Montagu's Harrier

Circus pygargus

1. INTRODUCTION

Montagu's harriers are rare in Britain and Ireland, breeding regularly only in central, southeast, southwest and east England (Ogilvie & RBBP, 2004; Holling & RBBP, 2008). The breeding range in England and Wales was formerly more extensive and the species has also been recorded breeding in Scotland and Ireland. (Gibbons *et al*., 1993). Montagu's harriers are migratory. Birds breeding in northwest Europe winter in the northern tropics south of the Sahara (Underhill-Day, 2002b). They return to breeding grounds in England from late April. The blue-grey males are distinctive and easily separated from the brown 'ringtails' (females or immature males). First-summer males can be distinguished from females by their smaller size and the presence of some adult male feathers (Clarke, 1996). Juveniles are easily separated from older birds by their distinctive dark buff to rufous breast, belly and undertail-coverts. A melanistic (dark) plumage morph has occassionally been recorded in Britain (e.g. Everett, 1991; Thomas, 2008). Montagu's harriers do not normally breed until two or three years old (Clarke, 1996).

For further information on the biology and ecology of this species, Clarke (1996) provides a comprehensive account.

Annual cycle

Breeding Activity	Peak Period	Range	Duration (days)
Occupation of home range	May	Late April to late May	
Territorial display	May	Late April to late May	
Egg laying	Late May	Early May to early June	4 to 8
Incubation	Late May to late June	Early May to early July	27 to 30
Hatching	Late June	Early June to early July	
Young in nest	Late June to mid-July	Early June to mid-August	35 to 40 (may leave nest at 21+ days and hide in nearby vegetation)
Fledging		Mid-July to mid-August	
Juvenile dispersal		Early August to early September	

2. HABITAT, HOME RANGE, NESTS AND BREEDING

2.1 Habitat

Essentially a lowland species, Montagu's harriers breed in both dry and wet habitats. In Britain and Ireland, they were formerly found in arable farmland, heaths and young conifer plantations. The small population in England is currently confined to arable farmland. The habitat must provide both sufficient cover for nesting and open areas for hunting.

2.2 Home range

Montagu's harriers have extensive home ranges for hunting; males may hunt 8 km or more beyond the nesting territory although females are likely to hunt within or close to the nesting territory (Cramp & Simmons, 1980). Home ranges are not exclusive and overlap with those of other harriers. Pairs may occur on their own or in loose colonies, possibly depending on the available food supply, whether areas of suitable nesting habitat are limited, or the need for mutual defence (Clarke, 1996). Within colonies, the distance between nests can be as little as 20–30 m but is usually 200–300 m. In Scotland and Ireland, all breeding attempts have involved solitary pairs but loose colonies have been found in England. Montagu's harriers are less aggressive in defending their nesting territory than other harrier species. A study in Italy found that the area defended around a nest ranged from 1.5–6 ha (Pandolfi & Pino d'Astore, 1992).

Montagu's harriers are occasionally polygynous: one case was found in 71 nests in Cornwall (Cramp & Simmons, 1980), and 13 out of 776 nests were polygynous in Norfolk between 1923 and 1982 (Underhill-Day, 1990). Possible polyandry has also been recorded (Arroyo, 1996).

2.3 Nest sites

Montagu's harriers nest in arable crops, particularly winter sown ones (cereal or rape) that have grown to a suitable height by the spring. Their nests have also been found in young forestry plantations, wet and dry heaths, peatlands, heather moorland, shrubs (gorse and similar plants), marshes, 'set aside' in agricultural land, and dunes (Cramp & Simmons, 1980; Clarke, 1996). In England, and other parts of Europe, Montagu's harriers will return to the same nesting range in successive years, and the new nest is generally built close to the old one. Movements of up to 7 km have been reported if the distribution of crops changes from year to year. The female is usually the more aggressive bird, but the male may also strongly defend the nest site.

