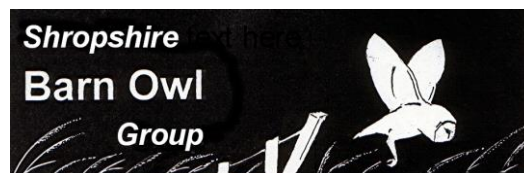


# Breeding success of the Barn Owl *Tyto alba* in Shropshire 2002-2019: a report by the Shropshire Barn Owl Group



## 1. Introduction

This report summarises the breeding success of the Barn Owl *Tyto alba* in Shropshire during the period 2002-2019. The Shropshire Barn Owl Group (SBOG) is a voluntary group which has been working since 2002 to increase the breeding population of Barn Owls by providing nestboxes in areas of suitable habitat and working with farmers and other landowners to improve and conserve their habitat. Four-hundred and thirty nestboxes have been installed across Shropshire to provide new breeding sites and to replenish natural nest sites lost to decay and development and 2932 nestbox and natural nest site inspections have been completed. Sites are monitored on an annual basis under Schedule 1 licence from the British Trust for Ornithology.

## 2. Egg laying and clutch size

Barn Owls are well established on their breeding sites in February and most eggs are laid in late April and May. To avoid disturbance of incubating females, SBOG does not commence nestbox monitoring until June and so data on laying dates and clutch sizes is anecdotal. The earliest date of the first egg during 2002-2019 was 7 Mar, in 2007, a particularly productive breeding season. 2014, another successful breeding season, also produced an early laying date of 15 Mar. The latest first egg date was 5 May in 2004. Clutch sizes ranged from 1 to 7

## 3. Breeding success in nestboxes and natural sites 2002-2020

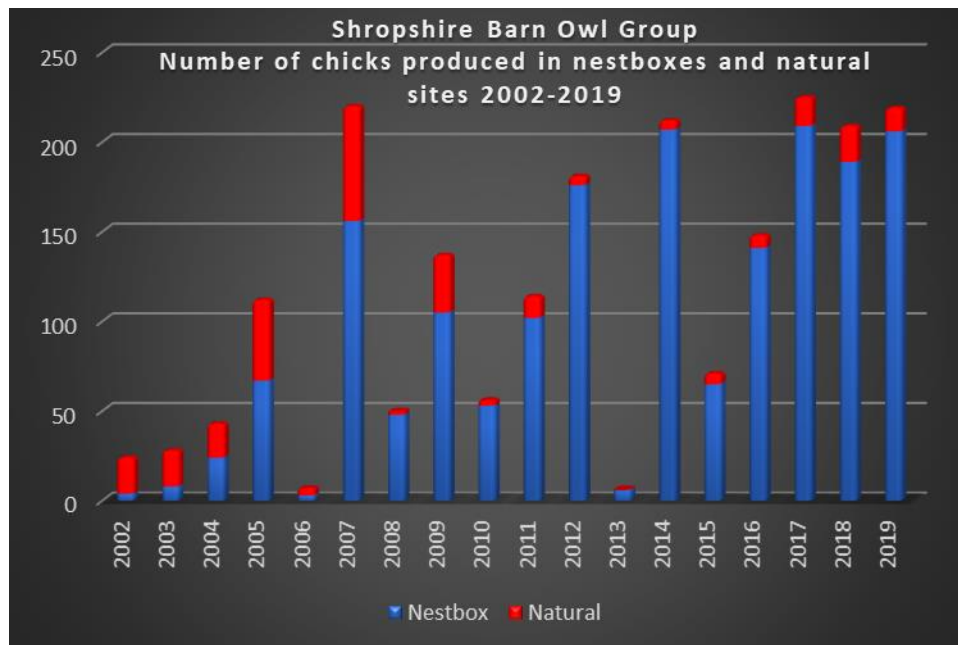
2057 Barn Owl chicks have been produced in nest sites monitored by SBOG since 2002. Table 1. Some additional records since 2015 provided by the Upper Onny Community Wildlife Group and an independent bird ringer are included in the data. The mean number of chicks produced per successful brood in Shropshire for the eighteen years 2002-2019 is 2.9. Studies elsewhere suggest that a long-term average productivity of about 3.2 young per pair is required to maintain viable populations, so the long-term productivity rate for Shropshire's Barn Owls appears to be viable and the population is probably self-sustaining.

