

A PRELIMINARY OVERVIEW OF MONITORING FOR RAPTORS IN GREAT BRITAIN*

Predhodni pregled monitoringa populacij ptic roparic v Veliki Britaniji

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This paper summarises monitoring of raptors (diurnal birds of prey and owls) in Great Britain. There is a long tradition of raptor monitoring in Great Britain, and all regularly breeding species receive at least a degree of survey coverage. Common raptors such as Buzzard *Buteo buteo* and Kestrel *Falco tinnunculus* are included in national all-species surveys co-ordinated by the British Trust for Ornithology (BTO), while rarer species are typically monitored in less extensive, more intensive studies conducted by specialist raptor fieldworkers. This work is supported (and often funded) by a large number of Non-Governmental Organisations (NGOs) and national government agencies. There is a need for greater co-ordination of local/regional study groups, which would facilitate the compilation of national-level population and productivity statistics, and also identify areas and/or species that require better survey coverage. There is potential for the better use of data collected by fieldworkers to provide evidence of human interference in breeding attempts.

Key words: birds of prey, owls, monitoring, survey, Great Britain**Ključne besede:** ujede, sove, monitoring, popis, Velika Britanija**1. Introduction**

Fifteen species of diurnal raptor and five owl species regularly breed in Great Britain (GB). Many were either very rare or effectively extinct at the beginning of the twentieth century (e.g. White-tailed Eagle *Haliaeetus albicilla*, Osprey *Pandion haliaetus*, Marsh Harrier *Circus aeruginosus*, Red Kite *Milvus milvus*), and have recovered in numbers either by natural processes and *in situ* conservation action (Osprey, Marsh Harrier), reintroduction (White-tailed Eagle) or a combination of the two (Red Kite) (LOVE 1983, CLARKE 1995, CARTER 2001, DENNIS 2008). The Little Owl *Athene noctua* was introduced into southern England in 1842 and has since naturalised, spreading

through most parts of England and Wales, and into southern Scotland (GREENOAK 1997).

The Kestrel *Falco tinnunculus* was the most abundant raptor until the last couple of decades, when it was overtaken by the Buzzard *Buteo buteo* (CLEMMENTS 2002). The Honey Buzzard *Pernis apivorus* and Montagu's Harrier *C. pygargus* are the least abundant breeding species (BAKER *et al.* 2006). Several species occur only (or predominantly) in Scotland (Golden Eagle *Aquila chrysaetos*, White-tailed Eagle, Osprey, Hen Harrier *C. cyaneus*). Hen Harriers breed in small numbers (ca. 40 pairs) in Wales, and even smaller numbers in England, while Marsh Harriers and Hobbies *F. subbuteo* are found predominantly in England (BALMER *et al. in print*).

* Note that the United Kingdom is covered here in two separate entries: England, Scotland and Wales are covered by this paper on Great Britain, and Northern Ireland is covered in the paper for Ireland (i.e. together with the Republic of Ireland). However, some of this paper on GB also applies to parts of Ireland.

2. Main players

The main organisations involved in raptor monitoring fall into four main groups:

- (1) Non-governmental organisations and charities with at least some professional staff – e.g. Royal Society for the Protection of Birds (RSPB); British Trust for Ornithology (BTO); Rare Breeding Birds Panel (RBBP); Hawk and Owl Trust (HOT).
- (2) Volunteer-led organisations and individual volunteers – e.g. Scottish Raptor Study Groups (SRSGs); Northern England Raptor Forum (NERF); Welsh Rare Breeding Bird and Raptor Study Group (WRBBRSG); Welsh Kite Trust; Shropshire Raptor Study Group and Wiltshire Raptor Study Group.
- (3) Statutory/government agencies – Natural England (NE); Scottish Natural Heritage (SNH); Natural Resources Wales (NRW); Joint Nature Conservation Committee (JNCC).
- (4) Commercial consultancies.

