



2004 Cornwall Barn Owl Survey Report

Results from a countywide survey by the Barn Owl Trust

in association with

The Cornwall Bird Watching and Preservation Society



Paul R French and David J Ramsden

Paul French (BOT) – fieldwork, data processing and mapping, report writing
David Ramsden (BOT) - project design & management, report editing/writing

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BOT Staff

Amy Oliver - managing volunteers, fieldwork, proofreading and data entry.
John Howells – ledger production, help with IT, data entry and fieldwork.
Simon Balmford - fieldwork, data entry and proof reading.
Isabel Vacas – fieldwork and data entry.
Sandra Reardon - IT support, admin management and proof reading.
Frances Ramsden - cover design
Stacey Sewell - proof reading.

BOT Volunteer Interviewers

Stan Gay
Daniel Eva
Paula West
John and Brenda Dickson
Neil Lindsay
Elizabeth Bancroft
Leonard Oates
Vaughan Upson
Abi Evans
Karen Barnard
Pat Williams
Chris Robinson
Tom and Yvonne Byles
Sally Roberts
Les Minton
Jennifer Gegg
Phillip Dale
Paul Cox

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2004 Cornwall Barn Owl Survey

Introduction.

The Barn Owl in a global context.

The Barn Owl (*Tyto alba*) is one of our most popular and attractive birds. It has been the subject of folklore and fascination for centuries. It also has one of the widest distributions of any land bird, breeding on every continent except Antarctica. The Barn Owl has been separated into 37 recognisable races, and the nominate race *Tyto alba alba* is distributed across Britain, western and southern parts of Europe, and into adjacent parts of North Africa (Taylor 1994). The European population is largely sedentary, although north eastern populations may move south and west to escape the worst of the continental winters (Mikkola 1983). Barn Owls from the darker eastern European race *Tyto alba guttata* are occasionally recorded in Britain and although most of these are found on the east coast ring recoveries show that eastern European Barn Owls can even occur in Cornwall (Wernham et al, 2002). Here in Britain, it is only dispersing juveniles that move any distance. Adult British Barn Owls are highly sedentary and most remain faithful to one home range throughout their lives. During the breeding season hunting is concentrated within 1-2 km of the nest but in winter individuals may forage as far as 5 km from their former nest site (Cayford 1992, Taylor 1994, Wernham et al. 2002).

UK Barn Owl population estimates.

The evidence for the Barn Owl's abundance and subsequent decline is largely anecdotal, however compelling it may be. The first attempt at a population census was undertaken by George Blaker in 1932 and gave a population estimate for England and Wales of 12,142 pairs (Blaker 1933). A second census over the same area was attempted between 1983-1985, and resulted in a population estimate of 3,750 pairs (Shawyer 1987), a decline of 69% over 50 years. However, due to limitations in both surveys, Percival (1992) suggested that there was not enough quantitative data to identify how large the decline of the Barn Owl was, and whether or not it was still continuing. The first reliable population estimate for Britain's Barn Owls was achieved in 2000 by *Project Barn Owl* (Toms et al. 2000), and gave an estimate of 4,000 pairs.

Barn Owl decline.

Whilst the causes of Barn Owl decline are numerous, there is a general consensus that the principal factor is a reduction in food supply caused by agricultural intensification. Specific changes include loss of unimproved pasture, increase in stocking rates, the switch from hay making to silage, loss of rough field margins and hedgerows, the switch from spring sown to autumn sown cereals and changes in grain storage (Chamberlain et al. 2000). The loss of unimproved and rough grassland was estimated at 92% (Fuller 1987) and hedgerow loss at 23% (Haines-Young et al. 2000). As a result, the amount of Barn Owl prey (mainly voles, shrews, mice, and rats) on farmland has been greatly reduced and this is closely associated with reduced nesting success and an increase in Barn Owl mortality (Taylor 1994).

The loss of old barns through disuse, decay, demolition and conversion along with the loss of hollow trees has greatly reduced the number of potential nest/roost sites and has been identified as a cause of local population decline (Ramsden 1995, 1998). In recent years it has also become apparent that major roads (such as dual carriageways) are having a serious negative impact on Barn Owls and are a major limiting factor in their population and distribution (Ramsden 2003). All the causes of Barn Owl decline in the UK as a whole are also evident in Cornwall (pers obs).

Cornish Barn Owl population estimates.

In 1932, the Cornish Barn Owl population was estimated to be approximately 342 pairs (Blaker 1933) and the 1983-1985 survey produced an estimate of 269 pairs (Shawyer 1987). However, the reader should remember that these estimates were not reliable and that in this relatively remote part of Britain the Barn Owl population was almost certainly under-recorded and therefore under-estimated.

The Barn Owl Trust (BOT) and the Cornwall Bird Watching and Preservation Society (CBWPS) undertook the first Cornwall Barn Owl Survey in 1994 as a joint project. This study estimated the Cornish population to be between 100-200 pairs (Grant *et al.* 1995) however the reader should note that this survey was not designed to produce an accurate county population estimate. It consisted of re-checking all known sites rather than the cold searching of randomly selected areas (as in *Project Barn Owl*) which is a preferred method for producing population estimates. Despite these limitations, the census-type methodology used in the 1994 survey did have the advantage of producing a detailed database on the bird's activity at all known sites. It also enabled conservation effort to be directed at confirmed nesting and roosting sites, as a much higher proportion of nesting pairs were located than in a random search of selected areas, as in *Project Barn Owl*.

Since the 1994 survey the Barn Owl Trust has continued to record Barn Owls in Cornwall and the number of reports of traditional nest sites collected annually at the Royal Cornwall Show suggests that Cornish Barn Owls have been greatly under-recorded in the past.

Barn Owl conservation in Cornwall since the 1994 survey.

The work of the Barn Owl Trust and others has helped increase awareness of Barn Owls across the county. Advice from groups such as BOT, FWAG, CWT, and RSPB along with agri-environment schemes such as Countryside Stewardship have all helped to increase the amount of rough grassland (the Barn Owl's optimum foraging habitat) in Cornwall. The Barn Owl Trust, individual enthusiasts, and farmers have erected hundreds of Barn Owl nestboxes particularly in modern farm buildings that otherwise lack potential hiding and nesting places.

Following recommendations from the BOT in 1995 North Cornwall District Council became the first local authority in Britain to require developers to incorporate provision for Barn Owls into all rural barn conversions. Other Cornish authorities have required provision to be made for Barn Owls only at development sites where signs of occupation were noticed. However the situation is improving and all local authorities in Cornwall now require a bat and Barn Owl survey to be undertaken as part of the planning application for a barn conversion. This should greatly increase the awareness of Barn Owls amongst planners and developers.

In Cornwall, Imerys Minerals Ltd, in conjunction with the BOT, currently undertakes the only dedicated conservation effort aimed solely at Barn Owls. This is a 5-year project involving the erection and annual monitoring of over 40 nestboxes and the provision of management recommendations for 23 designated habitat areas in the china clay mining area near St Austell. This initiative has had mixed success. Habitat management is a constant challenge due to the ever-changing nature of the landscape. 2004 proved to be good year, with three nests recorded in nestboxes on Imerys' land, and a further five on land adjacent to Imerys' mining area.

Aims of the survey.

The main aims of the 2004 Cornwall Barn Owl Survey were to:

1. establish the number and distribution of known sites where breeding or roosting occurred in 2004,
2. check all breeding and roosting sites found during the 1994 Cornwall Barn Owl Survey,
3. recheck all breeding and roosting sites recorded by the BOT in the ten years since the last survey,
4. create detailed distribution maps of Barn Owl activity,
5. check data coverage by interviewing landowners in randomly selected tetrads with no reported Barn Owl activity,
6. produce a county population estimate that can be compared to 1994.

Methods

Survey sites.

The 2004 Cornwall Barn Owl Survey was undertaken in much the same way as the 1994 survey, with slight but significant improvements. The same methods were used in the 2003 Devon Barn Owl Survey (Ramsden and Howells, 2004). The main activity involved the rechecking of all nesting and roosting sites held on the BOT database at the start of the survey year. The main ways in which sites have been reported were as follows:

- a) intentionally given to the BOT by the public/landowners/farmers (sometimes in response to specific media appeals).
- b) incidentally recorded in the course of general enquiries received by BOT.
- c) via contact with other organisations/groups/individuals with an interest in Barn Owls/conservation/rural buildings.
- d) by BOT staff/volunteers in the course of general fieldwork, education events, or research projects.