Table 1. Breeding success according to type of nest site 2002-2019 Shropshire Barn Owl Group							
	Tree nestbox	Building nestbox	Pole nestbox	Tree cavity natural	Building natural	Other natural	All sites
Total Broods	423	143	19	83	16	3	687
Total chicks	1255	452	57	236	47	10	2057
Mean No. chicks	2.9	3.1	3.0	2.8	2.9	3.3	2.9

### 3.1. Nestboxes

1764 Barn Owl chicks have been produced in nestboxes. Table 1 and Fig 1. The increase in the availability of nestboxes year on year and the firm establishment of existing new pairs at nestbox sites means that they produce a significantly greater proportion of chicks compared to natural sites. Eighty-five per-cent of broods and 85% of chicks were produced in nestboxes. It is highly probable

that nestboxes are now the predominant nest site for breeding barn owls in Shropshire. Most breeding occurs in tree nestboxes while internal nestboxes are marginally more productive than tree nestboxes and natural nests in buildings are marginally more productive than natural tree cavities. Perhaps environmental factors such as increased exposure to reduced temperatures or higher predation has a greater impact on external nest sites. Natural cavities other than trees or buildings are the most productive but the data is limited.



The average lapse time for the occupation of a nestbox by a breeding pair from a sample of records is 17 months. Roosting Barn Owls have been enticed to use nestboxes even quicker than: for example, a pole box succeeded in attracting a roosting Barn Owl within 28 days and tree nestboxes have been occupied by roosting owls within 2 months. A nestbox installed at Burlton only on the 1 May 2016 had an adult female with at least two chicks about ten days old on 9 August – probably SBOG’s quickest occupation by a successful breeding pair.

From the onset, the lack of natural cavities appeared to be restricting the breeding potential of the Barn Owl in Shropshire and an intensive programme of nestbox installation was identified as a priority. Tree nestboxes are substantial structures comprising an ‘A’ shaped box with a flat apex to provide a platform on which young owls can settle and exercise prior to fledging. Large, mature isolated trees, in the middle of fields or along hedgerows, are the preferred option on which to site them. Male and female Barn Owls roost apart for much of the year and often two tree nestboxes or a tree nestbox and an internal tea-chest are installed in close proximity, perhaps less than a few hundred metres apart, to provide both nesting and alternative roosting sites. Where a lone tree nestbox has been intermittently occupied by Barn Owls but has been taken over by a stock dove, for example, another nestbox sited close by has succeeded in providing a permanent Barn Owl site.

Modified tea chests are installed in internal sites, usually affixed to wooden beams in traditional barns and outbuildings or to girders and walls in modern agricultural buildings. Where a barn or similar structure is to be converted to a dwelling SBOG has in several cases been able to construct an owl window and loft space in mitigation. A small entrance hole is retained or fashioned in an outer wall behind which an enclosed box of around one square-metre, fully insulated and enclosed but accessible for inspection, is constructed.

Where hunting habitat exists but there are no suitable trees available, SBOG resorts to fixing large, rectangular, nestboxes to a reclaimed telegraph pole. This has the advantage of inserting the nestbox directly within a field of prime foraging habitat.

Additional species that have utilised nestboxes include Kestrel *Falco tinnunculus*, Little Owl *Athene noctua*, Tawny Owl *Strix aluco*, Stock Dove *Columba oenas*, Feral pigeon *Columba livia domestica*, Jackdaw *Corvus monedula*, Mandarin duck *Aix galericulata*, grey squirrel *Sciurus carolinensis*.

