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Forestry Commission

Bulletin 90

Barn Owl Conservation in Forests

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South Scotland Conservancy,
Forestry Commission*

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First published 1990

ISBN 0 11 710291 1
ODC 148.2 : Tyto alba : 907.1 : (414)

KEYWORDS: Birds,
Conservation, Forestry

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Front cover: An 80 litre plastic drum nestbox erected
on a woodland edge tree, allowing a clear approach to
the box (*S. J. Petty*).
Inset. Barn owl on fence post (*J. F. Young*).

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Barn Owl Conservation in Forests

Summary

Barn owl numbers have declined over much of the British Isles. However, in northern Britain afforestation has resulted in some local increases. Young plantations with rank grassy vegetation contain large numbers of field voles which are the main food of barn owls. Abandoned farm buildings provide nest sites for the owls, but these deteriorate and are unavailable for nesting by the time the forest is felled and foraging conditions are again suitable for barn owls. Even in afforested areas, the low density of buildings may limit the population of barn owls.

This Bulletin presents a summary of the work in forests of south-west Scotland where surplus nestboxes were provided to see if the density of barn owls could be increased. During three years when field vole populations were increasing, the barn owl population in the nestboxes increased from 0 to 31 pairs, demonstrating that the barn owl population had previously been limited by a lack of nest sites. Barn owls were abundant on the farmland area adjacent to the forest, and chicks produced from these traditional sites colonised the forest sites. Recommendations are also given on how the results from this study may be applied in other forests.

Conservation de la Chouette Effraie dans les Forêts

Sommaire

La population de la chouette effraie a diminué dans la plupart des Îles Britanniques. Cependant, dans le nord du pays le reboisement a provoqué des augmentations locales. Les jeunes cultures avec végétation herbeuse importante abritent des campagnols en grand nombre, qui constituent l'aliment principal de la chouette effraie. Les bâtiments de ferme abandonnés donnent à la chouette effraie des possibilités de nidification, mais les bâtiments vont se détériorer, et ils ne sont plus disponibles pour la nidification quand on abat la forêt et quand les conditions de nourriture sont encore convenables pour la chouette effraie. Même dans les régions reboisées, la densité faible des bâtiments peut limiter la population de la chouette effraie.

Ce Bulletin présente un sommaire du travail fait dans des forêts au sud-ouest de l'Écosse où on a pourvu des nichoirs en excès, afin de voir si on peut augmenter la densité de la chouette effraie. Pendant trois ans quand la population des campagnols était en augmentation, celle de la chouette effraie dans les nichoirs a crû de 0 à 31 paires. Ceci démontre que la population de la chouette effraie était préalablement limitée par manque de place pour la nidification. La chouette effraie était abondant dans la terre agricole attenante à la forêt, et les jeunes oiseaux de ces sites traditionnels ont colonisé les forêts. On fait des recommandations pour utiliser les résultats de cette étude dans d'autres forêts.

Schutz der Schleiereule im Wald

Zusammenfassung

Der Schleiereulenbestand hat einen Rückgang in manchen Gegenden in Grossbritannien erlitten. Die Aufforstungen in Nordbritannien haben jedoch einige örtliche Zunahmen verursacht. Junge Kulturen mit üppigem Graswuchs enthalten eine Vielzahl von Feldmäusen, die die Hauptnahrung der Schleiereule bilden. Verlassene landwirtschaftliche Gebäude liefern Nestlagen für die Eule, aber diese Gebäude verschlechtern sich, und sind daher für Nester nicht mehr verwendbar, wenn der Wald wieder gefallen wird, und wenn die Futterbedingungen für die Schleiereule wieder geeignet sind. Selbst in wiederaufforsteten Gegenden kann die niedrige Dichte der Gebäude den Schleiereulenbestand beschränken.

Dieses Bulletin gibt eine Zusammenfassung der Forschungsarbeit in den Wäldern Sudwestschottlands, wo überschüssige Nistkasten aufgestellt wurden, um zu sehen, ob der Schleiereulenbestand dadurch vergrössert werden könnte. Während drei Jahre, wenn der Feldmausbestand im wachsen war, nahm der Schleiereulenbestand in den Nistkasten von 0 bis 31 Paar zu, was beweist, dass der Schleiereulenbestand früher aus Mangel an Nistplätzen begrenzt worden war. Die Schleiereule war auf den landwirtschaftlichen an den Wald angrenzenden Flächen reichlich, und die jungen Eulen aus diesen traditionellen Stellen haben sich in den Wäldern angesiedelt. Man gibt auch Empfehlungen, wie die Ergebnisse aus dieser Untersuchung in anderen Wäldern gebraucht werden können.