In addition, a minority of previously unrecorded sites were reported to BOT during the survey year or discovered during survey fieldwork. However, there were no intentional physical searches for signs of Barn Owl occupation at completely unknown sites (no cold searching).

All reports from the general public were carefully examined. This often involved the careful asking of relevant questions when the initial report came in. It was usually possible to gauge how reliable a report was by contacting the informant and talking through their sighting with them. Many reports actually referred to Tawny Owls. These were usually easy enough to recognise, and any clearly incorrect reports were omitted from the dataset.

Just before survey fieldwork commenced (in Spring 2004), a ledger was created which listed all sites in Cornwall where Barn Owls had been reported as nesting, or roosting, at any time since the start of the previous survey year; 596 sites in total. This compares to 912 sites that were detailed in the Devon Barn Owl Survey 2003 ledger. Great care was taken to ensure that no sites received duplicate visits so as to minimise any disturbance to the birds. However, duplicate visits could still occur where the original information given to BOT was inaccurate (either site name or grid reference) or if a known site was newly reported under a different name and/or grid reference.

As far as possible, the type of site the birds were using and the nest position were recorded. Site types were categorised as follows:

1. Traditional agricultural building (TAB).
2. Modern agricultural building (MAB).
3. Nestbox (NB).
4. Barn conversion with provision for Barn Owls (incorporated into the structure).
5. Barn conversion without provision.
6. Hollow tree.
7. Other. (Any other type of building or structure e.g. derelict house, mine building, garden shed, mineshaft.)

Site search methods.

When searching for signs of Barn Owl occupation, the first point of contact was usually the original informant, who was often the site owner or tennant. This initial contact sometimes provided enough relevant information to render a site visit unnecessary. This was most commonly the case with nest sites adjacent to the owner's house where the activities of the Barn Owls and the noises made by the chicks were readily apparent. However, it was necessary to visit and search the majority of sites. This was only carried out by licensed BOT staff and no sites were entered without permission.

Most searches started by checking the outside of the buildings for signs of possible Barn Owl entry then progressed by checking the highest buildings for droppings, pellets, and feathers. After this any nestboxes or potential nest places were checked for signs of Barn Owl use. Systematic searching progressed through the site until all buildings with access for Barn Owls had been checked. Searches were conducted, signs were identified, and pellets were aged, following the methods described within the booklet *Barn Owls on Site - a guide for developers and planners* (Ramsden & Ramsden 2001).

Interview tetrads

Prior to the commencement of site survey work, a distribution map of the 596 sites to be checked was produced. From this map, 2km map squares (tetrads) were identified where there were no records of occupation by Barn Owls since 1st January 1994. These tetrads were semi-randomly allocated to a distinct group of BOT volunteers known as *interviewers*. The allocation intentionally avoided tetrads dominated by unsuitable habitat (urban, open water/mud, continuous woodland etc.) and positively selected those within the volunteer-selected distance (from home). Nevertheless, these interviewer tetrads were fairly evenly spread throughout the county (see Map 5). Within each tetrad every farmstead (and any other locations with potential roost/nest places) was visited and an interview held with the occupier following standard interview guidelines and recording form. Although interviewers did not search sites, BOT staff/volunteers were available for verification searches where necessary.

Data recorded

Where any material evidence relating to 2004 was found, the status was recorded as follows:

Nesting - one or more eggs or young seen, definite young heard calling for food, definite adults seen repeatedly carrying food to the nest site, nestling (mesoptile) down in the nest or nest debris certainly dating from 2004.

Roosting Regularly - ten or more pellets dating from 2004.

Roosting Occasionally - less than ten pellets dating from 2004.

In sites where no Barn Owl evidence was found, or where any evidence dated from before 1st January 2004, the status was recorded as absent. Where there was no material evidence, but the site owner had seen at least one Barn Owl in the immediate vicinity (since 1st January 2004), the status was recorded as seen *more than once a week*, *seen more than once a month* or *seen less than once a month* as appropriate.

Data processing

All of the information collected for the survey was entered on to the BOT database (Microsoft Access™). From this database, it was possible to selectively extract relevant site status data. The data was then transferred to Microsoft Excel™ for processing. This involved the manual amalgamation of multiple records for a small number of individual sites and searches for data entry errors, a small number of which were found and rectified. Distribution maps were created using D-map™.

Interpretation of distribution maps.

In the production of the distribution maps, the following parameters were followed:

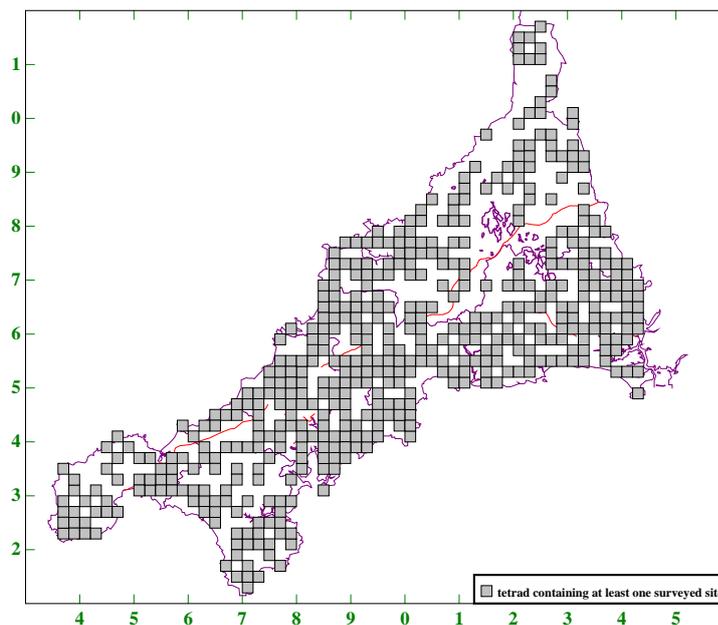
1. Nesting records are shown as priority, followed by regular roosting, occasional roosting and then sight records only.
2. Only one record is shown in any tetrad, following the priority order outlined in 1.
3. A tetrad may contain more than one record of the same type.
4. Blank tetrads do not necessarily indicate an absence of Barn Owls.
5. Local authority boundaries are defined with a dashed line.
6. The red lines indicate dual carriageway.
7. Land above 300 metres (mainly in Bodmin Moor) is outlined with a solid thin line.

An attempt was made to compare Barn Owl distribution to land use using aerial photographs on the CD-ROM Cornwall edition of "High in the Sky" and by using the agricultural land use data available on the DEFRA website.

Results

Survey coverage

The reader should bear in mind that no map squares were intensively searched (no cold searching) and that site recording was intentionally focused on roost and/or nest sites occupied at some time since 1st January 1994. Map 1 shows all of the tetrads that contained at least one of these sites and is therefore a good indicator of the distribution of survey effort.



Map 1. Distribution of tetrads containing at least one site checked during the 2004 Cornwall Barn Owl Survey

It should be remembered that this map only gives an indication of the geographical spread of our coverage, i.e. it may include tetrads where no material evidence of Barn Owls was subsequently found and may not include tetrads where additional sites were recorded during 2004.

Site occupation

The initial number of sites in the ledger was 596. This increased during the course of the survey (as more sites were reported to the Barn Owl Trust) and by the end of the survey 835 individual sites had been checked/recorded - five and a half times as many as were checked in 1994. Clearly this has implications for comparisons between the two surveys (see under Discussion and Appendix).

As can be seen from Table 1, the total number of 2004 nests recorded during the survey was 217, with 244 roosting-only sites.

