The Common Kestrel population in Britain

Rob Clements

Ben Green

ABSTRACT Estimates of the British population of Common Kestrel *Falco tinnunculus* suggest a continuing decline in the past 30 years, from around 100,000 pairs in the early 1970s to little more than a third of that level in the early years of this millennium. This paper summarises recent survey work in several English counties which questions recent estimates of Common Kestrel breeding density. It is suggested that the current British population remains above 50,000 territorial pairs and that, although there has been a steep decline in some parts of its range, the Common Kestrel still breeds at high density (50+ pairs per hectad) in mixed farmland in much of England.

Until recently, the Common Kestrel *Falco tinnunculus* (hereafter simply 'Kestrel') was generally acknowledged as Britain's most abundant raptor, its population greater than that of both Eurasian Sparrowhawk *Accipiter nisus* and Common Buzzard *Buteo buteo* (hereafter 'Sparrowhawk' and 'Buzzard', respectively). However, the population estimate has been revised downwards several times over the past 30 years and the Kestrel's status as our commonest bird of prey has increasingly been called into question.

Previous population estimates

In the mid 1970s, publication of the first Breeding Bird Atlas (Sharrock 1976), covering Britain and Ireland, set new standards for describing population size and distribution. For the Kestrel, taking into account an average 75 pairs per hectad (100 km^2) in all Common

Table 1. Published estimates of the British Common Kestrel *Falco tinnunculus* population, 1970–2004. Note that the BirdLife International (2004) estimate is for the UK, not Britain. British estimates rounded to nearest thousand.

Estimate (pairs)	*Source*
97,000	Sharrock 1976
70,000	Newton 1984
50,000	Gibbons *et al.* 1993
35,000–40,000	Shrubb 1993
36,800	BirdLife International 2004

Birds Census (CBC) areas in 1972, an arbitrary density of half that figure was applied to all occupied hectads during the survey period of 1968–72, resulting in a total 'at or above Parslow's [1973] 10,000–100,000 pairs'. For Britain and Ireland combined, the population estimate was thus 116,000–133,000 pairs, depending on whether records of breeding evidence ('probable' plus 'confirmed' breeding) or simply all breeding-season sightings are used; the comparable figures for Britain alone were 87,000–97,000 (note that Parslow's estimate also included Ireland). A decade later, Newton's (1984) estimate of 70,000 pairs suggested that the British Kestrel population was already some way below the maximum figure suggested in the first Atlas.

By the time of the second Atlas (Gibbons *et al.* 1993), detailed survey work by Andrew Village in various different habitats led to those earlier estimates being revised downwards. Using an average density of 20 pairs per occupied hectad, the second Atlas produced an estimate of 40,000–50,000 breeding pairs for Britain. At around the same time, Shrubb (1993) suggested that the Kestrel's British population was in fact only 35,000–40,000 pairs, with the highest densities in northern England and southern Scotland. More recently, after many years of apparent decline, especially in western and northern Britain, and a 29% reduction over the period 1994–2000 in Breeding Bird Survey (BBS) data (Baillie *et al.* 2001), a new estimate of 36,800 pairs for the UK was published by BirdLife International (2004). Newson *et al.* (2005) presented further evidence in support of this lower figure, an analysis of BBS data showing a national population size of 77,420 individuals.

Evidence for breeding density

Anecdotal evidence, motorway counts or maximum-number counts are of little value in assessing Kestrel breeding density. Kestrels avoid each other when hunting, rarely form congregations like Buzzards and can be highly secretive around their nest-site. Only protracted, time-consuming fieldwork can reveal their true breeding density. All recent Kestrel population estimates are based on the densities found in different habitats by Andrew Village (Village 1990). The highest density of breeding Kestrels (around 32 pairs per hectad) was found in a grassland/conifer plantation study area in southern Scotland. In mixed farmland in the English Midlands and in areas of intensive arable cultivation in the Fens, the densities were lower. On the basis of these results, as mentioned above, an average density of 20 pairs per hectad was assumed to apply throughout the Kestrel's range in the second Atlas. Since then, little has been published that either confirms or contradicts the assumptions behind this estimate. Many fieldworkers carry out valuable work on this species in terms of recording breeding performance but I can find little recent work on breeding density, and only one long-term study area, in Avon (J. Holmes *in litt*; see also the *Avon Bird Report* for the years 1996–2003). My recent survey work in southern England has found densities far greater than this average of 20 pairs per hectad, and this, I believe, calls into question the previous population estimates.

