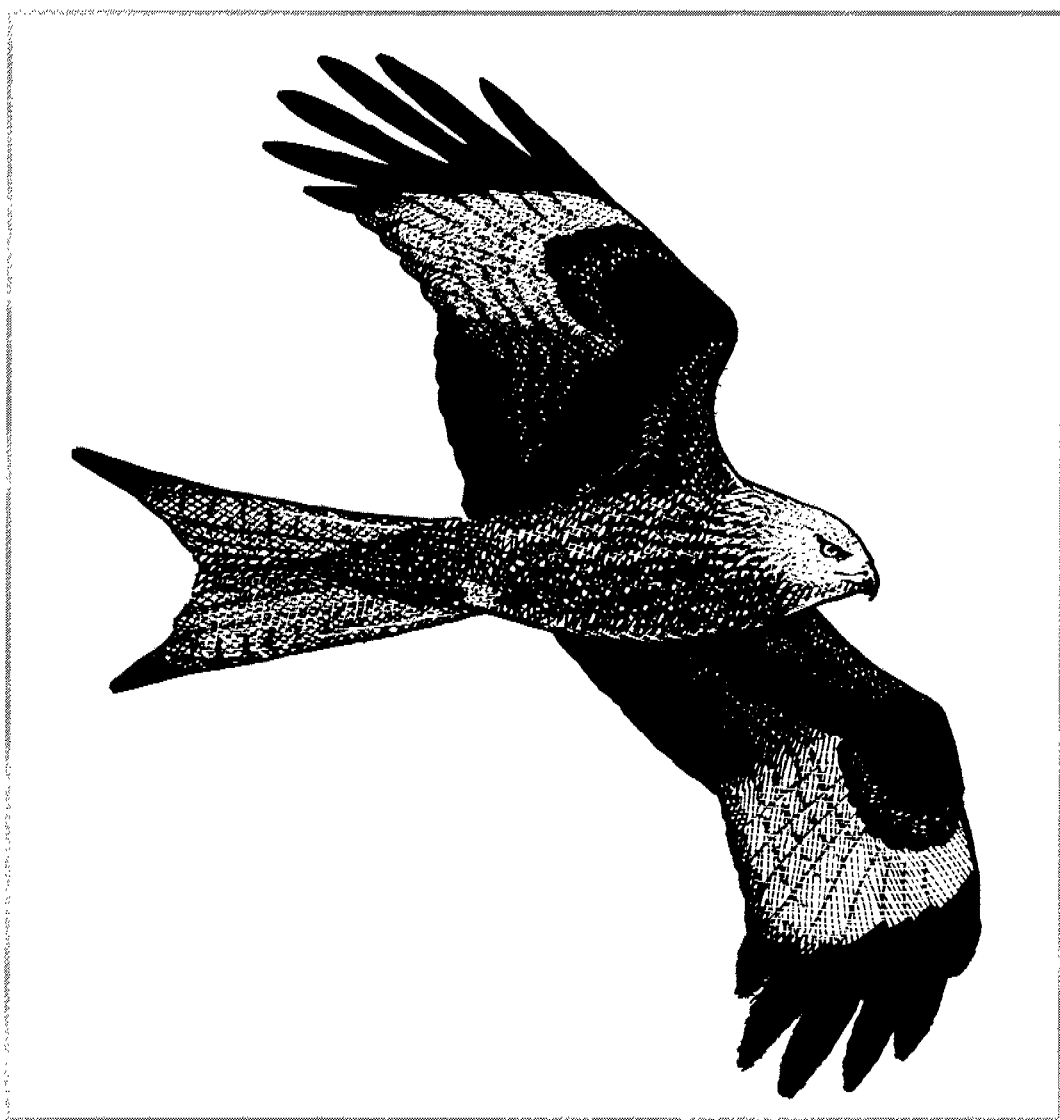


The illegal persecution of raptors in England

No. 343 - English Nature Research Reports



working today
for nature tomorrow

English Nature Research Reports

No. 343

The persecution of raptors in England

John Holmes¹
David Walker²
Peter Davies²
Ian Carter¹

¹ English Nature
² Cumbria Raptor Study Group

You may reproduce as many additional copies of
this report as you like, provided such copies stipulate that
copyright remains with English Nature,
Northminster House, Peterborough PE1 1UA

ISSN0967-876X
© English Nature 2000

Contents

Summary	Page 7
1. Introduction	Page 9
2. Sources of information	Page 10
3. How important are England's birds of prey	Page 11
4. The scale of persecution in England	Page 13
5. Effects on populations	Page 15
6. Conclusions and recommendations	Page 28
References	
Acknowledgements	
List of tables	
List of figures	
Annex 1 - Raptor study group recording form	

Summary

This research report assesses the scale, location and significance of illegal persecution (by destruction of eggs, nests and adults) for birds of prey in England during the 1990s. Information on persecution and its effects was gathered directly from raptor workers and from the Royal Society for the Protection of Birds' Investigations Database.

England holds substantial proportions of the UK's breeding raptor populations, with 13 of the UK's 15 species breeding regularly in England. England holds all or the bulk of the UK's Montagu's harriers *Circus pygargus*, honey buzzards *Pernis apivorus*, hobbies *Falco subbuteo*, and marsh harriers *Circus aeruginosus*.

Four species are particularly vulnerable; the hen harrier *Circus cyaneus*, red kite *Milvus milvus*, peregrine *Falco peregrinus* and goshawk *Accipiter gentilis*. We estimate that 61 kites from the re-established populations in southern England and the Midlands have been illegally poisoned between 1989 and 1998. A further four are known to have been shot. The hen harrier is threatened with extinction as an English breeding species by illegal persecution. The distribution and breeding success of both peregrine and goshawk are also considered to be limited in places by illegal persecution. Numerically, the buzzard *Buteo buteo* is England's most persecuted raptor, though it is unclear whether this is the main barrier to the spread of this species outside its current range.

1. Introduction

As a group, raptors in England are faring comparatively well. Some common species such as sparrowhawk *Accipiter nisus* have shown a steady recovery since organochlorine pesticides decimated populations in the 1950s and 1960s (Newton 1986) and the buzzard *Buteo buteo* is expanding its range eastward, albeit slowly. Other formerly extinct species such as the red kite and marsh harrier are now re-established thanks to reintroduction or natural recolonisation.

Nevertheless, most of England's raptors remain vulnerable. Even the kestrel *Falco tinnunculus*, though relatively common, is recognised as a bird of conservation concern by the UK Biodiversity Steering Group (Anon 1995) owing to its population decline, possibly through changes in prey availability brought about by the intensification of agricultural management. As top predators, whose nests are relatively easy to find, most raptors also remain vulnerable to direct human persecution of one form or another and eggs of even the commonest species are stolen for collections. However, it is illegal persecution in the form of shooting, poisoning, lethal trapping and nest, egg or chick destruction that poses the greatest threat to raptors as a whole in England. Evidence from those involved in monitoring raptors, and from studies of national distribution, suggests that persecution can severely limit the productivity and distribution of some species.

In 1991, the Nature Conservancy Council and Royal Society for the Protection of Birds published *Death by Design* (RSPB/NCC 1991), which highlighted in particular the illegal poisoning of raptors in Britain. In the late 1990s, illegal persecution continues but many discussions focus on the perceived impacts of raptors on the interests of pigeon fanciers and game managers. The Department of the Environment, Transport and the Regions (DETR) established a Raptor Forum in 1995, comprising landowning, sporting and conservation interests, to examine these issues. A Raptor Working Group advising the Government will publish its final report in 2000. This study was commissioned as a contribution to the debate and focusses on direct persecution by killing and nest or egg destruction. It does not consider egg or chick theft for collections or falconry, which is reported on elsewhere (e.g. RSPB 1999, Thomas & Elliot, in prep.).