Barn Owl Conservation in Forests

G. Shaw and A. Dowell, Newton Stewart Forest District, Forestry Commission

Introduction

The barn owl, once a familiar feature of the rural landscape, is declining on a national scale (Sharrock, 1976; Bunn, *et al.*, 1982; Cramp, 1985; Shawyer, 1987). Changes in agricultural practices are considered to be largely responsible but these are complex and include for instance, the removal of overgrown grassy field margins and damp corners where the small mammals that barn owls hunt could be found, and the use of more toxic rodenticides.

One habitat that remains rich in these small mammals is the early phase of afforestation (Charles, 1981). It has been known for some time that barn owls can move into young conifer plantations (Bunn *et al.*, 1982; Taylor *et al.*, 1988; Taylor *et al.*, in press). Dark cavities are required for nesting; traditionally these were in old buildings, large hollow trees and rock cavities (Cramp, 1985). A shortage of such sites has limited populations in young forests, and canopy closure has led to the demise of some of these populations. In second rotation forests, when small mammal populations once again increase in density in the early establishment phase (Petty, 1987; 1989), few derelict buildings survive to provide nest sites for owls.

A new approach to barn owl conservation

Barn owls hunt mostly over open habitats such as rough grassland, newly afforested and restocked areas, and grassy edges between different habitat types where field voles and other small mammals are plentiful. They do not regularly hunt inside closed-canopy forests.

Barn owls have four main requirements:

1. suitable hunting habitat;
2. abundance of small mammal prey;
3. freedom from frequent disturbance;
4. nest sites.

Most forests provide the first three conditions at some stage. A conservation project was started in Newton Stewart Forest District, south-west Scotland (South Scotland Conservancy) in 1985. The aim was to create a surplus of nest sites in good feeding areas, with the prediction that owl numbers would increase. There was also the opportunity to try and retain barn owls throughout the closed-canopy stage, by creating nest sites on forest edges bordering rough grassland and streamsides.

Most barn owl nestbox schemes in the British Isles have relied on the presence of buildings in which to site boxes (Kennedy, 1979; Bunn *et al.*, 1982; Shawyer, 1987). The main feature of this project has been to provide new nest sites in suitable habitats, rather than just to select buildings, which are absent from many otherwise suitable areas.

Study area in south-west Scotland

South-west Scotland was an ideal situation for this project, as the barn owl remains relatively common on the farmland adjacent to forests (Figure 1) (Taylor *et al.*, 1988).

Prior to the start of the project, surveys showed the importance of the forest/farmland edge for barn owls; often the birds nested in the nearest building to the forest, and observations showed that they spent much time hunting over young plantations. Within the forest, one area

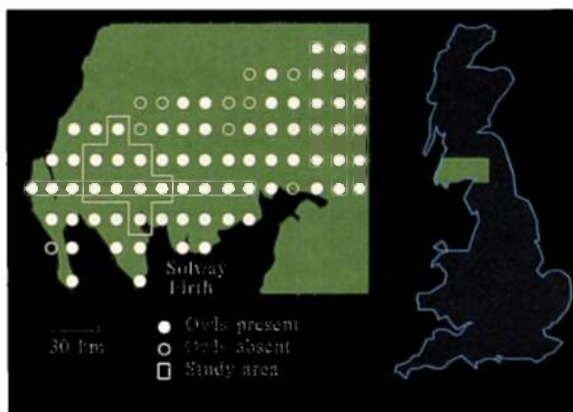


Figure 1. Distribution of breeding barn owls in south-west Scotland in 1981–1986 (adapted from Taylor et al., 1988) in relation to the location of the nestbox study area. Each circle represents one 10 km².

planted in the 1950s and 1960s held up to 10 pairs of owls in abandoned buildings until the 1970s, but lost birds thereafter due to canopy closure and the dilapidation of the buildings (Figures 2a and b). As restocking approached in the mid-1980s, only two to four pairs of owls remained, and most of the former nest sites had been lost so preventing a new generation of owls from recolonising the forest.

In order to provide nest sites in good feeding

areas, such as restocked sites, or along forest edges adjacent to afforested areas or farmland, it was important to design a nestbox that could be easily fixed to a conifer trunk.

Nestbox design

Compared with tawny owls barn owls can have larger broods and the nestling period of about 60 days is about twice as long (Cramp, 1985). Therefore, nestboxes need to be much larger than those for tawny owls. Two designs of boxes have been used.

80 litre plastic drum (see front cover)

These drums were both lightweight and weather resistant. Two were erected at a number of sites, one vertically (see front cover illustration), the other horizontally. This was done to determine whether the owls had a preference for either.