Study areas

During 2004–07, I carried out survey work in several study areas in Kent, Buckinghamshire and Hertfordshire. Multiple visits were made to all tetrads in these study areas from March to July. Initially, working from observation points that gave a panoramic view of the study area, I recorded the presence of Kestrel pairs on 1:25,000 Ordnance Survey maps. Later work concentrated on locating nest-sites. Finding nests was relatively easy where only a few hedgerow trees were present but much more difficult where birds were nesting in small woodlands or where multiple possible nest-sites were available. Probable breeding was indicated by display, copulation, territorial defence or aggression towards predators by pairs of adult Kestrels. The locality of a probable breeding pair was revisited for confirmation of a breeding attempt – location of the nest, food-carrying or the presence of recently fledged

Table 2. Common Kestrel *Falco tinnunculus* breeding density: some recent English studies. For data source, see text.

Study area	*Year(s)*	*Area (km²)*	*Density (pairs per hectad)*	*Farmland type*
Low Weald (Kent)	2005	25	160	Mixed
North Downs (Kent)	2006	35	103	Mixed/woodland
	2007	35	160	Mixed/woodland
Sittingbourne (Kent)	2004	45	25	Arable/orchards
Vale of Aylesbury (Buckinghamshire)	2006	20	100	Mixed
Keynsham (Avon)	1996–2003	60	40–52	Mixed/woodland
SK58 (Yorkshire/Nottinghamshire)	2007	100	70–80	Mixed/woodland

juveniles. Where initial observations suggested the presence of two pairs in close proximity, great care and effort was taken to establish that there really were two pairs rather than one mobile pair. Single territorial birds and immatures were ignored, even though some pairs of immatures may have bred. In places, where access was impossible, only the presence of adult Kestrels behaving territorially could be recorded. Access constraints, allied to the time-consuming nature of the fieldwork, meant that Kestrel breeding density could be recorded accurately only in small (20–35 km²) study areas. Larger study areas, although more significant in terms of results, present insuperable problems for a lone fieldworker.

Kent

My first survey, in April 2004, attempted to locate all breeding pairs in 90 km² of varied habitat in north Kent, including areas of intensive arable farmland or orchards, mixed farmland with fragmented woodland and an urban component. It soon became apparent that the chosen area was too large for one fieldworker to cover because there were at least 50 pairs of Kestrels present. Nonetheless, it was still possible to establish that there was a much higher breeding density (4–6 pairs per tetrad) in mixed farmland than intensive arable/orchards (one pair per tetrad) (Clements 2005). During 2005–07, I concentrated on smaller study areas, where it was more feasible to establish breeding density.

A study area comprising 35 km² of mixed farmland with around 22% woodland cover on the North Downs was chosen as typical of this habitat in Kent. In 2006, 36 territorial pairs were found (fig. 1), while follow-up work in 2007 located no fewer than 56 pairs, equivalent to 160 pairs per hectad. The increase was probably due to more effective fieldwork, building on the knowledge gained in 2006, rather than any real increase in numbers. This landscape, of fragmented woodland and mixed grassland and arable, is widespread throughout much of southern England, providing both numerous nest-sites and varied food resources for a high density of breeding Kestrels. A similar 10-km² study area in east Kent showed an average spacing of 1.1 km between nest-sites (P. Chantler *in litt.*). The central part of my North Downs study area was visited annually during 2004–07. This revealed no major changes in breeding density, suggesting that the high densities found in 2006–07 were not simply a temporary phenomenon, reflecting an abundance of one particular food resource. Buzzards first arrived in this study area in 2001 and, by

