

Cambridge University Press

0521823684 - Handbook of Biodiversity Methods: Survey, Evaluation and Monitoring

Edited by David Hill, Matthew Fasham, Graham Tucker, Michael Shewry and Philip Shaw

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Handbook of Biodiversity Methods

Biodiversity is recognised to be of global importance, yet species and habitats continue to be under increasing pressure from human-induced influences, whether in urban, rural or wilderness settings. Environmental concerns have never before been so high on the political agenda, driving increased legislation which places major emphasis on individual, public and corporate responsibility for conserving biodiversity and for managing development in an environmentally sensitive and sustainable way. The starting point for assessing legal compliance is the requirement for a comprehensive biodiversity audit. For those needing to undertake such audits, this *Handbook* provides standard procedures for planning and conducting a survey of any terrestrial or freshwater species or habitat and for evaluating the data so as to determine its local, national and international significance.

Organised in three parts, the *Handbook* first addresses planning, providing a pragmatic approach to method selection, sampling strategy, and data analysis and evaluation. The second part is devoted to habitats, describing survey, evaluation and monitoring methods for a broad range of habitats. Part III considers species and provides information on general methods before addressing specific methods of survey and monitoring for the major taxonomic groups

(lower plants, fungi, vascular plants, invertebrates, fish, amphibians, reptiles, birds and mammals).

The *Handbook* provides an invaluable compendium for ecologists, wildlife managers, nature conservation professionals, local and national authorities, environmental managers, corporate bodies and companies, government conservation agencies and regulators involved in auditing ecological resources. It will enable practitioners to better monitor the condition of the biodiversity resource, resulting in improved data upon which to base future conservation, management, development and policy decisions and actions.

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Any opinions expressed are those of the authors and do not necessarily represent the views of RPS or Scottish Natural Heritage.

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CAMBRIDGE UNIVERSITY PRESS

Cambridge, New York, Melbourne, Madrid, Cape Town, Singapore, São Paulo

CAMBRIDGE UNIVERSITY PRESS

The Edinburgh Building, Cambridge, CB2 2RU, UK

Published in the United States of America by Cambridge University Press, New York

www.cambridge.org

Information on this title: www.cambridge.org/9780521823685

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First published 2005

Printed in the United Kingdom at the University Press, Cambridge

A record for this book is available from the British Library

Library of Congress in Publication data

ISBN 13-978-0521-82368-5 hardback

ISBN 10-0-521-82368-4 hardback

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In memory of Colin J. Bibby,
an outstanding conservation scientist

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Preface

This generation is living at a time when the world's biodiversity resources have never been so impoverished. If we take the UK as an example of what has happened across many parts of the planet, since 1945, largely as a result of agricultural intensification, we have lost over 50% of our ancient lowland woodlands, 150 000 miles of hedgerow, 95% of traditional hay meadows, 80% of chalk downland and 80% of wetland fens and mires. This has given rise to massive losses in some, once very common, farmland birds: in the past 30 years 40% of Song Thrushes, 54% of Yellowhammers, a staggering 87% of Starlings and 90% of Corn Buntings have disappeared.

In addition to agricultural intensification, development pressure as a result of industrialisation, human population expansion and resultant increases in the 'ecological footprint' of our own species through, for example, house building, airports, seaports, road infrastructure, water supply, energy generation, waste management, freight distribution and extraction of raw materials, has taken its toll on biodiversity. The UK government's sustainable development commission recently announced that the country has a very long way to go before existing developments, and the way we manage environmental resources, can be deemed to be 'sustainable'. This is without any consideration of the impending threat from climate change.

But it would be wrong to focus entirely on the negatives. There are signs that our attitudes to our environment are changing and there are a growing number of examples where the primary focus of governments, companies and individuals is towards the stitching back of the fabric of the environment and countryside. A range of agri-environment schemes is attempting to redress the damage caused to farmland biodiversity by the Common Agricultural Policy, reforming subsidies away from production and into environmental benefits. Organisations such as the RSPB continue

to expand their reserve network and extend new habitats near existing ones by means of novel techniques based on scientific understanding. There is large-scale restoration of contaminated land sites. Coastal managed realignment offers opportunities to create massive areas of wet grassland, saltmarsh and reedbed habitat, which will provide substantial benefits to wildfowl and waders. Industry, too, is working with organisations to create large-scale reserves in currently uninteresting farmland, a prime example being the Great Fenland Project in the Cambridgeshire Fens of the UK.

As biodiversity has dwindled in the past 50 years, so policies and laws aimed at turning the tide have flourished. There are now over 200 legal instruments aimed at protecting the environment and which have an impact on countries such as the UK. The greatest successes have been achieved where there has been government regulation: we now have the best air and water quality in Britain for about 200 years, almost entirely as a result of regulation. Key instruments for biodiversity conservation in the UK are the Wildlife & Countryside Act, the Countryside and Rights of Way Act, The Nature Conservation (Scotland) Act EU Birds and Habitats Directives, the Habitats Regulations, the EIA Directive and EIA Regulations, the Hedgerow Regulations, Bonn Convention, Ramsar Convention, Bern Convention, European and National Red Lists of species of conservation concern, and Biodiversity Action Plans. A whole industry has developed to support biodiversity conservation, to save what we have and improve upon it. In parallel there has been increased site-based protection: the designation of local wildlife sites, green corridors, County Wildlife Sites, Sites of Special Scientific Interest, National Nature Reserves, Special Protection Areas, Special Areas of Conservation, Biosphere Reserves and World Heritage Sites.

