CONSERVATION SCIENCE IN THE RSPB 2002

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Chris Knights (rspb-images.com)

Conservation Science in the RSPB, 2002

The Royal Society for the Protection of Birds (RSPB) works for a healthy environment rich in birds and wildlife. It depends on the support and generosity of others to make a difference. The RSPB works with bird and habitat conservation organisations worldwide in a global partnership called BirdLife International.

Andrew Hay (rspb-images.com)

The RSPB prides itself on using the best scientific evidence available to guide its conservation policies and practice. Only by basing our work on such evidence can we be confident that our actions will be of benefit to birds and other wildlife.

For further copies of this report, or that for 2001, please contact the Conservation Science Department, The RSPB, UK Headquarters, The Lodge, Sandy, Bedfordshire SG19 2DL, or visit **www.rspb.org.uk/science**


Andrew Hay (rspb-images.com)

INTRODUCTION

Dr Mark Avery
Director,
Conservation,
The RSPB

This is the second report on the RSPB's scientific work. The first report, for 2001, published last year was well received and this has spurred us on to produce the second in what we hope will become an annual series.

The 2002 annual report includes a selection of two dozen projects. While just a snapshot of our overall scientific programme, I hope that these demonstrate the depth and breadth of the scientific work that the RSPB undertakes. The report is divided into three separate sections: monitoring, threatened species research, and ecological process or issue-focused research.

Two large-scale repeat surveys, one of lowland wet grassland (p 10) and the other of the uplands (p 11), show that several species of breeding wading birds, but particularly the lapwing, have declined on these two important habitat types over the last two decades. A large proportion of such monitoring work is undertaken in partnership, with much of the fieldwork carried out by volunteer ornithologists. Increasingly, we are also trying to involve a wider cross-section of the public and RSPB members in our work, by engaging them in simple, but useful, 'citizen science' projects such as surveys of urban birds (p 12). Abroad, we are helping develop monitoring schemes in a number of European countries; the one in Hungary reported here (p 13) involving more than 200 volunteer birdwatchers.

Studies of the ecology of threatened species are a particular strength of the RSPB, and this report includes several such studies, ranging from that of the great yellow bumblebee (p 16) to the exceptionally rare Raso lark (p 28). The impacts of agricultural change on species are apparent in the studies of house sparrows (p 17), tree sparrows (p 18), reed buntings (p 20) and even on corn buntings in the remote north west of Scotland (p 27). The use of miniature time-lapse cameras has shown that the impact of nest predation on Scotland's Slavonian grebe population (p 26) may not be as serious as had been feared, while the impact of fox predation on little terns may be more so (p 22). In India, six new locations for the critically threatened Jerdon's courser were discovered (p 29) when they left their footprints in specially constructed tracking strips, while in Morocco foraging northern bald ibises (p 30) were found to favour cultivated areas left fallow as much as semi-natural steppes, showing how land management by local villagers influences its use by the ibis.

Lapwings have declined in lowland and upland habitats.

Ray Kennedy (rspb-images.com)

There is increasing evidence that human disturbance can have deleterious impacts on some bird species, and new research shows that this includes the nightjar on lowland heathland (p 32). Further north at the RSPB's Abernethy Forest nature reserve, research has shown the importance of blaeberry, and the insects that feed on it, in the diet of the rapidly declining capercaillie; a recent study (p 33) has shown how to manage forest tree cover to encourage blaeberry. Grazing is being increasingly advocated as a conservation management tool, not only in northern forests, but also to halt scrub encroachment onto fenland. Research on the RSPB's Mid Yare nature reserve (p 39) has considered the impact of such light grazing on vegetation and invertebrates. Finally, a remarkable study has estimated the enormous economic value of wild nature (p 36) and shows that a single year's loss of natural habitats costs humanity more than $200 billion in that year, and in every year thereafter.

As an applied conservation organisation, it is important for us to achieve a balance between disseminating the results of our work to conservation practitioners as soon as we are confident of them, while also maintaining the quality of our scientific work by publishing it in the peer-reviewed scientific literature. Thus, while in most cases the information contained in this report is based upon publications in peer-reviewed scientific journals, in others we have presented important preliminary results that have not yet been published formally. A complete list of all publications for 2002 and the first half of 2003 is provided at the back of the report.

Much of the work outlined in this report would not be possible without the involvement of partners and funders, while none of it would be possible without the commitment of our scientific staff and affiliated PhD students. All are listed in the report, and its publication allows me to thank them all.

I would be delighted to hear any ideas you might have on how we could improve future versions of this report.

In the Trent valley 60% of rape fields were occupied by breeding reed buntings (left). Nest predation on Slavonian grebes (right) may be less serious than previously suspected.


Tony Hamblin (rspb-images.com)


Malcom Hunt (rspb-images.com)

THE ROLE OF SCIENCE IN THE RSPB

Dr David Gibbons
Head of Conservation Science, The RSPB

I am frequently asked how science fits into the work of the RSPB and, within that, how we set our scientific priorities. Here, I attempt to answer these questions.

Monitoring and prioritisation

Science plays a number of distinct roles in the RSPB's conservation work. Monitoring of birds and other taxa informs us of the status of each species and their population trends. This knowledge is used to set conservation priorities, so that species with an unfavourable status, such as the skylark, the bittern or the great yellow bumblebee, become high priorities.

These priorities are broadly shared with partner organisations because the methods of setting them are also shared. In the UK, the *Birds of Conservation Concern* red and amber lists, and *Biodiversity Action Plan* listings guide our species priorities for birds and other taxa, while the global red-listing process guides our international bird species priorities.

Unfortunately, we are unable to study all priority species, especially internationally where there is a vast array of threatened species. We have to be more pragmatic and prioritise further, and we do this within the RSPB's corporate plan, *Future Directions*. In the UK, we focus on those priority species for which the RSPB is best placed to deliver research, conservation management and advocacy, whereas internationally, we study threatened species in those countries in which the RSPB focuses its broader work.

Research

We subsequently undertake research to diagnose the causes of the unfavourable status of these priority species. Although they overlap, we adopt two separate approaches, either intensive studies of species' ecology, or studies of ecological processes. While single species studies provide a wealth of information to guide that species' conservation, it may sometimes be more efficient to study wider ecosystem processes where these may have more general effects across species and habitats. Climate change, agricultural intensification, pollution and predation are all examples of such ecological processes. Both approaches allow us to suggest remedial solutions to improve the status of wildlife.

Testing solutions

We endeavour to test these solutions, ideally by experiment, prior to implementing them more widely. This allows the likelihood of success to be measured and the practicalities determined. Wherever practical in the UK, we test solutions on land that we manage or own, while accepting that in some cases experimentation may be impossible.

Research for advocacy

Although strongly influenced by biological priorities, our scientific programme is not solely dictated by them, else we would be unduly focused on the past and present, rather than the future. Industrial developments, changing land management practices and evolving government policy all require our research programme to be flexible to meet changing demands. Research is needed to allow us to understand the likely response of wildlife to these changes, so that we can advocate our view with confidence. Predicting the biodiversity effects of

renewable energy technologies, continuous cover forestry, or of the Common Agricultural Policy in EU accession countries fall squarely into this category. In addition, unpredictable events as diverse as disease outbreaks among Indian vultures, volcanic eruptions on Montserrat and foot and mouth in the UK have all required a rapid response from our research programme.

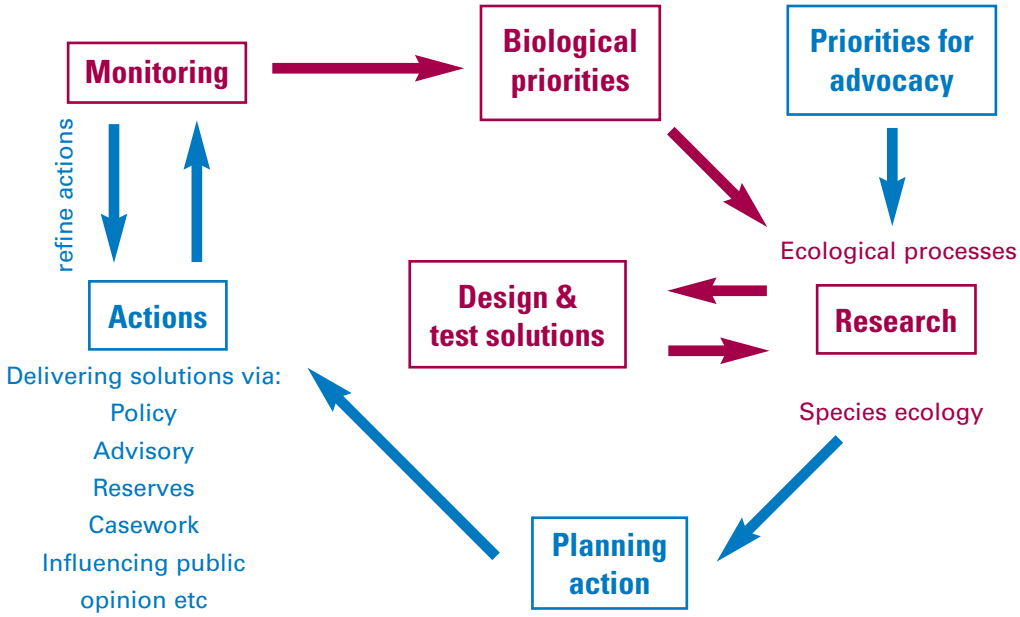
Conservation action

In principle, many research organisations could undertake such monitoring and research work. Arguably, the RSPB's greatest strength is that it acts upon these scientific results in order to improve the fortunes of wildlife, both on its own land and off. Underpinned by a range of strategic plans, the RSPB combines its scientific knowledge with policy development and advocacy to influence wildlife legislation and policy areas such as agriculture and planning. Perhaps the best recent examples of the inter-dependency of science and policy and science and practice, respectively, are the RSPB's role in the development of management options for agri-environment schemes, and the management of our own land for bitterns.

The RSPB combines science and policy development to influence the agri-environment schemes available to farmers.

Back to monitoring

Finally, of course, we continue to monitor populations to assess whether or not our actions, and those of others, have improved the status of species, allowing us to modify our actions if necessary.

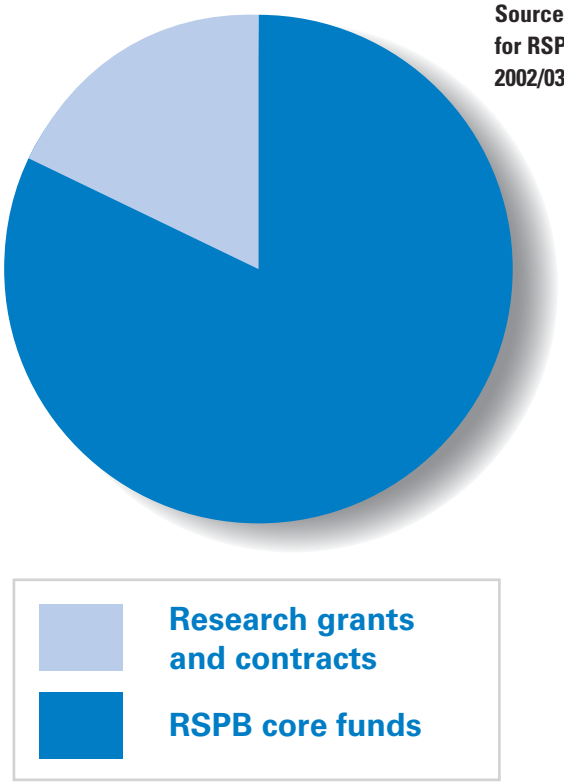


Links in the conservation chain, from monitoring to action. Science plays a leading role in those links shown in red.

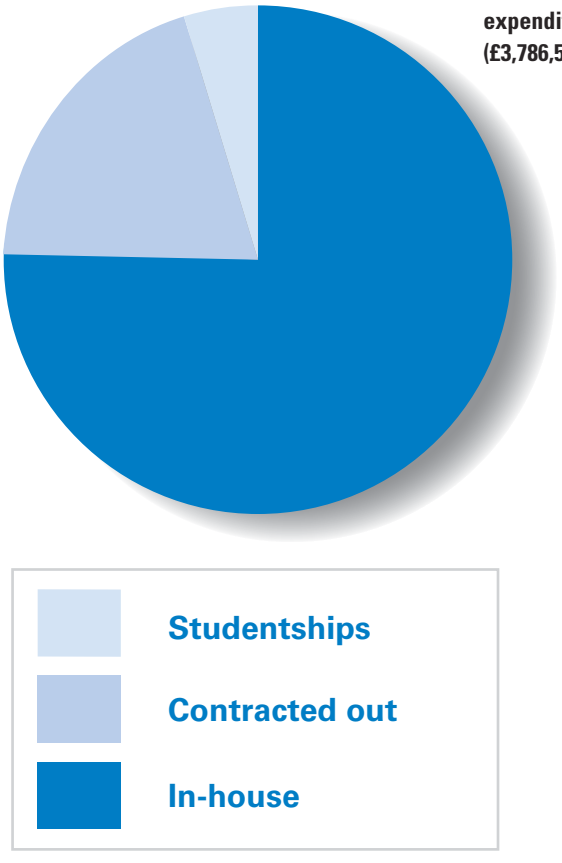
FUNDING

While its members and supporters fund most of the RSPB's scientific work, many organisations (listed below) have funded specific projects through, for example, research contracts and grants towards partnership projects. Many of those listed are also active partners in the research, or may have provided support for wider conservation action.

Anglian Water
Biotechnology and Biological Sciences Research Council
BP (through Scottish Forestry Alliance)
British Beet Research Organisation
British High Commission, New Delhi, India
British Ornithologists' Union
British Potato Council
CJ WildBird Foods
Club 300 Sweden
Countryside Council for Wales
Crop Protection Association UK
Darwin Initiative
Department for Environment, Food and Rural Affairs
Department for International Development
Department of Trade and Industry
English Nature
Environment Agency
Environment and Heritage Service
EU LIFE Fund
Foreign and Commonwealth Office
Forestry Commission
Home Grown Cereals Authority
Linking Environment and Farming
National Trust
Natural Environment Research Council
Safeway Stores plc
Sainsbury's Supermarkets Ltd
Scottish Executive Environment and Rural Affairs Department
Scottish Natural Heritage
Syngenta Crop Protection UK
The Woodland Trust



Sources of funding for RSPB science 2002/03.



RSPB science expenditure 2002/03 (£3,786,526).

PARTNERSHIPS

By working with a wide range of partners, listed below, the RSPB is able to maximise the quantity and quality of conservation science that it undertakes. The value of partnership is nowhere more evident than in the contribution made by thousands of birdwatchers who take part in bird monitoring. Their contribution is invaluable.