### **3.2. Natural tree nest sites**

293 Barn Owl chicks have been produced in natural sites. Table 1 and Fig 1. Data on the location and number of tree sites is limited due to their inaccessibility. SBOG will identify some tree sites on surveys but those lying on private land to which SBOG has not had access are reliant on being brought to SBOG's attention by landowners or other recorders.

Four tree species were utilised as breeding sites by barn owls in Shropshire – Ash *Fraxinus excelsior*, English oak *Quercus robur*, Sycamore *Acer pseudoplatanus* and Black poplar *Populus nigra*. Ash (48%) and English Oak (47%) were most frequently utilised. Most nest sites comprise a cavity in the tree trunk and some in a branch. Most are in live trees. The height of the nest hole above ground ranges from 3 to 10 metres. The actual nest platform inside the cavity can be some depth below the entrance and in one instance where the nest hole was 10 metres above ground level the nest platform within the tree trunk was at ground level. Elms were historically important before Dutch elm disease removed most of them.

Trees utilised for breeding were situated in hedgerows within fields, hedgerows along the roadside or in isolated trees in fields: trees at the edge of woodland were ignored. It is unlikely that Barn Owls have a preference for any particular tree species but will utilise those trees that are predominant in the landscape and have a propensity to form holes large enough to support a brood of Barn Owls. Examination of the trees indicated that the cavities in the tree trunks comprised a hole or gash which had exposed the heart wood to infection and rot. Nest sites in branches were located at some point along the branch where part of the branch had snapped off or where the branch adjoined the trunk and the whole branch had fallen away, again exposing the heart wood to decay.

### **3.3. Natural building nest sites**

Natural nest sites comprise mainly agricultural outbuildings – traditional barns, stock sheds, cart sheds, Dutch barns and bale stacks within traditional or modern agricultural buildings. One industrial building, historical ruin, water tank and a dovecote has been used. Within buildings, Barn Owls will nest on a roof-space floor, on internal walls.

The recorded occupation of buildings is low. The reason for this is uncertain but is unlikely to be due to building nest sites going undetected on site surveys. Nearly 400 surveys have been conducted and whilst not all sites supported suitable outbuildings, where they did they were surveyed. It is feasible that farmers with Barn Owls breeding in buildings are keeping the sites confidential and many remain undisclosed but it is highly probable that suitable farm buildings are now relatively scarce or those that remain are unsuitable for breeding Barn Owl.

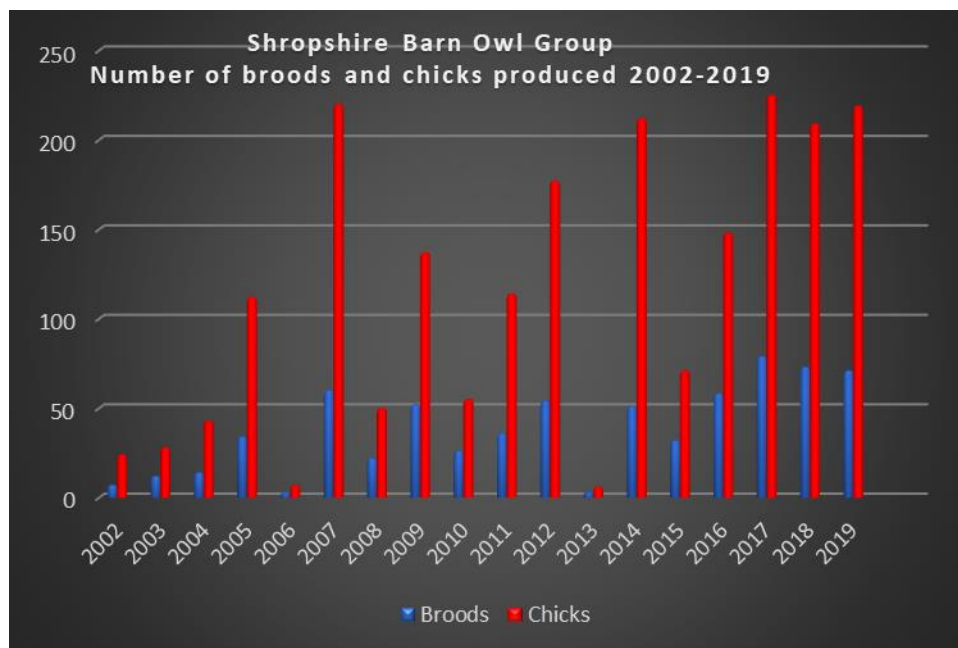
Most breeding occurs in tree nestboxes, but internal sites, whether nestboxes or natural sites within buildings, are marginally more productive than tree nestboxes and nests in natural tree cavities. Perhaps environmental factors such as increased exposure to reduced temperatures or higher predation has a greater impact on external nest sites. Natural cavities other than trees or buildings appear to be the most productive but the data is limited.