In England and Wales, the majority of work is undertaken by NGOs and charities, with some funding provided by government agencies. An example of the latter is the SCARABBS (Statutory Conservation Agency/RSPB Annual Breeding Bird Scheme) series of periodic surveys for scarcer breeding birds, some of which are raptors. This is a rolling programme which has included in recent years: Barn Owl *Tyto alba* in 1995–1997 (TOMS *et al.* 2001); Red Kite in 2000 (WOOTTON *et al.* 2002); Peregrine Falcon *F. peregrinus*, in 2002 (BANKS *et al.* 2010); Golden Eagle in 2003 (EATON *et al.* 2007); Marsh Harrier in 2005 (*unpubl.*); Merlin *F. columbarius* in 2008 (EWING *et al.* 2011); and Hen Harrier in 2010 (HAYHOW *et al.* *in press*).

In Scotland, raptor monitoring is co-ordinated under the *Scottish Raptor Monitoring Scheme* (SRMS), a partnership between SNH, JNCC, BTO, RBBP, RSPB, Scottish Ornithologists' Club (SOC), Forestry Commission Scotland (FCS) and the SRSGs, and funded by SNH (WERNHAM *et al.* 2008, ANON. 2002).

Across the whole of the UK, the *Breeding Bird Survey* (BBS) provides annual indices of change for certain common species, though few of these are raptors. This survey is organised by the BTO, and funded/supported by BTO, JNCC and RSPB. The BTO also runs the UK-wide *Nest Record Scheme* (NRS) and ringing scheme, which provide data on survival and productivity, though some parameter estimates may contain regional biases due to variation in sample sizes. Breeding records of rare birds (< 1,500

breeding pairs in the UK), which include several raptor species, are collated by the RBBP, a panel comprising representatives from the BTO, RSPB and JNCC, as well as a small number of independent individuals.

The data obtained through monitoring are used by (1) government agencies, for setting and assessing conservation targets, reviewing effectiveness of protected areas and development planning, (2) universities and other research organisations, for academic and applied conservation work, (3) NGOs, for applied conservation work and provision of advice to government, (4) consultancies, for development planning (e.g. Environmental Impact Assessments) and government contracts. Some individuals provide data to MEROS Monitoring of European Raptors and Owls; e.g. MAMMEN & STUBBE 2009, but this programme is probably not widely known in GB.

3. National coverage

Apart from BBS and the periodic SCARABBS surveys, there is little GB-scale co-ordination of monitoring. Annual, multi-species national co-ordination currently occurs only in Scotland, via the SRMS. Coverage in Scotland is variable by species; those best covered are Golden Eagle, Peregrine Falcon, Hen Harrier and Goshawk *Accipiter gentilis*, but even for these species the national coverage is patchy. Other species such as Buzzard, Merlin, Barn Owl and Tawny Owl *Strix aluco* are monitored extensively and intensively within discrete regional study areas (ETHERIDGE *et al.* 2013).

The recently-formed WRBBRSG aims to fulfil the same role as the SRMS for Wales; there is no equivalent organisation covering the whole of England, but there is a number of smaller organisations that co-ordinate monitoring of certain species regionally, most prominently NERF, covering all diurnal raptor and owl species in the north of the country (DOWNING & NERF 2011).

Other groups focus on individual species, such as the Barn Owl Trust and the South West Peregrine Group, both of which operate in south-west England. White-tailed Eagles are monitored annually by the RSPB in the two areas of Scotland where they have been reintroduced, and the reintroduced populations of Red Kites in Scotland are also monitored by RSPB (ETHERIDGE *et al.* 2013). Populations of kites in England and Wales are monitored but the proportion of pairs covered has steadily decreased as these populations grow (Welsh Kite Trust; http://www.gigrin.co.uk/red_kites_in_the_united_kingdom_breeding_pairs_1989-2007).

