



Sparrowhawk

Accipiter nisus

1. INTRODUCTION

The sparrowhawk (Eurasian sparrowhawk) is one of the commonest and most widespread birds of prey in Britain and Ireland (Gibbons *et al.*, 1993; Newton, 2002). Its absence from some northern and western areas is probably due to the lack of suitable woodland and scrub for nesting, rather than a lack of small birds for prey (Gibbons *et al.*, 1993). Adults are sedentary in Britain and Ireland. Juveniles disperse in their first autumn before settling in a home range (Newton, 2002). Scandinavian breeding populations are migratory and many individuals cross the North Sea to winter in Britain, while others pass through and move on to southern Europe (Newton, 1986, 2002). Sparrowhawks show marked sexual dimorphism with females 60-100% heavier and 15% larger in leg and wing length than males (Moss, 1979). Adult males are distinctive in the field due to their blue-grey backs and rufous underparts. Adult females have dark grey-brown backs and barred brown underparts. Immatures have brown backs with a scaly appearance due to pale-tipped feathers, and the feathers of the underparts have terminal spots rather than bars so they appear more streaked than barred. Sparrowhawks can breed at one year old, whilst still in immature plumage.

For further information on the biology and ecology of this species, Newton (1986) provides a comprehensive account.

Annual cycle

Breeding Activity	Peak Period	Range	Duration (days)
Occupation of home range		All year	
Territorial display		October to June Most frequent in March and April	
Nest building		February to May	
Courtship		March to May	
Laying	Early May	Late April to early June	4 to 10
Incubation	Early May to mid-June	Late April to early July	33 to 35
Hatching	June	Late May to early July	
Young in nest	Early June to mid-July	Late May to early August	24 to 28
Fledging		July to August	
Juvenile dispersal		August to September	

2. HABITAT, HOME RANGE, NESTS AND BREEDING

2.1 Habitat

Sparrowhawks prefer to breed in mature woodland but in the absence of woods they can also nest in scrub, windbreaks or scattered trees. They are found nesting in city parks and other urban areas. Their foraging areas are diverse and range from dense forest to open country, as long as they support suitable populations of small birds.

2.2 Home range

In Britain and Ireland home ranges are occupied all year round. Home range size is influenced by season, habitat, food supply, sex and social status (Marquiss & Newton, 1981; Newton, 1986; Selas & Rafoss, 1999). Throughout the year, the nesting range provides a focus of activity and a roosting area for established birds. During the breeding season, a nesting territory is defended against conspecifics and in the prelaying period there is minimal overlap between the ranges of neighbouring males; for much of the year, however, the ranges of neighbouring birds overlap (Newton, 1986). Except during periods when they are confined to their nests (prelaying, incubation and brooding), females tend to have larger ranges than males and to hunt over different areas; their home ranges generally contain more open country than males and this is reflected in differences in prey caught by the sexes (Newton, 1986). First year birds and individuals occupying poor habitats also tend to have larger home ranges. In southern Scotland, home range sizes at different times of year were found to vary between 16–874 ha for males and 3–3,528 ha for females (Marquiss & Newton, 1981).

2.3 Nest sites

Sparrowhawks normally build a new nest in a different tree each year. They prefer to nest in large woods, and prefer conifers to deciduous trees. They tend to choose dense stands of trees (2–4 m apart; Newton, 1986; Selas, 1997), as long as there is flight access, in woodland of average age 37 ± 18.5 years. Dense stands of trees help to protect sparrowhawks from predation. Goshawks prefer woodlands with lower tree densities and their presence is thought to force sparrowhawks into denser woodland (Newton, 1986). Sparrowhawks will use less favoured habitats (smaller woods or clumps of trees, more widely spaced trees, deciduous trees, scattered trees in city parks) when ideal sites are not available. In sparsely timbered parts of Ireland, overgrown orchards and quarries, old hedgerows, railway lines and belts of trees along streams are common nesting places (Newton, 1986). Distances between the nest sites of neighbouring pairs of sparrowhawks vary with the productivity of the habitat and the abundance of small bird prey; in Britain, mean nearest neighbour distances (in continuous areas of suitable habitat) ranged from about 0.5–2 km (Newton *et al.*, 1977; Newton, 1986).