### 3.4. Other natural nest sites

Breeding occurred for the first time in 2007 in a natural site other than a tree cavity or building when a pair successfully produced three young in a disused quarry. The nest site was in a rockface fissure, 10 metres above the quarry floor. The site was subsequently occupied in 2009 and 2011.

### 4. Why the peaks and troughs?

Fig. 2. shows the number of broods and chicks produced for the years 2002 to 2019. The steady rise in the number of Barn Owl broods and chicks since 2002 is attributable to the annual increase in the provision of nestboxes and the number of new breeding pairs established at nestbox sites and not any change in monitoring: over 200 sites are routinely checked each year. A cycle of peaks and troughs in breeding productivity is increasingly evident but has been less notable in the last three years and data from future breeding seasons might offer an insight.



#### 4.1. Peak years

Peak breeding seasons producing a notably high number of young following a poor breeding season, occurred in 2005, 2007, 2009, 2011, 2012, 2014, 2016, 2017, 2018 and 2019. Brood sizes were notably larger than those in trough years with an average of 3.1 chicks, range 2.5 to 4.1. The increased breeding activity and success was probably in relation to the cyclical nature of the Barn Owls primary prey, the short-tailed field vole *Microtus agrestis*, which tend to peak every three years and then decline. This means that the vole population will increase in one year, peak in the second and then decline in the third. This cycle is not synchronised across the UK but varies from county to county. Breeding in peak years is typified by early laying dates and a high number of broods, increased breeding success and second broods. Many nestboxes in 2005 were occupied by breeding pairs for the first time and at one site Barn Owls bred for the first time in over twenty years in a nestbox installed by SBOG in the previous year. The 2007 breeding season began early with the first egg produced on 7 March and the first chick on 6 April. The season also extended later in the year than normal with young still in one nest in late October and probably fledging as late as 18 November, the latest fledging date in SBOG records. Thirteen pairs were double-brooded, five of which were in the same nest site as the first brood.

Laying also began early, around 12 April, in 2012 and eight pairs were double-brooded, usually on sites with two nestboxes closely situated to each other. In one case, it appeared that when the chicks reached around ten weeks old the female laid a second clutch in a second nearby nestbox while the male continued to provision the young in the original nestbox. Young barn owls were still present in one nestbox when monitored on 19<sup>th</sup> October. Eleven second breeding attempts were made in 2014 of which nine successfully produced 27 chicks. Six of the second breeding attempts were in the same nestbox as the first attempt. The latest estimated fledging date from a brood was 27 October. Bigamy was suspected for the first time when one male was believed to pair with two females which bred in nestboxes separated only by a field. It is highly probable that bigamy may be more frequent in peak breeding seasons.

