

**Institute of
Terrestrial
Ecology**

Annual Report 1995-96

Centre for Ecology and Hydrology
Natural Environment Research Council

The ITE mission

The Institute of Terrestrial Ecology will develop long-term, multidisciplinary research and exploit new technology to advance the science of terrestrial ecology, leading to a better understanding and quantification of the physical, chemical and biological processes of the land

Priority is placed on developing and applying knowledge in the following areas

- the factors which determine the *composition, structure, and processes* of terrestrial ecosystems, and the *characteristics* of individual plant and animal species
- the dynamics of *interactions* between atmospheric processes, terrestrial ecosystems, soil properties and surface water quality
- the development of a sound scientific basis for *monitoring, modelling* and *predicting* environmental trends to assess past, present and future effects of natural and man-made change
- the securing, expansion and dissemination of ecological data to further scientific research and provide the basis for impartial advice on environmental protection, conservation, and the sustainable use of natural resources to governments and industry

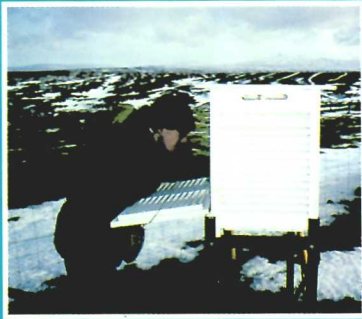
The Institute will provide training of the highest quality, attract commissioned projects, and contribute to international programmes

ITE will promote the use of research facilities and data to enhance national prosperity and quality of life

**Report of the
Institute of Terrestrial Ecology
1995–1996**

Centre for Ecology and Hydrology

Natural Environment Research Council



**Institute of
Terrestrial
Ecology**

Annual Report 1995-96

Centre for Ecology and Hydrology
Natural Environment Research Council

The ITE mission

The Institute of Terrestrial Ecology will develop long-term, multidisciplinary research and exploit new technology to advance the science of terrestrial ecology, leading to a better understanding and quantification of the physical, chemical and biological processes of the land

Priority is placed on developing and applying knowledge in the following areas

- the factors which determine the *composition, structure, and processes* of terrestrial ecosystems, and the *characteristics* of individual plant and animal species
- the dynamics of *interactions* between atmospheric processes, terrestrial ecosystems, soil properties and surface water quality
- the development of a sound scientific basis for *monitoring, modelling* and *predicting* environmental trends to assess past, present and future effects of natural and man-made change
- the securing, expansion and dissemination of ecological data to further scientific research and provide the basis for impartial advice on environmental protection, conservation, and the sustainable use of natural resources to governments and industry

The Institute will provide training of the highest quality, attract commissioned projects, and contribute to international programmes

ITE will promote the use of research facilities and data to enhance national prosperity and quality of life

**Report of the
Institute of Terrestrial Ecology
1995–1996**

Centre for Ecology and Hydrology

Natural Environment Research Council

Contents

Forward by CEH Director, Prof W B Wilkinson **1**

Introduction by ITE Director, Prof T M Roberts **3**

CEH research programmes – see separate files **14 - 92**

Soils **14**

Land use **16**

Biodiversity **36**

Pollution assessment and control **52**

Global change **64**

Generic enabling science **76**

Appendices

1 Staff at 31 March 1996 **93**

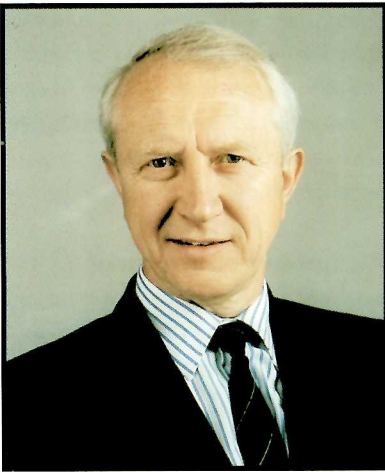
2 Finance and administration **98**

3 Research projects at ITE stations at 31 March 1996 **102**

4 Publications by ITE staff in 1995-96 **105**

5 ITE publications **129**

6 Environmental data network **134**



Robust and timely responses to major environmental problems, such as the sustainability of natural resources, climate change, pollution, etc, are only possible if based on sound interdisciplinary science.

Foreword by CEH Director

Recognising the importance of an holistic approach to the environmental sciences, the Natural Environment Research Council restructured its activities during 1994. A major element of this re-organisation was a grouping of four NERC Institutes into the Centre for Ecology and Hydrology (CEH). Research within CEH is concerned with the land on which we live, its fresh waters and the living organisms which share the environment with us. Component Institutes of CEH are:

- Institute of Freshwater Ecology
- Institute of Hydrology
- Institute of Terrestrial Ecology
- Institute of Virology and Environmental Microbiology

CEH has some 625 staff (475 scientists) and about 300 visiting scientists and students, well-equipped laboratories located throughout the UK (p100), and a reputation for excellence in national and international research, monitoring and data collection. As such, CEH must have one of the strongest capabilities in the world for undertaking holistic research in the terrestrial and freshwater sciences.

The CEH capability to address multi-disciplinary issues has been strengthened during the past year following a full review of its research and a reshaping into ten new research programmes. These set the course for research over the next five years and beyond. The new programmes have been formulated by the CEH Directors and scientists working closely with the external assessors who constitute four Programme Review Groups. In drawing together the new research programmes, the scientists have also been cognisant of:

- the 'wealth creation' and 'quality of life' thrust in the 1993 White Paper, *Realising our potential – a strategy for science and technology*,
- the National Technology Foresight Programme,
- the legislation and policy of the UK Government and of the European Union,
- and the content of the major international science programmes.

The Institutes' activities have been further cemented by cross-Institute inter-disciplinary research projects. These form part of the Integrating

Prof W B Wilkinson



**Centre for
Ecology &
Hydrology**

Science Fund which was established last year. Some seven projects were funded during 1994-95. All have made good progress. During the present year a further six have been approved (p104)

During 1994 the CEH Institutes were required to prepare papers and give evidence to the Office of Public Science and Services as part of the 'Efficiency Survey of the Public Sector Research Establishment'. The published report of the Survey left unresolved the role of many Research Council Institutes within public sector science. In September 1995 the Government announced that 42 public sector research establishments would be subject to further review to assess whether the 'functions' of the establishments were needed and whether the public sector should provide them. Scope for further rationalisation was also to be examined.

CEH was subject to this so-called 'Prior Options' Review. CEH provided extensive documentary evidence and made a verbal presentation to the Steering Committee undertaking the NERC Prior Options Review. CEH took the opportunity to highlight the major benefits that have been derived and will continue to flow to the ecological and hydrological sciences as a result of the strong interdisciplinary focus that is now possible through CEH. The NERC Steering Committee presented its report to Government in late July 1996. Neither the recommendations of the Steering Committee nor the Government response to these are known at the time of writing.

It is to the credit of all CEH staff that the research has remained buoyant and the science outputs have been maintained at a high level during the year against this background of uncertainty and potential change.

The **Institute of Terrestrial Ecology** has contributed in a major way to the development of the new CEH research programmes, is collaborating fully with the other CEH Institutes through the Integrating Fund research projects, and has developed inter-Institute links in many other ways. The Director of ITE, Professor Mike Roberts, is also Deputy Director of CEH, and as such has worked closely with me in formulating CEH policy. Under his Directorship, ITE has had another very successful year and its science flourishes. This Annual Report describes in some detail a number of important ITE achievements and I commend it to you.

I would also take this opportunity to draw your attention to the complementary Annual Reports for 1995-96 from the other CEH Institutes and to the CEH Overview Report.

**Centre for
Ecology &
Hydrology**

Institute of Freshwater Ecology
Institute of Hydrology
Institute of Terrestrial Ecology
Institute of Virology & Environmental Microbiology

Natural Environment Research Council



The main factor driving ITE's success is the commitment, flexibility and resilience of staff at all levels in the Institute.

Introduction by ITE Director

This has been a very successful year for ITE with major gains in the key areas of high-quality research output, commissioned research income, the integration of interdisciplinary teams, and collaboration with the academic and industrial sectors. Success has been achieved in securing support for new research projects from NERC under the thematic funding mode, thereby strengthening collaboration with the universities. Institute staff have made important contributions to the development of interdisciplinary core strategic research programmes for the Centre for Ecology and Hydrology (CEH) – programmes which have subsequently been well received by independent assessors. European co-operation has been enhanced through successful proposals to the Fourth Framework Programme of the European Union. The level of commissions from UK Government departments has been sustained and industry links have been enhanced. These achievements have been secured against an uncertain background of continuing review and re-organisation, increasing competition and financial constraints. The main factor driving this success is the commitment, flexibility and resilience of staff at all levels in the Institute.

In 1995–96 there was continued Government progress to bring the concept of sustainable development into policy formulation. The British Government Panel on Sustainable Development produced two reports covering key issues relevant to ITE, such as climate change, ozone depletion, land use change, transport, and environmental accounting. The Royal Commission on Environmental Pollution also reported on the sustainable management of UK soils and transport. The Rural White Paper published in October 1995 aimed to promote sustainable economic development whilst conserving and improving the environment. The 1995 Environment Act established the Environment Agency (EA) and the Scottish Environment Protection Agency (SEPA) with a remit 'to protect and enhance the environment as a contribution towards achieving sustainable development'.

NERC has responded to the growing importance of this issue by focusing its research priorities around six themes relating to sustainable development (natural resources, biodiversity, waste, pollution, risks and hazards, and

Prof T M Roberts

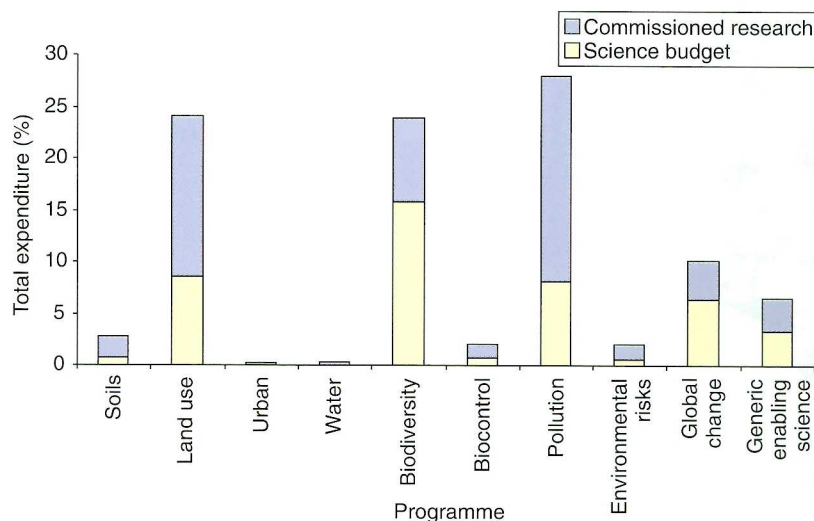


Figure 1. ITE expenditure within the CEH core strategic programmes in 1995-96

The CEH capability to mount interdisciplinary projects parallels the Government's drive for a more integrated approach to pollution regulation.

global change). The continued development of research programmes within the Centre for Ecology and Hydrology (established in 1994) has provided the basis for a more integrated contribution to the six NERC themes – particularly in the areas of environmental information and the development of indicators of sustainable management. The CEH capability to mount interdisciplinary research across atmospheric, terrestrial and aquatic environments parallels the Government's move towards a more integrated approach to environmental regulation (as illustrated by the establishment of the Environment Agencies).

