

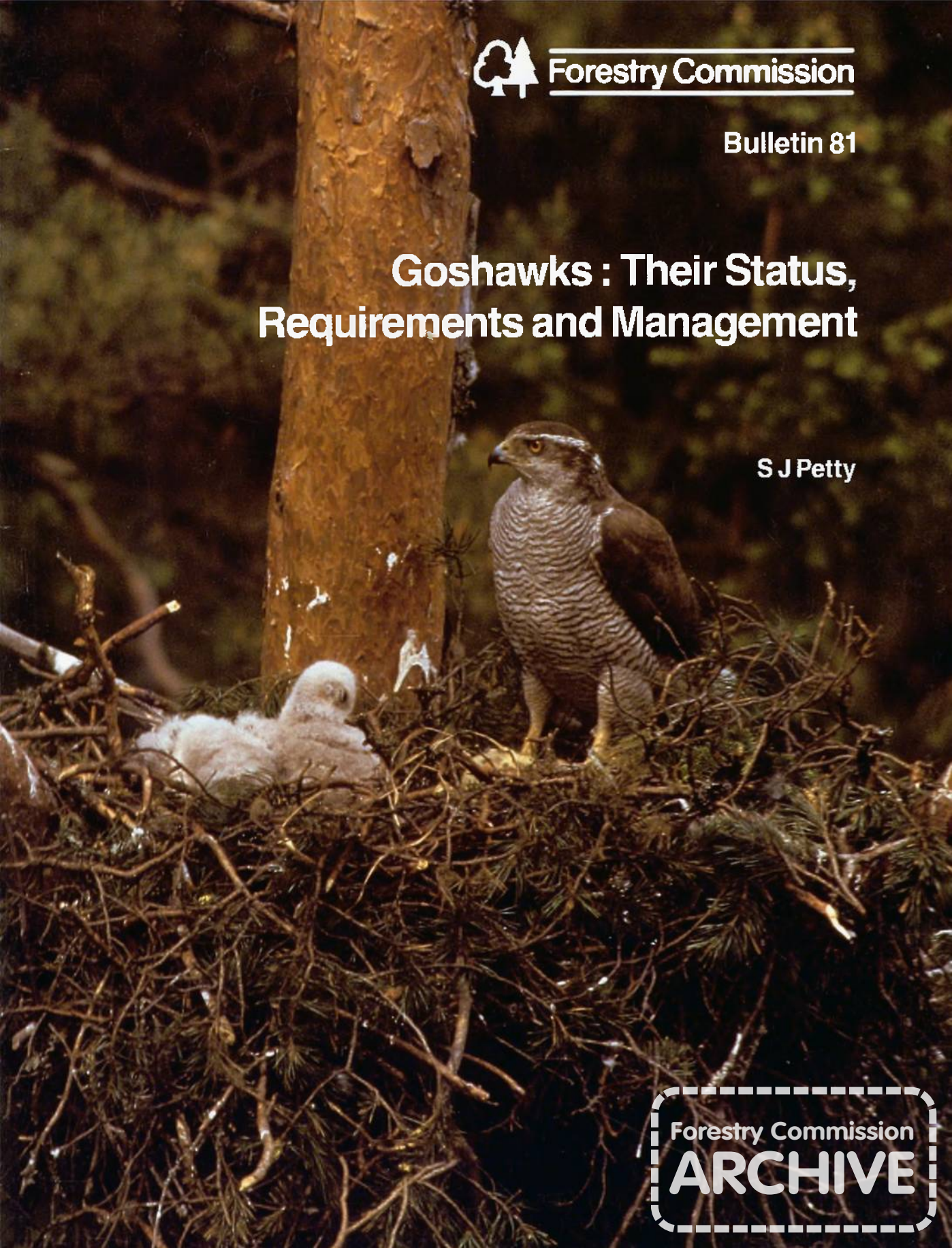


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Goshawks : Their Status, Requirements and Management

S J Petty



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Goshawks: Their Status, Requirements and Management

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Forestry Commission*

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FRONT COVER: Female goshawk at a nest with
downy chicks. The large nest has been built on a
substantial whorl of branches in a Scots pine.
(*G. Lind*)

Contents

Introduction	Page 5
Description	5
Status	5
Food	6
Habitat requirements	7
Population density and productivity	13
Protection	13
The management of nesting areas	14
Locating nesting areas	14
Retaining nesting areas	14
Protecting nest trees and the use of artificial platforms	15
Controlling disturbance	16
Accidents and robberies	16
Acknowledgements	16
References	17

Goshawks: Their Status, Requirements and Management

S. J. Petty
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Introduction

The goshawk is a large bird of prey which was re-introduced into Britain in the 1960s and 1970s. Populations are now beginning to expand, particularly in areas with large forests, and where human persecution is not a limiting factor. It is predicted that goshawks will become relatively common in some parts of Britain by the early 1990s. They are generally considered a spectacular and welcome addition to forest wildlife. Goshawks are vulnerable to both accidental and wilful human disturbance when they are breeding. Recommendations are given for the management of nesting areas, together with a background of the history of goshawks in Britain, their requirements, population density and the legislation which gives them full protection.