The drums had removable lids; this was ideal for nest inspection, and to allow the drums to be cleaned out after each breeding attempt. The vertical drum had a 10 cm square hole cut near the top, just below the lid. Below the entrance hole two pieces of wood were bolted, one inside, the other outside the drum. This wooden batten enabled the owls to get a better grip when

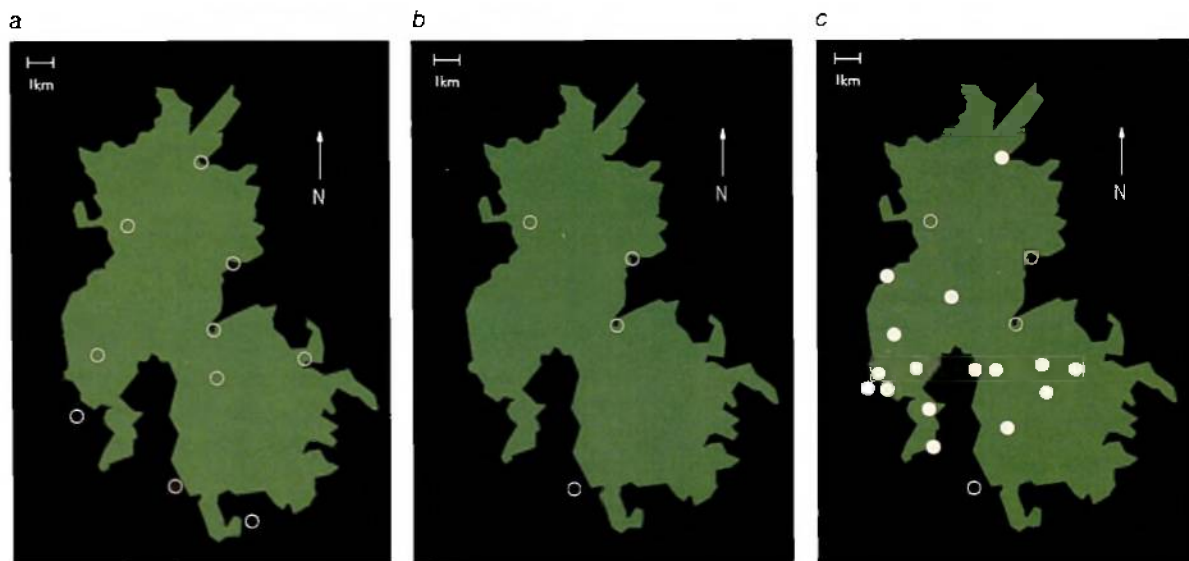


Figure 2. Change in the barn owl population in part of the study area during three time periods. (a) 1960–1980; abandoned buildings (open circles) were the only nest sites available. Up to a maximum of 10 pairs bred in any one year. (b) 1984; only four buildings were still suitable for barn owls. (c) 1988; nestboxes created during 1985–1987 resulted in 16 new breeding pairs (closed circles) being established by 1988.



Plate 1. Barn owl nest with five eggs in a horizontally erected drum. (G. Shaw)

Plate 2. Barn owl brooding three chicks in a vertically erected drum. (G. Shaw)



entering and leaving the drum. Finally drainage holes were drilled in the drum base, and a 5–10 cm layer of dry conifer needle litter or chainsaw chips was added. Drums were numbered to simplify site reference. To produce the horizontal version, the drum was placed on its side and the hole (with wooden batten) was cut in the lid (Plate 1).

Wooden 'A' frame (Figure 3)

This design was a triangular wooden box with a basal area of 85 cm (front) × 32 cm (side) and sloping sides of 90 cm. Results showed that barn owls took to it readily. It was heavy and cumbersome to erect when constructed from sawn timber. Ideally it should be made with marine plywood on a timber frame. The exterior surfaces should have two coats of a preservative such as Cuprinol. Creosote should not be used.

An inspection door was added below the entrance hole, and roofing felt applied to the sloping sides. Again drainage holes were drilled in the base and a good layer of dry conifer needle litter or chainsaw chips was placed in the box.

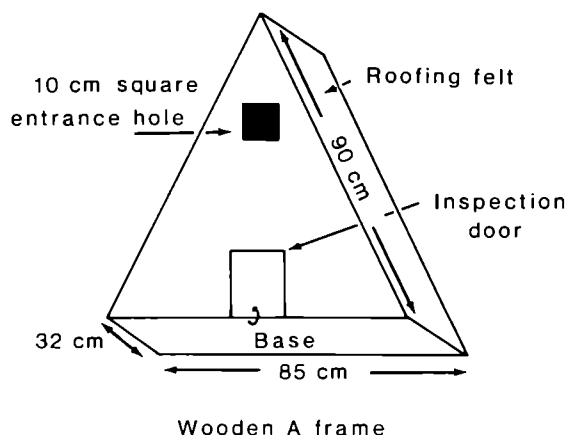


Figure 3. Design for a wooden 'A' frame nest box. (Dr I. Taylor).