2.4 Nests

Sparrowhawk nests are built in the lower canopy of trees, at a height of 1.5–25 m above the ground, with most nests at 6–12 m. Both sexes take part in nest building. The nest is placed in a fork in a tree or next to the trunk where two or more branches emerge at the same level. It is a flat, bulky structure about 40–80 cm across and 10–30 cm deep, with a cup about 15–20 cm across and 5–10 cm deep. It is made from small branches up to 60 cm in length and is lined with bark fragments or small twigs (Cramp & Simmons, 1980; Newton, 1986). Completed nests may sometimes be abandoned before laying and new nests made. A fresh nest is normally built every year so that long-established nesting ranges may contain clusters of old nests. Within tracts of suitable woodland, groups of nests tend to be regularly spaced, at distances related to habitat productivity and prey availability (Newton, 1986). Nests survive longest when built of larch twigs; those built with smooth twigs, such as birch, sycamore or

Norway spruce, tend to disintegrate rapidly after use and nesting ranges in these types of woodland tend not to contain clusters of old nests (Petty, 1979).

2.5 Clutch size and incubation

In Britain and Ireland, sparrowhawks lay eggs between late April and early June, with the majority laying in early May. The average laying date is up to 10 days later in years with cold, wet springs, and there is a one day delay in the average laying date for every 60 m rise in altitude in southern Scotland (Newton, 1986). Birds that lay earlier produce more young than those that lay later. The eggs are laid on alternate days, usually in the morning, and clutch size varies from 3–6 eggs, occasionally seven (Cramp & Simmons, 1980; Newton, 1986). The BTO Nest Records Scheme gives an average clutch size of 4.6 eggs ($n = 1,431$). First-year birds lay slightly smaller clutches on average than adults (Cramp & Simmons, 1980; Newton, 1986). If the first clutch fails, a repeat clutch may be laid about two weeks later. Incubation lasts for 33–35 days per egg, beginning with the laying of the third or a later egg. The female incubates and is fed by the male (up to five times per day; Newton, 1986).

2.6 Brood size and fledging

Hatching may be synchronous or asynchronous, with larger clutches generally having a greater spread of hatching dates. The young are brooded for the first 8–14 days. Initially, the male provides food to the female, who feeds the young. Once the young are over three weeks old, the female also hunts. Feeding rates of broods increase from around six items per day during the first week to 10 items per day in the week before fledging (Newton, 1986). The chicks leave the nest and move to nearby branches when they are 24–28 days old and fledge at 24–30 days (Cramp & Simmons, 1980). They gradually increase in flying proficiency as they become independent and disperse 20–30 days later (Wyllie, 1985; Cramp & Simmons, 1985).

3. SURVEY TECHNIQUES

CAUTION Care should be taken to avoid flushing female sparrowhawks from a nest during incubation or brooding as eggs may be dislodged from the nest cup and may not be incubated properly, or small young may be accidentally knocked out of the nest by the startled female. If a nest visit is planned, flushing can be avoided by deliberately making a noise (talking, breaking a stick) when entering the nesting wood so that an incubating or brooding female is aware of an approach. Any displaced eggs or young found during nest inspections should be replaced carefully. Nests with large chicks (well feathered, over 24 days) should not be visited as the young may fledge prematurely. Appropriate health and safety precautions should be taken when climbing trees to inspect nests (see Section 7.10 of Introduction).

3.1 Breeding season visit schedule

The sparrowhawk is a Schedule 1 species in Northern Ireland and the Isle of Man (see Section 7.1.1 of Introduction). Due to the difficulty of locating active nests in woodland, it is recommended that all four visits are made, even if no signs of occupancy are found during the earlier visits. Sightings of birds are likely to be rare so the recommended survey method is to search for signs, including clusters of old nests, droppings and plucks.

Visit 1	April to early May	To check for occupancy and find new nests
Visit 2	May	To locate active nests
Visit 3	June	To check for young
Visit 4	July to early August	To check for fledged young

3.2 Signs of occupancy

3.2.1 *Locating home ranges*

The suggested timing of the first visit to search for signs of occupancy and new nests is April to early May, although woods may be searched systematically for old nests and plucking posts at any time of the year (with appropriate care taken at times when females may be laying, incubating or brooding small young). Groups of old nests from previous years indicate a nesting range and their position should be marked on a map. Since new nests are generally placed close to clusters of old nests, such areas should be searched first. Signs such as droppings and fresh plucks will appear before new nests and are also more obvious (Newton, 1986). Some nesting ranges have more than one cluster of old nests.

