



# CONSERVATION SCIENCE 2008

IN THE RSPB



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## Conservation science in the RSPB

**The RSPB is the UK charity working to secure a healthy environment for birds and wildlife, helping to create a better world for us all. We belong to BirdLife International, the global partnership of bird conservation organisations.**

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 those for earlier years, please contact the Conservation Science Department, The RSPB UK Headquarters, The Lodge, Sandy, Bedfordshire SG19 2DL or RSPB Scotland, Dunedin House, 25 Ravelston Terrace, Edinburgh EH4 3TP. You can also e-mail [science@rspb.org.uk](mailto:science@rspb.org.uk) or visit [www.rspb.org.uk/ourwork/science](http://www.rspb.org.uk/ourwork/science)

## Introduction

**Welcome to the seventh report on the RSPB's scientific work. As in previous years, this report includes summaries of a score or so of the projects we are involved in. While these represent just a snapshot of our overall scientific programme, we hope they demonstrate the depth and breadth of the scientific work undertaken by the RSPB.**

Arguably, the most notable achievement during the period of this report was the publication of *A Climatic Atlas of European Breeding Birds*. This long-awaited volume, written by researchers at RSPB, Durham University and the University of Cambridge, and published by Lynx Edicions, shows projections of the future distributions of most of Europe's breeding birds at the end of this century in a changing climate (see pp 12–15). The maps presented in this volume suggest that the potential breeding distribution of a typical bird species will shift several hundred kilometres north (and a bit east), and will lose a substantial proportion of its current range extent. The front cover of the atlas shows just how dramatic this could be for one species, the Dartford warbler, which is expanding its range northwards in Britain, but with an equally dramatic retraction of range in the Iberian peninsula. A 2006 survey of Dartford warblers in Britain (pp 20–21) shows clearly how this species' range has already moved northwards, fitting the predictions of the Atlas. A recent analysis by the same research team (pp 12–15) has shown that across a suite of rare

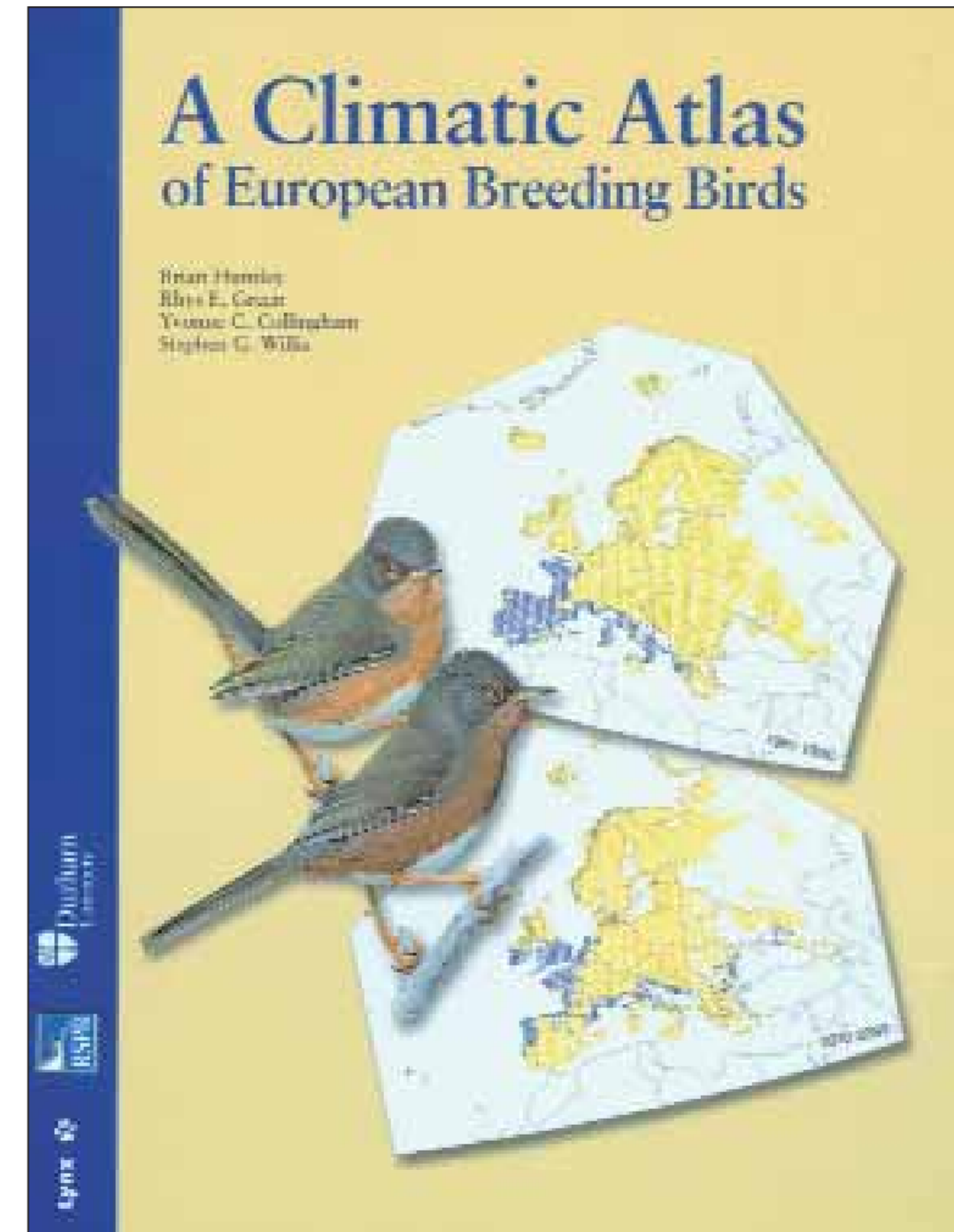
British breeding birds, those for which the Atlas predicts Britain will become more climatically suitable have tended to increase in numbers over the last quarter century. Similarly, those for which it predicts the climate will become less suitable have tended to decline. Thus, it seems that the Atlas predictions are already coming true.

A study of an upland breeding bird, the golden plover, and its crane-fly prey (pp 44–45) provides an example of the sort of mechanism that may underpin the impact of climate change on wildlife. August temperatures increased by nearly 2°C over the last 35 years on the upland plots studied, and this research has shown that increased late summer temperatures reduce the abundance of emerging crane-flies – probably because the soil dries out – thus reducing chick survival the following year and causing golden plover populations to decline. RSPB and others are now considering how uplands could be managed to keep them wetter, so maintaining their suitability for crane-flies, golden plovers and other species dependent on this ubiquitous prey.

Keeping the landscape wet seems to be an emerging theme for a range of bird species that are in decline. For example, willow tits (pp 26–27), whose UK numbers have declined by nearly 90% since 1970, seem to favour young woodlands found on wet soils, avoiding older, drier woods. In a study in the Broads (pp 40–41), numbers of lapwing pairs were

higher, and use of fields by lapwing chicks greater, in fields with high densities of footdrains (shallow channels that retain water throughout the breeding season), probably because they help provide a rich food source. Similarly, lowland wet grassland fields are softer and wetter where snipe continue to breed, compared with fields from which they have been lost (pp 28–29). Intriguingly, though, while the fields studied have tended to become softer and wetter over time, snipe have nevertheless still declined on them. The next stage in this research is to understand these apparently conflicting results; perhaps wetting the soil reduces populations of important prey such as earthworms?

In late 2007, the RSPB reviewed the scientific evidence for the impacts of predation on bird populations. This review, published as *The predation of wild birds in the UK* (available at [www.rspb.org.uk/ourwork/science](http://www.rspb.org.uk/ourwork/science)) concluded that there was growing evidence that breeding populations of some ground nesting birds were limited by predation. It also suggested that while killing predators could help to increase breeding numbers of prey, many other non-lethal solutions to reduce predation were available, although their efficacy was poorly known. A recent study (pp 30–31) shows the potential for reducing predation by managing habitats, rather than killing predators. This study showed clearly that lapwing nests were more successful when in the middle of wet grassland fields and surrounded by other



nesting lapwings. With funding from Defra, the RSPB is now experimentally trying to manage wet grassland to encourage lapwings to nest at higher densities in the middle of fields. Predator control, however, can be effective, especially where the predator is not native to the area. For example, productivity of common and arctic tern chicks in west Scotland was more than two and a half times higher in areas where introduced American mink were killed, compared to where they were not (pp 46–47).

While it is always rewarding to discover ways to improve the status of threatened wildlife, there can be little greater thrill for the conservation scientist than the discovery of a new species, particularly among such a well-described group as birds. This is exactly what has happened recently on the Azores. Monteiro's storm-petrel was thought to be a distinct population of the closely-related Madeiran storm-petrel, albeit one that bred at a different time of year. A recent study (pp 22–23), however, investigating vocal, morphological and

genetic differences has now shown that it is a separate species, albeit an extremely rare and threatened one.

As an applied conservation organisation, we need to disseminate 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 on 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 2007 and the first half of 2008 is provided towards the back of the report, and for previous years is available at [www.rspb.org.uk/ourwork/science](http://www.rspb.org.uk/ourwork/science)

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

**Dr Mark Avery**  
Director, Conservation, the RSPB

**Dr David Gibbons**  
Head of Conservation Science, the RSPB

## Funding

**The RSPB has a policy of keeping only a few months' running costs in its financial reserves. We must raise all our annual expenditure every year and we depend on a range of sources for this funding.**

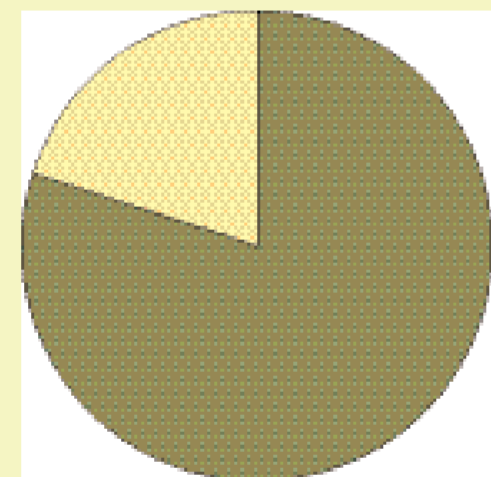
Around 80% of the RSPB's income comes from the generosity of individuals (our members and supporters) and although this income can be predicted with some certainty, it is by no means guaranteed and fluctuates. The RSPB must continue to pursue a wide variety of funding sources to continue our work and grant funding is a vital source in the mix. Many organisations (listed below) have funded specific science projects in 2007–08 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 additional support and funds for wider conservation action.

AEWA Secretariat  
Breckland District Council  
British Birdwatching Fair  
BP (through Scottish Forest Alliance)  
Cairngorm National Park Authority  
CCW  
Conservation International  
Darwin Initiative for the Survival of Species  
Defence Estates, MoD  
Department for Environment, Food and Rural Affairs  
Department for International Development

European Commission Directorate General Environment  
EU Life Environment Fund  
EU Life Nature Fund  
Forestry Commission (England, Scotland and Wales)  
HGCA  
The MacArthur Foundation  
Moors for the Future  
Natural England  
Northern Ireland Environment Agency  
Ornithological Society of the Middle East

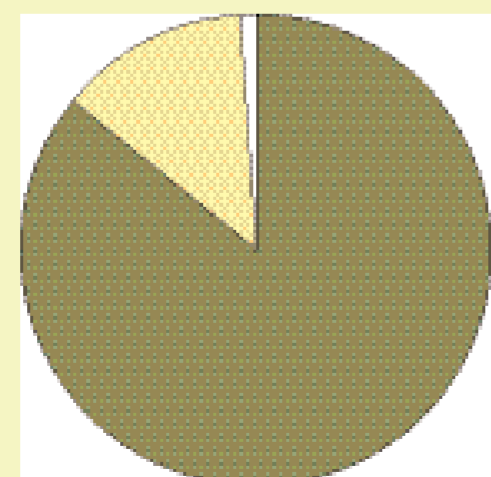
The Overseas Territories Environment Programme (OTEP)  
Pesticide Safety Directorate  
The Rufford Foundation  
Scottish Executive Biodiversity Action Grants Scheme  
Scottish Executive Environment and Rural Affairs Department  
Scottish Natural Heritage  
SITA Trust  
Welsh Assembly Government

**Sources of funding for RSPB science 2007/08**



■ **RSPB fundraising**  
■ **Research grants and contracts**

**RSPB expenditure on science 2007/08 (£4,788,569)**



■ **In-house**  
□ **Studentships**  
■ **Contracted out**

## Partnerships

**By working during 2007–2008 with the wide range of partners listed, the RSPB maximised the quantity and quality of conservation science that it undertook. Underpinning much of this is the huge contribution made by thousands of birdwatchers in surveying, monitoring and ringing of birds within the UK and further afield. Their contribution and the partnership with them are invaluable.**

Aberdeen Centre for Environmental Sustainability

ADAS

Allerton Research & Education Trust

Andhra Pradesh Forest Department

Anguilla Department of the Environment

Anguilla National Trust

A P Leventis Ornithological Research Institute, Nigeria

Aquatic Warbler Conservation Team

Armed Forces, Malta

Ascension Conservation

Association for the Conservation of Biodiversity in Kazakhstan (ACBK)

Audubon

Avian Demography Unit, University of Cape Town

BASC

Bat Conservation Trust

Bird Conservation Nepal

Bird Conservation Society of Thailand (BCST)

BirdLife African Partnership secretariat

BirdLife Europe Office

BirdLife International

BirdLife International Indochina Programme

BirdLife Malta

BirdLife Middle East Office

BirdLife South Africa

BirdWatch Ireland

Biodiversity & Nature Conservation Association Myanmar (BANCA)

Biomathematics & Statistics Scotland

Bombay Natural History Society (BNHS)

British Antarctic Survey

British Birds

British High Commission, Kolkata, India

British Museum of Natural History

British Ornithologists' Union

British Trust for Ornithology

Bulgarian Society for the Protection of Birds

Bumblebee Conservation Trust

Burung Indonesia

Butterfly Conservation

CABI Bioscience

Cambridge Conservation Forum

Centre for Agri-Environmental Research, University of Reading

Centre for Ecology & Hydrology

Centre for Life Sciences Modelling, University of Newcastle

Centre for Research into Ecological & Environmental Modelling, University of St Andrews

Centre for Social & Economic Research on the Global Environment, UEA

Central Science Laboratory

Chagos Conservation Trust

Conservation Society of Sierra Leone

Countryside Council for Wales

Czech Society for Ornithology (CSO)

Defence Estates

Denny Ecology

Département des Eaux et Forêts, Morocco

Department of Agriculture & Rural Development (NI)

Department of Biology & Biochemistry, University of Bath

Department of Biology, Queen's University, Kingston

Department of Biology, University of York

Department of Forest & Wildlife, India

Department of Geography, University of Reading

Department of Geospatial & Space Technology, University of Nairobi

Department of National Parks and Wildlife Conservation, Nepal

Department of National Parks, Wildlife & Plant Conservation, Thailand

Departments of Plant & Soil Science & Zoology, University of Aberdeen	Glasgow Natural History Society Harper Adams University College	Ministry of Agriculture & Agrarian Reform, Syrian Arab Republic	Penny Anderson Associates	School of Conservation Sciences, Bournemouth University	UNEP World Conservation Monitoring Centre
Department of Oceanography and Fisheries, University of the Azores	Herbarium Bogoriense	Montana State University	Percy Fitzpatrick Institute of African Ornithology	The Scottish Association for Marine Science	VURV (Czech Crop Production Research Institute)
Department of Zoology, University of Cambridge	Hymettus Indian Veterinary Research Institute	Montserrat Department of the Environment	The Peregrine Fund	The Scottish Chough Study Group	Dr Adam Watson
Department of Zoology, University of Oxford	International Advisory Group for Northern Bald Ibis	Montserrat National Trust	Plantlife	Scottish Agricultural College	Mr Nicholas Watts
De Wildt Cheetah & Wildlife Trust - South Africa	Institute of Biomedical & Life Sciences, University of Glasgow	National Bird of Prey Trust	Polish Society for the Protection of Birds (OTOP)	The Scottish Raptor Study Groups	Wildlife Conservation Society Cambodia
Direction Regionale des Eaux et Forêts du Sud-Ouest, Agadir, Morocco	Institute of Water & Environment, Cranfield	National Geographic Society	Ponds Conservation Trust	The Scottish Ornithologists' Club	Wildlife Institute of India
Doga Dernegi (Turkish Nature Society - BirdLife Partner designate)	Institute of Zoology, London	National Institute of Agricultural Botany (NIAB)	Portuguese Society for the Study of Birds (SPEA)	Shetland Oil Terminal Environmental Advisory Group	The Wildfowl & Wetlands Trust
Durrell Wildlife Conservation Trust	International Centre for Birds of Prey	National Institute of Water & Atmospheric Research, New Zealand	QPQ Software	Slender-billed Curlew Working Group	WOCAT (World Overview of Conservation Agriculture & Technologies)
The Environment Council	Istituto Nazionale per la Fauna Selvatica, Bologna	National Museums of Kenya	Queen's University, Belfast	SOVON	Wildlife Trust of South and West Wales
Ethiopian Wildlife & Natural History Society	IUCN	National Soil Resources Institute, Cranfield University	Rare Breeding Birds Panel	Spanish Ornithological Society (SEO)	Woodland Trust Scotland
European Bird Census Council	JNCC	National Trust for Nature Conservation, Nepal	Rare & Endangered Species Trust - Namibia	State Government of Assam	WWF – US
European Commission	Francis Kirkham, Ecological Consultant	Natural Environment Research Council	Rhino & Lion Wildlife Conservation NPO	State Government of Haryana, India	Mr Peter Wombwell
European Topic Centre: Biological Diversity	Lembaga Ilmu Pengetahuan Indonesia	NatureKenya	Royal Botanic Garden - Kew	State Government of West Bengal, India	Yayasan KEHI
Field Ornithology Group of Sri Lanka (FOGSL)	Linking Environment & Farming (LEAF)	Natural Research Ltd UK	Royal Holloway College	Statistics Netherlands	Zoological Society of London
Footprint Ecology	The Macaulay Institute	Agriculture and Natural Resources Department, Government of Tristan da Cunha	Royal Navy Birdwatching Society (RNBWS)	UK Overseas Territories Conservation Forum	Zoological Museum, University of Copenhagen
Forestry Division, Sierra Leone	Makerere University Institute of the Environment & Natural Resources	NatureUganda	Russian Bird Conservation Union	The University of Aberystwyth	
Forest Research, Northern Research Station	Malloch Society	Newport University	School of Biological Sciences, University of East Anglia	The University of Chiang Mai	
The Game and Wildlife Conservation Trust	Malta Maritime Authority	Nigerian Conservation Foundation	School of Biology, University of Nottingham	University of Coimbra, Portugal	
GEM, EC Joint Research Centre	Malta National Museum of Natural History	Norwegian Institute for Nature Research (NINA)	School of Biological & Biomedical Sciences, University of Durham	The University of Exeter	
Geographical Research Institute, Hungarian Academy of Sciences	Marine Turtle Research Group, School of Biological Sciences, University of Exeter	The Open University	School of Biological Sciences & School of Geosciences, University of Edinburgh	The University of Leuven	
		Ordnance Survey	School of Biological and Environmental Science, University of Stirling	The University of Manchester	
		Oriental Bird Club		The University of Plymouth	
		Parc National de Souss-Massa		The University of Pretoria	
				The University of Wolverhampton	
				Universities Federation for Animal Welfare	

## The application of science

### Determining the impacts of grazing on moorland birds



David Tipling (rspb-images.com)

**Moorlands dominate the upland landscapes of the United Kingdom, from SW England to the Shetland Isles, and consist of a wide range of heathland, mire and grassland habitats. These are internationally important, with a breeding bird assemblage that is also of high conservation importance. Sheep grazing has traditionally been the major land-use, and large increases in upland sheep numbers between the 1970s and 1990s, together with increases in red deer in the Scottish Highlands, led to concerns over the impacts on moorland bird populations. However, more**

**recently, changes to agricultural support have led to rapid declines in sheep and cattle numbers in some upland areas, with concern shifting to the possible effects of large-scale stock reductions, or even abandonment. Research to improve our understanding of how changes in grazing affect moorland bird populations has been underway at the RSPB for the past nine years.**

Together with burning, grazing by large herbivores is the principal factor maintaining the open character of moorlands. Changes in grazing

regimes often have major effects on vegetation composition and structure. Increases in grazing cause a shift from heather to grass, sedge and rush swards, whilst reductions (and exclusions) may reverse this trend, although the extent to which this actually occurs depends upon a range of factors, including vegetation composition at the time of reduction. Increases in grazing also reduces overall vegetation height and density; reductions cause the opposite trend.

