

METHODS

WHAT DO DATA FROM BIRDWATCHERS NOTEPADS TELL US? THE CASE OF THE BEARDED TIT (*Panurus biarmicus*) OCCURRENCE IN WESTERN POLAND

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ABSTRACT

Surmacki A. 2005. *What do data from birdwatchers notepads tell us? The case of the Bearded Tit (Panurus biarmicus) occurrence in western Poland*. Ring 27, 1: 79-85.

Birdwatchers gather significant amount of casual observations which are often used in scientific research. However, accuracy of this data is seldom controlled. The aim of this study was to detect if casual observations reflect real situation in the case of Bearded Tit occurrence. Two sources of data were compared: different birdwatchers casual observations (*CO*) and results of regular studies (*RS*) carried out in the same region by the author. In the case of *RS*, study areas were selected randomly and playback method was used to maximise efficiency of species searching. It has been revealed that birdwatchers explore mainly large lakes and big river valleys. Small marsh patches and streams, where significant part of Bearded Tit sites is located, are usually omitted. According to *CO* data, the peak of non-breeding birds, which normally occurs in the first half of October, took place a month later. This shift resulted from higher birdwatchers activity connected with holidays in the beginning of November and dynamics of rare waterbirds in the region. Flocks of wintering Bearded Tits found during *RS* were significantly smaller than in *CO*. Possible causes of observer biases are presented and discussed.

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Key words: Bearded Tit, *Panurus biarmicus*, bird occurrence, birdwatching, volunteers, casual observations, data biases.

INTRODUCTION

Many of ornithological field studies used birdwatchers data and volunteers help. This source of data was used in analysis of breeding biology (Crick *et al.* 2003, Wesołowski and Czuchra 2003), habitat use (Chamberlain *et al.* 2004), migration

and phenology (Baillie *et al.* 2004), number trends (Vorisek *et al.* 2004) and many others. In most cases such surveys are coordinated by professional ornithologists, co-workers are carefully trained and use special forms or questionnaires. However, a great amount of accidental observations gathered by birdwatchers are also used in scientific purposes, for example in the regional faunistic atlases (*e.g.* Dyrz *et al.* 1991, Bednorz *et al.* 2000). The question arises: how reliable are these data and how accurately do they reflect real processes?

The aim of this paper was to compare data on whole year occurrence of the Bearded Tit in western Poland which originated from two sources: 1) casual observations collected by dedicated birdwatchers and 2) regular studies performed by the author of this article. It was assumed that data from regular surveys are reliable due to: special census methods used, fixed schedule of observations, random selection of study plots and only one observer involved. Therefore, any differences between two data sets were interpreted as casual observations biases. Results on distribution, habitat use, population dynamics outside the breeding season, flock sizes and sex ratio were analysed. Possible sources of biases are discussed.

MATERIAL AND METHODS

Casual observations (CO)

Birdwatcher data on the Bearded Tit occurrence originated from casual observations recorded on "observation cards" and deposited in Department of Avian Biology and Ecology, Adam Mickiewicz University in Poznań. Data on breeding sites, based on observation cards, were published as well (Bednorz *et al.* 2000). Each card included following information: date, location (*e.g.* lake name), nearest town, number of birds and the name of observer. Information about sex, age of the birds and size of particular flocks were not obligatory. Birdwatchers had a choice of place, time and frequency of surveys. In total, data from 181 cards were gathered by 48 birdwatchers between 1975 and 2002. Some cards consisted of more than one record from a particular site, so the total number of observations analysed was higher ($n = 301$). Data were collected at 57 sites in the whole Wielkopolska region (39 300 km²). Among them, data on size of 182 Bearded Tit flocks were included. Flocks which size was assessed only on the basis of voices were excluded from further analysis.

Regular studies (RS)

Data came from regular surveys on the Bearded Tit occurrence, conducted in breeding seasons 2000 and 2001 and between September 2000 and March 2001 (Surmacki and Stępniewski 2003). Study area covered 1872 km² in the central part of the region. Within it, 44 reed marshes were randomly selected and surveyed using point counts combined with playback method (Surmacki 2003, Surmacki and Stępniewski 2003). Outside the breeding season 10 visits within two weeks intervals

were done. All sites were checked twice in May and June 2001 to search for breeding birds (for further details see Surmacki and Stępniewski 2003).