Nestbox siting

The nestboxes were sited in areas providing good small mammal habitat, for instance plantation edges facing rough pastures (Plate 3), newly afforested or restocked plantations (Plate 4). Distance between sites may depend on the quality of the habitat for barn owls; most

boxes in Galloway were sited 1–2 km apart although boxes as close as 400 m apart have been used by different pairs.

Boxes were fixed to trees with polypropylene rope. With the plastic drums, two pieces of rope were used, one round the drum top just under the lid and above the entrance hole, the other round the drum near the base. Both pieces were then tied at the back of the tree. The wooden 'A' frame was secured by drilling two holes into the back of the box, the rope was passed into one and out of the other, both ends were then tied to the tree. With both types of boxes it was often possible to position the boxes so that the base was supported by a whorl of branches which were cut off at 0.5 m from the trunk.

The nestboxes were erected about 4–6 m above ground level with a clear fly-way into the box (see front cover illustration). When edge trees are used it is advisable to remove branches from above and below the nestbox.

Use of nestboxes by barn owls

The nestboxes were used by barn owls from the first year of the project (1985), when three sites were occupied. Numbers increased in each successive year to 31 pairs in 1988 when field vole populations were high. Over the 1988/89 winter field vole populations crashed and fewer pairs were present in the boxes in 1989 (Figure 4).

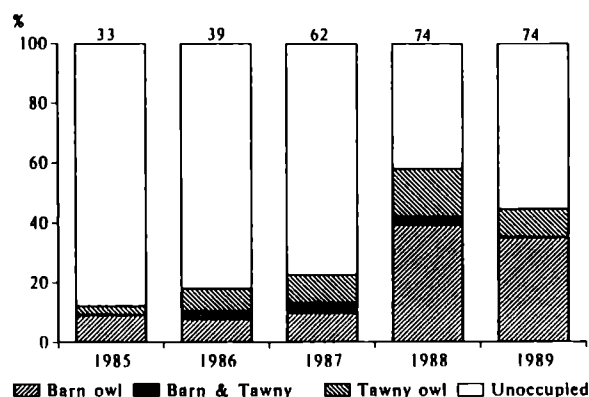


Figure 4. Occupancy rates of barn owl and tawny owl in the nestbox sites during the 5 years of the study in Newton Stewart Forest District. The number of nestbox sites available each year is given at the top of each histogram. Most nestbox sites had two boxes.



Plate 3. *Nestboxes have been erected among forest/farmland edges to allow barn owls to exploit the small mammal populations present in the unimproved pastures adjacent to the forest. (S. J. Petty)*



Plate 4. *Restocked sites with grassy vegetation provide good feeding opportunities for barn owls but no nest sites. (S. J. Petty)*

In one part of the study area where the barn owl population had declined to as low as two to four pairs by the mid-1980s the provision of nestboxes resulted in 16 new breeding territories being established (Figure 2c), so increasing the breeding population well beyond the maximum 10 pairs present in the period 1960–1980 (Figure 2a).

Over this same period, pairs using traditional nest sites in buildings in the 600 km² covered by the project remained stable. Therefore, the nestboxes did provide increased nesting opportunities for the owls, so enabling a greater number of pairs to exist in the area. It effectively demonstrated that prior to the project, barn owl populations had been limited by a lack of nest sites.

Origin of barn owls using the nestboxes

Widespread ringing of barn owl chicks, combined with captures of adults in nestboxes, showed that a large proportion of the new sites were taken up by owls reared the previous year in traditional nest sites. Mean dispersal distances from birth place to nesting place were 6 km for males and 9 km for females (Shaw and Dowell, 1989).

Surprisingly few nestboxes were used for roosting outwith the breeding season, but the presence of fresh droppings around the box suggested that the birds maintained an interest in the site, even in mid-winter. Recaptures of breeding adults in successive years has demonstrated that the same birds return to breed in the same boxes, in spite of the apparent absence of birds in between breeding seasons.

Use of nestboxes by other birds

Small numbers of tits, wagtails and jackdaws bred in the nestboxes, but the main species, other than barn owl was the tawny owl (Table 1).

