



1. INTRODUCTION

The buzzard (common buzzard), with its catholic diet and habitat preferences, and a general decline in persecution, now breeds in almost every part of Britain. Substantial increases in the population have occurred during the last two decades (Clements, 2000; Holling, 2007). Breeding numbers and range have also increased in Ireland (Norriss, 1991; Greenwood *et al.*, 2003). Adult buzzards are largely sedentary in Britain and Ireland, in contrast to the majority of European populations that are migratory. Most immature buzzards undertake dispersive movements from their first September until they settle at around two years of age (Walls & Kenward, 1998). Fennoscandian buzzards are migratory and a few may reach eastern Britain. Adults of both sexes are similar, although males may be identified from their smaller size when seen close to females. Before their first moult at one year old, juveniles can be separated from adults. Adults have dark brown eyes and a broad, dark sub-terminal tail band; juveniles have lighter eyes and faint, narrow tail bars with no broad sub-terminal band. Juveniles also have distinct teardrop streaking to the feathers on the underparts, often showing a lot of the whitish background feathers. Adults are never streaked but have barring on many of the breast and belly feathers, sometimes very heavy so that little if any white shows. Adults also clearly show the classic pale crescent across the breast usually absent in juveniles.

For further information on the biology and ecology of this species, Tubbs (1974) provides a comprehensive account.

Annual Cycle

Breeding Activity	Peak Period	Range	Duration (days)
Occupation of home range		All year	
Nest building	March	Late January to early May	
Egg laying	Mid-April	Mid-March to early May	6 to 9
Incubation		Late March to mid-June	36 to 38
Hatching	Mid- to late May	Late April to mid-June	
Young in nest		Late April to late July	40 to 60 days
Fledging	Late June to early July	Mid-June to late July	
Juvenile dispersal		August to November	From 25 days after fledging

2. HABITAT, HOME RANGE, NESTS AND BREEDING

2.1 Habitat

Buzzards frequent all habitats that provide open areas for hunting, preferably with perches (trees, posts, rocks), and suitable trees or crags for nesting. These include moorland and other upland habitats, but buzzards prefer pasture or cultivated farmland with small woods or copses, and open forests. They will not nest within extensive closed forests but will breed in thinned plantations or near the forest edge and make use of clear-felled areas. They avoid high mountainous areas (Cramp & Simmons, 1980).

2.2 Home range

Buzzards generally occupy areas of 2–3 km², of which a core area of 0.5–1 km² is usually defended against conspecifics other than close relatives (Walls & Kenward, 2001). The size of the home range varies with the abundance of prey, particularly rabbits. The nests of separate breeding pairs have been found as close as 90 m apart (Swann & Etheridge, 1995), indicating that nesting territories can be very small. When buzzard densities are high, some feeding areas may be used almost communally and large groups can sometimes be seen feeding together in fields. Densities of 2.4 pairs km⁻² and 0.9 pairs km⁻² have been recorded in areas with dense rabbit populations compared to 0.1 pairs km⁻² in an area with few rabbits (Newton, 1979; Jon Hardey, pers comm.).

2.3 Nest sites

Buzzards can nest on cliffs (from small crags to large seacliffs), on bluffs and steep slopes in moorland without crags or trees, in coniferous, deciduous or mixed woodland of any size, in isolated trees and hedgerows. Nests have also been found on seaweed on a beach, on sand dunes, on top of a ruin and on a wall under a gorse bush. Tree nests are normally positioned at about two-thirds of the height of the tree (3–25 m from the ground) and close to the trunk or on side branches. Old crows' nests in trees may also be utilised.

2.4 Nests

Buzzard nests are built by both sexes. They are normally substantial structures of sticks and heather with a shallow cup, lined with green foliage (Cramp & Simmons, 1980). Some pairs use the same nest for several years in succession, whereas others change annually. In woodland, the old nests of a particular pair of buzzards are generally found in discrete groups, with the occasional outlier. A pair may have up to 15 nests in their nesting range.

