

Differences between the predictors of abundance, trend and distribution as three measures of avian population change

Jaroslav Koleček & Jiří Reif



Introduction

- three widely used measures of bird population changes:
 - i) **change in abundance**
 - ii) **change in magnitude of population trend**
 - iii) **change in distribution**
- differences between these measures often neglected
- interpretation of results might differ depending on the measure used

Methods

- i. **change in abundance**: population trends in 1990–2000 (BiE II)
- ii. **change in magnitude of population trend** between 1970–1990 and 1990–2000 (BiE I and II)
- iii. **change in distribution** between 1985–1989 and 2001–2003 – Czech national atlas mappings

- predictors:
 - life-history traits
 - ecological traits
 - legal protection status in CZ



Results

Significant predictors of changes in abundance (a), magnitude of population trend (b) and distribution (c).

Species trait	a		b		c	
	Estim.	P	Estim.	P	Estim.	P
Habitat niche position	-0.108	0.0845*	0.023	0.7253	-0.034	0.2025
Habitat humidity	0.048	0.7308	-0.160	0.2797	0.148	0.0142
Latitudinal distribution	0.015	0.4898	-0.010	0.6870	0.024	0.0128
Nest location	0.170	0.2031	-0.076	0.5947	0.140	0.0153
LH traits (PC 1)	-0.057	0.5532	-0.337	0.0012	-0.049	0.2349
Legal protection	0.014	0.8724	0.291	0.0022	-0.016	0.6780

* significant only using backward stepwise selection

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Abstract. Changes in bird populations can be described as simple changes in abundance or density of individuals or in larger areas, as changes of distribution or population indices. Although these measures describe different aspects of population change, they are often used interchangeably when discussing the relationships between various predictors of bird population changes found in different studies. This hampers a meaningful comparison of results, because it is unclear which differences between studies are biologically relevant and which are just methodological artifacts, caused by the different nature of measures used to quantify population changes. We compared predictors of the three measures of population changes: (i) change in abundance, (ii) change in magnitude of population trend and (iii) change in distribution, using data collected in a single region, the Czech Republic, and over similar time periods. We also aimed to identify significant drivers of population changes of Czech birds, using a large set of predictor variables and virtually all species regularly breeding in the region. No significant predictors were common across the three measures of pop-