Academy of Sciences, Belarus
Aculeate Conservation Group
Adam Mickiewicz University (Poland)
ADAS
Allerton Research and Education Trust
Aquatic Warbler Conservation Team
Australian Animal Health Laboratory
Avian Demography Unit, University of Cape Town
Azov-Black Sea Ornithological station
Bird Conservation Belarus (APB)
Bird Conservation Nepal
BirdLife International
BirdLife Middle East Office
BirdLife South Africa
BirdWatch Ireland
Biomathematics and Statistics Scotland
Bombay Natural History Society
Botanical Society of the British Isles
Botanical and Zoological Museums of the University of Copenhagen
British Antarctic Survey
British Birds
British Bryological Society
British Lichen Society
British Museum of Natural History
British Ornithologists' Union
British Sugar
British Trust for Ornithology
Bumblebee Working Group
Butterfly Conservation
Cambridge Conservation Forum
Cape Verde Government
Centre for Agri-Environmental Research, University of Reading
Centre for Ecology and Hydrology
Centre for Life Sciences Modelling, University of Newcastle
Centre for Social and Economic Research on the Global Environment, UEA
Central Science Laboratory
The Chough Study Groups
Czech Society for Ornithology
Department des Eaux et Fôret – Morocco
Department of Agriculture and Rural Development (NI)
Department of Biological Sciences, De Montfort University
Department of Biological Sciences, University of Stirling
Department of Forest and Wildlife, India
Departments of Plant & Soil Science and Zoology, University of Aberdeen
Department of Zoology, University of Cambridge
Department of Zoology, University of Oxford
Department of Zoology & Animal Ecology, University of Cork
DHKD (former Turkish BirdLife Partner)
Directorate of National Parks, Ministry of Forestry, Turkey
Direction Regionale des Eaux et Fôrets du Sud-ouest, Agadir, Morocco
Division of Environmental & Evolutionary Biology, University of Glasgow
Durrell Wildlife Conservation Trust
Doga Dernegi (Turkish Nature Society – BirdLife Partner designate)
Doñana Biological Station
ECOSA (Ecological Survey and Assessment)
Entotax Consultants UK
Environment Agency
Environmental Research Centre, University of Durham
European Bird Census Council
Falklands Conservation
FAO Syria
Fauna & Flora International
Forestry Commission
Forest Enterprise
Friends of the Chagos
Frizzell Insurance
The Game Conservancy Trust
Gdansk Ornithological Station - Polish Academy of Sciences
Ghana Wildlife Society
The Government of Tristan da Cunha
G Spoor Associates
Harper Adams University College
The Hawk and Owl Trust
Hungarian Ornithological Nature Conservation Society (MME)
Institute of Biomedical & Life Sciences, University of Glasgow
Institute of Zoology
Instituto Nazionale per la Fauna Selvatica, Bologna

Invertebrate Link
JNCC
Jonathan Tipples
Laboratoire D'Analyses et Récherches Vétérinaire D'Agadir, Agadir, Morocco
Lake District National Park Authority
Leicestershire and Rutland Wildlife Trust
The Macaulay Institute
Makerere University Institute of the Environment and Natural Resources
Malloch Society
Marine Turtle Research Group, University of Wales – Swansea
Ministry of Defence
Ministere Delegue, Charge des Eaux et Forets, Morocco
Minsk Institute of Zoology
Montana State University
Montserrat Ministry of Agriculture, Lands, Housing & Environment
Montserrat National Trust
NABU (German Society for Nature Conservation)
National Audubon Society
National Bird of Prey Centre
National Institute of Water & Atmospheric Research, New Zealand
National Museums of Kenya
NatureKenya
NatureUganda
Nicholas Watts
Nigerian Conservation Foundation
Nyiregyhaza College, Hungary
Parc National de Souss-Massa
Penny Anderson Associates
Percy Fitzpatrick Institute of Ornithology
Plantlife
Polish Society for the Protection of Birds (OTOP)
Portuguese Society for the Study of Birds (SPEA)
Poultry Diagnostics Research Centre - India
Queen's University, Belfast
Rare Breeding Birds Panel
Royal Botanic Gardens - Kew
Royal Holloway College
Russian Bird Conservation Union
School of Animal and Microbial Sciences, University of Reading
School of Biological Sciences, UEA
School of Biological Sciences & School of Geosciences, University of Edinburgh
Scottish Environmental Protection Agency
Scottish Agricultural College
Scottish Forestry Association
The Scottish Raptor Study Groups
The Seabird Group
Severn Trent Water
Shetland Oil Terminal Environmental Advisory Group
Slender-billed Curlew Working Group
Spanish Ornithological Society (SEO)
State Government of Haryana, India
Statistics Netherlands
The Tyndall Centre, UEA
UK Overseas Territories Conservation Forum
The University of Derby
The University of Helsinki
The University of Wolverhampton
The University of Riga
UNEP World Conservation Monitoring Centre
The Welsh Kite Trust
Wildlife Conservation Society of Tanzania
The Wildlife Trusts
The Wildfowl & Wetlands Trust
The Woodland Trust
WWF-UK
Yorkshire Dales National Park Authority
Zoological Society of London

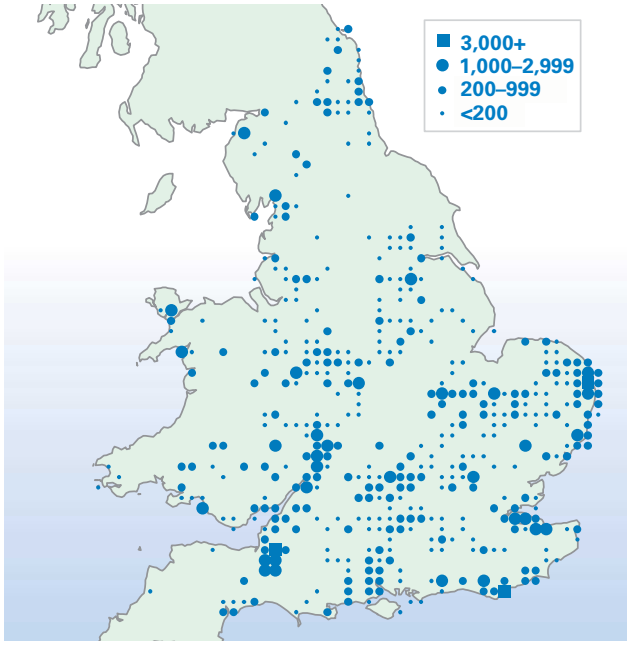
MONITORING

The RSPB is involved in a wide variety of monitoring schemes for birds and, to a lesser extent, other taxonomic groups. These include annual, multi-species bird monitoring schemes carried out in partnership with other organisations (for example the Breeding Birds Survey and Wetland Birds Survey), monitoring programmes on our own nature reserves, and single species surveys undertaken as part of the Statutory Conservation Agencies/RSPB Annual Breeding Bird Scheme (SCARABBS). We have established a biodiversity monitoring scheme on our reserves, covering a wide range of taxa, and are involved in surveys of several UK Biodiversity Action Plan priority species.

Lapwing by Gordon Langsbury (rspb-images.com)

Breeding waders of wet meadows

This joint BTO/RSPB/EN/DEFRA survey aimed to estimate the sizes of the populations of breeding waders on lowland wet grassland sites in England and Wales in 2002, and to assess changes since the previous survey in 1980–83 (mostly 1982).



Location of sites surveyed in 2002; symbols refer to area covered (ha) in each 10-km square.

Important sites missed in the previous survey, or created subsequently, were also surveyed in 2002 to provide new baseline population estimates for breeding waders on wet grassland. The main species recorded were redshank, snipe, lapwing, curlew and oystercatcher, although other waders, ducks and yellow wagtails were also recorded. Yellow wagtails were included because of their association with wet grassland and concerns about declining numbers.

In 2002, 1,035 sites were surveyed compared with 1,398 sites in 1980–83. Of these, 814 sites were suitable for paired comparisons. Fieldworkers were sometimes refused access to sites in the aftermath of foot and mouth disease, which also led to a reduction in grazing in 2002. Furthermore, several observers noted that the exceptional spring drought caused many grasslands to remain dry throughout the spring.

Over the 20-year period, curlew numbers declined by 40%, redshanks by 21%, lapwings by 40% and snipe by an alarming 61% on wet grassland. By contrast, oystercatcher numbers increased by 51% over the same period. Site occupancy by the declining wader species in 2002 was well below that found 20 years earlier. For example, snipe were found on only 7.4% of sites in 2002, but on 25.5% in 1980–83. Although lowland wet grassland comprises only part of the distribution of these breeding waders, their trends are useful indicators of the quality of this habitat. A high proportion of the waders recorded in 2002 were found on nature reserves: 44% compared with 30% in 1980–83. While this may not be surprising, given that conservation management is the priority on these sites, it shows the increased importance of nature reserves for these species on wet grassland.

Breeding wader numbers for all sites surveyed in 2002, and a comparison of numbers on sites surveyed in both 1980–83 and 2002.

Species	Number of pairs in 2002	% change in pairs 1982 to 2002 (confidence limits)	% of sites occupied 1982	% of sites occupied 2002
Oystercatcher	951	+ 51 (+ 27 to + 86)	15.6	19.2
Lapwing	5,170	– 40 (– 52 to – 25)	71.2	45.5
Snipe	576	– 61 (– 73 to – 48)	25.5	7.4
Curlew	435	– 40 (– 53 to – 27)	18.7	12.1
Redshank	2,281	– 21 (– 39 to – 2)	42.0	23.3

Smith KW (1983) The status and distribution of waders breeding on lowland wet grasslands in England and Wales. *Bird Study* 30: 177-192.

Repeat upland bird surveys

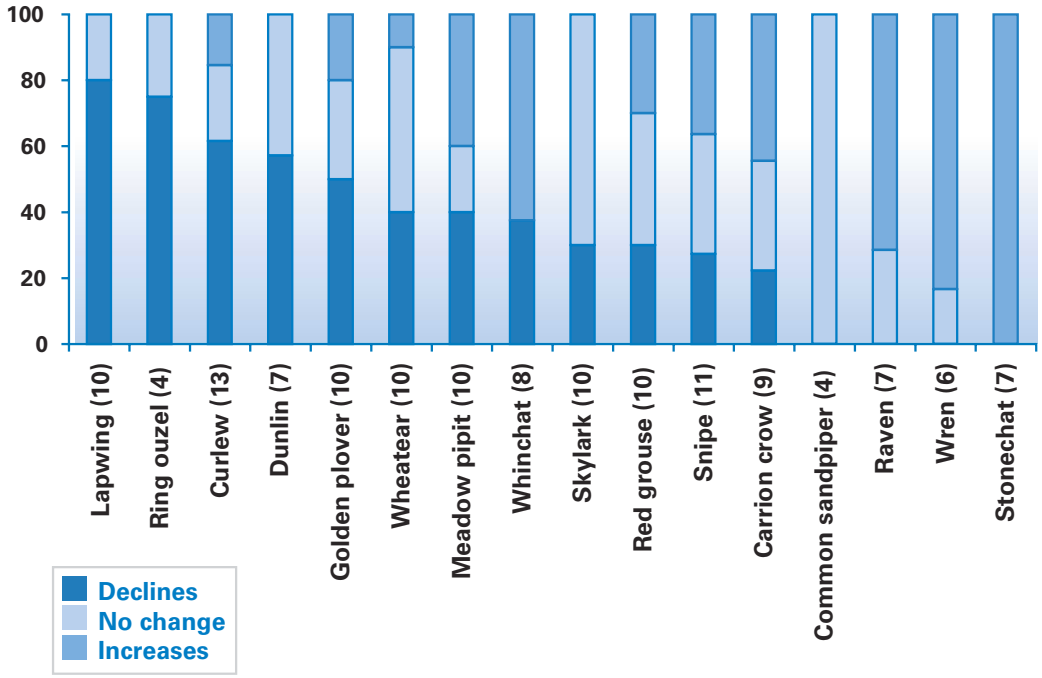
Uplands, approximately one-third of the land surface of the UK, hold important breeding concentrations of several birds of conservation concern, such as the curlew, dunlin, ring ouzel and twite.

Knowledge of the population trends of many widespread upland breeding birds in Britain is, however, poor, as there has been little long-term monitoring. The aim of this RSPB/CCW/EN/DEFRA study was to repeat previous upland bird surveys as closely as possible, in order to determine trends in upland breeding bird populations over the last 10–20 years.

We re-surveyed 1,353 km^2 of the British uplands, in nine large study areas. These areas were originally surveyed in 1980–91, and were re-surveyed in 2000 and 2002. They ranged from North Wales to Lewis & Harris, and encompassed the North and South Pennines, North Yorkshire, the Lake District, North East Scotland, Sutherland and Caithness. In addition, we included in our analyses trends from another five upland study areas that had been re-surveyed – South and South West Scotland, North Staffordshire, North West Wales and Exmoor. These five areas, covering about 460 km^2, were originally surveyed in 1977–1989 and re-surveyed in 1992–2002.

In general, wrens, stonechats and ravens increased over the period (as did buzzards, although they were recorded at few sites), while lapwings, curlews, dunlins and ring ouzels declined. The trends for individual species were often variable between study areas, however, increasing in some areas, but declining in others. The factors underlying these population trends are likely to be complex, but may well involve changes in land use, grazing levels and predator abundance.

Although a huge area of upland was surveyed, we need to be cautious in extrapolating our results to all of the British uplands because of the necessarily non-random selection of the study plots. Despite this, the declines among some of the breeding waders are worrying and largely unexpected.



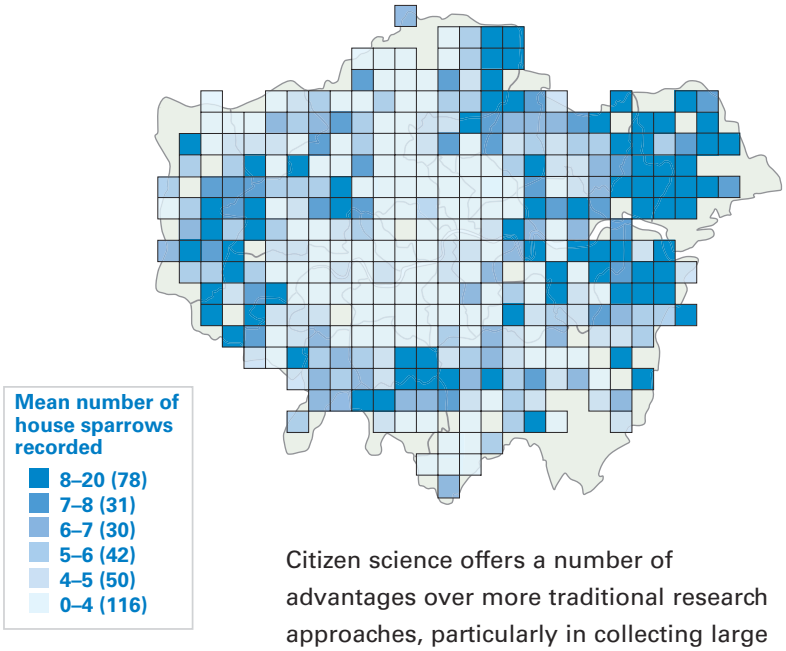
The percentage of study areas with significant declines, no change or increases for each species. Only species recorded on four or more areas included; number of areas in parentheses.

JNCC, SNH, and the Lake District and Yorkshire Dales National Parks Authorities provided invaluable help and assistance.

Citizen science at the RSPB

The RSPB is becoming increasingly adept at collecting scientific data by engaging the public in citizen science projects. Such projects are valuable tools for conservation organisations for a variety of reasons, not least for the scientific data they yield.

Map of house sparrow abundance across London by tetrad.



Citizen science offers a number of advantages over more traditional research approaches, particularly in collecting large samples of data with a wide geographical spread on common bird species. Inevitably, however, data collected by such projects suffer from a number of problems, such as bias in participants, under-reporting of negative results, inaccuracy, exaggeration and mischievous returns. This means that results have to be interpreted with caution, and the data are often best used as indices, as biases and error margins are unlikely to vary between regions and repeat surveys.

To date, citizen science at the RSPB has concentrated on birds in gardens and those actually nesting within participants' houses. The *Homes for birds* survey, which involved 10,000 or so volunteers, found that house martins, swifts, house sparrows and starlings were four times more likely to breed on older, rural houses than modern, urban ones, while houses with recent roof repairs were significantly less likely to host swifts or starlings. These findings have highlighted the potential impact of modern housing design, building materials and new building regulations on birds.

In June 2002, more than 12,000 people participated in a London house sparrow survey organised by the RSPB and the London Biodiversity Partnership, allowing the distribution and geographical pattern of abundance of this species to be described on a resolution unattainable previously. The results showed a clear pattern of low numbers and frequency of occurrence in central London, with more birds in the outskirts and particularly high densities in east London. Future analyses will look for relationships between sparrow distribution and the environmental factors that might underlie it, and that could be implicated in recent declines. Other projects, such as investigations into the choice of nest sites in gardens and the long-running Big Garden Birdwatch, point to a productive future for citizen science at the RSPB.

Simple surveys involving members of the public can provide valuable data.