2.5 Clutch size and incubation

Buzzards lay from early April to mid-May, occasionally as early as mid-March (Tubbs, 1974; Maguire, 1979; Austin & Houston, 1997). Eggs are laid at 2–3 day intervals and clutch size is usually from 2–4 eggs; occasionally one, five and, exceptionally, six eggs are laid (Tubbs, 1974; Austin & Houston, 1997). The BTO Nest Record Scheme gives an average clutch size of 2.4 ($n = 1,082$). Clutch size may vary significantly between areas, probably linked to differences in prey density (Swann & Etheridge, 1995; Austin & Houston, 1997). The incubation period is usually 36–38 days per egg in Britain (Brown, 1976) and begins with the first or second egg. The female carries out most of the incubation and always incubates at night; the male brings food to the female during incubation and she may leave the nest to receive and eat the food (Cramp & Simmons, 1980).

2.6 Brood size and fledging

The chicks hatch asynchronously at about two day intervals (Tubbs, 1974; Cramp & Simmons, 1980). Brood size varies with the availability of prey but is normally 1–4. The female stays

with the young for the first fortnight and broods them continuously for the first week after hatching (Tubbs, 1974). The male provides most of the food for the first three weeks with both parents provisioning young after 25 days (Cramp & Simmons, 1980). A study of radio-tagged birds found that the young fledged at 43–54 days and remained within 300 m of the nest for another 2–3 weeks until their feathers hardened (Tyack *et al.*, 1998). Cramp & Simmons (1980) note that fledging occurs at 50–55 days, sometimes later. Young buzzards remain within about 1 km of the nest for at least two more weeks, with about half dispersing by late October, others mainly in the following spring, and 80% by their second December (Walls & Kenward, 1998).

3. SURVEY TECHNIQUES

CAUTION *Nests should not be visited when buzzards are laying eggs as desertion can occur. Nests with eggs or small young should not be disturbed in cold, wet or exceptionally hot weather. During incubation, nest visits should be kept brief and confined to checks of activity at known nests. Searches for new nests should be delayed until after the hatching period. If nest inspection visits require 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 Northern Ireland and the Isle of Man (see Section 7.1.1 of Introduction). To establish occupancy and the presence of a breeding pair, it is recommended that all four visits are made. However, if time is limited and a home range appears to be unoccupied on the basis of the first two visits, then further visits can be omitted. Alternatively, if an area is well known to a surveyor, then Visit 1 may be omitted. Care must be exercised to avoid disturbing birds that may be laying, so it is recommended that Visit 2 should be confined to quick checks for occupancy at known nests (a maximum of 10 minutes duration) with searches for new nests delayed until Visit 3. Broods that have fledged early may start to disperse by early August.

Visit 1	Late February to March	To check for occupancy
Visit 2	Late April to May	To check activity at known nests (incubating birds should not be flushed from the nest unless there is a specific need to record clutch size)
Visit 3	June	To check for young, or for evidence of breeding and new active nests if no signs were seen on previous visits
Visit 4	July to early August	To check for fledged young

3.2 Signs of occupancy

3.2.1 Locating home ranges

Home ranges can be located throughout the year by watching for displaying birds. Solo and mutual high-circling displays by buzzards are common (particularly by adult males), although they may be more regular between February and June and late August/September, when soaring conditions may be most favourable (Cramp & Simmons, 1980). Such circling displays may involve the territory holder(s) but groups of buzzards from nearby territories may circle together, particularly in areas of high buzzard density. The birds often call loudly while circling. In autumn, passage birds may also carry out this form of circling, as may immatures (the latter are less

likely to be involved in such displays in the spring; Cramp & Simmons, 1980). When displaying, particularly in the weeks leading up to laying, buzzards may carry twigs or, less commonly, prey in their talons. High circling may also lead to sky-dancing (by males and only occasionally by females; Tubbs, 1974; Cramp & Simmons, 1980), involving plunging and swooping that may be repeated 12 or more times; this behaviour is most frequent in March–April and again in July–October. In open terrain, including farmland, displaying buzzards can rise to a considerable height and then wander, making it difficult to associate them with a specific area. Prytherch (2009) provides a very detailed account of buzzard social behaviour, including display and territorial defence.