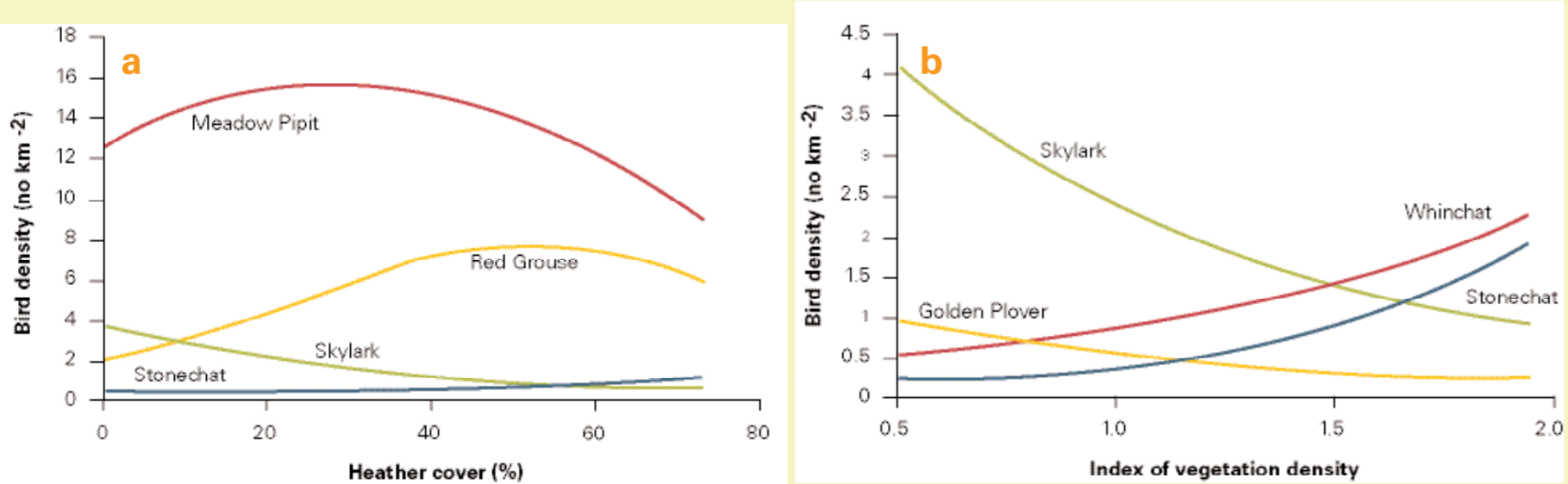
Much of the research at the RSPB has focused on determining how bird abundance is related to moorland

vegetation composition and structure, and then interpreting these findings in relation to the known effects of grazing on vegetation. These studies have concentrated on nine relatively widespread moorland bird species, including red grouse, curlew, golden plover, snipe and several moorland passerines. In broad terms, findings indicate the importance of variation in both vegetation composition and structure in providing the greatest benefits to the widest range of bird species. Few species benefit from extremes of either heather or grass cover with, for example, densities of red grouse (a well known heather specialist) showing no further increase beyond 50–60% heather cover, and being positively correlated with a measure of variability in dwarf shrub and grass cover. Variability in vegetation structure also benefits some key species (curlew), although others are strongly linked to open (golden plover and skylark) or dense (whinchat and stonechat) vegetation. These bird-habitat relationships have been produced using data from four

upland regions (south Scotland, North Pennines, South Pennines and Wales), with the findings suggesting a general consistency in the relationships across the regions. Similar principles appear to apply amongst some other, rarer, moorland birds, in terms of the benefits of compositional and structural heterogeneity. Merlins, hen harriers, short-eared owls, black grouse and ring ouzels all tend to select nest sites in tall heather, whilst heather and other dwarf shrubs are important food plants for black grouse. Studies of ring ouzels in the Moorfoot Hills, southern Scotland, found that historical breeding sites were more likely to become deserted in areas with less heather dominated vegetation, implicating heather loss as a factor contributing to declines here. However, these species also benefit from access to grassier habitats. Meadow pipits and voles, the main prey species of the raptors and of short-eared owls, are most abundant in grass-heather mixes or in

tall grass. Ring ouzels select short grass for foraging during the nestling period, when earthworms are the main food, whilst black grouse broods often select damp grass/sedge habitats, where the invertebrate foods of their chicks are most abundant. Findings of the type outlined above describe the habitat conditions required by moorland birds, and therefore the conditions that grazing regimes can help to create, where management for birds is an objective. They also indicate the species likely to be most sensitive to major changes in grazing. However, these findings are derived largely from correlative studies, and their reliability needs to be assessed by field trials and experiments involving manipulations of grazing. At the RSPB's Geltsdale reserve, sheep stocking densities were reduced by approximately 70% on part of the moorland but kept constant on an adjacent area during a

**Predicted relationships between bird abundance and (a) heather cover and (b) vegetation density. Data were collected from 85 plots in south Scotland and northern England. No significant relationships were found with either variable for curlew, snipe and wheatear. Densities for meadow pipit and skylark have been divided by 10.**



three-year period, before also being reduced on this second area. These reductions led to an increase in vegetation height and were associated with declines in both golden plover and curlew abundance. Whilst a decline in golden plover abundance was expected, that for curlew was less so, indicating that this species may be more sensitive to grazing reductions than suggested by the relationships with vegetation height in the correlative studies. Current trends for declines in upland livestock appear to offer opportunities for some bird species, such as black grouse, but present serious threats to others, perhaps most notably the waders. The conservation challenge will be to find ways to maintain required habitat conditions in the areas of greatest importance for species that are most dependent upon open moorland habitats.

**Contact:**  
[murray.grant@rspb.org.uk](mailto:murray.grant@rspb.org.uk)

Funding for the research described above has been provided by Defra, NE, CCW, and NERC. Studies on ring ouzels were made in collaboration with Cambridge University. The RSPB is grateful to the large numbers of landowners, gamekeepers and farmers who have provided access to allow these studies to be undertaken.

Pearce-Higgins JW and Grant MC (2006) Relationships between bird abundance and the composition and structure of moorland vegetation. *Bird Study* 53: 112-125.

Sim IMW, Burfield IJ, Grant MC, Pearce-Higgins JW and Brooke ML (2007) The role of habitat composition in determining breeding site occupancy in a declining ring ouzel *Turdus torquatus* population. *Ibis* 149: 374-385.

Pearce-Higgins JW, Grant MC, Beale CM, Buchanan, GM and Sim IMW (in press) International importance and drivers of change of upland bird populations. In Bonn A, K Hubacek, J Stewart & T Allott (eds) *Drivers of Change in Upland Environments*, Routledge  
**See also: 2001: 32; 2002: 25; 2007: 25**



Ben Hall (rspb-images.com)

**Increasing deer numbers in some areas and decreasing sheep densities in others present different challenges for upland bird populations.**



Andy Hay (rspb-images.com)

## Assessing the likely effects of future climatic change on birds

Little egret by Robert Smith (rspb-images.com)



The little egret has colonised the UK in recent years.

**Global warming is in progress and expected to have large effects on biodiversity. How can we assess what the impact of this change might be and adjust our priorities for conservation accordingly?**

One approach is to make statistical models that describe the range of climatic conditions in which each species has been found in recent times. That model is then used, in combination with a projection of future climate made by climatologists, to indicate where the geographical range of the species

might be located in the future. Of course, this assumes that the species' recent range was principally determined, directly or indirectly, by climatic factors. This is not the case for all species; most obviously those whose recent range has been curtailed by persecution by humans or large-scale habitat loss. Even so, the method offers one of the few possible ways to get a glimpse of what might be in store. Researchers at the RSPB, Durham University and the University of Cambridge have now prepared models and future range projections

of this kind for nearly all European breeding birds and published them as *A Climatic Atlas of European Breeding Birds*. The results suggest that, for a typical European bird species, more than half of the recent breeding range might become climatically unsuitable by the late 21st century. Even if it can colonise all newly suitable areas, such a species might have a total range about 30% smaller than its present one. The results for grasshopper warbler fall very close to the average projected response for all species. Some less typical species may fare

much worse, potentially losing the majority of their range and, in some cases, having their potential range shifting by hundreds of kilometres so that it barely overlaps the present range. The species affected in this way include some that are found entirely or almost entirely in Europe, such as azure-winged magpie and Dupont's lark.

Given the gravity of these projections, an assessment is needed to establish whether the models upon which they are based really allow us to draw such conclusions. Has the climate already changed in the way projected by the climatologists and, if so, are the changes in range predicted by the models anything like those that have actually occurred?

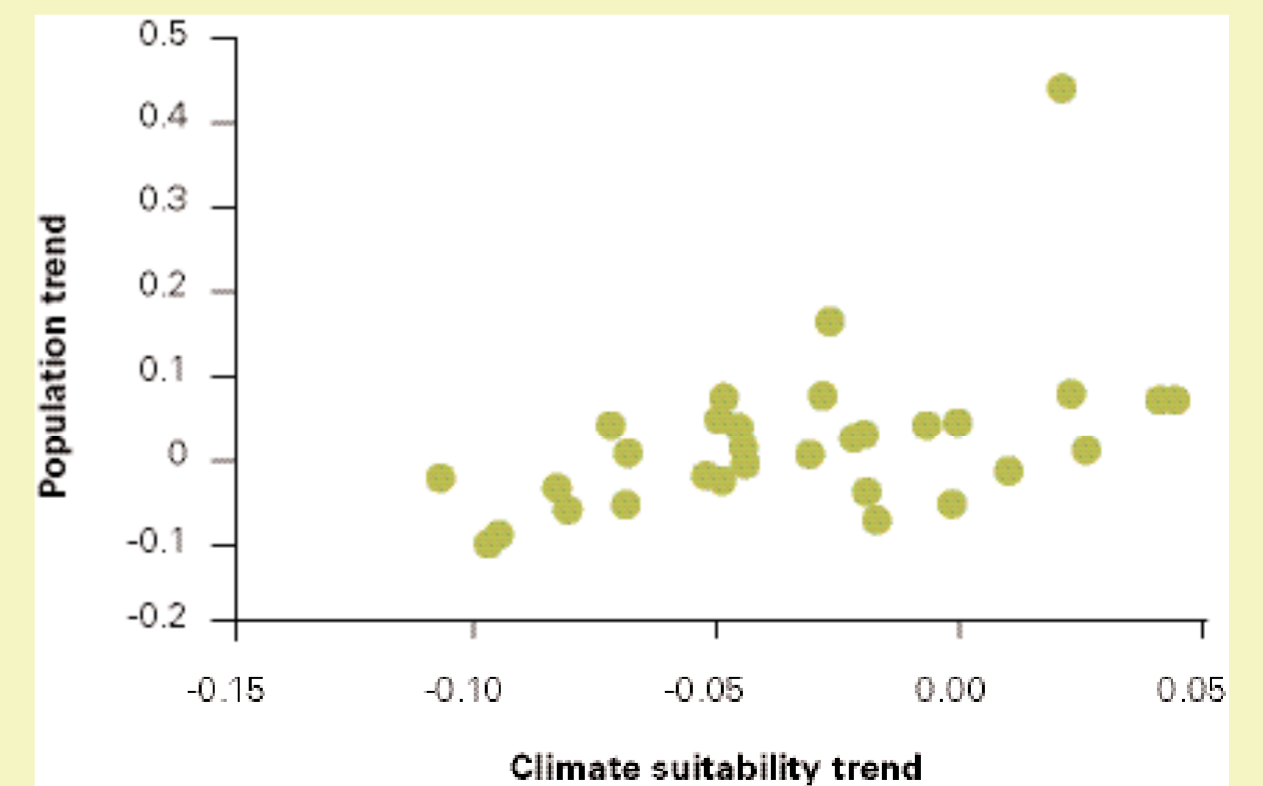
To address these questions, the authors of the *Climatic Atlas*, together with other colleagues from



The future range of azure-winged magpies may shift to a completely new area.

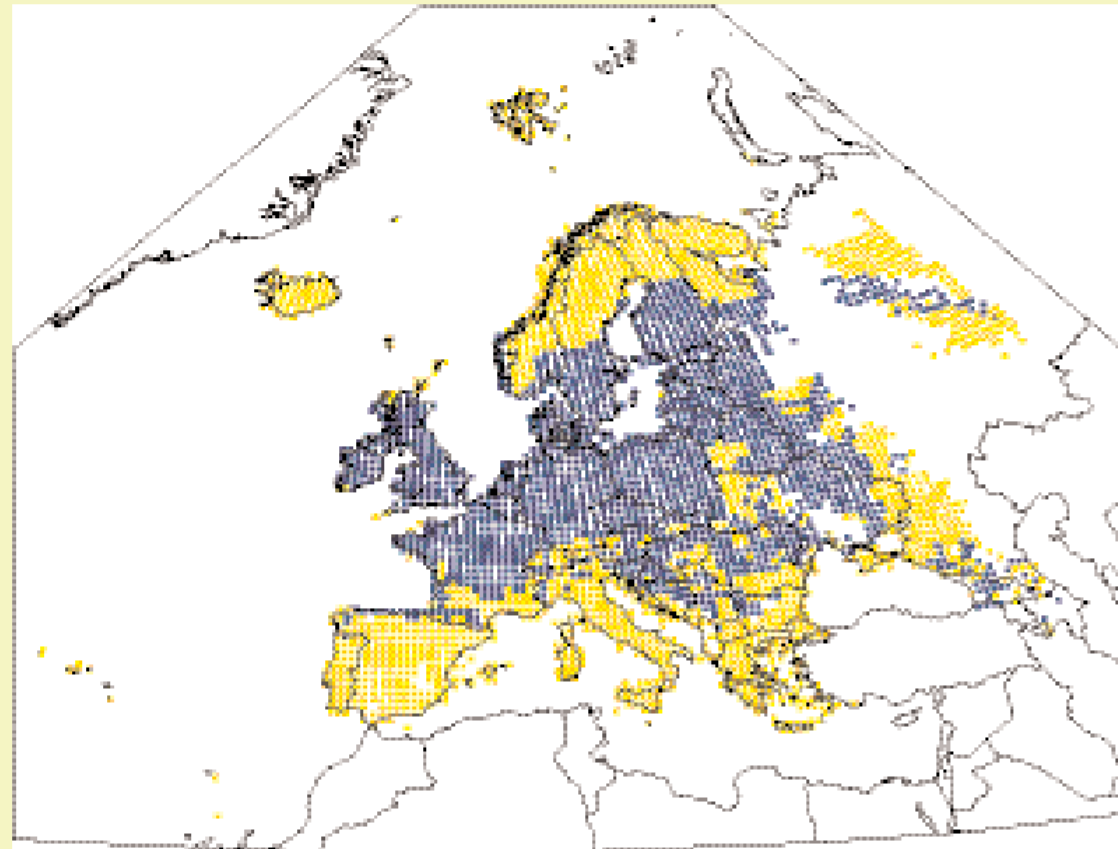
Mike Lane (rspb-images.com)

**Observed population trend, 1980-2004, for 31 species of rare breeding birds with an average of five or more breeding pairs per year in the UK (vertical axis) in relation to the trend in climate suitability calculated from annual meteorological data and the climate envelope model for each species.**



the RSPB, used the models of bird distribution and measurements of climatic conditions to hindcast changes in the climatic suitability of the UK for 42 species of rare breeding birds, which are on the edge of their European ranges here. They found that from about 1980 onwards the climate of the UK showed a systematic warming trend in the direction expected from climate models. Before that there was no clear trend. Annual numbers of breeding pairs during 1980–2004 were obtained from the database compiled and published by the Rare Breeding Birds Panel (RBBP). Species that the models hindcast to have improving climatic conditions had a greater tendency to have actually increased in population size than species for which the models