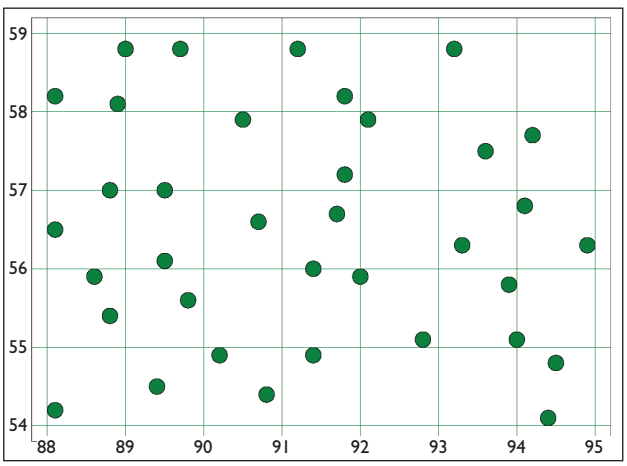

Fig. 1. Spacing of Common Kestrel *Falco tinnunculus* breeding pairs (36 pairs in total) in a 35-km² mixed-farmland study area, Kent 2006.

2007, there were no fewer than 32 territorial pairs in 35 km²; it will be interesting to see if their continued increase has a long-term effect on Kestrel numbers.

In a separate study area (45 km²), of intensive arable farmland and orchards in the Sittingbourne area, Kestrels were present at a density of about one pair per tetrad (25 pairs per hectad) in 2004. This lower density presumably reflects the lack of grassland and shortage of potential nest-sites and is more typical of previous farmland studies. A 25-km² study area on mixed farmland on the Low Weald was characterised by having considerably less woodland (2–3% cover) than on the North Downs. Nonetheless, the Kestrel density proved as high as that on the North Downs: 21 confirmed breeding pairs were found in 2005, and another 19 pairs for which breeding was not proven. Failure to confirm breeding in these areas was due either to access restrictions or to lack of time available for some parts of the study area but the majority of these 19 territorial pairs undoubtedly bred or attempted to breed. The density, equivalent to 160 pairs per hectad, was remarkably similar to that recorded in the North Downs (some 15 km away) in 2007. The Low Weald study area was surrounded by apparently similar farmland where casual observations suggested a similar spacing of breeding Kestrels. Although there was little woodland, plentiful hedgerow trees meant that there was no shortage of nest-sites, while the small average field size provided much grassland and edge habitat for hunting. No breeding Buzzards were present in this study area.

The tendency for small study areas to show abnormally high densities, which cannot be replicated across larger areas, has been noted previously (Village 1990). However, my study areas in Kent were chosen as typical of larger areas of similar habitat and appeared to have nothing unusual about them that would result in an unrepresentative breeding density. Less intensive fieldwork in small (10 km²) areas of mixed farmland habitat in other parts of the county revealed a similar spacing of Kestrel pairs.

Previously, the Kent breeding population had been estimated at 750–800 pairs, using a notional average of 25 pairs per occupied hectad (Henderson & Hodge 1996). My results suggested that much higher densities occur across much of the county. Application of recorded breeding densities to four basic farmland categories within the county resulted in a revised population estimate of 2,125–2,805 pairs (Clements 2007).

Hertfordshire

In 2006, a small sample (approximately 10 km²) of similar habitat was surveyed in north Hertfordshire. The results were virtually identical to those from Kent, with at least one pair of Kestrels per square kilometre throughout the area.

Buckinghamshire

In 2006, I surveyed a small farmland study area in the Vale of Aylesbury. Specific fieldwork in this area during 1981–86 had indicated a density of 9–10 breeding pairs of Kestrels per hectad, perhaps 11–12 pairs in a good year (Lack & Ferguson 1993). Although the farmland (mixed grassland/arable with only 0.5% woodland) was very different from my study

Günter Bachmeier

125. Common Kestrel *Falco tinnunculus* with prey, Germany, February 2002.

Kit Day

126. Common Kestrel *Falco tinnunculus*, Suffolk, July 2005.

areas in Kent, there was a similar density of breeding Kestrels (equivalent to c. 100 pairs per hectad). The density figure is less specific than those for Kent, since the study area was small and less time was spent on survey work. Nonetheless, in those parts of the study area where I was sure that all breeding Kestrel pairs were located, the distance between nests averaged c. 0.9 km (range 0.5–1.75 km). It is difficult to explain the discrepancy between my results and the survey work in the 1980s, but I am quite sure of the numbers of breeding Kestrels recorded in my 20-km² study area.