Cold searching of known home ranges or suitable habitats in late winter or spring can also locate resident birds, which may respond to the intrusion by alarming. The regular presence of birds can also be detected by finding plucks (e.g. on fallen tree roots), pellets, or white faecal droppings below roosts or perches (see 3.2.3 and 3.2.4 below).

The number of soaring buzzards has been used to provide an estimate of the number of pairs occupying home ranges (Sim *et al.*, 2000). Areas of suitable habitat need to be located in advance of the survey and the survey area divided into tetrads (2 x 2 km squares). It is recommended that counts are made in the first half of April during good soaring weather (dry with a wind speed of less than 30 mph and less than 50% cloud cover; Sim *et al.*, 2000), although fieldwork may be started from the beginning of March (BTO, 1983; Taylor *et al.*, 1988; Gilbert *et al.*, 1998). Counts should be made between 09.30h and 16.30h for one hour in a 2 km square (Sim *et al.*, 2000). Considerable regional variation in the soaring behaviour of buzzards is suspected, however, possibly related to the number of non-territorial birds within the local population as well as habitat. Counts of soaring buzzards should therefore be used with caution to estimate the size of local populations (unless such counts are calibrated against intensive territory-finding work; Sim *et al.*, 2000); if repeated annually, however, they may provide an index for estimating population changes (Greenwood *et al.*, 2003).

3.2.2 Locating roosts

The locations of buzzard roost sites will depend on the terrain. In woods, they tend to be in denser stands of trees that offer more shelter. Roosts on crags are often sheltered under overhangs and may have copious amounts of faecal droppings. Roosts may also be located on steep banks with no exposed rocks. Active roosts will have freshly moulted feathers, especially down, and fresh pellets. Roosts may be in any part of the home range.

3.2.3 Recognition of signs

Buzzard pellets are generally large and elliptical, consisting mainly of tightly packed fur, with few bone fragments (length = 45–60 mm; width = 25–30 mm; Brown *et al.*, 2003). Kills, pellets and faeces are not generally distinctive enough to differentiate from those of other species (e.g. goshawk), however, and so should only be used as supporting evidence for occupation in addition to sightings of birds or moulted feathers.

3.2.4 Evidence for occupation

Sightings of a pair or a single bird on several occasions over a localised area during the breeding season indicates that a territory is occupied. Freshly built nests, recently used roosts and fresh prey remains provide supporting evidence for occupancy but are not sufficient in the absence of sightings.

3.3 Evidence for breeding

3.3.1 *Locating active nests*

Nests can be located by checking crags, steep slopes, woods, and isolated trees. Some nests on crags are very accessible. It is easier to search deciduous woods in winter or early spring as the lack of leaves makes nests more obvious. Nests can be ascribed to a pair's home range by locating associated displaying bird(s) from February to April. It can be difficult to locate nests within large blocks of commercial forestry but watching displaying birds can reveal nest locations as they will dive down into the plantation close to their nest site. Birds may also be seen sitting on prominent perches, such as crags' close to the nest site. It will not always be possible to locate an active nest because buzzards may not breed every year but most pairs will give an indication of breeding behaviour by decorating a nest with small leafy branches and other fresh plant material. Some pairs may line more than one nest before laying, so that the number of sightings of adult birds as well as the number of active nests found should be borne in mind when estimating the number of pairs occupying home ranges in a given area.

Known nests should be visited to check for fresh material (new branches, leaves, down and moulted feathers) and for faecal droppings round the nest tree. Care must be exercised to avoid excessive disturbance during laying and early incubation. Incubating birds should not be flushed from their nest unless there is a clear need to record clutch size. If an active nest is not located during Visit 2, the search should be extended to all suitable nesting habitats within the home range during Visit 3. Successful nests can be more easily located once the young fledge because they remain close to the nest and call frequently, especially in the early morning.