The importance of raptors in England is reviewed and an overview of illegal persecution in the 1990s presented. An assessment of the impact of this persecution is then presented and recommendations made for improving enforcement and recording of incidents are made. The aim was to assess the scale and location of raptor persecution in England and, where possible, its potential impact on raptor populations. For many species, case studies from particular areas are presented which illustrate a potentially much more widespread problem. For a limited number of species, such as the hen harrier and red kite, where most or all of the English population is closely monitored, it has been possible to make more accurate assessments of the impact of persecution at a national level.

2. Sources of information

The monitoring of raptors in England is carried out by dedicated fieldworkers, both on a voluntary and professional basis. These fieldworkers frequently report suspected persecution incidents to the Police, the RSPB or English Nature.

Suspected persecution incidents are often difficult to interpret. Comparatively few carcasses are retrieved for analysis and nests are often found empty and deserted, when persecution may be suspected but cannot be proved. Most raptors that have been deliberately destroyed are likely to be removed or hidden immediately after the event. The frequent non-return of adults to breeding sites in a particular area after nesting has begun, may also lead experienced raptor workers to suspect persecution is the most likely cause of disappearance.

A variety of information sources were used to compile this report. Information on confirmed incidents from the RSPB's persecutions database was used to assess the scale and significance of persecution at a national level. In addition, reports from raptor study groups and individuals were collated by the Cumbria Raptor Study Group on behalf of English Nature. These have been used primarily in the case studies presented in chapter 5.

Raptor workers have long provided information on persecution when reporting on licences issued to them by English Nature. However, different interpretations of incidents and different styles of reporting make it difficult to interpret this information consistently. To help ensure a consistent approach, raptor workers were asked to supply information on a standard form (annex 1). This form asked respondents to categorise incidents as *confirmed* if investigations proved illegal persecution to be the cause of death, or *suspected* if persecution was strongly indicated by the circumstances. Other nest failures, e.g. where natural desertion was likely, were not recorded as incidents. Where the RSPB Investigations Database is given as the information source, the incidents are all *confirmed*, investigations having demonstrated illegal persecution as the cause of death or nest failure.

There is undoubtedly much more evidence of persecution held by individuals or groups than was forthcoming for this report. For consistency, however, only those responses received on the standard form have been used in this report to illustrate the effects of persecution. Recommendations are provided at the end of this report for ways in which this information might be better gathered in future.

3. How important are England's birds of prey?

England holds substantial proportions of the UK's raptor populations, with 13 of the UK's 15 species breeding regularly. The entire UK population of Montagu's harriers nests in England, as do all but a few pairs of the UK's marsh harriers and all but about 25 of its hobbies.

England also supports more than 1% of the European populations of hobby, peregrine, merlin *Falco columbarius*, sparrowhawk and kestrel.

All 13 regular breeders are listed as species of conservation concern by the UK Biodiversity Steering Group (Anon 1995). Of these, four (red kite, marsh harrier, hen harrier and merlin) are on the 'Red List' of birds of conservation concern (RSPB *et al.* 1996) and five (honey buzzard, Montagu's harrier, golden eagle *Aquila chrysaetos*, kestrel and peregrine) are on the 'Amber List' (*ibid.*). Four species (hen harrier, golden eagle, kestrel and peregrine) are listed by BirdLife International as Species of European Concern (Tucker *et al.* 1995).

Maintaining and enhancing England's raptor populations is, therefore, essential if the UK as a whole is to fulfill its international obligations under the Birds Directive, Berne Convention and Bonn Convention (Raptor Working Group, in prep.). England is also internationally important for its upland moor and heath communities. The biodiversity of these communities is limited in many places, however, by the deliberate exclusion of raptors from the upland fauna. For example, only 3% of the UK's hen harriers nest in England, despite there being considerable apparently suitable habitat, for example in the Pennines and North York Moors (Potts 1998).

Table 1 Estimates of bird of prey populations in England as a proportion of the UK total.

Species	UK estimate ¹ (year)	England estimate ¹ (year)	% of UK population ²	Source ³
Montagu's harrier	9-12 f (1997)	9-12 f(1997)	100%	Ogilvie <i>et al.</i> 1999
Honey buzzard	12-34 p (1997) ⁴	12-32 p (1997)	94%	Ogilvie <i>et al.</i> 1999
Marsh harrier	156 f (1995)	≥150 f (1995)	>96%	(Underhill-Day 1998), RBBP data
Red kite	296 p (1999)	82 p (1999)	28%	English Nature, Scottish Natural Heritage, Welsh Kite Trust and RSPB data
Golden eagle	422 p (1992)	1 p (1992)	<1%	Green 1996
Goshawk	400-450 p (1996)	120 p (1996)	27%	Petty 1996
Hen harrier	570 p (1999)	19 p (1999)	3%	Sim <i>et al.</i> submitted..
Hobby	500-900 p (1988-91)	500-900 p (1988-91)	>97% (v.small numbers in Wales and Scotland)	Gibbons <i>et al.</i> 1993
Peregrine	1,283 (1991)	283 p (1991)	22%	Crick & Ratcliffe 1995.
Merlin	1,100-1,500 p (1993-94)	401 p (1993-94)	27%	Rebecca & Bainbridge 1998
Buzzard	12-17,000 p (1988-91)	4-6,000 p (1988-91)	35%	Gibbons <i>et al.</i> 1993
Sparrowhawk	34,500 p (1988-91)	22,000 p (1988-91)	64%	Gibbons <i>et al.</i> 1993
Kestrel	51,500 p (1988-91)	35,500 p (1988-91)	69%	Gibbons <i>et al.</i> 1993

¹ The year(s) to which the estimates apply are given in brackets in columns two and three, where units are indicated by *f* (females) or *p* (pairs).

² The % of the UK population occurring in England is based on the maximum estimates in columns two and three.

³ The most recent published estimates have been used for all species except hen harrier and red kite, for which recent, as yet unpublished, survey results are used.

⁴ The population estimate by RBBP is regarded as an under-estimate by Roberts *et al.* 1999, who suggest the UK population could be as high as 60 pairs.

4. The scale of persecution in England

An analysis of confirmed persecution incidents recorded on the RSPB Investigations Database indicates that upland counties in England, particularly those in which grouse moor management is a major land use, have a higher proportion of incidents than lowland counties. Table 2 shows that Devon, Cumbria, Lancashire, Northumberland, Shropshire and North Yorkshire have the highest frequency of incidents (these six account for 40% of all confirmed incidents between 1990 and 1998). Whilst a greater number of incidents might be expected in counties with relatively high raptor populations, Lancashire, Northumberland and North Yorkshire have relatively low breeding densities of the species most frequently targeted (buzzards and hen harriers), but experience some of the highest rates of illegal persecution.

Figure 1 Map of confirmed incidents of bird of prey persecution in England, 1990-98. Note that only the 149 incidents with known grid references are shown. These represent 64% of the 232 confirmed incidents during this period. Source: RSPB Investigations Database.