**Grasshopper warbler**  
**Simulated current range (presence shown blue, absence yellow)**

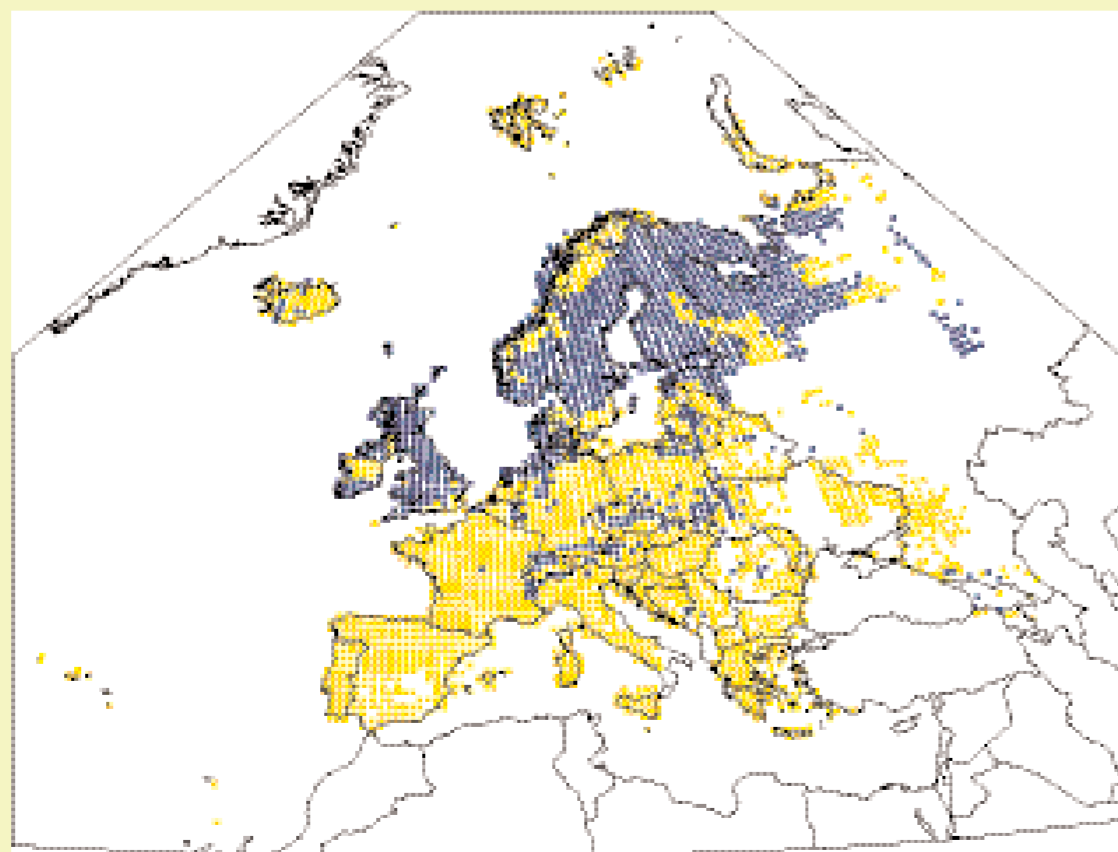


Suitable conditions for the Scottish crossbill may be lost entirely

Danny Green (rspb-images.com)



**Grasshopper warbler**  
**Simulated future range (presence shown blue, absence yellow)**



Grasshopper warbler



Mike Lane (rspb-images.com)

indicated that the UK had become less climatically suitable. This was especially so when those species with UK breeding populations averaging less than five pairs were excluded, which might arise if population fluctuations caused by chance events obscure effects of climatic change. The most marked agreement between the hindcast and the observed change was for the little egret, which has colonised the UK as a breeding bird during the period studied. Although it seems obvious that climatic change is behind such colonisation events, it requires careful comparison of trends across many species, as we have done here, to really test that explanation. Hence, although many other kinds of environmental change are known to affect changes in

populations and ranges of birds, these findings suggest that climatic change has now joined them as another driver of bird population change. Further tests of this research approach are in progress. The aim of this work is to assess the scale and rapidity of changes in bird populations and distribution caused by global warming as an aid to identifying species needing the most urgent help to compensate for adverse effects. Possible aids include extending nature reserves in areas where vulnerable species are projected to persist and in areas they are projected to colonise.

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Particular thanks are due to the Rare Breeding Birds Panel for providing

access to the data used in this analysis and to the large number of ornithologists who have, over the years, contributed their data to the RBBP.

Huntley B, Green RE, Collingham YC, Hill JK and Willis SG (2007) *A Climatic Atlas of European Breeding Birds*. Durham University, The RSPB and Lynx Edicions.

Huntley B, Collingham YC, Willis SG, Green RE (2008) Potential Impacts of Climatic Change on European Breeding Birds. *PLoS ONE* 3(1): e1439. doi:10.1371/journal.pone.0001439

Green RE, Collingham YC, Willis SG, Gregory RD, Smith KW and Huntley B (2008) Performance of climate envelope models in retrodicting recent changes in bird population size from observed climatic change. *Biology Letters* 4: 599–602.

See also: 2001: 37; 2004: 40; 2005: 30; 2006: 37

## Monitoring and indicators

The RSPB is involved in a wide variety of monitoring schemes and surveys of birds and, to a lesser extent, other key taxonomic groups.

Helping to develop monitoring schemes outside the UK is increasingly important, as is the growth in the use of monitoring data to produce policy-relevant indicators that measure the changing state of the environment.

## The 2005 national survey of black grouse



**In Britain, black grouse are found in a wide range of upland habitats, from mires, heathland, young and open forests to pasture and meadows. The males are renowned for their mating displays or 'leks' in early spring. Numbers appear to have been in decline since the early 1900s. The first full national survey in 1995–96 estimated the British population at 6,506 displaying males, which was substantially lower than the previous estimates from the 1980s and early 1990s. As a result of this decline, black grouse is red-listed as a species of conservation concern in the UK**

**and is a priority species under the UK Biodiversity Action Plan ([www.blackgrouse.info](http://www.blackgrouse.info)). To estimate the current population, and any further change in numbers since 1995–96, the second national survey was carried out in 2005.**

In Britain as a whole, the estimated number of displaying males fell from 6,506 in 1995/96 to 5,078 in 2005, a decline of 22%. The survey estimated only 3,344 displaying males in Scotland, a 29% decline from the 4,719 estimated in 1995-96. Steep declines were recorded in the southeast (Lothian & Borders –69%)

and southwest (Dumfries & Galloway and southern Argyll –49%), with no significant changes in the rest of Scotland. However, Scotland continues to hold a high proportion (66%) of the British population, and encouragingly in Perthshire the species is now showing signs of recovering from a low point in the mid 1990s. In northern England, the population was estimated at 1,521 displaying males in 2005, down slightly from the 1995–96 estimate of 1,704, although a subsequent survey of England in 2007 suggested the population may be increasing again. Encouragingly, active management

partnerships in Wales, involving foresters, conservationists and land managers, have seen numbers rise by 39% to 213 displaying males in 2005. Continuing uncertainty as to their precise requirements suggests that, where numbers have declined, further research is required to reveal the underlying mechanisms and appropriate conservation measures.

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The 2005 National Black Grouse Survey was a partnership between the RSPB, Forestry Commission, The Game and Wildlife Conservation Trust, DEFRA, Countryside Council for Wales and many volunteers.

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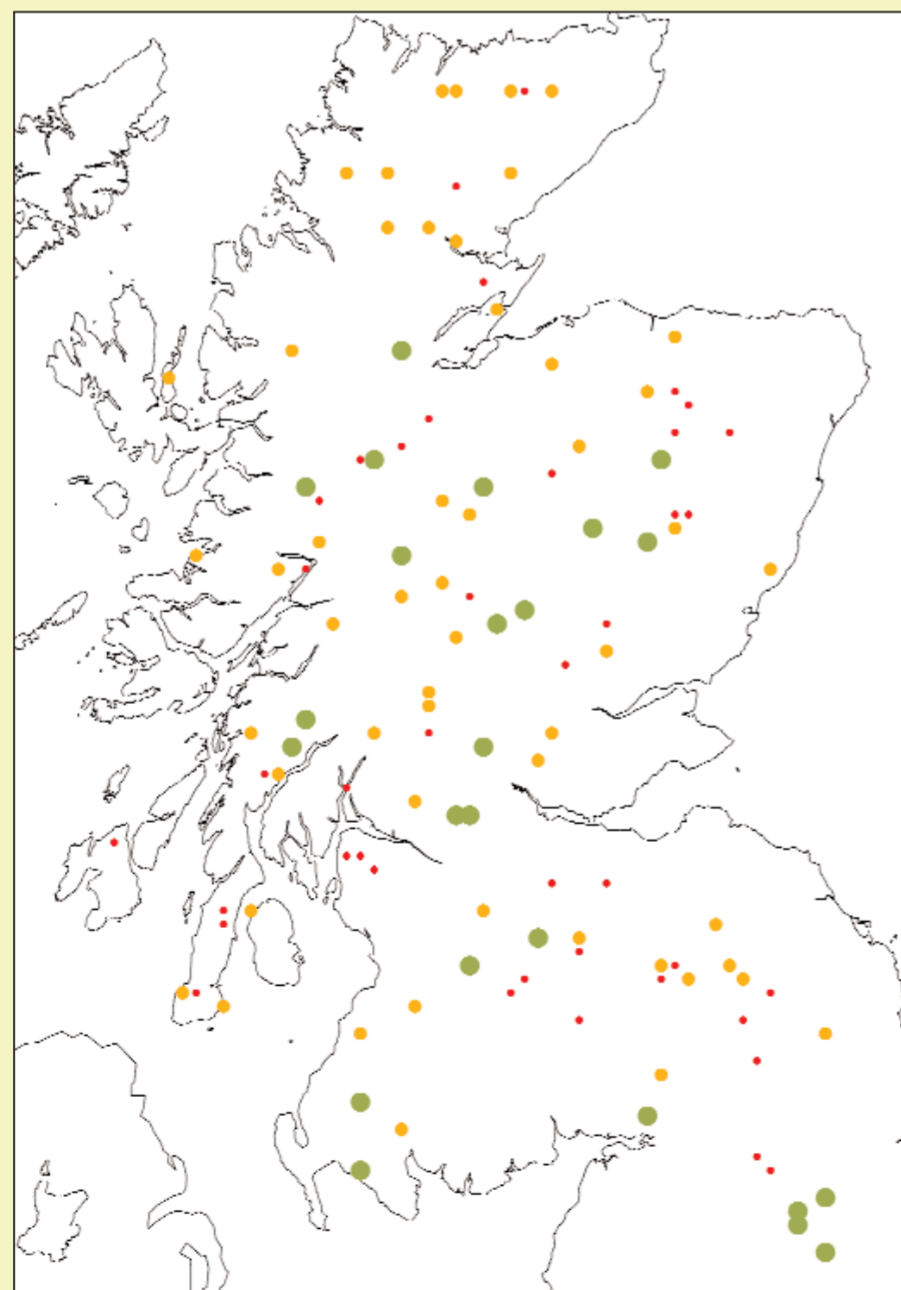
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See also: 2002: 24; 2006: 31



Chris Gomersall (rspb-images.com)

**Changes in the number of displaying males in 117 5-km squares surveyed in Scotland and England in both 1995-96 and 2005 (large green dots = increase, medium orange dots = no change, small red dots = decrease).**



## Bird atlases come of age

**The current BTO/SOC/BirdWatch Ireland atlas project to map the distribution of all the UK's breeding and wintering birds promises to be one of the best ever undertaken. However, bird atlases are not new. A recent analysis has attempted to chart their evolution, and so identify patterns that might help guide the development of atlases in the future.**

Since the publication of the first systematic regional bird atlas in 1970 (covering the West Midlands region of England), and the first national atlas in 1976 (the first UK breeding atlas), over 400 systematic bird atlases have been published worldwide. Atlases have a range of uses, from guiding local conservation priorities to providing data to predict the effects of climate change on bird distributions. Atlases have covered areas as large as the whole of North America (nearly 10 million square

km) and as small as the town of San Donà di Piave in Italy (12 square km), and have involved from 1 to 10,000 participants. Italy leads the way with at least 73 national and regional atlases, followed by the USA (65), the UK and Germany (each 54) and Spain (26). With such a range of coverage and the greatly differing availability of volunteers to do the fieldwork, it is hardly surprising that many different atlas methods have evolved and that these have evolved over time.

Atlases have become significantly reduced in scale over time, covering smaller areas in shorter periods of fieldwork, but at higher spatial resolutions and with increasing numbers of observers per unit area. An important finding was that atlases that generated information on abundance as well as distribution were no more costly in terms of observer effort or analysis time than those that collected only data on

distribution, suggesting that with little extra effort, atlases could collect and present more valuable data. Of concern, however, is evidence of a significant decline in the number of new atlases being produced at a time when their value for science and conservation is beginning to be fully appreciated and exploited.

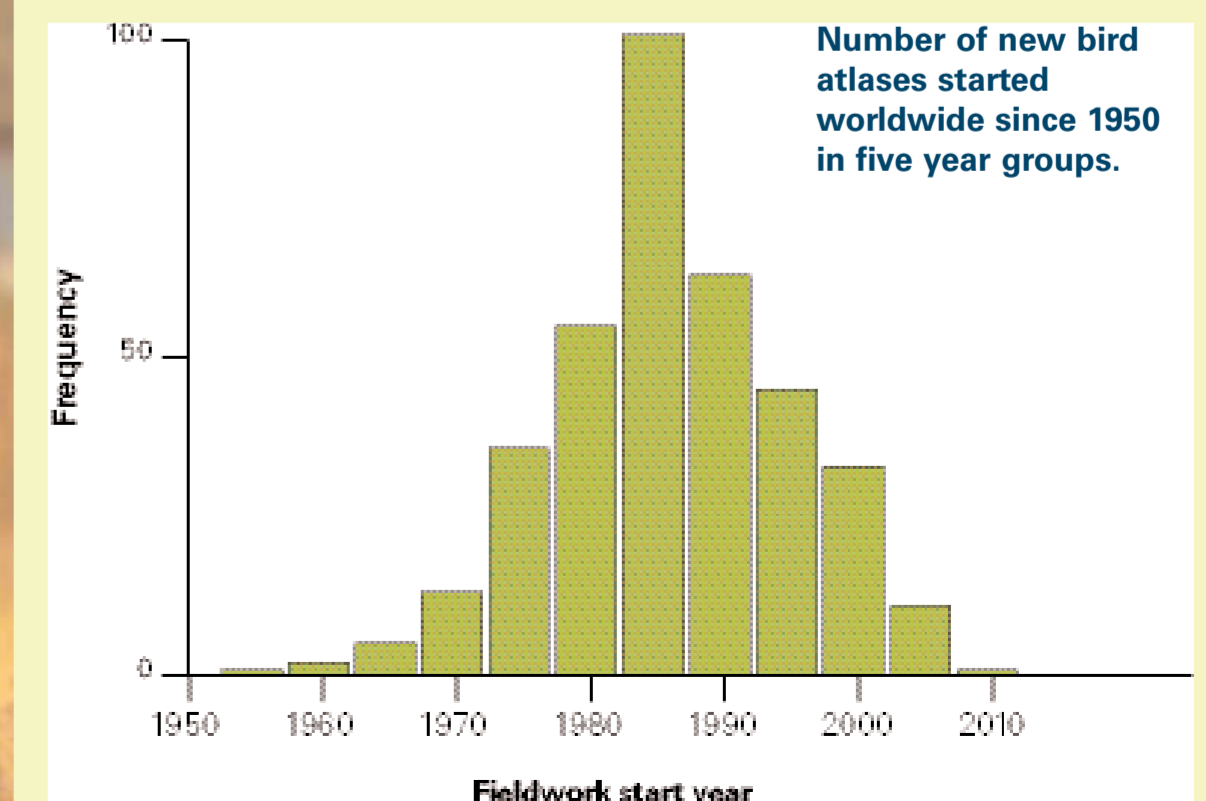
**Contact:**  
david.gibbons@rspb.org.uk

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For more information on the current BTO/SOC/BirdWatch Ireland atlas visit [www.birdatlas.net](http://www.birdatlas.net)



David Norton (rspb-images.com)



## The 2006 national surveys of Dartford warbler and woodlark

**Two of the key species of lowland heath, Dartford warbler and woodlark, were surveyed comprehensively in 2006. This was the fourth national survey of Dartford warbler and the third of woodlark, and followed the results from the previous national surveys, which had shown encouraging increases.**

For both species, coverage was based on surveying 1 km squares. The aim was to fully cover 'core' squares, those occupied during the previous national surveys and recorded subsequently, and to survey a random selection of 'sample' squares from 5 km and 10 km buffers around the defined core, stratified by presence of suitable habitat. Any remaining squares within the Special Protection Areas (SPAs) designated for either species and that were not already within the sample coverage, were also surveyed to ensure full coverage for the Common Standards Monitoring of designated sites. For Dartford warblers, two visits were made to survey squares between April and June and for woodlarks two visits between mid-February and the end of May.

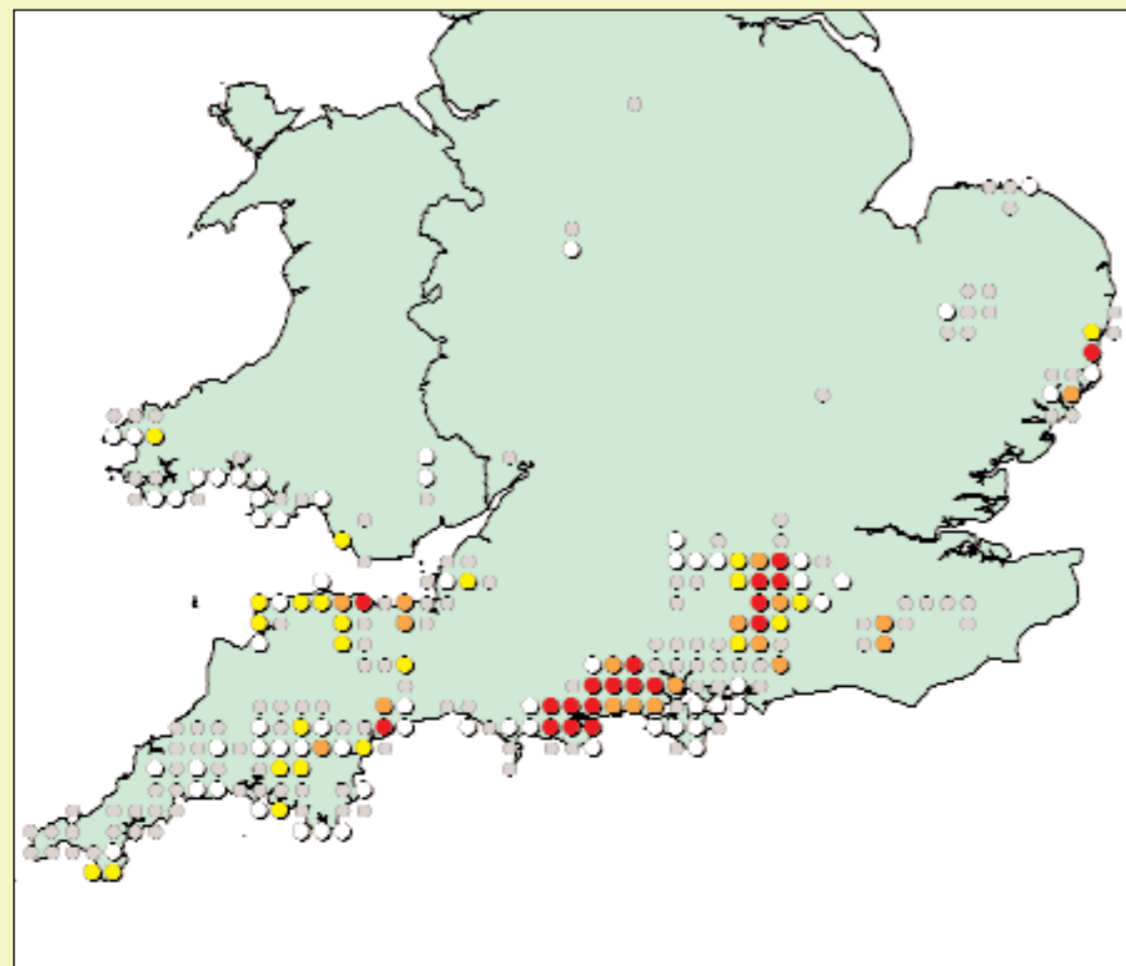
### Dartford warbler

There were an estimated 3,212 territories (95% confidence limits 2876–3589) in the UK in 2006, up by 70% since the previous survey in 1994. Dartford warblers were found in 124 10 km squares, a range increase of 114% since 1994. None were recorded in Wales in 1994, but



Colin Carver (rspb-images.com)

**Distribution and abundance of Dartford warbler in 2006. 1 km squares with 1–4 territories are shown as white circles; 5–14 territories as yellow circles; 15–49 territories as orange circles; 50+ territories as red circles. Grey circles show 1 km squares where no territories were recorded.**



there were an estimated 72 territories (95% confidence limits 41–113) here in 2006. A further 85 territories were recorded on the Channel Islands, with 53 found on Jersey. In 2006, 88.7% of territories were found on lowland heath, compared to 98.0% in 1994. In the same period, the proportion on upland heath has increased from 0.1% to 6.9%, mainly on Dartmoor and Exmoor.