Integration within the Centre for Ecology and Hydrology

The 'Prior Options' Review of the functions, effectiveness and ownership models for CEH was the dominant external factor in 1995. The Review drew into sharp focus the significant contribution of ITE in delivering the CEH mission through:

- its high-quality research capability in terrestrial ecology
- contributing to a critical mass of interdisciplinary teams
- carrying out long-term surveys and monitoring
- maintaining accessible environmental databases

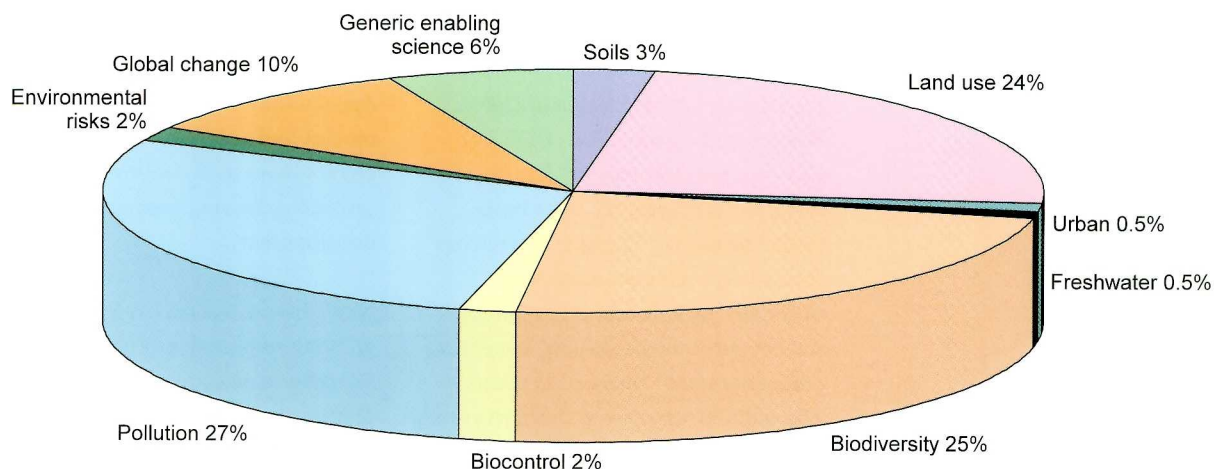


Figure 2. ITE total expenditure within the CEH core strategic programmes in 1995-96

- meeting the needs of users for information and advice
- technology transfer and co-sponsorship of science
- contributing to post-graduate training and research
- enhancing public understanding

It was encouraging that responses to the 'Prior Options' consultation process, across the Government, academic and industrial sectors, were uniformly positive about the efficiency and effectiveness of ITE research and the extent of outreach and networking activities. In particular, the effectiveness of the regional distribution of ITE's research capability was recognised in delivering high-quality, long-term research across the full range of UK's varied landscapes, thereby meeting user community needs at the national, regional and local level.

1995–96 saw proposals for substantial changes to the mechanisms by which the underpinning scientific research of the Institute is funded. At Research Council level there has been the introduction of a 'New Funding Model', which divides NERC's budget between

- **non-thematic** (responsive) mode grants and training
- **thematic** programmes (formerly community research programmes and special topics)
- **core strategic** mode (support for NERC's mission)
- **infrastructure** (elements of the 'well-found laboratory')

ITE welcomed the clarity this division brought to the funding mechanisms (particularly the commitment to sustain the 'well-found laboratory' infrastructure). The opportunity to bid into the NERC non-thematic programme will enhance collaborative research with the universities.

Table 1 Contribution of ITE Stations to CEH core strategic programmes

CEH programme	Monks					
	Wood	Merlewood	Furzebrook	Edinburgh	Banchory	Bangor
Soils	-	•	-	-	-	•
Land use	•	•	•	•	•	•
Urban environments	-	-	-	•	-	•
Freshwater resources	-	-	-	-	-	-
Biodiversity	•	-	•	•	•	-
Biocontrol	-	-	•	-	-	-
Pollution	•	•	-	•	-	•
Environmental risks & hazards	-	-	•	-	-	-
Global change	•	•	•	•	•	•
Generic enabling science	•	•	-	-	•	-

Within the New Funding Model, the six environmental and natural resource issues described by NERC provide the focus for thematic and core strategic programmes. These issues have been expanded by CEH into ten core strategic programmes which have been evaluated by independent review panels. ITE was well placed to make a significant contribution to the programmes covering soils, land use, biodiversity, pollution, global change and cross-sectoral research. Other CEH programmes – such as biocontrol, environmental risks and urban environments – are new areas of research for ITE and will be developed. The core strategy delineates the areas within which CEH Institutes will seek funding complementary to the science budget baseline. Partnership agreements, particularly with UK Government departments and agencies, are encouraged as well as strong links to basic research in the university sector. The distribution of ITE expenditure on the core strategic programmes is shown in Figures 1 and 2.

The development of interdisciplinary research across terrestrial and freshwater ecology and hydrology has been promoted by successful collaborative proposals to the CEH integrating programme. ITE participated in all seven projects initiated through this procedure in

The opportunity to bid into the NERC non-thematic programme will enhance collaborative research with the universities.

The CEH core strategic programmes will promote interdisciplinary research and facilitate links with the user community.

The Monks Wood Research Station provides a strong research capability concerning the intensive agricultural landscape of eastern England.

The Merlewood Research Station is focused on land use research, radioecology, soil ecology, environmental chemistry, and long-term environmental monitoring.

The Furzebrook Research Station provides a strong research capability in coastal ecology and the ecology of semi-natural habitats in southern England.

1995 Collaborative projects with the Institute of Freshwater Ecology (IFE) and the Institute of Virology and Environmental Microbiology (IVEM) had a strong emphasis on microbial ecology (including molecular microbiological studies of organic pollutant degradation and methane oxidation in soils) Collaborative projects with the Institute of Hydrology and the Institute of Freshwater Ecology focused on ecosystem transport processes (including radionuclide transport and combined growth and water use modelling of forests and mixed vegetation)

The core strategic role and function of the ITE sites

The six research sites (Monks Wood, Merlewood, Furzebrook, Edinburgh, Banchory and Bangor) of ITE enable the Centre for Ecology and Hydrology to deliver strategic and applied research, survey, and long-term monitoring in terrestrial ecology through a distributed research network The network responds to national priorities whilst exploiting regional opportunities The national network is extended by interdisciplinary collaboration with the other CEH Institutes and the university sector At each site there is a strong synergy between research funded by the NERC science budget and that funded by science commissions

The site-based functions have been re-focused to deliver the terrestrial ecology component of CEH's mission (Table 1), namely

- *advancing* the science of terrestrial ecology through research, leading to a better understanding of processes at the ecosystem and species level,
- *investigating* the interactions between the atmosphere, terrestrial ecosystems, the soil, and surface water quality,
- *securing, expanding and*

providing ecological data to further scientific research and provide advice to governments and industry,

- *promoting* the use of research facilities and data to provide wealth creation and research training

The Monks Wood Research Station provides a strong research capability concerning the intensive agricultural landscape of UK's lowlands, and in particular the population dynamics of animals and plants within this landscape and the processes that determine community structure The research has strong applications in habitat management, habitat restoration, environmental economics, and the assessment of risks and hazards due to the release of chemicals into the environment The site also maintains NERC's Data Centre for terrestrial and freshwater ecology – the Environmental Information Centre The focus of Monks Wood's strategic research within CEH's programmes concerns environmental management, animal ecology, ecological processes, pollution and ecotoxicology, and the Environmental Information Centre The site also houses the Directorate for ITE, the Remote Sensing Applications Development Unit, and the Eastern Rivers Group of IFE

The Merlewood Research Station is focused on land use research, radioecology, soil ecology, environmental chemistry, and long-term environmental monitoring It maintains, through the Land Use Group and the Environmental Change Network, important national databases and the capacity to census land use and ecological change Merlewood provides the focus for ITE's critical mass of soil ecologists, along with supporting facilities for analytical chemistry, stable isotopes and molecular microbiological laboratories The site also supports

NERC's independent capability in radioecology, in a region of the UK where the nuclear waste management industry is centred. The focus of Merlewood's strategic research within CEH's programmes concerns land use, soil ecology, radioecology, analytical chemistry, and the Environmental Change Network.

The **Furzebrook Research Station** provides a strong research capability in coastal ecology and the ecology of semi-natural habitats in southern England, through the application of modern techniques in population and community ecology. The site's research also has strong applications in environmental impact assessment, habitat restoration, coastal zone management, and conservation. Within CEH, the site has a specific role for integrated research on the risk assessment of genetically modified organisms (GMOs), in co-operation with IVEM, complementing IVEM's work on genetically modified micro-organisms. The focus of Furzebrook's strategic research within CEH's programmes concerns plant ecology and genetics, invertebrate ecology, vertebrate populations, and trophic ecology.

The **Edinburgh Research Station** provides the focus for research in tropical forest management, land/atmosphere gas exchange, and process-based modelling. Edinburgh is a UK centre for forestry research and the Station concentrates on tropical forest management, contributing in this role to the Edinburgh Centre for Tropical Forests (ECTF). The Station supports a leading European group for research on trace gas and pollutant fluxes. The group also provides information and advice on environmental quality issues, including acidic deposition, photochemical oxidants, nitrogen deposition and 'greenhouse gas' fluxes to a broad user community. The focus of Edinburgh's strategic research

within CEH's programmes concerns ecosystem modelling, tropical forestry, pollution, and trace gas fluxes.

The **Banchory Research Station** provides a strong research capability in upland and arctic-alpine ecology, concentrating on animal and plant populations of conservation importance within semi-natural communities, and human impacts in intensively managed ecosystems. Strong links with NERC's user community in Scotland (eg Scottish Office, the oil industry, Scottish Natural Heritage) are maintained, and the site houses both the Scottish Centre for Ecological Data and a 'National Trust for Scotland' research team. The focus of Banchory's strategic research within CEH's programmes concerns successional processes in upland ecosystems, applied ecology, and vertebrate population ecology.

The Station is a founder member of the Aberdeen Research Consortium, and, with the University of Aberdeen, supports NERC's Molecular Ecology Initiative. The staff also co-operate with other Institutes in the UK and Europe through work on the effects of land use change on montane ecosystems.

The **Bangor Research Unit** provides a research capability in biogeochemistry, ecosystem responses to air pollution and climate change, and conservation ecology, particularly with regard to managed uplands, and ensures strong links with NERC's user community in Wales (eg Countryside Council for Wales, Welsh Development Agency, Welsh Office). The focus of Bangor's strategic research within CEH's programmes concerns upland ecology, biogeochemistry and land use, and ecosystem response to pollution.

The Edinburgh Research Station provides the focus for research in tropical forest management, land/atmosphere gas exchange, and process-based modelling.

The Banchory Research Station provides a strong research capability in upland and arctic-alpine ecology, and human impacts in intensively managed ecosystems.

The Bangor Research Unit provides a research capability in biogeochemistry, ecosystem responses to air pollution and climate change, and conservation ecology.

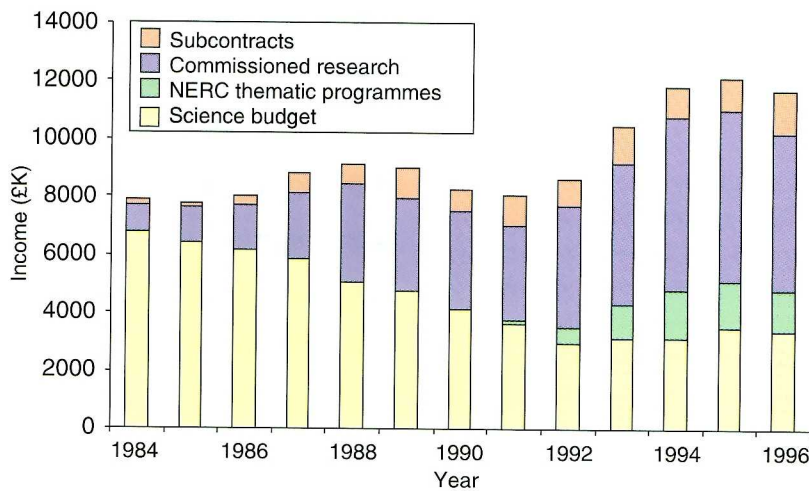


Figure 3. Trends in ITE income (at constant prices – 1984–96 using Gross Domestic Product indices)

The Institute’s role in collecting, curating, interpreting and supplying environmental data continued to grow in importance.

ITE performance in 1995–96

This was an excellent year in terms of financial stability, output of publications and the expansion of links to the user community and educational sector. The research programmes in ITE continued to be supported both by the science budget and commissioned income from a broad customer base (Figures 3 & 4). Excluding subcontracts, the science budget provided 34% of the annual income, thematic programmes 14%, and commissioned research 52%. A small decline in funding from the Department of Environment was offset by a comparable increase from the Ministry of Agriculture, Fisheries and Food (Figures 5 & 6). Income from the competitive NERC thematic programmes was sustained by awards under the continuing Terrestrial Initiative in Global

Environmental Research (TIGER) and the Land/Ocean Interaction Study (LOIS). ITE was particularly successful in the Thematic Programme on Large-Scale Processes in Ecology and Hydrology; staff were involved in collaborative projects with university colleagues in five of the six successful consortia.

ITE’s output indicators were sustained at the high level established in the previous year (Figure 7). The Institute’s high-quality research, survey and monitoring generated over 400 scientific papers in 1995–96, along with over 20 books. Commissions from the user community produced over 200 contract reports. Contributions to public understanding of science took the form of over 100 journal and newspaper articles. Increased involvement with schools arose from the Nuffield Schools Bursary scheme and a national land use survey sponsored by the Geographical Association. Increased liaison with the industrial sector arose from successful bids to the LINK Programme on Remote Sensing and the NERC CONNECT schemes.