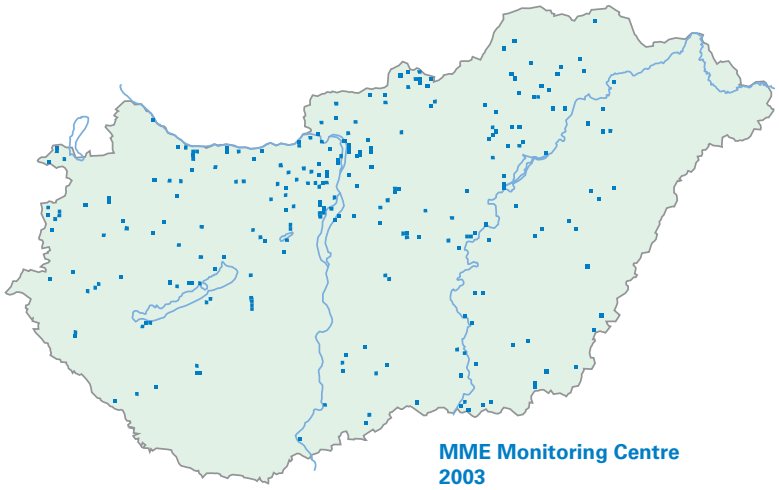
Andy Hay (rspb-images.com)

Eaton MA, Gregory, RD and Farrar A (2002) Bird Conservation and Citizen Science. *ECOS* 23: 5-13.

Wotton SR, Field R, Langston, RHW and Gibbons, DW (2002) Homes for birds: the use of houses for nesting by birds in the UK. *British Birds* 95: 586-592.

Common breeding bird monitoring in Hungary

MME/BirdLife Hungary, in co-operation with the RSPB and the European Bird Census Council, began a common breeding bird monitoring scheme in Hungary in 1998. The scheme, which uses a point count method to survey birds in 2.5 x 2.5 km grid squares, has grown from strength to strength.



Squares surveyed in Hungary in 2002.

By 2002, the scheme, called *Mindennapi Madaraink Monitoringja* (MMM), involved at least 218 volunteer counters surveying 278 squares. The survey squares are selected at random but from within an area defined by the observer; hence the design is semi-random but this has proved extremely effective in getting people involved.

A number of new initiatives have been developed recently. Recordings of bird songs have been distributed on tapes to new counters, and population trend analyses have been undertaken using the very latest methods. With financial help from the Hungarian Environment Ministry, a website has been developed which contains information on numbers and trends of breeding birds in Hungary, and enables counters to submit and verify their field data. Finally, the same method has been adopted to survey common wintering birds and nearly 100 squares were counted in January 2003.

Although the period over which population trends are examined is short, from 1999 to 2002, some interesting results have already emerged. For example, house sparrow numbers have increased while lapwings and bee-eaters have declined. Interestingly, farmland birds as a group seem to be doing quite well in Hungary, in stark contrast to their fortunes in NW Europe. In general, agricultural practices and land use are much less intensive in Hungary than in the west and this probably explains the difference in population trends. Of course, all this could change when Hungary becomes a member of the European Union in 2004. The MMM will provide a unique baseline against which to measure the impact of accession on the Hungarian countryside and its birds.

Andrew Hay (rspb-images.com)

Bee-eater numbers declined in Hungary from 1999 to 2002.

Szép T and Nagy K (2002) Mindennapi Madaraink Monitoringja (MMM) 1999-2000. MME/BirdLife Hungary, Budapest.

THE ECOLOGY OF THREATENED SPECIES

Research into the ecology of threatened species is a particular strength of the RSPB, and provides a wealth of valuable information to guide conservation work. Outside the UK, most of our ecological research is undertaken on globally threatened bird species in RSPB 'focal' countries. In the UK, however, where there are few globally threatened bird species, research is directed at those species that have declined most. More recently, we have begun research on threatened species in other taxonomic groups.

House sparrow by Laurie Campbell (rspb-images.com)

Ecology and conservation of the great yellow bumblebee

The RSPB is lead partner for 36 rare or declining species identified as priorities within the UK Biodiversity Action Plan. One of these is the great yellow bumblebee *Bombus distinguendus.*

Great yellow bumblebee.

M Edwards (Bumblebee Working Group)

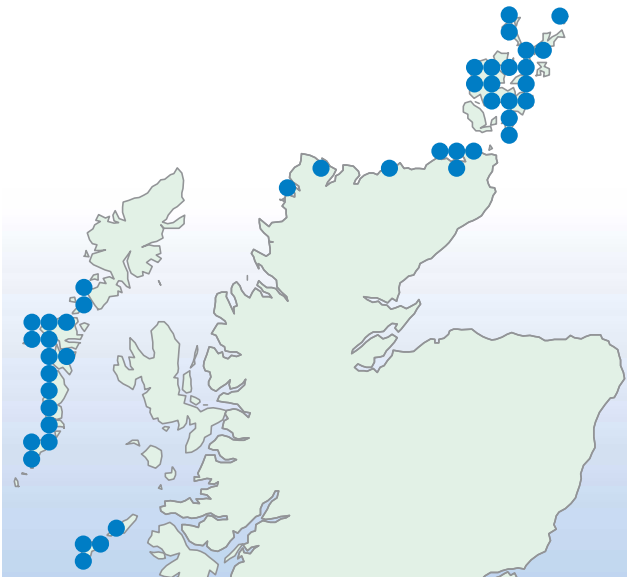
In 2000, an RSPB/SNH/Bumblebee Working Group survey showed that this formerly widespread bee was now confined to the western seaboard of Scotland and the Orkney Islands, with strongholds in the Inner and Outer Hebrides.

An earlier, 1998, study of its foraging behaviour in South Uist, facilitated by the RSPB, established its requirements as flower-rich machair grassland and a continuum of pollen and nectar-rich flowering plants throughout its May to September flight period. The bumblebee was adversely affected by early cutting and summer grazing, and hence probably benefited from management advocated for the corncrake.

More recently, the Institute of Zoology (Zoological Society of London) and the RSPB have initiated a pilot study of the population genetics of *Bombus distinguendus*. Eight polymorphic microsatellite loci have been identified which can be used for genotyping. The method will be applied to samples from throughout the bees' range over the next few years to determine the number of colonies within sites, assess the degree of inbreeding within sites and the level of gene flow between them. This will help to determine at what level to apply conservation measures: by site, island group or across the entire species' range.

During this pilot study, a few worker bees were sacrificed to provide sufficient DNA for analysis. A non-lethal technique has now been developed using a related but common species of bumblebee, *Bombus terrestris*. This technique is now being used to study the great yellow bumblebee and other species.

In 2002, an RSPB and NERC funded PhD at Cambridge University and Institute of Zoology began to investigate the great yellow bumblebee's ecology and conservation further, with the aim of identifying favourable methods of managing its habitat.



10-km square distribution of the great yellow bumblebee in Scotland 1989–2000, courtesy of the Bumblebee Working Group.

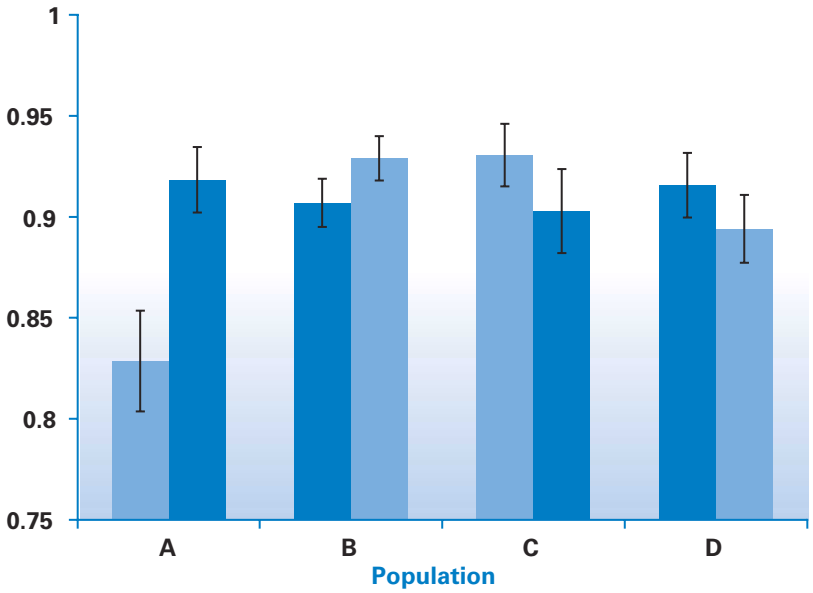
Hughes L (1998) The great yellow bumblebee, *Bombus distinguendus* (Morawitz): aspects of habitat use, phenology and conservation on the Machair of the Outer Hebrides, UK. MSc thesis, University College London.

Holehouse KA, Hammond RL and Bourke AFG Non-lethal sampling of DNA from bumble bees for conservation genetics. *Insectes Sociaux* (in press).

Ecology and conservation of rural house sparrows

The decline of house sparrows has generated intense public and media interest, helping to raise the profile of declining farmland birds.

With NERC, the RSPB co-funded a study of four farmyard house sparrow populations (A–D) in Oxfordshire. The population at A had declined by 80% since 1971, from 150 breeding individuals to 35. While equivalent historical data for the other sites were unavailable, landowners thought their populations had remained stable.



Monthly survival rates (± s.e.) of house sparrows at each of four populations. For each site the left hand bar refers to 1999, the right to 2000. Light blue bars were years with no supplementary food, dark blue bars were with food provided.

Genetic analyses detected differentiation between all four populations even though they were only separated by a maximum of 24 km. Differentiation at this small spatial scale is rare in birds, and probably reflects a combination of the highly sedentary nature of this species and the fragmentation of its breeding habitat.

Annual productivity of the declining population (A) did not differ between the pre-decline period (1967–1971) and the present. Similarly, productivity at the only stable population at which it was measured (B) and at A was comparable, as were post fledging survival rates. Over-winter survival rate was much lower at A than at all other sites, however, with only 40% of birds surviving between one autumn and the following spring. To investigate the cause of this low survival, supplementary seed food was provided experimentally during the winter at all of the sites, yet increased over-winter survival only at A.

We concluded that population A was limited by over-winter food supply and that the restricted movement between populations may be insufficient to sustain it by immigration. Winter food supplies may have been diminished by reductions in spring sowing of cereals (loss of stubbles), herbicide-mediated reductions in weed seeds, and increases in bird-proof storage of grain and animal feed stocks. The hypothesis that rural house sparrows may decline by a series of local extinctions was supported by a farmer survey. This revealed that house sparrow decline presents itself not as a reduction in numbers at all farms, but as a complete loss at some farms, with population stability at others.

As well as winter food supplies, invertebrate food for nestlings or lack of nest sites may be limiting at some sites. Given the house sparrow's sedentary nature, these resources must be provided as ubiquitously as possible. The new 'entry level' agri-environment scheme, which is hoped to reach up to 80% of farms, may help to achieve this.

Inspecting a house sparrow nest box.

Hole DG, Whittingham MJ, Bradbury RB, Anderson GQA, Lee PLM, Wilson JD and Krebs JR (2002) Widespread local house-sparrow extinctions. *Nature* 418: 931.

The ecology of tree sparrows

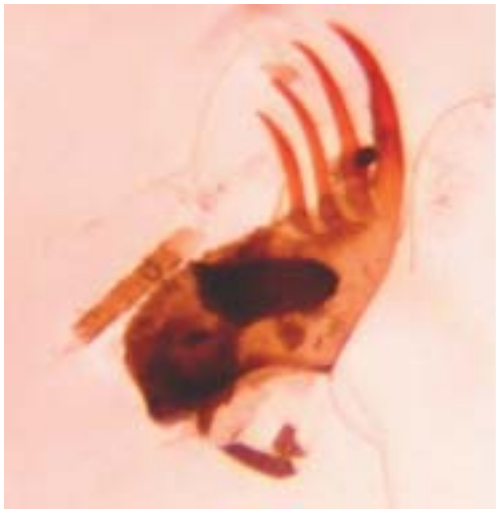
The 95% decline in the UK tree sparrow population between 1970 and 1999 prompted the RSPB, EN and Anglian Water to investigate the environmental factors currently limiting tree sparrow populations, and to identify conservation measures to allow population recovery.

The study focused on tree sparrows breeding around Rutland Water in the East Midlands of England, and is supported by the Leicestershire and Rutland Wildlife Trust and sponsored by CJ WildBird Foods.

Experimental provision of nest boxes has shown that locally recruiting birds show a strong preference to nest close to wetland edge habitats, relative to open farmland. This is probably due to the abundance and diversity of chick food invertebrates associated with wetlands. Birds breeding adjacent to wetland make heavy use of marginal habitats (willows, sedge, shingle, wet grassland etc) while foraging for chick food. Nestling diet can include large numbers of aquatic invertebrates such as

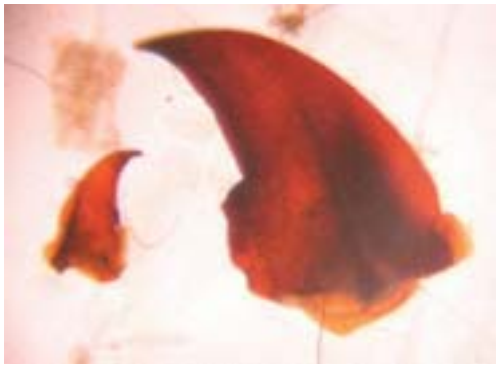
Guy Anderson

Wetland habitats around Rutland Water provide valuable invertebrate food sources for breeding tree sparrows.



Derek Gruar

Damselfly nymph mouthparts



Derek Gruar

Adult ground beetle mandibles

Rob Field

Adult chironomid midge head

Examples of invertebrate fragments identified under a microscope, taken from tree sparrow chick droppings.

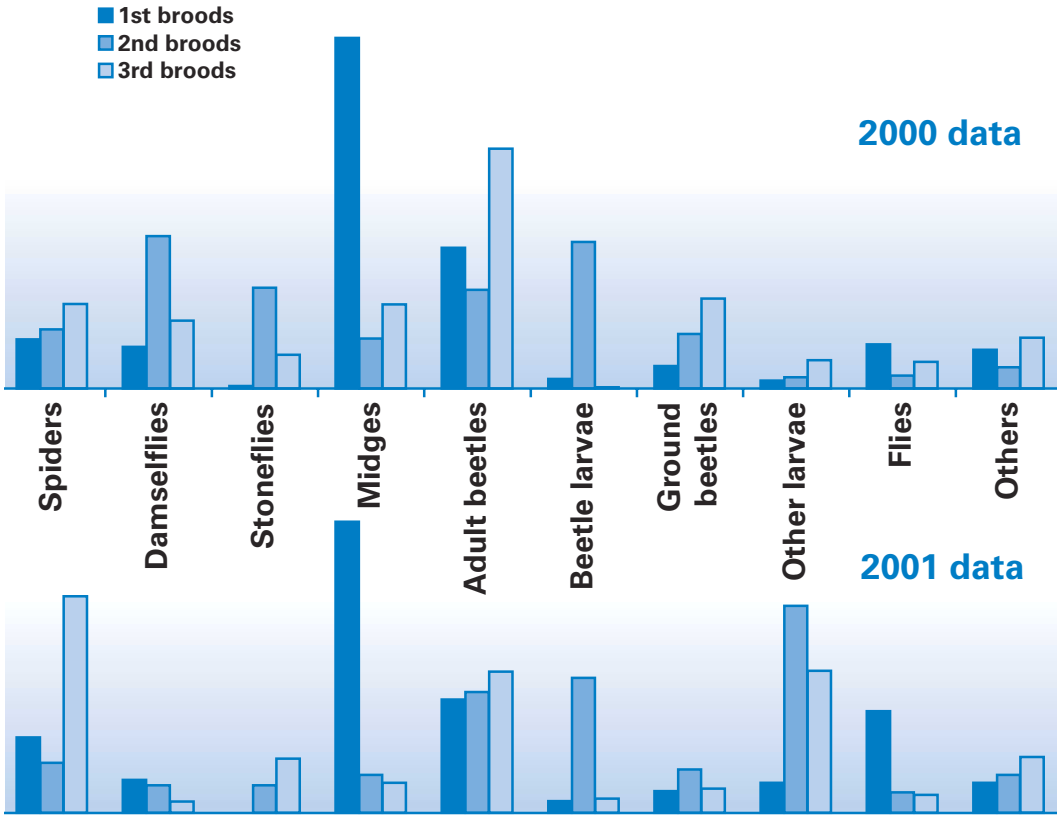
midges and damselflies, and is generally diverse with at least 15 different invertebrate orders identified by faecal analysis. Large seasonal and annual differences in chick diet composition suggest that tree sparrows are generalist invertebrate feeders, switching between prey types dependent on temporary local availability.