Description

Goshawks are large woodland raptors about the size of a buzzard or peregrine. It is an inconspicuous bird with habits similar to the much smaller sparrowhawk. Females are substantially larger than males and both sexes have the bulk of a peregrine but differ in having more rounded wings and a much longer tail (Cramp and Simmons, 1980). The upper parts of adults vary from dark brown to grey depending on whether they originate from central or northern Europe, the underparts are whitish closely barred with dark brown/black. Adults have a conspicuous white stripe above the eye (front cover). Yearlings, before they undergo their first adult moult in their second year of life, are much browner than adults, the upper body coverts have light brown tips and the breast feathers have characteristic tear-drop markings (Plate 2).

Status

Goshawks ceased to breed in Britain in the 1880s when the last few pairs were removed by man (Bannerman and Lodge, 1956). However, they were also scarce during the first part of the last century (Newton, 1972), suggesting that their main decline occurred much

earlier, probably as a result of the extensive deforestation which occurred in lowland Britain and some parts of the uplands prior to the 16th century (Dimbleby, 1984).

The goshawk occurs in boreal and temperate zones of the northern hemisphere and is relatively common in suitable habitats throughout most of Europe. Populations declined in central Europe in the 1960s (Thissen *et al.*, 1981; Bühler and Oggier, 1987), together with those of other bird-eating raptors, as a result of the contamination of food chains through the use of persistent organochlorines in seed dressings (Newton, 1979).

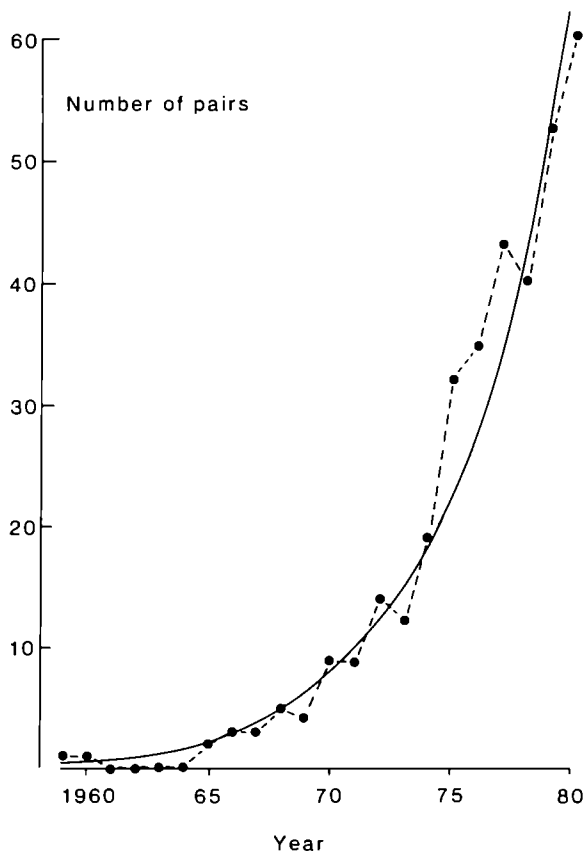


Figure 1. The number of goshawk pairs reported displaying or nesting in Britain from 1959 to 1980. (Redrawn from Marquiss, 1981.)

The present British population appears to be derived from birds which were purposely or accidentally released by falconers (Marquiss and Newton, 1982). Many of the birds came from Finland, and these tend to be larger and greyer than central European goshawks (Cramp and Simmons, 1980; Marquiss, 1981).

In Britain, breeding became regular from the mid 1960s and by 1980 around 60 pairs were known (Figure 1). Since then the population has further increased, possibly to over a 100 pairs by 1986 (Spencer *et al.*, 1988) and nearer 200 pairs by 1988 (Petty, unpublished data). The most successful populations are in large forests where they are relatively secure from persecution by game-bird managers and the illegal theft of eggs and chicks by egg collectors and falconers. These factors may be limiting successful colonisation or range expansion in less wooded parts of Britain (Marquiss and Newton, 1982).

Even though the goshawk is increasing in Britain it is still a very rare bird (Table 1). Six birds of prey have national populations smaller than those of goshawk, these include red kite, osprey and white-tailed eagle. The goshawk is the scarcest of the next group of raptors with populations lying between 100 and 1000 pairs including golden eagle, hen harrier, merlin and peregrine. All species of raptors with a population of less

than 1000 pairs have been the subject of intensive research in recent years.

Therefore, considering both the scarcity of goshawks in Britain and the high level of legal protection which they are given (see 'Protection' p.13), there is considerable justification for further research into the requirements and impact of this species in Britain. Some work has already been initiated by the Forestry Commission and will continue, but future research needs to look at:

1. range expansion of goshawks in Britain;
2. density of goshawks, to determine the carrying capacity in a wide range of habitats;
3. the impact of goshawks on prey species, particularly scarce mammals/birds and gamebirds;
4. reproductive rates in relation to goshawk density, habitat and food supply.