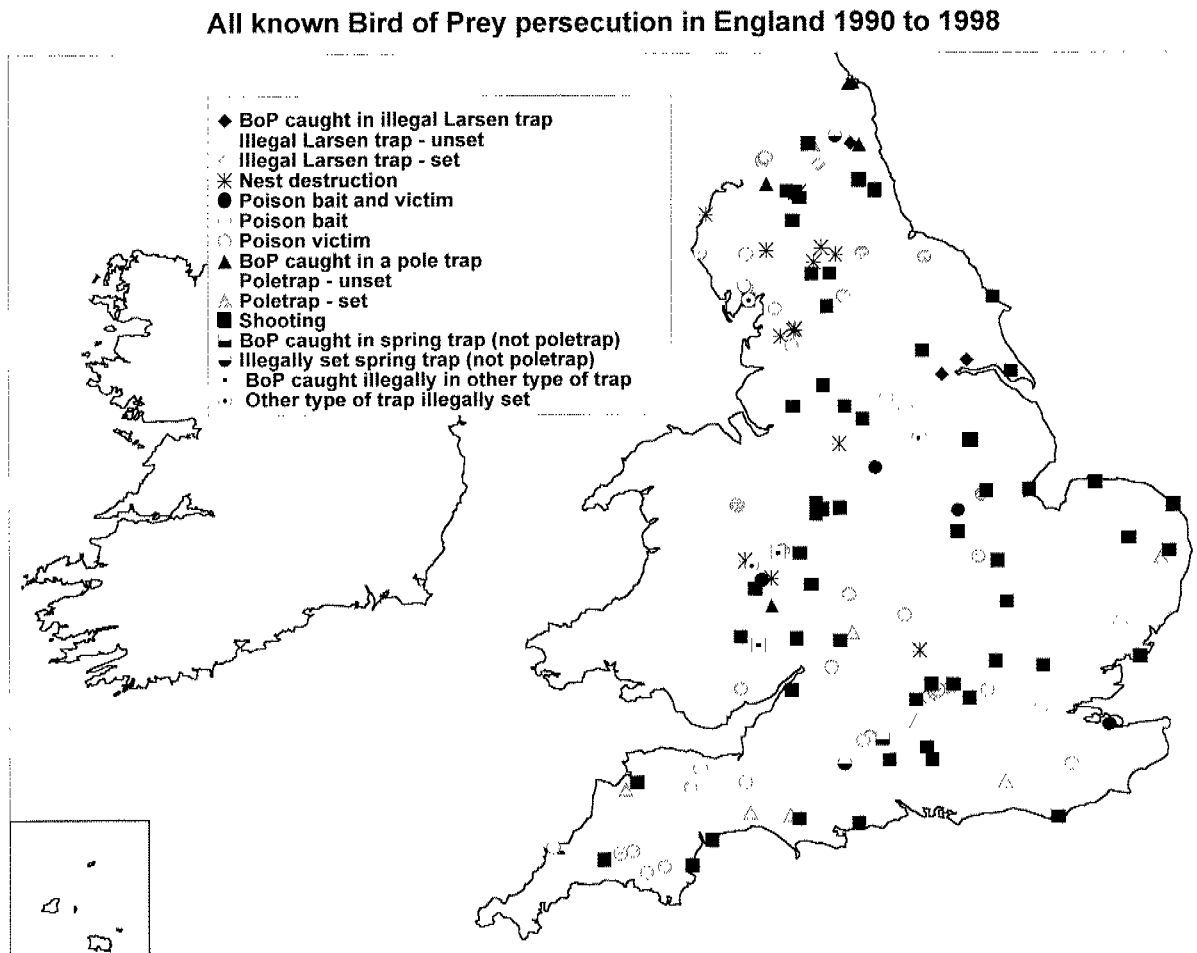


Table 2 Number of incidents of bird of prey persecution, including nest destruction confirmed by RSPB, Ministry of Agriculture (MAFF) or Police investigations in England, by county, during 1990-98. Source: RSPB Investigations Database.

County	Shot	Trapped	Poisoned	Nest destroyed ¹	Total
Avon	3	0	0	0	3
Bedfordshire	3	1	0	0	4
Berkshire	1	0	0	0	1
Buckinghamshire	2	0	2	0	4
Cambridgeshire	4	0	0	0	4
Cheshire	1	0	1	0	2
Cleveland	1	0	0	0	1
Cornwall	2	1	2	0	5
Cumbria	6	1	7	2	16
Derbyshire	3	0	1	2	6
Devon	11	3	6	0	20
Dorset	8	0	1	0	9
Durham	1	0	0	3	4
Essex	0	0	0	2	2
Gloucestershire	5	0	1	0	6
Greater London	2	0	0	0	2
Greater Manchester	1	0	0	0	1
Hampshire	5	3	0	0	8
Hereford & Worcester	5	2	0	0	7
Hertfordshire	1	0	1	0	2
Humberside	3	1	0	0	4
Kent	1	0	3	0	4
Lancashire	2	0	2	10	14
Leicestershire	2	0	0	0	2
Lincolnshire	2	0	3	0	5
Norfolk	9	0	0	0	9
North Yorkshire	6	2	4	0	12
Northamptonshire	1	0	1	0	2
Northumberland	8	2	2	2	14
Nottinghamshire	1	1	0	0	2
Oxfordshire	4	0	6	1	11
Shropshire	5	3	3	2	13
Somerset	1	0	2	0	3
South Yorkshire	0	0	0	1	1
Staffordshire	7	0	0	0	7
Surrey	2	0	0	0	2
Tyne and Wear	1	1	0	0	2
Warwickshire	0	0	3	0	3
West Sussex	1	0	0	0	1
West Yorkshire	2	0	0	0	2
Wiltshire	0	1	5	0	6

¹ 'Nest destroyed' includes all incidents where the nest structure, eggs or young were destroyed. Incidents where eggs or young were stolen (for collections or falconry) are not included.

5. Effects on populations

5.1 Which species are most affected?

In order to form an overview of the impact of persecution on populations at a national level, a 'persecution index' has been produced using data provided by the RSPB. This is the number of birds known to have been destroyed (between 1990 and 1998) as a proportion of the population estimate for England. Nest destruction and egg robbery were excluded. The index for each species is given in table 3.

The table clearly indicates that hen harriers, red kites, peregrines and goshawks are the species most affected by illegal persecution. It is likely that, without illegal killing, the populations of these four species would have recovered more quickly from low points/extinction earlier this century and would now be more widespread.

Table 3 Impact of persecution on breeding birds of prey killed in England, 1990-98.

Species	England population ¹	Poisoning ²	Shooting ³	Trapping ³	Persecution index ⁴	Assessment of impact on population in England
Hen harrier	19 p	3	4	0	37.0	High; persecution severely limits distribution to very few protected areas; risk of extinction in England as a successful breeding species.
Red kite	82 p	11 ⁵	4	0	18.3	Moderate; rate of increase and spread is being reduced, especially through illegal poisoning.
Peregrine	283 p	9	20	1	10.6	Moderate; high levels of suspected persecution reported by raptor workers in northern England.
Goshawk	120 p	0	7	4	9.2	Moderate; raptor workers report persecution possibly limiting range expansion.
Marsh harrier	150 f	2	2	0	2.7	Moderate-low; species range and population increasing, though persecution may affect re-establishment locally.
Buzzard	4-6,000 p	30	42	10	1.4-2.1	Low; persecution possibly plays role in limiting expansion.
Merlin	401 p	0	3	0	0.7	Negligible / nil
Sparrowhawk	22,000 p	3	29	3	0.2	Negligible / nil
Kestrel	35,500 p	1	18	6	0	Negligible / nil
Hobby	500-900 p	0	0	0	0	Negligible / nil
Honey buzzard	12-32 p	0	0	0	0	Negligible / nil
Montagu's harrier	9-12 p	0	0	0	0	Negligible / nil
Golden eagle	1 p	0	0	0	0	Negligible / nil

¹ p = pairs; f = females..

² Illegal poisoning incidents confirmed by MAFF investigations.

³ Shooting and trapping incidents confirmed by RSPB investigations.

⁴ The index is a *minimum* based on confirmed incidents: more birds are killed than are discovered and reported to MAFF, the Police or RSPB.

⁵ A further one red kite was found alive and poisoned but recovered to be released.