It is well established that agricultural intensification has had negative effects on many invertebrate groups, and it is possible that large areas of UK farmland no longer provide the seasonal diversity and abundance of invertebrates required to maintain adequate tree sparrow productivity.

At the scale of this experiment, proximity to wetland was more critical in determining nesting location than the local year-round availability of seed food. On a larger scale, however, more relevant to winter foraging ranges, the RSPB's *Bird Aid* project has shown that winter seed food may also be limiting, as supplementary seeds provided over winter have tended to increase local breeding populations. This emphasises the need for conservation measures to provide all required resources at appropriate scales to ensure population recovery.

Mark Hamblin (rspb-images.com)

Tree sparrow numbers declined by 95% in the UK between 1970 and 1999 (BTO data).



Seasonal and annual variation in tree sparrow chick diet. Within each brood and year, bars represent the proportion of all identified individual invertebrates in each taxonomic group. The vertical axis is the same for both years.

Anderson GQA, Gruar DJ, Wilkinson NI and Field RH (2002) Tree sparrow *Passer montanus* chick diet and productivity in an expanding colony. *Aspects of Applied Biology* 67: 35-42.

The ecology of reed buntings

Reed buntings suffered a large population decline in both wetland and agricultural habitats during the late 1970s and early 1980s. Increased winter mortality linked to agricultural intensification was the probable cause.

Oilseed rape in flower.

Following a period of population stability during the late 1980s, numbers in lowland England began to decline again, with some indication from BTO nest record cards of increasing nest failure rates at the egg stage.

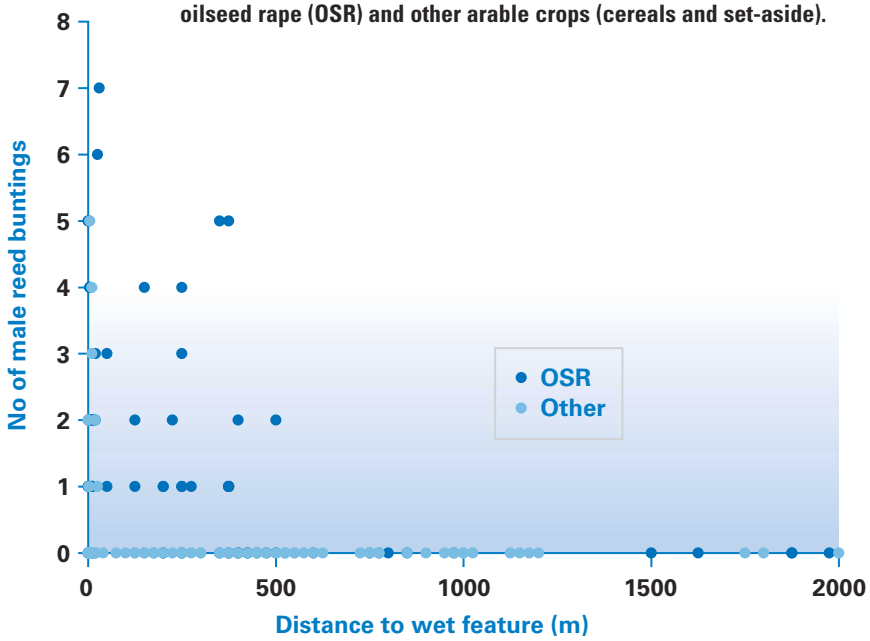
In 2000, the RSPB and EN initiated a detailed study of factors influencing the distribution and breeding success of reed buntings in farmland and wetland habitats (gravel pits) along the Trent Valley in Nottinghamshire. Sixty percent of oilseed rape fields were occupied by breeding reed buntings compared with just 10% of fields under winter wheat, 5% under barley and 20% under set-aside. Most rape fields contained 1–3 pairs but some held up to seven.

Reed buntings on cereal or set-aside fields were always within 50 m of a stream or wet ditch, but occurred on oilseed rape fields up to 500 m away from any wet habitat. This suggests that rape provided key resources that cereals and set-aside lacked. Oilseed rape receives less summer insecticide than most cereal crops and reed buntings were regularly seen collecting invertebrates from within rape fields. It may be that cereals and set-aside are relatively poor in invertebrates, forcing birds in these fields to nest near to wet habitats with their more abundant food supplies.

Breeding attempts were more successful when nests were concealed in emergent grass or herbaceous vegetation, with more of the relatively exposed nests in cereal and set-aside fields being predated. Adult buntings preferred to forage in rank grass and herbaceous cover, set-aside and rape, while chick condition was lower in nests that lacked nearby wetland features or rank vegetation. Nesting success was highest for birds breeding around gravel pits, lowest in cereal and set-aside fields and intermediate for farmland nests located in rank vegetation along streams, wet ditches or field boundaries.

In the absence of oilseed rape, farmland reed buntings need significant areas of invertebrate-rich rank vegetation in order to raise their young. The provision of wide, uncropped field margins should promote nesting opportunities for reed buntings on farmland.

The influence of distance to wet features (ponds, streams and wet ditches) on the abundance of male reed buntings in fields of oilseed rape (OSR) and other arable crops (cereals and set-aside).



Peach WJ, Siriwardena GM and Gregory RD (1999) Long-term changes in over-winter survival rates explain the decline of reed buntings in Britain. *Journal of Applied Ecology* 36: 798-811.

The University of Nottingham provided much logistical help.

Home range and habitat selection of male bitterns

One of the objectives of the RSPB/EN bittern ecology project is to understand the habitat requirements of bitterns to facilitate their recovery.

On a broad scale, this was achieved by comparing the characteristics of sites that lost breeding bitterns with those that retained them. Those reedbeds that retained bitterns were large wet sites at which management had taken place to prevent or limit successional drying out. Using these results, several key reedbeds have been improved for bitterns by recreating such early successional habitat.

At the fine scale, however, there was still a need to understand how bitterns used habitat features within reedbeds. To study this we followed the movements of eight males of this secretive species by catching and fitting them with small radio tags at our Minsmere and Leighton Moss reserves. These birds maintained home ranges of 10–20 ha during the breeding season, but expanded them at other times of year. This knowledge of the area of habitat required by males has informed the scale of reedbed rehabilitation projects and the size of newly created sites.

The radio tagged males fed almost exclusively inside the reedbed, particularly in the margin of reed next to open water. They were also sensitive to water levels within the reedbeds in which they fed; the average water depth used was about 20 cm. The presence of water and its free flow into the reedbed is important as it brings with it the fish prey upon which bitterns depend.

Reedbed management work to restore early successional habitats for bitterns continues to be undertaken and supported by the RSPB and others. Along with seven partners, the RSPB has successfully secured European LIFE funding to create new reedbed and restore wet reed at 19 sites throughout England. The future of Britain's bittern population looks more hopeful as a consequence.

An aerial photograph of the reedbed at the RSPB's Minsmere reserve showing the home range of a radio tagged male bittern during the breeding (white), moulting (red) and winter (yellow) periods.

A bittern at the reedbed edge.

2,310 active locations of eight male bitterns were obtained from radio tracking. Most were located in reedbeds within 30 m of the water's edge (open pools or ditches).

Tyler GA, Smith KW and Burgess DJ (1998) Reedbed management and breeding Bitterns *Botaurus stellaris* in the UK. *Biological Conservation* 86: 257-266.

Gilbert G, Tyler GA and Smith KW (2002) Local annual survival of booming male Great Bittern *Botaurus stellaris* in Britain, in the period 1990-1999. *Ibis* 144: 51-61.

Gilbert G, Tyler GA and Smith KW Nestling diet and fish preference of Bitterns *Botaurus stellaris* in Britain. *Ardea* (in press).

Diagnosis of the population decline of little terns in Britain and Ireland

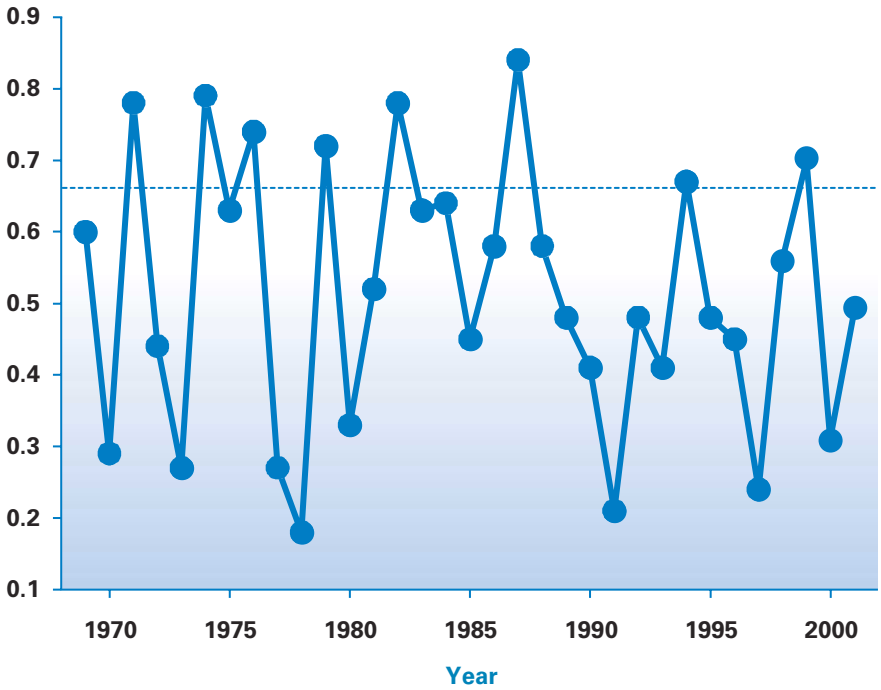
Little terns nest on mainland beaches where they are vulnerable to predation.

Little terns in Britain and Ireland declined by 27% from 2,850 pairs to 2,085 pairs between the comprehensive 1985–87 Seabird Colony Register (SCR) and the 1999–2001 Seabird 2000 surveys.

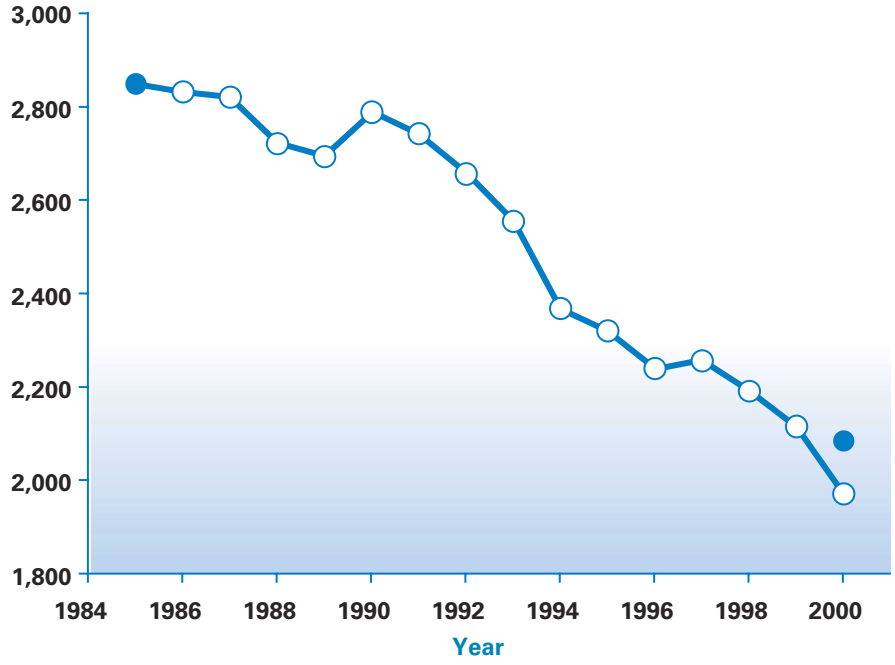
Data from annual counts at a sample of colonies (containing about 65% of the national total) demonstrate a long-term chronic decline at a rate of around 1.5% per annum. The decline has been manifested throughout the little tern's range with the exception of west Scotland where they have remained stable.

Reduced productivity is the most likely explanation for the population decline. Estimates of productivity have been very variable and at or below that required to maintain a stable population for over a decade. A simple population model using these variable annual productivity estimates, but constant survival rates, predicts the decline between the two surveys reasonably accurately.

Increased fox predation is the most likely cause of the reduction in productivity. There is little support for the widely held belief that vulnerability of little terns to foxes has increased owing to them being concentrated into fewer, larger colonies. The frequency

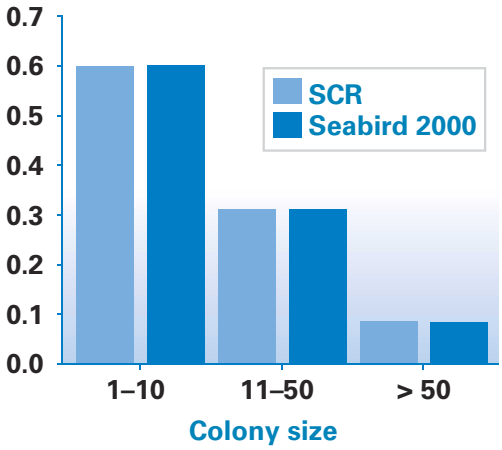


Trends in national productivity (chicks per pair) of little terns from 1969–2000. The dotted line represents the level of productivity required to maintain a stable population.



Model (open circles) of little tern population trend (number of pairs in Britain and Ireland), 1985–2000. Adult survival (assumed 0.89), survival to recruitment (0.33) and age of first breeding (three years) were held constant, but productivity allowed to vary. The filled circles are the little tern's actual population size (from SCR and Seabird 2000).

distribution of colonies of varying sizes did not change during the period of decline, and there is no relationship between productivity and population size. It is more likely that the population and range of foxes has increased. Game Conservancy data show fox populations have increased by about 400% since 1960, and their range has spread into East Anglia and the lowlands of eastern Scotland where they were formerly scarce.



Proportion of colonies of different sizes during the SCR (1985–87) and Seabird 2000.

Conservation of little terns will depend on reducing rates of fox predation at their colonies. Improvements in design of electric fencing around mainland colonies and creation of offshore islets using dredge spoil are possible solutions. Productivity and population trends at created sites or those with improved exclusion measures need to be compared with other sites to determine the efficacy of these methods.

Ratcliffe N, Pickerell G and Brindley E (2000) Population trends of Little and Sandwich Terns in Britain and Ireland from 1969 to 1998. *Atlantic Seabird* 2: 211-226.

Seabird monitoring is undertaken by a partnership between the RSPB, JNCC, Birdwatch Ireland, Seabird Group and SOTEAG.

Mark Thomas (rspb-images.com)

Predation of little tern eggs and chicks is probably causing its population decline.

Black grouse recovery in Wales

RSPB

The habitat management carried out in some areas included tree thinning in closed canopy conifer plantations. Densities were reduced from over 2,000 trees per ha to 200–1,000 per ha to allow heather and bilberry to regenerate.

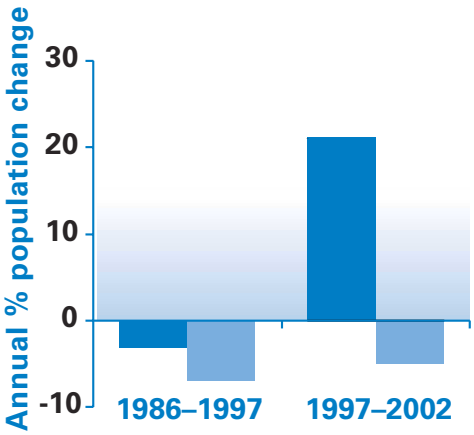
Although black grouse numbers increased in Wales in the mid 1900s, probably due to widespread conifer planting in the uplands, evidence of a subsequent rapid decline prompted the first all Wales census in 1986.

Repeat censuses documented a systematic decline of 50% by 1997, mirroring declines elsewhere in the UK. In response, a partnership of organisations supported a Welsh recovery project during 1997–2002.