Food

The goshawk is a diurnal predator at the top of forest food chains in Britain. Birds and mammals form the bulk of goshawk prey (Kenward, 1979; Cramp and Simmons, 1980; Marquiss and Newton, 1982; Cooper and Petty, 1988). They are capable of killing a wide range of species, from the smallest birds such as

Table 1. Status and population trends of goshawks in relation to other diurnal raptors in Great Britain in the 1980s

Species	Estimated number of pairs	Population trends	References
Kestrel	up to 80 000	fluctuates	Newton (1984); Cadbury <i>et al.</i> (1988)
Sparrowhawk	c. 25 000	increasing	Newton (1984); Cadbury <i>et al.</i> (1988)
Buzzard	12–15 000	increasing	Taylor <i>et al.</i> (1988)
Peregrine	c. 1000	increasing	Cadbury <i>et al.</i> (1988)
Merlin	550 – 650	declining	Bibby and Natrass (1986)
Hobby	c. 500	stable	Fuller <i>et al.</i> (1985)
Hen harrier	c. 450	declining	Cadbury <i>et al.</i> (1988)
Golden eagle	400 – 500	slow increase	Dennis <i>et al.</i> (1984)
Goshawk*	53 – 112	increasing	Spencer <i>et al.</i> (1988)
Red kite	40 – 60	slow increase	Cadbury <i>et al.</i> (1988)
Osprey	40 – 50	slow increase	Dennis (1987)
Marsh harrier	30 – 50	increasing	Day (1988)
Honey buzzard	<20	not known	Spencer <i>et al.</i> (1988)
Montagu's harrier	<10	slow increase	Elliott (1988)
White-tailed eagle*	<10	slow increase	Cadbury <i>et al.</i> (1988)

* Species which ceased to breed in Britain and were re-introduced.

goldcrest, up to the size of brown hare or capercaillie, and even raptors smaller than themselves such as sparrowhawk, kestrel and tawny owl (Mikkola, 1983). However, they tend to concentrate on species which are both abundant and vulnerable, such as pigeons, rabbits, crows, rooks and also larger songbirds. Therefore, there can be great regional variations in the prey taken by goshawks. Like many predators they switch to alternative prey as particular species become more available, leading to both seasonal and annual changes in diet (Opdam, 1975; Opdam *et al.*, 1977) (Figure 2).

In Britain this wide range of prey may occasionally include some scarce or declining birds and mammals, such as black grouse, merlin, short-eared owl and red squirrel (Petty, unpublished data). There is some concern that populations of these species may be affected by goshawks. The rarity of such prey species will be some protection, and an equilibrium between goshawks and these species has been established

elsewhere in Europe. Currently there is no evidence that goshawks are affecting the distribution and numbers of any species, but the situation will need to be monitored as goshawks are still below the potential carrying capacity almost anywhere in Britain.

Goshawks can also kill poultry, racing pigeons and game-birds and can be particularly troublesome at unprotected pheasant release pens (Kenward *et al.*, 1981; Kenward, 1983). It is essential that pens are protected by overhead netting. It would also be unwise to site pens near goshawk nest sites.

Habitat requirements

Goshawks evolved in boreal and temperate forest of the northern hemisphere. These natural forests with many openings provided goshawks with all their requirements; trees for roosting and breeding, suffi-