5.2 Red kite

The red kite was once widespread in Britain but persecution led to its extinction in England by the end of the nineteenth century. A reintroduction programme began in 1989, and 93 young kites were released at a site in southern England between 1989 and 1994. A further 70 birds were released at a site in the Midlands between 1995 and 1998. The southern England population increased to at least 75 breeding pairs in 1999 and is now considered to be self-sustaining. The first successful breeding in the Midlands took place in 1997 and the 1999 population consisted of at least seven breeding pairs. Released birds were fitted with radio-transmitters and individually numbered wing-tags and the majority of wild-fledged young have been fitted with wing-tags. Intensive monitoring has been carried out in both release areas by professional project staff and by local people encouraged through publicity to report sightings of kites, including dead birds.

Since the start of the project 12 red kites from the two release areas have been found illegally poisoned, including one bird that was poisoned but recovered sufficiently to be re-released. In many cases it is likely that poison baits were used with the intention of controlling pest species such as corvids or foxes. Kites are particularly vulnerable to this form of illegal pest control owing to their predominantly scavenging habits. Five of the cases involved mevinphos and three alphachloralose (including the bird that recovered). Endrin, metaldehyde, phorate and aldicarb were each involved in a single incident. The majority of poisoning cases (eight out of 12) have occurred in the southern England release area in Oxfordshire, Buckinghamshire and Berkshire, reflecting the earlier establishment of a population in this area and its relatively large size. Illegal poisoning has also occurred in the Midlands release area, and dispersing first year birds have been poisoned elsewhere in England.

Including an incident in 1999, a total of five red kites have now been found to contain shotgun pellets since 1995. In four cases injured birds were found in southern England with the lead pellets embedded in their flesh. Three of these recovered and were re-released while the fourth was taken into captivity and subsequently euthanased. The fifth case involved a Midlands bird found dead with a lead pellet embedded in the soft tissues of the neck, although it was not clear from the post-mortem if the bird had died as a result of being shot. It is difficult to estimate the true number of incidents involving shot birds as dead or severely injured birds are likely to be recovered by the perpetrator and the evidence of illegal activity destroyed. Only when birds are injured but not caught by the individual attempting to kill them is there a chance of finding out about the incident through recovery of the bird. The number of recorded incidents is therefore likely to greatly underestimate the true extent of the problem.

Death from poisoning, however, occurs when the perpetrator is not present, and intensive monitoring of a high proportion of individuals making up the English red kite population means that this form of mortality has been identified more frequently. The following analysis uses data on nesting success and survival rates for released and wild-fledged kites, and information on the number of birds found dead through poisoning (see table 4) to estimate the true extent of illegal poisoning of red kites in England.

1. Based on radio-tracking work and sightings of individually marked wing-tagged birds in England, 76% of released and fledged kites survive their first year, increasing to 94% in subsequent years (Evans *et al.* 1999).
2. Using these survival rates it is estimated that, by the start of the 1999 breeding season, 196 of the 579 kites so far released or fledged in England have died.
3. Since the start of the project a total of 35 birds have been found dead in good enough condition for a full post-mortem to be carried out. 11 of these deaths (31%) were attributed to illegal poisoning.
4. Assuming this is representative of the national situation, then the estimated number of deaths from illegal poisoning is 61 birds (31% of 196).

This analysis clearly indicates that the illegal poisoning of birds of prey is a relatively common practice in certain lowland areas. It is worth noting that the release sites were chosen partly because the local communities were highly supportive of the project and few persecution incidents had been recorded in these localities in the recent past. Illegal killing is, in fact, the largest single mortality factor recorded for kites in the re-introduced populations.

Table 4 Summary of releases and resulting red kite population data for England, 1989-99.

	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999
Birds released	5	13	15	20	20	20	11	18	20	21	0 ¹
Territorial pairs	0	0	2	7	12	22	26	38	60	86	96
Breeding pairs	0	0	2	4	9	20	24	36	57	75	82
Successful pairs	0	0	0	4	8	17	22	33	50	67	77
Young fledged	0	0	0	9	14	37	55	80	111	146	169
Illegally poisoned ²	1	1	0	0	1	0	2	4	1	1	-

¹ 20 young kites were released at a third English site in Yorkshire in 1999, though these were translocated from nests in southern England and are therefore included in the figure of 169 young fledged in 1999.

² Figures given are the number of kites found dead as a result of illegal poisoning in each year. The actual number of deaths will be much higher as shown by the analysis above.

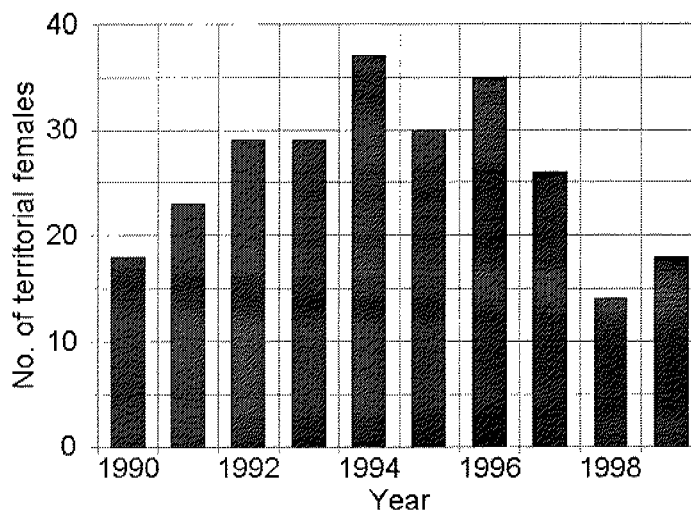
In the Midlands, where the kite population is still small, losses due to illegal poisoning may reduce the chance of a viable population becoming re-established. In southern England, although the kite population has increased rapidly since the start of the project, kites have

been slow to spread into new areas away from the release site. The high number of birds illegally killed, while not preventing the population increase, has undoubtedly been a factor in reducing its rate of spread.

5.3 Hen harrier

The hen harrier once bred over a much larger part of England than is currently the case, with populations occurring in a small number of lowland areas until the early nineteenth century and throughout suitable areas of upland habitat until the 1840s (Holloway 1996). The species was exterminated by game managers during the 19th Century, and was not again recorded as breeding in England until 1968-72 when pairs bred in Durham, Yorkshire and Lancashire. A small number of pairs have attempted to breed each year during the 1990s (see figure 2), though their success rate has been poor.

Figure 2 Number of confirmed territorial female hen harriers in England 1990-98 (M.Stott *in litt.*). Note that the figure for 1999 is 18 confirmed pairs: the 19 pairs given in table 1 is an estimate produced by extrapolation (Sim *et al.* submitted.).



Etheridge *et al.* (1997) attributed the low productivity and survival of hen harriers on commercially managed grouse moors in Scotland to illegal human intervention. Evidence from England demonstrates a similar situation, and that the impact on hen harriers may actually be greater than in Scotland. There were only 11 known nesting attempts in 1998. Only 64% of these were successful, fledging a total of 22 young (3.14 young per successful nest, 1.57 young per territorial female). During the 1999 breeding season, 18 females took up territories in England, though only 11 were successful, raising 41 young (3.73 young per successful nest, 2.28 young per territorial female). Successful breeding was limited to Northumberland, Gelstdale RSPB reserve in Cumbria and moorland owned and managed by

North West Water PLC in Lancashire (M.Stott *in litt.*). Even in these places, the hen harrier is persecuted: three poisoned baits and a poisoned female hen harrier were found on the Geltsdale Reserve in 1999.

Most suitable areas of breeding habitat in England are now monitored annually and, even with access restrictions in place, it is unlikely that many nesting attempts go unnoticed. Hen harrier workers from raptor study groups in northern England began collaborating in 1994 to relate data on breeding success to the type of moorland management. Though the number of breeding attempts (n=142) noted in the five-year study reported below were relatively few, the results are consistent with those reported by Etheridge (1997) for Scotland.

