



## 1. INTRODUCTION

The honey-buzzard (European honey buzzard) was traditionally regarded as breeding mainly in southern and southwest England, but breeding pairs have been found increasingly in Wales, northern England and northeast Scotland (Gibbons *et al.*, 1993; Murray, 1993; Roberts *et al.*, 1999; Ogilvie, 2003; Ogilvie & RBBP, 2002, 2003, 2004). Breeding birds have not been recorded in Ireland. The breeding status of the species in Britain is poorly understood but it is believed to be expanding northwards and westwards. There are records of breeding for northern England and Scotland in the 1800s (Holloway, 1996), however, and it is possible that there has been irregular breeding and/or under-recording in these areas historically. British and mainland European honey-buzzards are long distance migrants that winter in tropical Africa (Toms, 2002a); some that breed in mainland Europe pass through Britain on passage. British birds have a short breeding season between their arrival in late April or May and departure from August onwards. The slightly smaller males can usually be distinguished by their greyer heads. Juveniles resemble females and are difficult to distinguish in the field. There is uncertainty about the age of first breeding. The majority of yearlings and some adults probably summer in Africa (Bijlsma, 1993; Forsman, 1999) although there is evidence that some juveniles return to Europe in the spring of their second calendar year (Panuccio & Agostini, 2006), and breeding at one year old has been reported (Kostrzewa, 1998).

## Annual cycle

Breeding Activity	Peak Period	Range	Duration (days)
Occupation of home range		Late April to May	
Territorial display		Early May to early August	
Courtship		From mid-May	
Egg laying	Late May to early June	Mid-May to mid-July	3 to 10
Incubation	Late May to early July	Mid May to mid-August	30 to 35
Hatching	Late June to early July	Mid-June to mid-August	
Young in nest	Late June to early August	Mid-June to late September	35 to 40
Fledging		Late July to late September	
Juvenile dispersal		Late August to mid-October	

## 2. HABITAT, HOME RANGE, NESTS AND BREEDING

### 2.1 Habitat

Honey-buzzards breed where there is woodland cover. Suitable woods are located close to areas with sufficiently large populations of social wasps, their main prey (Brown, 1976). The availability of amphibians as prey may be important when the birds arrive, to help build up body fat reserves while wasp numbers are still low. In Britain, honey-buzzards occupy upland coniferous plantations, central hill country with mixed farmland and woodland, and lowland woodland, at a range of altitudes from sea level to just below 500 m ASL (Roberts *et al.*, 1999). The climatic differences between the upland (wetter and cooler) and lowland habitats appear to have no effect on the productivity of the species. Woods used by nesting birds are usually extensive, but scattered woodland, interspersed with farmland, heath or moorland, is also used (Batten, 2001). Woodland cover within 25 km<sup>2</sup> of a sample of nest areas in Britain ranged from 31–81% (average 46%; Roberts *et al.*, 1999).

### 2.2 Home range

Birds arrive on their breeding grounds in England and Wales from late April, and in Scotland from mid-May. They generally return to the same nesting range each year (Roberts *et al.*, 1999). Home ranges are extensive and may overlap. Studies in the Netherlands, Germany and Austria have recorded maximum sizes of 1,150 to 2,200 ha for males and 980–4,500 ha for females; larger home ranges have been recorded in Sweden (Kostrzewa, 1998). In a British population adults appeared to forage mostly within 4–6 km<sup>2</sup> of the nest site but during the nestling period travelled as far as 8–10 km (Cramp, 1980). Studies in Scotland found that most distinct forest blocks attracted single pairs of honey-buzzard but the largest woods supported 2–3 pairs at an average spacing of 2.7 km (2.2–3.6 km, n=5; Etheridge, 2007). The size of the home range may increase during the breeding season (Kostrzewa, 1998) and also varies between years, possibly linked to the abundance of wasps and bees. The male defends only the immediate vicinity of the nest site.

