

Short paper

The distribution of Barn Owl nest-sites in relation to altitude in southwest England

In Britain, Barn Owls *Tyto alba* are often described as lowland birds with an upper altitudinal limit to their breeding distribution (Bunn *et al.* 1982; Shawyer 1987, 1998; Taylor 1994); this understanding influences both conservation recommendations (e.g. Askew 2006, Ramsden & Twigg 2009) and survey methodologies (e.g. Ramsden 1998, Toms *et al.* 2001, Shawyer 2011, Barn Owl Trust 2012). Previous authors have stated either that an upper limit to distribution in the UK occurs at 250–300 m above sea level (Taylor 1994) or that 150 m is close to the upper limit of habitat suitability, rising to 200 m in the southwest (Shawyer 1998).

Barn Owls may breed at slightly higher altitudes in southwest England than elsewhere in the UK owing to the relatively mild climate; factors such as increased snow cover may be more restrictive elsewhere (for example, through the effect of increased winter mortality of adults; Taylor 1992, 1994; Dadam *et al.* 2011). This short paper aims to show the altitudinal distribution of Barn Owls in Devon and Cornwall, and to discover whether Barn Owl nest-sites are distributed randomly across the available landscape in the region, in terms of altitude.

Methods

Some 1,549 Barn Owl nest-sites were recorded in Devon and Cornwall between 1980 and 2011, mainly via reports from the public and in the course of fieldwork undertaken by Barn Owl Trust staff and volunteers. Nests recorded within 200 m of one another were regarded as the same nest-site.

The altitude in metres above sea level of 84% of nest-sites was measured by entering a six-figure grid reference into MapMate, which provided an aerial image of the 100 m² containing the nest-site and allowed measurement of AMSL for any point within the square. If the exact position of the nest-site was easily identifiable, the precise altitude was recorded; if not, the altitude was measured from the bottom left corner of the

square. Nest-site altitude for the remaining 16% of sites was estimated using contour lines on Ordnance Survey maps.

The nest-sites used in this study were grouped into 50-m altitude bands. The number of hectares within each 50-m altitude band was measured using GIS software (MapInfo in Devon and ArcGIS in Cornwall). Tidal areas and the largest urban areas (Exeter, Plymouth and Torbay) were excluded, being largely unsuitable habitat for Barn Owls.

The relationship between the altitudinal distribution of nest-sites and land available was assessed by testing (using chi-square) for a difference between the observed and expected (given the amount of land available) number of nest-sites in these altitude bands. The expected values represent nest-sites distributed randomly across the landscape in terms of altitude.

Results

Six nest-sites were recorded above 300 m, the highest at 384 m on Dartmoor. The median altitude of nest-sites was 107 m and while 23.8% of nest-sites were above 150 m, the vast majority (98.2%) were below 250 m.

Fig. 1 shows the observed and expected altitudinal distribution of nest-sites in Devon and Cornwall. There was a significant difference between the observed and the expected altitudinal distribution ($\chi^2=265.4$, $P < 0.001$), which confirms that Barn Owl nest-sites are not distributed randomly and that more sites were found at lower altitudes (below 150 m) than would be expected by chance.

Discussion

Despite the finding that the altitudinal distribution of Barn Owl nest-sites in the southwest is lower than that expected by chance, there is some evidence that birds are nesting at comparatively higher altitudes now than 50 years ago. The percentage of birds breeding above 150 m in Devon was estimated at 12% during 1959–64 (Goodfellow

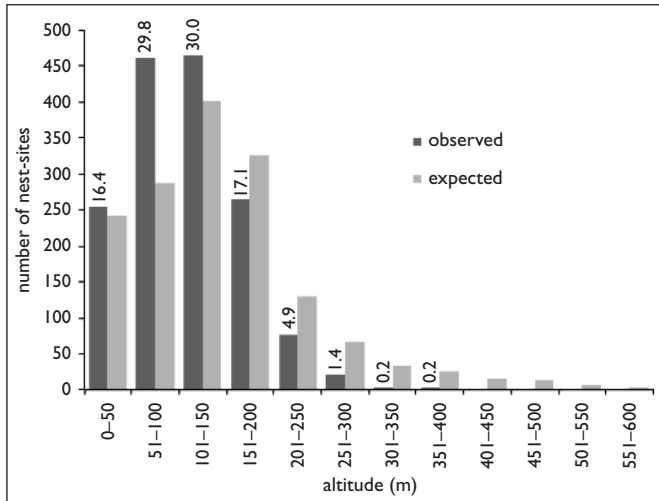


Fig. 1. Number of observed and expected Barn Owl *Tyto alba* nest-sites in Devon and Cornwall in 50-m altitude bands ($n=1,549$). The expected distribution of nest-sites reflects the proportion of land available in each altitude band. The percentage of nest-sites observed in altitude bands are indicated by bar labels.

1966) but had increased to 30.4% in this study. Such range expansion could well be a result of climate change and thus may be expected to continue.

Based on the records analysed here, a current upper altitudinal limit for the region may be estimated at almost 400 m. To date in southwest England, the siting of Barn Owl nestboxes above 300 m has been encouraged only where there is evidence that the species already occurs. Since, in this region there are few suitable tree sites for nesting (Shawyer 1987; Toms *et al.* 2000), and there is evidence that traditional farm buildings have been lost at a significant rate and that many modern buildings are unsuitable for Barn Owls unless a nestbox is provided (Ramsden 1995, 1998), a shortage of suitable nest-sites may be a limiting factor for Barn Owls at higher altitudes. This requires further investigation and should be borne in mind when designing regional conservation measures.

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