Approximately 70% of the estimated 2704 km² of grouse moor in England (Hudson 1992) was surveyed by fieldworkers each year between 1994 and 1998. Data on numbers and their breeding success are presented in table 5, separated into two categories: from moors managed commercially for grouse, and moors with discernable conservation interests (e.g. nature reserves or areas with nest protection schemes organised by the land owner/occupiers).

Table 5 shows that on grouse moor without nest protection schemes, only 61% of territorial females attempted to nest, compared to 87% on protected moors. Only 44% of nesting attempts were successful on grouse moors compared with 85% on protected moors. Overall, of female hen harriers holding territory in England in spring, only 27% breed successfully on commercially managed grouse moor compared with 74% on protected moors. Note that these are maximum success rates since some nesting attempts may go undetected. These figures are similar to the 20% and 60% figures for commercial grouse moors and other moors respectively in Scotland (Etheridge 1997).

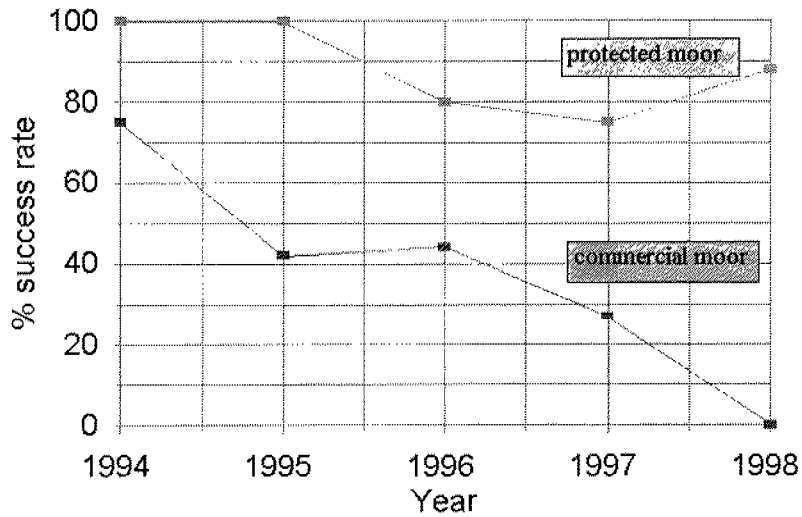
Table 5 The success of female hen harriers monitored on grouse moors in England 1994-1998.

Year	Grouse moor with nest protection schemes (128 km ²)			Commercial grouse moors (1767 km ²)		
	Territorial females	Nesting attempts ¹	Successful nests ² (%)	Territorial females	Nesting attempts ¹	Successful nests ² (%)
1998	8	8	7 (87.5)	6	3	0 (0)
1997	11	11	8 (72.7)	15	11	3 (27.3)
1996	5	5	4 (80.0)	30	18	8 (44.4)
1995	4	4	4 (100)	26	19	8 (42.1)
1994	10	5	5 (100)	27	12	9 (75.0)
Total	38	33	28 (84.8)	104	63	28 (44.4)

¹ - at least one egg laid

² - at least one young fledged

Figure 3 Success rates (%) of hen harriers nesting on moorland managed commercially for grouse and moorlands with nest protection schemes in England 1994-98.



Hen harriers in County Durham have been censused each year from 1990-98. Successful breeding was first recorded in 1994, when one nest fledged five young. Three of four known nesting attempts prior to 1994 failed as a result of suspected illegal persecution. Ten nesting attempts were made between 1994 and 1998, of which four were successful rearing 14 young (an average of 3.5 young per successful nest). A further four attempts failed as a result of suspected persecution, with a total of 5 chicks being removed from nests and presumably killed and seven eggs from two nests being broken. Two nests were also considered to have been deliberately damaged. In summary, between 1990 and 1998 seven of 14 nesting attempts (50%) failed as a result of confirmed or suspected persecution. Given that mean productivity is greater in this area than in northern England overall, the impact of persecution can be estimated as the loss of at least 24 harriers from the population (7 nests at 3.5 young per nest).

Potts (1998) estimated that there is sufficient suitable habitat for an additional 216 territorial females in England. The population estimate of 19 territorial females given in table 1, therefore represents around 8% of the potential English population. There can be little doubt that deliberate persecution is restricting both the numbers and range of breeding hen harriers in England (Tapper 1999). With persecution occurring even at protected sites, this species can be considered vulnerable to extinction as a breeding species in England as a result of persecution.

5.4 Goshawk

The goshawk had become extinct in England by the beginning of the 20th Century and only three British nesting sites were known between 1938 and 1951 (Petty 1996). There are no accurate census data for England, the best estimate being 120 breeding pairs (*ibid.*). Several counties are considered to hold populations in excess of 25 territories.

The species is believed to be one of the most severely persecuted raptors in England, with its population size and range suppressed below the apparent carrying capacity of the available habitat. Goshawks are closely monitored during the breeding season in some areas and the extent of persecution is summarised below for one lowland and one upland county (Gloucestershire and Cumbria).

121 breeding attempts were monitored in Gloucestershire between 1990 and 1998. 20 (16%) of these attempts failed owing to confirmed or suspected persecution. Most incidents involved removal of eggs or young, though deliberate disturbance at the nest was also suspected and it is known that nine goshawks were shot and at least two trapped in one game management area. Despite 237 young being fledged between 1990 and 1998, the number of breeding pairs never exceeded 16 per year (mean of 13.4 per year). There is a strong implication, therefore, that persecution of adults and dispersing young away from the nest site is limiting the number of breeding pairs.

The populations in Cumbria and Derbyshire have been approximately stable in recent years. These populations are still persecuted, however, and the number of breeding pairs is probably lower than the carrying capacity. In Cumbria, five out of 42 (12%) nesting attempts monitored by the Cumbria Raptor Study Group between 1993 and 1998 failed owing to suspected persecution. Despite the relatively large area of woodland that is not commercially managed for timber in Cumbria (where Goshawks receive a degree of protection from forestry staff), relatively few nesting records were received outside commercial forestry plantations between 1993 and 1998. Just 12 out of 42 (29%) recorded nesting attempts in this period occurred outside commercial plantations and only three of these (25%) are known to have been successful. Of the 30 attempts occurring in commercial plantations, a minimum of 16 (55%) were successful. It is also known that on one Cumbrian pheasant-rearing estate, goshawks were prevented from breeding between 1990 and 1993 and have not since been recorded during the breeding season. Another territory in Cumbria was occupied in nine consecutive years without breeding ever being confirmed.

The evidence also suggests that persecution both at and away from nesting sites may be preventing the species from establishing viable populations. Evidence from Cumbria suggests that persecution prevents the species from occupying much suitable habitat away from commercial forestry plantations in some areas.