The project concentrated on six key areas that the 1997 census had shown contained 80% of the population. Management took place in winter, where conifer plantations and heather moor occurred together. Prescriptions were based on previous studies of habitat requirements and included conifer thinning along plantation edges and heather mowing on adjacent moor, both of which stimulate the regeneration of heather and bilberry, important chick feeding habitats. More than 1,300 ha of management was completed in the key areas, bringing 2,600 ha of habitat into favourable condition. In addition, advice was given for sites outside the key areas and management was carried out by landowners on two of these.

To evaluate any response to this management, a census was undertaken in 2002 and a total of 243 birds was counted, 88% more than 1997 and just 7% less than in 1986. This result might, however, have come about if black grouse had responded to some factors other than habitat management, such as a series of dry summers or a general increase in predator control for sporting interests. To control for this, the change in black grouse numbers in the years before and after management began was compared between areas with and without management.

The results were striking; in managed areas, numbers increased markedly following its implementation, while elsewhere the population continued to decline. Although levels of localised predator control varied between managed areas, they did not change markedly between the two periods and are thus unlikely to explain this response. The black grouse population response did vary between key areas, however. Further analyses will identify what demographic rate has changed to cause population recovery, and how it might have been influenced by habitat management and predator control.



Annual percentage change in number of lekking black grouse before and after habitat management started in winter 1997, in areas with (dark blue) and without (light blue) management. There were 264 black grouse in Wales in 1986, 131 in 1997 and 243 in 2002.

Lindley P, Johnstone I and Thorpe R (2003) The status of black grouse in Wales in 2002 and evidence for population recovery. *Welsh Birds* (in press).

Funding for this project was provided by the European Agriculture Guidance and Guarantee Fund, the National Assembly for Wales Rural Development Grant, Forest Enterprise Cymru, Countryside Council for Wales and the RSPB.

Habitat associations of breeding ring ouzels

The ring ouzel is one of our least studied birds. This lack of knowledge has hindered identification of the causes of an estimated 58% decline in the UK breeding population between 1988–91 and 1999, which led to its recent red-listing as a bird of conservation concern.

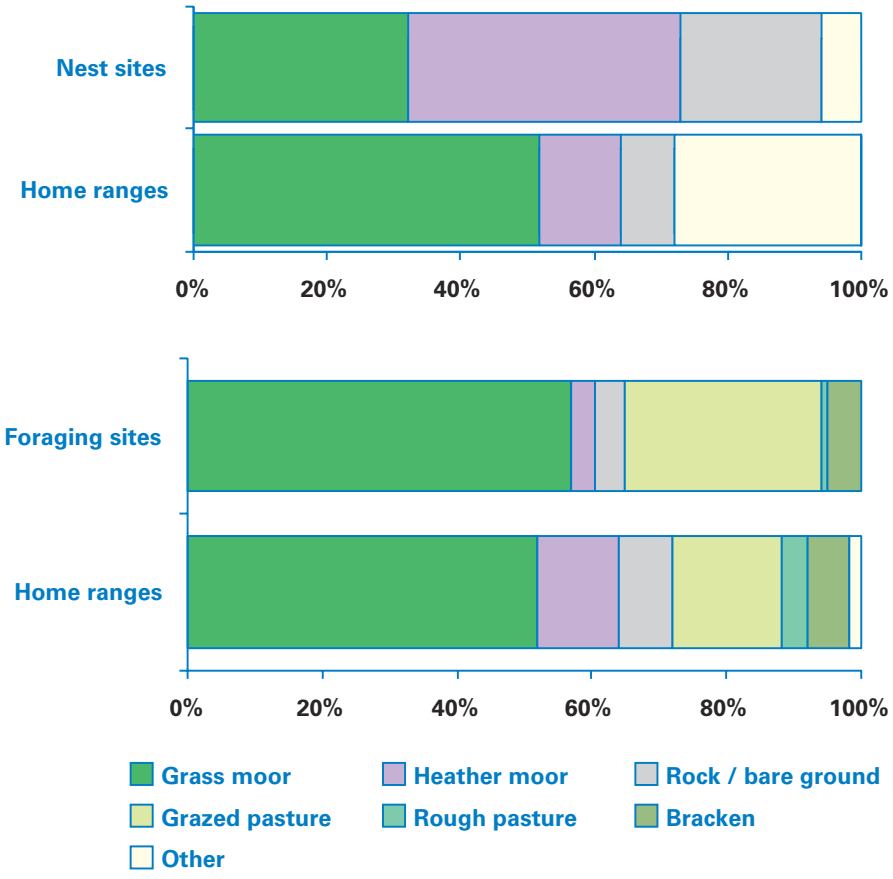
Two RSPB research projects addressed this issue, the first a study of ring ouzel breeding ecology in collaboration with Cambridge University and NERC, the second an analysis of broad scale correlates of changes in abundance in collaboration with SNH.

The breeding ecology study found that ring ouzels selected tall heather for nesting, usually on steep slopes, but that they selected short, open sward, grasslands for foraging during the nestling stage. Earthworms formed the bulk of the nestling diet and their availability is probably greatest on short grass. Overall, ring ouzels foraged in certain grassland habitats more, and in heather moorland less, than expected based on the availability of these habitats within home ranges. Home ranges in turn comprised more of these grassland habitats, and less heather moor, than expected from their availability in the study area. Almost all foraging was within 400 m of the nest, and home ranges occurred in areas with a diverse habitat composition, suggesting that ring ouzels require habitat mosaics where suitable nesting and foraging sites are in close proximity.

The broad scale analysis found that declines in the abundance of breeding ring ouzels between 1988–91 and 1999 in Scotland were least marked in areas with steeply sloping terrain, but greatest at both extremes of the species' altitudinal range. In addition, declines were greater in areas with more extensive conifer plantations during the late 1980s, suggesting detrimental effects of afforestation that extended beyond the initial loss of breeding habitat.

These two studies suggest that changes to upland habitats and land-use could be causing ring ouzel declines and further work is planned to investigate this in greater detail.

The percentage of ring ouzel nest sites (top) and foraging locations (bottom) in different habitats in relation to their availability in home ranges. While nests are preferentially located in heather and rock, grass moor and grazed pastures are selected for foraging.



Burfield IJ (2002) The breeding ecology and conservation of the ring ouzel *Turdus torquatus* in Britain. PhD thesis, University of Cambridge.

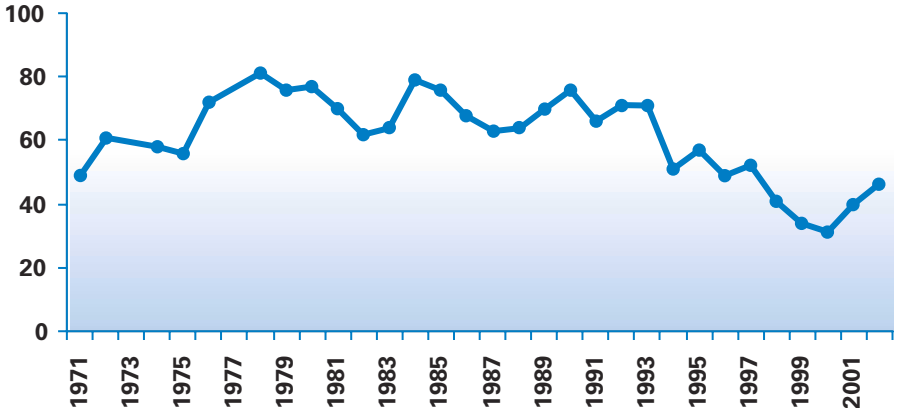
Buchanan GM, Pearce-Higgins JW, Wotton SW, Grant MC and Whitfield DP (2003) Correlates of the change in Ring Ouzel *Turdus torquatus* abundance in Scotland from 1988-91 to 1999. *Bird Study* 50: 97–105.

Causes of nest failure of Slavonian grebes

Slavonian grebes nest on a small number of lakes in northern Scotland, and annual censuses have taken place since 1971. Between 1978 and 1993, the population fluctuated between 60 and 80 pairs, but then declined to only 31 pairs in 2000, the lowest count since annual monitoring began. The number of occupied lakes also halved over the same period, to 15 in 2000.

Allan Perkins

Stoat predating a Slavonian grebe nest at night, caught on a miniature video camera.



Slavonian grebe breeding population (pairs) in Scotland, 1971–2002.

Previous work has shown that breeding productivity (clutch and chick survival) of Scottish birds was low compared with other European populations (in Scandinavia and Iceland) and that predation of full-grown birds was taking place. The causes of nest failure were often not determined during this study, however, and the predator of adult grebes was unknown. Therefore, in 2001 and 2002, miniature 24-hour time-lapse video cameras were placed next to 23 nests with the aim of establishing the frequency with which nests were predated and to identify the predators responsible.

Six nests were predated, and abandoned eggs were predated from two further nests. The otter was the most frequently filmed predator, taking two clutches and an adult grebe plus chicks from the nest. Other predators filmed were stoat, carrion crow, common gull and coot. Overall, nest predation rates were low (17% probability of nest predation before chicks hatched), and were similar to failure rates due to flooding (25%), and desertion or accidental or deliberate removal of eggs by incubating grebes (17%). Wave damage was a greater cause of nest flooding than water level rise, and was the most frequent cause of nest failure at exposed sites on Loch Ruthven.

One constraint of nest cameras is that they can only detect predation at the nest. The full extent of predation of grebes remains unknown, and otters, American mink (recorded at one lake during the study), and large predatory fish such as pike, which have been introduced to many lakes in the region, are all potential predators of grebes away from the nest.

Hancock M, Summers R and Butcher N (2002) Predation of Slavonian Grebe nests by Otters. *British Birds* 95: 390-391.

This study was supported by SNH and the Jennie S Gordon Memorial Foundation.

Corn buntings and cereal harvesting on the Uists

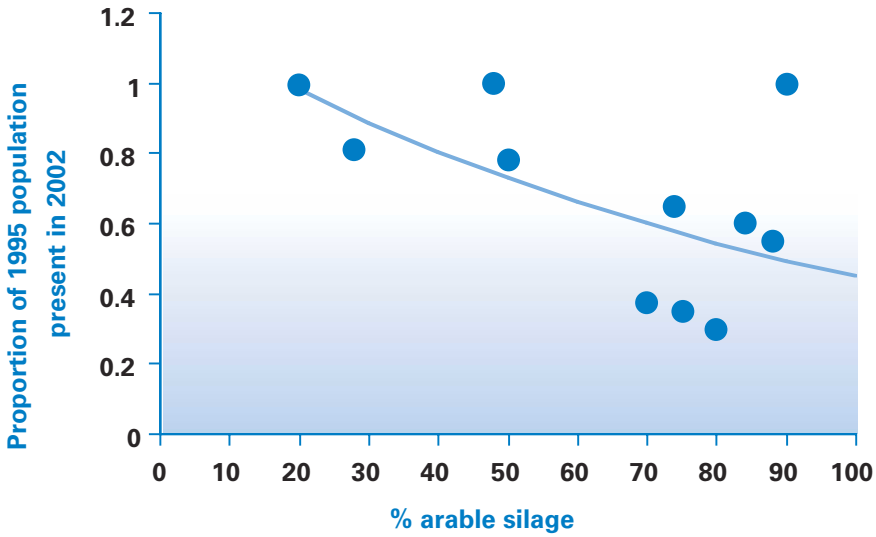
Corn buntings are in rapid, long-term decline in the UK. In Scotland, they are now found only on the Outer Hebrides, and patchily along the east coast from Fife to Inverness. Declines continue; the breeding population is probably fewer than 800 pairs, and extinction in Scotland threatens.

Loss of winter seed sources, impacts of pesticides on abundance of chick food invertebrates and earlier harvesting operations may all have contributed to these declines. On the Uists, however, a 1995 survey indicated little change since the early 1980s, with territory densities amongst the highest in Britain. The birds are associated with cultivated machair, where cereals grown for winter cattle fodder provide grain. Traditional reaper-binder harvesting of ripe corn fed to cattle on-the-sheath is, however, being replaced by green-harvested arable silage, stored in black bales. This may reduce the availability of winter grain to corn buntings both on stubbles and at livestock feeding stands.

An RSPB study tested this hypothesis by repeating the 1995 survey in June 2002. Across 14 study areas, populations had remained stable in three, declined by 20–50% in five, and by more than 50% in three. Allowing for unsurveyed areas, there are probably only 100–120 territories on the islands, a stark comparison with the 240–320 estimated in 1995. In September– October we recorded the harvesting method applied to all cereal strips in the same 14 survey areas.

Analysis shows that corn bunting presence has been maintained at sites where traditional harvesting practices are dominant, but lost from areas where cereals are now mostly harvested as arable silage. Fieldwork is now assessing grain availability and corn bunting occurrence at livestock feeding stands, to test whether corn fed on-the-sheath to cattle is richer in grain and able to support more feeding corn buntings than arable silage. Further research may be needed to develop agri-environment prescriptions to encourage crofting agriculture on the Uists and Benbecula to maintain a winter grain supply for this population.

The Uists' corn bunting decline correlates with the preponderance of arable silage.



Digger Jackson

Making a corn-stack on the Uists.

Donald PF, Hines P, Jackson P, Dustow J, Hepburn I, Albon GF and Jervis S (1996) Numbers, distribution and habitat associations of Corn Buntings on the Outer Hebrides and Tiree in 1995. *Scottish Birds* 18: 170-181.

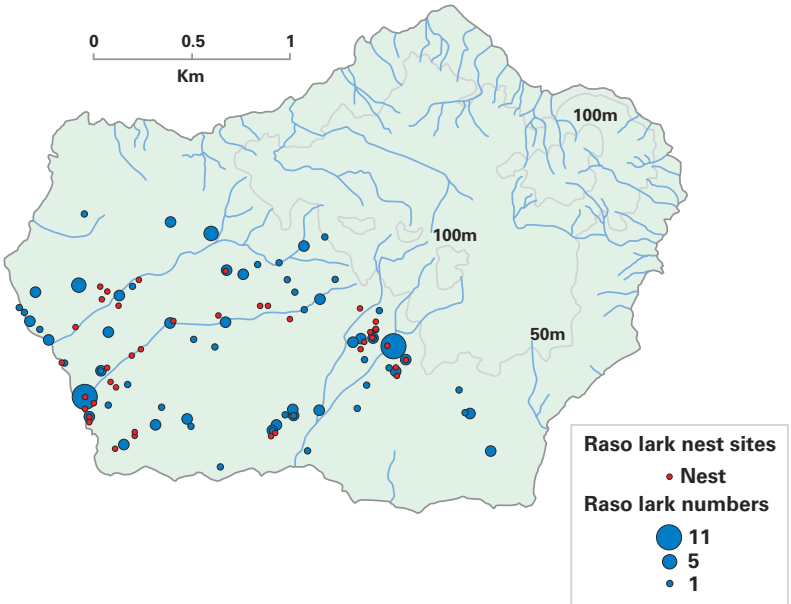
Ecology and conservation of the Raso lark

The Raso lark *Alauda razae* is one of the rarest and most threatened birds in the world. It is confined to the tiny island of Raso (7 km^2) in the Cape Verde Islands of the east Atlantic, and may have the smallest range of any land bird in the world. Until recently, its status and ecology were virtually unknown, due largely to the difficulty of reaching Raso.

Paul Donald

Predated Raso lark nest.

Distribution and abundance of the Raso lark.



In 2001 and again in 2003, however, researchers from the RSPB together with those from the Spanish (SEO) and Portuguese (SPEA) BirdLife Partners landed on Raso for extended periods to study this species in detail for the first time.

The population was estimated at 130 birds in 2001, and just 98 in 2003. The effective population size is even smaller, since males outnumber females by around two to one. This might be due to differences in feeding ecology. The males, with their longer bills, spend much time digging in the ground to extract water-rich tubers, whereas the far smaller-billed females seek seeds from the surface.

Population size appears to be determined mainly by rainfall, falling after long droughts and recovering rapidly after rain. Nest survival rates were extremely low, and the sole predator appears to be the endemic Cape Verde giant gecko *Tarentola gigas*.

