



# Marsh Harrier

*Circus aeruginosus*

## 1. INTRODUCTION

The marsh harrier (western marsh harrier) is increasing as a breeding species in Great Britain (Gibbons *et al.*, 1993; Underhill-Day, 1998; Holling & RBBP, 2008) with breeding recorded as far north as Orkney (Bell, 2007). A pair of marsh harriers that fledged two young in Northern Ireland in 2009 represents the first recorded breeding by this species since about 1840. In the Republic of Ireland, breeding has not been confirmed since 1917, although regular sightings of marsh harriers in suitable habitat suggest that the species is likely to recolonise in the near future. British and Irish marsh harriers are partial migrants (Underhill-Day, 2002a). A few individual birds, mostly females, winter in the south and east of England, south Wales and southeast Ireland. Ringing recoveries of British birds show that they migrate into Iberia and northwest Africa. Migratory birds from northern Europe and Scandinavia may cross the Sahara to winter in central and southern Africa as far south as the Transvaal (Underhill-Day, 2002a). During migration, passage birds can be seen in areas where they do not breed or winter. Adult male marsh harriers have a distinctive plumage, with black wingtips, a grey wing panel and tail, and a dark brown back (Clarke, 1995). The adult female's plumage is more variable; the body and wings are brown, and the crown and chin are yellow or pale. Juveniles and immatures resemble females (though they may lack pale markings on the head) and begin to moult into adult plumage in their second calendar year. Juvenile males can be separated from females by their smaller size. Marsh harriers do not breed until 2–3 years old (Clarke, 1995).

For further information on the biology and ecology of this species, Clarke (1995) provides a comprehensive account.

## Annual Cycle

Breeding Activity	Peak Period	Range	Duration (days)
Occupation of home range		Late January (southern England)/ late March (Scotland) to late May	
Courtship	Late March to early May	Mid-March to June	
Egg laying	Late April to mid-May	Early April to early June	2 to 14
Incubation	Late May to mid-June	Early April to July	31 to 38
Hatching	Late May to late June	Mid-May to July	
Young in nest	Late May to late July	Mid-May to late August	Approximately 28
Fledging	Late June to late July	Late June to late August	At 35 to 40 days old
Juvenile dispersal		August to September	At 60 to 73 days old

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

### 2.1 Habitat

Marsh harriers use a variety of wet and dry habitats. They nest in beds of common reed, crops (oil-seed rape and winter cereals) and rough grass (Underhill-Day, 1998). In both summer and winter, they hunt over dry arable farmland, reed beds, flooded grassland and salt-marshes (Underhill-Day, 2002a).

### 2.2 Home range

Marsh harriers defend only the immediate area around the nest, the nesting territory, which has a radius of about 100–300 m. They may breed as single pairs or in loose colonies (Clarke, 1995). Male marsh harriers are often polygamous (25–30% of nests), usually bigamous, but occasionally trigamous (Underhill-Day, 1998; Clarke, 1995). In Scotland, nesting territories are occupied from late March to early May, when the birds return from their wintering grounds. In southeast England, some marsh harriers, mostly females and immatures, over-winter; these females may move into nesting territories as early as January (Cramp & Simmons, 1980). Most territorial defence is by the male (Fernandez & Azkona, 1994). In East Anglia, the home range of males varied with the stage of the breeding cycle from 569 ha during courtship to 1,407 ha during the post-fledging period (Underhill-Day, 1990). Males may hunt up to 7 km from their nesting territory. Females have smaller home ranges, but these increase in size when they start to feed young (from 100–1,300 ha).

### 2.3 Nest sites

Nests are normally found in freshwater or brackish reed beds, in other wetlands with tall emergent vegetation and few or no trees, or in tall crops adjacent to a wetland. Of 542 UK nests for which habitat was recorded between 1983–90 and in 1995, most (86%) were in reed beds, with smaller numbers in arable crops (13%), and the remainder in rough grassland. In 1995 the majority of reed bed nests were in wet areas (65%), with 18% in tidal beds and 12% in dry reed beds (habitat was unspecified for the remaining 5%). Also in 1995, most (87%) nests were within 10 km of the sea or a large estuary (Underhill-Day, 1998). The reed beds or wetlands can be extensive, or small (less than 1 ha in size). Nests within loose colonies are often only 50–300 m apart (Cramp & Simmons, 1980).