Two-hundred and nine chicks in 2017 was the highest number of chicks recorded and followed a productive breeding season in 2016. However, brood sizes were relatively low, averaging 2.8 chicks, and the high number of chicks was driven by the highest number of broods, 79, recorded. The year was then proceeded, unusually, by another peak year in 2018. Although monitoring of nestboxes in July 2018 indicated that Barn Owls were feeding their young predominantly on Wood Mouse *Apodemus sylvaticus*, suggesting that Field Vole were in short supply, it proved to be the fifth most productive breeding season.

Similarly, 2019 was another peak breeding season which unusually followed two previous successful breeding seasons, with no notable dip associated with field vole cycles as in some previous years. The 219 young successfully produced was the third highest. Unfortunately, forty-eight chicks were lost in the nest, possibly due to predation but most likely due to starvation as a result of heavy and persistent rainfall in June which impeded feeding by the adults with first broods. Three pairs proceeded to have second broods in July and August: one of the three first broods of these pairs were successful and all three second broods were in the same nestbox as the first breeding attempts and all succeeded. By the end of August 13 nestboxes contained small young, which was unprecedented, with young in the nest noted into late October. However, the loss of so many chicks in 2019 and an impending fall in the field vole cycle will most probably impact the 2020 breeding season.

### **4.3. Trough years**

Trough years are characterised by pairs not attempting to breed or abandoning attempts, low clutch and brood sizes and high egg failure and chick mortality. The average brood size in trough years was 2.1, range 2.0 to 2.3 chicks. Two years, 2006 and 2013, were exceptionally poor breeding season with only seven chicks successfully produced from three broods in 2006 and six chicks from three broods in 2013. Both years typically proceeded and preceded relatively peak years. It is likely that environmental factors contributed to the decline of voles as well as the crash in vole numbers. Below average temperatures in March 2006 probably inhibited the growth of fresh grass, depleting the field vole population, and above average rainfall in May 2006 will have made hunting difficult for Barn Owls. Two nests produced clutches which subsequently failed to hatch, suggesting pairs may have abandoned breeding activity due to a lack of prey and the consequent failure to sustain breeding condition. At one site, an unusual predominance of stashed young Rats *Rattus sp.* further pointed to a paucity in the availability of field voles. The possibility that pairs remained alive but not breeding is supported by direct observations made by SBOG: in the two instances of failed clutches, both members of the pair were recorded alive and roosting in the nest site or adjacent cavities on a subsequent site visit.

For the first time no chicks were recorded in natural nest sites in 2013 and nestbox monitoring revealed caches of predominately secondary prey items in the boxes, shrews *Sorex sp.* and wood mice. Several pairs produced eggs which subsequently failed, probably due to a reduced food supply and the consequent inability of the adults to maintain weight and remain in breeding condition.

Breeding productivity in some trough years was less severe than the extremes of 2006 and 2013 but still much reduced. For example, several nestboxes in 2008 were found to support non-breeding pairs which were utilising the nestboxes for roosting purposes. Similarly, in 2010 nine nests failed at the incubation stage either due to desertion by the adults or predation and this, together with the low productivity of successful nests and the occupation of several sites by non-breeding pairs, suggests that Barn Owls struggled to maintain breeding activity and to feed their young or deferred breeding altogether. This low breeding activity may have been partly attributable to low rainfall in January and February which resulted in poor grass growth across Shropshire which probably impacted vole numbers when Barn Owls were attempting to attain breeding condition. Infertile eggs, desertion and predation appeared to a factor in the poor breeding season of 2015. Non-breeding pairs were noted at five sites and no second broods were recorded.

## **5. Is the nestbox programme and conservation measures working?**

### **5.1. The current breeding population of Barn Owl**

In 1932 there were 287 breeding pairs of Barn Owl in Shropshire. By the time of the 1992 Atlas the population was substantially reduced to around 140 pairs. The decline continued, SBOG estimating the population at 121 to 140 pairs in 2002, a loss of around 150 pairs in just over 70 years. Three-hundred and ninety site surveys, 2392 nestbox and natural nest site inspections and 430 nestboxes later there are signs of a definite increase in the Barn Owl population - an estimated 200-220 pairs in Shropshire following the 2008-2013 Atlas survey.