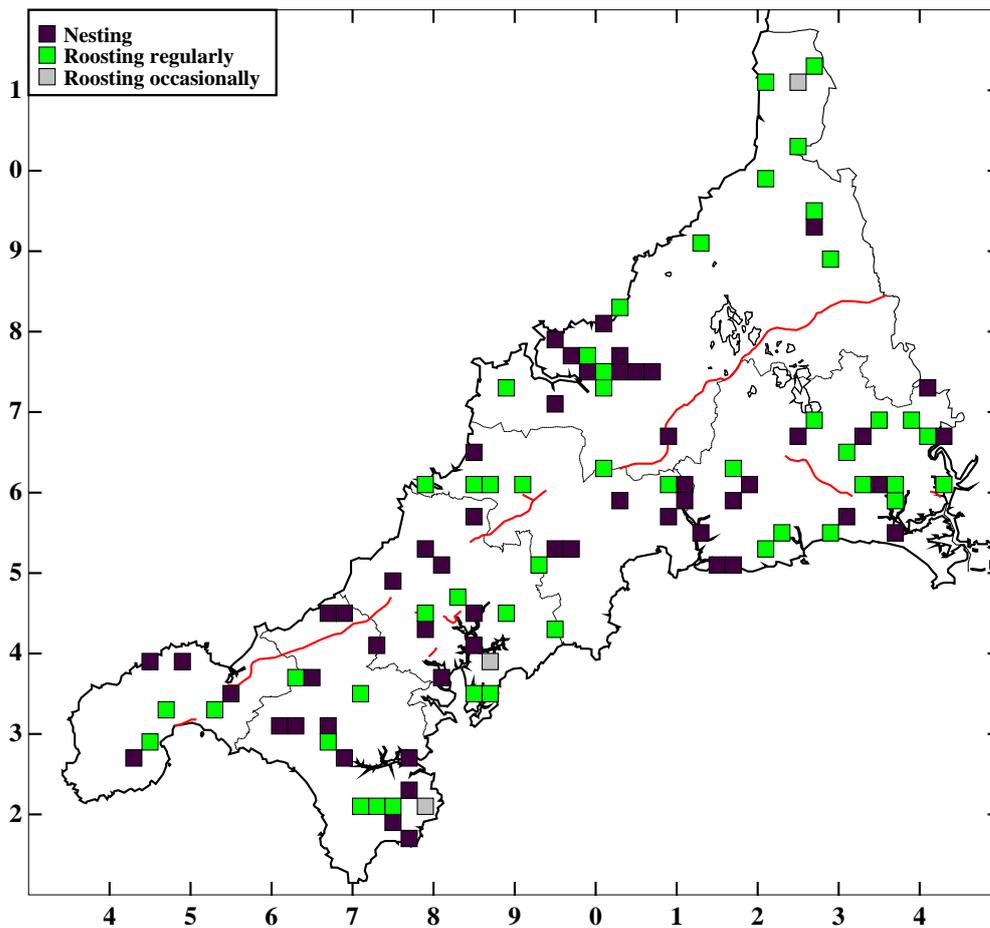
Of the 56 nest sites recorded in 1994, 22 were still used for nesting in 2004, while 19 had been abandoned. Similarly, of the 54 roosting sites recorded in 1994, 5 were still being used for roosting, 11 were found to be nest sites in 2004, and 27 (50%) were recorded as absent. A full breakdown of these figures and a comparison of changes within each local authority district can be found in the tables within Appendix 1.

Local Authority District	Barn Owl status in Cornwall during 2004			
	Nesting	Roosting Regularly	Roosting Occasionally	Previously occupied, now Absent
Penwith	18	10	9	22
Kerrier	34	16	6	26
Carrick	32	19	20	30
Restormel	39	17	10	40
North Cornwall	65	36	22	49
Caradon	29	30	20	54
Totals	217	157	87	221

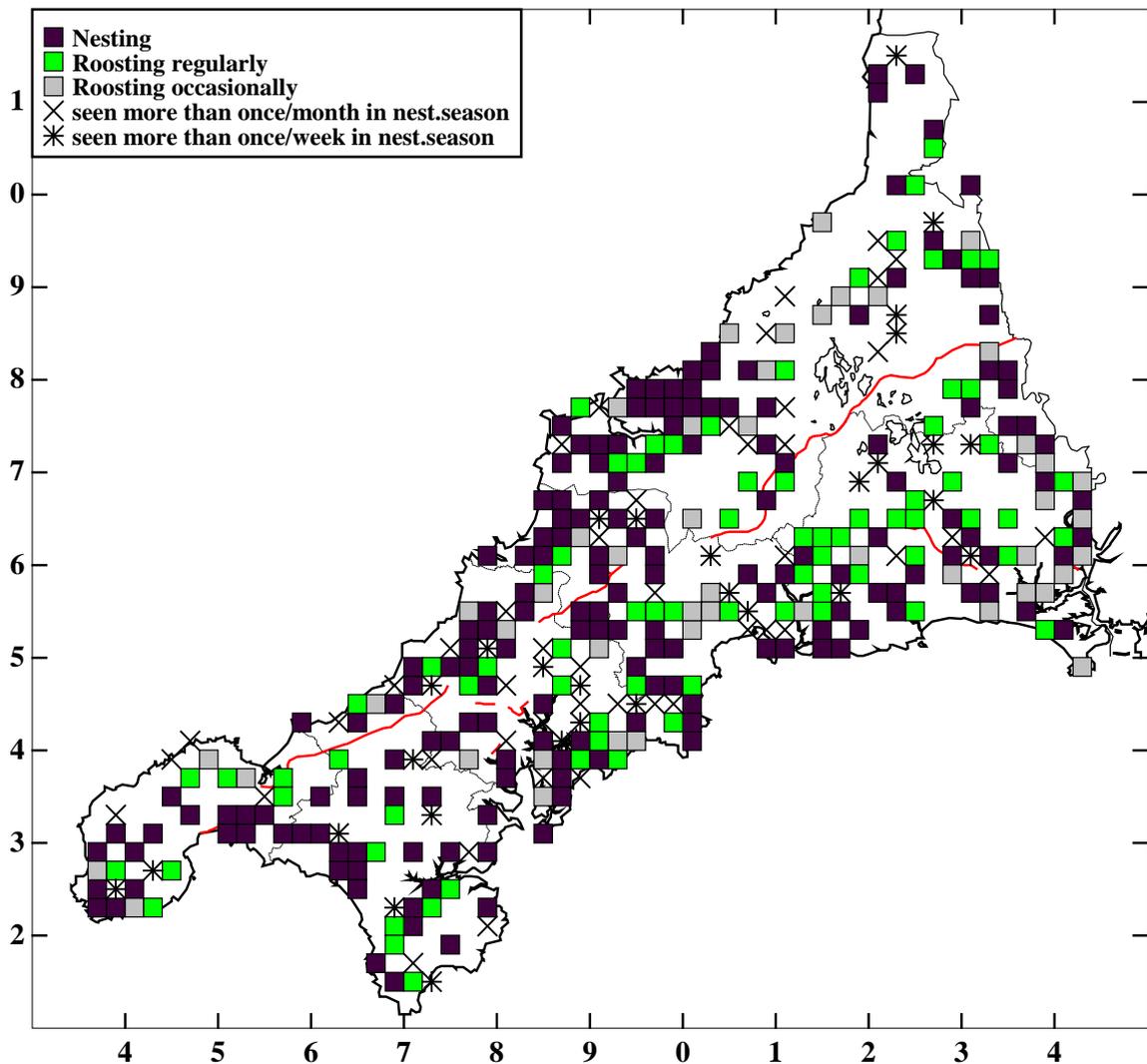
Table 1: Main results table showing number of Barn Owl sites in each local district as recorded during the 2004 Cornwall Barn Owl Survey. Note that all sites referred to as absent are where Barn Owls had been reported either nesting or roosting between 01/01/94 and 31/12/03.

Distribution

The previous Cornwall Barn Owl Survey Report (1994) only presented distribution maps at the 5km² level. This was in accordance with the Barn Owl Trust's confidentiality policy at the time (Grant *et al.* 1995). This policy was subsequently revised, so the 1994 results are reproduced here at the tetrad level (Map 2).



Map 2. The distribution of Barn Owls as recorded during the 1994 Cornwall Barn Owl Survey.