The Institute’s role in collecting, curating, interpreting and supplying environmental data continued to grow in importance. At the European level, ITE has played a lead role in both the ‘Remote sensing’ and ‘Nature’ Topic Centres of the European Environment Agency. Staff of the Biological Records Centre at Monks Wood made a significant contribution to the Co-ordinating Commission for Biological Recording, preparing a comprehensive national review of data needs, management techniques and options for the future. The review underpinned the proposals for improved management of data and information on nature conservation and biodiversity, set

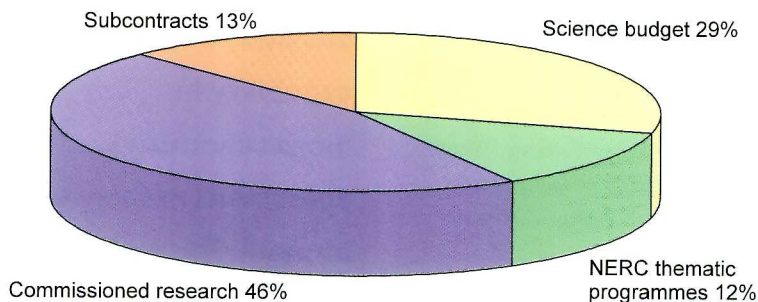


Figure 4. The percentage breakdown of trends in income for 1995–96

out in the report of the UK Biodiversity Steering Group (1995). The Institute's information on UK biodiversity was extensively used in validating lists of 'key species' for the UK Biodiversity Steering Group report and in contributing to final revisions of the report.

A major development in 1995–96 was the establishment of the Environment Agency (and SEPA) which promotes an integrated approach to environmental management to prevent pollution and conserve natural resources. In 1995, ITE's Environmental Information Centre provided key information to the EA in support of authorisations under Integrated Pollution Control of acid pollutant releases from power stations in England and Wales. The future emission limits should ensure compliance with the UK's international commitments to reduce emissions of acid pollutants. Using nationally and internationally defined thresholds for pollutant effects, ITE made a comparison of environmental sensitivity with modelled predictions of atmospheric pollution levels. A geographical information system made it possible to identify where – and by how much – thresholds were likely to be exceeded. The results for individual power stations considered both local and national effects, and the predicted impacts for a variety of emission scenarios formed the basis of EA's negotiations with the power generators.

Applications of ITE research in 1995–96

ITE has made a significant contribution to developing information on several key issues in sustainable development. The following selection of achievements highlights the contribution to sustainable land management and biodiversity, impacts of pollution and

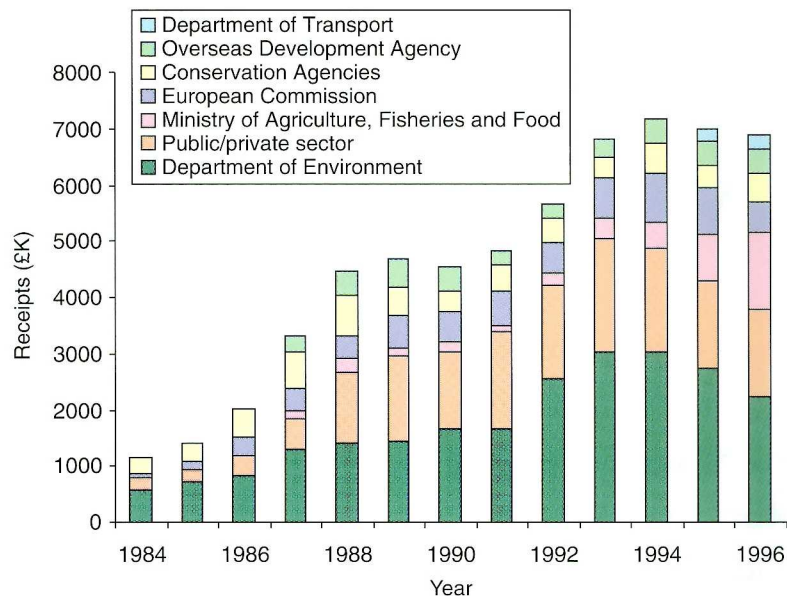


Figure 5. Long-term pattern of ITE receipts from major customers (at constant prices – 1984–96 using Gross Domestic Product indices)

nuclear accidents, mitigation and adaptation to climate change, and long-term monitoring of environmental change.

Towards sustainable deer management in the Scottish uplands

Red deer (*Cervus elaphus*) are an important sporting resource in Scotland, with the main quarry being mature males (stags). However, traditional management has led to high densities of deer in many parts, resulting in conflicts with other land uses, such as forestry, agriculture and nature conservation. A joint study with the University of St Andrews, BioSS, Macaulay Land Use Research Institute (MLURI) and the Red Deer Commission has developed a simulation model to assess different culling regimes on red deer population size and structure. In particular, the model determines which culling strategies allow the number of deer to be reduced while maintaining a given offtake of mature stags. The model is based on the Leslie matrix method and uses extensive ITE population datasets. In principle, for populations below carrying capacity,

ITE has made a significant contribution to developing information on several key issues in sustainable development.

The importance of land use change is illustrated by progress of research to underpin game management and woodland development in the uplands.

Contributions to tropical forest biodiversity have been made through remote sensing of biogeographical zones and genetic studies of endangered species.

for every ten mature stags stalked, it is possible to reduce numbers such that the summer population comprises just 70 stags, 40 hinds and 20 calves – far below existing densities. The result would be significant regeneration of vegetation of conservation value.

Blueprint for expansion of upland woodlands in Wales

Under contract to the Countryside Council for Wales, ITE staff have produced a blueprint for assessing and implementing woodland expansion in Wales (in collaboration with the Forest Authority, the University of Wales and landscape consultants). The first phase developed a procedure for taking account of the effects of expansion on farming operations, farm incomes, landscape and ecology. The second phase applied the procedure in three test areas and demonstrated that it can be effective in generating strategies for woodland expansion in specific areas. This multidisciplinary approach is now being used by English Nature to harmonise the wide-ranging views of land use issues, ultimately to the benefit of the land manager.

Biodiversity mapping for tropical forest management

As part of the UK Government's Darwin Initiative, staff of the

Environmental Information Centre, in collaboration with Makerere University, Kampala, have completed a map of land cover for the Sango Bay area of Uganda derived from earth observation data. A geographical information system has been developed, which combines the Land Cover Map with data from field surveys of plants and animals, topographic and socio-economic data to assist in the definition of conservation zones, aimed at protecting and enhancing biodiversity in the region.

Genetic diversity in Central American mahogany

The mahogany family (Meliaceae) includes a number of economically important timber species, such as *Swietenia macrophylla* (American mahogany) and *Cedrela odorata* (Spanish cedar). These species are now endangered because of overlogging, and exist as small fragmented populations. The long-term viability of these populations depends upon adequate gene flow between them, to counter the processes of genetic erosion which occur when trees are removed by logging.

Analysis of DNA, by the RAPD (Randomly Amplified Polymorphic

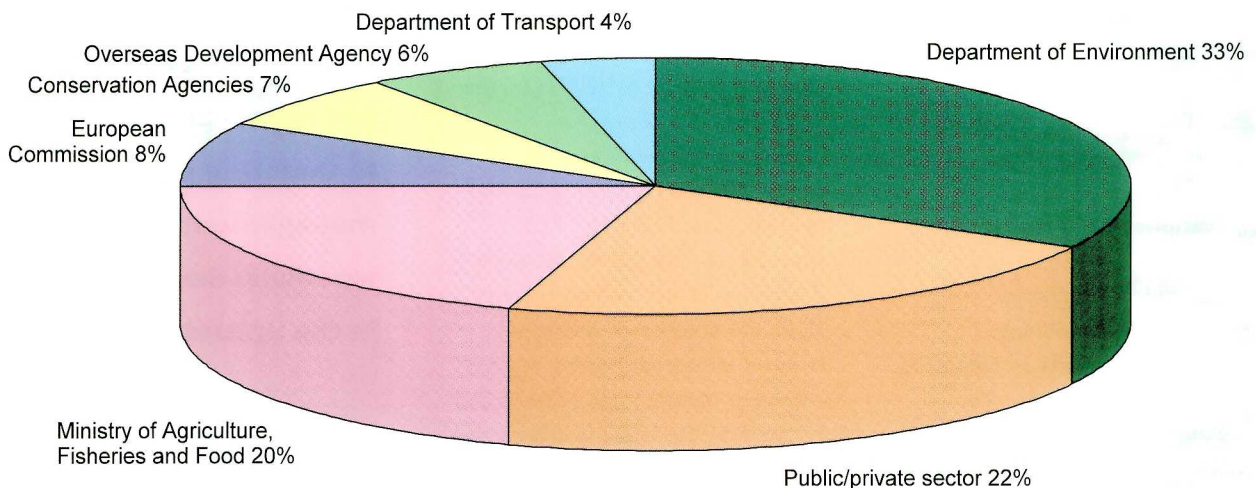


Figure 6. Division of ITE commissioned research income from major customers in 1995-96

DNA) technique, has enabled 'genetic fingerprints' to be produced for individual trees. Populations of *Cedrela odorata* from the Pacific Coast of Costa Rica have been shown to be distinct from those of the Caribbean coast. This difference is not simply related to ecological wet zone/dry zone distinctions, as wet and dry zone populations from other Central and South American countries display RAPD profiles similar to those evident in the dry zone (Pacific) Costa Rican individuals. An explanation for this variation may be found in the complex paleogeographic history of the area.

Launch of RANGES V software for radio-tracking

RANGES software, for analysing movement data of individual animals, has been evolving within ITE since 1984 for work on radio-tagged raptors and squirrels. RANGES IV was made generally available in 1990, and is used at more than 200 sites worldwide. In 1992, an agreement with the Norwegian Institute for Nature Research (NINA) and researchers from the US Fish and Wildlife Service (now National Biological Service) led to the development of RANGES V. With double the previous features, including innovative analyses of sociality, dispersal and habitat use, the new suite is designed to turn radio-tracking from natural history to quantitative science. When driven by command files, RANGES V provides 'live' demonstrations for teaching, including an introductory review for downloading from the Internet (WWW address: <http://www.nmw.ac.uk/ite/soft.html>).

Risk assessment of radionuclides following the Chernobyl accident

A decade has now passed since the Chernobyl accident on 26 April 1986, and the lessons that the scientific community has learnt in coping with the resulting radioactive

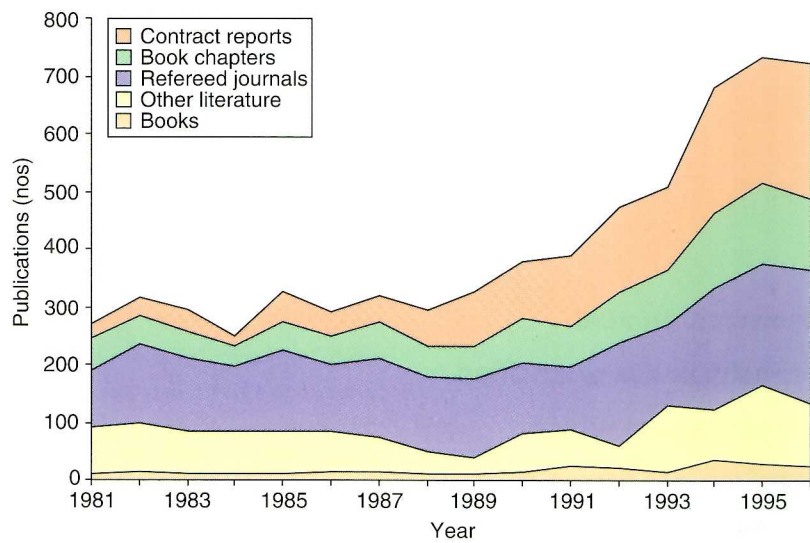


Figure 7. Trends in output of ITE publications (1981-96)

contamination have recently been reviewed to mark the 10th anniversary. The extent of the contamination was severe, not only in the former Soviet Union, but also in many parts of Scandinavia and western Europe because of the prevailing weather conditions. Consequently, intervention limits in many food products were exceeded, including upland sheep and grouse in the UK. Research has shown that the ecological half-lives of radiocaesium are much longer than originally anticipated. The development of an improved understanding of mechanisms of environmental transfer, with testing of suitable countermeasures to reduce contamination levels, has been a significant scientific challenge. ITE has been at the forefront of this work, in close collaboration with both MLURI and the University of Nottingham. We have identified the main factors causing high contamination levels in upland sheep and grouse and those causing significant spatial variation in the rates of radiocaesium transfer. We have also tested the suitability of countermeasures for free-ranging sheep.