### 2.4 Nests

These are located in thick, marshy vegetation or crops. Each is a substantial pile of reeds, grasses or twigs. The average diameter is 50–80 cm, with a cup of 15–20 cm in diameter and an average height of 25–30 cm (Cramp & Simmons, 1980). Nests may be on the ground or over water, in which case they are normally 50–70 cm above water level. The male starts to build 'cock' nests and platforms after occupying a nesting territory. He will display vigorously until he attracts a female. If she adopts his nest site, the pair will build the nest together. Occasionally, the female will reject the site chosen by the male and move to a new one. The nest is usually built in 7–10 days (completed more quickly if it is built on the remains of an old nest), with material gathered from up to 300 m away (Cramp & Simmons, 1980). The nest becomes flattened during incubation and the nestling period and must be rebuilt constantly to maintain its structure in unstable wetland vegetation. Both sexes continue to bring fresh material to the nest, with the male contributing during incubation and the early part of the nestling period, and the female continuing to bring nest material until the young fledge (Fernandez, 1992).

### 2.5 Clutch size and incubation

Clutch size varies from 2–8 (Underhill-Day, 1984), with eggs laid at intervals of 2–3 days. Larger clutches are more successful than smaller ones in fledging at least one young. Incubation lasts

31–38 days per egg, usually starts with the first egg, and is carried out almost solely by the female (at least 90%). She is fed by the male, who may cover the eggs in her absence (Cramp & Simmons, 1980; Clarke, 1995).

## 2.6 Brood size and fledging

Hatching is asynchronous and chicks are brooded by the female for the first 4–10 days (Cramp & Simmons, 1980). During this time, all the food is provided by the male and passed to the female, who feeds the young. As the young develop, the female may also hunt and may deliver as much food as the male. Food delivery rates generally increase from around 3–4 items per day when the young are 10 days old to 4–5 items per day at the age of 30 days (although 11–12 items per day can be delivered; Cramp & Simmons, 1980; Clarke, 1995). The young leave the nest and move into the surrounding vegetation from 28 days, and fledge at 35–40 days (Clarke, 1995); they use nearby bushes or posts as perches. The food delivery rate to the young by some males declines after fledging, but females continue to bring food to the young until they are over 60 days old. By 73 days, the young have started to disperse from the breeding home range.

## 3. SURVEY TECHNIQUES

**CAUTION** Nest visits during incubation or when there are small young can cause desertion and should be avoided unless it is essential to monitor the nest contents. Otherwise any visits should be delayed until the young are large enough to ring or wing tag (3–4 weeks old; guidance is provided in Section 3.3.1 below on estimating hatch date from observations of parental behaviour), and should not be made in poor weather. Great care should be taken to restrict damage to the surrounding vegetation, as tracks through a reed bed or other tall vegetation can lead predators or other people to the nest. Nests in reedbeds should be approached from the water side. After a visit, the nest should be watched from a suitably distant vantage point to ensure that the female returns to the nest and/or the parents continue to behave normally. If this does not happen within a reasonable time, the observer 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. Fieldworkers entering reed beds should wear wellington boots or waders depending on water depth and consider wearing goggles to protect their eyes from reed stems. To minimise the risk of disturbance it is recommended that nesting areas are viewed from a distance of 300–500 m, although the reedbed nesting habitat may provide a degree of protection in terms of reducing the visible detection of disturbance by marsh harriers (Ruddock & Whitfield, 2007; Whitfield et al., 2008b).

### 3.1 Breeding season visit schedule

The species is listed on Schedule 1 in Great Britain, Northern Ireland and the Isle of Man (see Introduction Section 7.1.1). To establish occupancy and the presence of breeding pairs, at least three visits are recommended (as detailed below). Visit 2 spans a broad period of time because of the wide range of laying dates in this species; multiple watches during this time will increase the chances of detecting active nests (see Gilbert et al., 1998).

Visit 1	Mid-March to late April	To check for occupancy. It is important that birds are located before incubation starts
Visit 2 (several visits can be made)	Late April to mid-July	To locate active nests
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 marsh harriers is suspected, watches should be carried out in suitable habitats from mid-March to late April in order to locate nesting territories. Watches should be made from a vantage point that gives a clear view of the area and should start at dawn, as the male will generally feed the female shortly afterwards via a food pass (which may take place in the air or on the ground). If the prey is large, he may not feed the female again for several hours. In central Scotland, activity at the nesting area generally decreases around midday before increasing again in the early evening, depending on the number of chicks being fed. In England, analysis of prey delivery patterns for males and females during the courtship to nesting periods showed no variation with time of day (Underhill-Day, 1989).