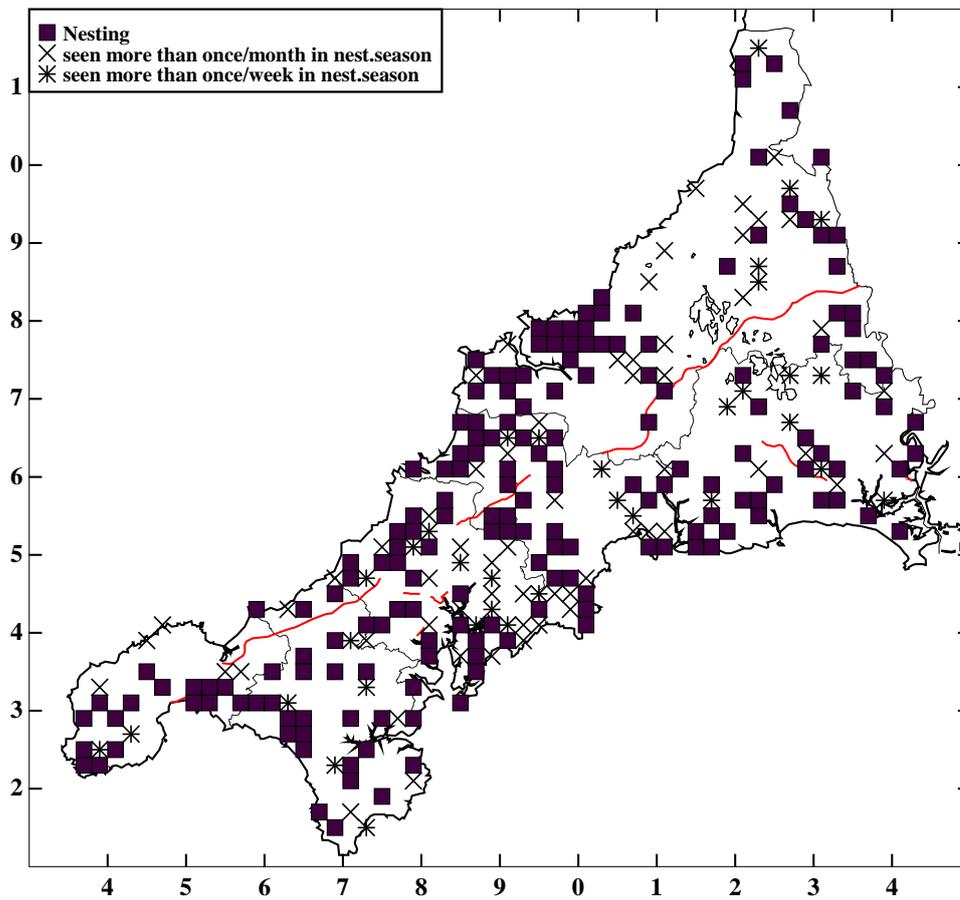


Map 3. **MAIN 2004 RESULTS MAP.** The distribution of Barn Owls as recorded during the 2004 Cornwall Barn Owl Survey (2km squares). Including regular sightings during the main breeding season (March – August inc.).

In the new distribution map (Map 3), frequent Barn Owl sightings during the breeding season are included so as to check for the under-recording of nest sites. Of the 52 sightings reported as being “seen more than once a week” during the breeding season, 22 were in tetrads already containing at least one nesting or roosting sighting record. This leaves a further 30 tetrads containing at least one “seen more than once a week” sighting.

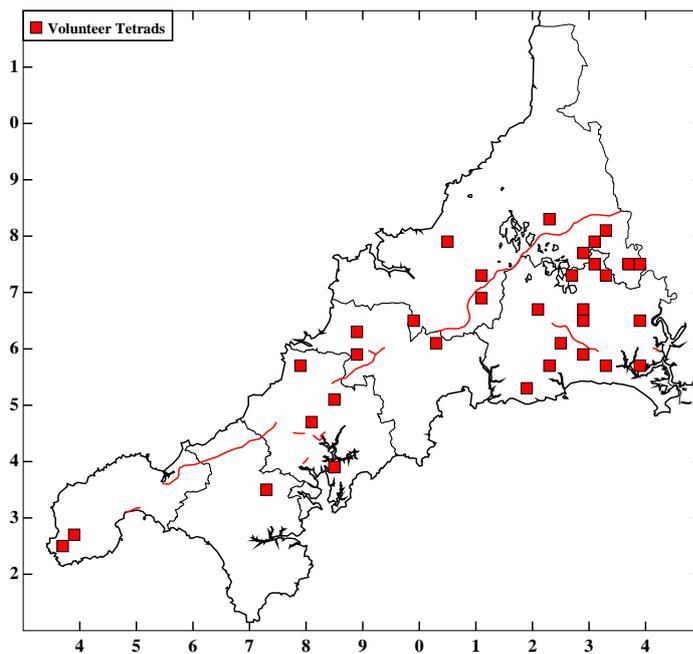
To further investigate the possibility of under-recording, all of the frequent (breeding season) sightings were mapped with all of the known nest sites but ignoring roost sites (Map 4). If coverage was excellent, frequent sightings should have been in or adjacent to squares containing known nests. As can be seen from both Maps 3 and 4, this was generally the case, but with some notable exceptions. Map 4 shows this to good effect. Out of the 52 tetrads containing frequent sightings there were only nine which were not adjacent to a tetrad containing a known nest site.

Less frequent sightings (e.g. “seen more than once a month”) may refer to non-breeding birds, whereas Barn Owls seen more than once a week in the nesting season are much more likely to be breeding nearby. Tetrads containing roosting only records are more difficult to assign to a possible nesting status as many roosting-only sites will be used by birds which breed elsewhere. The non-breeding status of the Barn Owl population is largely unknown, but is likely to be significant. Unfortunately, no serious work has been done to investigate how many non-breeding adults are present in a population at any one time (Taylor 1994). This makes any assumption about roosting birds having a nest nearby invalid, as they may simply be part of the non-breeding population.



Map 4. The distribution of known nest sites and regular sightings during the main breeding season (March – August inc.) as recorded during the 2004 Cornwall Barn Owl Survey.

Interview tetrads



Map 5. Distribution of Interview Tetrads used in the 2004 Cornwall Barn Owl Survey.

The purpose of the interviews was to establish whether there was any known Barn Owl activity in tetrads (Map 5) where the BOT had no records (since 1st January 1994) so as to provide a further indication of survey coverage (the extent of under-recording). Within these 33 tetrads (132km²), four new nest sites were recorded along with seven roosting-only sites and 37 regular sightings. Due to the nature of interviews, there is a possibility that there were further occupied sites that were not recorded. This may have been due to lack of knowledge on the interviewees' part, or an unwillingness to disclose the information.

Table 2 shows the distribution of interview results in each local authority district. There was a distinct easterly bias in the allocation of interview tetrads, which is reflected in the results. Nearly 70% of all the interview tetrads were in Caradon or North Cornwall. Therefore it is to be expected that more records would be found in these areas. When the percentage of total records in Caradon and North Cornwall are compared to the percentage of tetrads in each district, the two figures are almost identical. The numbers of interview tetrads in each of the remaining four districts (1+2+3+4) were too low to permit a similar comparison. However grouping them together shows that the 30.9% of interview tetrads (in the four westernmost districts) produced 29.2% of all the records collected by interviews. The similarities in the three pairs of figures (Caradon, North Cornwall, and the rest) suggest that there was no obvious east/west or north east/south east difference in the extent of under-recording.

In the 132km² (where BOT had no records of previous nesting or roosting and where interviews took place) the 4 nests recorded suggests a population density of not less than 3.3 pairs/10km square in the blank squares in Map 1 (other than those in areas of unsuitable landscape).

	Number of interview tetrads in each district	Nest	Reg. roost	Occ. roost	Seen > once a week	Seen > once a month	Seen < once a month	% of total interview tetrads in district	% of total interview records in district
Penwith	2	1	0	1	2	0	1	6.1	10.4
Kerrier	1	0	0	0	0	0	0	3.0	0
Carrick	4	0	0	0	0	1	0	12.1	2.1
Restormel	3	0	0	0	1	1	6	9.1	16.7
North Cornwall	10	0	1	0	1	2	11	30.3	31.3
Caradon	13	3	3	2	2	4	5	39.4	39.6
Totals	33	4	4	3	6	8	23		

Table 2: Breakdown of results from the *Interview Tetrad* element of the 2004 Cornwall Barn Owl Survey, showing the number of interview tetrads in each local authority district, the status of previously unrecorded Barn Owl sites, and the percentage of the tetrads (n=33) and Barn Owl records (n=48) in each district.