### Woodlark

In 2006, there were an estimated 3,064 territories (95% confidence limits 2472–3687) in the UK, an increase of 88% since the last survey in 1997. Woodlarks were found in 131 10 km squares, a 46%

increase since 1997. A pair bred in Wales for the first time, probably, since 1982. There were also encouraging increases in Hampshire, north Norfolk and Yorkshire. Numbers were stable in Breckland, but there were further declines in the Suffolk Sandlings. Most of the population is split between lowland heath and coniferous forest plantations, but with an increasing number on farmland, particularly in Hampshire, Suffolk and Yorkshire.

Overall, for both species there has been an encouraging increase in numbers and range since the mid 1990s. However, woodlarks are still absent from much of their former range in SW England and Wales. The

restoration and management of suitable lowland heathland has been a major factor in this increase. For woodlarks, sympathetic management of coniferous plantations has also been important. Over the coming years, it will be interesting to see if woodlarks continue to extend their range further north and west, and if Dartford warblers continue to spread further into upland areas in England and Wales.

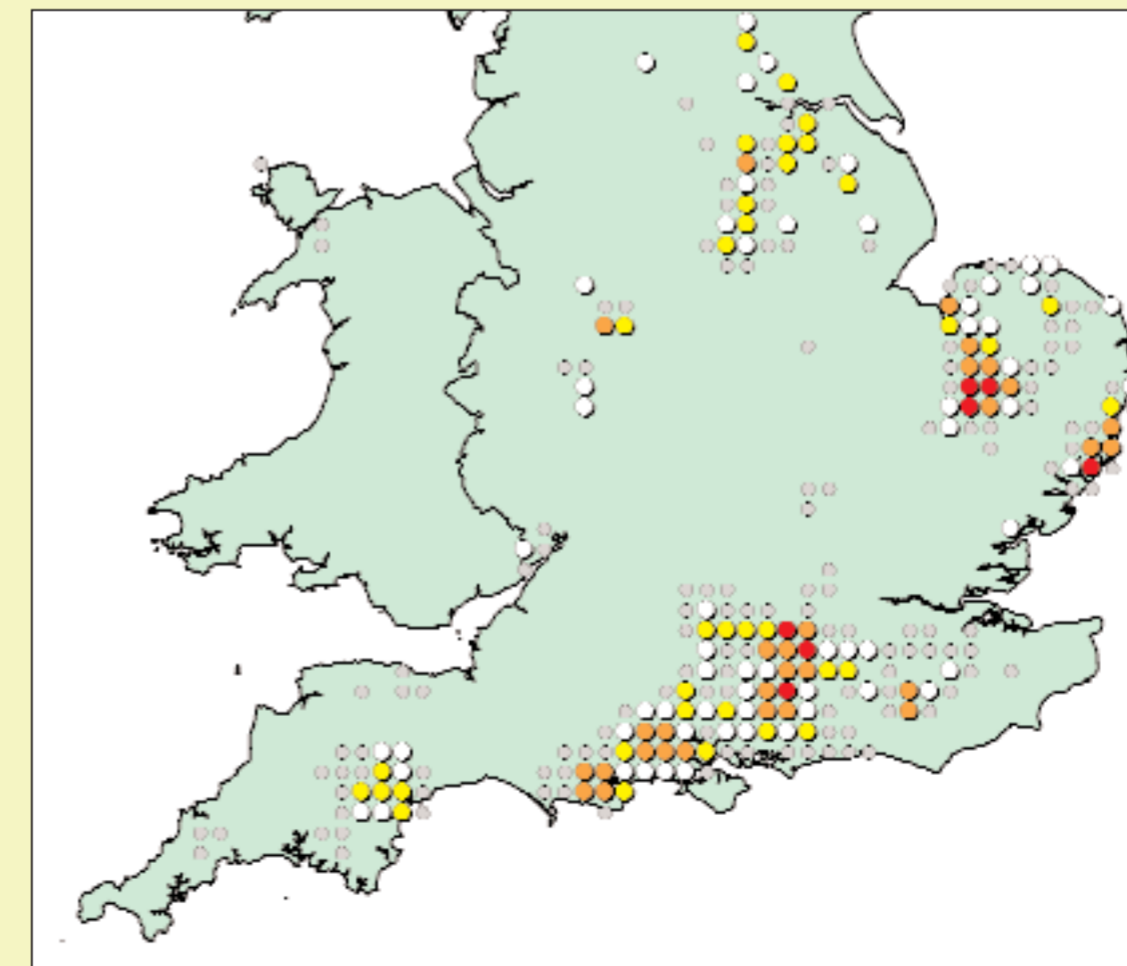
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These surveys were part of the Statutory Conservation Agencies/RSPB Annual Breeding Bird Scheme, organised by the British Trust for Ornithology (BTO) and the RSPB, and funded by the RSPB, Natural England (as part of the Action for Birds in England partnership), the Forestry Commission (England), and by the Joint Nature Conservation Council (JNCC).

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**See also: 2006: 18: 2007: 44**



## A new species of storm-petrel from the Azores



A Madeiran Storm-petrel photographed close to a breeding colony on St Helena. The taxonomic affinities of the storm-petrel populations of the South Atlantic have not yet been studied, and recent research shows that seasonal breeding also occurs at colonies on St Helena.

Mark Bolton (RSPB)

**The Madeiran storm-petrel, so-called since it was first described from Madeira by Edward Harcourt in 1851 and also known as the band-rumped storm-petrel and Harcourt's storm-petrel, breeds on many islands in both the Atlantic and Pacific oceans. At several colonies nesting occurs in two distinct periods ("hot" and "cool" seasons), with different pairs of birds time-sharing the same nest crevices, approximately six months apart. Storm-petrels nesting in the hot-season at a colony in the Azores have a different song to those breeding on the same island in the winter months, and playback experiments have shown that hot-season birds prospecting the colony at night for mates did not recognise the calls of their cool-season counterparts. In addition, hot-season birds are smaller, have longer and more deeply forked tails, and smaller heads and bills than the winter breeders.**

Recent molecular analyses have shown striking genetic differences among some of the seasonal populations of storm-petrels in both the North Atlantic and Pacific Oceans. Specifically, the two populations in Azores are genetically distinct, have no contemporary gene flow and appear to have diverged from each other at least 70,000 years ago. This combination of vocal, morphological and genetic differences warrant the description of the hot-season form as a distinct species, which has recently been named Monteiro's storm-petrel.

Historical chronicles dating from the 16th century, not long after the first settlers arrived in the Azores, describe a small, nocturnal, black and white seabird that was almost certainly Monteiro's storm-petrel. These were then so numerous that they could be attracted to land at night with bonfires and knocked from the air using sticks by the thousand, to be used for oil and food. Sadly and in marked contrast, Monteiro's storm-petrel is now known to breed on just two small uninhabited islets with a total population size estimated at fewer than 300 pairs. As such, it is one of Europe's rarest species and work is now needed to ensure its continued survival.

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The newly described species commemorates the late Dr Luís Monteiro, who initiated this research and worked tirelessly for seabird conservation in the Azores. Fieldwork was conducted by Mark Bolton, whilst a Visiting Research Fellow at the Department of Oceanography and Fisheries, University of Azores, Dr Joël Bried and Renata Medeiros. Molecular analysis was carried out by Drs Vicki Friesen and Andrea Smith at Queen's University, Kingston, Canada, and Dr Jacob González-Solís, Elena Gómez-Díaz and José L. Roscales at the University of Barcelona. This work was supported by a research fellowship from the Portuguese Science and Technology Foundation, the EU Life project and the British Ecological Society.

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**See also: 2007: 36**

**Monteiro's storm-petrel *Oceanodroma monteiroi* (right) and Madeiran Storm-petrel *O. castro* in flight off the only two known breeding islets of the former: Praia Islet (foreground) and Baixo Islet, Graciosa, Azores. The figure illustrates the differences in plumage wear and moult that are apparent in August, when both species attend the colonies in large numbers. Monteiro's Storm-petrels show faded plumage and have commenced moult of the inner primaries, whereas Madeiran Storm-petrels have relatively fresh plumage and have recently completed moult. Mark Bolton**



## The ecology of threatened species

Research into the ecology of threatened species has been at the core of RSPB conservation science for many years and continues to provide a wealth of information to guide our own conservation work and to influence others. Outside the UK, the emphasis of our ecological research is on globally threatened bird species and their habitats in RSPB 'focal' countries. Within the UK, where there are few globally threatened bird species, research is directed mainly at those species that have declined most. We are also supporting research on threatened species in other taxonomic groups, particularly those occurring on our own nature reserves.

## Asian vultures – the declines continue

**The rapid decline in the numbers of Asian vultures since the mid 1990s has produced one of the world's most urgent conservation problems. Three species are now listed by the IUCN as Critically Endangered as a result of contamination of their food supply with the veterinary painkiller diclofenac. Vultures die from kidney failure when they eat tissues from cattle that were treated with the drug shortly before death.**

In India, a repeat nationwide survey undertaken in 2007 by the Bombay Natural History Society (BNHS) covered over 18,000 km of hot and dusty roads to reveal the magnitude of these declines. In comparison to the early 1990s, populations of Oriental white-backed vultures have decreased by more than 99.9% and continue to decline at an annual rate of 44%. Only 11,000 birds are now estimated to remain in India, whereas before diclofenac this species was numbered in the tens-of-millions. Numbers of slender-billed vultures are even lower, with only around 1,000 birds surviving in India.

Surveys by BNHS of cattle carcass dumps in India reveal the extent of the underlying problem. Just before the 2006 ban on its manufacture in India for veterinary use, diclofenac was found in 10.1% of 1,848 livestock carcasses sampled. This level is more than sufficient to have driven the rapid declines in vulture numbers. Repeat surveys since the ban so far show little change and further action is urgently needed to effectively remove this drug from the vulture food supply.

Despite the magnitude of the declines and the continuing diclofenac problem, it is not all bad news. It is now established that another veterinary drug, meloxicam, is safe for vultures and, since this research was completed, the number of manufacturing companies and the availability of meloxicam has increased markedly in India and Nepal. Three vulture conservation breeding centres are now up and running in India, with a fourth centre recently established in Nepal. Encouragingly, two chicks fledged in 2007-08: the first time these vultures have been bred in captivity.

Lastly, innovative in-situ conservation efforts in Nepal to remove stocks of diclofenac and provide safe feeding resources have seen an increase in vulture numbers at the target site. Continuing and expanding this progress remains a key goal for all involved in vulture conservation.

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Collaborating agencies in this work include the Bombay Natural History Society, Indian Veterinary Research Institute, Wildlife Institute of India, Bird Conservation Nepal, University of Aberdeen, Zoological Society of London and the National Bird of Prey Trust. Funding for this project comes from the UK Government's Darwin Initiative programme.

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**See also: 2006: 12**

**Oriental white-backed vulture**



Blickwinkel/Alamy

## Investigating the cause of the British willow tit decline



**The willow tit is red listed as a species of conservation concern in the UK and has now been included in the revised list of UK BAP priority species due to a massive population decline in recent decades. The reasons for the decline are not fully understood, but hypotheses suggested include: inter-specific competition with other tits for nest sites, predation by great spotted woodpeckers, and changes in favoured woodland habitats.**

To test these hypotheses, a study was carried out in south east England of woods currently occupied by willow tits paired with woods within 50km which had been abandoned

five or more years previously. Point counts of willow tits, other tit species and great spotted woodpeckers were carried out throughout each wood and habitat variables were recorded. There was no difference in the number of woodpeckers, the main potential predator, or competitor tit species numbers between the occupied and abandoned woods. However, soil water content was found to be higher in woods still occupied by willow tits.

To further investigate willow tit habitat selection, a second study was carried out on an apparently stable population in Nottinghamshire. Willow tit presence was determined using a playback technique at 65

woods and habitat measurements were taken from all woods. Site occupancy was positively related to soil water content and negatively related to wood age (a compound variable derived from several measures of tree size). Willow tits tended to be found in a high proportion of young woods and were generally only present in older woods if they had high soil moisture content. However, older, drier woods were not occupied.

These two independent studies of willow tits suggest that the drying up of British woods could be implicated in the decline, along with maturation of woodland and lack of management. It is suggested that

habitat management for the species should be focussed on maintaining high water content in priority willow tit areas, and ensuring large areas of young growth woodland is provided.

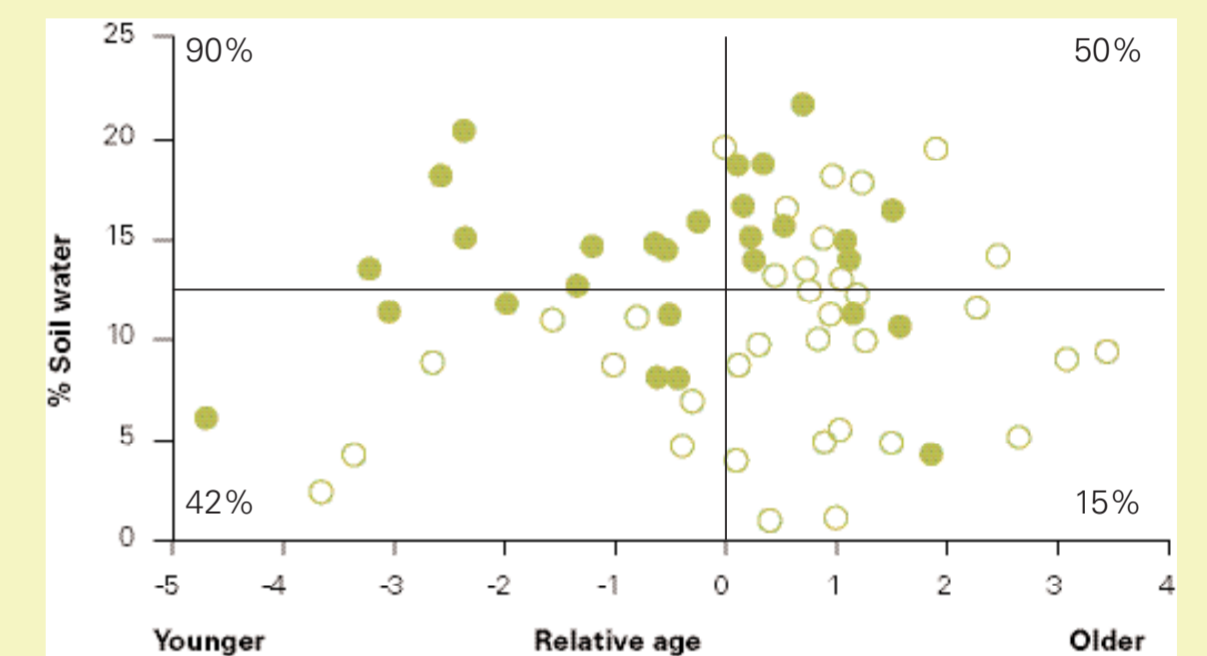
**Contact:**  
**Elisabeth.Charman@rspb.org.uk**

This study was led by Alex Lewis and Arjun Amar and supported by Natural England under the Action for Birds in England partnership and Forestry Commission, England

Lewis AJG, Amar A, Cordi-Piec D, and Thewlis RM (2007). Factors influencing willow tit *Poecile montanus* site occupancy: a comparison of abandoned and occupied woods. *Ibis*, 149 (Suppl. 2): 205-213.

**The influence of soil water content and the relative age of woods on the occupancy rates by willow tits. Woods occupied (solid) and unoccupied (open) and the probabilities of occupancy in each quadrant are shown. Willow tits tend to be found in woods with younger trees and damper soil.**

Wood age is a compound variable comprising maximum and mean diameter at breast height of trees within the wood, the maximum recorded height of trees and canopy height.



Alex Lewis weighing willow tit; willow tit chick in excavated nest hole

## Breeding snipe: are soil characteristics linked to population declines?

**The abundance of snipe breeding on lowland wet grasslands has declined dramatically in the last 25 years. Most birds in southern England are now restricted to a few key nature reserves and land where management is targeted at enhancing habitats for breeding waders. There are various reasons why this decline may have occurred, one of which is that large-scale drainage of wet grasslands for agriculture may have reduced the quality of breeding habitats of snipe.**

Research in the 1980s showed the critical importance of soft soils for snipe, which feed by probing the soil for earthworms, their main food. These results led to management recommendations designed to raise

the level of the water table in fields, so that soil softness was maintained during the breeding season.

We used information on breeding snipe, soil condition (wetness and softness) and land management, collected in the early 1990s and repeated in 2006, to answer three questions.

1. Were breeding snipe more likely to have persisted in fields with soft, wet soils?
2. Had soil condition become more or less suitable for snipe over time?
3. If soil condition had changed, were the changes due to land management?

We discovered that fields where snipe persisted were indeed softer

and wetter than fields from which they had disappeared. However, soil conditions overall had actually become softer and wetter over time, resulting in more suitable conditions. This suggests that the particular aspects of soil condition that we measured are unlikely to be the cause of the continued decline in snipe. Furthermore, changes in land management (reduced grazing pressure and increased water levels), exactly those recommended to generally benefit breeding waders, have also been implemented over time.