### 2.3 Nest sites

Honey-buzzards nest in coniferous, mixed and broadleaved woodland. In the Scottish Highlands, two-thirds of 49 nests were built in mixed coniferous and deciduous forest and the remainder in coniferous plantations (although there may have been some observer bias as nests in the former woodland type were less difficult to locate). In mixed woodland most nests were in beech (55%) and pedunculate oak (39%), whereas in coniferous woods Douglas fir (75%) and Scots pine (19%) were favoured (Etheridge, 2007). In upland, central and lowland England and Wales, nests were found in coniferous, mixed and broadleaf woodland, with a suggested preference for nesting in conifers (35 of 52 nests between 1989–97; Roberts *et al.*, 1999). Honey-buzzards return from migration after the buzzards and goshawks that nest in similar habitats have started to breed and pairs of either species may occupy old honey-buzzard nests. Honey-buzzards will breed close to buzzards but avoid goshawks, which may prey on honey-buzzard chicks. In the Netherlands, honey-buzzard nests are located a minimum of 1.2 km from the nearest buzzard nests, and 2.3 km from the nearest goshawk nests (Kostrzewa, 1998). In Britain, honey-buzzards have been found breeding within a few hundred metres of buzzards. In Wales, where goshawks are common, honey-buzzard nests are generally very well hidden, mainly in dense conifer stands where it may not be possible for birds to fly through or below the canopy unless they use rides or roads. Honey-buzzards may also be more secretive in their nest visits where goshawks are common.

## 2.4 Nests

Nests tend to be large, particularly if they have been in use for several years (Roberts *et al.*, 1999), with an external diameter of 65–90 cm (Cramp & Simmons, 1980). They are constructed from sticks, often of the same species as the nesting tree, and the cup lined with a pad of green leaves. Sprays of green leaves are often also built into the nest itself. In coniferous trees, nests are often placed against the trunk or in the live crown, making them difficult to see. In broadleaf trees, nests may be placed on side limbs and may be built amongst ivy. Roberts *et al.* (1999) found that the height of nests in Britain varied from 8–26 m above the ground, with most nests above 15 m. Some nests are built on the remains of the old nests of other species (carrion crow, buzzard, goshawk) or on squirrel dreys (although this has never been reported from Scotland). Honey-buzzards will re-use their own nests in subsequent years and old nests may be an important focal point for returning pairs. In Scotland, some woods had several nests which were used in turn each spring, possibly by the same pair, whilst at other sites a new nest was built each year. One nest in an oak tree was used 5 times between 1978 and 1991, and another nest in a beech tree four times over a period of 17 years (Etheridge, 2007). In Britain, outside the New Forest, the average distance pairs moved between years was 250 m, with a maximum of 750 m (Roberts *et al.*, 1999). In the New Forest this distance was greater: an average of 2 km and a maximum of 4.5 km; this difference may be attributable to the practice, by fieldworkers, of removing nests during the winter as a precaution against egg-thieves (Roberts *et al.*, 1999). Nest building begins in mid-May, takes place in the early morning and can be completed rapidly (one nest was built in three days, Roberts *et al.*, 1999). Honey-buzzards that are not breeding may build ‘summer nests’ in July and August, which may be used for breeding in the subsequent year.

## 2.5 Clutch size and incubation

In Britain, the clutch size is usually two eggs (Roberts *et al.*, 1999), rarely three, laid at intervals of 3–5 days. Incubation may start with the first egg, and lasts for 30–35 days per egg, and up to 37 days for a clutch of 2 eggs (Cramp & Simmons, 1980). Both sexes incubate, with the female taking the larger share and probably incubating at night. The eggs tend to be heavily marked and show considerable variation in colour and pattern; characteristic markings may be used to identify individual females (Roberts *et al.*, 1999). Replacement clutches are rare.