Sparrowhawks soar in all months of the year, particularly on bright, breezy days, and the behaviour is used to prospect before hunting, as well as for display, so may not necessarily indicate a bird holding a breeding home range. The high-circling display (generally by the female) tends to show a peak at the start of nest building and again around the time of laying (Cramp & Simmons, 1980). Other solo flight displays include slow-flapping and undulating flight and may be combined with high-circling to form a more elaborate sky-dance by the male in the presence of the female. Mutual high-circling is frequent around the time of egg laying, particularly in the early morning, and may be followed by the male sky-dancing or making plunges towards the female. Generally any calling that takes place during displays is only audible at close quarters (Cramp & Simmons, 1980). Sparrowhawks display over large areas, however, so that such observations of display should only be used to find general areas where sparrowhawks are present or as supporting evidence for occupancy.

3.2.2 *Locating roosts*

Active roosts may be found during the searches for nesting ranges, as they are generally close to the nest site during the breeding season. They may be recognised by the accumulation of fresh faecal droppings, pellets, moulted feathers and down.

3.2.3 *Recognition of signs*

Fresh sparrowhawk plucks of small birds occur on prominent features such as old stumps or logs if a wood has little ground cover, or in trees or old nests in woods with denser ground cover. Feathers from such plucks are sometimes scattered throughout the nesting range. It can be difficult to distinguish between the plucks of sparrowhawks and goshawks; sparrowhawks generally take smaller birds and, once incubation has commenced, moulted feathers are usually present nearby. Collecting feathers is recommended as individual birds may be recognisable from the variation in patterns (Newton, 1986; Bijlsma, 1997). Sparrowhawk pellets are usually distinguishable from those of other raptor species, being small and compacted, rounded at one end and tapered at the other; they may range in size from less than 20 x 10 mm to 35 x 18 mm. They consist almost entirely of greyish feather material, with the occasional piece of bone or other hard parts (Newton, 1986; Brown *et al.*, 2003). Sparrowhawk pellets are smaller than those of goshawk, and can be distinguished from owl pellets by their smaller size, lack of skulls and general scarcity of bone material (which sparrowhawks usually digest).

3.2.4 *Evidence of occupation*

A nesting range is occupied if there is clear evidence from signs or observations of resident birds that sparrowhawks are present. Droppings and signs may be found in many woodland areas, but it is a concentration of signs that indicates occupation of a nesting range (Newton, 1986).

3.3 Evidence of breeding

3.3.1 *Locating active nests*

Nesting ranges located during first visits should be checked again in May for the presence of active nests, starting in the vicinity of old nests but bearing in mind that new nests may be built some distance from clusters of old nests, necessitating searches of the surrounding woodland. Fresh plucks located in the spring may provide a cue as active nests are often close by (within 50 m and downhill on sloping ground) and fresh faecal droppings will also be found if birds are present. Fresh plucks will not usually be found after a pair have failed. From the ground, a new nest can be distinguished from old nests by its light airy structure, the white ends of freshly broken twigs, and daylight shining through. Old nests look solid and drooping in comparison and fallen leaves prevent light getting through. From around the time of laying, flecks of white down shed by the female begin to accumulate on the nest and surrounding branches. When the nest contains young, the ground and vegetation below become covered with droppings and the female may be heard alarm calling nearby (Newton, 1986). A description or sketch of the location of an active nest site should be recorded, as well as a map reference (at least six figure). If nest visits are made to record nest contents during incubation or brooding, fieldworkers should be alert to the possibility that a female sparrowhawk flushed from the nest may dislodge eggs or small young from the nest cup, sometimes with fatal results.

3.3.2 *Evidence of fledging*

Fledged young can be located by their calls. Nests from which young have fledged successfully are generally covered with down; droppings will be splattered over a wide area below the nest and there will be a large number of plucks nearby. The number of fledged young can be best estimated by counting large young (more than 24 days old), either standing in the nest or on nearby branches. Once the young have fledged fully, it is difficult to count them accurately as they move around and may not be seen all together. The young from early broods may even disperse to the nest sites of pairs with younger chicks (Frumkin, 1994), where they remain for short periods, stealing food delivered to the nestlings.

3.4 Evidence of non-breeding

Non-breeding is relatively common and about 20% of sparrowhawks may form part of a 'floating' non-breeding population (Newton & Rothery, 2001). A pair of sparrowhawks occupying a home range may not lay eggs if the female is in poor condition and/or the male is unable to supply sufficient food (Newton, 1986). If an occupied nesting range is located but no signs of an active nest or fledged young are found during the appropriate visits, then this provides evidence for non-breeding.