During this recent period we have moved from a natural history mentality to an accountancy

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mentality, where numbers and targets are the order of the day. Government has set out some ambitious targets for biodiversity: by 2010, for example, it wants 95% of all SSSIs in England to be in a Favourable Condition. We have a long way to go. Currently about 42% of the one million or so hectares of SSSIs in England fail to make the grade of 'Favourable Condition'. The percentages in unfavourable condition in England, according to selected habitats, are: rivers and streams 69%, upland grasslands and heaths c. 65%, fen, marsh and swamp 35%, and lowland broadleaved woodland 33%. This gives an idea of the widespread losses in quality that have taken place in addition to losses in habitat quantity. Changes to quality are being addressed by a plethora of site or conservation management plans, and similar mechanisms are being used to mitigate for development impacts, including Section 106 agreements, unilateral undertakings and mitigation plans.

So, against this background of biodiversity decline and a commitment to rebuild it, there are three observations I would make. First, ecology has a vital part to play in delivering a better quality environment and better quality of life for people. Second, environmental quality improvements are increasingly being seen as solutions rather than as costly problems at the levels of both the corporate entity and society at large. Third, there is a need for high-quality information on which to base decisions. We have written this *Handbook* in order to enable biodiversity data to be collected and evaluated according to standard procedures. Future decisions on policy reforms, land management, development impacts and biodiversity conservation initiatives at a range of spatial scales can then be based on fact rather than on conjecture.

The *Handbook* consists of three parts. The first (Part I) addresses planning and describes how to set objectives, what is it you actually want to do, selecting the appropriate method, how to design a

survey and/or monitoring programme, sampling strategy and data analysis. There is then a section which describes generically how to evaluate the data collected: what does it mean at different spatial scales?

Part II is devoted to habitat survey, evaluation and monitoring, describing approaches for the full range of habitats in the UK but with direct relevance to many countries. For each habitat type the potential attributes that indicate condition are defined, together with appropriate and commonly used methods for surveying them and establishing a monitoring scheme for the habitat concerned. Based on structural similarities the methods can be applied to the full range of habitat types found in Europe and, indeed, in other parts of the world. Evaluation criteria are developed and defined for each habitat.

Part III is devoted to the survey, evaluation and monitoring of species. General methods applicable to a range of taxa are first described, such as total counts, timed searches, use of quadrats, distance sampling, line transects, point counts, etc. Each taxonomic group is then addressed, from fungi to mammals. For each group, the attributes for assessing condition are described, followed by survey and monitoring methods that can be applied, and then details of particular methods for species of conservation importance as appropriate. Finally, for each group there is a section that describes the currently applicable conservation evaluation criteria.

I hope that the approaches and methods described in this *Handbook* will stand the test of time and enable us to better monitor the condition of the biodiversity resource. We should then be able to plan improved biodiversity conservation and measure how well we are doing towards meeting targets in the years ahead.

David Hill

Acknowledgements

The writing of the *Handbook* has been a mammoth task. However, we have been very fortunate to have been able to assemble a highly competent team of authors who not only eased the task but were able to take the text to greater depths of detail than any one of the editors could possibly have achieved. Their wisdom, knowledge and experience shines through. We therefore thank our contributing authors for their superb support and hard work.

We were also fortunate to have had to hand a long list of experts who kindly commented on the original version. Our sincere thanks go to Helen Armstrong, Sally Blyth, Phil Boon, Mairi Cole, Andrew Coupar, Louise Cox, Andy Douse, Kathy Duncan, Willie Duncan, Lynne Farrell, Vin Fleming, Stuart Gardner, Martin Gaywood, Doug Gilbert, Dave Horsfield, Keith Kirby, John Kupiec, Kate Holl, Philip Immirzi, Ross Johnstone, Ed Mackey, Jane Mackintosh, Jill Matthews, Angus MacDonald, Ed Mountford, John Orr, Brigid

Primrose, Deborah Procter, Geeta Puri, Rob Raynor, Terry Rowell, Pamela Strachan, Chris Sydes, Neale Taylor, Gavin Tudor, Stephen Ward, Christine Welch, Peter Wortham and the late David Phillips.

RPS provided time and logistical support to the whole project which enabled us to meet deadlines and to see the whole project through to a fruitful conclusion. We are most grateful to them. Alan Crowden of Cambridge University Press and Michael Usher, then Chief Scientist for Scottish Natural Heritage, were convinced that the project was worthwhile and gave much encouragement and support.

Finally, we thank the many professionals who are striving to ensure we stitch back together the fabric of the countryside, both in the UK and abroad, to secure a future environment in which it is worth living. We hope this book plays some small part in assessing how well we are doing in the years to come.