5.5 Peregrine

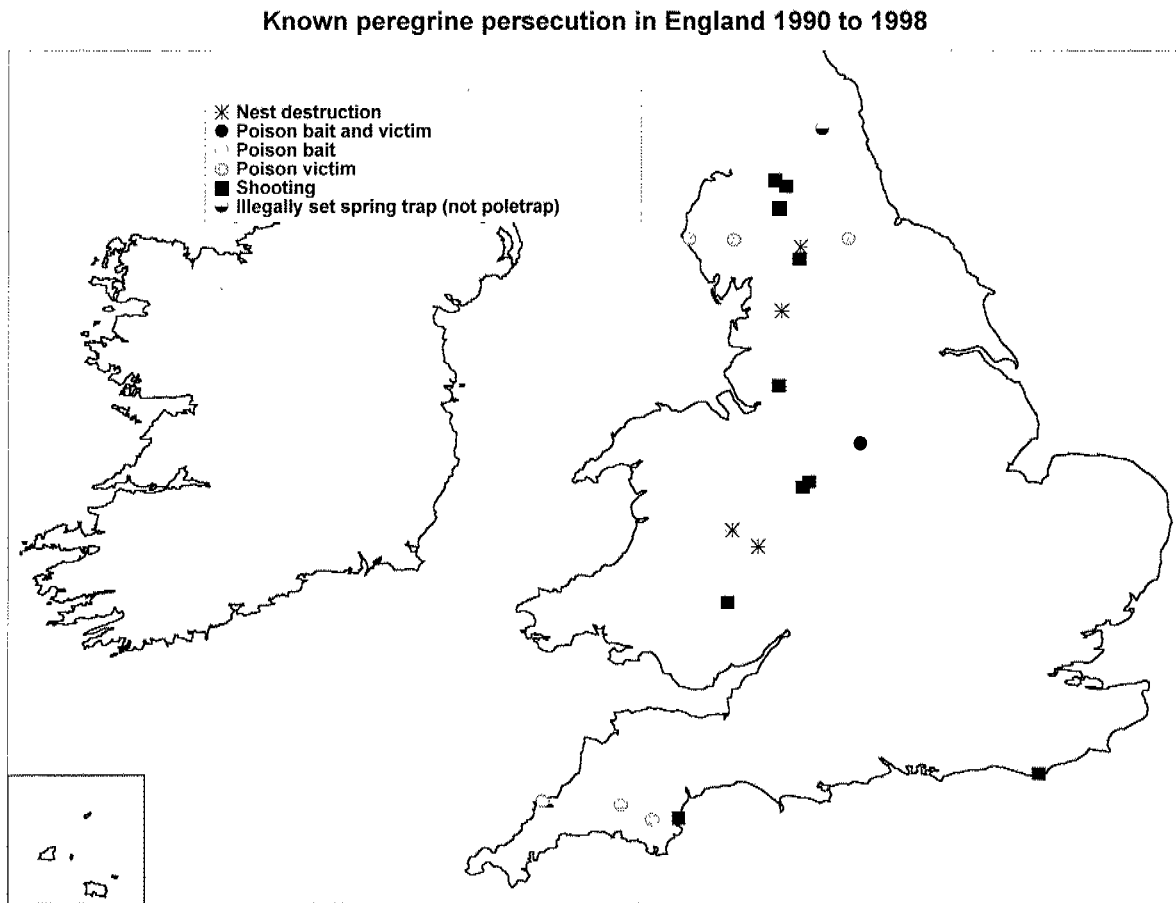
The decline and subsequent recovery of the peregrine in Britain has been well documented, and further increases have continued throughout much of its range (Ratcliffe 1993). In England, the peregrine nests mainly in the uplands and along the coasts of south western counties, though it is spreading slowly to some towns and cities and along parts of the south coast. Much of the population increase has occurred in upland areas with, for example, the Cumbrian population rising from as few as six pairs in the 1960s to around 100 occupied sites by the late 1990s.

Table 6 summarises breeding performance in relation to persecution in six study areas in the north of England as reported by raptor study groups. This illustrates well the difficulty of confirming persecution as a cause of nest failure for this species, even when it is strongly suspected. Raptor groups in the north of England identified 332 incidents where persecution was suspected between 1990 and 1998. However, investigations found evidence sufficient to confirm persecution in only 38 cases in the whole of England during the same period. Of the 22 incidents shown in figure 4, 18 involved poisoning or shooting, types of persecution which can be carried out away from the nest and which are, therefore, difficult to detect.

Table 6 Peregrine breeding performance in six study areas in the north of England

	Cumbria	Durham	Halifax area	Peak District	Yorkshire Dales	NE Lancs
Years	1990-98	1990-98	1994-98	1994-98	1990-98	1990-98
Mean no. pairs attempting to nest / year	76.8	5.7	4.0	6.8	9.9	12.0
Total no. attempts failing through suspected/confirmed persecution during the period (F)	90	9	11	6	10	38
% of attempts affected by suspected or confirmed persecution during the period	13	18	55	18	11	35
Mean no. of young / successful pair (P)	2.4	2.7	1.0	2.0	2.4	1.1
No. of young potentially lost through persecution (F x P)	216	24	11	12	24	42

Figure 4 Map of confirmed incidents of peregrine persecution in England, 1990-98. Note that only the 22 incidents with known grid references are shown. These represent 58% of the 38 confirmed incidents during this period.



5.6 Other species

Marsh harrier

The marsh harrier became extinct in England in 1899 through habitat loss and persecution. Marsh harriers bred again in England in 1927, increasing to a peak of 15 nests in 1958. However, they declined to just a single pair in 1971, as a result of organochlorine pesticide poisoning. Following the progressive withdrawal of these compounds and a decline in persecution, the UK population has increased substantially. 156 females were recorded breeding in the UK during the last national survey in 1995 (Underhill-Day 1998). Of these, at least 150 bred in England, mainly in East Anglia and the South-east. Most marsh harriers have traditionally nested in reedbeds (many on nature reserves which usually afford greater security), but an increasing proportion now occur on arable farmland.

Table 7 Causes of marsh harrier nest failures in the United Kingdom during 1983-90 and 1995 compared with 1971-82 (from Underhill - Day 1998).

Cause of failure	Number of failures (% of total failures)	
	1971-82	1983-90 & 1995
Unknown	7 (23.3)	41 (45.5)
Human persecution	6 (20.0)	15 (16.7)
Predation	2 (6.7)	8 (8.9)
Nest flooding	4 (13.3)	8 (8.9)
Human disturbance	4 (13.3)	7 (7.8)
Desertion / disappearance of adult	5 (16.7)	7 (7.8)
Other	2 (6.7)	4 (4.4)
Total	30	90

Between 1983 and 1995, the UK marsh harrier population (based on breeding adults) grew at around 17% per annum. Complete English population data are available for the years 1983-90 inclusive and 1995. During these years, productivity was at least 2.5 fledglings per nest started: 90 out of 542 (17%) nests failed: 15 of these failures (3% of nests) were as a result of confirmed persecution (see table 7). Persecution was the greatest single known cause of failure, and could have been of even greater significance had the reason for some of the failures categorised as unknown causes or desertion been illegal persecution.

Persecution of marsh harriers continues to occur, with five poisoned and two shot since 1990. This has not prevented the English population from increasing during the 1990s, but it is likely to have reduced the rate of expansion, particularly in certain parts of their range, such as North Kent, where several incidents have occurred.

Common buzzard

The buzzard is a comparatively common species, although its distribution is concentrated in western counties, with only low numbers being recorded in the east. Gibbons *et al.* (1993) reveals little real change in the national status between the two national breeding bird atlas surveys undertaken in 1968-72 and 1988-91. This status was little changed from an estimated distribution for 1865 (Tubbs 1974), though the status of this species clearly reflects historic persecution (Holloway 1996). There is some evidence of continued expansion during the 1990s, with buzzards now breeding regularly in counties such as Sussex and Warwickshire. Persecution has long been suggested as explaining the slow population expansion into areas adjacent to current population strongholds (e.g. Moore 1957). This is supported by Elliot and Avery (1991) who found that buzzards are significantly more likely to be reported dead through persecution at the edge of their range in Britain than in the middle.

However, it is possible that only moderate productivity and high natal philopatry results in an intrinsically slow expansion of the species. Gibbons *et al.* (1995) showed that the distributions of both buzzard and raven *Corvus corax* were strongly limited by the distribution of grouse moor in Britain, but were unable to conclude whether this was the result of persecution rather than moorland management or food and nest site availability.