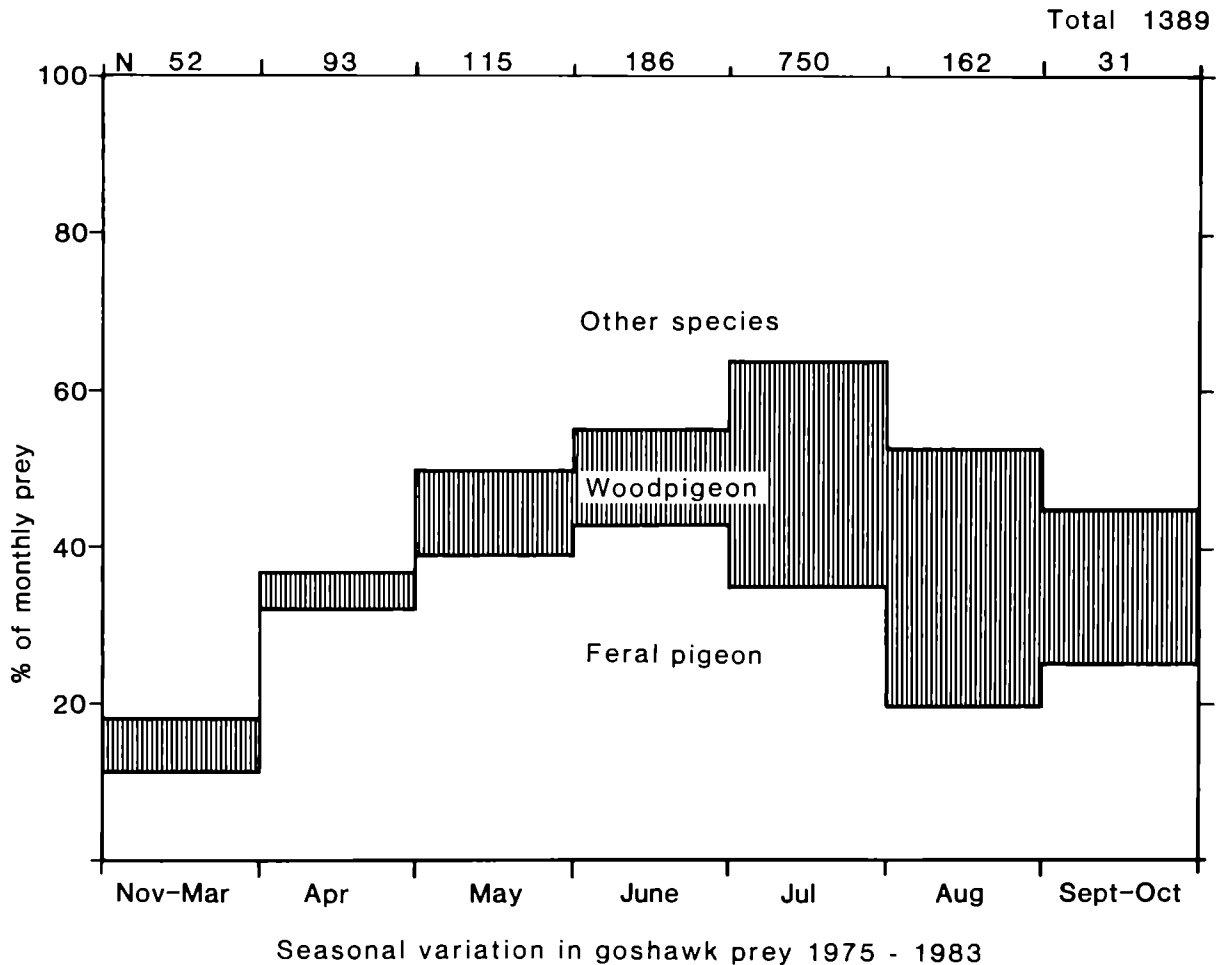


Figure 2. The seasonal variation in goshawk prey in an upland area of Britain. (Drawn from data given in Cooper and Petty, 1988.)

cient prey and enough room within the forest for these large birds to hunt. Contemporary forests in Britain have a much closer tree spacing, and although goshawks will use roads, rides, clear felled areas and well thinned or old crops for hunting, they appear to require some open ground including either moorland or low lying agricultural land where they obtain much of their food. A combination of open ground and forest is ideal.

The size and structure of tree stands in which goshawks nest is highly variable, and probably reflects what is available locally. Goshawks will breed in small woods (down to about 3 ha), but because their nests are easily found and destroyed or robbed, productivity is usually greater when they breed in larger forests, because they are then more difficult to locate. Nest sites are often situated high in relation to the local terrain and have a good outlook over the surrounding countryside. Goshawks appear to avoid nesting in the bottom of valleys unless they have no choice. In North America a number of studies have indicated that goshawks may avoid nesting on slopes with a southerly aspect (Reynolds *et al.*, 1982; Moore and Henny, 1983; Speiser and Bosakowski, 1987).

Goshawks build a large nest which is always in a tree

and needs a substantial crotch or whorl of branches for support (Plate 1). Most nests are in conifers; spruce, larch, Douglas fir and Scots pine are frequently used, but nest tree choice probably reflects what is available locally although larch appears to be preferentially selected. When conifers are absent goshawks will nest in broadleaves.

The area around the nest needs to be open enough to allow the birds good flight access below the tree canopy. Therefore, thicket stage crops are unsuitable, but become acceptable towards the end of the commercial rotation (40–60 years of age) when thinning or windthrow, and often a combination of both, provide enough space between the trees. The nesting area is used for courtship, roosting, preening, and feeding which takes place on strong horizontal branches or the tops of windblown root plates, and is used as a nursery area for the young once they leave the nest. These requirements can be met in habitats as different as mature well-spaced stands of oak in the lowlands, or windblown pockets in otherwise dense Sitka spruce plantations in the uplands. In any area, goshawks tend to breed in the more open stands of timber whereas the closely related but much smaller sparrowhawk prefers denser stands (Figure 3).