Other species are covered by occasional, regular surveys that attempt complete or near-complete coverage or have a rigorous sampling strategy (Honey Buzzard, Marsh Harrier, Hen Harrier, Golden Eagle, Peregrine Falcon, Merlin, Barn Owl), but such surveys typically occur at decade-long intervals. All Montagu's Harrier breeding attempts are probably effectively covered annually via reports to the RBBP (HOLLING *et al.* 2012), and there has recently been an effort by NE and RSPB to collate data on this species (A. MUSGROVE *pers. comm.*). The annual RBBP reports include a total for Goshawk based on fairly comprehensive samples (but this is likely to underestimate both numbers and geographic range; HOLLING *et al.* 2011 & 2012). Ospreys have been surveyed fairly comprehensively on an annual basis by the SRSGs and RSPB (ETHERIDGE *et al.* 2013); they occur principally in Scotland, with one or two isolated breeding areas in England and Wales (BALMER *et al. in print*).

Common species (Kestrel, Buzzard, Sparrowhawk *A. nisus*) are covered by the BBS, providing indices of population change at the UK scale (and at national scales in some instances, depending on the number of survey squares; BAILLIE *et al.* 2013). RBBP has recently begun to collate county summaries of both Long-eared *Asio otus* and Short-eared Owls *A. flammeus* (HOLLING *et al.* 2012). See Appendix 1 for details of surveys.

4. Key species and key issues

All regularly breeding bird of prey and owl species receive at least a degree of monitoring in Britain during the breeding season (Appendix 1), and Hen Harriers are also monitored (with unknown proportional coverage) during the winter via the *Hen Harrier Winter Roost Survey* (CLARKE & WATSON 1990, DOBSON *et al.* 2012).

The key threats experienced by raptors are species- and region-specific. In upland habitats (mainly Scotland and northern England) where land is managed for shooting of Red Grouse *Lagopus lagopus scotica*, illegal killing is a threat to a number of raptor species, but especially Hen Harriers, Golden Eagles, Peregrine Falcons and Red Kites (ETHERIDGE *et al.* 1997, WHITFIELD *et al.* 2004, SMART *et al.* 2010, AMAR *et al.* 2011). Management of lowland areas elsewhere in Britain for shooting of Pheasants *Phasianus colchicus* and partridge (*Alectoris rufa* and *Perdix perdix*) may also provide an incentive for illegal killing of a wide range of species (ALLEN & FEARE 2003). Loss of habitat due to agricultural intensification affects populations of many species, but especially Barn Owl, Little Owl and Kestrel (LOVE *et al.* 2000, BAILLIE *et al.* 2013).

Monitoring of Golden Eagle, Hen Harrier and Peregrine Falcon in Scotland has contributed to Conservation Frameworks, which were commissioned by SNH, and aimed at assessing the conservation status of these species and identifying the main threats to population survival (HUMPHREYS *et al.* 2007, WHITFIELD *et al.* 2008, FIELDING *et al.* 2011). Monitoring of regional populations and productivity of Peregrine Falcons and Red Kites has identified areas where illegal killing limits population stability (SMART *et al.* 2010, AMAR *et al.* 2011).

International networking would benefit the interpretation of monitoring data for migratory species such as the Hen Harrier, of which an unknown proportion of the GB wintering population may originate from Fennoscandian and/or Dutch breeding areas (DOBSON *et al.* 2012), and the apparently nomadic Short-eared Owl, whose numbers in GB may fluctuate in response to factors operating elsewhere in Europe (CALLADINE *et al.* 2012).

5. Strengths and weaknesses

GB is fortunate to contain a large number of skilled volunteers, and there is a strong tradition of interest in (and monitoring of) birds, reflected in the existence of organisations such as the RSPB, BTO and raptor/upland bird study groups. Nonetheless, there are regions where survey coverage is poor or inconsistent between years, especially (but not exclusively) areas with low human population density. There is also a tendency towards secrecy among and between raptor fieldworkers – a legacy of a long history of illegal killing of raptors – which sometimes prohibits effective co-ordination of effort and sharing/collation of data. The SRMS has helped in building trust and a collective voice.