Nest site type

Out of the total of 217 nest sites, site type was recorded at 70% (n=151) and the position of the nest was recorded at 65% (n = 141). The results are presented in Charts 1 & 2. A closer examination of the data revealed that nests in MABs (modern agricultural buildings) are almost always in nestboxes whereas nesting in TABs (traditional agricultural buildings) is divided between nestboxes and more semi-natural sites such as wall tops. This is simply a reflection of the nesting opportunities which these buildings provide as was shown in an earlier study: MABs are generally unsuitable for Barn Owls unless a nestbox is provided but 48% of TABs afford a potential nest place even without a nestbox (Ramsden 1995).

Although the majority of recorded nests were in nestboxes the reader should bear in mind that nests in boxes were more likely to be recorded. Birds in natural sites (such as hollow trees) and more semi-

natural sites (such as ruins) were less likely to be recorded and are therefore probably more frequent than these results suggest.

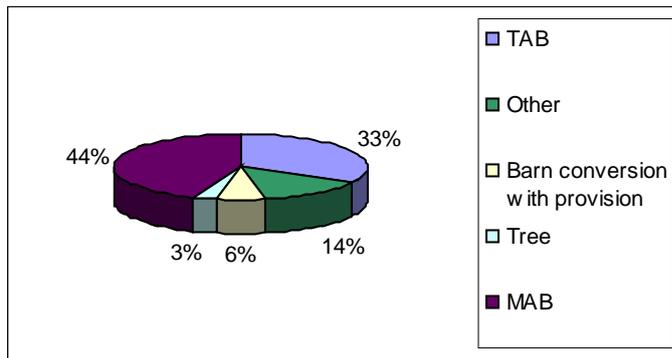


Chart 1. Type of sites where Barn Owl nests were recorded (n = 151) during the 2004 Cornwall Barn Owl Survey.

Note:
 "Other" refers to a wide variety of man-made structures. These include disused mine buildings, derelict houses, sheds and even a viaduct.

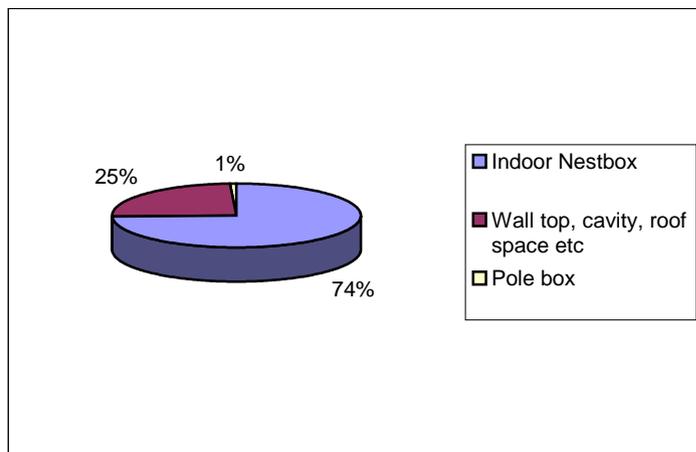


Chart 2. Nest position at sites where nest details were recorded (n = 141) during the 2004 Cornwall Barn Owl Survey.

Note:
 Wall tops, cavities in walls, roof spaces and other related sites are grouped together for ease of recording. Often the site owner knew that Barn Owls were nesting, but was not exactly sure where the nest was.

Discussion

BOT data collection and county survey methodology.

The systematic recording of Cornish Barn Owl sightings reported to the BOT started around 1990 and much of this early data was incorporated into the 1994 Cornwall Barn Owl Survey. From this baseline, the number of records held by the Barn Owl Trust of Cornish nest sites, roost sites and sightings of individual Barn Owls has increased to over 3,200. This represents a huge database of Barn Owl activity, and is only exceeded by the BOT's number of records for Devon. It was from this database that all nesting and roosting records from 1st January 1994 were extracted.

Surveys designed to produce a reliable population estimate are normally based on the intensive cold searching of randomly selected sample areas where absence (as well as presence) is quantified. The figures are then extrapolated to provide an estimate for the whole area. This is the type of method used in *Project Barn Owl* (see Introduction). Unfortunately, such studies are unable to produce detailed local information (such as distribution maps) as only a small percentage of the area (and the population) is ever surveyed. Census-type county surveys (such as the 1994 and 2004 Cornwall Barn Owl Surveys) make no attempt to quantify the absence of Barn Owls and this prevents the production of a reliable population estimate. However the census-type survey method has some major advantages:

- It facilitates the verification of occupation at previously recorded sites
- It produces a highly detailed inventory of all known currently occupied sites
- It allows conservation effort to be targeted at known Barn Owl sites
- It enables the production of detailed local distribution maps.

As a direct result of the BOT's data recording and census-type surveys (in Devon and Cornwall), south west England probably has the most accurately mapped Barn Owls anywhere in the world*. The addition of the *interview tetrad* element of the current survey, plus the comparison of frequent breeding-season sightings with known nest sites, both help to indicate the extent of coverage/under-recording.

* See the first-ever combined Devon and Cornwall distribution map in Appendix 3.

Indications of coverage achieved.

- a) The 33 interview tetrads recorded four nest sites and seven roosting sites that were previously unknown to the BOT (see Table 2 for a breakdown of results). In the 2003 Devon Barn Owl Survey 28 interview tetrads produced no new nest records. The higher number recorded in Cornwall suggests that coverage is lower than in Devon (i.e. that Cornish Barn Owls are relatively under-recorded).
- b) A close examination of the main results map (Map 3) shows that 81% of roosting-only tetrads are adjacent to nesting tetrads. This suggests reasonable coverage was achieved.
- c) Similarly, a close examination of Map 4 shows that 83% of the tetrads containing frequent breeding-season sightings were adjacent to a tetrad containing a known nest site. This too suggests that coverage was reasonable.
- d) BOT staff who carried out the survey noted that many sites were independently reported as being occupied (by two or more people). Similarly, many of the sites reported by the public during the survey year were already in the survey ledger (see Methods). This suggests reasonable coverage was achieved.
- e) Compared to the approximately 150 sites checked in the 1994 Cornwall Barn Owl Survey, the 835 sites checked during the 2004 Survey represent a 557% increase in the number of sites covered.
- f) As a general estimate of geographical coverage, there were 492 tetrads that contained at least one site checked for this survey and these tetrads represented 63% of potentially suitable landscape. Out of the remaining 294 tetrads, 33 (11%) were covered by volunteer interviews at all farmsteads and other potential sites (see point a).

Coverage has obviously increased dramatically and with hindsight the coverage achieved in 1994 seems very poor. Given the indications (above) and sheer number of 2004 Barn Owl records, it's hard to imagine that less than 50% of occupied sites were recorded.

Distribution of the Barn Owl in Cornwall.

Barn Owls are widespread in Cornwall but their distribution is far from even and parts of the county are devoid of records. One obvious feature of Map 3 is the red line of the A30 which cuts a corridor through most of the county where there are relatively few Barn Owl records. The effects of modern "A" roads on Barn Owls are well documented in the BOT publication "Barn Owls and major roads" (Ramsden 2003). The presence of a modern "A" road can have a considerable negative impact on fledgling survival and dispersal, and of all owl and raptor road casualties Barn Owls are the most frequent. Major roads normally result in the complete absence of breeding Barn Owls within 0.5km either side of the road, severe depletion of their population within 0.5-2.5km of the road and some depletion within 2.5-8km of the road (Ramsden 2003).

The three main areas showing a distinct lack of records are North Cornwall coast (between Tintagel and Kilkhampton), Bodmin Moor, and a small region south of Wadebridge. Possible local factors and Barn Owl distribution over the rest of the county are discussed on a district-by-district basis in Appendix 2.