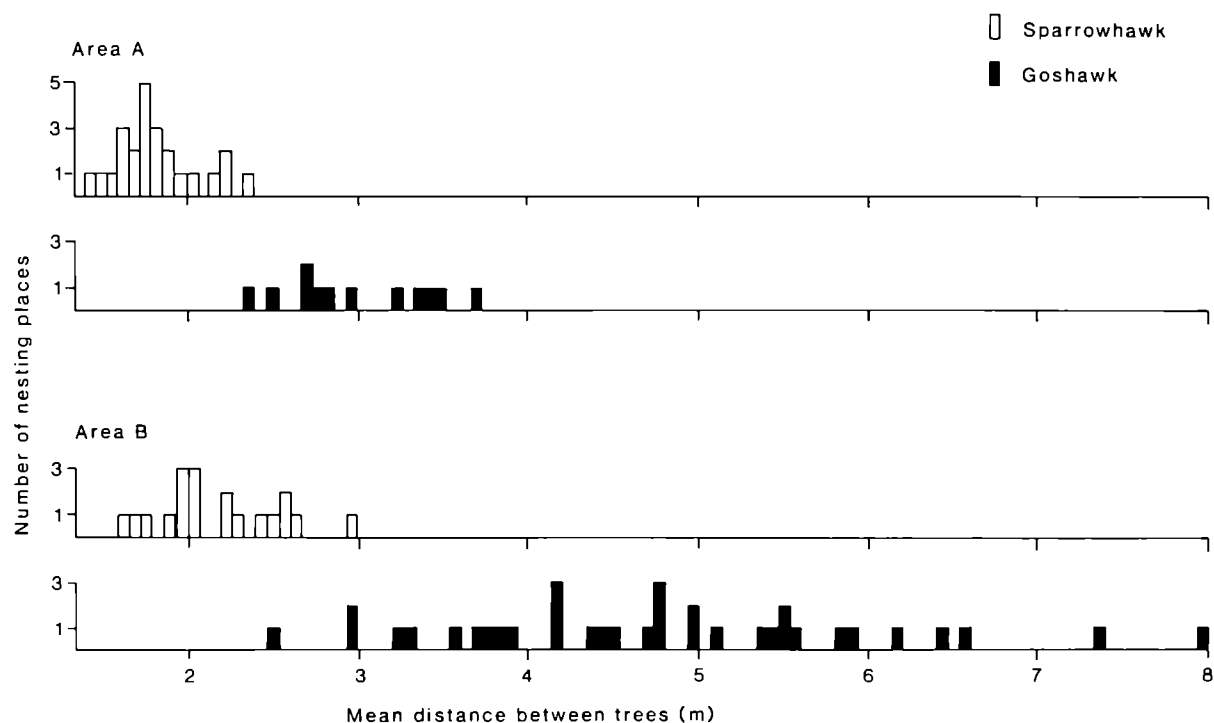


Figure 3. The spacing of trees in nesting areas of goshawk and sparrowhawk in two areas of Britain. The distance between trees differed in the two areas, but in each area the goshawk occupied the more open stands. (Redrawn from Newton, 1986.)



Plate 1. Nest in a larch stand; such sites are easy to find when the leaves are off the trees, they are less easy to find in evergreen conifers. (*S.J. Petty*).



Plate 2. Nestling just prior to fledging. (*S.J.Petty*)

Plate 3. Inner primary (wing) feathers of goshawk (top left), compared with primaries of buzzard (top right), sparrowhawk (bottom left), kestrel (bottom centre) and tawny owl (bottom right). (37972).



Plate 4. Pellets from birds of prey. Top row; golden eagle (2 left pellets) and buzzard (3 right pellets). Second row: long-eared owl (3 left) and tawny owl (3 right). Third row: goshawk (3 left) and peregrine (3 right). Bottom row: sparrowhawk (3 left) and merlin (3 right). (37977).



Plate 5. Typical skeletal remains of goshawk prey (top and bottom right); both are of red grouse and both show how cleanly the meat and skin has been stripped from the bones, the thinner part of the sternum also being eaten. these are usually retrieved below perching places. The other carcass (bottom left) is of a lapwing eaten by a sparrowhawk, and shows how this smaller raptor is incapable of removing some of the tougher skin; there is also little damage to the sternum. (37978).

Population density and productivity

Goshawks have large home ranges which overlap with adjacent pairs and non-breeding birds (Cramp and Simmons, 1980). Each pair defends only the immediate vicinity around the nest (nesting area). Given suitable habitat then nesting areas are regularly spaced. This pattern is broken when nesting habitat is not available. Thus a dearth of trees may limit population density in some areas. As a result of afforestation this century there is a vast amount of suitable habitat available for goshawks in Britain.

When sufficient breeding habitat is available, the optimum spacing between pairs may vary between areas and appears to be regulated by food (Wikman and Lindén, 1981). When food is abundant, pairs breed closer together than when it is scarce. The average spacing between breeding pairs ranges from 2 km in some of the densest populations in central Europe to over 6 km in boreal forests in central Sweden (Thissen *et al.*, 1981; Wikman and Lindén, 1981; Bühler and Oggier, 1987). It is estimated that this range in goshawk spacing is likely to occur in Britain, given the wide diversity of habitats available. At present there are few habitats in Britain where goshawks are at carrying capacity. Persecution may be the main factor limiting goshawk expansion in much of lowland Britain. The future of goshawks appears to be depen-

dent either on the presence of large forests where they are free from interference and where the potential exists for populations to expand, or lowland areas with little or no persecution.