3.3.2 *Evidence for fledging*

Counts of buzzard chicks in the nest at about four weeks of age (with primary feathers at least halfway out of quills) can be used as a measure of brood size at fledging, as very few die after reaching this age. Counts can be made from a vantage point or (for more accuracy) by climbing to the nest. The estimated age of young at the time of such counts should be recorded. Fully feathered young are capable of leaving the nest so, if counts are made at this age, trees or crags adjacent to the nest should be checked carefully in addition to the nest itself. Recently fledged young can generally also be located by their calls and counted. Counts of fledged young are no longer reliable once dispersal starts.

3.4 Evidence for non-breeding

Not all buzzards of breeding age breed every year. Studies in southern England have shown that the proportion of non-breeding adults in any one year can be high (66–73% of adults not laying eggs; Kenward *et al.*, 2000; Walls *et al.*, 2004). This proportion is made up of a mixture of birds, from unpaired individuals to territory-holding pairs that maintain nests but do not lay eggs. Non-breeding probably occurs more frequently in cold wet springs or when prey levels are low. To establish whether any given pair is not breeding is difficult, however, without very intensive fieldwork. In a territory that is apparently occupied early in the season, the absence of an active nest, despite several searches during the appropriate visit periods, and a decline in alarm response from the adults, are indicative of non-breeding or early nest failure.

3.5 Ageing and sexing young

Chicks can be aged approximately by measuring their wing length (Figure 25; based on Dutch birds; Bijlsma, 1999) or, using length of the longest primary feather (Figure 26; based on Scottish birds; Austin & Houston, 1997). Measurement of the longest primary (the fifth from

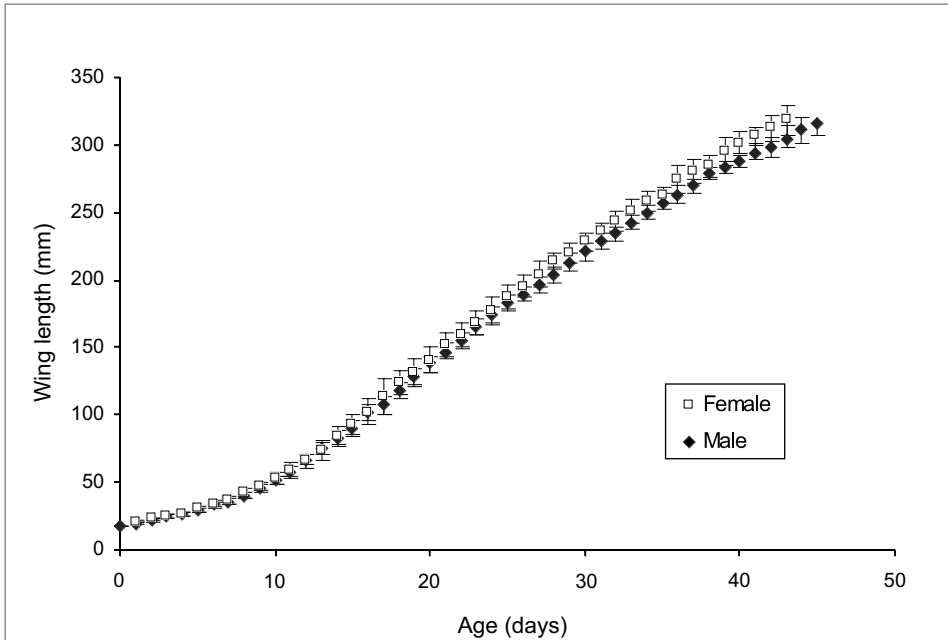


Figure 25. Increase in mean wing length (with 95% confidence limits) of buzzard chicks with age. Data from 1–4 nests per year over eight years and one study area; each point based on measurements from 5–16 males and 5–17 females (from Bijlsma, 1999).