Seasonal changes in the total non-breeding bird number were analysed for half-month periods, beginning from the second half of September till the second half of February (see Surmacki and Stępniewski 2003). In the case of casual observations, the total number of individuals seen in all sites during particular half-month period was used in analysis. If there was more than one observations done in particular site, only the highest count was used. Habitats used by birds were divided into three classes (see Surmacki and Stępniewski 2003): (1) lakes – natural lakes and artificial reservoirs with permanent water surface of the area larger than 1 ha, (2) river valleys – reedbeds associated with rivers and streams, (3) marsh patches – reedbeds not associated with lakes nor rivers, with open water area smaller than 1 ha. Because the largest lake studied in *RS* was 308.8 ha, the *CO* from lakes that exceeded this area were excluded from area comparisons. All statistics were used according to rules given by Sokal and Rohlf (1995).

RESULTS

In total, 2084 individuals were observed during *CO*. Only in 172 birds the sex was determined, what is a significantly smaller number comparing to *RS* (8% vs 59% – Yates' χ^2 -test: $\chi^2 = 325.22$, $df = 1$, $p < 0.001$). Sex ratio of the birds seen during *CO* was slightly male biased (59%), similarly to *RS* results (Yates' χ^2 -test: $\chi^2 = 0.67$, $df = 1$, $p = 0.415$). The percentage of individuals recorded based on voices only, was significantly higher for *RS* comparing to *CO* (23% vs 2% – Yates' χ^2 -test: $\chi^2 = 247.99$, $df = 1$, $p < 0.001$).

Habitats

Numbers of breeding and non-breeding sites found by volunteers (*CO*) within the area covered by regular studies (*RS*) were 5 and 9, respectively. Comparing to *RS* results, it stated for 23% of breeding and 29% of non-breeding sites. According to birdwatchers data (*CO*) collected in the whole region, Bearded Tits bred almost exclusively at lakes, which accounted for 94% of the sites. From river valleys and marsh patches only 6% of all breeding records came. The distribution of breeding sites among habitat types deviates significantly from this found during *RS* (53%, 29% and 18%, respectively – $\chi^2 = 43.27$, $df = 2$, $p < 0.01$).

Outside the breeding season Bearded Tits were observed in 66 sites: 73% of them were located at lakes, 24% sites in river valleys and 3% in marsh patches. Comparing to *RS*, significantly more observations were done at lakes and less at the marsh patches (48%, 24% and 28%, respectively – $\chi^2 = 11.41$, $df = 2$, $p = 0.004$). The valleys where Bearded Tits were observed were significantly wider in *CO* (median = 2100 m, $n = 16$) than in *RS* (median = 208 m, $n = 8$, Mann-Whitney *U*-test: $z = -3.56$, $p < 0.001$). Similarly, the mean area of lakes and marsh patches (combined) occupied outside the breeding season was markedly smaller in *RS* (median

= 21.2 ha, $n = 21$) than in *CO* (median = 96.5 ha, $n = 41$, Mann-Whitney *U*-test: $z = -1.96$, $p = 0.05$). The mean breeding site area in *CO* (mean \pm *SD* = 134.6 \pm 97.4 ha) was larger than in *RS* (mean \pm *SD* = 102.3 \pm 115.5 ha), but the difference was not statistically significant (*t*-test: $t = 0.92$, $df = 37$, $p = 0.37$).

Changes in non-breeding birds number

Numbers of non-breeding birds recorded during *CO* and *RS* were significantly correlated ($r_s = 0.83$, $p = 0.003$, $n = 10$; Fig. 1). However, the peak, which in *CO* occurred in the first part of November, in *RS* appeared a month earlier (Fig. 1). There was no significant relation between *CO* and *RS* with regard to the number of sites where Bearded Tits were observed ($r_s = 0.17$, $p = 0.64$, $n = 10$; Fig. 2). Total numbers of individuals in *CO* was markedly correlated with number of sites ($r_s = 0.82$, $p < 0.01$, $n = 10$).