So far little has been published about the reproductive rate of British goshawks. Marquiss and Newton (1982) and Cooper and Petty (1988) both give mean clutch sizes of 3.8 eggs, and mean brood sizes of 3.0 (chicks fledged from successful nests) and 2.3 (chicks fledged from all nests in which eggs were laid) respectively. These figures are comparable to and perhaps a little higher than mean clutch and brood sizes from both central and northern Europe (Cramp and Simmons, 1980). A sample of British eggs analysed from the mid-1970s onwards contained low levels of organochlorines and showed little or no eggshell thinning (Marquiss and Newton, 1982; Petty, unpublished data). These data suggest that the goshawk population in Britain has the biological potential to increase in the same dramatic way as has occurred since the late 1960s in some European countries (Kenward and Lindsay, 1981). In the Netherlands for example, goshawks increased from around 30 pairs in the 1960s to over 400 pairs in the early 1980s (Figure 4).

Protection

Under the Wildlife and Countryside Act 1981 goshawks are fully protected at all times of the year. They are listed on Schedule 1 of the Act, which makes it illegal to cause intentional disturbance while they are building a nest, or in, on or near a nest containing eggs or young. In this context, a sensible interpretation of disturbance would be the prevention of normal parental activity. Such disturbance can occur at a considerable distance from the nest (see 'Controlling disturbance' p.16). The legislation also prohibits the disturbance of dependent young. The law therefore classes a nest as occupied from the start of nest building until the young have dispersed from its vicinity, not just the period when eggs or young are in the nest.

A licence (issued by the Nature Conservancy Council (NCC), Northminster House, Peterborough PE1 1UA) is required by all persons, including landowners and their employees, who wish to disturb a goshawk nest for any reason including conservation or scientific purposes. A person with an NCC licence also requires the landowner's or his agent's consent to visit nests. Applicants with NCC licences should be carefully vetted by the landowner or his agent, to ensure that nest visits are justified and are not being duplicated by different people.

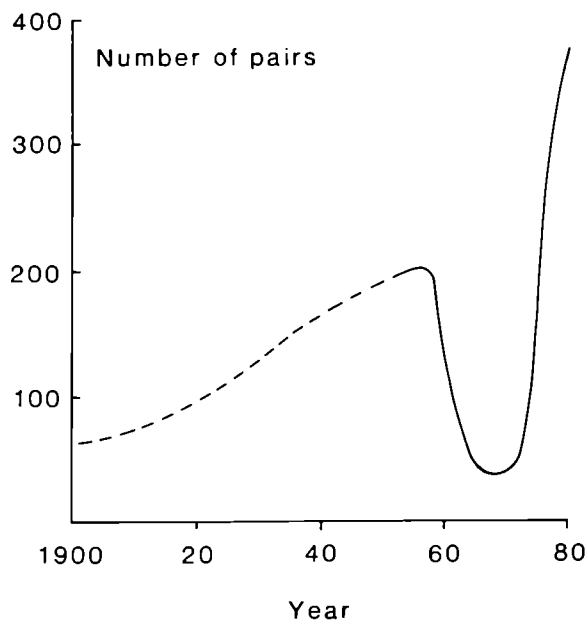


Figure 4. Approximate number of goshawks in the Netherlands during the twentieth century. (Redrawn from Thissen *et al.*, 1981.)

The management of nesting areas

Commercial forests have provided goshawks with a suitable habitat for their expansion in Britain. During breeding attempts, they are vulnerable to accidental disturbance from forestry operations as well as deliberate human interference. This can be overcome or reduced by using the following guidelines which have been developed from work by the Forestry Commission into the requirements and performance of goshawks in upland forests. They may also apply to lowland areas.

If it is necessary to visit occupied sites, then an NCC licence is required. Further advice on nest site management can be obtained from the Forestry Commission's Wildlife and Conservation Research Branch.

Locating nesting areas

Although goshawks are large birds, they are surprisingly elusive and can be present in an area for a considerable time before they are discovered. People working in the forest are usually the first to notice their presence, and once identified they are easily recognised again.

Nesting areas can be located by checking places where goshawks are repeatedly seen during the breeding season. Most pairs will return faithfully to the same nesting area each year, but a few birds can have alternative nesting areas up to 2 km apart within their home range.

Goshawks are particularly obvious around the nest site at two periods in the year; first, prior to incubation in March and early April, when the female spends a considerable amount of time in the nesting area; and second, after the chicks have left the nest in mid to late July, when they become very noisy and visible as they chase each other and their parents around the nesting area. If goshawks are thought to be present in a forest, it is advisable to check areas that are going to be felled or thinned in the period March–July inclusive, just prior to work starting.

When trying to confirm that an area is used for nesting by goshawks, a number of signs can be looked for. The most obvious, apart from the presence of the birds, is a nest (Plate 1). These are big and often larger than buzzard nests, particularly when they have been added to over a number of years. However, first-time breeders often build fairly small nests, sometimes not much bigger than a large sparrowhawk nest. Occasionally goshawks will use old nests of buzzard, sparrowhawk and squirrel as a base for a new nest. In conifers, nests tend to be built on a whorl of branches just below the base of the green crown. Good access is

required into a nest, so unless the crop is fairly open, nests are often sited along racks, rides or along the edge of windblown pockets. Some birds use the same nest for a number of years, while others tend to build a new nest each year. This varies with the species of tree in which they are nesting, with nests in spruce being more frequently re-used compared with nests in larch. When numerous nests are present within a nesting area, the active one can be identified by the presence of fresh down on the nest and surrounding branches.