Although the tawny owl is generally more numerous than the barn owl in forests there was no evidence that tawny owls prevented barn owls occupying boxes. Competition between these two owl species may occur when only one nest-hole is available. This could lead to the earlier nesting tawny owl using most of the available nest-holes. With two nestboxes available at each site, such conflict may have been reduced. At one to two sites most years, both species of owl bred without any interaction, by using both nestboxes (Table 1).

Box type preference

Analysis of box usage at sites where both horizontal and vertical drums were available showed that barn owls had a significant preference (71%) for the vertical drum. Tawny owls used both types in equal numbers.

Monitoring and disturbance

The Wildlife and Countryside Act 1981 ensures that barn owls are fully protected throughout the year; under Schedule 1 of the Act it is illegal to cause disturbance at an occupied nest site. A licence issued by the Nature Conservancy Council (Northminster House, Peterborough PE1 1UA) is required by any person who wishes to visit an occupied nest, in addition to the permission of the landowner. The breeding season may extend from March through until October (Hardy *et al.*, 1981).

Table 1. Number of nestbox sites available and occupied each year. Most nestbox sites contained two nestboxes, both of which were occupied by different species in some years

Year	Sites available	Number of sites occupied by			
		Barn owl	Tawny owl	Barn and tawny owl	Other species
1985	33	3	1	0	2
1986	39	3	3	1	1
1987	62	6	6	2	2
1988	74	29	12	2	2
1989	74	26	7	0	1

In practice, occupation of nestboxes can often be assessed from a discrete distance, without the need to disturb the site. Unlike tawny owls, barn owls leave quantities of faeces, cast pellets and feathers around the box. Occupation can be confirmed after the breeding season when examination of boxes is recommended for the removal of accumulated pellets and the provision of a fresh litter layer.

Potential conflict with pine marten

A small number of nestboxes in south-west Scotland have been used as sleeping places and/or latrines by pine martens. These mammals are very scarce in the area, resulting from introductions 10 years ago. Nestbox schemes in Scandinavia for both owls and squirrels have been adversely affected by pine marten predation, and there is evidence that some individuals learn to associate nestboxes with prey. Therefore any proposed nestbox scheme in areas where martens are present would require careful monitoring, and a readiness to move boxes around or even remove them if excessive predation occurs (Sonerud, 1989).

Implications for barn owl conservation in forests

1. Most barn owl nestbox projects in Britain have been associated with farm buildings which lack suitable nesting places. Such buildings only occur at a low density in any landscape and may well limit barn owl populations well below the potential for an area.
2. This project has demonstrated how the provision of artificial nest sites can increase the population of barn owls in conifer forests. While two designs of nestboxes were used,

other designs with a minimum basal area of 1400 cm² may also be suitable.

3. One reason for the high occupation rate in the south-west Scotland project was the good population of barn owls nesting on the surrounding farmland. This fact should be borne in mind before erecting boxes in forest areas. To obtain an idea of numbers already present either check the local farm/derelict cottages, or contact local ornithologists or farmers.
4. Many forests contain derelict buildings. Some may hold breeding owls, but others may be used only for roosting because no suitable nest site is available. When this is the case a box erected on the rafters or on a gable end would often encourage owls to nest there.
5. Large areas of open foraging habitat are required. In this study these comprised rank grassy areas including plantations in the establishment phase, forest/farmland edges and unimproved pasture.
6. The barn owl suffers badly from adverse weather conditions such as prolonged snow cover and low temperatures; these and other climatic features become more severe with increasing altitude, therefore boxes at high elevations are less likely to be occupied. Most boxes in the Galloway scheme were at altitudes between 0–200 m above sea level, with a few over 200 m. Ideally boxes should not be placed in areas over 250 m a.s.l.
7. While this study has been undertaken in an upland forest, there is no reason why the guidelines developed should not be applied to many areas of lowland woodland. The recent policy to establish farm woodlands could also provide large areas of good habitat for barn owls during the establishment phase. Farm woodlands have a high edge to woodland area ratio; these edges, particularly if the vegetation consists largely of grasses, may also provide suitable hunting areas for barn owls as the tree crops mature.

ACKNOWLEDGEMENTS

The project in south-west Scotland was started jointly by the Forestry Commission and Edinburgh University. Steve Petty, Wildlife and Research Branch, Forestry Commission, provided constant support, encouragement and comment. Dr I. Taylor designed both the nestboxes described in this Bulletin and we thank him for his help and ideas in the initial stages of the project and for commenting on this text. We also thank Diane Chadwick for typing numerous drafts, George Gate for drawing the figures, and the Nature Conservancy Council for providing the licences that were required for the fieldwork.

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