A preliminary investigation into the factors that may be influencing Cornish Barn Owl distribution suggests that Barn Owls may be more numerous in areas of mixed or mainly arable farming rather than in mainly livestock areas. It is important to remember that the Barn Owls are probably not using the crop fields themselves for hunting, but rather the associated areas of set aside and rough grassland along the field margins and hedgerows. Agri-environment grant schemes such as

Countryside Stewardship (CSS) have helped to increase the amount of rough grass field margins on arable and mixed farms to a greater extent than on livestock farms.

The amount of land under CSS management is fairly evenly distributed throughout Cornwall, and a distribution map is available by following the links from the DEFRA website. Interestingly the Roseland Peninsular has a very high percentage of land farmed under CSS, and the possible correlation between this and the high Barn Owl population in this area is hard to ignore. Conversely, large areas of Bodmin Moor and the North Cornwall coast are under CSS management, and these areas are mainly devoid of Barn Owls. Clearly, the fact that a farm enters into CSS does not necessarily infer that it will suddenly become attractive to Barn Owls. Many of the grass field margins created in agri-environment grant schemes are not primarily managed for small mammals. In order to maximise the benefit to predators such as Barn Owls it is important that future schemes provide permanent grassland that is sufficiently rough and tussocky with a decent litter layer so as to maximise Field Vole numbers (the Barn Owl's main prey).

Breeding density and county population estimate.

Cornwall extends to approximately 3548.7km² and within this area approximately 85.5km² is mainly urban, 268.7km² is woodland and 10km² freshwater. In addition, approximately 40km² is above 300 metres and generally unsuitable for Barn Owls because of the dominant habitat type (intensively grazed upland). Excluding these unsuitable areas leaves approximately 3144.5km² of potentially suitable land (31.4 10km squares). The 217 nests recorded in 2004 suggest a breeding density of 6.1 pairs/10km squares, and an adjusted figure to reflect potentially suitable habitat of 6.9 pairs/10km square.

The *indications of coverage achieved* (see above) provide reasonable confidence that the survey managed to record more than half of all the Barn Owl nests in Cornwall in 2004. If coverage was exceptionally low (50%), then the actual breeding population would be twice the number of nests recorded (2 x 217 =) 434 pairs. Similarly, if the coverage achieved was exceptionally high (90%) this would give a breeding population estimate of 241 pairs. Given the *indications of coverage achieved* it is likely that coverage was in the range of 60-80%. This means that the **2004 Cornwall Barn Owl population estimate is 271-361 breeding pairs.**

Excluding the approx. 404km² of unsuitable landscape results in a population density of 8.6-11.5 pairs/10km square. This compares with a population density estimate for Devon of 5.3-7 pairs/10km square.

Due to the incomparable methods used in the 1932 and 1985 surveys of England and Wales and the extent of under-recording in the 1994 Cornwall survey (see *Introduction*) any direct comparison would be misleading.

Population estimates published in Project Barn Owl are of limited comparative use for this survey, as they include the whole of the south-west region (Cornwall, Devon, Somerset, Dorset and Wiltshire). Population density values ranged from 3.06 pairs/10km square to 4.5 pairs/10km square (Toms *et al.* 2000). The use of only 3 tetrads in Cornwall for the Project Barn Owl research, and the inclusion of four other counties with potentially very different Barn Owl populations render comparison of these figures to those arrived at by this survey of limited value. It is evident however, that Cornwall's population density is well above the regional average. It is certainly much higher than the 5.3-7.0 pairs/10km square estimated for Devon in 2003 (Ramsden & Howells, 2004).

Site type.

Nearly half (44%) of all nest sites where the site type was recorded were found in modern barns. This may come as a surprise to the reader with the traditional image of a Barn Owl perched on the window ledge of an old stone barn. These traditional barns are still an important nesting resource for Barn Owls, with 33% of all nest sites recorded being found in them. The dominance of these two site types is perhaps not surprising, given that they are the two most common potential nest sites in the countryside. Indeed, studies by Taylor (1990) in SW Scotland and Ramsden (1995) in Devon showed

that the selection of nest site type by Barn Owls was governed simply by the availability of the various types.

Barn conversions with provision provided 6% of all recorded nest sites. This relatively low figure might have been much higher if Barn Owl-friendly planning policies had been adopted by Local Authorities BEFORE many old barns were converted rather than afterwards. Nevertheless, the increasing requirement for full Protected Species Surveys being carried out on all potential development sites is encouraging.

Hollow trees represented only 3% of all recorded nest site types compared to 13.5% in the 1994 survey. Although birds in remote hollow trees are likely to be under-recorded, there is no reason to think that this bias will have increased over the past ten years. The drop from 13.5 to 3% almost certainly represents a real decline in the number of tree-nesting Barn Owls due to a continuing decline in the number of suitable hollow trees.

The exact position of the nest is inevitably linked to the type of site it is within. Modern barns do not generally have suitable wall tops or cavities, and so the only nesting opportunity is usually within a purpose built nestbox. Traditional barns have a much wider range of potential nest sites. These may include a flat wall top, a cavity in the wall, the roof space or any number of small dark concealed corners. Many people have erected nestboxes in traditional barns, and these are also readily used. In fact, 74% of all recorded nest sites were within an indoor nestbox. These are ideal for the Barn Owl to use, but the percentage indicated here is likely to be an over-representation of the true number, as an erected nestbox will be known about by the site owner and is therefore more likely to be reported.

74% of all recorded nests were in nestboxes compared to only 46% in the 1994 survey. Although birds in nestboxes are more likely to be recorded, there is no reason to think that this bias has increased over the past ten years. The increased proportion in nestboxes is almost certainly a result of the decline in the availability of more natural and semi-natural sites such as hollow trees and old barns.

The conservation of Cornish Barn Owls depends not only on the availability of sufficient feeding habitat but also the availability of suitable nest/roost sites. Hollow trees are becoming very scarce indeed and as more and more traditional barns are lost to decay, demolition, and unsympathetic development, the importance of making provision for Barn Owls in barn conversions increases as does the usefulness of erecting nestboxes in modern barns.

Summary.

The 2004 Cornwall Barn Owl Survey consisted primarily of the re-checking of the 596 nest and roost sites recorded by the Barn Owl Trust since 1st January 1994. During the survey year an additional 239 sites were recorded by the Trust, bringing the total number of sites checked to 835. Barn Owls were found to be nesting at 217 sites, roosting only at 244 sites, and absent from 221. At the remaining 153 sites there was no material evidence of occupation but sightings of individual birds were recorded.

The difference between the actual number of occupied sites and the number recorded (survey coverage) was investigated in various ways including the semi-random selection of 33 tetrads (132km²) where interviews were conducted at all farmsteads and other potential Barn Owl sites. Coverage was estimated to be in the range of 60-80% leading to a population estimate of 271-361 pairs and a breeding density of 8.6-11.5 pairs per 10km square, one of the highest breeding densities in Britain.

Detailed distribution maps revealed that the species is widely but not evenly distributed across the county. There was a lack of Barn Owl records along the A30 dual carriageway (as a result of road mortality) on Bodmin Moor (less suitable landscape) and in several other areas for reasons which are not fully understood.

In most cases the type of site used by the birds was recorded. Nest site types were fairly evenly divided between traditional barns and modern barns, with 74% of recorded nests being located in a nestbox. Between 1994 and 2004 the proportion of nests in hollow trees declined significantly and the proportion of nests in nestboxes increased significantly.

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Appendix 1

Results from the rechecking (in 2004) of Barn Owl sites that were occupied in 1994

Total number of nest sites recorded in 1994		56	100%
Number of 1994 nest sites where in 2004 Barn Owls are:	Still nesting	22	39.3%
	Only roosting regularly	5	8.9%
	Only roosting occasionally	5	8.9%
	Seen more than once a week	0	0.0%
	Seen more than once a month	4	7.1%
	Definitely absent	19	33.9%
	Unknown	1	1.8%

Table A1.1: Barn Owl status in 2004 at sites in Cornwall where Barn Owls nested in 1994, as recorded during the 1994 and 2004 Cornwall Barn Owl Surveys.