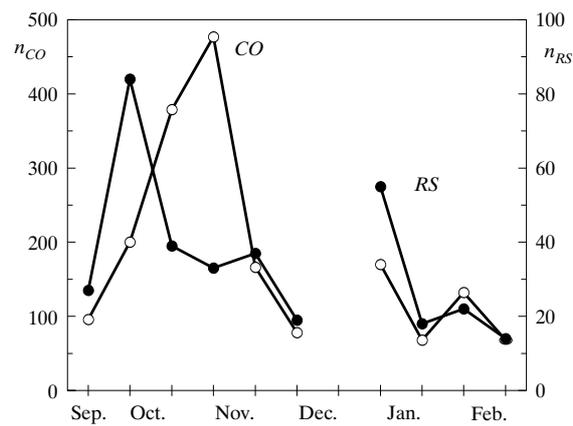


Fig. 1. Changes of the Bearded Tit number indicated by casual observations (*CO* – n_{CO} , left axis) and regular surveys (*RS* – n_{RS} , right axis). Points at x-axis are halves of subsequent months.

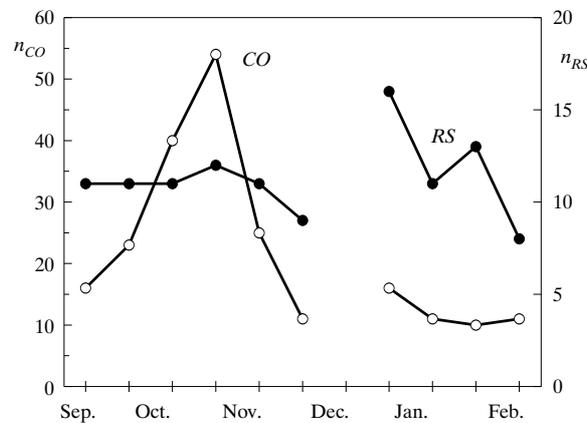


Fig. 2. Changes of number of sites outside the breeding season. Explanations as at Figure 1.

Flock size

Flocks recorded by birdwatchers (*CO*) were on average significantly larger than those of regular studies (*RS*) – mean \pm *SD* = 4.8 ± 5.5 vs 3.6 ± 5.9 indiv., respectively (Mann-Whitney *U*-test: $z = -2.72$, $p = 0.023$, $n_{CO} = 182$, $n_{RS} = 82$). Changes of mean flock size obtained by two methods were not correlated ($r_s = -0.05$, $p = 0.89$, $n = 10$; Fig. 3). According to birdwatchers data (*CO*) the largest flocks occurred in December and January (Fig. 3). Contrary to *RS*, no relationship between mean flock size and the total bird number during particular period was found ($r_s = 0.30$, $p > 0.05$, $n = 10$).

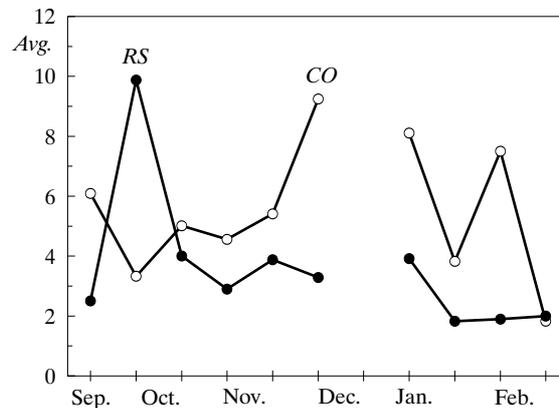


Fig 3. Mean flock size (Avg.) outside the breeding season. Explanations as at Figure 1.

DISCUSSION

The habitat use of the Bearded Tit derived from accidental data is strongly biased. According to them, sites occupied by the species are limited to large lakes, fishponds and valleys of big rivers. In fact, the Bearded Tit occupies wider range of habitats, including small patches of reedbeds. Birdwatchers tend to explore sites with large area of open water and these places are most attractive for them in terms of probability of seeing rare waterbird species.