Male marsh harriers perform high circling displays above the nesting territory or up to 1 km away on fine days, soaring high with quick, jerky wing beats and calling irregularly (Cramp & Simmons, 1980). Pairs also engage in flight play, in which the male mock-attacks the female, who may perform flight-rolls or present talons. High circling by males may include a sky-dance or song-flight display but the form of this varies with wind conditions, whether or not food is being carried, and the proximity of other territorial males. These displays can be spectacular, including somersaults, rolls, twisting, and falling as though shot. A far-reaching call is often uttered each time a dive is completed, and the wings make a rushing sound during the descent. Two or more males may sky-dance at once, and, in areas of high population density, these may be joined by further adults or immatures.

It is recommended that records of displaying marsh harriers and/or food passes over extensive areas of reed bed or other uniform vegetation should be supplemented by sketch maps or digital photographs showing salient features of the landscape beyond the nesting territory (trees, fence posts, dykes, buildings). This, along with a record of the observation points, should allow the fieldworker to relocate the display area quickly. Compass bearings should also be used to fix positions by triangulation whenever possible.

### 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*

Searches for pellets or prey remains in nesting areas are also not recommended until after fledging, because of the potential for disturbance. 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 (moulted feathers, recently used nest) to allow their specific identification.

### 3.2.4 *Evidence of occupancy*

A nesting territory is occupied if a single bird or pair of marsh harriers is observed displaying, courtship feeding or nest building.

## 3.3 Evidence of breeding

In estimating the numbers of breeding marsh harriers in the UK, 1983-95, Underhill-Day (1998) recorded a breeding attempt when observations were made of food being delivered to a nest site, eggs were known to have been laid, young were fledged, or where breeding

had taken place in the opinion of an experienced observer. Evidence of nest building or courtship feeding alone were not considered sufficient to indicate a breeding attempt. It was acknowledged that this recording system may have underestimated breeding numbers by missing some breeding attempts that failed at the egg stage. Gilbert *et al.* (1998) define evidence for a probable nest site as follows: a female carrying nest material stays at a potential nest site for an hour or more; and / or a female stays at the nest site for more than four hours and receives a prey delivery from the male during this time.

As marsh harriers can breed polygynously, breeding numbers are often reported in terms of the number of breeding males, breeding females, or known nests in an area (e.g. Underhill-Day, 1998; Ogilvie & RBBP, 2004).

### 3.3.1 *Locating active nests*

Once the presence of marsh harriers in an area has been confirmed, follow-up visit(s) should be made to confirm breeding. Watches should last at least four hours, preferably in the early morning or evening; nest locations may be revealed through observations of males and females nest building. Observers should also watch for males carrying prey to females, which occurs during nest construction and laying as well as during incubation and brooding. The female will leave the nest to receive prey from the male by a food pass, which, initially, normally occurs on the ground. During the pre-laying and laying periods a food pass may be followed by copulation, either at the point of food transfer, or the male may follow the female to a favoured feeding perch. The female can be watched back to the nest once she has eaten. After a food pass, the male may go to a favoured perch to preen.

After the first (alpha) female has laid, another female may gain access to the nesting territory and be courted and fed by the male. Fieldworkers should continue to watch the male's behaviour after locating a nest, to check whether he is polygynous.

When a nest location has been identified, a sketch map should be drawn showing its position in relation to landscape features, either close to the nest (shrubs, posts, gaps in the reed bed) or beyond (distinctive trees, houses) in a direct line through the nest from the vantage point. To augment field notes, a digital photograph can be taken of the nest location and surrounding area, and photo imaging software used to transfer any features or lines which can be used to relocate the nest on subsequent visits. When noting such features early in the year, account should be taken of possible changes in vegetation during the spring and summer which may alter or obscure them. A compass bearing should also be taken from the vantage point (recorded as at least a six figure map reference) to the nest. In large reed beds, several watches should be made from different vantage points; these will give different lines or bearings to the nest(s), which will help pinpoint their locations.

If the aim is to measure, ring and/or tag chicks, multiple nest watches will be required during the second visit period to provide an indication of the age of the chicks and the appropriate timing of a nest visit. The first sign of food being taken to the nest by the female indicates hatching; large chicks are fed at the nest by both parents.

If nest visits are undertaken in large reed beds, it is useful if the fieldworker who is visiting the nest is guided by an observer at a vantage point with an unobstructed view of the nest site and a perspective of depth within the reed bed. Two-way radios or mobile phones (if reception is available) should be used so that the observer can guide the fieldworker to the nest. Observers can be stationed some distance from the nest site (normally up to 2 km, although distances

of up to 4 km have been used successfully in good visibility) and should ideally be on site earlier in the day to confirm activity at the nest before a visit is made. The fieldworker visiting the nest should carry a tall pole (up to 2 m) with a large, fluorescent pointer at the top. This will reveal their position to the observer and the pointer can be used by the observer to guide the fieldworker.