Avon

An area of 60 km² of mixed farmland with c. 10% woodland cover was surveyed between 1996 and 2003, with Kestrel density varying between 40 and 52 territorial pairs per hectad (J. Holmes *in litt.*). There was a high and increasing Buzzard population in this study area, rising from 32 pairs in 1996 to 56 pairs in 2003.

SK58 (South Yorkshire/Nottinghamshire)

This hectad is a long-term study area, covered intensively by local birders although not specifically for Kestrels. However, many 1-km squares were found to hold two or more pairs and, overall, the mixed farmland/woodland component held approximately one pair per square kilometre. The current estimate of 70–80 pairs for the hectad represents a significant decline from earlier levels (A. Hirst, M. Clay pers. comm.). Such a density, in a study area far removed from those in southern England, suggests that densities above 50 pairs per hectad are not uncommon in much of the Kestrel's British range.

Perhaps unsurprisingly, I found few other recent examples of Kestrel breeding density. A survey of 4.5 km² in coastal Suffolk produced up to 11 pairs (D. Thurlow pers comm.). Farmland near Gateshead, Tyne & Wear, had six pairs in 10 km² (Bowey *et al.* 1993). A Kestrel survey in Richmond Park, Greater London, in 1967–69, which found up to 22 pairs in 9.5 km², is a good indication of the sort of density that Kestrels can reach where numerous nest-sites are available (B. Marsh *in litt.*).

Most county avifaunas published after 1990 give a population estimate for the Kestrel based on a notional 20 pairs per hectad. Such figures are rarely based on any actual fieldwork in the county concerned. Intriguingly, in the recently published *Birds of Wiltshire* (WOS 2007), the relevant species account states that densities calculated from BBS data would suggest some 1,240–2,400 pairs in the county (equivalent to c. 35–70 pairs per hectad). The author, James Ferguson-Lees, goes on to suggest that this figure is surely too high a proportion of the British total, and that 500–700 pairs is perhaps a more reasonable figure.

Discussion

Previous estimates of the British Kestrel population, outlined at the start of this paper, illustrate the Kestrel conundrum. If the 1972 estimate was accurate, then later estimates are called into question, since there has not been a recorded decline of such magnitude (e.g. www.bto.org/birdtrends2007/wcrkestr.htm). If, however, the 1972 estimate was incorrect, perhaps based on unrepresentative CBC data, there is still a problem, since the average density from the most recent (2004) estimate – in the region of 15 pairs per hectad – is far below the

densities recorded in the recent studies summarised in table 2 (roughly 50–160 pairs per hectad). Based on my own experience and data from other study areas, I suggest that most areas of mixed farmland, at least in lowland Britain, still contain Kestrels at a density well above 15 pairs per hectad.

The estimate in the second Atlas was based on an assumption that maximum density in good habitat was around 30 pairs per hectad, and that anything greater than 40 pairs was unlikely (Kostrzewa 1988; A. Village in Gibbons *et al.* 1993). However, I suggest that higher densities are common in areas of mixed farmland in at least some parts of England. Kestrels are remarkably non-territorial for a raptor, often tolerating near neighbours at a few hundred metres' range, occasionally much closer (Village 1990). Moreover, they are highly adaptable, utilising a wide variety of nest-sites, often close to human habitation, and will take a wide variety of prey species. The Buzzard, a much larger raptor species, is now reaching 100+ pairs per hectad in mixed farmland in southwest England (Robin Prytherch pers. comm.), so it would be surprising if Kestrels had not reached that level in the past. Indeed, the density of 75 pairs per hectad recorded in CBC squares in 1972 supports this (Sharrock 1976). Until recently, both Buzzards and Northern Goshawks *A. gentilis* were either extremely localised or completely absent throughout much of southern and eastern England, so Kestrels suffered little competition or predation from those species.