Monitoring – which is potentially fairly intrusive – is strictly regulated by the national government agencies, which issue annual licences for this purpose. This licence system does not, however, include a compulsory facility for reporting evidence of illegal human interference. The Partnership for Action against Wildlife crime (PAW) and the RSPB's persecution database – as well as the SRMS in Scotland – offer channels through which such activities may be reported.

The main geographical gaps are in the north-west of Scotland and in lowland England and Wales (for dedicated raptor monitoring; apart from north-west Scotland, these areas are generally well covered by some other bird surveys such as the BBS). In terms of species, the commoner species are generally less well monitored by dedicated raptor fieldworkers, but they

are covered to an extent in the BBS and other pan-avian surveys. The raptor monitoring movement in Britain was motivated by the historical rarity of species such as Golden Eagle, Hen Harrier and Peregrine Falcon, caused by illegal killing and (in the case of the Peregrine Falcon) the pesticide crisis of the 1960s and 1970s. There is therefore a traditional emphasis on upland areas managed for shooting, and on scarcer species.

6. Priorities, capacity-building

The main priority for GB raptor monitoring is to increase the national-level co-ordination of survey effort and the sharing of data, such that a strategic assessment of coverage and monitoring gaps can be carried out and addressed in future. In general terms, the SRMS model needs to be mirrored in England and Wales. The engagement of a new generation of raptor fieldworkers is also of paramount importance; the vast majority of monitoring in GB is undertaken by volunteers, and it is essential to maintain continuity of long-running surveys by recruiting new people.

There are a number of gaps in coverage of certain species already recognised at GB scale, which can be briefly summarised as: lack of comprehensive coverage of Red Kite in most English counties, especially in the Chiltern Hills area; lack of comprehensive coverage of Marsh Harrier in the core areas of East Anglia, Lincolnshire and Kent (though if the national SCARABBS survey is repeated this will be less critical); lack of comprehensive coverage of Hen Harrier, Golden Eagle, Merlin and Peregrine Falcon from most regions of Scotland (consistent, long-term study areas cover only a (sometimes non-representative) proportion of the national range for any species); data on Goshawk are based largely on monitored nests, and there is an unknown number of territorial birds present, which are not diligently counted, due to secrecy (data not submitted to recorders) or lack of descriptions in marginal areas, where recorders demand descriptions to support records; data for Ospreys in Scotland are often either withheld from SRMS/RBBP or submitted with insufficient site metadata; there is probably a relatively large, unrecorded population of Hobbies in the southern half of England, where population estimates may be based solely on counts of known nests, though the method of extrapolation of counts from intensively-studied areas (CLEMENTS 2001) has the potential to increase the accuracy of estimates; there are few regions of GB where Long-eared & Short-eared Owls are studied regularly in pre-defined areas.

The SRMS is currently formally reviewing the

coverage of raptor monitoring across Scotland (Roos *et al. in print*; BTO Scotland & SRMS *unpubl.*). The SRMS is also developing an Entry-Level scheme wherein new members will be encouraged to survey grid squares that have been selected from a random (or, more likely, a stratified-random) sample, so that field data may be more rigorously translated into regional and/or national population trends. Finding a compromise between the scientific rigor of a survey design and its attractiveness to volunteers is a key challenge for survey co-ordinators.