When the birds have not been seen or a nest found, a number of other signs at the site can also be used to confirm identity. Many birds of prey start to moult during breeding, and shed wing and tail feathers can be collected in nesting areas and used to identify the occupant positively (Plate 3), however they need to be separated from feathers of bird prey. Feathers can often be retrieved from below the nest or the roost/perch trees, where white faeces are also present often with pellets (Plate 4). Goshawks also have regular perches where they feed, these can be on stumps, large horizontal branches or windblown root plates. Carcass (Plate 5) or plucked feather remains of prey are either present at these sites, on the ground below, or under regularly used perches. In sloping topography, feeding sites and perches, are usually uphill of the nest, allowing the birds a clear flight down to the nest. Many of these signs are less obvious in sites with dense ground vegetation.

Retaining nesting areas

The area that goshawks use around nests can be determined by plotting all signs of their presence (faeces, pellets, prey remains and feathers) on a map of the area. This is best done just before the chicks leave the nest (Table 2), as by then a lot of signs have accumulated at the site. Surveys should be undertaken earlier in the season at sites where a heavy growth of ground vegetation such as bracken is expected. The area which goshawks used in one upland study varied from 4 to 5 ha. So if it is considered desirable to retain a nesting area at the time of clear felling, this can be achieved very satisfactorily by leaving at least 5 ha, which includes both the feeding and perching areas as well as the nest sites. Usually a larger area will be retained when the site boundaries are extended out to the nearest windfirm edge or landscape boundary, or added on to other crop retentions. Reynolds (1983) working in conifer forests in Oregon recommended that 8 ha of uncut timber should be left around goshawk nests.

It is usually far easier to plan for the retention of goshawk nesting areas, rather than to fell sites and to

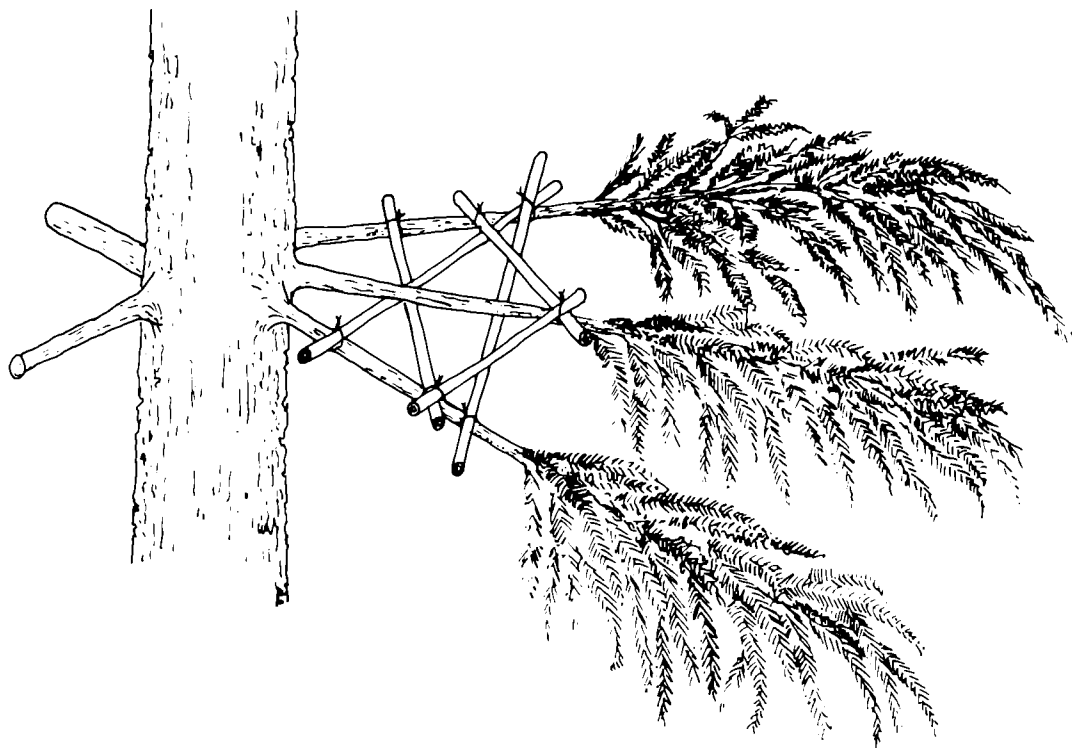


Figure 5. Artificial nest platform for a goshawk. (Redrawn from Saurola, 1978.)

lose contact with the birds, and risk accidentally destroying an active but unknown nest, or have to move harvesting sites at short notice when a nest is discovered.