Total number of roost sites recorded in 1994		54	100%
Number of 1994 roost sites where in 2004 Barn Owls are:	Now nesting	11	20.4%
	Only roosting regularly	2	3.7%
	Only roosting occasionally	3	5.6%
	Seen more than once a week	0	0.0%
	Seen more than once a month	3	5.6%
	Seen less than once a month	2	3.7%
	Definitely absent	27	50.0%
	Unknown	6	11.1%

Table A1.2: Barn Owl status in 2004 at sites in Cornwall where Barn Owls only roosted in 1994, as recorded during the 1994 and 2004 Cornwall Barn Owl Surveys.

	Nesting sites in 1994	Still nesting in 2004	Was nesting, now absent	Roosting sites in 1994	Still roosting in 2004	Was roosting, now absent
Penwith	4	0	3	3	1	1
Kerrier	11	3	6	7	0	5
Carrick	9	4	2	8	0	4
Restormel	6	2	2	7	0	3
North Cornwall	13	6	5	13	1	5
Caradon	13	7	1	16	3	9
Total	56	22	19	54	5	27

Table A1.3: Barn Owl status in 2004 at sites in each Cornish Local Authority District where Barn Owls were also recorded in 1994 (as recorded during the 1994 and 2004 Cornwall Barn Owl Surveys). Note: sites without material evidence of occupation but where birds had been sighted (in 2004) are excluded.

Appendix 1 continued

Local Authority District	1994 Nest Sites	2004 Nest Sites	% Change
Penwith	4	18	+ 350
Kerrier	11	34	+ 209
Carrick	9	32	+ 256
Restormel	6	39	+ 550
North Cornwall	13	65	+ 400
Caradon	13	29	+ 123
Total	56	217	+ 288

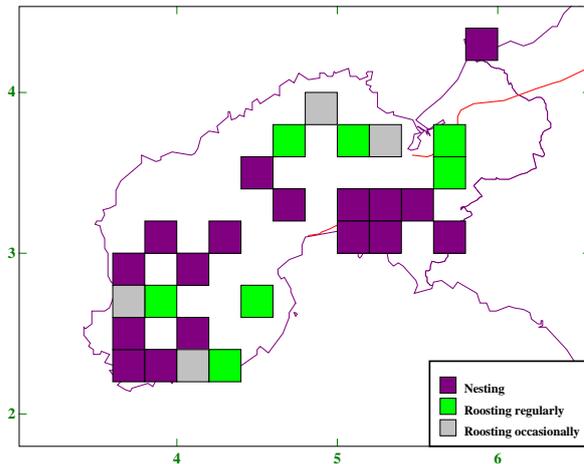
Table A1.4: Changes in the number of recorded Barn Owl nest sites between 1994 and 2004 in each Cornish Local Authority District (as recorded during the 1994 and 2004 Cornwall Barn Owl Surveys).

Local Authority District	1994 Roost Sites	2004 Roost Sites	% Change
Penwith	3	19	+ 533
Kerrier	7	22	+ 214
Carrick	8	39	+ 388
Restormel	7	27	+ 286
North Cornwall	13	58	+ 346
Caradon	16	50	+ 213
Total	54	215	+ 298

Table A1.5: Changes in the number of recorded Barn Owl roosting-only sites between 1994 and 2004 in each Cornish Local Authority District (as recorded during the 1994 and 2004 Cornwall Barn Owl Surveys).

Appendix 2

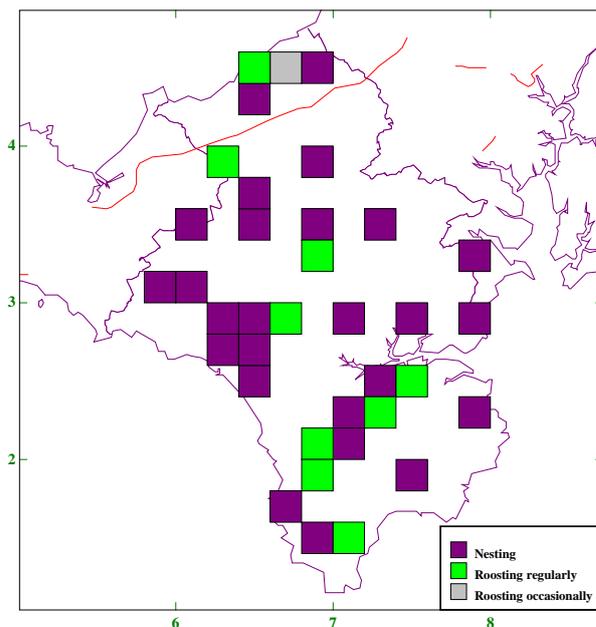
Barn Owl distribution in each local authority district.



Penwith.

Widely distributed throughout most of the district. An apparent lack of records in the north west coastal strip is also apparent in other bird species and may be related to the higher altitude and extremely exposed nature of this area (P. McCartney pers comm.).

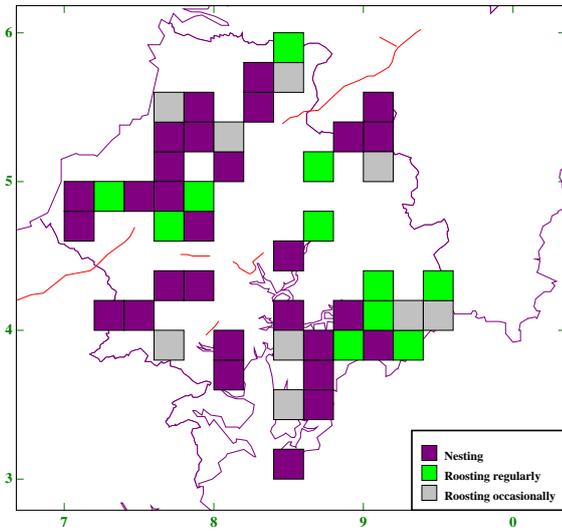
J. H. Johns carried out a survey of Barn Owls west of a line running north from Cudden Point in 1971 and discovered 8 nesting pairs (CBWPS 41st report. 1971). In 2004 16 nest sites were recorded (an increase of 100%). It is impossible to say whether or not this represents an increase in numbers, but does suggest that recent coverage in this area was good.



Kerrier.

Widely distributed throughout the district. There is a distinct concentration of nests around Helston (again an area of mixed farming). The somewhat sparsely distributed nests in the area between Camborne and the Helford River may be due to less suitable habitat associated with the Carnmenelus upland area. The lack of records along the A30 may be a consequence of major road mortality

The relative scarcity of records from the eastern half of the Lizard is surprising however a survey of the Lizard by McCartney *et al.* (1984) found a very similar distribution, although with less breeding records.

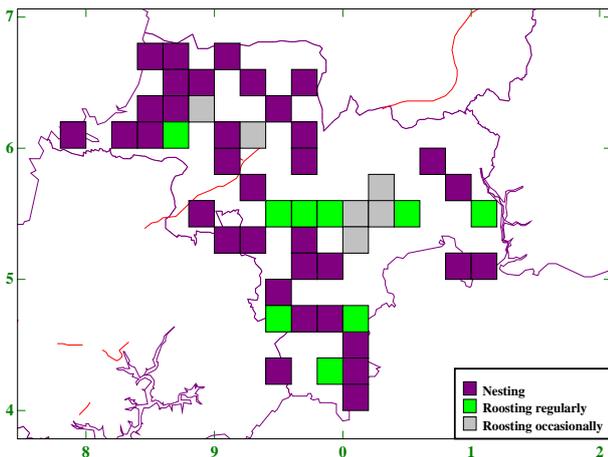


Carrick.

The Roseland Peninsular has a good number of Barn Owl records. This is perhaps the most traditional area of farming in Cornwall, and is well known for being a stronghold of many Cornish farmland bird species (P. McCartney pers comm.).

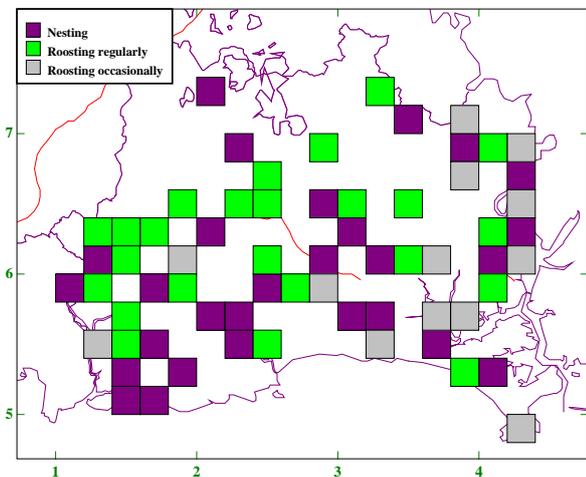
No records within 2km of the A30 dual carriageway possibly as a consequence of major road mortality. Where there is a break in the dual carriageway (to the north west of Truro) Barn Owls were recorded.