7. Povzetek

Pričujoči prispevek je kratek oris dejavnosti, povezane z monitoringom ptic roparic (ujed in sov) v Veliki Britaniji. Redno spremljanje teh ptic ima na britanskem otočju dolgo tradicijo, tako da so v večji ali manjši meri popisane vse redno gnezdeče ptice roparice. Pogoste ptice roparice, kot sta kanja *Buteo buteo* in postovka *Falco tinnunculus*, so vključene v nacionalne popise vseh vrst, ki jih koordinira British Trust for Ornithology (BTO), medtem ko so redkejša vrsta deležna pozornosti v manj obsežnih, a intenzivnejših študijah terenskih izvedencev. To delo podpira (tudi v finančnem smislu) tako več nevladnih organizacij kot nacionalnih vladnih agencij. Sicer pa avtorji prispevka ugotavljajo, da je potrebna večja koordinacija lokalnih/regionalnih študijskih skupin, s čimer bi se olajšalo zbiranje statističnih podatkov o populacijah in produktivnosti ptic roparic na državni ravni in tudi ugotavljanje območij in/ali vrst, ki terjajo temeljitejša popise. Sicer pa obstaja potencial za boljšo uporabo podatkov, zbranih na terenu, in s tem zagotavljanje dokazov o človekovih motnjah pri gnezdenju ptic roparic.

8. References

- ALLEN, D.S. & FEARE, C.J. (2003): Birds of prey and lowland gamebird management. pp. 427–442 In: THOMPSON, D.B.A., REDPATH, S.M., FIELDING, A.H., MARQUISS, M. & GALBRAITH, C.A. (eds.): Birds of Prey in a Changing Environment. – The Stationery Office, Edinburgh.
- AMAR, A., COURT, I.R., DAVISON, M., DOWNING, S., GRIMSHAW, T., PICKFORD, T. & RAW, D. (2011): Linking nest histories, remotely sensed land use data and wildlife crime records to explore the impact of grouse moor management on peregrine falcon populations. – *Biological Conservation* 145 (1): 86–94.
- ANONYMOUS (2002): Scottish Raptor Monitoring Scheme Agreement. – Scottish Natural Heritage.
- BAILLIE, S.R., MARCHANT, J.H., LEECH, D.I., MASSIMINO, D., EGLINGTON, S.M., JOHNSTON, A., NOBLE, D.G., BARIMORE, C., KEW, A.J., DOWNIE, I.S., RISELY, K. & ROBINSON, R.A. (2013): Bird Trends 2012: trends in numbers, breeding