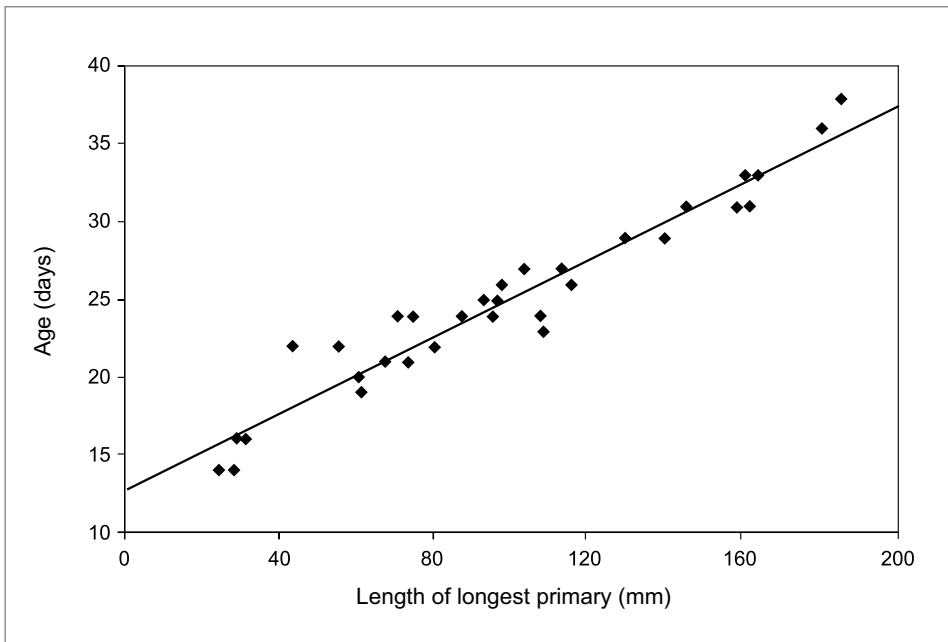


Figure 26. Increase in length of longest primary feather with age of buzzard nestlings (based on a sample of 33 young from Argyll, Scotland; Austin & Houston, 1997). Reproduced with kind permission from *Bird Study*.

the wing tip, including the vestigial outer primary) allowed most of a sample of 14, known age, young to be aged to within a day, and all to within four days, from the equation (Austin & Houston, 1997):

$$\text{Age} = 12.75 + 0.125 (\text{length of longest primary, mm}) \quad (\text{iii})$$

Based on buzzards in the Netherlands, Bijlsma (1997, 1999) describes the use of body weight in conjunction with other body measures for sexing (Table 4). The sample sizes are small (a maximum of 18–20 young of each sex) and the weights of Dutch buzzard chicks of a given age may be less than those of nestlings in Britain and Ireland, so these data should be used as a guide only. Although measurements for young of less than 26 days are included, sexing of such young is generally not reliable.

Table 4. Criteria for sex determination of three age categories (based on wing length) of buzzard chicks based on body mass (with and without crop), and maximum tarsus width (from Bijlsma, 1999).

Age (days)	Wing length (mm)	mass (no crop) (g)		mass (with crop) (g)		Tarsus width (mm)	
		♂	♀	♂	♀	♂	♀
<26	<192	-	>760	-	>800	<9.5	>9.5
26-30	192-225	<600	>800	<600	>850	<9.5	>9.5
>30	>225	<700	>830	<735	>870	<9.7	>10.0

Further data are required for reliable ageing and sexing of buzzards in Britain and Ireland. Based on 96 young from Dorset, a minimum tarsus width (callipers squeezed tightly) of less than 6.0 mm at fledging was found to discriminate males from females with 95% accuracy (Walls & Kenward, 1995).

4. SURVEYS OUTSIDE THE BREEDING SEASON

An index of buzzard abundance during the winter months can be obtained by carrying out counts of birds observed from defined survey routes (preferably randomly selected or at least representative of habitats in the area to be covered), either on foot or by car (see Section 2.2.2 of Introduction). Observers should cover a fixed route in a set time, and record observations of buzzards and the approximate distance of each bird from the 'transect' line. Weather conditions should also be noted. The data collected would be appropriate to be used as an index of change in numbers between years. In Britain and Ireland, such survey work would be best undertaken between November and February to exclude irregular influxes of immigrants during passage periods, and surveys should be carried out at approximately the same time each year to ensure comparability.