## 2.6 Brood size and fledging

In Britain the brood size is usually 1–2, rarely three, young, with broods of two most common (Roberts *et al.*, 1999). In Scotland, broods of 2 were most frequent ( $n=33$ ) broods of one less common ( $n=7$ ) and broods of 3 unusual ( $n=2$ ) (Etheridge, 2007). Breeding success in Britain has been recorded as 1.7–1.8 young per breeding attempt (Roberts *et al.*, 1999); Etheridge, 2007) and appears to be higher than that recorded in central Europe (Kostrzewa, 1998). The young are brooded for 7–10 days, mainly by the female who remains close to the nest for a further seven days. The male may either bring food to the female to feed the small chicks or he may feed them directly (Kostrzewa, 1998). Young are generally fed 3–6 times each day, increasing to 7–9 and occasionally 15 times when older (Cramp & Simmons, 1980). The young feed themselves after about 18 days. They leave the nest at 35–40 days and move to nearby branches before fledging at 40–44 days. The young become independent at about 75–100 days old, shortly before they migrate.

### 3. SURVEY TECHNIQUES

**CAUTION** *If nest inspection visits require tree climbing, then appropriate health and safety precautions should be taken (see Section 7.10 of Introduction).*

#### 3.1 Breeding season visit schedule

The species is listed on Schedule 1 in Great Britain and the Isle of Man (see Section 7.1.1 of Introduction). Honey-buzzards are unobtrusive and due to the difficulty of locating active nests in woodland, it is recommended that four visits are made to confirm occupancy, even if no signs of occupancy are found during the earlier visits.

Visit 1 (preferably several visits)	Mid-May to mid-June	To locate displaying birds over suitable habitat
Visit 2	June	To check for occupancy and locate active nests
Visit 3	July	To check for young
Visit 4	August	To check for fledged young

#### 3.2 Signs of occupancy

##### 3.2.1 Locating home ranges

If the presence of breeding honey-buzzards in an area is suspected, watches for displaying birds should be carried out from a good vantage point (with 'lots of sky') overlooking the potential nesting range, particularly during the last two weeks of May. The absence of displaying birds at this time of year does not mean a site is unoccupied, however, or that breeding will not occur. Watches should last for at least four hours (Batten, 2001), preferably from 09:00h onwards and, if possible, repeat visits should be made to confirm any observations of presence or absence. As honey-buzzards may range widely, it is important to try and identify individuals from plumage and / or moult patterns in order to get an understanding of the numbers present in a given area; for this purpose, as well as locating and following birds at a distance, and determining if they are carrying food, a good telescope will be required. Two observers may be useful at this stage as more than one bird may need to be followed. Wet weather will not produce many sightings, but birds will often appear after rain has stopped (Batten, 2001). Honey-buzzards have a distinct 'wing-clapping' display flight (Cramp & Simmons, 1980), which occurs from mid-May to mid-June and again from mid-July. This display may be seldom seen, however, as it occurs erratically (Roberts *et al.*, 1999) and often at a great height; many returning pairs settle quickly into their nesting ranges without obvious display flights. Wing-clapping may also take place when a single male or pair of males 'advertise' a territory, or when a male intrudes into another's territory. The most commonly observed pair display is single or mutual circling over the nest site and surrounding area (Roberts *et al.*, 1999). Synchronised soaring or gliding does not necessarily indicate a breeding pair: it could involve the resident male and an intruding female and may occur over a wide area. Care should therefore be taken not to interpret this latter display as evidence of breeding failure or of non-breeding if it occurs later in the season (Roberts *et al.*, 1999).

##### 3.2.2 Locating roosts

Roosts generally occur near to the nest site during the breeding season, and may be found during searches for active nests, although they cannot be definitely identified as honey-buzzard roosts unless moulted feathers or other signs are found close by.

### 3.2.3 Recognition of signs

The remains of depredated wasp nests (combs, paper) can provide evidence of the presence of honey-buzzards. Ground nests of wasps are, however, often unearthed by badgers and this can cause confusion. Honey-buzzards break open bee and wasp nests for the insects and leave the honey and combs largely intact, whereas nests broken open by badgers have the honey-comb destroyed and the insects largely disregarded (Brown *et al.*, 2003). Additional signs, such as moulted feathers, provide stronger evidence.

### 3.2.4 Evidence of occupancy

Observations of a single honey-buzzard or a pair in the same area on several occasions during the breeding season provide evidence of occupancy.