- success and survival for UK breeding birds. BTO Research Report No. 644. – BTO, Thetford.
- BAKER, H., STROUD, D.A., AEBISCHER, N.J., CRANSWICK, P.A., GREGORY, R.D., MCSORLEY, C.A., NOBLE, D.G. & REHFISCH, M.M. (2006): Population estimates of birds in Great Britain and the United Kingdom. – *British Birds* 99 (1): 25–44.
- BALMER, D.E., GILLINGS, S., CAFFREY, B.J., SWANN, R.L., DOWNIE, I.S. & FULLER, R.J. (*in print*): Bird Atlas 2007–2011: The breeding and wintering birds of Britain and Ireland. – BTO Books, Thetford.
- BANKS, A.N., CRICK, H.Q.P., COOMBS, R., BENN, S., RATCLIFFE, D.A., & HUMPHREYS, E.M. (2010): The breeding status of Peregrine Falcons *Falco peregrinus* in the UK and Isle of Man in 2002. – *Bird Study* 57 (4): 421–436.
- CALLADINE, J., DU FEU, C. & DU FEU, R. (2012): Changing migration patterns of the Short-eared Owl *Asio flammeus* in Europe: an analysis of ringing recoveries. – *Journal of Ornithology* 153 (3): 691–698.
- CARTER, I. (2001): The Red Kite. – Arlequin Press, Shrewsbury.
- CLARKE, R. (1995): The Marsh Harrier. – Hamlyn, London.
- CLARKE, R. & WATSON, D. (1990): The Hen Harrier *Circus cyaneus* Winter Roost survey in Britain and Ireland. – *Bird Study* 37 (2): 84–100.
- CLEMENTS, R. (2001): The Hobby in Britain: a new population estimate. – *British Birds* 94 (9): 402–408.
- CLEMENTS, R. (2002): The Common Buzzard in Britain: A New Population Estimate. – *British Birds* 95 (8): 377–383.
- DENNIS, R. (2008): A Life of Ospreys. – Whittles Publishing, Dunbeath.
- DOBSON, A.D.M., CLARKE, M., KJELLEN, N. & CLARKE, R. (2012): The size and migratory origins of the population of Hen Harriers *Circus cyaneus* wintering in England. – *Bird Study* 59 (2): 218–227.
- DOWNING, S.E. & THE NORTHERN ENGLAND RAPTOR FORUM (2011): NERF Annual Review 2010. – NERF.
- EATON, M.A., DILLON, I.A., STIRLING-AIRD, P.K. & WHITFIELD, D.P. (2007): The status of the golden eagle *Aquila chrysaetos* in Britain in 2003. – *Bird Study* 54 (2): 212–220.
- ETHERIDGE, B., RILEY, H., WERNHAM, C., HOLLING, M. & STEVENSON, A. (2013): Scottish Raptor Monitoring Report 2011. – Scottish Ornithologists' Club, Aberlady, on behalf of the Scottish Raptor Monitoring Scheme.
- 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 (4): 1081–1105.
- EWING, S.R., REBECCA, G.W., HEAVISIDES, A., COURT, I.R., LINDLEY, P., RUDDOCK, M., COHEN, S. & EATON, M.A. (2011): Breeding status of Merlins *Falco columbarius* in the UK in 2008. – *Bird Study* 58 (4): 379–389.
- FIELDING, A., HAWORTH, P., WHITFIELD, P., MCLEOD, D. & RILEY, H. (2011): A Conservation Framework for Hen Harriers in the United Kingdom. JNCC Report 441. – Joint Nature Conservation Committee, Peterborough.
- GIBBONS, D.W., REID, J.B. & CHAPMAN, R.A. (1993): The New Atlas of Breeding Birds in Britain and Ireland: 1988–1991. – T & A D Poyser, London.
- GREENOAK, F. (1997): British Birds: Their Folklore, Names and Literature. – Christopher Helm, London.
- HAYHOW, D.B., EATON, M.A., BLADWELL, S., ETHERIDGE, B., EWING, S., RUDDOCK, M., SAUNDERS, R., SHARPE, C., SIM, I.M.W. & STEVENSON, A. (*in print*): The status of the Hen Harrier, *Circus cyaneus*, in the UK and Isle of Man in 2010. – Bird Study.
- HOLLING, M. & THE RARE BREEDING BIRDS PANEL (2011): Rare Breeding Birds in the United Kingdom in 2009. – *British Birds* 104 (9): 476–537.
- HOLLING, M. & THE RARE BREEDING BIRDS PANEL (2012): Rare Breeding Birds in the United Kingdom in 2010. – *British Birds* 105 (7): 352–416.
- HUMPHREYS, L., WERNHAM, C. & CRICK, H. (2007): Raptor Species Conservation Frameworks: The Peregrine Conservation Framework Project Progress Report – Phase I. BTO Research Report No. 535. – BTO, Thetford.
- LOVE, J.A. (1983): The Return of the Sea Eagle. – Cambridge University Press, Cambridge.
- LOVE, R.A., WEBBON, C., GLUE, D.E. & HARRIS, S. (2000): Changes in the food of British Barn Owls (*Tyto alba*) between 1974 and 1997. – *Mammal Review* 30 (2): 107–129.
- MAMMEN, U. & STUBBE, M. (2009): [Annual Report 2003 and 2004 for monitoring of birds of prey and owls in Europe.] – Jahresbericht zum Monitoring Greifvögel und Eulen Europas 16/17: 1–118. (in German)
- PETTY, S.J. (1996): History of the Northern Goshawk *Accipiter gentilis* in Britain. pp 95–102 In: HOLMES, J.S. & SIMONS, J.R. (eds.): The Introduction and Naturalisation of Birds. – HMSO, London.
- ROOS, S., DOBSON, A., NOBLE, D., HAWORTH, P., FIELDING, A., CARRINGTON-COTTON, A., ETHERIDGE, B. & WERNHAM, C. (*in print*): Raptors in Scotland – developing trends and indicators. – Scottish Natural Heritage Commissioned Report.
- SMART, J., AMAR, A., SIM, I.M.W., ETHERIDGE, B., CAMERON, D., CHRISTIE, G. & WILSON, J.D. (2010): Illegal killing slows population recovery of a re-introduced raptor of high conservation concern – The red kite *Milvus milvus*. – *Biological Conservation* 143 (5): 1278–1286.
- TOMS, M.P., CRICK, H.Q.P. & SHAWYER, C.R. (2001): The status of breeding barn owls *Tyto alba* in the United Kingdom 1995–97. – *Bird Study* 48 (1): 23–37.
- WERNHAM, C.V., ETHERIDGE, B., HOLLING, M., RIDDLE, G., RILEY, H.T., STIRLING-AIRD, P.K., STROUD, D., THOMPSON, D.B.A. & WILSON, J.D. (2008): The Scottish Raptor Monitoring Scheme: objectives, achievements in the first four years, and plans for future development. – *Ambio* 37(6): 460–465.
- WHITFIELD, D.P., FIELDING, A.H., MCLEOD, D.R.A. & HAWORTH, P.F. (2004): Modelling the effects of persecution on the population dynamics of golden eagles in Scotland. – *Biological Conservation* 119 (3): 319–333.
- WHITFIELD, D.P., FIELDING, A.H., MCLEOD, D.R.A. & HAWORTH, P.F. (2008): A conservation framework for golden eagles: implications for their conservation and management in Scotland. – Scottish Natural Heritage Commissioned Report No. 193 (ROAME No. F05AC306).
- WOTTON, S.R., CARTER, I., CROSS, A.V., ETHERIDGE, B., SNELL, N., DUFFY, K., THORPE, R. & GREGORY, R.D. (2002): Breeding status of the Red Kite *Milvus milvus* in Britain in 2000: The first co-ordinated Red Kite survey across Britain since the reintroduction programme began in 1989, yields 430 breeding pairs. – *Bird Study* 49 (3): 278–286.