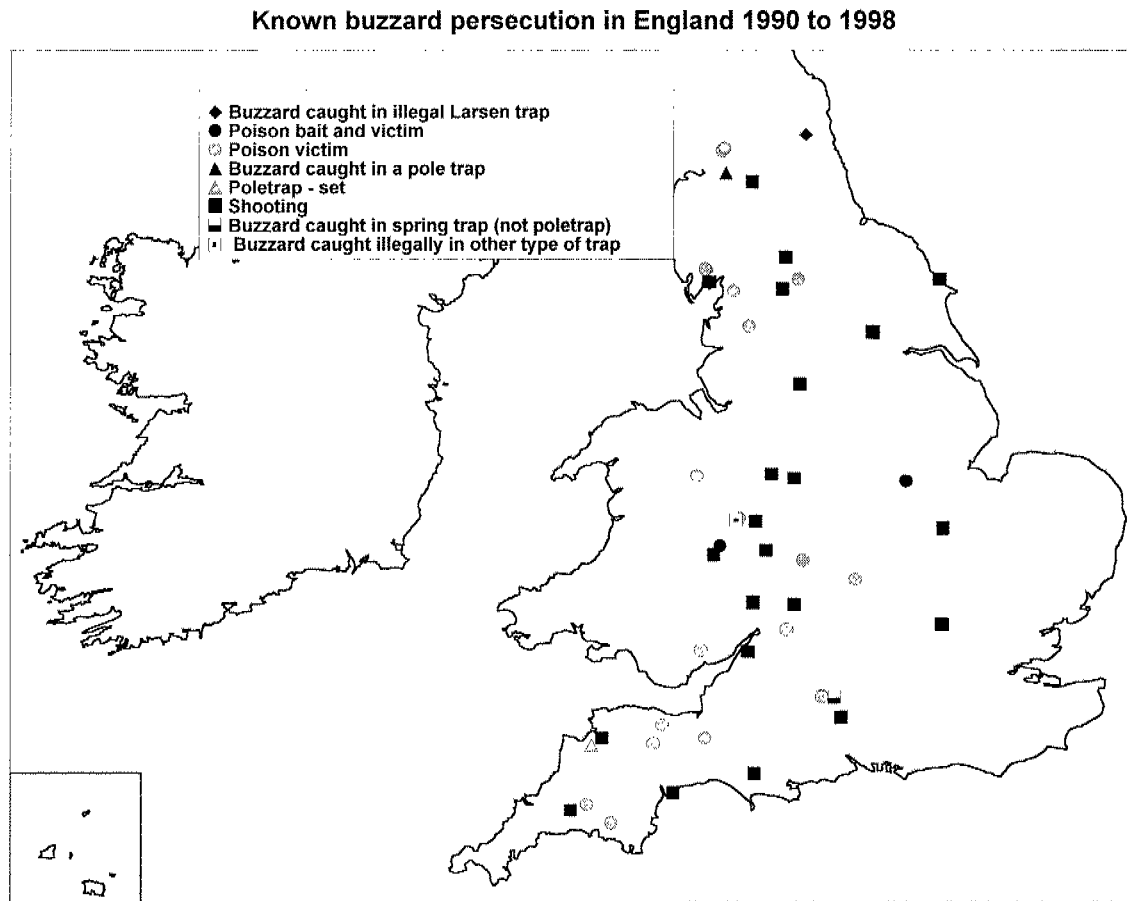
Figure 5 shows the distribution of confirmed incidents of buzzard persecution in England between 1990 and 1998, where grid references are known. Whilst the majority of incidents are from the buzzard's core range in the west of England, there are several from central and eastern counties where the species is currently expanding.

In 1998, buzzards are known to have been shot in Cumbria, Derbyshire, Northumberland and Yorkshire. They were poisoned in Cornwall, Shropshire and Yorkshire and pole trapped in Cornwall and Cumbria. Given that field workers are often unable to monitor nesting sites or suitable habitat in game rearing areas and that poisoning and shooting are the main forms of persecution (see figure 5), these incidents probably represent the tip of the persecution iceberg.

Golden eagle

Exterminated from England by the late 18th Century (Holloway 1996) the golden eagle remained only an occasional visitor until breeding was reconfirmed in 1969. Even so, the species has not established a viable population with only three to four adults resident during the 1990s. At this low population level, it is impossible to say whether illegal persecution limits the re-colonisation of England. Nevertheless, there is evidence even within its current limited range that the species is resented by some as it is accused of lamb killing or harrying far outside its known range. A Cumbrian breeding site suffers disturbance on an almost weekly basis during the breeding season despite almost constant surveillance. In December 1989, a nest was deliberately destroyed, resulting in a breeding failure and the probable loss of young from the population. A rebuilt nest on the same ledge was also destroyed in January 1990.

Figure 5 Map of confirmed incidents of buzzard persecution in England, 1990-98. Note that only the 50 incidents with known grid references are shown. These represent 61% of the 82 confirmed incidents during this period.



6. Conclusions and recommendations

Most English breeding raptor species are subject to persecution in the form of killing or nest destruction. Only Montagu's harrier, honey buzzard and hobby have not suffered significantly from these forms of persecution. Persecution is highly unlikely to cause the extinction of the red kite from its current range in England, though it is slowing the rate of re-establishment of the species. Our evidence also suggests that peregrine and goshawk breeding success and range are limited by persecution. In terms of the actual numbers of incidents the buzzard remains the most persecuted raptor in England, although this reflects mainly its relatively large population size.

The case of the hen harrier is particularly worthy of note. The species could potentially breed across much of upland England with unoccupied areas in the Pennines and North York Moors appearing particularly suitable. Successful breeding, however, is now virtually limited to just three areas managed by sympathetic landowners. Even in these places, where nests are closely monitored, the species does not escape persecution. The hen harrier is clearly vulnerable to extinction as a breeding species in England as a result of persecution.

As noted earlier, persecution incidents are usually difficult to detect for any species, the only evidence in some cases being the sudden unexplained failure of a nesting attempt through disappearance of adults, eggs or nestlings. Much suitable nesting habitat for raptors occurs in areas currently without public access. Many raptor workers may be faced with a difficult dilemma: whether to trespass on land where they are unwelcome in order to monitor vulnerable raptors, or to abandon the birds to what they suspect is likely to be an unfortunate end.

The difficulty of establishing clear evidence for persecution is illustrated clearly by the case presented for peregrine, where investigations confirm persecution in relatively few cases though it is strongly suspected by experienced raptor workers. The difficulty of securing prosecutions is indicated by their paucity between 1993 and 1998. Of the 142 known bird of prey persecution incidents in England between 1994 and 1998, only eight (5.6%) resulted in court appearances. Seven of those charged (88%) were employed as gamekeepers and of these, four were found guilty.

Unsurprisingly perhaps, reports revealed seasonal differences in the types of persecution occurring. Illegal poisoning occurs most frequently before and during the early part of the breeding season, timed presumably to protect breeding game and livestock from all predators. Trapping, on the other hand, is most frequent later in summer when young game birds may be taken by raptors to feed their own young.

In compiling this report, it has become apparent that better use could be made of the information collected by dedicated raptor workers in England. We have made the following specific recommendations which could help achieve this:

- i. The value of persecution data collected by raptor groups could be improved if common definitions for describing persecution incidents were agreed with

investigating agencies (RSPB and the Police): common interpretations of evidence are needed to define potential, suspected and confirmed incidents.

- ii. Raptor groups could increase the value of their work by collecting in a consistent way, information on the management of the areas they cover, on the monitoring effort in each year, and on 'nil returns' for known territories from which raptors are absent in particular years.
- iii. English Nature could make better use of persecution information provided by licensed raptor workers. For example, a summary of reports could be included in the annual newsletter provided to all Schedule 1 licence holders.
- iv. Accessing information on raptors would be greatly assisted if a national register of raptor studies and groups was compiled by an appropriate body. This should incorporate information on aims, methods, study area, membership etc.