### 3.3.2 Evidence of fledging

To locate fledged young, observations should be made from a vantage point overlooking the nesting territory between mid-July and mid-August. The fledged young will sit in the vicinity of the nest on bushes or similar prominent perches and can usually be counted easily. The area should be watched until the fieldworker is confident that all of the young present have been located. Observations in Scotland suggest that very few young die after the feathers are almost fully grown, so counts of young in the nest at this stage may provide an estimate of fledging success.

If the outcome of a breeding attempt is not known, visits to confirmed or probable nest sites from late August may provide clues as to whether young fledged successfully or any cause of failure (e.g. presence of prey remains or unhatched eggs; Gilbert *et al.*, 1998)

## 3.4 Evidence for non-breeding

It is extremely difficult to prove that a pair of marsh harriers has not bred. Nests can easily be missed if no food is brought in during a watch. All nesting territories that may be occupied by non-breeding birds should be checked on several occasions for breeding behaviour (using watches of sufficient duration from suitable vantage points) and for fledged young, to ensure that a nest has not been missed.

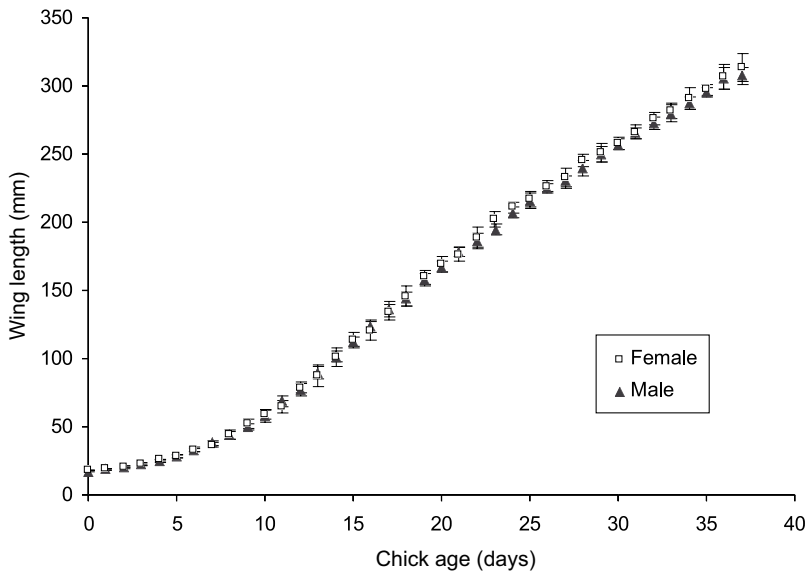
## 3.5 Ageing and sexing young

From measurements of marsh harriers in the Netherlands, chicks can be aged approximately using wing length (Figure 11; Bijlsma, 1997).

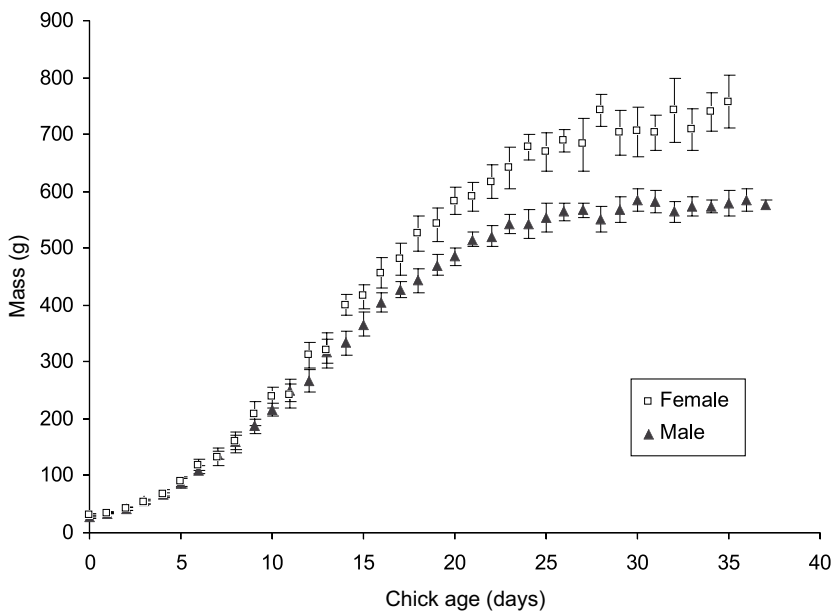
Measurements from the Netherlands also indicate that after the age of 19–22 days, most young can be sexed by a combination of mass and foot span without talons (for guidance on taking measurements see Introduction, Section 7.8.4). Females become heavier than males from around 14 days old (Figure 12; Bijlsma, 1997). After the age of about 22 days (wing length greater than 190 mm), any chick of more than 700 g is likely to be a female and any less than 600 g is likely to be a male. After the age of 19 days (wing length greater than 160 mm), females have foot spans equal to or greater than 80 mm while those of males are equal to or smaller than 78 mm (Figure 13; Bijlsma, 1997). Chicks that fall between the ranges for males and females for weight and/or foot span should be left unsexed. Iris colour is not useful for sexing the young of this species (Bavoux *et al.*, 1993).