The importance of spatial variation in transfer has also been considered in studies of the sensitivity of different

New information on spatial variation in radionuclide transfer has been used to classify the sensitivity of different arctic areas to possible nuclear accidents.

Research on acid deposition has quantified the processes which regulate gas fluxes over semi-natural vegetation.

Calculation of mass balances of dioxin inputs from atmospheric deposition reveal that inputs are up to 20-fold higher than known sources.

arctic areas to possible nuclear accidents. Estimates of the net flux of radiocaesium, which depends on both rates of transfer and total consumption of food products, have shown that arctic terrestrial environments and indigenous peoples are more vulnerable to radiocaesium contamination than many other population groups. Such studies in the Arctic and in rural areas in Ukraine, Belarus and Russia contaminated by the Chernobyl accident have highlighted the importance of food from semi-natural environments (eg mushrooms) in contributing to internal dose from radiocaesium, particularly over long time periods. This is because of high transfer rates, long ecological half-lives and high consumption rates by certain population groups. Quantification of spatial variation in all these factors will form an important part of radioecological studies in future.

Continuous measurement of deposition fluxes of air pollutants

In collaboration with Dutch and German research groups, ITE has developed and operated the first-ever continuous flux measuring stations for the trace gases NH_3 , SO_2 , NO_2 , NO and O_3 . These have been operating throughout 1995 at three European sites (southern Scotland, The Netherlands, SE Germany). Such data are vital to quantify the long-range transport and deposition of pollutants in Europe and the results have immediate application for national and international policy development.

The most important scientific development has been to identify the processes which regulate long-term NH_3 and SO_2 and NO_x exchange over semi-natural vegetation. Prior to these measurements, such surfaces were believed to be 'perfect sinks' for NH_3 , with fluxes controlled by

atmospheric transport. In fact, atmospheric transfer and surface processes are equally important, inputs to such surfaces are smaller than was believed, and new deposition maps are being produced. Substantial changes to the deposition parameters for NH_3 , SO_2 and NO_2 used in deposition modelling have been obtained and validated.

New sources of dioxin and dioxin-like chemicals to the environment

Calculation of mass balances of dioxin inputs from atmospheric deposition reveal that inputs are up to 20-fold higher than known sources. Our work on chemical accidents led us to consider a previously unknown source of dioxins to the environment. Pyrolysis of a wide range of chlorinated materials results in the production of dioxins. Under accident conditions at industrial and chemical storage facilities, large quantities of chlorinated material may be pyrolysed, resulting in the release of substantial quantities of dioxins into the environment. A recent survey of dioxin residues, in a forest ecosystem contaminated by a PVC fire, showed elevated levels of dioxins in soil and transfer through food chains to small mammals.

Critical responses of forests to climate change

One of the critical decisions to be made by parties to the Framework Convention on Climate Change is the level at which 'greenhouse gas' concentrations in the atmosphere should be stabilised. This concentration is defined in part as that which will not endanger ecosystems.

Two comprehensive process-based models of forest ecosystems have been used to examine the impacts of different scenarios of future climate change. Both models identify

critical degrees of warming, beyond which any given forest declines, owing to water stress. After forest death the ecosystem becomes a net source of CO₂ rather than a sink. For many forests, warming beyond 1–2°C becomes critical. Elevated CO₂ 'protects' forests from this water stress effect, and increases their tolerance to warming, whereas increased nitrogen deposition makes them less tolerant.

Establishment of the Environmental Change Network

The UK Environmental Change Network (ECN) is co-ordinated by NERC on behalf of a consortium of sponsoring organisations. It is a long-term integrated monitoring programme which in 1993 began collecting physical, chemical and biological data from a network of sites in the UK. Its aim is to detect and interpret the mechanisms of environmental change and to provide data for the development and calibration of models for forecasting future changes.

From an initial network of eight founding sites in 1993, ECN has expanded to 22 terrestrial and 38 freshwater sites in 1996. The standard protocols developed for terrestrial site monitoring were published this year and are set to influence other national and international monitoring programmes.

During the past year ECN has been developing methods of promoting the use of its data in state-of-the-environment reporting and in scientific research. In particular, ECN pioneered a facility giving users direct, interactive access to its summary database via the Internet (WWW address <http://www.nmw.ac.uk/ecn>), and has published a series of *Data digests* for the period 1993–95 giving the

results from the first three years of integrated environmental monitoring in the UK.

Personal achievements

The ITE complement of Individual Merit Promotion (IMP) Band 3(S) staff was increased to seven by the promotion of Dr G W Elmes (ITE Furzebrook) in 1995. Links with universities were strengthened by the award of Honorary Chairs to M G R Cannell by the University of Edinburgh and to A J Gray by the University of Southampton. T W Ashenden and M P Harris were also awarded Visiting Professorships by the Universities of Newcastle upon Tyne and Glasgow respectively. Dr J N Cape was elected as a Fellow of the Royal Society of Chemistry. There have been several awards to retired ITE staff. Dr A Watson was granted the Honorary Degree of Doctor of the University of Stirling. Dr J C Frankland was appointed as President of the British Mycological Society.

From an initial network of eight founding sites in 1993, the Environmental Change Network has expanded to 22 terrestrial and 38 freshwater sites in 1996.

The quality of science in ITE is reflected by the relatively high number of Individual Merit Promotion researchers.

APPENDIX I

*Staff at 31 March 1996***DIRECTORATE**

ITE Monks Wood
Abbots Ripton
HUNTINGDON Cambs PE17 2LS
Telephone 01487 773381-8
Fax 01487 773467
WWW <http://www.nmw.ac.uk/ite>

Director Prof T M Roberts (2S)

Dr	LS	Anderson	5(S)
Miss	ME	Collis	8(A)
Miss	R	Cooper	8(A)
Mrs	JI	Green	6(A)
Mrs	D	Harman <i>PS to Director</i>	8(A)
Miss	C	Hodgson	8(A)
Mrs	JV	Kimber	9(A)
Ms	J	Mann	8(A)
Mrs	JS	Parsell <i>Admin Officer</i>	5(A)
Miss	SL	Stapleford	7(A)
Mrs	S	Stefanelli	7(A)
Miss	J	Wright	8(A)

Monks Wood

Abbots Ripton
HUNTINGDON
Cambs PE17 2LS
Telephone 01487 773381-8
Fax 01487 773467

HoS Dr S Dobson (3S)

Mr	D	Barratt	8(S)
Mr	PE	Bellamy	7(S)
Dr	LA	Boorman	4(S)
Dr	PD	Carey	6(S)
Dr	CP	Cummins	5(S)
Miss	L	Dale	7(S)
Dr	AS	Dawson	4(S)
Dr	S	Dobson	3(S)
Mrs	J	Francis	8(A)pt
Mr	P	Freestone	6(S)
Mr	RA	Garbutt	7(S)
Mrs	JM	Gaunt	9(A)
Mr	A	Glasscock	6(S)
Mr	PD	Greenslade	7(S)
Mrs	EM	Guerin	9(A)
Mr	PK	Hankard	7(S)
Dr	MO	Hill	4(S)
Dr	SA	Hinsley	6(S)
Mr	PD	Howe	6(S)
Mrs	MJ	King <i>Personal Secretary to Head of Station</i>	8(A)
Miss	N	Maguire	8(S)
Mr	HM	Malcolm	6(S)
Miss	S	Manchester	7(S)
Dr	A	McLeod	5(S)
Miss	S	McNally	7(S)
Dr	A	Meharg	5(S)
Mrs	R	Morgan	8(A)
Mr	JO	Mountford	6(S)
Mr	DG	Myhill	7(S)
Dr	K	Newsham	6(S)

Prof	I	Newton	2(T)
Dr	D	Osborn	4(S)
Dr	RJ	Pakeman	5(S)
Mrs	M	Palmer <i>Library Services</i>	7(L)
Dr	RF	Pywell	6(S)
Dr	SM	Redpath	6(S)
Mrs	C	Richards	8(A)pt
Mrs	CF	Rigden <i>Station Secretary</i>	7(A)
Mr	P	Rothery	4(S)
Prof	J	Sheail	3(D)
Dr	RF	Shore	5(S)
Mrs	AS	Southwood	8(T)
Mr	TH	Sparks	5(S)
Mr	MR	Spendlove	8(T)
Mr	A	Turk	8(S)
Mrs	D	Wade	8(A)
Mr	K	Walker	7(S)
Miss	EA	Warman	7(S)
Dr	JM	Weeks	5(S)
Mr	J	Wright	7(S)
Miss	CL	Wyatt	7(S)
Mr	I	Wyllie	5(S)
Mrs	IS	Wyllie	8(T)
Mr	MG	Yates	6(S)
Mrs	TJ	Yates	6(S)

Merlewood Research Station

GRANGE-OVER-SANDS
 Cumbria LA11 6JU
 Telephone 015395 32264
 Fax 015395 34705

HoS Prof M Hornung (3S)



Miss	CL	Barnett	7(S)
Mr	CJ	Barr	5(S)
Mr	J	Beckett <i>Library Services</i>	6(L)
Mr	CB	Benefield	6(S)
Mr	DG	Benham	6(S)
Mr	NA	Beresford	6(S)
Dr	HJ	Black	6(S)
Mrs	JCE	Brown <i>Station Secretary</i>	7(A)
Dr	RGH	Bunce	4(S)
Mr	P	Burdekin	9(T)pt
Mrs	C	Cook <i>Library Services</i>	8(A)pt
Mr	PA	Coward	6(S)
Mr	ASC	Culling	8(S)
Mrs	J	Delve <i>Personal Secretary to Head of Station</i>	8(A)
Mrs	AL	Dickinson	7(S)
Mrs	MG	Dixon	9(A)pt
Miss	BA	Dodd	8(S)
Miss	N	Ellis	6(S)
Dr	LG	Firbank	4(S)
Dr	JC	Frankland	CT(pt)
Miss	JS	Garnett	8(S)
Miss	MK	Gillespie	7(S)
Mrs	K	Goodsir	8(C)
Ms	J	Grimshaw	9(A)
Dr	AF	Harrison	4(S)
Mr	J	Haynes	Casual
Dr	BJ	Howard	4(S)
Dr	DC	Howard	6(S)
Mrs	G	Howson	6(S)
Dr	P	Ineson	4(S)
Dr	HE	Jones	5(S)pt
Mrs	VH	Kennedy	6(S)
Mr	R	Lethbridge	TG2
Mr	DK	Lindley	4(S)
Miss	N	Parekh	6(S)
Mr	JA	Parkinson	5(S)
Mrs	J	Parrington	7(S)pt
Mrs	JM	Poskitt	7(S)
Miss	R	Pounder	8(A)
Mr	C	Quamby	5(S)
Mrs	L	Raine	9(A)pt

Mr	JD	Roberts	5(S)
Miss	SMC	Robertson	7(S)
Mr	MJ	Rossall	8(S)
Mr	AP	Rowland	5(S)
Dr	A	Sanchez	5(S)
Mr	R	Scott	6(S)
Miss	DL	Singleton	7(S)
Mr	D	Sleep	7(S)
Mr	S	Smart	7(S)
Mr	G	Stark	6(S)
Mr	JW	Watkins	6(C)
Mrs	D	Whittaker	8(T)
Mr	DL	Williams	7(S)
Mr	D	Wilson	8(S)
Mr	C	Woods	6(S)
Mr	S	Wright	7(S)

CEH staff located at this site

Mr	C	Hankinson	7(T)
Mrs	PA	Ward	6(A)

ECN staff located at this site

Mr	S	Adams	7(S)
Mr	JK	Adamsom	6(S)
Mr	AS	Gardiner	8(S)
Ms	AJM	Lane	6(C)
Dr	TW	Parr	4(S)
Dr	WA	Scott	4(S)

Edinburgh Research Station

Bush Estate,
PENICUIK, Midlothian EH26 0QB
Telephone 0131 445 4343
Fax 0131 445 3943

HoS Prof M G R Cannell (3S)