Lack of records around the Tregothnon Estate, south-east of Truro where a gamekeeper in the 1970's apparently reported around 15 pairs.



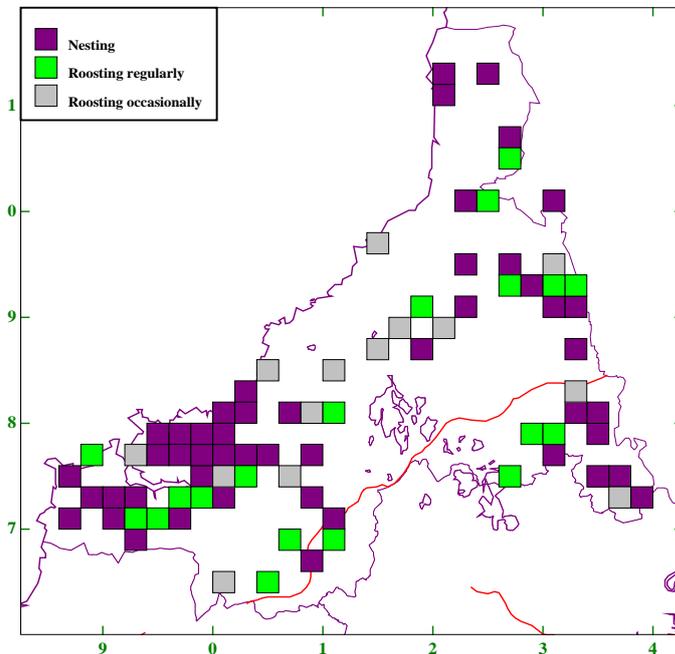
Restormel.

Fairly evenly distributed. No obvious reason for the slight lack of records to the north of the china clay mining area.



Caradon.

Barn Owls are generally well distributed across southern and central Caradon – an area of mainly mixed farming whereas the predominantly pastoral areas of Bodmin Moor (and the areas extending south-west and south-east from Bodmin Moor) are largely devoid of records.



North Cornwall

Barn Owls in North Cornwall are far from evenly distributed. The coastal strip from Delabole right up to (and including) the Bude area appears to be almost devoid of Barn Owls.

Possibly the best area for Barn Owls in Cornwall is the mainly arable area to the north and west of Wadebridge this may be related to the presence of set aside land.

The extent to which Barn Owl distribution is related to farming type is unknown. It is perhaps surprising to find more records of birds in a mainly arable area rather than pastoral. Further research in this area would be of great interest.

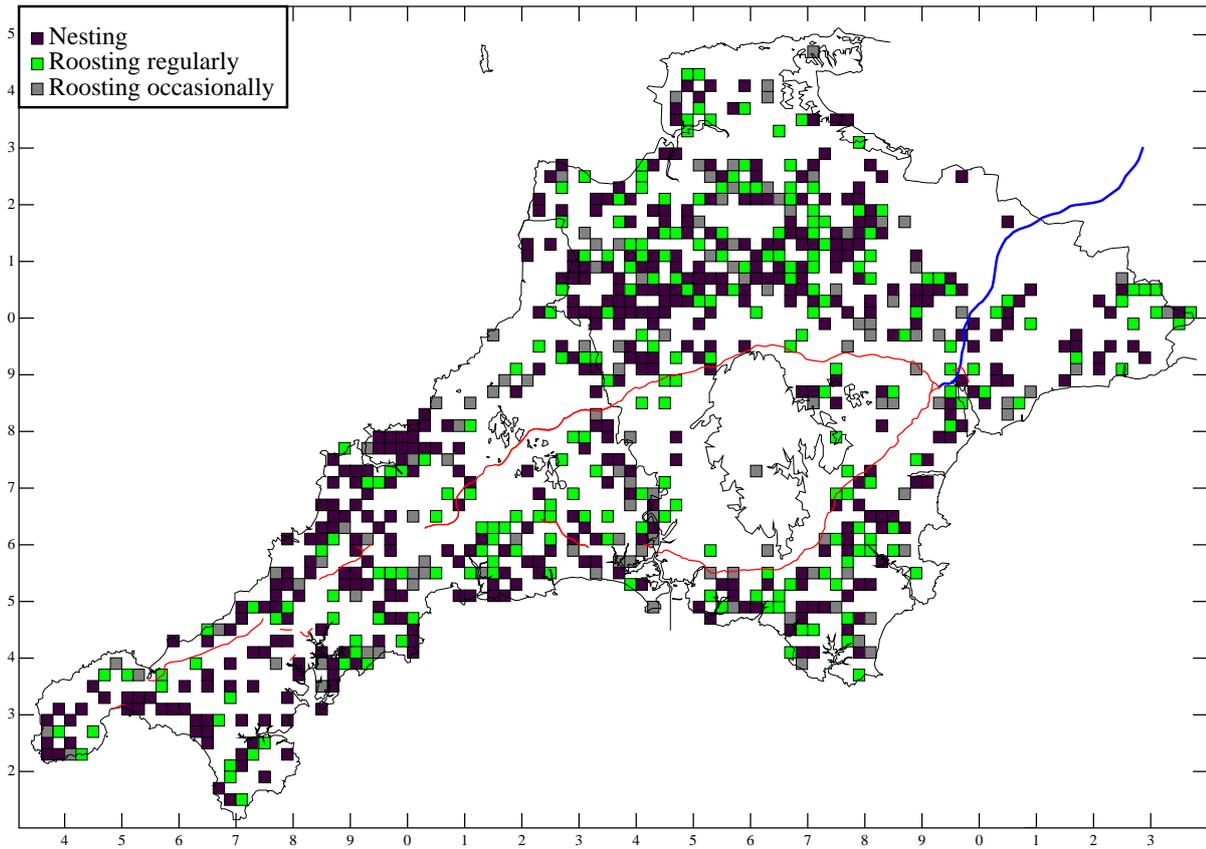
The areas north west of Bodmin, west of Launceston and the coastal strip between Tintagel and Bude are mainly pastoral and lacking in Barn Owl records. Bodmin Moor is also largely devoid of Barn Owl records which is less surprising due to the upland nature of the landscape and dominance of sheep and cattle grazing.

It is unclear as to how much of an effect altitude has on the distribution of Barn Owls in Cornwall. The higher areas of Bodmin Moor, especially those areas above 300 metres, are likely to receive higher rainfall and have more days of snow cover which would make hunting more difficult. However, Bodmin Moor was previously thought to be a Cornish good area for Barn Owls. In 1942-44 a pair bred in a deserted farmhouse between Brown Willy and Rough Tor, while another pair was thought to breed on the slopes of Garrow Tor (Penhallurick, 1978). A survey of the moor by the CBWPS in 1977-79 found 14 pairs of Barn Owls, but a similar survey done in 1984 could only locate two pairs (Chown & Akers, 1984). This suggests that Barn Owls have been lost from Bodmin Moor relatively recently, and perhaps the intensity of beef cattle and sheep grazing, rather than altitude, is the major factor behind this.

North Cornwall District Council was the only local authority to actively construct and erect Barn Owl nestboxes. The North Cornwall Barn Owl Conservation Project (Caldwell *et al.* 1989) recorded 26 nest sites in use in North Cornwall and erected approximately 230 nestboxes in an attempt to increase the population. Only three of their nestboxes had been used by the time their report was published (in 1989).

Appendix 3

Barn Owl distribution in Devon and Cornwall.



Map A3.1 Barn Owl distribution in Devon and Cornwall as recorded during the 2003 Devon Barn Owl Survey and 2004 Cornwall Barn Owl Survey. Showing county boundaries, the 300 metre contour, motorway (blue) and dual carriageway (red).