2.4 Nests

The nest is placed on the ground in dense vegetation of typically 50–100 cm in height (Clarke, 1996), tall enough to hide the female when she is brooding or incubating. The nest is built by the female from any available vegetation (reed-stems, heather, twigs, coarse grass. The normal height is 5–10 cm, with a diameter of 20–30 cm and a shallow cup of about 15–20 cm in diameter (Cramp & Simmons, 1980).

2.5 Clutch size and incubation

Montagu's harriers normally lay 3–5 eggs but clutch size can range from 1–8 eggs (Cramp & Simmons, 1980; Clarke, 1996; Arroyo *et al*., 1998) and exceptional clutches of up to 10 eggs have been recorded. Variability in clutch size has been related to weather, food supply and the breeding condition of pairs (Arroyo *et al*., 1998; Corbacho & Sanchez, 2000). Mean clutch size also declines as the season progresses. Eggs are laid at 1.5–3 day intervals. Incubation

normally lasts for 27–30 days per egg and 27–40 days per clutch. It usually begins with the first egg, although it is not uncommon for full incubation to be delayed until 2–3 eggs are laid. Only the female incubates, and is fed by the male, on average 5–6 times per day (Clarke, 1996); if larger prey items (e.g. rabbits, leverets) are brought, however, there may only be 2–3 visits a day. Breeding success tends to increase with clutch size (Corbacho *et al*., 1997).

2.6 Brood size and fledging

Eggs hatch asynchronously but the first two chicks may hatch at the same time. If there is a reduction in the food supply, younger chicks have a lower chance of survival. The first eggs laid tend to hatch female chicks (Leroux & Bretagnolle, 1996), with later eggs hatching males. The proportion of male chicks hatched was higher in smaller colonies than in larger ones. The sex ratio was also related to food availability with more female chicks produced in years of higher prey populations (Arroyo, 2002).

A limited number of observations have shown delivery rates of 23-26 items per day during the nesting period; feeding activity was reduced in the early afternoon (Clarke, 1996). Feeding rates may average one visit per two hours when young are small, and increase to one per hour when they are large (Glutz *et al*., 1971 in Cramp & Simmons, 1980). The young fledge 35–40 days after hatching but may leave the nest and hide in nearby vegetation after 21 days (Cramp & Simmons, 1980). They become independent 15–30 days after fledging and start to disperse from the nesting territory; birds that fledge later in the season take less time to become independent (Arroyo, 2002).

Productivity has been linked to prey abundance, with cyclic oscillations in vole numbers influencing breeding success in France (Leroux & Bretagnolle, 1996; Butet & Leroux, 2001) and the Netherlands (Koks *et al*., 2002); more young are produced in years with greater vole numbers. In western France, spring and summer vole densities were found to be good predictors of productivity (Butet & Leroux, 2001). In areas where voles are not abundant, birds (Sanchez-Zapata & Calvo, 1998) or lagomorphs (Arroyo, 1995) form the main prey.

3. SURVEY TECHNIQUES

CAUTION *To minimise potential disturbance, nesting areas should ideally be viewed from vantage points between 500-750 m away. Depending on location and topography, however, this can be reduced as far as about 200-300 m. Sensitivity to disturbance depends on individuals, so if a bird repeatedly flies around a particular spot, apparently aiming to land, but changing its mind at the last minute, this probably indicates that the observer is too close for comfort. The nests of Montagu's harriers should not be visited unless there is a specific reason for doing so, and nest visits should always be kept to an absolute minimum. Trampling of tall vegetation will increase the risk of mammalian predation, therefore care should be taken to cause as little damage as possible to the vegetation surrounding the nest. Any visits to record the nest contents or to ring the young should be made as late in the breeding cycle as possible (when young are three to four weeks old) and should not be made in poor weather. After visiting a nest, the observer should watch from a suitably distant vantage point to ensure that the female returns to the nest and that the parents continue to behave normally. If the female does not return within a reasonable time, the fieldworker should leave the area completely and return at a later date. If desertion is suspected, the pair/nest site should be treated with extreme caution in future years.*

3.1 Breeding season visit schedule

The species is listed on Schedule 1 in Great Britain and the Isle of Man, and on Schedule II in the Republic of Ireland. To establish occupancy and the presence of breeding pairs, at least three visits are recommended, although further watches during the second period will increase the chances of detecting active nests.