Our study shows that despite an apparent improvement in soil softness and wetness, the numbers of breeding snipe have continued to fall, suggesting that other causal

factors are more important. Future research work should focus on understanding whether the habitat changes described here have had an adverse impact on earthworm populations, and establishing the relative role of breeding success and survival in driving the current decline of this charismatic species.

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This research was carried out with Natural England as part of the Action for Birds in England partnership and we are grateful to all the landowners who allowed us access.

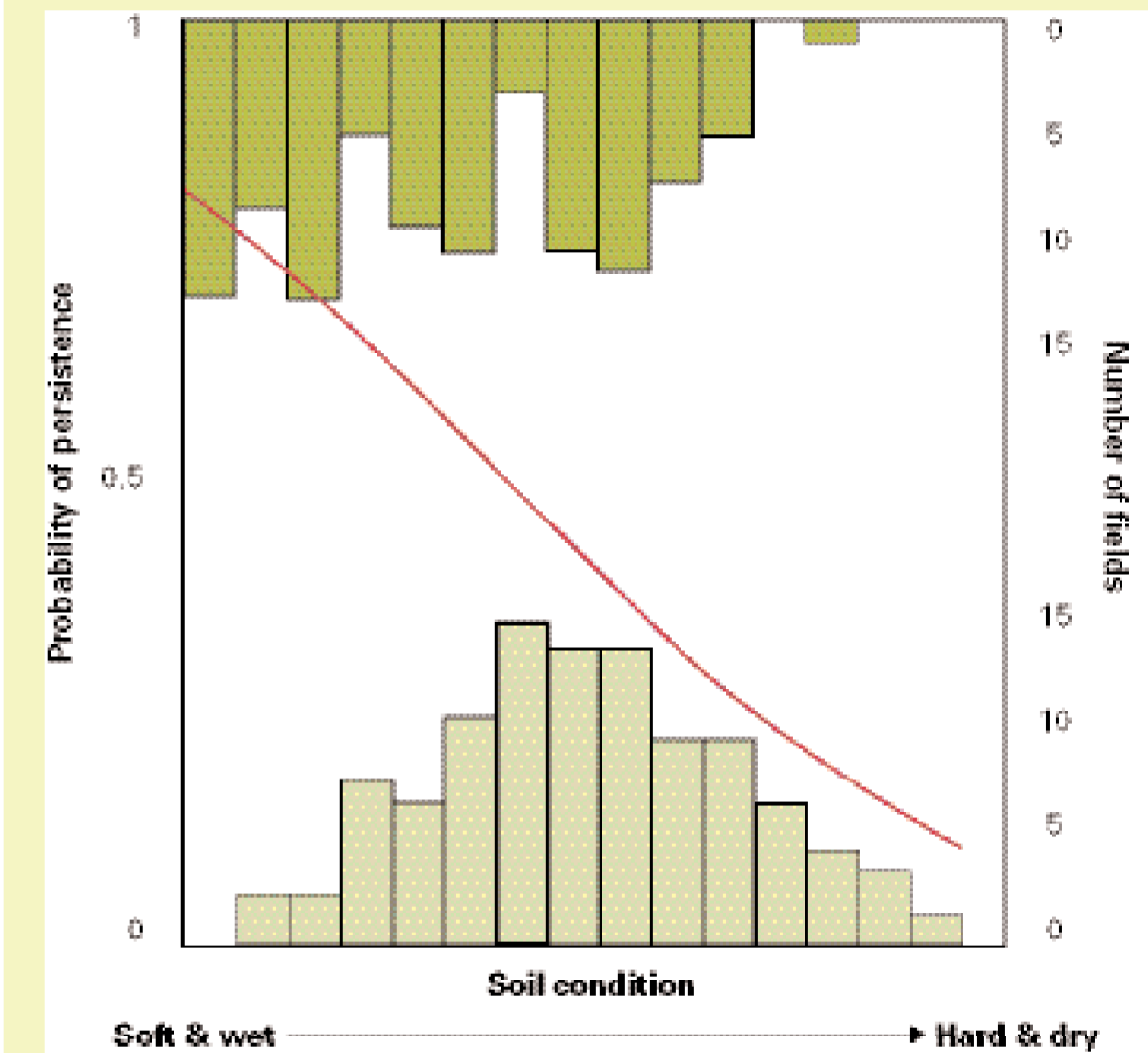
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**See also: 2001: 35; 2002: 10; 2004: 30**

**The probability of breeding snipe persisting in fields is higher the softer and wetter fields are. Bars show the frequency distribution of conditions for fields where snipe persisted (dark bars) and fields where snipe became extinct (pale bars). The red line shows the predicted probability of persistence for a given soil condition.**



## Nest predation of lapwings



Mark Bolton

**The lapwing is a beautiful bird, well known for its distinctive call and spectacular courtship flights in spring. Numbers have declined in the UK in recent decades, and this decline has been ascribed to agricultural intensification, including drainage and fertilisation of wet grassland. However, there is also concern that predation of lapwing nests may create additional pressure by reducing productivity.**

We investigated which factors predicted the likelihood of lapwing nests being predated. Using data collected at seven lowland wet grassland sites in England and Wales, we modelled the daily predation rate of lapwing nests against abundance of potential predators (foxes and crows), distance to crow nests and perches and to fox dens, nest visibility, distance to field edge, and lapwing nest density (number of nests within 100 m).

The strongest relationship was with lapwing nest density: nests with more close neighbours had lower rates of predation. Other researchers have obtained similar results, but our findings are particularly interesting, as the use of temperature loggers at these sites has indicated that nest predation was predominantly nocturnal (and therefore mammalian). This suggests that lapwings nesting at high density may be able to effectively deter mammalian predators, something that has been previously doubted. It

is of course possible that lapwings settle to nest at higher densities where predation pressure is lower, but we found no negative relationships between predator densities and lapwing nesting densities at the site level.

The other (weaker) significant relationship was with distance to field boundary: nests further from the field edge were less likely to be predated. Our results have possible implications for land managers; if lapwings can be encouraged to nest at higher densities by manipulating habitat, then nest predation may decrease. If these nesting colonies are distant from field edges, there may be additional benefits. Research

is continuing, to give a better understanding of the mechanisms driving wader nest predation and the role that habitat manipulation can play in increasing productivity.

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This study was funded by DEFRA and was carried out in partnership with CEH.

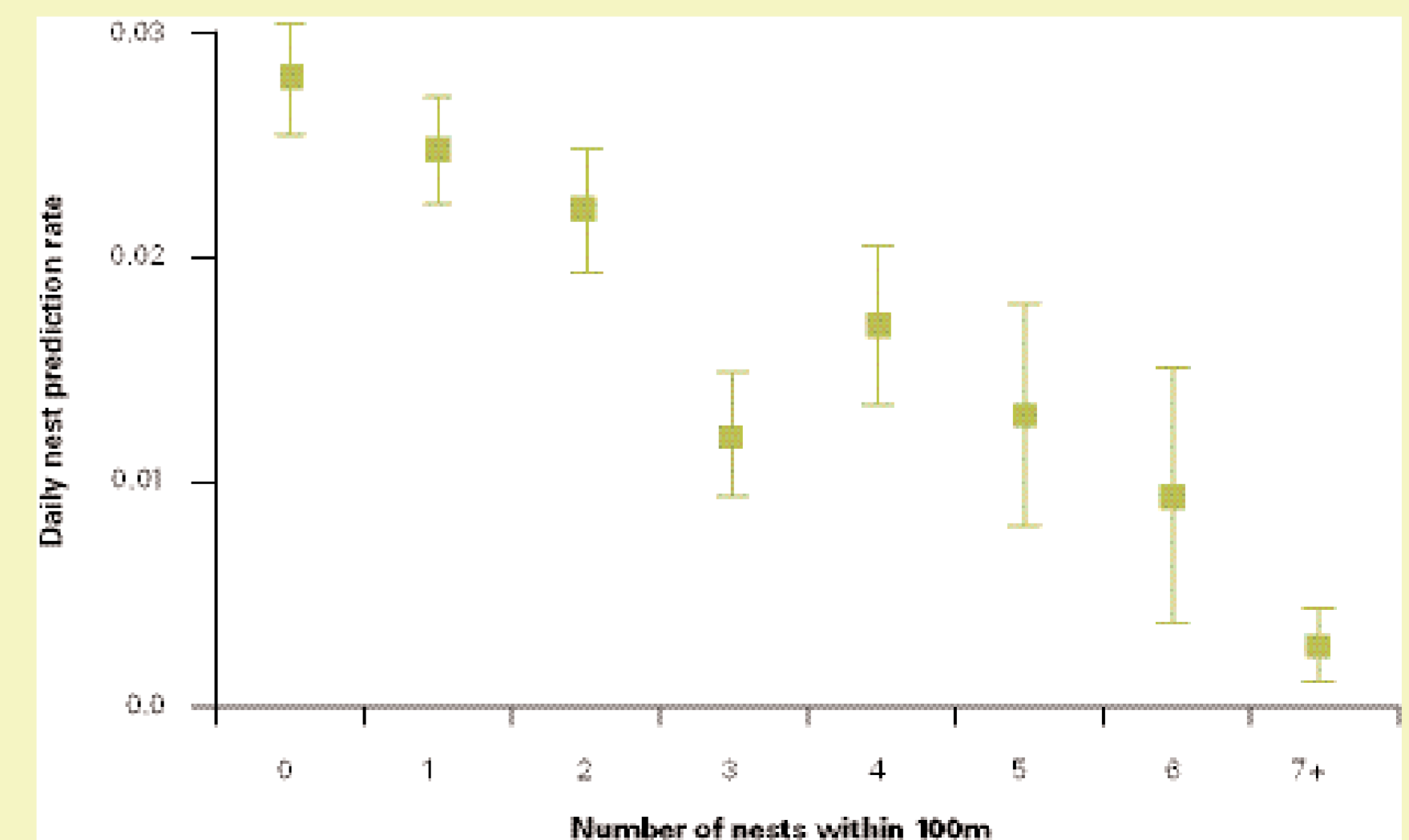
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**See also: 2004: 30; 2006: 46**



Chris Knights (rspb-images.com)

**Daily predation rate (+/- 1 SE) of lapwing nests in relation to the number of neighbouring nests within 100m.**



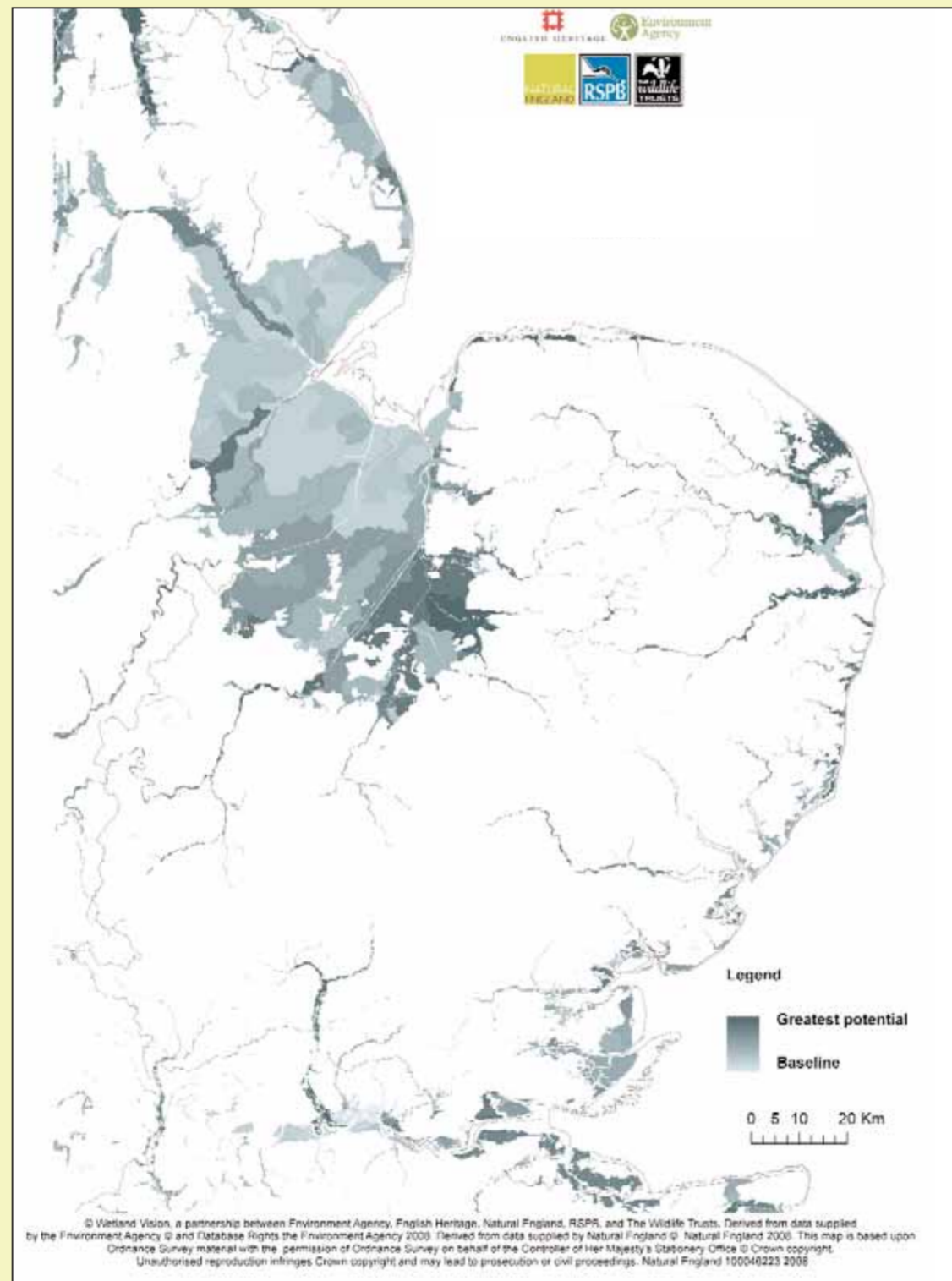
# Bittern recovery, a Wetland Vision and hope for the future

**Wetlands, whether naturally functioning or not, can be immensely biodiverse and provide an essential aesthetic, recreational and economic resource. Unfortunately, the scale of wetland habitat loss in the UK and in other western European countries has been dramatic. This is particularly true of seasonally flooded habitat that has tended to be drained and reclaimed for agriculture or to be built upon.**

Since the mid 1990s, a growing understanding of what needs to be done has led to an increased willingness by organisations such as the EU, Natural England, HLF and the RSPB to attempt and, importantly, fund large-scale wetland restoration and creation projects in the UK. The approach has usually been targeted at key species and focussed on prescriptive and follow up management at specific sites. Much of the impetus for this work has been driven by conservation action for bitterns, the population of which is now recovering following a protracted decline.

The effectiveness of the conservation actions taken for bitterns since the mid 1990s was tested by analysing how changes in habitat related to the recovery in numbers. We collected a wide variety of data to describe the changes in wetland habitat resulting from restoration or creation works.

The bittern recovery was clearly related to habitat management



**A map of the East of England from Wetland Vision showing a relative gradient from areas where suitable environmental conditions occur for reedbed (pale colour), through to areas that could offer the greatest opportunity for effective delivery (darker colour).**

interventions and specifically those that slow or reverse natural succession and raise water levels. Recovery also took place on sites restored using more expensive and dramatic interventions, such as bed lowering and increasing the length of ditches and edges along which bitterns can feed.

Despite this success with bitterns, the threat from sea level rise to some of the most valuable freshwater sites presents a huge challenge in terms of further wetland creation and restoration. Tools such as the 50-year Wetland Vision for England should help identify further national prescriptive and species-driven projects, and help to select areas for more ambitious projects, which seek to create a greater diversity of wetland habitats and allow the free operation of natural process at the floodplain scale.

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The Great Bittern Ecology project and the annual monitoring programme are jointly funded by the RSPB and Natural England through the Action for Birds in England programme. A large number of individuals, site owners, agencies and organisations have undertaken or facilitated works to reverse the decline of bitterns. That the species remains as a breeding bird in the UK in the 21st century is direct testimony to their effective action.

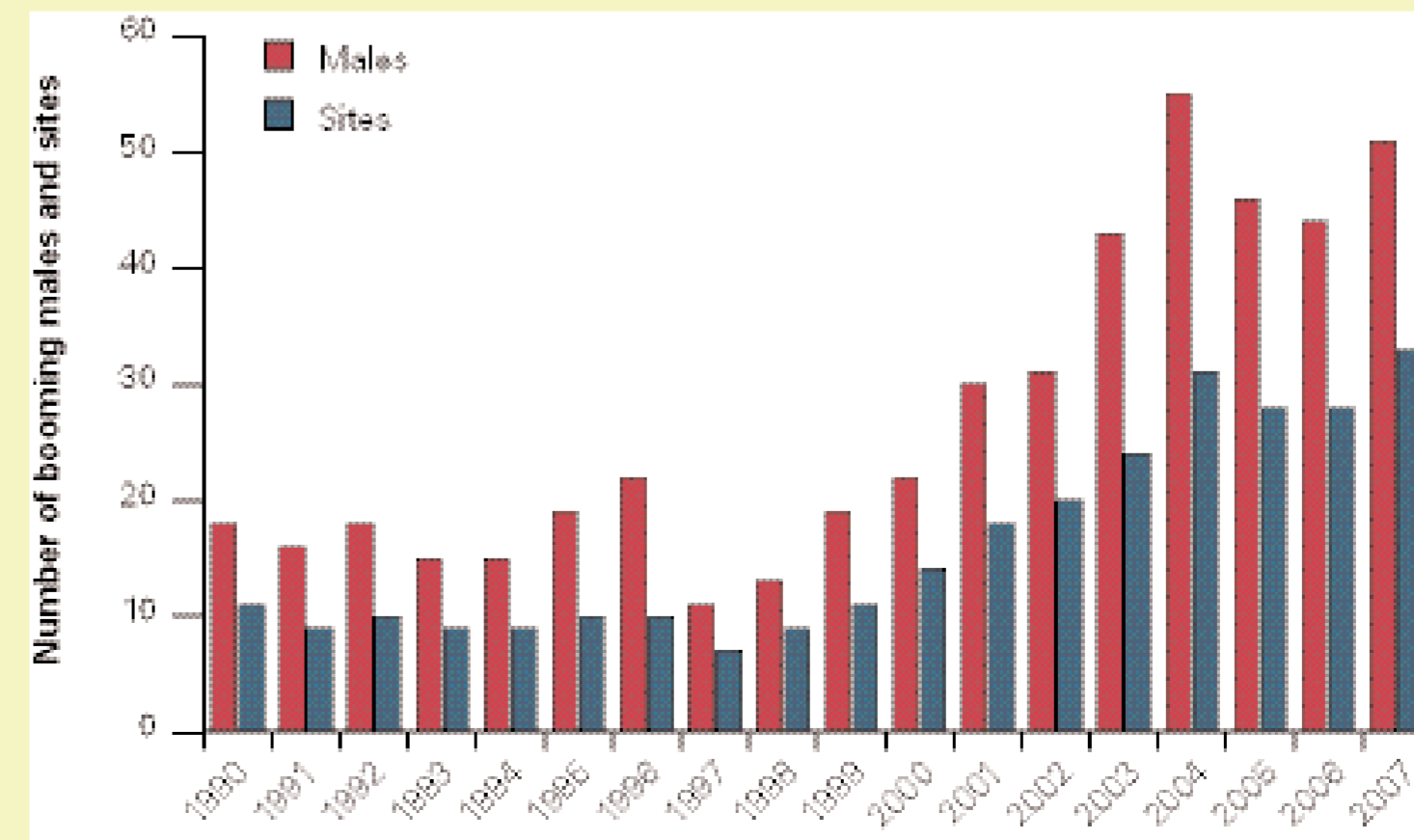
The Wetland Vision is a strategic partnership between English Heritage, the Environment Agency, Natural England, RSPB and The Wildlife Trusts and has set out our aspirations for future freshwater wetlands for the next 50 years, both as maps and in joint statements of commitment. For more information

on the Wetland Vision, visit [www.wetlandvision.org.uk](http://www.wetlandvision.org.uk) or contact [kareen.holliday@rspb.org.uk](mailto:kareen.holliday@rspb.org.uk)

Gilbert G, Tyler GA, Dunn CJ, Ratcliffe N and Smith KW (2007) The influence of habitat management on the breeding success of the Great Bittern *Botaurus stellaris* in Britain. *Ibis* 149: 53-66.

