

HAS THE NUMBER OF EUROPEAN ROBINS *ERITHACUS RUBECULA* WINTERING IN SPAIN DECREASED?

¿HA DISMINUIDO EL NÚMERO DE PETIRROJOS *ERITHACUS RUBECULA* INVERNANTES EN ESPAÑA?

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SUMMARY.—This paper explores the numerical trends of winter ring recoveries of the European robin *Erithacus rubecula* in Spain to determine whether the number of extra-Iberian individuals has decreased in recent decades. Results show that despite the increasing numbers of ringed and controlled robins, the number of recoveries of individuals of northern origin has decreased since the 1970s. This pattern is congruent with the northwards retreat of the wintering grounds of some partially migratory bird species that may be due to global warming.

RESUMEN.—Este trabajo analiza los cambios en el número de recuperaciones de anillas de petirrojos europeos *Erithacus rubecula* durante las últimas décadas para comprobar si el número de invernantes ha disminuido en España. Los resultados demuestran que, pese al creciente número de petirrojos anillados y controlados, hay una reducción en el número de recuperaciones extra-ibéricas desde la década de los 70. Esto apoyaría la retirada hacia el norte de las áreas de invernada de ciertos migrantes parciales por el efecto del calentamiento global.

INTRODUCTION

Some populations of partially migratory species have responded to global warming by shifting their wintering grounds northwards (Visseret *et al.*, 2009; Pautasso, 2012). However, little empirical evidence is available on the decline in migratory populations in the Mediterranean region, a traditional wintering ground for many European birds (Onrubia and Tellería, 2012). This note explores the numerical trends of winter ringing recoveries of the European robin *Erithacus rubecula* in

Spain to detect any changes in arrivals of extra-Iberian individuals.

MATERIAL AND METHODS

Winter ring recoveries (December, January and February) provided by the Spanish Office of Migratory Species (Spanish Ministry of Agriculture, Food and Environment; code ESI: ICONA, Madrid and ESM: Museo de Ciencias Naturales, Madrid; table 1) were used to analyse the patterns between 1919 and 2010. Many

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were of robins ringed and recovered within Spain, but others were of birds ringed in Sweden, Germany, Poland, Switzerland or Belgium (see Bueno, 1998 for details), which travel more than 1000 km to reach the Iberian Peninsula. These ring recoveries were classified into short-distance (< 1000 km, mean \pm SE, 10.14 ± 1.17 km, $n = 3616$) and long-distance groups (> 1000 km, $1,955.20 \pm 22.66$ km, $n = 804$) according to distances between ringing and recovery localities. In addition, these recoveries were grouped into three periods: pre-1970, 1971-1990 and 1991-2010. To control for potential artefactual effects on the recovery rates, such as the formerly widespread capture of small passerines by hunters (Santos *et al.*, 1988), we also explored the trends of recoveries in relation to the mist-netting activity of ringers (recoveries included in code 20 of the EURING exchange code 2000; Speek *et al.*, 2001). The temporal distribution of robins marked with Spanish rings (available from the European Union for Bird Ringing, EURING; www.euring.org) was also explored to illustrate the temporal trends of ringing effort in monitoring robin movements in Spain. Chi-squared tests were used to assess

whether the observed number of long-distance recoveries differed from the predicted in terms of changes in the number of robins ringed in Spain.

RESULTS

The total number of ring recoveries of the European robin increased over the study period as a result of an increase in activity of the Spanish ringing scheme (table 1). However, despite this increase, the number of extra-Iberian birds recovered in Spain decreased from the 1970s onwards (table 1; fig. 1; $\chi^2 = 2260$, $df 2$, $p < 0.001$). The trends were similar when only those recoveries resulting from ringing activity were considered (table 1, fig. 1; $\chi^2 = 1928$, $df 2$, $p < 0.001$).

DISCUSSION

These results are congruent with a reduction in the number of central and northern European robins wintering in Spain. This decrease cannot be explained by any change in ringing

TABLE 1

Distribution of winter ring recoveries of the European robin in Spain according to recovery periods and geographical origins. The number of birds controlled by ringing activity is given in brackets. The temporal change of the number of robins marked with Spanish rings is also reported.

[Distribución de las recuperaciones de petirrojos de acuerdo con el origen y el periodo analizado. Se ofrece entre paréntesis el número de individuos controlados a través del anillamiento. Se indica también la evolución temporal del número de petirrojos anillados con anillas españolas.]

Period	< 1970	1971-1990	1991-2010
Short distance recoveries (< 1000 km)	83 (37)	143 (71)	3,390 (3260)
Long-distance recoveries (> 1000 km)	422 (106)	299 (100)	83 (26)
All recoveries (total)	505 (143)	442 (171)	3,473 (3,286)
Number of ringed robins (total)	220	57,441	233,217

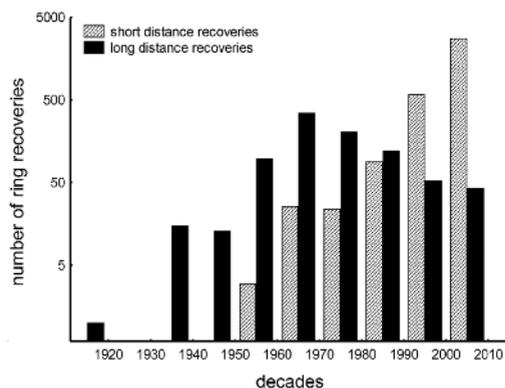


FIG. 1.— Temporal distribution of short-distance and long-distance recoveries of wintering robins. Note the logarithmic scale (\log_{10}) of the Y axis. [Distribución temporal de las recuperaciones de corta y larga distancia de petirrojos invernantes. El eje de las Y está en escala logarítmica (\log_{10})].

activity over previous decades in Spain, (table 1) and Europe (Du Feu *et al.*, 2009) since the ringing effort has increased. Nor is it due to a decline in robin populations, as the evidence suggests that the species is increasing in Europe (European Bird Census Council <http://www.ebcc.info/>). The only potential artefactual effect on these patterns concerns a change in how robin recoveries arise: records reported by bird catchers have been substituted by data provided by ringing activity from the 1970s onwards, following the enforcement of legal protection of small passerines in Spain (Santos *et al.*, 1988). However, the patterns depicted by ringing activity alone also indicate a reduction in foreign-origin controls. Thus, the most parsimonious explanation of the pattern reported here is that robins are increasingly remaining to overwinter further north.

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