3.5 Ageing and sexing young

Growth curves for Sparrowhawk young are available from both southwest Scotland (Moss, 1979) and the Netherlands (Bijlsma, 1997). The Scottish young (from 49 nests) were measured over three breeding seasons from study areas in differing habitat types (coniferous woodland 200-400 m ASL in the Ae Forest and mixed farmland and woodland and small plantations on low ground in the Annan Valley). Hence, they are thought to represent a range of growth rates from good to poor based on geographical variations in prey availability (Moss, 1979; Newton, 1986).

For about 10 days after hatching, the age of young of either sex can be estimated from wing length (Figure 22a) or outermost (10th) primary length (Figure 22b) and tarsus length (length of tarsus plus heel, Figure 23a; tarsus, Figure 23b). After this, size differences between males

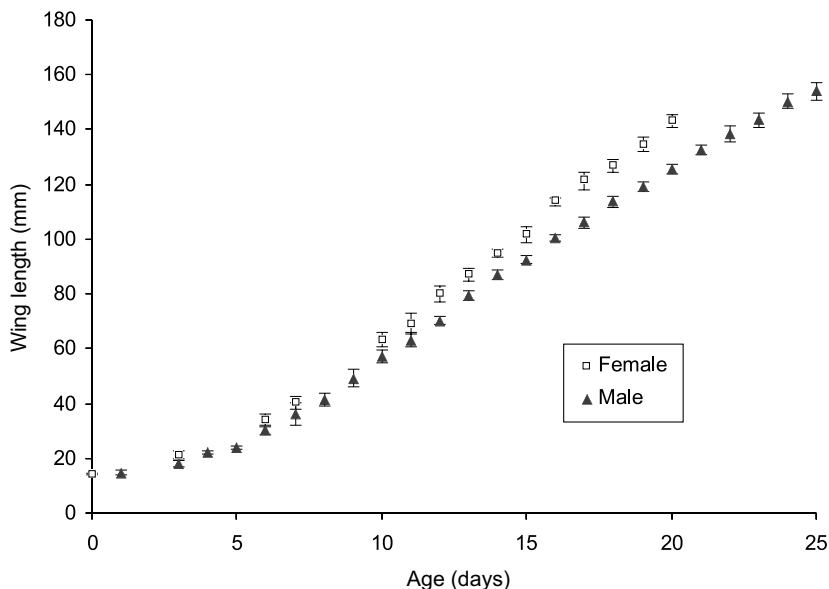


Figure 22a. Change in the mean wing length (mm, with 95% confidence limits) of sparrowhawk chicks with age. Data from 1–25 nests per year over seven years and four study areas; each point based on measurements from 6–20 male and 5–17 female young (from Bijlsma, 1997).

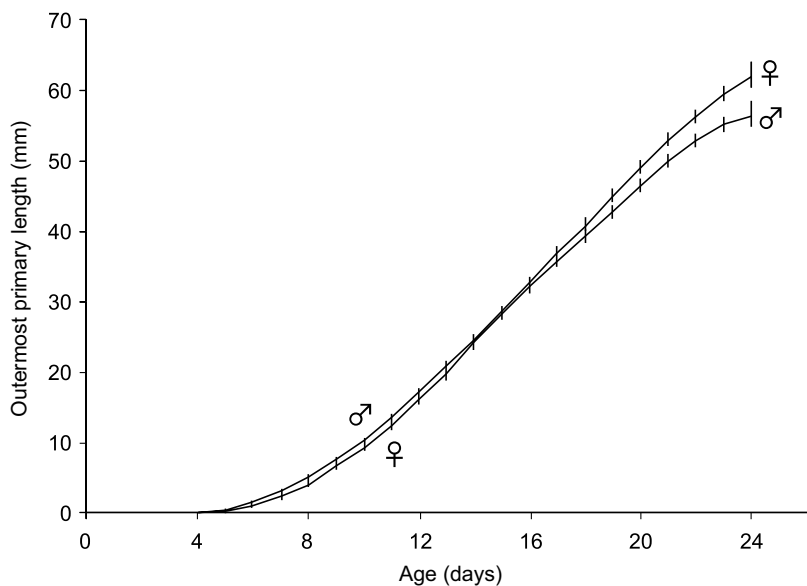


Figure 22b. Change in mean outermost (10th) primary length (with 95% confidence limits) of sparrowhawk chicks with age. Data from 49 nests in southwest Scotland over three years (from Moss, 1979; reproduced with kind permission of Blackwell Publishing).