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**See also: 2001: 21; 2002: 21; 2005: 8**



**Numbers of booming male bitterns and the sites at which they have been recorded have increased steadily since 1997.**

# Conservation of the northern colletes mining bee



Robin Wynde

**The northern colletes is a solitary-nesting mining bee: one of 36 UK Biodiversity Action Plan priority species for which the RSPB is leading the work, in this case jointly with Hymettus – the UK Aculeate Conservation Group.**

In the UK, the species is restricted to species-rich coastal grasslands, particularly the machair of the Scottish Hebrides. A key aim of recent work has been to assess its current range and status. Ten years ago, when the action plan was written, it was thought to have been lost from many areas, but surveys conducted since then have confirmed its continued presence at many of its former sites in the Outer Hebrides. Large populations were discovered on Tiree, Coll and Islay in the Inner Hebrides, including populations on seven RSPB

reserves. After an absence of records for 70 years, an RSPB survey rediscovered the bee in Northern Ireland, at four sites on the north coast, whilst a Hymettus surveyor relocated the bee in Ayrshire in 2007. Despite this, the species appears to have been lost from several large areas of its former range, including Dumfries and Galloway and Lewis and Harris.

The northern colletes requires diverse, flower-rich swards containing a choice of southward-facing sandy banks in which the bees can dig their aggregations of nesting burrows. Winter livestock grazing followed by a summer grazing break appears to produce optimal conditions and is now practised at relevant RSPB reserves. It is also being promoted at other key sites throughout the remaining UK range. This

management also provides suitable foraging habitat for the great yellow bumblebee, another BAP priority species.

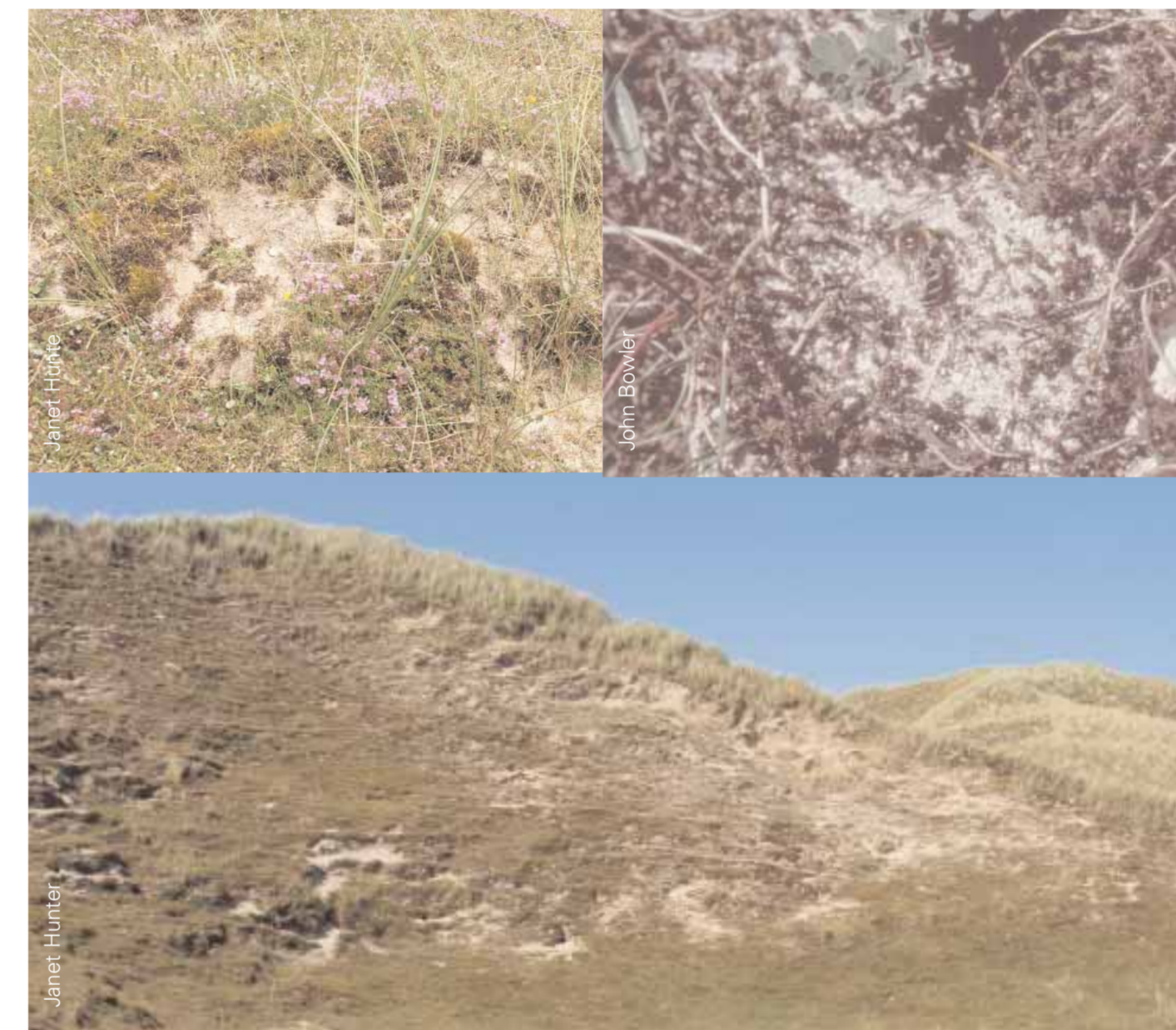
A genetics study by Queen's University, Belfast, assisted by the RSPB, has investigated the amount of gene flow between populations. Preliminary results suggest that genetic interchange between some remaining sites may be low and that inbreeding may potentially be limiting populations. The species also remains vulnerable to sea-level rise due to climate change, and many of its Hebridean coastal populations are predicted to be lost.

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Initial surveys carried out by Hymettus were jointly funded by SNH and RSPB. NIA (formerly EHS) helped fund work in Northern Ireland. The genetics work at Queen's University Belfast was carried out by Emily Davis, Tom Murray and Rob Paxton.

Sears J and Hunter J (2005). The re-discovery of the rare mining bee *Colletes floralis* Eversmann 1852, in Northern Ireland in 2003. *Irish Naturalists' Journal* 28:53-58.

**See also: 2007: 32**



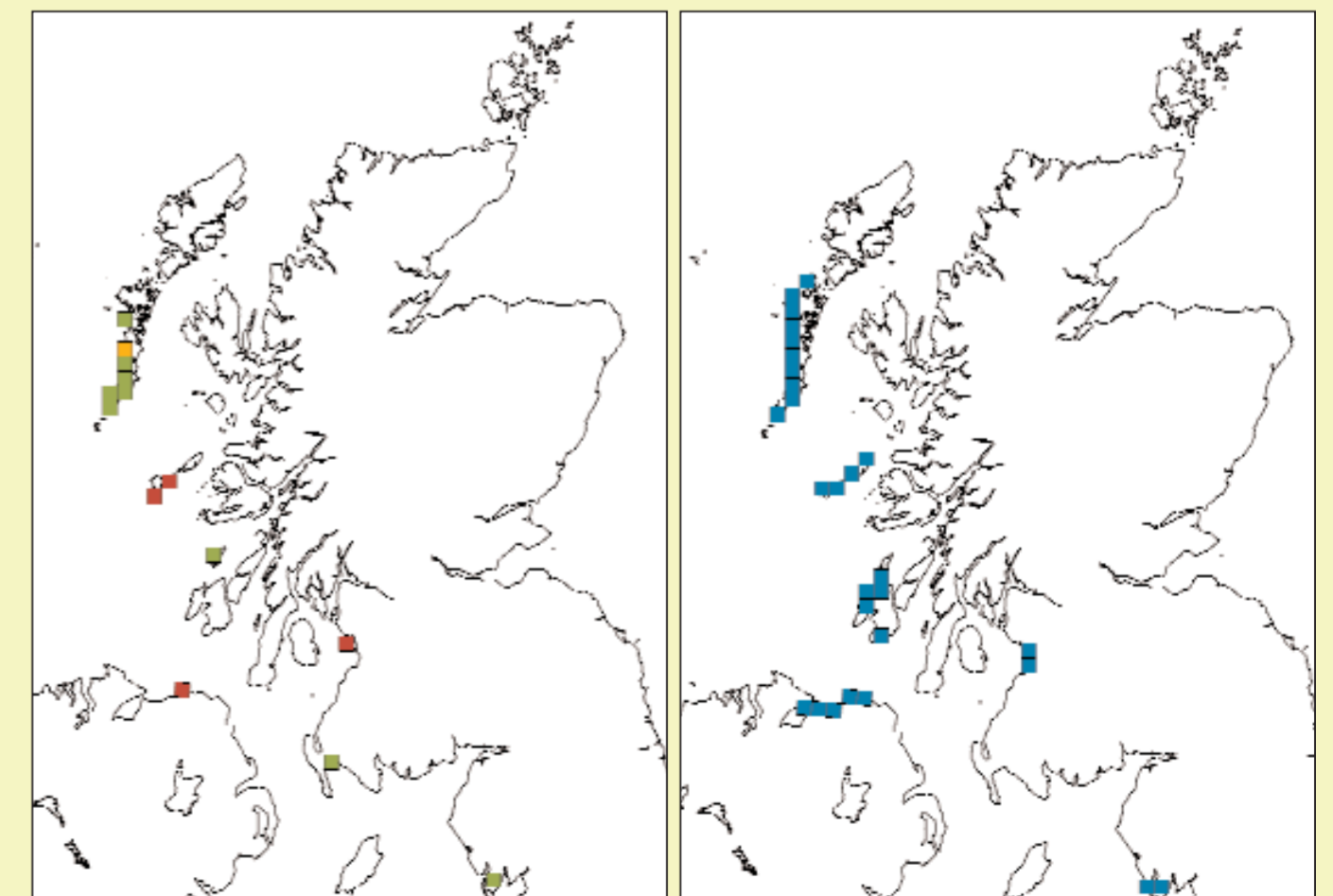
Janet Hunter

John Bowler

Janet Hunter

**Northern colletes burrows at Machir Bay, Islay (top left), northern colletes bee, Tiree (top right) and nesting bank at Killinallan, Islay (bottom).**

**Distribution of northern colletes bee by 10 km square: records before 2000 (left hand map) shown as red (pre 1970 only), green (post 1970 only) and orange (both periods). Post 2000 records (all blue) are shown on the right hand map.**



## Small grants provide vital help for the world's rarest birds

**Often the main obstacle to helping an endangered species is the lack of even the most basic knowledge about it. For a high proportion of the world's most threatened birds, we do not know how many of them there are, or even exactly where they occur. In such cases, even a small research project can provide essential information to help assess their conservation status and start to protect the species.**

Since 2001, the RSPB has been providing researchers, largely in developing countries, with small grants to undertake key research on species listed by the World Conservation Union as Endangered or Critically Endangered. Of the 320 applications so far received from nearly 100 countries, we have been able to fund 72. Projects have been funded in South America (20), the

Caribbean (2), Africa (18), Asia (28), Europe (2), the Middle East (1) and the Pacific (1). Co-funding from other grants schemes and generous donations have allowed us to support projects to the total value of over £50,000. The number of projects funded increased greatly after 2005, when the British Birdfair joined the scheme and provided additional annual funding. The scheme, the Birdfair/RSPB Research Fund for Endangered Birds, now contributes nearly £10,000 each year to help researchers working in their own countries to undertake research on the planet's rarest and most poorly-known species.

The many significant successes of the scheme include:

- the rediscovery of Chinese crested tern in Fujian, China
- the discovery of important staging posts of sociable lapwings in Syria

- the discovery of new sites for the fringe-backed fire-eye in Brazil
- the recovery of the tiny remaining population of the pale-headed brush-finch in Ecuador
- the possible rediscovery of the Banggai crow in Indonesia
- identification of key wintering sites for the scaly-sided merganser in China.

One of the criteria for successful projects is that they address key conservation actions identified for each species by BirdLife International, ensuring the work has the highest possible impact.

Further details can be found at: [www.rspb.org.uk/ourwork/science/international/smallgrants/endangeredbirdgrants.asp](http://www.rspb.org.uk/ourwork/science/international/smallgrants/endangeredbirdgrants.asp)

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## Ecological process and issues research

**While studies of individual species will remain a cornerstone in the RSPB's research portfolio, we are now studying an increasingly broad range of ecological processes and issues that affect birds. These include studies of habitat management and restoration, the impact of disturbance, predation and pollution on bird populations, and the wide-scale impacts of land uses such as agriculture. Overarching all these is the increasing need to understand and make allowance for the impacts of a changing climate. Wherever possible, our research seeks to design novel solutions to mitigate the effects of any deleterious impacts.**



**One of the most exciting discoveries funded by the scheme was the existence of important migration staging areas for the critically endangered sociable lapwing in Syria and Turkey.**

## Enhancing biodiversity of winter wheat fields



Mark Hamblin (rspb-images.com)

**One of the early experiments within the Sustainable Arable Farming For an Improved Environment (SAFFIE) project was able to show that skylarks responded to small unsown plots (each approximately 4 m x 4 m, established at a density of 2/ha, and known as Skylark Plots). A further experiment demonstrated that other passerines foraged at greater densities on 6 m-wide field margins with more open and floristically diverse swards.**

During 2004–06 on each of 26 farms in England and Scotland, four combinations of these two measures in winter wheat fields were tested: fields with no skylark plots (SP) or margins; fields with skylark plots

only; fields with margins only and fields with both. For all but one of the species or groups tested, the densities of foraging birds and territories were greatest in fields with SP and margins together (1.3–2.8 times higher than normal crops). Among those to respond positively were species that nest in the crop (skylark), boundary-nesting species (eg finches), and the suites of species used in the Defra Farmland Bird Index. As expected no differences in densities between treatments were observed in a 'control' group of species associated largely with woodland (eg tits).

In field margins, foraging bird numbers were positively correlated with higher beetle and spider abundances and with a more

complex sward. In wheat crops, birds responded positively to the presence of SP and, at a finer-scale, to bare ground at foraging locations but there were only weak links to invertebrate abundance.

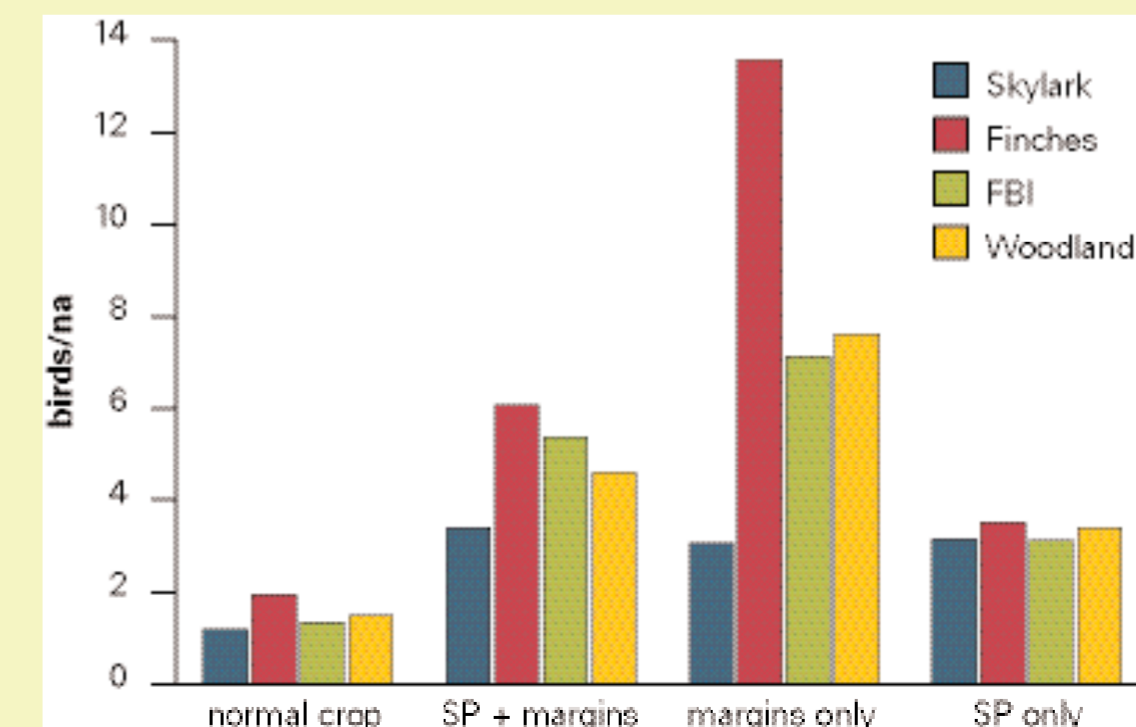
The results suggest that more open swards significantly increased densities of farmland birds. Previous research suggests low invertebrate abundance in arable fields can limit the performance of some farmland birds. While increasing chick-food in crops remains desirable, this study shows that benefits can be achieved by creating foraging access amongst the dense crop vegetation, without necessarily increasing food abundance within-crop and with no adverse effects on weed, pest or disease levels in arable rotations.



An experimental 6m margin in Herefordshire. The floristically diverse sward remains short and patchy into July, allowing access for foraging birds.

