu 50, CZ-77146 Olomouc, Czech Republic
[b] Institute of Vertebrate Biology, Academy of Sciences of the Czech Republic, v.v.i., Květná 8, CZ-60365 Brno, Czech Republic
[c] Biodiversity and Climate Research Centre (BiK-F) and Senckenberg Gesellschaft für Naturforschung, Senckenberganlage 25, D-60325 Frankfurt (Main), Germany
[d] BirdLife International, Wellbrook Court, Girton Road, Cambridge CB3 0NA, United Kingdom
[e] MTA Centre for Ecological Research, Lendület Ecosystem Services Research Group, Alkotmány u. 2-4, Vácrátót 2163, Hungary
[f] Department of Biological Sciences, Goethe University, Max-von-Laue-Straße 9, D-60438 Frankfurt (Main), Germany
[g] Institut des Sciences de l'Evolution, UMR 5554-CNRS, Université Montpellier II, Montpellier Cedex 05, France
[h] Hazi Foundation, Granja Modelo, s/n, 01192 Arkaute, Álava, Spain
[i] Department of Ecology, Faculty of Science, Charles University in Prague, Viničná 7, CZ-12844 Praha 2, Czech Republic
[j] Sovon Dutch Centre for Field Ornithology, P.O. Box 6521, 6503 GA Nijmegen, The Netherlands
[k] Department of Animal Ecology, Institute for Wetland and Water Research, Radboud University Nijmegen, Toernooiveld 1, 6500 GL Nijmegen, The Netherlands
[l] Department of Zoology, Faculty of Biology, Ivan Franko National University of Lviv, Hrushevskyi St. 4, UA-79005 Lviv, Ukraine
[m] Institute for Environmental Studies, Faculty of Science, Charles University in Prague, Benátská 2, CZ-12801 Praha 2, Czech Republic

ARTICLE INFO

Article history:
Received 27 May 2013
Received in revised form 15 February 2014
Accepted 23 February 2014
Available online 17 March 2014

Keywords:
Conservation effectiveness
Ecological trait
Environmental legislation
Global change
Life history strategy
Population growth rate

ABSTRACT

Protecting species is one of the major focuses of conservation efforts. However, large-scale assessments of the effects of species protection on animal populations are rare. Protection has been shown to benefit birds in Western Europe and in the United States, but not yet in Eastern Europe, where modern environmental legislation was only established in the early 1990s after political changes. We compared the population trends of bird species between 1970–1990 and 1990–2000 in ten Eastern European countries for species protected since 1990s and unprotected species, controlling for effects of species' phylogeny and traits. After 1990, trends in protected species improved more than in unprotected species. This suggests that national legislation has helped prevent declines of the protected species, although there was a high variability in population trends among countries. In particular, there was great improvement in the population trends of protected species in countries providing 'narrow and deep' protection to few species. In contrast, trends of protected species remained nearly unchanged in countries providing 'broad and shallow' protection to most species, while few unprotected species had adverse population trends in these countries. Although our correlative analysis cannot show causal relationships, the positive relationship between protection and long-term population trends suggests that species protection is a highly relevant tool for conservation. A combination of 'broad and shallow' and 'narrow and deep' protection might be most efficient for securing healthy bird populations for the future.

1. Introduction

Many bird species have declined strongly in the last century from exploitation, land-use changes, climate change and biological invasions (Bonebrake et al., 2010; Williams et al., 2012). In response, policy makers have introduced legislation to protect species by limiting their exploitation and the destruction of their habitats (e.g. Male and Bean, 2005; Williams et al., 2012). Since applying such legislation has financial and other consequences, it

* Corresponding author at: Institute of Vertebrate Biology, Academy of Sciences of the Czech Republic, v.v.i., Květná 8, CZ-60365 Brno, Czech Republic. Tel.: +420 605 552 978.
E-mail addresses: j.kolecek@gmail.com (J. Koleček), matthias.schleuning@senckenberg.de (M. Schleuning), ian.burfield@birdlife.org (I.J. Burfield), andrasbaldi@gmail.com (A. Báldi), katrin.boehning-gaese@senckenberg.de (K. Böhning-Gaese), vincent.devictor@univ-montp2.fr (V. Devictor), jofernandez@hazi.es (J.M. Fernández-García), david@natur.cuni.cz (D. Hořák), chris.vanturnhout@sovon.nl (C.A.M. Van Turnhout), sjanka@ukr.net (O. Hnatyna), jirireif@natur.cuni.cz (J. Reif).

http://dx.doi.org/10.1016/j.biocon.2014.02.029
0006-3207/

is important to know whether the protection efforts are really beneficial to the protected species (Hoffmann et al., 2010). Although the benefits of various management applications have been assessed for many species (e.g. Bonebrake et al., 2010; Williams et al., 2012), general assessments of bird protection at the national or international level are far less common (Donald et al., 2007; Voříšek et al., 2008).