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APPENDIX 1 / DODATEK 1

Status of populations and monitoring of raptors in Great Britain

Status populacij in monitoring ptic roparic v Veliki Britaniji

Species / Vrsta	Population size/ Velikost populacije (pairs / pari)	Latest national survey/ Zadnji nacionalni popis	Next national survey/ Naslednji nacionalni popis	Extent of annual national monitoring / Obseg letnega nacionalnega monitoringa	Parameters/ Parametri	Source/ Vir
Honey Buzzard <i>Pernis apivorus</i>	33–69	2000		Records submitted to RBBP	BP, Pr	NS
Red Kite <i>Milvus milvus</i>	1,043 (5-yr mean)	Annual		Professional monitoring of re-established populations	BP, Pr, S	1
White-tailed Eagle <i>Haliaeetus albicilla</i>	40 (5-yr mean)	Annual		Professional monitoring of re-established populations	BP, Pr, S	1
Marsh Harrier <i>Circus aeruginosus</i>	360	2005		Records submitted to RBBP**	BP, Pr	NS
Hen Harrier <i>Circus cyaneus</i>	687	2010* (and annual winter)		Partial co-ordinated coverage by RSGs	BP, Pr, S	NS
Montagu's Harrier <i>Circus pygargus</i>	15	Effectively annual via RBBP		Records submitted to RBBP	BP, Pr	1
Goshawk <i>Accipiter gentilis</i>	400	1988–91 BTO/ SOC/IWC Atlas	2007–11 BTO/ BWI/SOC Atlas	Partial co-ordinated coverage by RSGs***	BP, Pr	1, 2
Sparrowhawk <i>Accipiter nisus</i>	38,600	1988–91 BTO/ SOC/IWC Atlas	2007–11 BTO/ BWI/SOC Atlas	Coverage in BBS, and locally by some RSGs	BP, I, Pr	3
Buzzard <i>Buteo buteo</i>	31,100–44,000	1988–91 BTO/ SOC/IWC Atlas	2007–11 BTO/ BWI/SOC Atlas	Coverage in BBS, and locally by some RSGs	BP, I, Pr	3
Golden Eagle <i>Aquila chrysaetos</i>	442	2003		Considerable co-ordinated coverage by RSGs	BP, Pr	NS
Osprey <i>Pandion haliaetus</i>	180 (5-yr mean)	Effectively annual		Declining proportion covered by RSPB and RSGs as population increases	BP, Pr	1
Kestrel <i>Falco tinnunculus</i>	35,400	1988–91 BTO/ SOC/IWC Atlas	2007–11 BTO/ BWI/SOC Atlas	Coverage in BBS, and locally by some RSGs	BP, I, Pr	3