## 3.3 Evidence of breeding

Proving that breeding has taken place can be very difficult. The following criteria for establishing breeding status were used for the first national survey of honey-buzzards in the UK (Batten, 2001; Ogilvie, 2003):

#### Confirmed breeding

1. Nest with eggs or young.
2. Recently fledged young.

#### Probable/possible breeding

3. Adults entering or leaving woodland, indicative of occupied nest (May to mid-August).
4. Adult carrying food (May to Mid-August).
5. Adult carrying sticks or spray into woodland.
6. Adult giving alarm calls.
7. Wing clapping over/into woodland.
8. Adult attacking other raptors/corvids.
9. Pair observed in suitable nesting habitat.
10. Adult in same area on at least two different days, at least one week apart, in May-July.
11. Long-distance direct flight to or from woodland.
12. Low-level circling over woodland.
13. Adult perched in tree-top in woodland.
14. Species observed in suitable habitat.
15. Wing clapping display in August.
16. Tree nests of social wasps found destroyed.

It is not uncommon to get just a single sighting of a honey-buzzard during many hours of observation. There are issues, however, related to the interpretation of criterion 14 in view of the distances that birds may travel from their breeding area and the potential for confusion with sightings of unmated, perhaps immature individuals and/or migrants passing through as early as the beginning of August, when breeding pairs are still feeding young (Ogilvie, 2003).

### 3.3.1 Locating active nests

Once the presence of a pair on its territory has been established, observations of a honey-buzzard circling up from a wood before flying off, or of a bird flying or plunging with folded wings directly into a wood, are regarded as a good indication of breeding (Roberts *et al.*, 1999). Several observers in telephone / radio communication from different vantage points may be used to pinpoint nest locations, and in this respect learning to interpret flight

behaviour in and out of nest sites is important. This knowledge can be gained from working with a more experienced fieldworker. Alternatively, suspected breeding woods can be searched systematically for nests. Honey-buzzards are extremely secretive during incubation and lengthy searches may be required to find the precise location. Nests are often next to rides or near to clearings, which are used to approach and leave the nest by birds flying below the canopy. Many nests in conifers are extremely well hidden in the canopy and it may be necessary to climb several trees to locate such nests. Faecal droppings are not evident but moulted feathers, wasp combs and wasp paper can be found near to the nest (such signs may also be found around old nests, however). Occupied nests generally contain a lot of greenery, which may be visible from below. The alarm call is distinct (Cramp & Simmons, 1980) and some birds are very vocal whereas others may not alarm when the fieldworker is close to the nest. The adult may not leave the nest but may 'mantle' over it, even if the tree is climbed. If breeding is suspected but a nest is not found during the expected incubation period, then searching may be more productive later in the season when young would be expected in the nest, at which stage there will be more signs and activity from the parent birds.

### 3.3.2 Evidence of fledging

Evidence of fledging is provided by the presence of large young (of at least 30 days old). These can be counted during a nest visit or after they have left the nest and moved onto the surrounding branches. Roberts *et al.* (1999) report that fledglings return to the nest to be fed and in one instance a nest was found in a suspected nesting area by imitating the call of an adult bringing food.

## 3.4 Evidence of non-breeding

The incidence of non-breeding is higher in years with cold springs and when wasp numbers are low, and alternative prey are not available. Because of the difficulty of locating active nests, non-breeding is difficult to prove for honey-buzzards. If an occupied nesting range is located but no evidence of an active nest or of fledged young is found during the appropriate visits and prolonged observations, this suggests that the birds are not breeding.

## 3.5 Ageing and sexing young

The age of honey-buzzard young can be estimated from wing growth (Figure 8). Photographs of chicks at various stages of development are included in Roberts *et al.* (1999). Sexing young by measurement is difficult, as there is considerable overlap in size. After the age of 35 days (wing length >287 mm), chicks heavier than 1,000 g with an empty crop and with a tarsus width of >10 mm are likely to be females. Other young cannot be sexed accurately, except by DNA analysis (Bijlsma, 1997).

# 4. SURVEYS OUTSIDE THE BREEDING SEASON

The species does not occur in Britain or Ireland during the winter.