Regular studies on non-breeding Bearded Tit population dynamics revealed gradual decrease of overall bird number as well as of mean flock size (Surmacki and Stepniewski 2003). At the same time, the number of occupied sites remained constant. This pattern could be interpreted as a natural process of breaking up of the large autumn flocks of immature birds, caused by dispersal, winter mortality and pair forming. In *CO* similar number changes were recorded, however no relationship with flock size was found. On the other hand, total number of birds significantly depended on number of occupied sites. It suggests, that seasonal changes of

Bearded Tits indicated by birdwatchers are connected with their field activity. It is the highest in November, when the peak of waterfowl occurs in the region (Bednorz *et al.* 2000, Kuźniak 1983), special counts of waterbirds on lakes are organised (Kuźniak *et al.* 1991) and the national holiday falls (11 November – Polish Independence Day; Fig. 4). So called “weekend effect” connected with higher birdwatchers field activity are known from elsewhere (Fraser 1997).

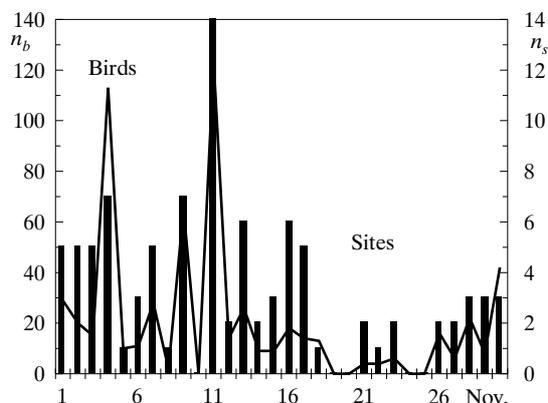


Fig. 4. Distribution of site (bars – n_s , right axis) and bird numbers (line – n_b , left axis) in November based on casual observations (data from all years together).

Despite high number of observers involved and long period of the study, efficiency of accidental birdwatching is relatively low. The main reason could be secretive behaviour of Bearded Tits and inaccessible habitat where they live (see Wawrzyniak and Sohns 1986). With no special methods used (playback), birds are seldom seen (Surmacki 2003), except for the large flocks. As a result, estimation of sites, both for breeding and non-breeding season, might be even threefold underestimated.

Concluding, casual observation are especially prone to significant biases and should be treated with special attention. People who are keen birdwatchers, usually have limited time for their hobby. Not surprisingly, the time and places where they watch birds are carefully selected. In this way, casual observations are more likely to reflect birdwatchers' rather than birds' preferences and temporal trends. The best solutions to avoid these problems is to engage birdwatchers into species-specific research programs. They should base on regular observations in randomly selected sites and the use of appropriate methods.

ACKNOWLEDGMENTS

Ziemowit Kosiński and Piotr Tryjanowski gave valuable advice on early draft of the manuscript. The research was supported by grant no. 207/2000 from Adam Mickiewicz University. Observations of following persons were used in the paper: J. Badaszewicz, W. Białek, P.T. Dolata, J. Dąbrowski, M. Duda, W. Głowski, Z. Gra-

bowski, J. Grzybek, M. Ilków, P. Jędrzejewski, ks. J. Kaczmarek, D. Kaczorowski, S. Kaczorowski, T. Kaleta, J. Konopka, Z. Kosiński, A. Krupa, R. Kubacki, D. Kujawa, W. Kulwas, P. Kusiak, S. Kuźniak, A. Lange, J. Liepelt, S. Lisek, G. Lorek, T. Łukasik, I. Michalak, S. Mielczarek, R. Miklaszewski, K. Mularski, I. Odrzykowski, A. Olszewski, Ł. Pakuła, S. Parniewicz, P. Pawęzowski, R. Pinkowski, W. Plata, T. Rosiński, [T. Statuch], J. Stępniewski, M. Szymkiewicz, P. Śliwa, P. Wieland, T. Wilżak, A. Winiecki, P. Wylegała, J. Wyrwał.

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