Continuation of Appendix 1 / Nadaljevanje dodatka 1

Species / Vrsta	Population size/ Velikost populacije (pairs / pari)	Latest national survey/ Zadnji nacionalni popsis	Next national survey/ Naslednji nacionalni popsis	Extent of annual national monitoring / Obseg letnega nacionalnega monitoringa	Parameters/ Parametri	Source/ Vir
Merlin <i>Falco columbarius</i>	1,128	2008		Partial co-ordinated coverage by RSGs	BP, Pr	NS
Hobby <i>Falco subbuteo</i>	2,200	1988–91 BTO/ SOC/IWC Atlas	2007–11 BTO/ BWI/SOC Atlas	Coverage in BBS, and records submitted to RBBP	BP, I, Pr	4
Peregrine Falcon <i>Falco peregrinus</i>	1,324	2002	2014?	Considerable co-ordinated coverage by RSGs	BP, Pr, S	NS
Barn Owl <i>Tyto alba</i>	3,000–5,000	1995–1997		Coverage in BBS, and locally by some RSGs	BP, I, Pr	NS
Little Owl <i>Athene noctua</i>	5,800–11,600	1988–91 BTO/ SOC/IWC Atlas	2007–11 BTO/ BWI/SOC Atlas	Coverage in BBS, and locally by some RSGs	BP, I, Pr	3
Tawny Owl <i>Strix aluco</i>	19,400	1988–91 BTO/ SOC/IWC Atlas	2007–11 BTO/ BWI/SOC Atlas	Coverage in BBS, and locally by some RSGs	BP, I, Pr	3
Long-eared Owl <i>Asio otus</i>	1,100–3,600	1988–91 BTO/ SOC/IWC Atlas	2007–11 BTO/ BWI/SOC Atlas	Local coverage by some RSGs	BP, Pr	5
Short-eared Owl <i>Asio flammeus</i>	1,000–3,500	1988–91 BTO/ SOC/IWC Atlas	2007–11 BTO/ BWI/SOC Atlas	Local coverage by some RSGs	BP, Pr	5

Sources:

(1) HOLLING & RBBP (2011); (2) PETTY (1996); (3) BAKER *et al.* (2006); (4) CLEMENTS (2001); (5) GIBBONS *et al.* (1993)

* Not yet published. Population estimate refers to 2004 survey; declines were apparent between 2004 and 2010.

** Note: from these records 5-yr mean to 2009 is 404

*** Note: from records submitted to RBBP 5-yr mean to 2009 is 431

NS – National survey; BTO – British Trust for Ornithology; SOC – Scottish Ornithologists' Club; IWC – International Waterbirds Census; BWI – BirdWatch Ireland; RBBP – Rare Breeding Birds Panel; RSGs – Raptor Study Groups; BBS – BTO/JNCC/RSPB Breeding Bird Survey.

Parameters: BP – Breeding pairs; I – Individuals; Pr – Productivity; S – Survival. Parameters measured by at least some monitoring schemes.