**Densities of skylarks and three groups of species in fields with or without skylark plots (SP) and wide margins. Data from 26 sites and three years (2004–2006).**

**FBI includes the 19 species used in the Defra Farmland Bird Index and Woodland a selection of species, such as tits and woodpeckers associated mainly with woodland. The main species in Finches were goldfinch, greenfinch, chaffinch and linnet.**



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The work described was carried out as part of SAFFIE (LK0926). This project is sponsored by the Department for Environment, Food and Rural Affairs (Defra), the Scottish Executive Environment and Rural Affairs Department (SEERAD) and Natural England (formerly English Nature), through the Sustainable Arable LINK programme. The industrial funders are British Potato Council, Agricultural Industries Confederation (AIC), Crop Protection Association, Home-Grown Cereals Authority (HGCA), Jonathan Tipples, Linking Environment And Farming (LEAF), Royal Society for the Protection of Birds (RSPB), Sainsbury's Supermarkets Ltd., Syngenta, the National Trust, and Wm Morrison Supermarkets PLC.

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**See also:** 2001: 18; 2004: 31; 2007: 9

# Management of surface water on wet grassland for breeding waders



Chris Gomersall (rspb-images.com)

**Areas of shallow, small-scale flooding are critically important for breeding waders, which have undergone severe declines during recent decades, principally due to habitat loss and degradation. Across Europe, nature reserves have acted as conservation islands for breeding waders, but for more wide-scale population recovery, management of the wider countryside is needed. This is likely to require the restoration of surface wet features, but in a manner that is compatible with normal farming operations.**

From 2005 to 2007, breeding lapwings were monitored on grazing marshes within the Broads Environmentally Sensitive Area in eastern England. We explored the extent to which the distribution of breeding lapwings and their chicks

was influenced by three types of wet feature:

1. "Footdrains" – shallow channels historically used for drainage but which can also be created and managed for water retention, and cause little disruption to farming activities.
2. "Footdrain floods" – areas where water overtops footdrains.
3. "Isolated pools" – unmanaged areas of surface water resulting from rainfall or high water tables.

Footdrains and their associated areas of flooding were found to retain water far more effectively than isolated pools. Fields with high footdrain flood densities attracted significantly higher densities of nesting lapwings and nests were likely to be close to these wet features. Later in the season, footdrains were the primary

remaining water source, and the use of fields by chicks increased with footdrain density. Chicks were also more likely to forage near footdrain floods in areas of wet mud created by receding water levels.

Management tools such as footdrains, coupled with appropriate hydrological management, provide a means of retaining water throughout the breeding season. Installation of these features is relatively simple, but maintaining sufficient water levels within the system is critical, especially in the face of increasingly unpredictable water supplies associated with climate change. Such management tools offer a solution that may be both effective at improving breeding wader populations and practicable for commercial grazing marsh management.

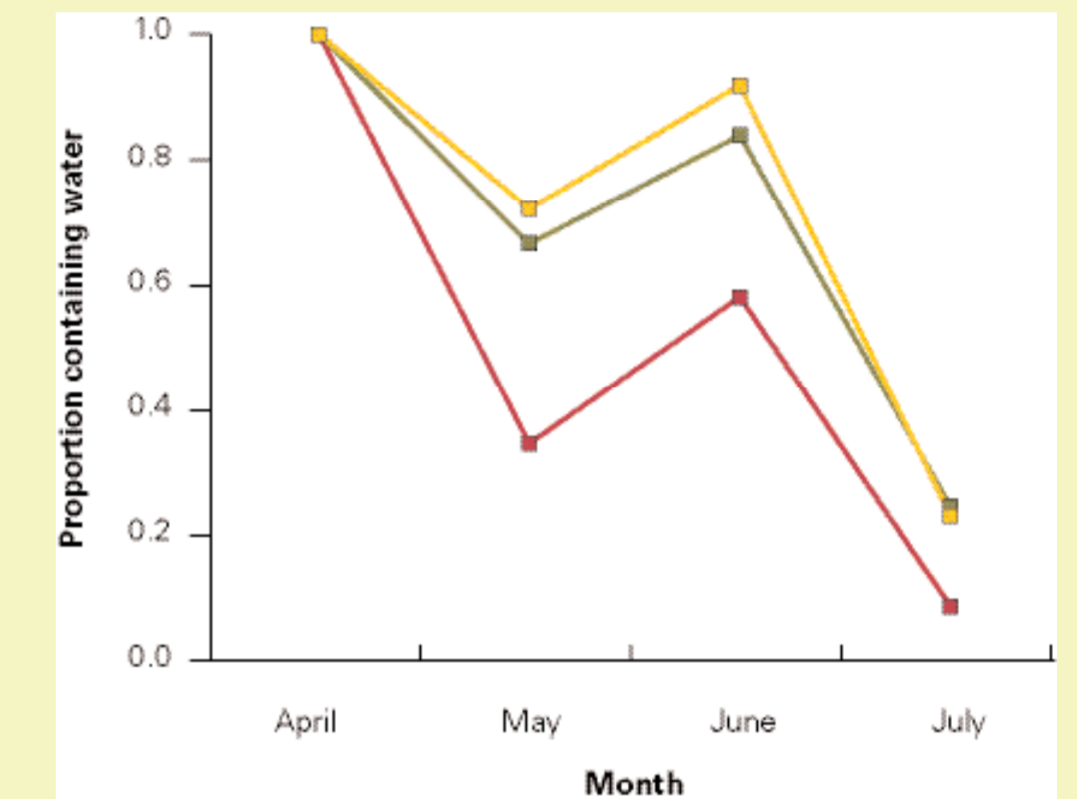
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This work was carried out by Sarah Eglinton at the University of East Anglia as part of her doctoral thesis. It was funded by Natural England and the RSPB, through the Action for Birds in England programme, and NERC.

Eglinton SM, Gill JA, Bolton M, Smart MA, Sutherland WJ and Watkinson AR (2008). Restoration of wet features for breeding waders on lowland grassland. *Journal of Applied Ecology* 45: 305-314.

See also: 2001: 22; 2004: 30; 2008: 30

**Changes in the proportion of the total number of wet features containing any water across 70 fields in the Broads, from April to July 2006; footdrains (yellow lines), footdrain floods (green lines) and isolated pools (red lines).**



RSPB



David Klaer (rspb-images.com)

# Forest edge effects and peatland breeding birds



Steve Knell (rspb-images.com)

Dunlins were adversely affected by proximity to forest edge.

**The blanket bogs of north Scotland – the ‘Flow Country’ – make up the largest single area of this habitat in Europe, and perhaps 4% of the world’s peatland resource. The importance of the area for birds is reflected in the fact that it contains 10% of all the land in the UK that is specially protected under the European Birds Directive.**

In the 1980s, the Flow Country was subjected to extensive afforestation with non-native conifers, leading to major declines in breeding wader

populations. Part of this was due to loss of habitat, but these new plantations also may have had ‘edge effects’ on adjacent open habitats, although this has been disputed.

For example, between 1988 and 2000, on peatland in the Flow Country that was never planted with trees, there was a 43% decline in the numbers of dunlins, equivalent to about 6.5% of the UK breeding population (Sim *et al.* 2005). ‘Edge effects’ could have contributed to this and other bird population declines.

We investigated the pattern of bird counts from Flow Country surveys in 1988 and 2000, using measures of habitat features important to birds, collected in 2000. We analysed counts, and changes between surveys, for three key wader species – golden plover, dunlin and greenshank – and also for red grouse. We then related these indices to habitat measures and to the distance of each survey area from the nearest forest.

Our results showed some evidence of forest edge effects for both dunlin

and red grouse. In areas of otherwise similar habitat quality, dunlin counts in 2000 were lower and red grouse declines more likely, close to forests. There was little or no similar evidence for golden plover and greenshank.

These results provide further support for the current programme of forest re-structuring in the Flow Country and suggest this may have additional benefits for birds of adjacent open areas. Future work will look at the responses of birds to this re-structuring work.

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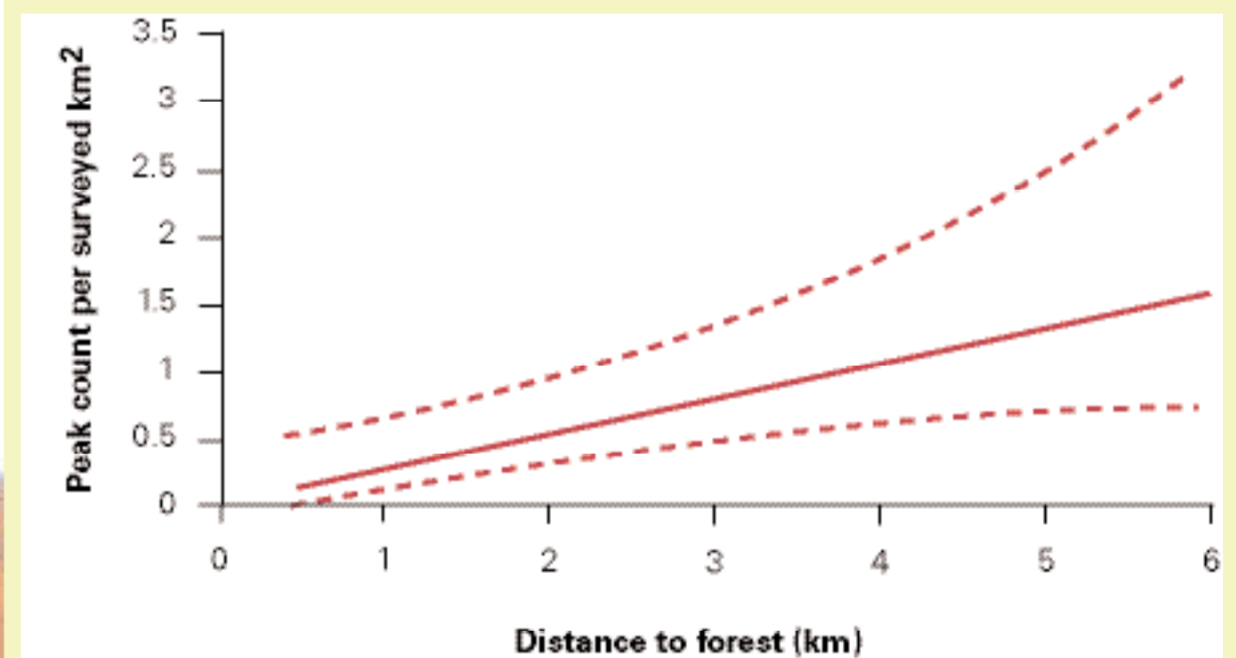
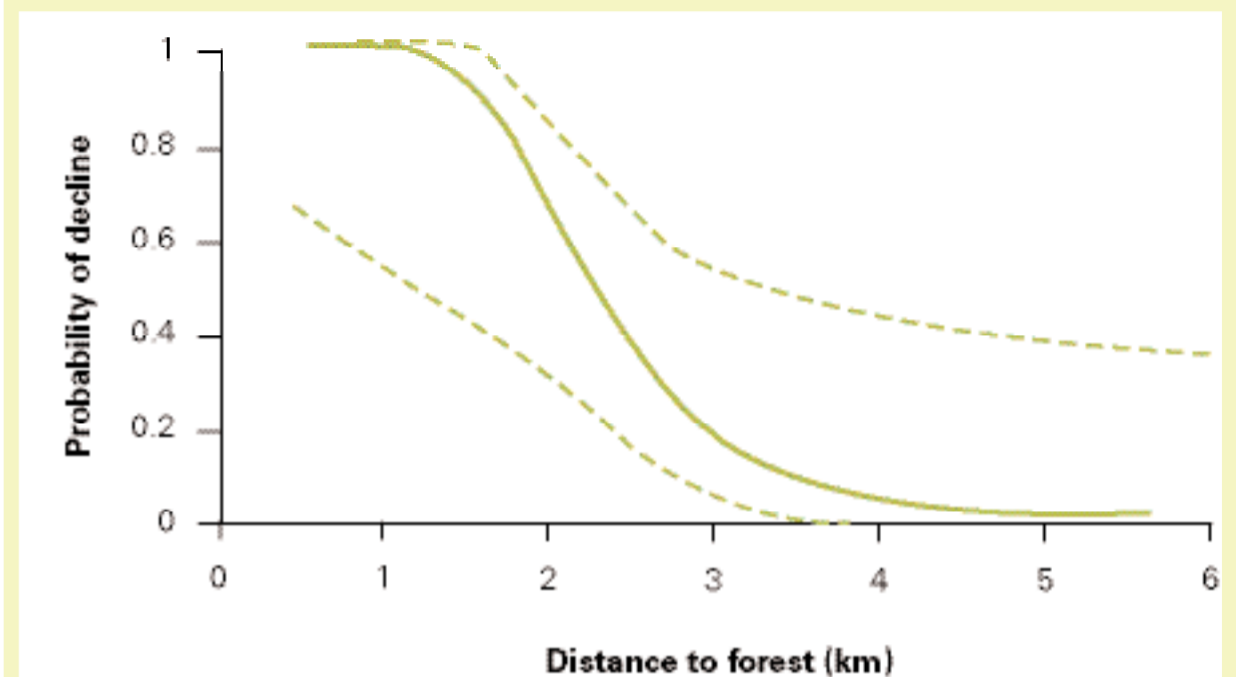
Sim IMW, Gregory RD, Hancock MH & Brown AF (2005) Recent changes in the abundance of British upland breeding birds. *Bird Study*, 52: 261-275.

Hancock MH, Grant MC and Wilson JD (in press) Associations between distance to forest and spatial and temporal variation in abundance of key peatland breeding bird species. *Bird Study*.



Norman Russell (rspb-images.com)

**In “average” habitat and between 1988 and 2000, the probability of red grouse decline was greater and counts of dunlin were lower near to forests. Fitted relationships and 95% confidence limits are shown. (Re-drawn from *Bird Study*)**



Sue Tranter (rspb-images.com)

No effect of forest edge on greenshanks was found.

## Effects of climate change on golden plovers

**Species occupying northern and upland habitats are among the most vulnerable to climate change. In order to undertake conservation management to increase their resilience, it is important to understand how such impacts may occur. Building on previous studies that showed how sensitive the timing of golden plover breeding and the emergence of their cranefly prey are to increasing temperature, we have continued to study the impact of temperature on craneflies and golden plovers.**

Long-term data on cranefly abundance were obtained from two upland sites in Scotland from 1995–2005, and supplemented with data from the Pennines, England. Annual variation in abundance in May and June was correlated with a number of a priori selected weather variables. The only significant relationships were strong negative effects of previous August temperature (mean daily maximum) on subsequent cranefly abundance at the two sites dominated by blanket bog. The relationship between temperature and cranefly abundance was curvi-linear at a third, drier, moorland site, but remained indicative of few craneflies emerging after high August temperature.

Annual fluctuations in a population of golden plovers in the Peak District, Pennines, were modelled from 1972–2007 as a function of key climate variables. The only significant



Chris Gomersall (rspb-images.com)

correlate was a negative effect of August temperature two years previously, mirroring the effects of August temperature on cranefly populations in the Pennines. Increasing late summer temperatures reduce the abundance of emerging craneflies in the following year, and hence reduce chick survival, leading to fewer golden plover recruits a year later and causing a population decline. August temperature has increased by 1.9 °C since 1972. If this trend continues it will result in a high probability of the extinction of this golden plover study population by 2100. As craneflies are important prey

for a wide range of northern and upland birds, these results have wider implications. Research will focus on the potential for management to increase the resilience of cranefly populations to climate warming, for example through blocking drains for peatland restoration.

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This research was conducted with Peter Dennis (Aberystwyth University), Mark Whittingham (Newcastle University), and Derek Yalden (University of Manchester).

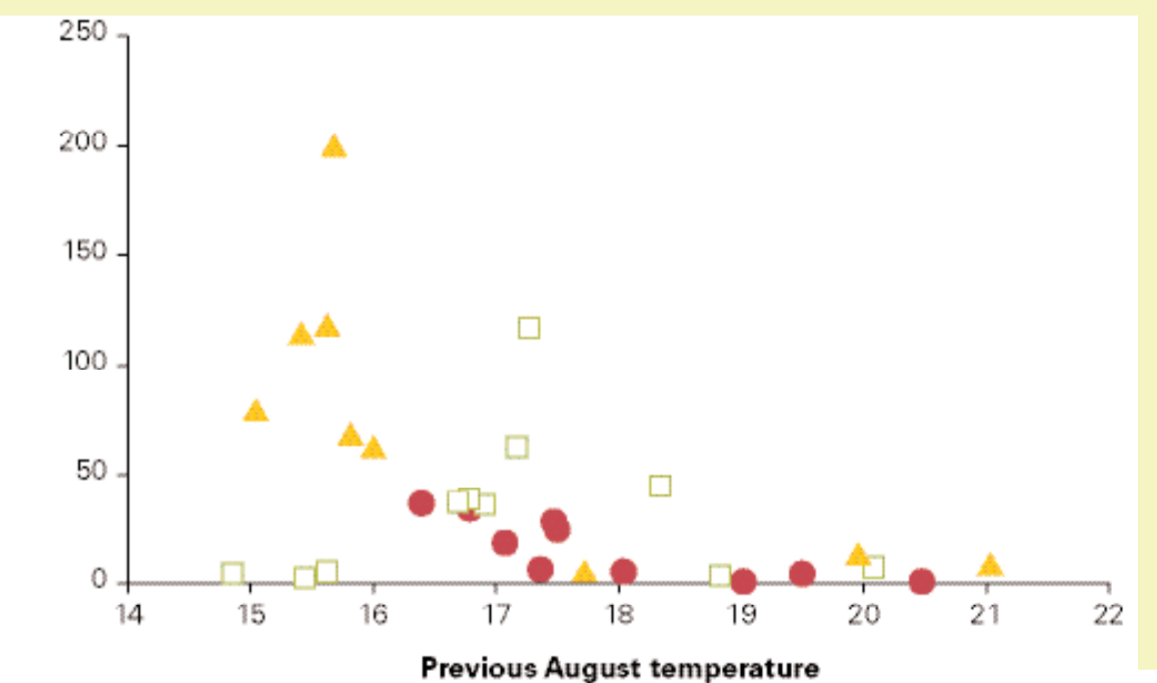
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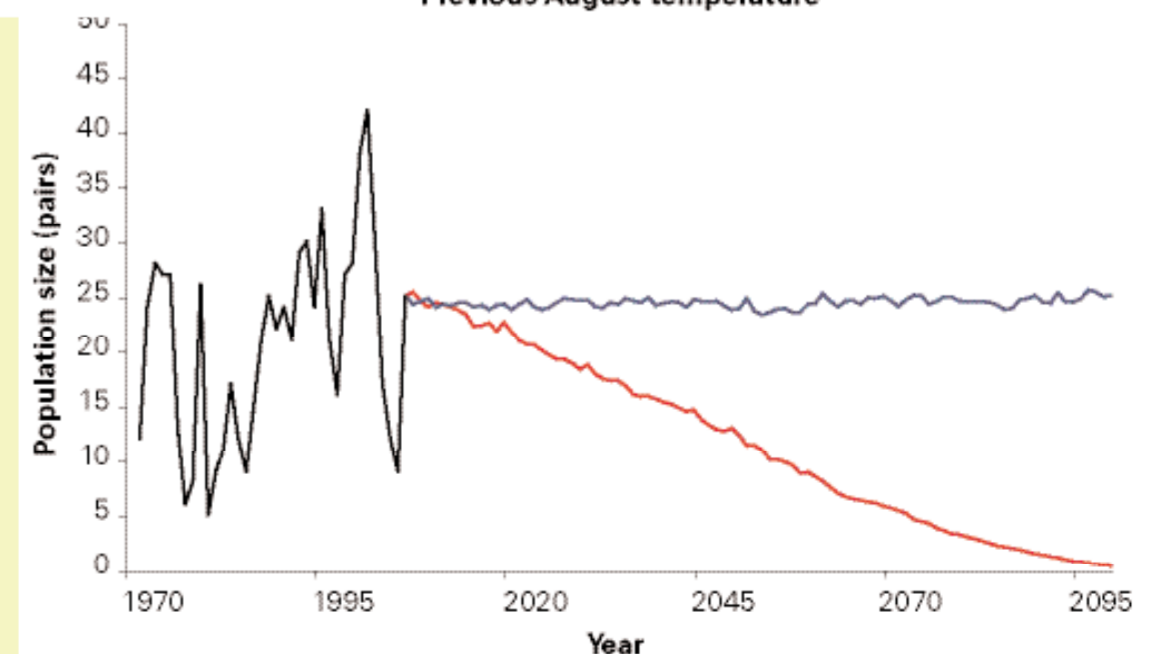
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**See also:** 2004: 34; 2005: 30; 2006: 37