Our strongest recommendation, however, must be for the improved enforcement of existing legislation to protect raptors from persecution.

References

- Anon 1995. *Biodiversity: the UK steering group report*. London, HMSO.
- Crick, H.Q.P. & Ratcliffe, D.A. 1995. The peregrine *Falco peregrinus* breeding population of the United Kingdom in 1991. *Bird Study*, 42, 1-19.
- DETR/JNCC (in prep.). *Raptor Working Group: final report to ministers*.
- Elliot, G.D. & Avery, M.A. 1991. A review of reports of buzzard persecution 1975-1989. *Bird Study*, 38, 52-56.
- Etheridge, B., Summers, R.W. & Green, R.E. 1997. The effects of illegal killing and destruction of nests by humans on the population dynamics of the hen harrier *Circus cyaneus* in Scotland. *Journal of Applied Ecology*, 34, 1081-1105.
- Evans, I.M., Summers, R.W., O'Toole, L., Orr-Ewing, D.C., Evans, R., Snell, N. & Smith, J. 1999. Evaluating the success of translocating red kites *Milvus milvus* to the UK. *Bird Study*, 46, 129-144.
- Gibbons, D., Gates, S., Green, R.E, Fuller, R.J. & Fuller, R.M. 1995. Buzzards *Buteo buteo* and ravens *Corvus corax* in the uplands of Britain: limits to distribution and abundance. *Ibis*, 137 (Supplement 1), 75-84.
- Gibbons, D.W., Reid, J.B. & Chapman, R.A. 1993. *The new atlas of breeding birds in Britain and Ireland: 1988-1991*. London, T&AD Poyser.
- Green, R.E. 1996. The status of the golden eagle in Britain in 1992. *Bird Study*, 43, 20-27.
- Holloway, 1996. *The historical atlas of breeding birds in Britain and Ireland, 1875-1900*. London, T&AD Poyser.
- Hudson 1992. *Grouse in space and time: the population biology of a managed gamebird*. Fordingbridge, The Game Conservancy Trust.
- Moore, N.W. 1957. The past and present status of the buzzard in the British Isles. *British Birds*, 69, 193-201.
- Ogilvie, M. & The Rare Breeding Birds Panel 1999. Rare breeding birds in the United Kingdom in 1997. *British Birds*, 92, 389-428.
- Petty, S.J. 1996. History of the northern goshawk *Accipiter gentilis* in Britain. *In: the introduction and naturalisation of birds*, ed. By J.S.Holmes and J.R. Simons, 95-102. London, HMSO.

- Potts, G.R. 1998. Global dispersion of nesting hen harriers *Circus cyaneus*; implications for grouse moors in the UK. *Ibis*, 140(1), 76-88.
- Ratcliffe, D. 1993. *The Peregrine*. Second edition. London, T&AD Poyser.
- Rebecca, G. & Bainbridge, I.P. 1998. The breeding status of the merlin *Falco columbarius* in Britain in 1993-94. *Bird Study*, 45, 172-187.
- Roberts, S.J., Lewis, J.M.S. & Williams, I.T. 1999. Breeding European honey buzzards in Britain. *British Birds*, 92, 326-345.
- RSPB 1999. *Birdcrime '98*. Sandy, RSPB.
- RSPB *et al.* 1996. *Birds of conservation concern*. Sandy, RSPB.
- RSPB/NCC 1991. *Death by design: the persecution of birds of prey and owls killed in the UK, 1979-1989*. RSPB, Sandy.
- Sim, I.M.W., Gibbons, D.W., Bainbridge, I.P. & Mattingley, W.A. (Submitted). Status of the hen harrier *Circus cyaneus* in the UK and the Isle of Man in 1998.
- Tapper, S. 1999. *A question of balance*. Fordingbridge, The Game Conservancy Trust.
- Thomas, M. & Elliot, G.D. (in prep.). *The impact of egg collecting on scarce breeding birds 1982-99*.
- Tucker, G.M. & Heath, M.F. 1995. Birds in Europe: their conservation status. *BirdLife Conservation Series No. 3*. Cambridge, BirdLife International.
- Underhill-Day, J. 1998. Breeding marsh harriers in the UK 1983-95. *British Birds*, 91, 210-218.

Acknowledgements

The authors wish to thank the following for contributing information to the Cumbria Raptor Study Group, some of which has been used to compile this report: Borders Goshawk Study Group (Malcolm Henderson), British Trust for Ornithology (Caroline Dudley and David Glue), Durham Upland Bird Study Group (David Raw), Marches Raptor Group (M.Thornley), Northumbria Ringing Group (Brian Galloway), North West Raptor Protection Group (Terry Pickford), South Peak Raptor Study Group (Martin Middleton, Mick Taylor), Yorkshire Dales Upland Bird Study Group (Paul Irving, P. Roe, D. Simpson, Colin Straker, G Todd, P.M. Wright), Brian Leecy, Jerry Lewis, Pat Lindley (RSPB), Dennis Moir (Forest Enterprise), Ivan Proctor (RSPB), Steve Roberts, Innes Sim (RSPB), Malcom Stott (RSPB), Sean Walls (ITE), Craig Bell , Geoff Horne.

Particular thanks go to the RSPB: Julian Hughes and Graham Elliot provided national statistics on persecution incidents; Keith Morton prepared the maps.

Andy Brown (English Nature) provided helpful editorial comments.

List of tables

- Table 1 Estimates of bird of prey populations in England as a proportion of the UK.
- Table 2 Number of incidents of bird of prey persecution and nest destruction confirmed by RSPB, Ministry of Agriculture (MAFF) or Police investigations in England, by county, during 1990-98.
- Table 3 Impacts of persecution by killing on breeding birds of prey in England.
- Table 4 Summary of releases and resulting red kite population in England, 1989-98.
- Table 5 The success of female hen harriers monitored on grouse moors in England 1994-1998.
- Table 6 Peregrine breeding performance in six study areas in the north of England
- Table 7 Causes of marsh harrier nest failures in the United Kingdom during 1983-90 and 1995 compared with 1971-82 (from Underhill - Day 1998).

List of figures

- Figure 1 Map of confirmed incidents of bird of prey persecution in England, 1990-98.
- Figure 2 Number of territorial female hen harriers in England 1990-98
- Figure 3 Success rates (%) of hen harriers nesting on moorland managed commercially for grouse and moorlands with nest protection schemes in England 1994-98.
- Figure 4 Map of confirmed incidents of peregrine persecution in England, 1990-98.
- Figure 5 Map of confirmed incidents of buzzard persecution in England, 1990-98.

Annex 1 Raptor study groups recording form

Complete a separate form for each species and each study area

Your name:

Name of study group:

Number of members in study group:

Species:

Part 1 Assessment of impact of persecution 1990-1998

Approximate size of study area in km² for this species.....

Location and name of study area:

Landuse of study area (see categories in Part 2 over).....

If more than one land use type, please give a breakdown of the figures for each type.
For example, we are particularly interested in comparisons between those areas with game rearing interests and those without.

Which of the following best describes your (or, if applicable, your group's) coverage of this area for this species? Please indicate the degree of coverage per year.

- Complete: all nesting attempts located and monitored Years:.....
- Good: most nesting attempts located and monitored Years:.....
- Partial: some nesting attempts located and monitored Years:.....

In which years was the area covered between 1990-1998?.....

YEAR	1990	1991	1992	1993	1994	1995	1996	1997	1998
# successful nests - fledging at least 1 young									
# unsuccessful where persecution is confirmed or suspected ¹									
#unsuccessful for natural/unknown reasons									
Total number of nesting attempts									
# young fledged									

¹see notes on next sheet for definitions