Dr	J	Arah	5(S)
Mr	BG	Bell	5(S)
Mrs	J	Binnie	7(S)
Mr	TAW	Brown	7(S)
Mr	BK	Bushell <i>Station Secretary</i>	6(A)
Mrs	AM	Campbell	8(A)pt
Dr	JN	Cape	4(S)
Ms	M	Coyle	7(S)
Dr	A	Crossley	5(S)
Mr	JD	Deans	5(S)
Dr	JM	Dick	6(S)
Mrs	LA	Dickson <i>Library Services</i>	8(A)
Mrs	MJ	Ferguson	9(A)
Prof	D	Fowler	3(T)
Dr	AD	Friend	5(S)
Dr	ACM	Gillies	6(S)
Dr	KJ	Hargreaves	6(S)
Mr	FJ	Harvey	6(S)
Mr	A	Horsburgh	9(T)
Mr	K	Ingleby	6(S)
Mrs	DS	Innes	8(A)
Mr	GJ	Lawson	5(S)
Mr	ID	Leith	6(S)
Dr	PA	Mason	5(S)
Mr	C	McBeath	7(S)
Mr	DA	McEwan	9(T)
Miss	C	Milford	7(S)
Dr	R	Milne	5(S)
Mr	B	Miners	7(S)
Dr	DC	Mobbs	6(S)
Mr	RC	Munro	6(S)
Mrs	MB	Murray	6(S)
Mr	TD	Murray	6(S)
Dr	CER	Pitcairn	7(S)
Miss	KJ	Potter <i>Personal Secretary to Head of Station</i>	8(A)
Miss	S	Scobie <i>Library Services</i>	7(L)
Dr	LJ	Sheppard	5(S)
Dr	U	Skiba	6(S)

Mr	RI	Smith	5(S)
Mr	RL	Storeton-West	7(S)
Dr	MA	Sutton	5(S)
Mr	J	Wallace	9(T)
Dr	AD	Watt	4(S)
Dr	J	Wilson	4(S)

Furzebrook Research Station

WAREHAM
Dorset BH20 5AS
Telephone 01929 551518-9, 551491
Fax 01929 551087

HoS Prof A J Gray (3S)



Dr	SL	Brown	6(S)
Dr	JM	Bullock	6(S)
Dr	RWG	Caldow	6(S)
Mrs	IM	Chester <i>Library Services</i>	8(A)
Mr	RT	Clarke	4(S)
Dr	RE	Daniels	4(S)
Dr	GW	Elmes	3(I)
Dr	JD	Goss-Custard	3(I)
Ms	K	Hodder	7(S)
Miss	FE	Hunt	8(A)
Mrs	MC	Jones <i>Station Secretary</i>	7(A)
Dr	RE	Kenward	4(S)
Mrs	S	Le V dit Durell	6(S)pt
Miss	LC	Maskell	7(S)
Dr	S	McGroarty	5(S)
Miss	R	Mogg	7(S)
Miss	IL	Moy	7(S)
Mr	B	Pearson	6(S)
Mrs	MK	Perkins <i>Personal Secretary to Head of Station</i>	8(A)
Dr	AF	Raybould	6(S)
Dr	CJ	Reading	5(S)
Mr	WE	Rispin	6(S)
Mr	RJ	Rose	6(S)
Mr	RG	Snazell	5(S)
Dr	RA	Stillman	6(S)
Dr	JA	Thomas	3(I)
Dr	JR	Treweek	5(S)pt
Dr	LK	Ward	4(S)
Mrs	JC	Wardlaw	6(S)pt
Dr	NRC	Webb	4(S)
Mr	A	West	7(S)

Banchory Research Station

Hill of Brathens,
Glassel
BANCHORY Kincardineshire AB31
4BY
Telephone 01330 823434
Fax 01330 823303

HoS Prof B W Staines (3S)



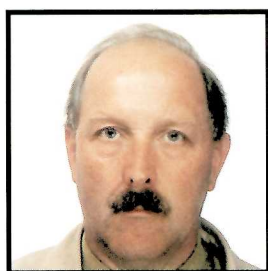
Dr	IM	Alonso	5(S)
Mrs	PM	Andrews	9(A)
Dr	PJ	Bacon	4(S)
Dr	NG	Bayfield	4(S)
Dr	DN	Carss	6(S)
Mr	JWH	Conroy	6(S)
Mr	RP	Cummins	5(S)
Mr	DD	French	5(S)
Prof	MP	Harris	4(S)
Dr	SE	Hartley	5(S)
Mrs	J	Jenkins	8(A)pt
Dr	H	Kruuk	3(I)
Mr	AD	Littlejohn	9(T)
Dr	M	Marquiss	5(S)
Dr	G	Massei	5(S)
Mrs	GM	McGowan	6(S)
Dr	R	Moss	4(S)
Mr	K	Nelson	8(S)
Mrs	ST	Oliver <i>Station Secretary</i>	7(A)
Mrs	S	Palmer	6(S)
Mr	IS	Paterson	5(S)
Miss	I	Pearce	7(S)
Mr	N	Picozzi	5(S)
Mrs	R	Ratcliffe <i>Library</i>	8(A)

Miss	RA	Roger	9(T)
Mr	D	Scott	7(S)
Mrs	V	Street <i>Personal Secretary to Head of Station</i>	8(A)
Miss	M	Thurlow	7(S)
Dr	S	Wanless	6(S)
Mr	A	Webb	7(S)
Mr	D	Welch	4(S)

Bangor Research Unit

University of Wales, Bangor
Deiniol Road
BANGOR Gwynedd LL57 2UP
Telephone 01248 370045
Fax 01248 355365

Head of Unit Dr J E G Good (3S)



Dr	TW	Ashenden	4(S)
Mrs	SA	Bell	7(S)
Mrs	A	Brittain	8(S)
Dr	A	Buse	5(S)
Mrs	JR	Cooper	9(A)
Dr	BA	Emmett	5(S)
Mr	S	Hughes	6(S)
Mrs	G	Langhorne	8(A)pt
Miss	JA	Lowe	7(S)
Mr	DA	Norris	7(S)
Miss	DE	Owen <i>Unit Secretary</i>	7(A)
Mr	GL	Radford	4(S)
Mr	CR	Rafarel	5(S)
Dr	B	Reynolds	4(S)
Mrs	HA	Roberts <i>Personal Secretary to Head of Unit</i>	8(A)
Mr	PA	Stevens	4(S)
Dr	C	Stirling	6(S)
Dr	AH	Thomas	6(S)
Mr	TG	Williams	7(S)

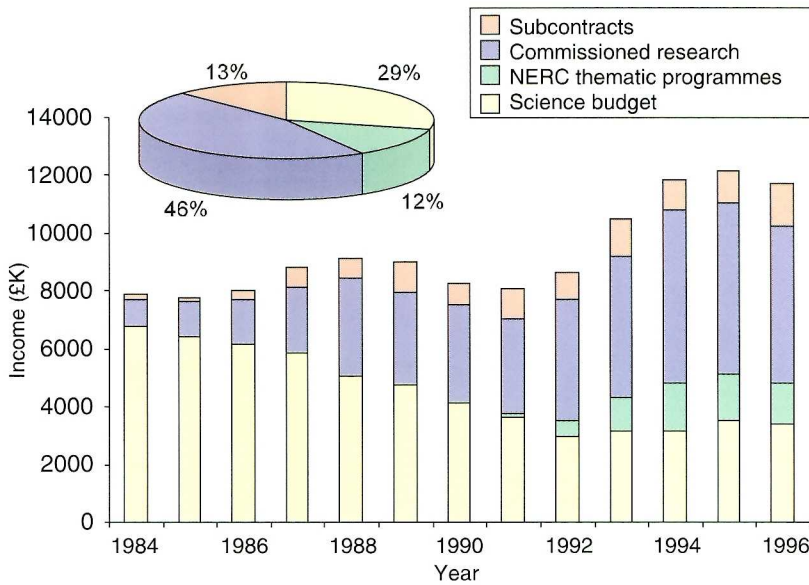
Environmental Information Centre

Monks Wood
Abbots Ripton
HUNTINGDON
Cambs PE17 2LS
Telephone 01487 773381-8
Fax 01487 773467

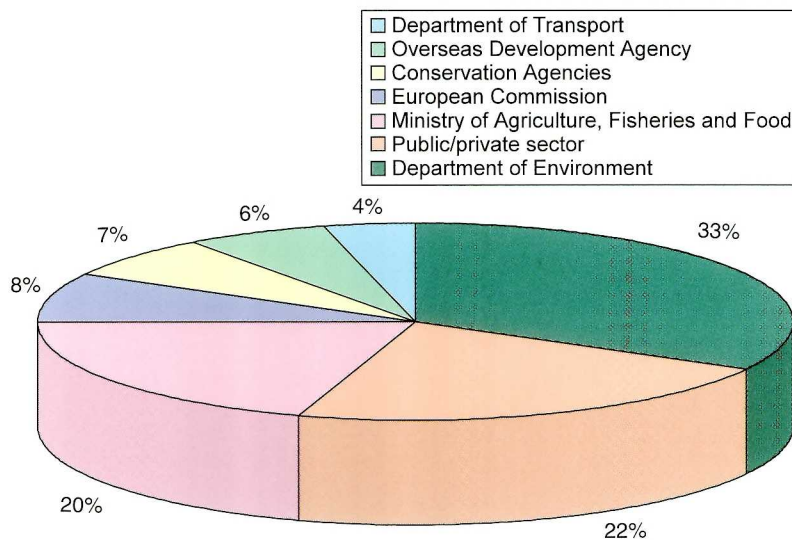
HoS Dr B K Wyatt (4S)



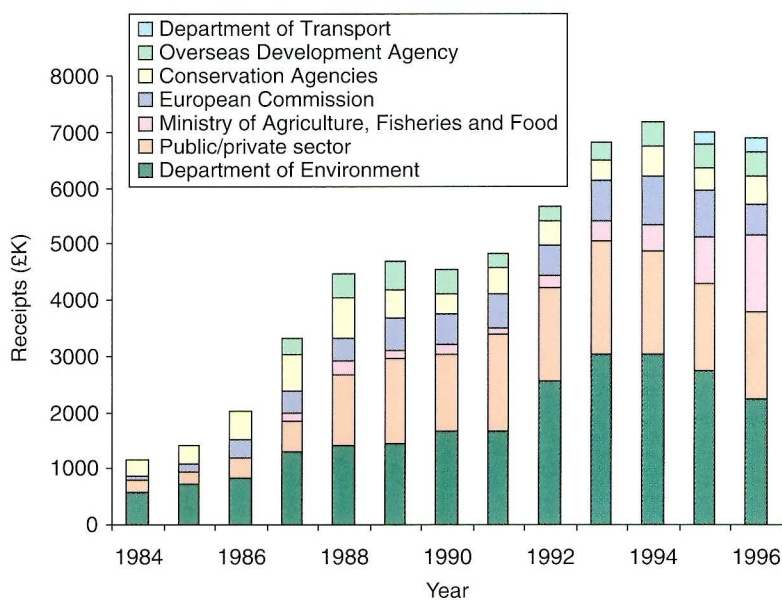
Mrs	V	Appleby	8(A)
Mr	HR	Arnold	6(S)
Mr	M	Brown	7(S)
Mr	NJ	Brown	6(S)
Dr	KR	Bull	4(S)
Ms	H	Chamberlain	4(S)
Miss	R	Cox	6(S)
Mrs	JM	Croft	7(S)
Ms	C	Davies	7(S)pt
Miss	H	Dyke	7(S)
Dr	JE	Eastwood	6(S)
Mr	BC	Eversham	5(S)
Ms	WA	Forrest	9(A)
Mr	RM	Fuller	4(S)
Ms	F	Gerard	6(S)
Mr	N	Greatorex-Davies	6(S)
Miss	JR	Hall	6(S)
Mr	PT	Harding	4(S)
Dr	TJ	Moffat	6(S)
Dr	D	Moss	4(S)
Mr	CD	Preston	4(S)
Mr	DB	Roy	7(S)
Dr	G	Smith	6(S)
Mr	T	Stamp	7(S)
Ms	R	Swetnam	7(S)
Mr	AG	Thomson	6(S)
Mrs	JM	Ullyett	7(S)
Dr	R	Wadsworth	6(S)
Mrs	S	Wallis	7(S)



The graph illustrates trends in income (at constant prices – 1984–95 revalued to 1996 using Gross Domestic Product indices). The pie chart shows the percentage breakdown for 1996.



The division of 1995–96 commissioned receipts by major customers.