**Relationship between the abundance of tipulids (craneflies) and temperature in August the previous year at two blanket bog sites, Glensaugh (filled circle) and the Pennines (grey triangle) and one drier moorland site, Sourhope (open square).**



**Observed fluctuations (black line) and predicted future trends in the population of golden plover. The blue line shows the prediction with no change in August temperatures; the red line shows the average prediction with a continuation of the current increase.**



## Modelling effects of mink control on breeding terns in West Scotland

**American mink were accidentally introduced to west Scotland when they escaped from fur farms on the mainland, Lewis and Arran during the 1950s and 1960s. Since then, they have spread along the mainland coast and its associated islands and into Harris and the Uists. Mink are semi-aquatic, which enables them to reach islands within 2 km of shore. Here they prey heavily on eggs and chicks of ground-nesting seabirds, which causes breeding failure and eventually may lead to colony abandonment.**

Two projects are currently underway in Scotland to control mink with the aim of conserving seabirds. The Mink Seabird Project removes mink

annually from the vicinity of key colony sites along the west Scottish mainland and Inner Hebrides, and the Hebridean Mink Project aims to eradicate them from the whole of the Western Isles. We tested the effects of these initiatives on tern productivity and population dynamics using a suite of GIS, statistical and simulation models.

A GIS model based on mink swimming distances revealed that most islands in west Scotland are accessible to mink, and that these host a large proportion of the region's common and Arctic terns. Statistical modelling of long-term productivity data demonstrated that unprotected sites within the range of mink have an average productivity of

0.33 chicks per pair, whereas that at sites where mink were trapped was 253% higher at 1.16 chick per pair. Population modelling revealed that both mink control projects delivered considerable benefits for common terns, because a large proportion of these were within the area of the control programmes and in sites that would be accessible to mink if no control were in operation. For Arctic terns, the benefits were less clear, since a larger proportion of these were outside the control areas, and many of these were in any case in sites isolated from, or unsuitable for, mink.

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Study conducted by Norman Ratcliffe with Clive Craik at Scottish Association for Marine Science and Alice Helyar and Sugoto Roy at Central Science Laboratories.

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David Klaer (rspb-images.com)



JCA Craik

## The potential range of mink in west Scotland

Much of the west of Scotland is either contiguous with or within easy swimming distance of mink release sites. Some key sites vulnerable to or isolated from mink are listed below:

Islands or island groups vulnerable to mink:

Bute, Cumbrae, Islay, Jura, Luing, Mull, Skye, Scalpay, Raasay, South Uist, Benbecula, North Uist, Taransay, Scarp

Islands or island groups isolated from mink:

Gigha, Colonsay, Oronsay, Coll, Tiree, Muck, Eigg, Rum, Canna, the Barra Group, Pabbay, The Monach islands, The Shiant, St Kilda, North Rona, Sula Sgeir

**Common tern chicks and adults recovered from the cache of a single American mink on an islet in Loch Linnhe (Argyll and Bute). The colony was subsequently abandoned.**

# Wetting up reedbeds and the effects on invertebrates



David Tipling (rspb-images.com)

**The RSPB has successfully created new and rehabilitated existing reedbeds to provide suitable conditions for priority reedbed birds, especially bitterns. Rehabilitation of dried out reedbeds has involved the creation of a range of successional stages from open water, to wet reed, and dry reed. This has been achieved by raising water levels and lowering areas of the substrate, a process known as bed-lowering.**

RSPB reserves also support a range of rare and scarce invertebrates. In particular, the reedbeds at our coastal Suffolk reserves, including Minsmere, support a variety of rare moths, such as Fenn's wainscot, flame wainscot and white-mantled wainscot. Most such specialist invertebrates are thought to be

restricted to drier areas of reedbed and this project aimed to assess the effects of rehabilitation work at Minsmere on the reedbed's invertebrate fauna.

Invertebrates were sampled using water traps and vegetation characteristics measured in pioneer, wet and dry blocks in eight different areas of reedbed. The conservation value of these successional stages was compared using the following measures: species-richness of wetland specialists, species-richness of reedbed specialists and a score based on the conservation status of all the species caught.

Differences in vegetation characteristics and water levels were most marked in the dry stage, which had a much higher plant richness.

However, despite these differences between the successional stages, there were no significant differences between the stages in any of the three measures of conservation value for the species sampled.

The results gave no indication that wet reedbed supported an invertebrate fauna of lower conservation value than that of dry reedbed. However, the methods used did not sample invertebrates that inhabit litter, and flooding dry litter will undoubtedly have a dramatic, negative impact on its associated invertebrate fauna. Where reedbed rehabilitation for birds increases the range of different successional stages present, there should also be an increase in the range of microhabitats available for invertebrates, thereby benefiting the

reedbed fauna as a whole. However, care should still be taken to ensure that adequate areas of drier reedbed are retained for their litter-associated invertebrate fauna.

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The work was carried out by Graeme Lyons and Mark Telfer, with support from Ian Hawkins and Robin Harvey.

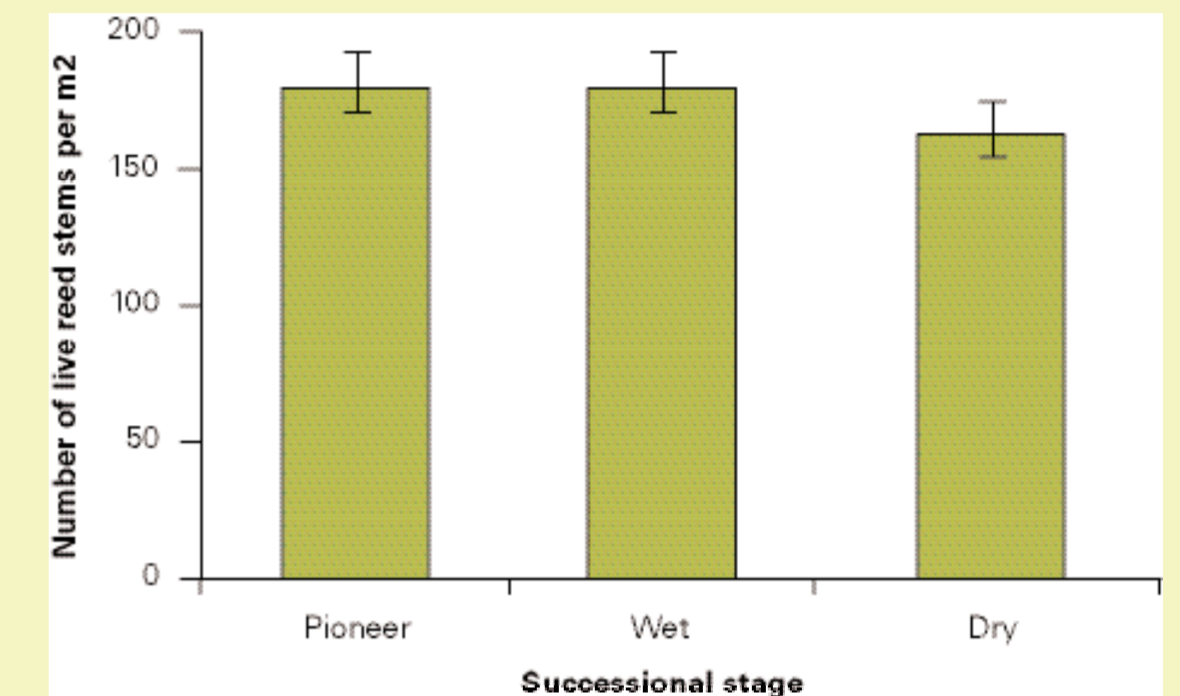
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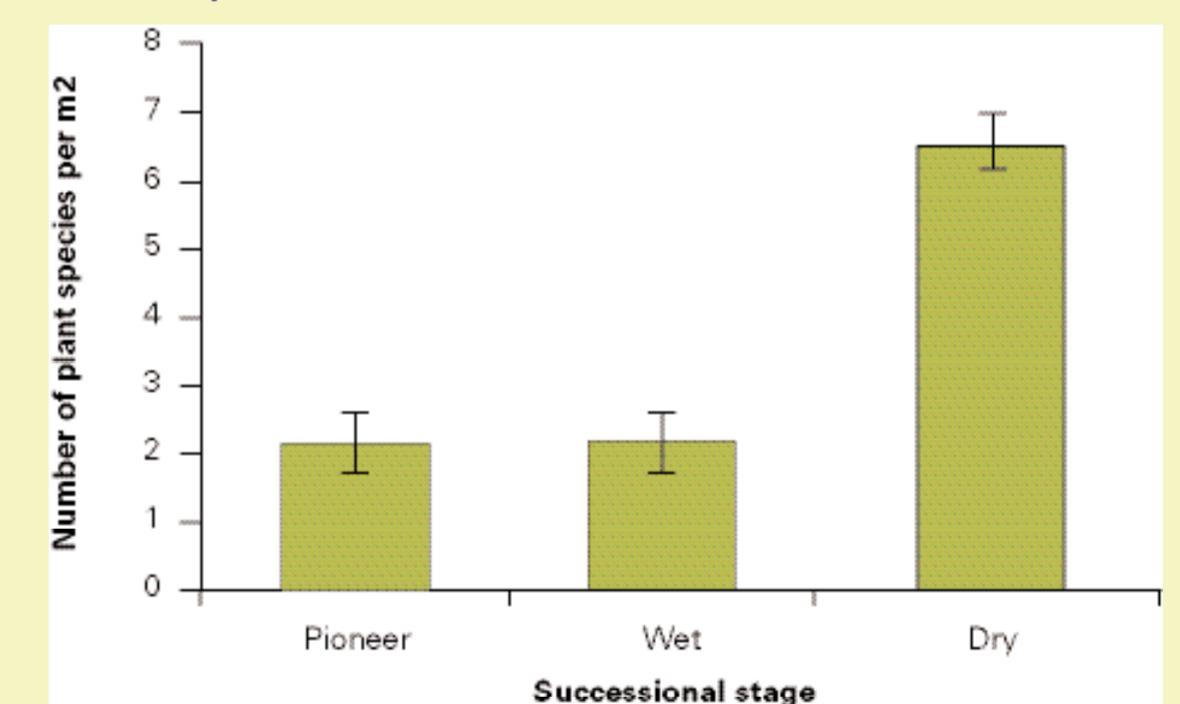
See also: 2006: 44; 2008: 32

Characteristics of the three different successional stages of reedbed sampled. Values are means +/- one standard error.

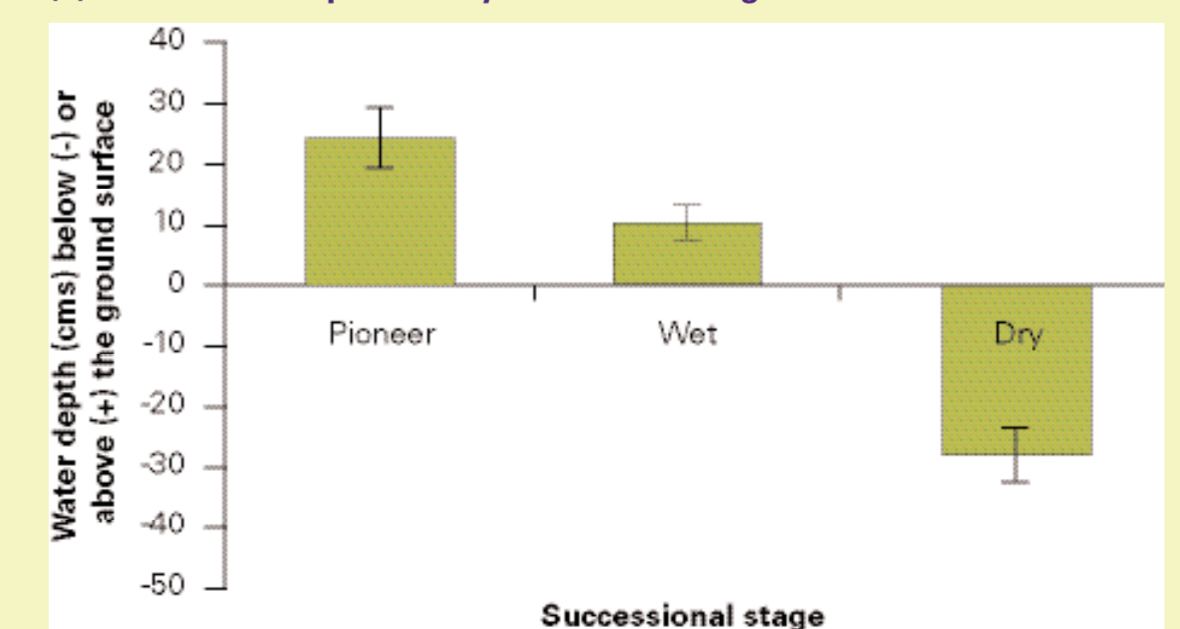
(a) Reed stem density



(b) Plant species-richness



(c) Water table depth in July relative to the ground surface



## PhD training

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

The following list shows PhD studentships involving the RSPB that were underway or newly started during 2007 and 2008. RSPB staff have been involved in the supervision of all these and the majority were also supported by varying amounts of funding and other in kind support. RSPB helped to initiate and continues to help fund the annual Student Conference on Conservation Science at Cambridge.

Research project	Student	University	Partners
Agriculture and biodiversity: India	Malvika Onial	Cambridge	DH
Stone-curlews and conservation management	Alison Johnston	Cambridge	NE
Agriculture and biodiversity: Ghana	Ben Phalan	Cambridge	StJC, RG, BOU
Disturbance in Caledonian pine forests	Mark Hancock	Edinburgh	
Corn bunting declines in Scotland	Allan Perkins	Edinburgh	SNH
Controlling ragwort without herbicides	Eleanor Sargent	Open	Leader+, NE, EA
Manipulating vegetation structure for birds	Tony Morris	Reading	
Flora and blanket bog management	Lindsey Rendle	Wales, Newport	
Meta-population dynamics of willow tits	Finn Stewart	Nottingham	NERC
Population change in European birds and bio-climate models	Nathalie Doswald	Durham	NERC
IBA programme in Sri Lanka	Chinthaka Kaluthota	Colombo	
Remote sensing of African IBAs	George Eshiamwata	Nairobi	BLA, GEM
Forest management and globally threatened birds	Dami Filibus Danjuma	Jos, Nigeria	APLORI
Conservation ecology of the St Helena wirebird	Fiona Burns	Bath	
Management of forest restock plantations for black grouse	Jenny Owens	Stirling	SNH, FR
Ecology and conservation of the pine hoverfly, <i>Blera fallax</i> .	Ellen Rotheray	Stirling	SNH, FR, Mall, NMS
Restoration of flower-rich meadows for great yellow bumblebee	Nicola Redpath	Stirling	
Disease in urban house sparrows	Daria Dadam	Liverpool	IoZ
Determining the causes of ring ouzel declines	Innes Sim	Aberdeen	SNH

### Key:

APLORI – Leventis Ornithological Research Institute (APLORI) at Jos, Nigeria; BOU – British Ornithologists' Union; BLA – BirdLife Africa Partnership Secretariat; DH – Dorothy Hodgkin postgraduate award; EA – Environment Agency; FR – Forest Research; IoZ – Institute of Zoology; GEM – GEM EC Joint Research Centre; Leader+ – Somerset Moors and Levels Leader+; NE – Natural England; NERC – Natural Environment Research Council; NMS – National Museums of Scotland; RG – Robert Gardner Memorial Trust; SNH – Scottish Natural Heritage; StJC – St John's College

Congratulations are also due to the following former students who have been awarded their PhD/DPhils: **Charlotte Watkins** (Harper Adams), **Anita Donaghy** (Cork), **Danaë Sheehan** (Reading), **Amy Crowther** (Stirling), **Sarah Eglington** (UEA), **Ross Wanless** (Cape Town) and **Samantha Dawes** (Reading).

# Publications

Disseminating the results of RSPB research as widely as possible is an important part of the RSPB's ongoing programme of conservation work. Although a considerable amount of information and advice is made available by informal means and direct contact with practitioners, publication in peer-reviewed journals is a key element in ensuring the quality of our work. Preparing a publishable account of applied research that convinces sceptical reviewers and editors of its worth is a stringent discipline. It frequently exposes flaws in reasoning, analysis or data and leads to improvements and strengthening of the scientific base for conservation. It also ensures that our results are accessible to professional conservation scientists worldwide.

## Publications in scientific journals, proceedings and books

The complete list of the RSPB's scientific publications for 2007 and the first half of 2008.

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- 1 based at University of Cambridge
- 2 outposted to Gola Forest, Sierra Leone
- 3 seconded to Harapan Rainforest, Sumatra
- 4 outposted on Gough Island, South Atlantic
- 5 outposted to the Czech Society for Ornithology

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