Visit 1	Late April to late May	To check for occupancy. It is important to try to locate birds before incubation starts as disturbance of incubating birds may increase the risk of nest predation
Visit 2 (several visits can be made)	Late May to late July	To locate the nest. No attempt should be made to visit the nest unless there is a specific need
Visit 3	Mid-July to mid-August	To check for fledged young

3.2 Signs of occupancy

3.2.1 Locating home ranges

If the presence of Montagu's harriers is suspected, suitable breeding habitats should be checked for displaying birds from late April to late May. Watches should be carried out from a vantage point for at least four hours. The vantage point should be far enough away from the potential nesting territory so as not to cause disturbance.

Montagu's harriers (males in particular) perform a solo high-circling display, reaching heights of 300–600 m, but will also perform mutual high-circling, often with the male above the female. Pairs may also perform a 'flight-drifting' display, in which they float back and forth over their nesting territory, sometimes indulging in flight play (flight-rolls and presentation of talons by the male; symbolic 'food passes'). Sky-dancing is performed predominantly by males (the female may or may not be present), often in fine weather. Individual males show variation in display, which may be related to age or prevailing weather conditions (Cramp & Simmons, 1980). Food passes from the male to the female, on the ground or in the air, begin before egg-laying, and the female remains dependent on the male for food well into the nesting period (Cramp & Simmons, 1980).

3.2.2 Locating roosts

Searches for roosting birds during the breeding season are not recommended because of the disturbance that they cause.

3.2.3 Recognition of signs

The areas around Montagu's harrier nests should not be disturbed unless there is a specific reason for doing so and no attempt should be made to locate pellets until the young are well on the wing. Care must be exercised in identifying pellets, as they are similar in appearance to those of other raptors. They will be useful only when there is additional evidence (e.g. moulted feathers, a recently used nest) to allow specific identification.

3.2.4 Evidence of occupancy

A nesting territory is occupied if a single bird or a pair of Montagu's harriers is observed displaying (Clarke, 1996; see 3.2.1 above), or if other breeding behaviour (e.g. a food pass) is observed.

3.3 Evidence of breeding

3.3.1 Locating active nests

Nests can be located from late May to late June, depending on the laying date. Watches should be carried out from a vantage point that gives a clear view of the area; they may need to last for up to six hours to observe a food pass or other definite sign of breeding. If the harriers alarm or appear reluctant to approach, the fieldworker may be too close to the nest and should move to a more distant vantage point. The female is likely to be incubating if she is no longer seen during site visits. If the male is seen displaying at this time, however, this may mean that the female has moved or died, as displays are rare after incubation starts. The only definite signs of breeding are food passes (generally in the air) or observations of adults carrying food to the nest. A female may leave the nest for a food pass, to defaecate, to pick up nest material, to dry her wings after rain or to mob potential predators. All such behaviours indicate probable breeding.

The female should be watched back to the nest after she has left it, noting that she may not return directly but approach the nest in a series of short flights. Once she has settled, her position should be noted on a sketch map and/or a digital photograph of the area taken. Only if necessary for a specific study should the fieldworker go to search for the nest (see 'caution' above). If the nest is in uniform habitat (e.g. in the middle of a crop or a large grassy area with no trees or posts), it is better if two fieldworkers co-operate to locate it, one directing the other from a suitable vantage point. Specific permission from landowners must be obtained before entering crops, and care must be taken in crops or long grass not to leave a trail to the nest, which might reveal its location to potential predators, or people. Wherever possible, in crops, fieldworkers should use existing 'tram lines' to gain access to nests. If working alone, the location of the nest can be determined from a vantage point by taking a compass bearing and estimating the approximate distance to the expected nest site. The fieldworker should then walk in the direction of the compass bearing and count paces to reach the estimated distance, mark this spot with a clearly visible object (pole, rucksack) and progressively search out from that point. Objects in the distance (posts, trees, buildings) beyond the nest site may help give a line to walk along towards the nest. The female may be reluctant to flush from her eggs or young.