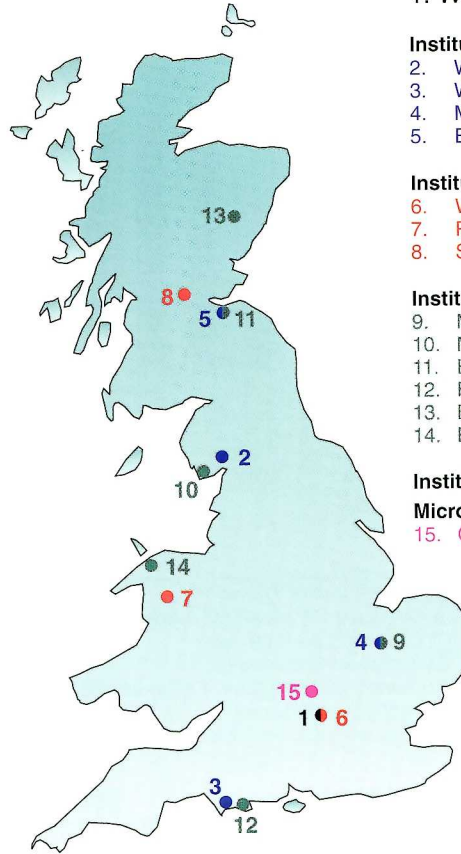


The long-term receipts from major customers (at constant prices – 1984–95 revalued to 1996 using Gross Domestic Product indices).



Centre for Ecology & Hydrology

**ITE is a component
Institute of the NERC
Centre for Ecology and
Hydrology.**



Centre for Ecology and Hydrology

1. Wallingford

Institute of Freshwater Ecology

- 2. Windermere
- 3. Wareham
- 4. Monks Wood
- 5. Edinburgh

Institute of Hydrology

- 6. Wallingford
- 7. Plynlimon
- 8. Stirling

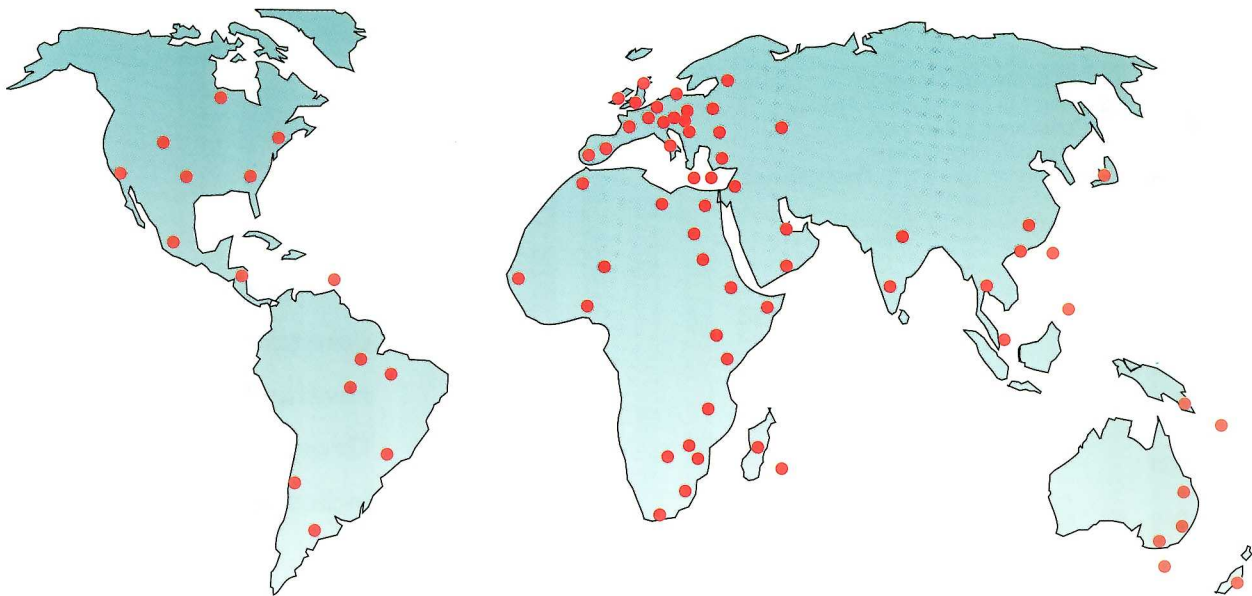
Institute of Terrestrial Ecology

- 9. Monks Wood
- 10. Merlewood
- 11. Edinburgh
- 12. Furzebrook
- 13. Banchory
- 14. Bangor

Institute of Virology and Environmental Microbiology

- 15. Oxford

Location of CEH sites



Location of recent research contracts undertaken by CEH Institutes

The Institute's position within the UK Research Council system is shown below. ITE is an integral part of the Natural Environment Research Council, which also supports a wide range of basic and strategic research in Higher Educational Institutions. As a component Institute of CEH, ITE is able to draw on the expertise of colleagues within the other Institutes.



APPENDIX 3

Research projects at 31 March 1996

Soils and soil/vegetation interactions

T01051-0	Mycological and faunal processes in carbon and nutrient flux in soil and soil/root interactions	H E Jones
T01062-0	Organic matter and nutrient dynamics in soils	A F Harrison
T03056-6	Microbiological processes in the terrestrial carbon cycle	M A Beran

Land use science

T01057-0	Forest modelling	M G R Cannell/A D Watt
T01059-0	Mycorrhizas and tree production	J Wilson
T01060-0	Tropical forestry and tree improvement	J Wilson
T01064-0	The water, carbon and energy relations of plants in fragile habitats	L S Anderson
T01065-0	Tropical forestry and tree improvement (continued)	J Wilson
T01066-0	Forest modelling (continued)	M G R Cannell/A D Watt
T02050-0	Human impact, erosion rehabilitation	N G Bayfield
T02051-0	Land use change and ecological impacts	R G H Bunce
T02055-0	Environmental impact assessment	J R Treweek
T02059-0	Grassland dynamics and management	J Sheail
T02070-0	Successional models for predicting ecological effects of changing agricultural practices	M O Hill
T02071-0	Land use change and ecological impacts	R G H Bunce
T02073-0	Human impact, erosion rehabilitation (continued)	N G Bayfield
T02076-0	Land use data supply	J W Watkins
T02080-0	Ecological factors contrasting biodiversity in the British countryside	R G H Bunce
T02081-0	Grassland dynamics and management (continued)	J Sheail
T05060-6	Land/ocean interaction study (LOIS) - ITE	A J Gray
T08050-0	Vertebrate population dynamics and upland habitat geometry	R Moss
T08073-0	Upland and montane communities	S Hartley
T08074-0	Ecology and management of coastal systems	L A Boorman
T08077-0	Upland ecology	G L Radford
T08078-0	Assessment, management and reconstruction of lowland communities	N R Webb
T08091-0	Spatial dynamics and structure linking the ecology of individuals, communities and the landscape	J M Bullock/M O Hill

Biodiversity and population processes

T02059-0	Grassland dynamics and management	J Sheail
T02070-0	Successional models for predicting ecological effects of changing agricultural practices	M O Hill
T02074-0	Biogeographical studies of the British Isles	B C Eversham
T02081-0	Grassland dynamics and management (continued)	J Sheail
T08051-0	Population ecology of predators	H Kruuk
T08054-0	Population dynamics of raptors	I Newton
T08056-0	Environmental control of avian breeding cycles	A S Dawson
T08057-0	Migratory wader ecology	J D Goss-Custard
T08059-0	Applied plant ecology and genetics	A J Gray/R E Daniels
T08060-0	The evolutionary ecology of interacting populations ant/plant/butterfly/parasitoid systems under different climates	J A Thomas/G W Elmes
T08068-0	Molecular ecology	A J Gray/I Newton
T08073-0	Upland and montane communities	S Hartley
T08078-0	Assessment, management and reconstruction of lowland communities	N R Webb
T08079-0	Metapopulation dynamics, habitat templates and successional processes	N R C Webb

T08080-6	Wildlife diseases - special topic	D Osborn
T08082-0	Metapopulation dynamics	I Newton
T08068-0	Molecular ecology	A J Gray/I Newton
T08080-6	Wildlife diseases - special topic	D Osborn
T08083-0	Vertebrate geodemography	R E Kenward
T08092-0	EIC Biological Databases Unit - international database development	D Moss
T08093-0	Dynamics of upland and montane plant communities	B W Staines
T08094-0	Population ecology of predators (continued)	H Kruuk
T08095-0	Large-scale processes Special Topic	R W G Caldow
T13061-0	ITE consultancies	T M Roberts

T02075-0	Disposal of oiled beach material (OBM) in sandy coastal environment, including low-grade dune and dune pastures	A F Harrison
T03066-6	Oxidation processes in the troposphere	M A Beran
T07050-0	Radionuclides in vegetation and soil	B J Howard
T07051-0	Radionuclide/animal transfers	B J Howard
T07052-0	Chemistry of radionuclides	A Sanchez
T07054-0	Critical loads of acidity, S and N for soils	M Hornung
T07057-0	Atmospheric pollutants and trace gases	D Fowler
T07058-0	Atmospheric pollution modelling and chemistry	J N Cape
T07059-0	Effects of atmospheric pollutants on trees	D Fowler/J N Cape
T07061-0	Hazard and risk assessment	D Osborn/S Dobson
T07062-0	The critical loads approach	K R Bull
T07064-0	Air pollution/climate change research	T W Ashenden
T07069-0	The impacts of climate change	M O Hill
T07070-0	Ecotoxicology	D Osborn/S Dobson
T07072-0	Upland nitrogen dynamics	B Reynolds
T07074-0	Critical loads of acidity, S and N for soils	M Hornung
T07076-0	Hazard and risk assessment (continued)	D Osborn/S Dobson
T07077-0	Radionuclide/animal transfers (continued)	B J Howard
T07078-0	Atmospheric pollutants and trace gases (continued)	D Fowler
T07079-0	Ecotoxicology (continued)	D Osborn/S Dobson
T08054-0	Population dynamics of raptors	I Newton

Pollution

T03054-6	Modelling the terrestrial carbon cycle	M A Beran
T03055-6	Carbon storage and turnover in vegetation and soils	M A Beran
T03057-6	Carbon flux in tropical forest	M A Beran
T03065-6	Field and regional scale emission of trace greenhouse gases	M A Beran
T03086-6	Ecophysical responses of organisms to change in CO ₂ and climate	M A Beran
T03087-6	Responses of populations, communities and ecosystems to changes in CO ₂ and climate	M A Beran
T03088-6	Effects of climate change at the regional and global scale	M A Beran
T03091-6	TIGER special topics	M A Berqan
T03098-0	Carbon sequestration in the biosphere	M G R Cannell
T07064-0	Air pollution/climate change research	T W Ashenden
T07069-0	The impacts of climate change	M O Hill

Global change

T02053-0	Ecological data management and GIS	K R Bull
T02054-0	EIC Biological Records Centre - biodiversity data centre	P T Harding
T02057-0	Historical aspects of environmental management	J Sheail
T02072-0	Remote sensing for ecological research	R M Fuller
T02077-0	Land use data base consultancy	C J Barr
T02079-0	EIC Biological Records Centre - biodiversity data centre (cont'd)	P T Harding
T03095-0	Detection of environmental change	T W Parr
T07075-0	Environmental diagnostics	D Osborn
T08092-0	EIC Biological Databases Unit - international database development	D Moss
T08090-6	Ecological molecular genetic initiative	T M Roberts
T13053-0	Services at ITE Banchory	B W Staines
T13054-0	ITE library services	J Beckett
T13055-0	Chemistry research, development and maintenance	M C French
T13056-0	NERC mass spectrometer service	C Quarmby
T13057-0	Merlewood scientific support services	D K Lindley
T13059-0	ITE Edinburgh scientific support services	M G R Cannell
T13060-0	Statistical research and development in ITE	P Rothery
T13069-2	ITE data networks	B K Wyatt

Integrating generic science



CEH INTEGRATING SCIENCE FUND PROJECTS

	IFE	IH	ITE	IVEM
Projects commencing 1995–96				
The microbial basis of methane oxidation in soils	•		•	•
Interactions of viruses, aphids and wild <i>Brassica</i>			•	•
Modelling the chemical availability of radionuclides in upland organic soils	•		•	
Combined growth and water use modelling of mixed vegetation		•	•	
Upland forest canopy closure – its significance for chemistry, ecology and hydrology	•	•	•	
Molecular genetics and process level events in the biodegradation of xenobiotics in rhizosphere soils			•	•
Microbial diversity and ecosystem function – Phase I	•	•	•	
Projects commencing 1996–97				
The role of seabirds in the epizootiology of lyme disease			•	•
Combined hydro-ecological and socio-economic models of land use, land management and environmental degradation (CHASM)		•	•	
The environmental characteristics of urban environments	•	•	•	
The role of microbial diversity in regulating ecosystem function – Phase II	•		•	•
50 m solar grids for the UK		•	•	
Modelling the fate of viruses in the aquatic environment		•		•

**CEH Institute activities
are strengthened by
cross-Institute
interdisciplinary research
projects.**

APPENDIX 4

Publications by ITE staff at 31 March 1996

Refereed papers in journals

(Allott, T.E.H., Curtis, C.J.), Hall, J., (Harriman, R. & Battarbee, R.W.) 1995 The impact of nitrogen deposition on upland surface waters in Great Britain a regional assessment of nitrate leaching *Water, Air and Soil Pollution*, **85**, 297–302