There appears to be no prospect of establishing a new population on a larger neighbouring island that may once have held birds, since recent visits show it to be overrun with cats. At present, therefore, the best hope of saving the Raso lark is to monitor its status and to make sure that no predators, such as cats, arrive on Raso. A management plan for Raso, which also holds important seabird colonies, is being prepared for the Cape Verde Government.

Donald PF, de Ponte M, Pitta Groz MJ and Taylor R (2003) Status, ecology, behaviour and conservation of Raso Lark *Alauda razae*. *Bird Conservation International* 13: 13-28.

This work was supported by Mr Julian Francis.

Conservation of the critically endangered Jerdon's courser in India

Jerdon's courser is a ground-dwelling nocturnal bird first recorded in the mid 19th century in India. Subsequently, it was considered extinct for more than 80 years before being rediscovered in 1986, since when it has been seen only in a few restricted areas of scrub jungle in Andhra Pradesh.

As part of an RSPB/Bombay Natural History Society/University of Reading project, funded by the Darwin Initiative, we studied Jerdon's coursers in the Sri Lankamaleswara Wildlife Sanctuary, Andhra Pradesh. Our aims were to develop a survey method to allow us to find Jerdon's coursers in previously unknown areas, and to describe their habitat requirements.

Because they are nocturnal and live in a wooded habitat, Jerdon's coursers are very elusive, so we developed a method for detecting their presence from footprints. To do this we used five-metre long tracking strips of fine-grained soil about 2 cm thick. Birds that ran across these strips left tracks, and to find out which species left which tracks we placed automatic cameras at the ends of some. By measuring the shape of the footprints, either from casts or photographs, we learned the distinctive track of Jerdon's courser.

In areas where Jerdon's courser was known to occur, its tracks were recorded, on average, on one in 30 nights. We calculated that if we checked a grid of 15 strips for about one month we would be very likely to detect them if present. Knowing this, we placed 15 tracking strips – arranged in a regular grid – in each of 10 areas of scrub jungle from which the courser was not known. Jerdon's courser tracks were found in six of these, three within 1 km of a previously known site, but three others up to 14 km distant.

By measuring the habitat around each strip, we showed that Jerdon's coursers preferred areas where there were about 500 large bushes and small trees per hectare: many more or many fewer than this and they were unlikely to occur. Hence, the clearing of scrub forest, and over- or under-grazing by livestock are likely to cause deterioration of the courser's habitat.

Plaster casts of footprints of Jerdon's courser and other species. The angle between the Jerdon's courser's inner and outer toes is less than that of red- and yellow-wattled lapwings, but more than that of the stone-curlew.

A Jerdon's courser leaving footprints on a tracking strip.

Jeganathan P, Green RE, Bowden CGR, Norris K, Pain D and Rahmani A (2002) Use of tracking strips and automatic cameras for detecting Critically Endangered Jerdon's coursers *Rhinoptilus bitorquatus* in scrub jungle in Andhra Pradesh, India. *Oryx* 36: 182-188.

We acknowledge the help of the Principal Chief Conservator of Forests (Wildlife) of Andhra Pradesh Forest Department and the District Forest Officer of the Cuddapah District.

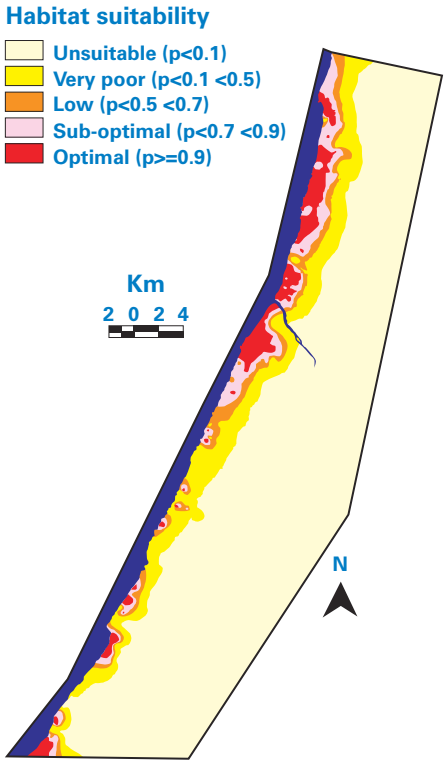
The landscape ecology of the northern bald ibis

Around half of the world population of the northern bald ibis is found in the Souss-Massa National Park in southern Morocco. Here, the RSPB has been working with SEO, the Spanish BirdLife partner, and the Moroccan Department of Eaux et Fôrets to develop and implement a park management plan.

Typical bald ibis feeding areas showing sparse perennial vegetation.

The ibises feed in open semi-desert steppe and nest and roost on isolated sea cliffs. They feed on invertebrates and reptiles found on the ground and in sparse vegetation. People from the local villages also use the steppe for grazing their stock, for fuel collection and low intensity cereal cultivation. Occasionally nomads arrive in the area with their herds of camels.

To ensure appropriate long-term management in the Park, it is important to understand how the human and ibis uses of the steppes interact. With a team from the University of Derby, a model of ibis foraging areas in the park has been developed. This uses known locations of feeding ibises, collected by our locally-recruited field team, detailed vegetation measurements from plots randomly located in the Park, soil and topographical maps



The Souss-Massa National Park showing how it varies in suitability for feeding bald ibis.

and satellite images to produce a map showing areas which vary in their suitability for ibises.

The map clearly shows that the most suitable feeding areas are within a narrow coastal strip of the Park. The model also predicts that suitability decreases with distance from the roost or breeding colony but also, interestingly, with distance from villages. Cultivated areas are rarely used but fallows (cultivated areas left fallow for one or two years) are favoured as much as semi-natural steppes. Grazing and/or cultivation appear to be essential to maintain a medium cover of low growing vegetation selected by the birds. Thus, the manner in which villagers manage the land around them clearly influences its use by the ibises.

Rice PM, Aghnaj A, Bowden CGR, Smith KW, Fox HR and Moore HM (2002) The landscape ecology of the Northern Bald Ibis *Geronticus eremita* in the Sous-Massa National Park, southern Morocco. In: Chamberlain D and Wilson A (eds) *Avian Landscape Ecology: pure and applied issues in the large-scale ecology of birds.* International Association for Landscape Ecology (UK): 264–272.

ECOLOGICAL PROCESS AND ISSUES RESEARCH

While studies of individual species will remain an important part of the RSPB's research portfolio, increasingly we are studying a broad range of ecological processes and issues that affect birds. These range from studies of habitat management to the impact of disturbance, predation and pollution on bird populations, through the impacts of land uses such as agriculture, to those of a changing climate. Wherever possible, our research seeks to design novel solutions to mitigate the effects of any deleterious impacts.

Chris Gomersall (rspb-images.com)

Human disturbance and urban development: nightjars on the Dorset heaths

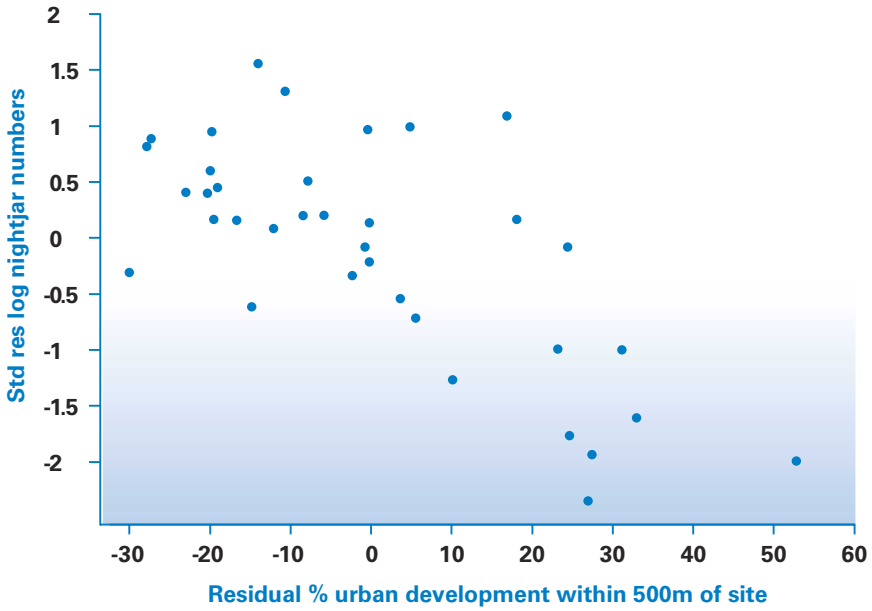
Recent proposed developments adjacent to heathland sites, such as at Holton Heath in Dorset, and the granting of open access to heathland within the Countryside and Rights of Way (CroW) Act (2000) have focused attention on the need for a better understanding of the effects of access and disturbance on heathland birds. One of the key bird species associated with lowland heathland is the nightjar.

Searching for nightjar nests at the RSPB's Arne reserve.

As part of an RSPB/EN/CEH study, we examined the factors that influenced the number of breeding nightjars on 36 heathland sites in Dorset, using novel spatial integration of existing datasets. Surrogate measures of human density and settlement, such as the amount of developed land at different distances from the heath (obtained from aerial photographs), strongly influenced the density of nightjars on a site, regardless of its size, such that sites with more developed land nearby held lower densities of nightjars. The amount of woodland – the nightjar's preferred foraging habitat – surrounding each patch also influenced nightjar numbers, independently of the extent of nearby development.

These results show clearly that the number of nightjars present on a heathland site is influenced by the surrounding land-uses and that the effect of urban development is not simply limited to the loss of habitat to building on land adjoining the heath.

In order to understand the mechanism underlying these impacts of human disturbance, nightjar breeding success was measured on several heaths. Forty-seven nests were found on a range of sites with different access levels. Breeding success was higher on sites with no public access. On sites with public access, the distance of the nest to the nearest footpath and the total length of footpaths within 100 m both influenced breeding success, with nests closer to paths being more likely to fail. The principal cause of nest failure was egg predation by corvids (crows and magpies) and anecdotal information suggested that dogs off leads may flush adults off the nest, exposing their eggs.



Nightjar numbers and percentage cover of developed land surrounding each site (adjusted for patch size and the extent of woodland cover within 500 m).

Liley D and Clarke RT (2003) The impact of urban development and human disturbance on the numbers of nightjar *Caprimulgus europaeus* on heathlands in Dorset, England. *Biological Conservation* (in press).

Murison G (2003) The impact of human disturbance on the breeding success of nightjar *Caprimulgus europaeus* on heathlands in south Dorset, England. English Nature Research Report, English Nature, Peterborough (in press).

Managing blaeberry for capercaillies

Blaeberry, or bilberry *Vaccinium myrtillus*, is a deciduous shrub of northern pinewoods and an important food plant for the capercaillie. Fully-grown birds eat the leaves in summer and berries in autumn, and the chicks eat moth caterpillars that themselves eat blaeberry leaves.

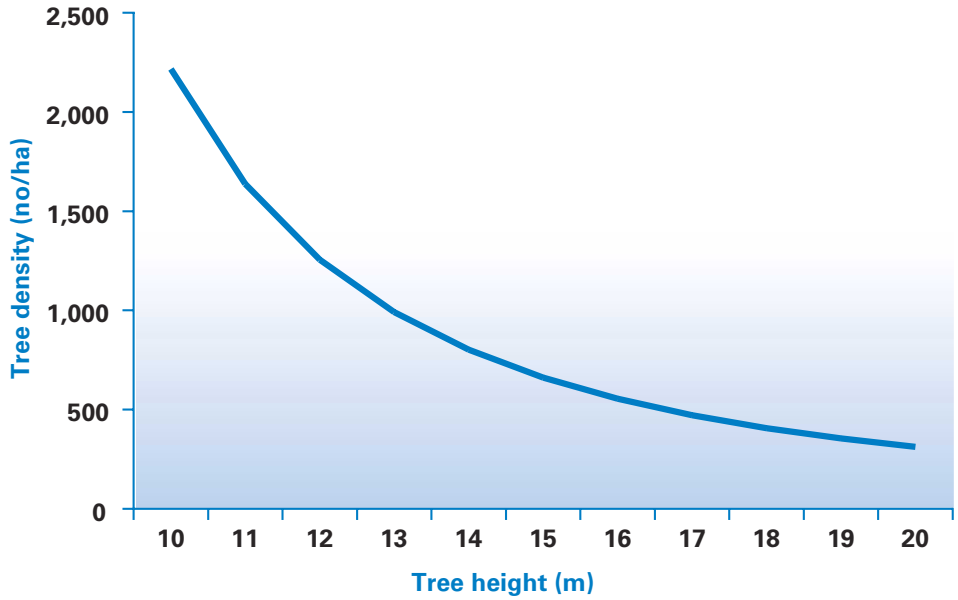
A study within native pinewoods at the RSPB's Abernethy Forest nature reserve showed that capercaillie broods selected areas with high amounts of blaeberry, being found in areas where average cover of *Vaccinium* was 47% and height was 24 cm. Thus, woodland can be improved for the capercaillie by increasing the amount of blaeberry. Unfortunately, many conifer woods in Scotland contain little blaeberry.

Our understanding of the conditions that favour blaeberry in pinewoods is limited, but light (irradiance) is certainly a key factor affecting its distribution and abundance. If tree density in a wood is low and there is a lot of light, blaeberry is out-competed by heather *Calluna vulgaris*. In contrast, in dense woodland with little light, blaeberry dies. It seems to grow best (out-competing heather) where there is a moderate level of light, but these values had not previously been measured.

In order to understand more clearly the light conditions where blaeberry grows best, we assessed irradiance from hemispherical vertical photographs of the canopy and related these to blaeberry cover. Optimum light levels occurred at irradiance values of 35%, though high values of blaeberry ranged between 20 and 50% irradiance. Light levels in a pine forest are affected by two variables: tree height and tree density, both of which reduce light levels as they increase. Knowing this, we have constructed a model showing which combinations of height and density provide the optimum light levels for blaeberry. This model is now being used by foresters and woodland managers to make decisions about the best way to manage woods for blaeberry and hence the capercaillie.

A hemispherical photograph of a native stand of Scots pine trees at Abernethy Forest.

Ron Summers (RSPB)



The line shows the combinations of Scots pine height and density that provides the optimum light level for blaeberry.

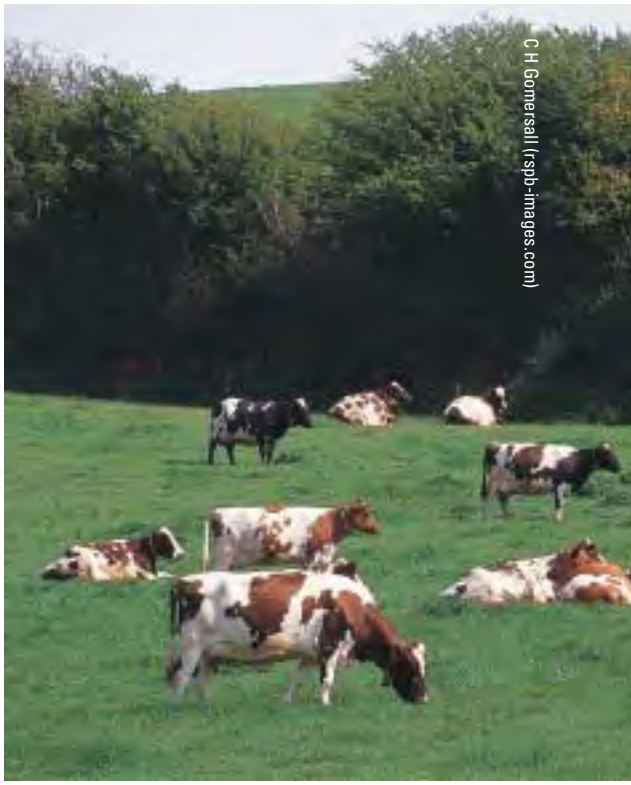
Summers RW, Mavor RA, MacLennan AM and Rebecca GW (1999) The structure of ancient native pinewoods and other woodlands in the Highlands of Scotland. *Forest Ecology and Management* 119: 231-245.