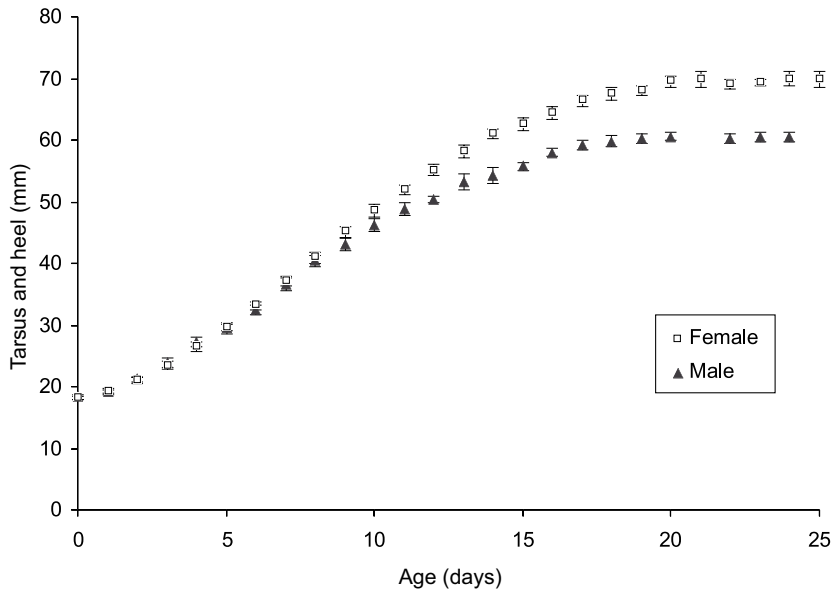


Figure 23a. Change in the mean tarsus plus heel length (mm, with 95% confidence limits) of sparrowhawk chicks with age. Data from 4–8 nests per year over two years and two study areas; each point based on measurements from 6–24 male and 5–24 female young (from Bijlsma, 1997).

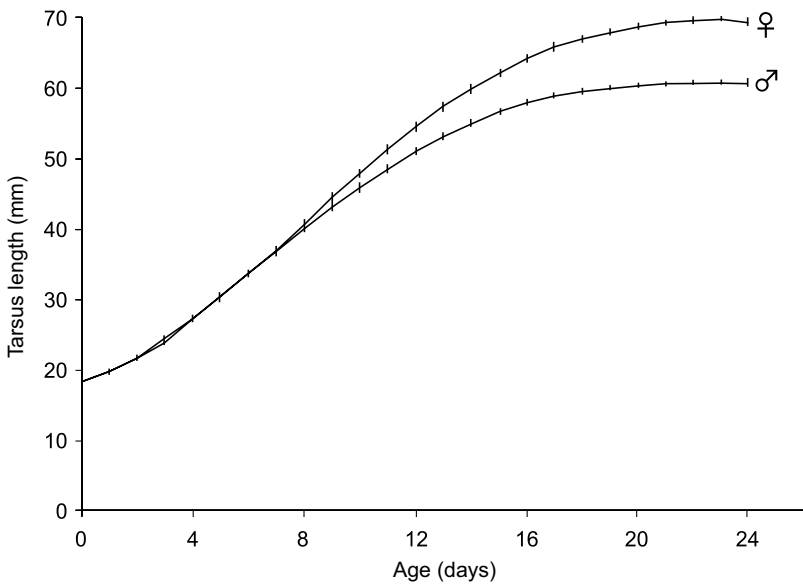


Figure 23b. Change in mean tarsus length (with 95% confidence limits) of sparrowhawk chicks with age. Data from 49 nests in southwest Scotland over three years (from Moss, 1979; reproduced with kind permission of Blackwell Publishing).