## 4. SURVEYS OUTSIDE THE BREEDING SEASON

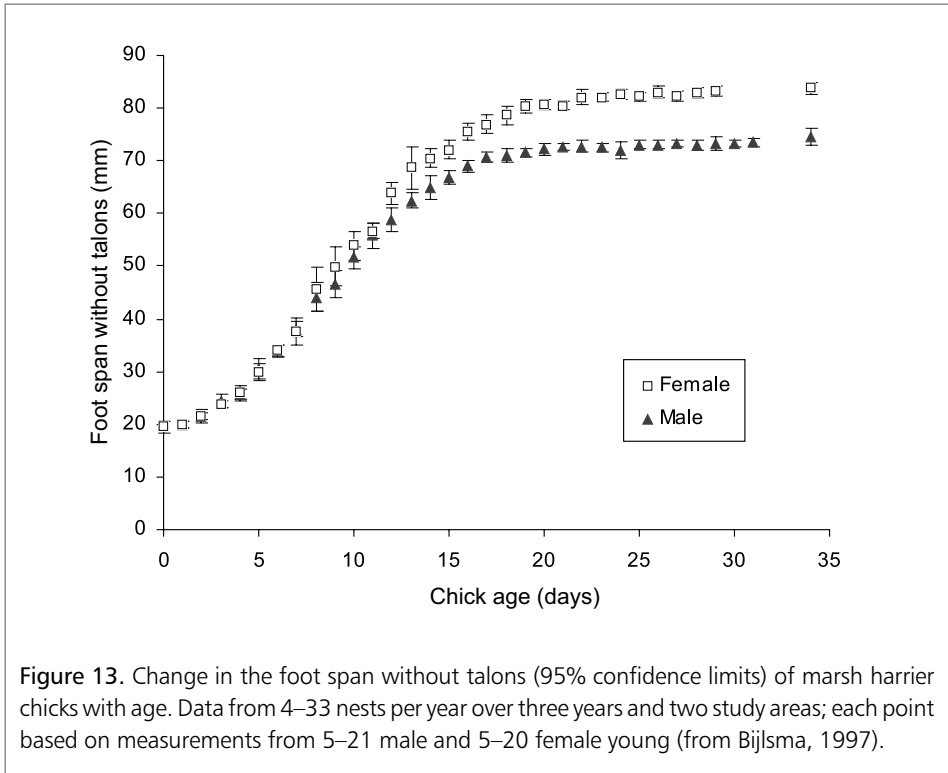
Marsh harriers can be counted at communal roosts. These often form in the autumn, when juvenile and adult birds roost together before migrating. Winter communal roosts occur at a few sites in southeast England (Clarke, 1995). Marsh harriers gather about an hour before sunset, perching on bushes among reed beds or on open ground. They move into the roost, which is generally in rank vegetation, at sunset and move out again at first light. Counts can be made from a suitable vantage point as the birds either enter or leave the roost. It



**Figure 11.** Change in the mean wing length (with 95% confidence limits) of marsh harrier chicks with age. Data from 4–33 nests per year over three years and two study areas; each point based on measurements from 5–36 male and 5–26 female young (from Bijlsma, 1997).



**Figure 12.** Change in the mean body mass (with 95% confidence limits) of marsh harrier chicks with age. Data from 4–33 nests per year over three years and two study areas; each point based on measurements from 5–43 male and 5–30 female young (from Bijlsma, 1997).



is important to be on site well before sunset (by mid-afternoon in mid-winter) or before dawn. Roosts can be found, initially, by following harriers as they return in the evening or by surveying suitable areas of habitat at dawn or dusk. Roosts often occur in the same localities in successive years if the vegetation remains suitable, although they can shift between years (Clarke, 1995). Marsh harriers counted at roosts are of unknown breeding origin and counts at roosts do not give any indication of the geographical areas used for foraging.

In areas with extensive wintering foraging habitat for marsh harriers, foot or road surveys could be used to provide indices of abundance in winter (see Introduction, Section 2.2.2) but few such areas occur in Britain and Ireland.