If the young are large, the female may hunt in addition to the male but she will probably remain near the nest. Adults with prey will be observed flying directly to the nest and the position of the nest can be determined as above.

Nests in arable fields may be at risk of destruction if crops are due for harvesting before chicks fledge. In such cases local staff of the Statutory Country Conservation Agencies and/or RSPB should be informed. They can advise on or undertake liaison with land managers over nest protection.

3.3.2 Evidence for fledging

It can be difficult to count well-grown young before fledging because they leave the nest and move into the surrounding vegetation. Counts can be made of chicks while they are still in the nest (noting that they may leave from 21 days onwards). In such cases, the age of the young must also be recorded because losses can occur before fledging. Fledged young can be counted accurately as they remain close to the nest for 10–14 days after fledging. They use low perches in the nesting territory and will fly to meet adults bringing food (Clarke, 1996); food passes give an excellent opportunity to count the young. To maximise the chances of seeing all the young, a watch should be carried out over the nesting territory for up to four

hours or until two food passes are seen. If there is more than one nest in the same area, care should be taken to avoid counting young from neighbouring nests that may fly towards any adult carrying food.

3.4 Evidence for non-breeding

If an area is occupied but no sign of breeding behaviour is observed after multiple visits involving watches of sufficient duration from suitable vantage points, including some time to check for fledged young, then this provides evidence for non-breeding.

3.5 Ageing and sexing young

Measurements from birds breeding in the Netherlands indicate that Montagu's harrier chicks can be aged by measuring their wing length (Figure 15; Bijlsma, 1997). Mass can also be used to give an approximate age for younger chicks but not for older young (after about 10–12 days) unless they can be sexed before estimating age (Figure 16; Bijlsma, 1997); for Spanish birds, Arroyo (1995) found that the growth of the eighth primary (the third outermost wing feather), was independent of the sex or condition of the chick. Based on these findings, age can be determined using the following formula, once primary growth (pin stage) has started at 7–8 days of age:

$$\text{Age} = (\text{Length of eighth primary (mm)} + 59.0)/7.73 \qquad \text{(ii)}$$