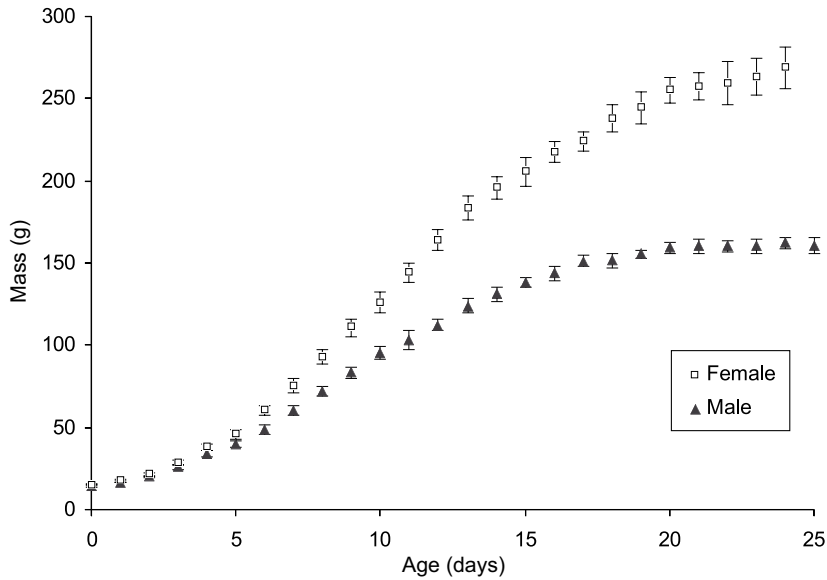


Figure 24a. Change in the mean body mass (with 95% confidence limits) of sparrowhawk chicks with age (most young weighed between 16:00h and 19:30h). Data from 1–8 nests per year over three years and three study areas; each point based on measurements from 5–22 male and 6–22 female young (from Bijlsma, 1997).

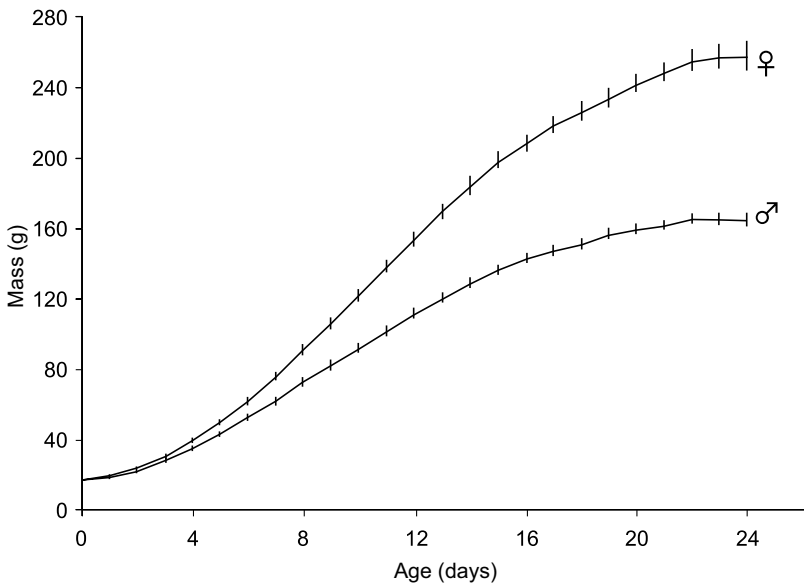


Figure 24b. Change in mean body mass (with 95% confidence limits) of sparrowhawk chicks with age. Data from 49 nests in southwest Scotland over three years (from Moss, 1979; reproduced with kind permission of Blackwell Publishing).

and females become apparent (Figures 22-24) and age can be estimated most accurately once a chick has been sexed. The primary feathers first emerge from their pins at 10-12 days in males and 12-13 days in females (Bijlsma, 1997). Young within a brood can be sexed visually, based on their size, from about the 12th day after hatching (Newton, 1986). The small feet and thin legs of males are easily distinguished from the larger feet and stouter legs of females, especially if both sexes are present in a brood. Sexing can be confirmed by measuring wing length (Figure 22), tarsus length (Figure 23) and mass (Figure 24).

4. SURVEYS OUTSIDE THE BREEDING SEASON

There is no established method for surveying sparrowhawk populations outside the breeding season. Some sparrowhawks display throughout the winter but they do this over large areas and observations of such displays are unlikely to be useful for estimating absolute winter population size.

An index of wintering sparrowhawk abundance might 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), although sample sizes in terms of the number of birds observed are likely to be low in relation to the survey effort required. Observers covering fixed survey routes on foot in a set time span several times each winter, and recording observations of sparrowhawks and their approximate distance from the transect line, could generate data of use for indexing changes in numbers between years. In Britain and Ireland, such survey work should be undertaken at similar times each year and between mid-November and late February, to exclude irregular influxes of immigrants during passage periods (Wernham *et al.*, 2002).