The indications are that whilst SBOG survey work and data collection has undoubtedly contributed to a better knowledge of the Barn Owl in Shropshire, the sustained effort to replenish the loss of natural cavities by the siting of nestboxes in areas of prey-rich habitat has promoted a real increase in the number of pairs. New pairs have been established across Shropshire. For example, in the north-east around the rivers Roden and Tern where none were recorded in the 1985-90 Atlas and the policy of targeting nest sites in areas of good barn owl habitat and in close proximity to known breeding pairs to allow for occupation of nestboxes by dispersing juveniles has been effective on The Weald Moors, north of Telford, where Barn Owls increased from one to nine pairs between 2002 and 2005 following the provision of 29 nestboxes.

### **5.2. What Barn Owls need now**

Barn Owls are not territorial but occupy a breeding range in which they require a minimum of 4ha of permanent, rough, tussocky grassland with a deep litter-layer averaging not less than 7cm and capable of supporting Field Vole. Suitable habitat on farmland is now often confined to field margins – arable headlands, hedgerows, fence lines, banks, ditches and riverbanks – and the conservation of these habitats is of paramount importance. Grassy margins sowed around arable fields under the agri-environment schemes are an increasing and valuable hunting habitat and the grassy banks of rivers and other waterways and wetlands, young plantations, old airfields, heathland, country lanes, roadside verges, railway embankments, brownfield sites and other unmanaged grassland, provide good foraging habitat. Intensively grazed pasture, rough grazing and paddocks are not suitable.

Ideally, farmland margins should be 6 metres wide. The structure of the grass is important and should comprise a thick sward 20-40 cm high and remain largely unmanaged to allow a dense thatch to develop at the base of the tussocks. Suitable tussock forming perennial grasses include False Oat-grass *Arrhenatherum elatius*, Timothy Grass *Phleum pratense*, Cocksfoot *Dactylis glomerata*, Meadow Foxtail *Alopecurus pratensis* and Yorkshire Fog *Holcus lanatus*. Grass headlands can be topped but not mown as this will destroy the thatch of leaves at the tussock base.

In the farmed landscape the signs are encouraging. When SBOG started out, farms enrolled in agri-environment schemes and affording grassland habitat suitable to Barn Owls as part of their

farm conservation plans were limited. Since then there has been a definite expansion in grass margins and headlands on arable farmland. As they mature and are colonised by Field Voles, and as long as the nestbox programme remains in place, SBOG is optimistic that Barn Owls can continue to recover.

### **5.3. The future**

Habitat loss and degradation, decay of old tree nest sites, the renovation and dilapidation of farm buildings, adverse winter conditions, climate change, rodenticides and road casualties, will all continue to impact the Barn Owl population. Urbanisation continues to encroach on hunting habitat and the disturbance and development of buildings known to support breeding Barn Owls continues. We must remain vigilant. Some of these factors can be mitigated but it is a sobering thought that, according to one estimate, three quarters of Britain's Barn Owl population now use nestboxes for breeding. But there is a caveat. Aside from the inherent problem of maintaining sufficient funding to continually install and replenish nestboxes, existing habitat must be safeguarded. Continued funding, targeted through agri-environment schemes following the UK's exit from the EU, is essential for grassy headlands and margins to secure the Barn Owl population. Reduced mowing of the miles of road verges along quiet country lanes where Barn Owls are unlikely to fall victim to car collisions will enhance their hunting habitat further and compliment the farmland margins. In the longer term, Oak and Ash trees continue to be lost due to decay and there is an urgent need for a hedgerow tree planting programme to ensure a sustainable supply of natural nest and roosting sites in the distant future.

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2020