(Aminah, H.), Dick, J. McP., Leakey, R.R.B., (Grace, J.) & Smith, R.I. 1995 Effect of indole butyric acid (IBA) on stem cuttings of *Shorea leprosula* *Forest Ecology and Management*, **72**, 199–206

Arah, J.R.M. & (Vinten, A.J.A.) 1996 Simplified models of anoxia and denitrification in aggregated and simple-structured soils *European Journal of Soil Science*, **46**, 507–517

Ashenden, T.W., Bell, S.A. & Rafarel, C.R. 1995 Responses of white clover to gaseous pollutants and acid mist implications for setting critical levels and loads *New Phytologist*, **130**, 89–96

(Baden, S.P., Eriksson, S.P.) & Weeks, J.M. 1995 Uptake, accumulation and regulation of manganese during experimental hypoxia and normoxia by the decapod *Nephrops norvegicus* (L.) *Marine Pollution Bulletin*, **31**, 93–102

(Baker, A., Sprent, J.I.) & Wilson, J. 1995 The effects of sodium chloride and mycorrhizal infection on the growth and nitrogen fixation of *Prosopis juliflora* *Symbiosis*, **19**, 39–51

(Baker, P.K.) & Hughes, S. 1995 Seven-coordinate pyridine-2-thione and pyrimidine-2-thione complexes of molybdenum (II) tungsten (II) *Journal of Coordination Chemistry*, **35**, 1–10

(Baker, P.K., Harman, M.E.), Hughes, S., (Hursthouse, M.B. & Malik, K.M.A.) 1995 Seven-coordinate complexes of molybdenum(II) and tungsten(II) containing pyridine-2-thionate and pyrimidine-2-thionate Crystal structure of [W(CO)₃(n²-pymS)₂] (pymS=pyrimidine -2-thionate)

Journal of Organometallic Chemistry, **498**, 257–266

Barton, T.R. 1995 A modified technique for extracting live ticks from small soil and litter samples *Experimental and Applied Acarology*, **19**, 357–360

Barton, T.R., Harris, M.P. & Wanless, S. 1995 Natural attachment duration of nymphs of the tick *Ixodes uriae* (Acari Ixodidae) on kittiwake *Rissa tridactyle* nestlings *Experimental and Applied Acarology*, **19**, 499–509

Baxter, R., Bell, S.A., Sparks, T.H., Ashenden, T.W. & (Farrar, J.F.) 1995 Effects of elevated CO₂ concentrations on three montane grass species III Source leaf metabolism and whole plant carbon partitioning *Journal of Experimental Botany*, **46**, 917–929

Beresford, N.A., Barnett, C.L., (Mayes, R.W., Pollaris, K., Vandecasteele, C.M.) & Howard, B.J. 1995 The use of an *in vitro* technique to predict the absorption of dietary radiocaesium by sheep *Radiation and Environmental Biophysics*, **34**, 191–194

Beresford, N.A., Barnett, C.L., (Crout, N.M.J. & Morris, C.C.) 1996 Radiocaesium variability within sheep flocks relationships between the ¹³⁷Cs activity concentrations of individual ewes within a flock and between ewes and their progeny *Science of the Total Environment*, **177**, 85–96

(Bignal, E.M., McCracken, D.I.), Stillman, R.A. & (Ovenden, G.N.) 1996 Feeding behaviour of nesting choughs in the Scottish Hebrides *Journal of Field Ornithology*, **67**, 25–43

(Bower, K.N., Wells, M., Choularton, T.W.) & Sutton, M.A. 1995 A model of ammonia/ammonium conversion and deposition in a hill cap cloud *Quarterly Journal of the Royal Meteorological Society*, **121**, 569–591

(Brown, A.F., Crick, H.Q.P.) & Stillman, R.A. 1995 The distribution, numbers and breeding ecology of twite

- Acanthis flavirostris* in the south Pennines of England *Bird Study*, **42**, 107–121
- (Brown,A.F.), Stillman,R.A. & (Gibbons,D.W.) 1995 Use of breeding bird atlas data to identify important bird areas a northern England case study *Bird Study*, **42**, 132–143
- Brown,M., Cox,R., Bull,K.R., Dyke,H., (Sanders,G.), Fowler,D., Smith,R. & (Ashmore,M.R.) 1995 Quantifying the fine scale (1 km x 1 km) exposure, dose and effects of ozone Part 2 Estimating yield losses for agricultural crops *Water, Air and Soil Pollution*, **85**, 1485–1490
- Brown,M.J., Dyke,H., Wright,S.M., Wadsworth,R.A., Bull,K.R., (Farmer,A., Barcham,S., Metcalfe,S.E., Whyatt,D. & Powesland,C.) 1995 Estimating the impact of air pollution on environmentally valuable sites *Water, Air and Soil Pollution*, **85**, 2589–2594
- Brown,S.L. & (Bell,J.N.B.) 1995 Earthworms and radionuclides, with experimental investigations on the uptake and exchangeability of radiocaesium *Environmental Pollution*, **88**, 27–39
- Bull,K.R. 1995 Critical loads – possibilities and constraints *Water, Air and Soil Pollution*, **85**, 201–212
- Bull,K.R., Brown,M.J., Dyke,H., Eversham,B.C., Fuller,R.M., Hornung,M., Howard,D.C., (Rodwell,J.) & Roy,D.B. 1995 Critical loads for nitrogen deposition for Great Britain *Water, Air and Soil Pollution*, **85**, 2527–2532
- Bullock,J.M. & Webb,N.R. 1995 Responses to severe fires in heathland mosaics in southern England *Biological Conservation*, **73**, 207–214
- Bullock,J.M., (Mortimer,A.M. & Begon,M.) 1995 Carryover effects on interclonal competition in the grass *Holcus lanatus* a response surface analysis *Oikos*, **72**, 411–421
- Bunce,R.G.H., Barr,C.J., Gillespie,M.K. & Howard,D.C. 1996 The ITE Land Classification providing an environmental stratification of Great Britain *Environmental Monitoring and Assessment*, **39**, 39–46 Also published in *Global to local ecological land classification*, edited by R.A. Sims, I.G.W. Corns & K. Klunka Dordrecht Kluwer
- Bunce,R.G.H., Watkins,J.W., Gillespie,M.K. & Howard,D.C. 1996 The Cairngorms environment and climate change in a European context *Botanical Journal of Scotland*, **48**, 127–135
- (Burkhardt,K., Peters,K.) & Crossley,A. 1995 The presence of structural surface waxes on coniferous needles affects the pattern of dry deposition of fine particles *Journal of Experimental Botany*, **46**, 823–831
- Calladine,J., Harris,M.P., Taylor,S. & Wanless,S. 1995 The status of the eider on the Isle of May and other Forth islands *Scottish Birds*, **18**, 1–10
- Cannell,M.G.R. & Milne,R. 1995 Carbon pools and sequestration in forest ecosystems *Forestry*, **68**, 361–378
- (Cao,M., Dent,J.B.) & Heal,O.W. 1995 Methane emissions from China's paddyland *Agriculture, Ecosystems and Environment*, **55**, 129–137
- (Cao,M., Dent,J.B.) & Heal,O.W. 1995 Modeling methane emissions from rice paddies *Global Biogeochemical Cycles*, **9**, 183–195
- Cape,J.N., Sheppard,L.J., Binnie,J., Arkle,P. & Woods,C. 1995 Throughfall deposition of ammonium and sulphate during ammonia fumigation of a Scots pine forest *Water, Air and Soil Pollution*, **85**, 2247–2252
- Cape,J.N., Smith,R.I., Crossley,A., Harvey,F.J. & Sheppard,L.J. 1995 The use of individual tree statistics to quantify effects in an 'acid mist' experiment with mature trees *Water, Air and Soil Pollution*, **85**, 1367–1372
- Carey,P.D. & Brown,N.J. 1994 The use of GIS to identify sites that will become suitable for a rare orchid, *Himantoglossum hircinum* L., in a future changed climate *Biodiversity Letters*, **2**, 117–123
- Carey,P.D., Preston,C.D., Hill,M.O., (Usher,M.B.) & Wright,S.M. 1995 An environmentally defined biogeographical zonation of Scotland to reflect species distributions *Journal of Ecology*, **83**, 833–845
- Carss,D.N. 1995 Prey brought home by two domestic cats (*Felis catus*) in northern Scotland *Journal of Zoology*, **237**, 678–686
- Carss,D.N. & (Elston,D.A.) 1996 Errors associated with otter *Lutra lutra* faecal analysis II Estimating prey size distribution from bones recovered in spraints *Journal of Zoology*, **238**, 319–332
- Carss,D.N. & (Parkinson,S.G.) 1996 Errors associated with otter *Lutra lutra* faecal analysis I Assessing general diet from spraints *Journal of Zoology*, **238**, 301–317
- (Chapman,P.J.), Reynolds,B. & (Wheater,H.S.) 1995 The seasonal variation in soil water acid neutralizing capacity in peaty podzols in mid-Wales *Water, Air and Soil Pollution*, **85**, 1089–1094
- (Choularton,T.W., Gallagher,M.W., Bower,K.N.), Fowler,D., (Zahniser,M. & Kaye,A.) 1995 Trace gas flux measurements at the landscape scale using boundary-layer budgets *Philosophical Transactions of the Royal Society of London A*, **351**, 357–369
- Conroy,J. & Kruuk,H. 1995 Changes in otter numbers in Shetland between 1988 and 1993 *Oryx*, **29**, 197–204
- Conroy,J.W.H. & (Johnston,R.C.) 1996 The Cairngorms in relation to the UK Environmental Change Network (ECN) *Botanical Journal of Scotland*, **48**, 137–154
- Cotrufo,M.F. & Ineson,P. 1995 Effects of enhanced atmospheric CO₂ and nutrient supply on the quality and subsequent decomposition of fine roots of *Betula pendula* Roth and *Picea sitchensis* (Bong.) Carr *Plant and Soil*, **170**, 267–277
- Cotrufo,M.F., Ineson,P. & Roberts,J.D. 1995 Decomposition of birch leaf litters with varying C-to-N ratios *Soil Biology and Biochemistry*, **27**, 1219–1221
- (Coulson,S.J., Hodkinson,I.D., Block,W.), Webb,N.R. & (Worland,M.R.) 1995 Low summer temperatures a potential mortality factor for high Arctic soil microarthropods? *Journal of Insect Physiology*, **41**, 783–792
- (Coulson,S.J., Hodkinson,I.D., Strathdee,A.T., Block,W.), Webb,N.R., (Bale,J.S. & Worland,M.R.) 1995 Thermal environments of arctic soil organisms during winter *Arctic and Alpine Research*, **27**, 364–370
- (Coulson,S.J., Hodkinson,I.D.), Webb,N.R., (Block,W., Bale,J.S., Strathdee,A.T., Worland,M.R. & Wooley,C.) 1996 Effects of experimental temperature elevation on high-arctic soil micro-arthropod populations *Polar Biology*, **16**, 147–153
- (Crawley,M.J.) & Brown,S.L. 1995 Seed limitation and the dynamics of feral oilseed rape on the M25 motorway *Proceedings of the Royal Society of London B*, **259**, 49–54
- (Crout,N.M.J.), Beresford,N.A., Howard,B.J., (Mayes,R.W., Assimakopoulos,P.A. & Vandecasteele,C.M.) 1996 Development and testing of a revised dynamic model of radiocaesium transfer to sheep tissues *Radiation and Environmental Biophysics*, **35**, 19–24