How long goshawks will continue to use these retained nesting areas is unknown. Some of the first retentions by the Forestry Commission were made 10 years ago, and in these goshawks have bred annually. In North America and Europe goshawks nest in forests

which are far more open than many of our oldest commercial conifer stands in Britain. Therefore, it would be wise to plan for the retention of goshawk nesting areas for at least 10 years, with the option of extending the life of the stand further, in 10-year periods, if goshawks continue to use it. Other wildlife species also benefit greatly from the presence of old growth crops (Ratcliffe and Petty, 1986; Petty, 1988).

Protecting nest trees and the use of artificial platforms

The protection of nests against the theft of eggs and chicks can create its own problems and should not be undertaken without first seeking expert advice. The timing of the installation of any 'defences' is important in order to avoid a desertion. Installation should be undertaken while the nest is being built or after the clutch has been completed. However, this latter option may prove too late. The speed of installation is also very important with no more than 30 minutes being spent in a nest site on any day.

High pruning of trees to within two whorls of the nest can sometimes stop casual disturbance to nests. However, this is unlikely to stop those intent on stealing eggs and chicks. In such circumstances, more

Table 2. Timing of breeding activity in goshawks, based on an incubation period of 36 days and a nestling period of 35 days. Breeding tends to be earlier in the south of Britain compared with the north (from Marquiss and Newton, 1981; and Petty, unpublished data)

Breeding activity	Period (range)
Nest building	late February – late April
Egg laying	12 March – 5 May
Hatching	17 April – 11 June
Fledging*	22 May – 16 July
Dispersal from nest area+	12 June – 6 August

* chicks leaving the nest

+ assumed to be 21 days after fledging

obvious defences such as electronic warning devices may have to be used. It is generally very expensive to mount 24 hour wardening of nest sites, and almost impossible to achieve complete coverage and success when sites have a history of being robbed. Another tactic in such circumstances, is to fell the nest site outside the breeding season, so giving the birds a chance to be successful in a new site for a year or two before they are re-discovered by nest thieves. This process may have to be repeated at regular intervals.

It is sometimes possible to erect artificial nest platforms to encourage birds, either into new areas where they have been seen prospecting, or to move birds from disturbed nest sites into safer areas. In the latter case it is essential to remove the old nest and whorl on which it was placed, or fell the nest tree outside the breeding season, otherwise the birds are likely to rebuild a new nest on the same whorl. Platforms are easily made by selecting a strong whorl, where at least three branches are securely tied or wired to several cut branch lengths placed at right angles to the whorl (Figure 5). This forms the base of the platform on to which other branches should be tied or woven. The aim is to form a solid base on which goshawks will then build their nest. Great care should be taken in selecting the whorl for the platform so as to allow goshawks good access. Ideally it should be placed in a conifer in the lower branches of the green crown. When tree climbing is undertaken, then recommended equipment and techniques should be used by trained personnel.

Controlling disturbance

It is part of a landowner's responsibility to minimise disturbance to breeding goshawks. Disturbance can be caused by forest operations which are too close to nests or by carelessly advertising the presence of nesting areas, which may lead to disturbance from bird watchers or more seriously, the theft of eggs and chicks.

During the breeding season, which extends from February to July inclusive (Table 2), it is recommended that no forest operations or other activities should be undertaken within a 400 m radius (50 ha) of an occupied nest. Birds should never be intentionally flushed from the nest. When goshawks are present in a forest, it is advisable to check all areas that are about to be clear felled for signs that would indicate an occupied nest.

Information on the location of nesting areas should

be confidential and the responsibility of one person within each forest who should be licensed by the NCC to check whether nest sites are occupied each year. It is not necessary to climb nest trees to determine whether sites are occupied (see 'Locating nesting areas' p.14). When it is necessary to check occupied nest sites, then visits should be for less than 30 minutes with no more than one visit per week per site.

Accidents and robberies

Occasionally the nest tree of a previously unknown goshawk pair may be accidentally felled. The risk of this should be substantially reduced if areas are checked for signs of goshawks and other raptors prior to the start of harvesting operations (see 'Locating nesting areas' p.14). When the nest contains eggs, there is usually little that can be done as these are often broken or soon chill causing the death of the embryo. If the nest contains chicks and some or all of them look unharmed, it is worth building an artificial platform (Figure 5) in an adjacent tree and placing the nest from the felled tree and the chicks in this. Providing the harvesting operation ceases there is a chance that the adult birds will continue to care for the chicks. Another alternative is to foster the chicks into another one or two goshawk nests with chicks of the same age. The increased brood size in the foster nest should never exceed four chicks. If fostering is contemplated then advice should be sought from the Forestry Commission's Wildlife and Conservation Research Branch or the RSPB.

Occasionally goshawk eggs or nestlings may be stolen. When good evidence exists that a robbery has occurred, or if offenders are caught in the act, the first approach should be to the Species Protection Officer of the Royal Society for the Protection of Birds at The Lodge, Sandy, Bedfordshire, SG19 2DL, telephone Sandy (0767) 80551, who will advise on what action should be taken.

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