The success of bird protection efforts can be assessed by comparing long-term population trends of protected and unprotected species. Legislation might prevent population declines of protected species, and cause more positive population trends in protected species than in unprotected ones. For instance, between 1988 and 2002, the population status of 52% of the 1300 plant and animal species protected under the US Endangered Species Act improved (Male and Bean, 2005). The proportion of species that were stable or improving increased by 64% within 13 years of their official listing, and improving trends were associated with the greatest mean institutional funding per year (Male and Bean, 2005). Using 8838 species/country combinations, Donald et al. (2007) showed that in Western Europe, species subject to special protection under Annex I of the EU Birds Directive were significantly more likely to have positive population trends during 1970–2000 than non-Annex I species. This pattern was not apparent in the same groups of species outside the EU. Moreover, for every additional 1% of a country's land area under EU protection (SPAs), the odds of a species being in more positive population trend classes increased by around 4% across all species (including non-Annex I species), and by around 7% for Annex I species (Donald et al., 2007). A similar approach was used to test the potential effect of hunting in long-term and large-scale trends in waterbird populations (Jiguet et al., 2012). These examples indicate that conservation policies applied over large regions for sufficiently long periods could have positive effects.

Whether protective legislation might also be beneficial in Eastern Europe has never been investigated. This region is important for biodiversity conservation, having a lower intensity of land use resulting in richer biodiversity than in Western Europe (Galewski et al., 2011). It is thus important to know whether species protection also affects population trends in this region (Pullin et al., 2009; Stoate et al., 2009). Since Eastern Europe was under totalitarian governments for much of the 20th century, a new era of nature conservation legislation started after the political changes of the early 1990s. Eastern European countries thus offer a very interesting opportunity to test the effectiveness of species protection.

Current conservation strategies contain a variety of approaches differing in targets and management tools (Brooks et al., 2006). From a perspective of management intensity and breadth of focus, one can discriminate 'narrow and deep' policies investing a high amount of resources into a limited sample of objects, and 'broad and shallow' policies, with a widely applied but modest effort (Vickery et al., 2004). Following this distinction, the national legislations of Eastern European countries on the protection of bird species might be divided as follows: (i) those protecting only the rare, most endangered and/or charismatic species ('narrow and deep'), and (ii) those protecting most species, including non-threatened or common species, leaving only a few (mostly game) species unprotected ('broad and shallow'). Whether these two strategies can have different impacts on population trends remains to be explored. Studies analyzing the impacts of conservation actions on protected species' population status across the globe found that the greatest success was achieved via targeted intensive actions (Butchart et al., 2006; Brooke et al., 2008; Sodhi et al., 2011). One can thus assume that the impact of the 'narrow and deep' strategy will result in more positive population changes in the focal species.

Besides protection, many environmental and life history factors correlate with bird population trends (e.g. Gregory et al., 2007), perhaps affecting species' susceptibility to adverse conditions and therefore the effectiveness of species protection (Böhning-Gaese and Oberrath, 2003; Jiguet et al., 2007; Van Turnhout et al., 2010; Webb et al. 2010). Specifically, it has been observed that habitat specialists, farmland species, seed-eaters, ground nesters, long-distance migrants and species breeding in cooler regions have suffered more from recent environmental changes than habitat generalists, forest species, residents and species breeding in warmer regions (Reif, 2013). Accordingly, correlation of species' ecological and life history traits with avian population trends must be considered when exploring relationships between species' protection status and population changes.

Here, we assess the relationships between species protection and population trends of birds in Eastern Europe, taking into consideration associations with species' traits. If species protection is efficient, we predict that (i) population trends of protected species would be more positive than those of unprotected species. We also predict that (ii) the differences between protected and unprotected species would be greater in countries with 'narrow and deep' protection than in countries with 'broad and shallow' protection.

2. Materials and methods

2.1. Protected species lists

To obtain lists of bird species protected by statute in each Eastern European country, we requested information from experts working for governmental and non-governmental organizations. We received feedback from 14 of the 15 countries contacted, and species lists suitable for our study were supplied for the following ten countries: Belarus, Croatia, the Czech Republic, Estonia, Hungary, Latvia, Moldova, Poland, Slovakia and Ukraine (Table A1). We analyzed legislation that came into effect between 1987 and 1995, i.e. around the time of political changes and approximating to the time period for which population change data are available (see below). As five countries protected 21–52% and the other five 81–92% of bird species, we considered the former group as having 'narrow and deep' protection and the latter as having 'broad and shallow' protection (see Table A1).

2.2. Population trends

We obtained population trends for the time period from 1970 to 1990 from Heath et al. (2000). This time period was considered to be representative for population trends before species protection was established after the political changes in Eastern Europe around 1990. Population trends for 1990–2000 from Burfield and Van Bommel (2004) were representative for the period with protection. Although the length of the periods differed, these are the best long-term data available for comparisons of bird population trends among European countries in different time periods and have been widely used (e.g. Donald et al., 2001, 2007; Sanderson et al., 2006; Jones and Cresswell, 2010). They are the only sources covering all breeding species in the focal countries. To unify the scale for both data sources, we merged the original population trends to three common categories: – 1 = species' populations showed >20% decrease or species went extinct; 0 = species' populations were stable with a change of <20% in any direction; 1 = species' populations showed >20% increase. Further, we excluded species with trends specified as "unknown" or "fluctuating". This approach ensured that our database contained only species with reliable measures of population trends and the estimates of trend changes between the time periods can be considered conservative. We also excluded new breeders that colonized a given country during the period 1990–2000 and species that went extinct in a