Summers RW, Proctor R, Thornton M and Avey G (2003) Habitat selection and diet of capercaillie *Tetrao urogallus* in Abernethy Forest, Strathspey, Scotland. *Bird Study* (in press).

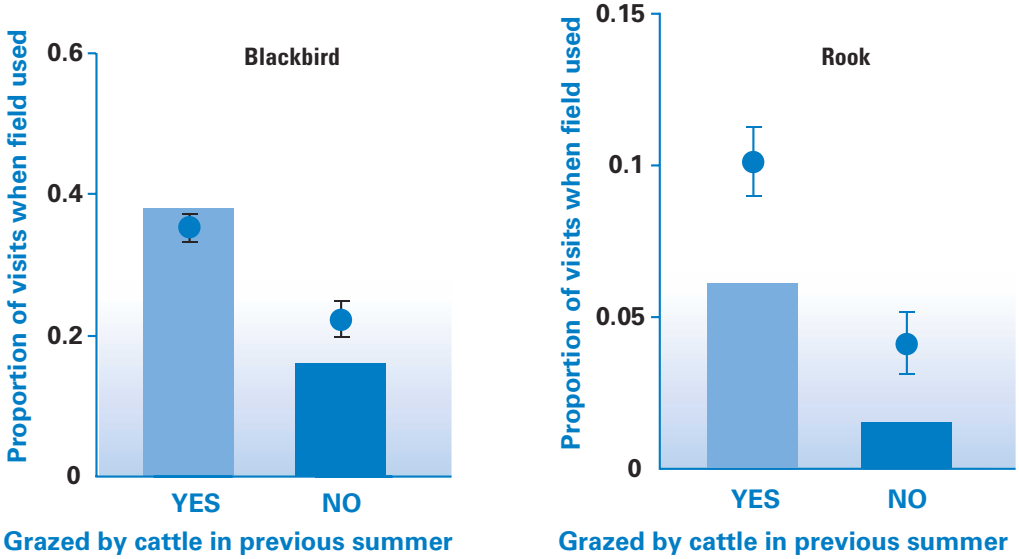
Lowland agricultural grasslands and birds

Until recently, most research and conservation action for declining farmland birds has focused on arable farming systems. Several new studies have, however, highlighted declining populations and local extinctions of birds in the grassland-dominated lowlands of western Britain and Northern Ireland.

Re-seeding of permanent pasture, the switch from hay to silage, and increased fertiliser use and stocking rates over recent decades have all been proposed as potential problems for birds, although no clear links have been established between these practices and bird populations. To determine whether such links exist, the RSPB has undertaken a range of studies in collaboration with the Centre for Agri-Environmental Research (University of Reading) and English Nature.



The effects of cattle grazing on foraging birds have been studied in the English west Midlands.



Effects of cattle grazing in summer on the use of grass fields in winter (filled circles, +/- s.e.) by blackbirds (left) and rooks (right). Bars show predicted usage taken from models that control for the effects of non-management variables (eg field size).

We studied bird usage of nearly 400 grass fields on 23 livestock farms in the English west Midlands to see how management influenced utility to foraging birds. Summer grazing by cattle promoted usage during the subsequent winter by a range of soil invertebrate-feeding species, including blackbirds, song thrushes, starlings and rooks. Seed-eating finches and buntings avoided grass fields that had received recent herbicide applications, and preferred fields with patches of bare ground in the sward.

Seed-eating birds were scarce on grasslands during winter but some species were found to select fertile silage fields. This surprising result was investigated experimentally. Silage fields were subdivided into plots where different mowing and grazing treatments were used to manipulate seed abundance and sward density. Large numbers of yellowhammers and reed buntings used the unmown, ungrazed plots throughout the winter. Further work is needed to develop practical ways of using seeding grass as a food resource for wintering birds.

Breeding yellowhammers need large invertebrate prey to rear their chicks successfully. Invertebrates can be abundant in longer grass but tall, dense swards can inhibit access by small birds seeking prey. We are now investigating how prey abundance and sward accessibility interact to determine the utility of grass fields to foraging birds. Early indications are that yellowhammers prefer complex mixes of short and long grass found on grazed pastures and infertile fields.

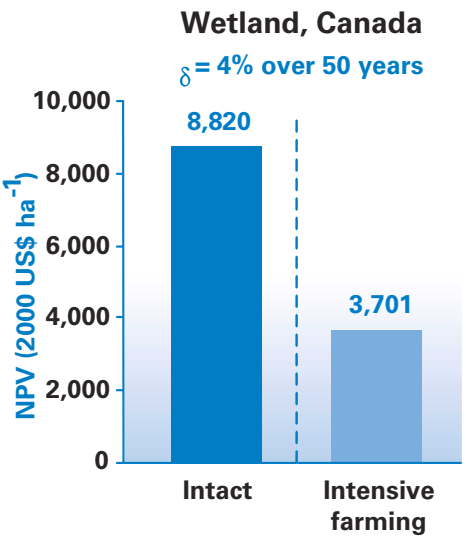
Dave Buckingham (RSPB)

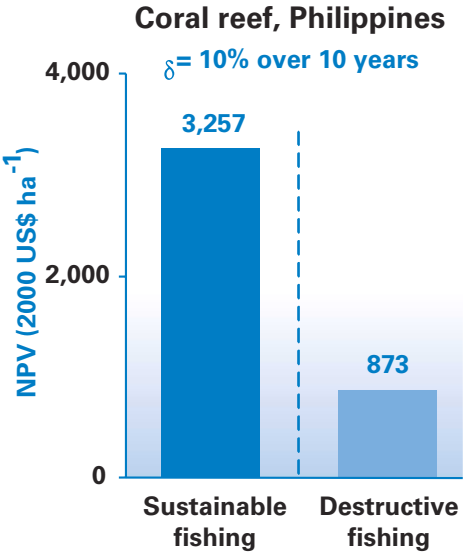
A field divided into four experimental plots. Final cut silage was left to set seed on the two right-hand side plots. The two foreground plots were grazed in autumn. Large numbers of buntings used the uncut, ungrazed plot (back right).

Buckingham DL, Peach WJ and Fox D (2002) Factors influencing bird use in different pastoral systems. In: Frame J (ed) *Conservation Pays? Reconciling environmental benefits with profitable grassland systems.* British Grassland Society Occasional Symposium no 36: 55-58.

The economic value of conserving wild nature

Humans benefit from relatively undisturbed ecosystems in very many ways – aesthetically, through ecological services such as climate regulation, and by directly harvesting wild species for food, fuel, fibres and pharmaceuticals.





The benefits of retaining or converting two natural habitats: a wetland and a coral reef. Benefits are expressed as Net Present Values (NPVs, in US$ per ha at the dollar value in 2000), summed across years using the discount rates (δ) and time horizons presented.

Putting a money value on these benefits is extremely difficult, as many of them do not involve goods and services traded in markets. One study in 1997 put their combined worth at about US$38 trillion a year, roughly equal to the global economy itself. An international workshop organised by the RSPB and the University of Cambridge met in January 2002 to consider how these values change as natural habitats are converted for other uses, how much habitat conversion therefore costs humanity, and whether conservation efforts to slow such losses make economic sense.

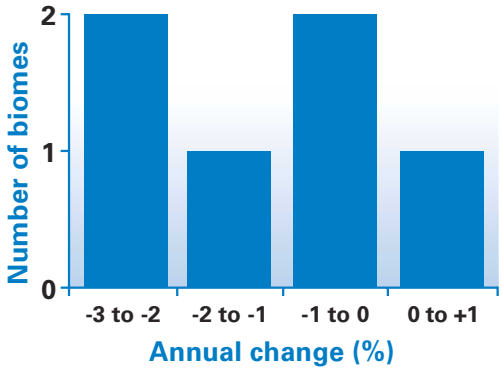
We reviewed more than 300 case studies, searching for matched estimates that compared the values of goods and services delivered by relatively intact habitats and by similar areas after conversion for human use. We found only five studies that provided enough information to do this. Two studies were of rain forests, one of a mangrove system, one of coral reefs, and one of temperate wetlands. Even though this sample was small, it yielded several consistent and important insights. In every case, the so-called Total Economic Value (TEV) of the habitats was higher when they remained intact. On average about 50% of TEV was lost upon conversion. The major benefits associated with retaining systems more or less intact were non-marketed services such as storm protection and carbon sequestration, which accrue to society as a whole. In contrast, conversion generally made economic sense from the perspective of private landowners, through an increase in marketable goods or because of subsidy schemes.

This private incentive for conversion, despite its cost to society as a whole, explains why habitats and populations continue to be lost at an alarming rate. The global area of only

six out of 14 major habitats have been monitored since the 1992 Rio Summit, but five out of these six have experienced net losses, with the mean rate of change across all measured biomes running at –1.2% per year, or –11.4% over the decade. This in turn means that the capacity of natural systems to deliver goods and services upon which we depend is decreasing dramatically. If ~50% of TEV is lost on conversion, then a single year's loss of natural habitats can be estimated to cost humanity more than US$200 billion that year, and every year into the future.

Slowing this loss would require greatly increased spending on conservation, but would deliver enormous benefits. Current conservation spending is around US$6.5 billion per year, but is grossly inadequate. We estimated that meeting targets for conserving a representative spread of habitats, species and services into the future would instead cost in the order of US$40 billion annually. The resulting protected area networks would, however, cover around 15% of the land and 30% of the sea, and ensure the continued delivery of goods and services with an annual value (net of benefits from conversion) of around US$5,000 billion. Based on this, the benefit to cost ratio of a reserve system meeting minimum safe standards is around 100 to 1. Greatly expanding conservation efforts thus makes sound economic as well as moral sense.

We examined the net benefits of conservation by comparing the value of the goods and services delivered by converted and intact habitats.



Distribution of recent estimates of the annual rate of change in area, or abundance of vertebrate populations, for tropical forests, temperate/boreal forests, mangroves, seagrass beds, freshwater habitats and marine habitats.

Balmford A, Bruner A, Cooper P, Costanza R, Farber S, Green RE, Jenkins M, Jefferiss P, Jessamy V, Madden J, Munro K, Myers N, Naeem S, Paavola J, Rayment M, Rosendo S, Roughgarden J, Trumper K and Turner RK (2002) Why conserving wild nature makes economic sense. *Science* 297: 950-953.

Balmford A, Green RE and Jenkins M (2003) Measuring the changing state of nature. *Trends in Ecology and Evolution* 18: 326–330.

Jenkins M, Green RE and Madden J (2003) The challenge of measuring global change in wild nature: are things getting better or worse? *Conservation Biology* 17: 1–4.

Lead isotopes identify sources of contamination of white storks in Doñana

On 25 April 1998, part of a mine tailings lagoon dam collapsed at Boliden Apirsa's Los Frailes pyrite mine near Aznalcollar, to the north of the Guadalquivir marshes, Southern Spain (Doñana). The Doñana marshes encompass an Important Bird Area, a World Heritage Site, a Ramsar Site and a UNESCO Biosphere Reserve

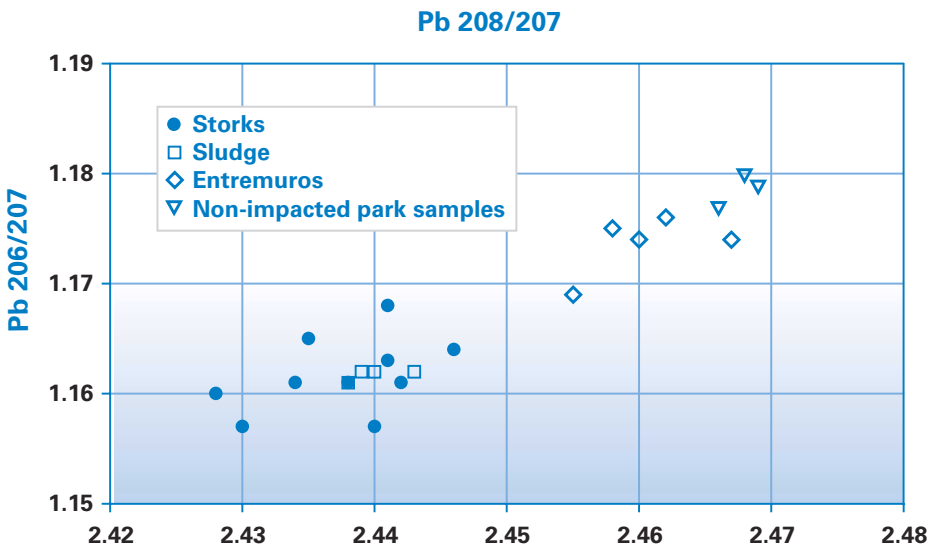
The tailings spillage contaminated the Guadiamar river, which feeds the eastern flank of Doñana, with ~5 million cubic metres of metal-rich sludge containing a range of toxic elements and organic pollutants.

White storks from a colony close to the area affected by the spillage fed in contaminated zones immediately after the accident. Stork blood metal concentrations were not especially elevated following the accident, but the following year, blood from stork chicks showed genotoxic damage, compared with controls.

A team comprising scientists from Aberdeen University, the RSPB, the Doñana Biological Station and the Scottish Universities Research and Reactor Centre investigated whether stork chicks from the affected colony had ingested sludge-derived contaminants. We did this by analysing lead isotopes in mining sludge and sediments from both contaminated and unaffected parts of Doñana, and in the blood of stork chicks from the affected colony. While genotoxic effects are unlikely to be related to lead exposure *per se*, lead can act as a marker to help source contaminants.

We found the mining sludge lead isotope ratio to be distinct from that of Doñana sediments, but to closely match that in the blood of stork chicks. From this we concluded that the storks from the colony showing genotoxic effects had ingested mining sludge-derived contaminants. Unpublished data also shows that this population exhibited high levels of leg and bill deformities.

This research demonstrates that lead isotopes can act as useful markers of sources of contaminants in birds and other wildlife.



Ratios of isotopes of lead (Pb 206/207 and Pb 208/207) for individual samples. The 'Entremuros' received contaminated water following the accident.

Meharg AA, Pain DJ, Ellam RM, Baos R, Olive V, Joyson A, Powell N, Green AJ and Hiraldo F (2002) Isotopic identification of the sources of lead contamination for white storks (*Ciconia ciconia*) in a marshland ecosystem (Doñana, S.W. Spain). *Science of the Total Environment* 300: 81-86.

Pain DJ, Sanchez A, and Meharg AA (1998) The Doñana ecological disaster: contamination of a World Heritage estuarine marsh ecosystem with acid pyrite mine waste. *Science of the Total Environment 222*: 45-54.

Pastor N, Lopez-Lazaro M, Tella JL, Baos R, Hiraldo F, Cortes F (2001) Assessment of genotoxic damage by the commet assay in white storks (*Ciconia ciconia*) after the Donana ecological disaster. *Mutagen* 16: 219-223.

We thank SEO, the Spanish BirdLife Partner, for help in Doñana following the mining spillage.

Fen grazing at Mid Yare

There is currently considerable interest in the use of non-commercial grazing animals to achieve conservation objectives in semi-natural habitats.

In East Anglia's Broadland, light grazing has been advocated as an alternative method to mowing to prevent accumulation of litter and establishment and growth of scrub. In 1999, following consultation with a wide range of conservation organisations and specialists, light grazing by Highland cattle was introduced to a 14 ha area of unmanaged fen at the Mid Yare RSPB nature reserve.

The effects of grazing on vegetation and molluscs were monitored, following three years of grazing, inside and outside seven randomly located 15 m x 15 m exclosures. Molluscs were monitored, because this and surrounding areas of fen were known to support the BAP priority species *Vertigo moulinsiana*. Vegetation parameters measured included height, plant species-richness and stem densities and standing crop of the main emergent plants. Mollusc densities were determined using timed searches of quadrats, and their habitat preferences within ungrazed areas of the fen investigated using multiple regression. Distribution of cattle within the fen was determined by plotting their locations at 3–4 day intervals.

Cattle were randomly distributed within the fen during autumn, winter and spring, but highly aggregated in summer. This variation in summer grazing pressure resulted in considerable variation in habitat structure throughout the fen. The main effects of grazing on the vegetation were to reduce litter accumulation, decrease the dominance of common reed *Phragmites australis*, and increase that of reed sweet grass *Glyceria maxima*. Plant species-richness also increased significantly in grazed areas compared with ungrazed areas.