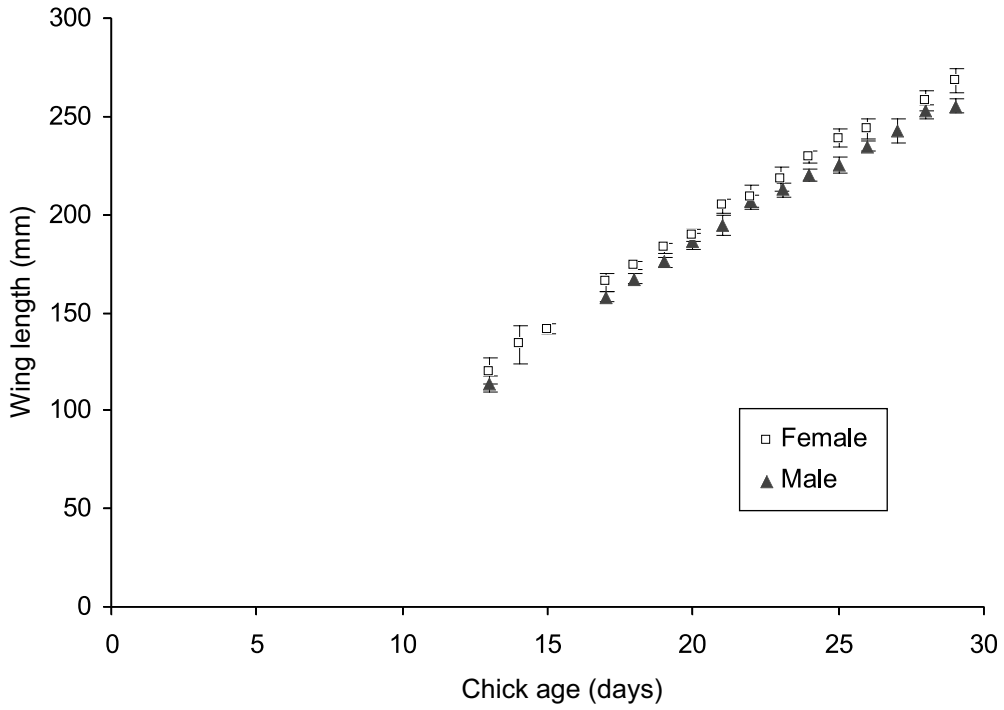

Figure 15. Change in the mean wing length (with 95% confidence limits) of Montagu's harrier chicks with age. Data from 1–8 nests per year over nine years and three study areas; each point based on measurements from 5–11 male and 5–9 female young (from Bijlsma, 1997).

Wing length cannot be used reliably to sex young. Based on a sample of 39 young from the Netherlands, Bijlsma (1997) suggested that foot width (without claws) can be used to separate many males and females reliably at 20 days or older (wing length greater than

187 mm): males had a foot span of 52 mm or less, and females 55 mm or greater (young with intermediate foot span cannot be sexed reliably by this measurement). Females over 20–23 days old usually weigh over 330 g, while males are normally below 300 g (Figure 16). Weights within a brood give a reliable contrast, as males are usually 40–50 g lighter than their sibling females after reaching the asymptotic (maximum) mass at 20–30 days of age. Iris colour can be used in conjunction with measurements. Males, from 12–15 days old, have a grey iris, while females have a brown iris (Forsman, 1999).

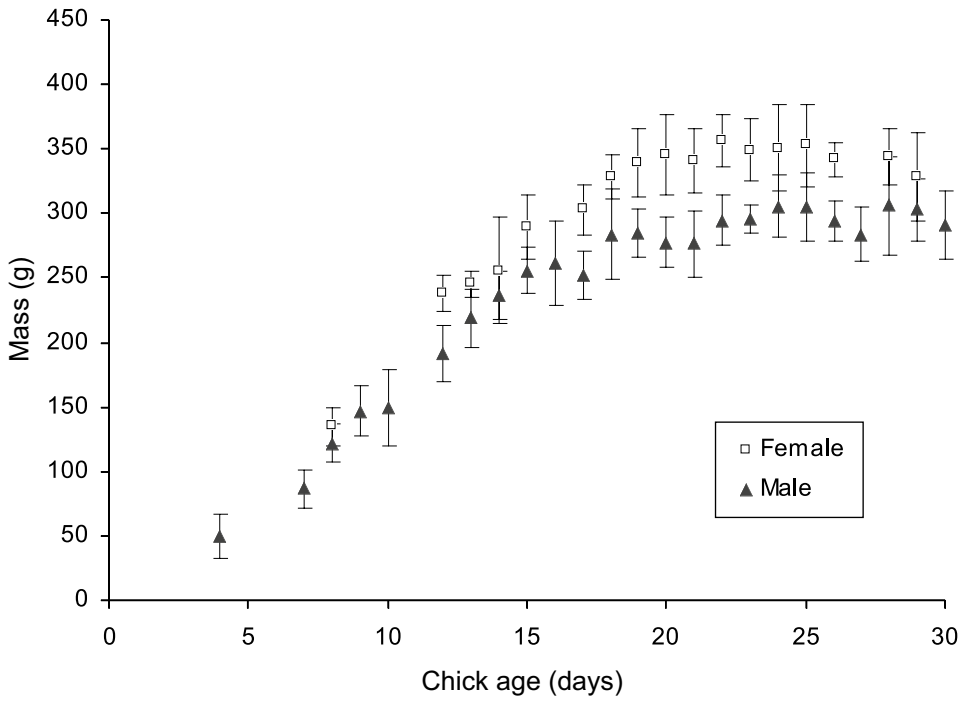

Figure 16. Change in the mean body mass (with 95% confidence limits) of Montagu's harrier chicks with age. Data from 1–8 nests per year over nine years and three study areas; each point based on measurements from 5–13 male and 5–11 female young (from Bijlsma, 1997).

4. SURVEYS OUTSIDE THE BREEDING SEASON

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