The much higher densities in my study areas, in southeast England, compared with those found during previous survey work on mixed farmland (Village 1990) may be due to several factors. One possibility is an increase in Kestrel numbers in such habitat (although BBS data clearly show a decline in the southeast) but it is perhaps more likely that the higher density of hedgerow trees and small areas of woodland, combined with more field-edge habitat, supports more Kestrels in southeast England. Moreover, the low altitude and richer soils of this region, and their effect on available habitats, should contribute to a higher density of most raptors; Newton (1986) reported much higher densities of Sparrowhawks in woodland in southeast England compared with upland conifer forest in southern Scotland. The lack of similarly high densities of Kestrels in mainland Europe may be attributable to the wider range of raptor species present, the higher levels of predation and competition perhaps restricting Kestrels to more specialised habitat, i.e. relatively treeless farmland.

Densities of 50+ pairs per hectad are clearly no longer found in some parts of western and northern Britain. Suggested reasons for this include agricultural intensification and overstocking in upland areas and competition for food resources from the expanding Buzzard population (Green 2002; Shrubb 2003). The emerging Goshawk population has had an effect on Kestrel numbers in some areas (Petty *et al.* 2003); the Kestrel population in The Netherlands is reported to have almost halved since 1990, having virtually disappeared from some well-wooded areas, a decline probably linked to an increase in Goshawk numbers (Bijlsma 1999). Many of these factors are most acute in western and northern Britain, and Village (in Gibbons *et al.* 1993) noted that the national decrease in the CBC index was largely explained by falling densities in plots in western England and Wales.

A revised population estimate

For reasons discussed in the previous section, I contend that recent estimates of the British Kestrel population are too low. The BBS population estimate (Newson *et al.* 2005) is clearly conservative; while extrapolating from transects in random squares may produce extremely good population estimates for many species, it is likely that those for species like the Kestrel may be less reliable. In particular, there is an issue with detectability – as described earlier, nesting Kestrels may be extremely secretive and,

Table 3. A suggested population estimate for the Common Kestrel *Falco tinnunculus* in Britain. For details of assumptions, see text.

	Density (pairs per hectad)	*Estimated no. hectads*	*No. pairs*
England			
High density	50	600	30,000
Low density	20	600	12,000
Urban/moorland	10	100	1,000
Wales			2,500–3,500
Scotland			7,500–11,000
Grand total			**53,000–57,500**

furthermore, most BBS fieldwork occurs early in the day when many raptors can be particularly inconspicuous.

The basis for a revised population estimate is summarised in table 3. Based on admittedly limited data, I suggest that high Kestrel densities (50+ pairs per hectad) can be found in many parts of southern and central England, from South Yorkshire south to Dorset and east to Kent. Areas of low Kestrel density now include much of northern and western England plus large areas where there is intensive arable farming (e.g. Lincolnshire and parts of East Anglia); an average of 20 pairs per hectad is a compromise between the densities recorded in pockets of good habitat and those in low-density (<10 pairs per hectad) areas on intensive arable. There are few data available for Wales and Scotland. Fieldwork for the second Atlas estimated 3,500 pairs in Wales and 11,000 pairs in Scotland; more recently, Gordon Riddle (in Forrester *et al.* 2007) suggested that the Scottish population was 7,500–7,800 pairs – a decline of around 30% in less than 20 years. The decline in Wales may be similar or even greater (Michael Shrubb pers. comm.). Even so, the total figure for the British population may well remain above 50,000 pairs.

The lack of relevant data from much of the Kestrel's range prevents the figures in table 3 from being anything other than a rough approximation of the current situation. Nonetheless, it is clear that the Kestrel still breeds at a higher density than previously recorded in at least *some* parts of its current range. If the densities recorded in Kent, South Yorkshire, Avon and perhaps Wiltshire are representative of mixed farmland in much of England, then 50 pairs per hectad might even represent a reasonable average over much of England. Until more fieldwork is carried out in those areas where the Kestrel's status remains uncertain, the true British population is probably more accurately summarised as being somewhere between 35,000 and 75,000 territorial pairs.

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Rob Clements, 8 Harrier Drive, Sittingbourne, Kent ME10 4UY;
e-mail richard.clements3@virgin.net