Grazing significantly reduced densities of three snail species: *Vertigo antivertigo, V moulinsiana* and *Euconulus alderi*. Because of the patchy nature of grazing, though, high densities of these species still persisted in less heavily grazed parts of the grazing unit. *V moulinsiana* was particularly associated with vegetation dominated by greater pond sedge *Carex riparia*.

The trial suggested that grazing should be considered as an alternative to rotational mowing of tall-herb fen. Although grazing decreases mollusc densities, this has to be set against the need to prevent scrub invasion and loss of fen vegetation and its associated mollusc fauna in the longer term.

Andy Hay (rspb-images.com)

Highland cattle are used to graze fen vegetation at the RSPB's Mid Yare reserve.

Managed re-alignment at Havergate

Coastal habitats in the UK are being lost due to sea level rise. The RSPB has undertaken three managed re-alignment schemes to re-create intertidal habitat behind seawalls to mitigate against these losses.

These have been at Havergate Island, Suffolk (8.5 ha), Freiston Shore, Lincolnshire (66 ha) and Nigg Bay, Highland (24 ha). The results of the first two years' monitoring at the earliest of these schemes, at Havergate where the seawall was breached in October 2000, are summarised below.

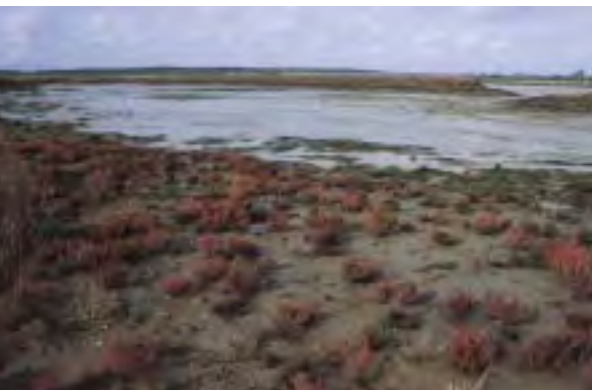
Accretion rates of sediment and vegetation composition were monitored at 100 permanent stratified random points of known elevation. Invertebrate densities were determined from cores taken from 30 stratified random points within the re-alignment area and compared to those taken from the adjacent estuary. Bird use has been recorded using regular low tide counts.

Accretion averaged 6.3 cm over the re-alignment area during the first year and 3.3 cm during the second. Nine of the 100 sampling points decreased in height due to erosion. The re-alignment area was rapidly colonised by benthic invertebrates, with densities of the two main species, *Hediste diversicolor* and *Macoma balthica*, increasing to levels similar to those on the adjacent estuary by two years after the breach.

Mean monthly low tide counts of all wader species increased from 1.0 bird per ha during the first year to 3.6 birds per ha during the second. The commonest five bird species during the first two years were, in decreasing order of abundance, avocet, redshank, black-headed gull, shelduck and black-tailed godwit.

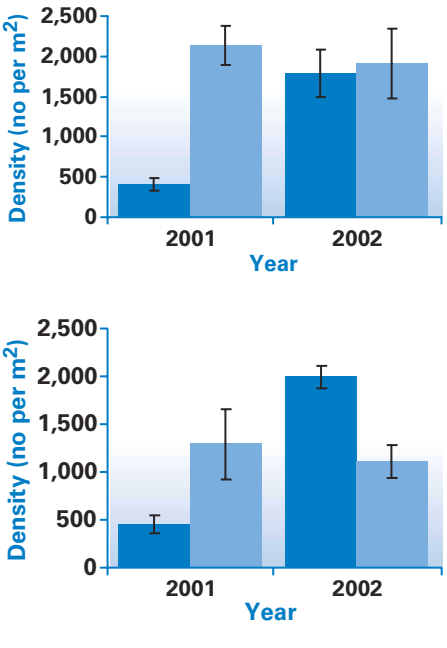
So far, saltmarsh vegetation, primarily consisting of *Salicornia* species and *Suaeda maritima*, has only colonised areas lying more than 25 cm above the mean high water level of neap tides. Large areas of mud below this level have been colonised by algae, mainly *Enteromorpha intestinalis*.

Thus, within two years of the breach, the area of former grassland at Havergate is scarcely distinguishable from existing mudflat in terms of its invertebrate and bird fauna. Further changes at the site will be monitored, and the results used to inform the design of future managed re-alignment schemes.



Malcolm Ausden (RSPB)

The realignment area after one year. The breach in the seawall is in the background at the far right of the picture.



Mean densities (+/- s.e.) of two benthic invertebrates in the managed re-alignment area and on the adjacent estuary: *Hediste diversicolor* (top); *Macoma balthica* (bottom).

TRAINING

In recent years, the RSPB has supported the training of PhD students and of conservation practitioners in several countries, the latter principally in monitoring and survey methods.

PhD training

The RSPB funds and supervises a substantial number of PhD studentships each year. This is a valuable mechanism for undertaking important research, and shows the RSPB's commitment to training conservation biologists.

The following list shows those PhD studentships involving the RSPB that were active at some stage during 2002 and 2003. All projects were funded and supervised by the RSPB to varying extents, with the exception of those marked with an asterisk, for which the RSPB provided supervision only. In addition, the RSPB helped initiate and funds the annual Student Conference on Conservation Science at Cambridge.

Research project	Student	University	Partners
Bombus distinguendus ecology	Tom Charman	Cambridge	NERC, IoZ
Stone-curlew disturbance	Elizabeth Taylor	Cambridge	EN
Stone-curlews and roads	Tom Day	Cambridge	
Rudd's lark ecology	David Maphisa	Cape Town (MSc)	
Urban & suburban house sparrows	Kate Vincent	De Montfort	EN
Dartford warblers and disturbance	Giselle Murison	East Anglia	EN
Yellow wagtails on arable land	James Gilroy	East Anglia	EN
Management of blanket bog	Allan Gray	Edinburgh	
Habitat enhancement and wetland plants	Maggie Keegan	Edinburgh	NERC
Fire, bogs and forests	Sandra Pratt	Edinburgh	NERC
Seabird survival rates	Sarah Davies	Glasgow	NERC
Non-inversion tillage	Heidi Cunningham	Harper Adams	
Farmland birds in the Baltic Republics*	Irina Herzon	Helsinki	
Belarus bitterns	Marina Dzmitranok	Minsk	
Bullfinch declines	Fiona Proffitt	Oxford	NERC
Ecology of malimbes in Nigeria	Manu Shiiwua	Oxford	
Stubble field prescriptions	Simon Butler	Oxford	BBSRC
Ecology of crows in pastoral areas	Ian Adderton	Queens, Belfast	DARD
Northern Ireland foxes	Declan O'Mahoney	Queens, Belfast	DARD
Intensification of lowland grassland	Dave Buckingham	Reading	
Orthoptera & grassland management	David Smith	Reading	
Conservation of Bryozoa	Samantha Hill	Reading	EA
Corncrakes in Latvia	Oskars Keiss	Riga	
Avermectin and dung invertebrates	Lisa Webb	SAC	
Farmland processes, insects and birds	Jenny Bright	Stirling	
Remote sensing of wetlands	Crona O'Shea	Stirling	
Ecological impact of managed retreat	tba	Stirling	
Corncrakes on Shannon callows	Anita Donaghy	Cork	Dúchas
Kite population dynamics*	Andrew Simpkins	Wolverhampton	

Congratulations to the following former students for being awarded their PhDs: Ian Burfield (Cambridge), Jörn Scharlemann (Cambridge), Rob Cathcart (Cambridge, MSc), Karl Evans (Oxford), Dan Hulea (East Anglia), Mark O'Brien (Edinburgh), Steve Votier (Glasgow), Rob Sheldon (Harper Adams), Richard Noble (Hull), Dave Hole, Manu Shiiwua and Fiona Proffitt (Oxford), Peter Njoroge (Reading), Sophie Lake (Southampton) and Claire McKeever (Stirling).

Training of conservation practitioners

Chris Bowden

Romanian delegates counting beans in grid squares – an exercise that illustrates how sampling can give robust population estimates for much wider areas.

Chris Bowden

The RSPB's Richard Gregory and Kenyan conservation practitioners discuss the principles of monitoring.

Monitoring bird populations, their habitats and the pressures on those habitats is an important part of identifying where conservation efforts are most needed. RSPB staff have a great deal of experience in bird monitoring methods and scheme development, and have begun sharing this knowledge with conservation practitioners abroad.

Over the past three years we have run training workshops for BirdLife Partners in Romania, India and Tanzania, covering a range of bird monitoring techniques. More recently, we have begun a series of training workshops in Kenya – with funding from the Darwin Initiative – that aim to develop monitoring of Important Bird Areas (IBAs). This initiative is a collaboration between BirdLife (its Secretariat, the RSPB and Nature Kenya), National Museums of Kenya, and the University of East Anglia. Most importantly, it involves the local conservation practitioners, in this case members of IBA site support groups, Kenya Wildlife Service and Forest Department staff.

The workshops seek to establish survey and monitoring procedures for each individual site using a two-tier approach of basic and detailed monitoring. Courses involve a mixture of practice and theory, with a series of interactive discussion sessions. A common theme is that monitoring of the threats and pressures on IBAs can sometimes be more practical, and potentially more important, than monitoring the wildlife interest itself.

RSPB SCIENTIFIC STAFF 2002/03

Although only established and long-term contract staff are listed, we appoint many senior research assistants and research assistants for short fieldwork contracts each year.

Head of Conservation Science Department
Dr David Gibbons

Research Coordinator	Anita McClune
Principal Research Scientist	**Dr Rhys Green**[1]
Research Biologist[c]	Dr Jörn Scharlemann[1]
Principal Research Manager	**Dr Lennox Campbell**
Research Biologist	Dr Ian Johnstone
Head of Aquatic Research	**Dr Ken Smith**
Senior Research Biologist	Dr Norman Ratcliffe
Senior Research Assistant (until May 02)	Georgina Pickerell
Senior Research Assistant	Sabine Schmitt
Research Biologist (from May 02)	Dr Mark Bolton
Senior Research Assistant[c]	Nick Wilkinson
Senior Research Assistant[c]	Roy Bamford
Senior Research Assistant[c]	Richard Allcorn
Research Biologist	Dr Gillian Gilbert
Senior Research Assistant[c]	Chris Dunn
Research Biologist (until April 02)	Dr Glen Tyler
Research Biologist[c] (from August 02)	Dr Jeremy Lindsell
Technical Development Officer	Nigel Butcher
Assistant p/t	Colin Gooch (volunteer)
Head of International Research	**Dr Debbie Pain**
Research Biologist	Chris Bowden
Research Biologist p/t	Dr Geoff Hilton
Research Biologist[c] (until July 02)	Dr Richard Cuthbert
Senior Research Biologist	Dr Paul Donald
Research Biologist[c]	Dr Charlie Williams
Research Biologist[c] p/t	Dr Thais Martins
Head of Monitoring and Survey	**Dr Richard Gregory**
Senior Research Assistant	Innes Sim
Research Biologist	Dr Rowena Langston
Senior Research Assistant	Simon Wotton
Research Biologist	Dr Mark Eaton
European Monitoring Coordinator	Dr Petr Vorisek[2]
Head of Research, Scotland	**Dr Jeremy Wilson**
Secretary	Alix Middleton
Senior Research Biologist	Dr Ron Summers
Research Biologist[c] (until Jan 02)	Dr Alastair Hamilton
Research Biologist	Mark Hancock

Ringing is a valuable tool in bird research: many RSPB staff are qualified ringers.

Peter Blinston (rspb-images.com)

Chris Gomersall (rspb–images.com)

Even though conservation science uses many high-tech methods, many biologists still rely on field notebooks.

Senior Research Assistant[c]	Allan Perkins
Research Assistant	Bob Proctor
Senior Research Biologist	Dr Murray Grant
Research Biologist	Dr James Pearce-Higgins
Senior Research Assistant[c] (until Jan 03)	Dr Alison Taylor
Research Biologist[c]	Dr Graeme Buchanan
Research Biologist (until Dec 02)	Dr Digger Jackson
Research Biologist	Dr Mark O'Brien

Head of Terrestrial Research	**Dr Andy Evans**
Secretary	Kathy Berkery
Senior Research Assistant[c]	Sarah Nelson
Senior Research Biologist	Dr Will Peach
Research Biologist[c] (until March 02)	Dr Nick Brickle
Senior Research Assistant	Derek Gruar
Research Biologist	Dave Buckingham
Senior Research Assistant[c] (until Aug 02)	Kim Fenton
Research Assistant[c] (until Sept 02)	Dave Barritt
Research Biologist	Dr Guy Anderson
Research Biologist[c]	Dr Rob Field
Research Biologist[c]	Danaë Stevens
Senior Research Assistant[c]	Trevor Smith
Bird Aid Project Officer[c]	Dominic Coath
Senior Research Assistant[c]	Emily Woodfield
Research Assistant[c]	Roger Taylor
Senior Research Assistant[c] (from Oct 02)	Stephen Dodd
Research Assistant[c] (from Oct 02)	David Wright
Research Assistant[c] (from Mar 02)	Frazer MacFarlane
Research Biologist	Dr Richard Bradbury
Research Biologist	Tony Morris
Research Assistant[c]	Chris Bailey
Senior Research Assistant	Will Kirby

Head of Conservation Data Management Unit	**Ian Fisher**
Data Management Officer	Ellen Wilson
Data Management Officer	Rhoda Kennedy
Data Management Assistant	Paul Britten
Data Management Assistant p/t	Stephen Blain
Data Management Assistant p/t	Irene Hutson
Data entry volunteer p/t	Eric Readman
Data entry volunteer p/t (until Jan 03)	Margaret Burgess
Data entry volunteer p/t	John Davies
Data entry volunteer p/t (from Nov 02)	Diego Zazueta
Kagu Project Officer[c] (from Nov 02)	Rachael Roberts

Head of Reserves Ecology[3]	**Dr Graham Hirons**
Senior Departmental Secretary (Rtd Mar 03)	Anne Smith
Reserves Ecologist	Dr Malcolm Ausden
Reserves Ecologist (monitoring) (until Nov 02)	Julianne Evans
Reserves Ecologist	Dr Joanne Gilbert
Reserves Ecologist	Dr Matt Self
Reserves Ecologist (data manager)	Dr Mark Gurney
Reserves Ecologist (biodiversity) (until Feb 02)	Matt Shardlow
Reserves Ecologist (biodiversity) (from Feb 03)	Dr Mark Telfer

Senior Reserves Ecologist, Scotland[4]	**Dr Dave Beaumont**
Reserves Ecologist, Scotland	Dr Neil Cowie

Biodiversity Science Officer[5]	**Dr Jane Sears**
Invertebrate Conservation Officer[c]	Ian Middlebrook[6]
Heathland Project Manager[7]	Durwyn Liley[c]
Senior Research Assistant[7]	Giselle Murison[c]

1 based at University of Cambridge
2 based at Czech Ornithological Society
3 part of Conservation Management Department
4 part of Land Management Department, Scotland
5 part of Sites and Species Conservation Department
6 based at Butterfly Conservation
7 part of South West Regional Office
c contract staff

PUBLICATIONS

The complete list of all of the RSPB's scientific publications for 2002, and the first half of 2003, is as follows.

Publications in scientific journals, proceedings and books

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Steve Austin (rspb-images.com)

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BirdLife INTERNATIONAL

The RSPB works for an environment rich in birds and wildlife. It depends on the support and generosity of others to make a difference. We work with bird and habitat conservation organisations in a global partnership called BirdLife International.

The RSPB
UK Headquarters
The Lodge
Sandy
Bedfordshire
SG19 2DL
Tel: 01767 680551

Northern Island Headquarters
Belvoir Park Forest
Belfast
BT8 4QT
Tel: 028 9049 1547

Scotland Headquarters
Dunedin House
25 Ravelston Terrace
Edinburgh
EH4 3TP
Tel: 0131 311 6500

South Wales Office
Sutherland House
Castlebridge
Cowbridge Road east
Cardiff
CF11 9AB
Tel: 029 2035 3000

www.rspb.org.uk

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