- Cummins, C.P.** 1995 *Atresia* as a source of variation in clutch size in *Sceloporus mucronatus* a re-appraisal of evidence presented by Mendez de la Cruz *et al Functional Ecology*, **9**, 351–353
- Cummins, C.P. & (Swan, M.J.S.)** 1995 Variation in reproductive characteristics of the stream frog *Colostethus trinitatis* on the island of Trinidad *Journal of Tropical Ecology*, **11**, 603–618
- (Dale, M.J., Downs, O.H.J., Costello, K.F., Wright, S.J., Langridge-Smith, P.R.R.) & Cape, J.N.** 1995 Direct analysis of polycyclic aromatic hydrocarbons in cloud-water aerosol filtrates using laser desorption mass spectrometry *Environmental Pollution*, **89**, 123–129
- Deans, J.D. & Harvey, F.J.** 1995 Phenologies of sixteen European provenances of sessile oak growing in Scotland *Forestry*, **68**, 265–273
- Deans, J.D. & Harvey, F.J.** 1996 Frost hardiness of sixteen European provenances of sessile oak growing in Scotland *Forestry*, **69**, 5–11
- (Delahay, R.J., Speakman, J.R.) & Moss, R.** 1995 The energetic consequences of parasitism effects of a developing infection of *Trichostrongylus tenuis* (Nematoda) on red grouse (*Lagopus lagopus scoticus*) energy balance, body weight and condition *Parasitology*, **110**, 473–482
- (Dempster, J.P., Atkinson, D.A.) & French, M.C.** 1995 The spatial population dynamics of insects exploiting a patchy food resource II Movements between patches *Oecologia*, **104**, 354–362
- Dennis, P., (Usher, M.B.) & Watt, A.D.** 1995 Lowland woodland structure and pattern and the distribution of arboreal, phytophagous arthropods *Biodiversity and Conservation*, **4**, 728–744
- Dewar, R.C.** 1995 Interpretation of an empirical model for stomatal conductance in terms of guard cell function *Plant Cell and Environment*, **18**, 365–372
- Dick, J.McP.** 1995 Flower induction in tropical and subtropical forest trees *Commonwealth Forestry Review*, **74**, 115–120
- Dighton, J.** 1995 Nutrient cycling in different terrestrial ecosystems in relation to fungi *Canadian Journal of Botany*, **73**, Suppl 1, S1349–S1360
- (Dollard, G.), Fowler, D., Smith, R.I., (Hjellbrekke, A.-G., Uhse, K. & Wallasch, M.)** 1995 Ozone measurements in Europe *Water, Air and Soil Pollution*, **85**, 1949–1954
- (Downing, C.E.H., Vincent, K.J., Campbell, G.W.), Fowler, D. & Smith, R.I.** 1995 Trends in wet and dry deposition of sulphur in the United Kingdom *Water, Air and Soil Pollution*, **85**, 659–664
- Emmett, B.A., Stevens, P.A. & Reynolds, B.** 1995 Factors influencing nitrogen saturation in Sitka spruce stands in Wales, UK *Water, Air and Soil Pollution*, **85**, 1629–1634
- (Ferns, P.N.) & Hinsley, S.A.** 1995 Importance of topography in the selection of drinking sites by sandgrouse *Functional Ecology*, **9**, 371–375
- Firbank, L.G., (Watkinson, A.R., Norton, L.R.) & Ashenden, T.W.** 1995 Plant populations and global environmental change the effects of different temperature, carbon dioxide and nutrient regimes on density dependence in populations of *Vulpia ciliata* *Functional Ecology*, **9**, 432–441
- Fishwick, S.K., Shore, R.F., Turk, A. & Sparks, T.H.** 1996 Variation of brain and serum cholinesterase activity with age in wild small mammals *Bulletin of Environmental Contamination and Toxicology*, **56**, 604–611
- Fowler, D., (Mourne, R. & Branford, D.)** 1995 The application of ²¹⁰Pb inventories in soil to measure long-term average wet deposition of pollutants in complex terrain *Water, Air and Soil Pollution*, **85**, 2113–2118
- Fowler, D., Hargreaves, K.J., MacDonald, J.A. & (Gardiner, B.)** 1995 Methane and CO₂ exchange over peatland and the effects of afforestation *Forestry*, **68**, 327–334
- Fowler, D., Hargreaves, K.J., Skiba, U., Milne, R., (Zahniser, M.S., Moncrieff, J.B., Beverland, I.J. & Gallagher, M.W.)** 1995 Measurements of CH₄ and N₂O fluxes at the landscape scale using micrometeorological methods *Philosophical Transactions of the Royal Society of London A*, **351**, 339–356
- Fowler, D., Leith, I.D., Binnie, J., Crossley, A., (Inglis, D.W.F., Choularton, T.W., Gay, M., Longhurst, J.W.S. & Conland, D.E.)** 1995 Orographic enhancement of wet deposition in the United Kingdom continuous monitoring *Water, Air and Soil Pollution*, **85**, 2107–2112
- Fowler, D., Smith, R.I., (Coyle, M., Weston, K.J., Davies, T.D., Ashmore, M.R.) & Brown, M.** 1995 Quantifying the fine scale (1 km x 1 km) exposure, dose and effects of ozone Part 1 Methodology and application for effects on forests *Water, Air and Soil Pollution*, **85**, 1479–1484
- Fowler, D., Hargreaves, K.J., (Choularton, T.W., Gallagher, M.W. & Kaye, A.)** 1996 Measurement of regional CH₄ emissions in the UK using boundary layer budget methods *Energy Conversion and Management*, **37**, 769–775
- Frankland, J.C., Poskitt, J.M. & Howard, D.M.** 1995 Spatial development of populations of a decomposer fungus, *Mycena galopus* *Canadian Journal of Botany*, **73**, Suppl 1, S1399–S1406
- Freeman, C., (Liska, G., Ostle, N.J., Jones, S.E. & Lock, M.A.)** 1995 The use of fluorogenic substrates for measuring enzyme activity in peatlands *Plant and Soil*, **175**, 147–152
- (Gallardo, J.F., Santa Regina, I., Harrison, A.F. & Howard, D.M.)** 1995 Organic matter and nutrient dynamics in three ecosystems of the "Sierra de Bejar" mountains (Salamanca Province, Spain) *Acta Oecologica*, **16**, 447–459
- (Gaunt, J.L., Neuc, H.-U., Cassman, K.G., Olk, D.C.), Arah, J.R.M., (Witt, C., Ottow, J.C.G. & Grant, I.F.)** 1995 Microbial biomass and activity in wetland rice soils *Biology and Fertility of Soils*, **19**, 333–342
- (George, S.G., Wright, J.) & Conroy, J.** 1995 Temporal studies of the impact of the Braer oilspill on inshore feral fish from Shetland, Scotland *Archives of Environmental Contamination and Toxicology*, **29**, 530–534
- Gillespie, M.K., Howard, D.C., Ness, M.J. & Fuller, R.M.** 1996 Linking satellite and field survey data, through the use of GIS, as implemented in Great Britain in the Countryside Survey 1990 project *Environmental Monitoring and Assessment*, **39**, 385–398 Also published in *Global to local ecological land classification*, edited by R.A. Sims, I.G.W. Corns & K. Klinka Dordrecht Kluwer
- (Goater, C.P.), Goss-Custard, J.D. & (Kennedy, C.R.)** 1995 Population dynamics of two species of intestinal helminth in oystercatchers (*Haematopus ostralegus*) *Canadian Journal of Zoology*, **73**, 296–300
- (Gosler, A.G.), Kenward, R.E. & (Horton, N.)** 1995 The effect of gull roost deterrence on roost occupancy, daily gull movements and wintering wildfowl *Bird Study*, **42**, 144–157
- Goss-Custard, J.D., Clarke, R.T., (Briggs, K.B., Ens, B.J., Exo, K.-M., Smit, C., Beintema, A.J.), Caldwell, R.W.G., Catt, D.C., (Clark, N.A.), Durell, S.E.A. & le**

- V dit, Harris, M.P., (Hulscher, J.B., Meininger, P.L.), Picozzi, N., (Prys-Jones, R., Safriel, U.N.) & West, A.D. 1995 Population consequences of winter habitat loss in a migratory shorebird I Estimating model parameters *Journal of Applied Ecology*, **32**, 320–336
- Goss-Custard, J.D., Clarke, R.T., Durell, S.E.A le V dit, Caldow, R.W.G & (Ens, B.J.) 1995 Population consequences of winter habitat loss in a migratory shorebird II Model predictions *Journal of Applied Ecology*, **32**, 337–351
- (Graham, I.M.), Redpath, S.M. & (Thirgood, S.J.) 1995 The diet and breeding density of common buzzards *Buteo buteo* in relation to indices of prey abundance *Bird Study*, **42**, 165–173
- Gray, S.N., Dighton, J., (Olsson, S. & Jennings, D.H.) 1995 Real-time measurement of uptake and translocation of ¹³⁷Cs within mycelium of *Schizophyllum commune* Fr by autoradiography followed by quantitative image analysis *New Phytologist*, **129**, 449–465
- Gray, S.N., Dighton, J. & (Jennings, D.H.) 1996 The physiology of basidiomycete linear organs III Uptake and translocation of radiocaesium within differentiated mycelia of *Armillaria* spp growing in microcosms and in the field *New Phytologist*, **132**, 471–482
- Groom, G.B., Fuller, R.M. & (Jones, A.R.) 1996 Contextual correction techniques for improving land cover mapping from remotely sensed images *International Journal of Remote Sensing*, **17**, 69–89
- (Hadi, D.A.) & Cape, J.N. 1995 Preservation of throughfall samples by chloroform and thymol *International Journal of Environmental Analytical Chemistry*, **61**, 103–116
- Hall, J., Bull, K., Brown, M., Dyke, H., Ulyett, J. & Hornung, M. 1995 The effects of scale and resolution in developing percentile maps of critical loads for the UK *Water, Air and Soil Pollution*, **85**, 2521–2526
- Hall, J.R., Wright, S.M., Sparks, T.H., Ulyett, J., (Allott, T.E.H.) & Hornung, M. 1995 Predicting freshwater critical loads from national data on geology, soils and land use *Water, Air and Soil Pollution*, **85**, 2443–2448
- (Hansen, I.V.), Weeks, J.M. & (Depledge, M.H.) 1995 Accumulation of copper, zinc, cadmium and chromium by the marine sponge *Halicbondria panicea* Pallas and the implications for biomonitoring *Marine Pollution Bulletin*, **31**, 133–138
- Harris, M.P. & (Harding, N.) 1995 Roseate terns return to the Isle of May *Scottish Birds*, **18**, 111
- Harris, M.P. & Wanless, S. 1995 The food consumption of young common murrets (*Uria aalge*) in the wild (Notes) *Colonial Waterbirds*, **18**, 209–213
- Harris, M.P. & Wanless, S. 1995 Survival and non-breeding of adult common guillemots *Uria aalge* *Ibis*, **137**, 192–197
- Harrison, A.F., Howard, P.J.A., Howard, D.M., Howard, D.C. & Hornung, M. 1995 Carbon storage in forest soils *Forestry*, **68**, 335–348
- Harrison, A.F., Stevens, P.A., Dighton, J., Quarmby, C., Dickinson, A.L., Jones, H.E. & Howard, D.M. 1995 The critical load of nitrogen for Sitka spruce forests on stagnopodsols in Wales: role of nutrient limitations *Forest Ecology and Management*, **76**, 139–148
- (Hartley, R.R.), Newton, I. & (Robertson, M.) 1995 Organochlorine residues and eggshell thinning in the peregrine falcon *Falco peregrinus* minor in Zimbabwe *Ostrich*, **66**, 69–73
- Hartley, S.E. & (Gardner, S.M.) 1995 The response of *Philaenus spumarius* (Homoptera: Cercopidae) to fertilizing and shading its moorland host-plant (*Calluna vulgaris*) *Ecological Entomology*, **20**, 396–399
- (Haygarth, P.M.), Harrison, A.F. & (Jones, K.C.) 1995 Plant selenium from soil and the atmosphere *Journal of Environmental Quality*, **24**, 768–771
- (Heaton, T.H.E.) & Crossley, A. 1995 Carbon isotope variations in a plantation of Sitka spruce, and the effect of acid mist *Oecologia*, **103**, 109–117
- (Hilton, J., Rigg, E., Davison, W., Hamilton-Taylor, J., Kelly, M., Livens, F.R.) & Singleton, D.L. 1995 Modeling and interpreting element ratios in water and sediments – a sensitivity analysis of post-Chernobyl Ru-Cs ratios *Limnology and Oceanography*, **40**, 1302–1309
- Hinsley, S.A., Bellamy, P.E. & Moss, D. 1995 Sparrowhawk *Accipiter nisus* predation and feeding site selection by tits [Comment] *Ibis*, **137**, 418–420
- Hinsley, S.A., Bellamy, P.E., Newton, I. & Sparks, T.H. 1995 Habitat and landscape factors influencing the presence of individual breeding bird species in woodland fragments *Journal of Avian Biology*, **26**, 94–104
- Hinsley, S.A., Bellamy, P.E., Newton, I. & Sparks, T.H. 1996 Influences of population size and woodland area on bird species distributions in small woods *Oecologia*, **105**, 100–106
- Hinsley, S.A., Pakeman, R., Bellamy, P.E. & Newton, I. 1996 Influences of habitat fragmentation on bird species distributions and regional population sizes *Proceedings of the Royal Society of London B*, **263**, 307–313
- (Hodgetts, N.) & Stark, G. 1995 A Bryophyte Site Register for Britain *Cryptogamica Helvetica*, **18**, 135–143
- (Hollingsworth, P.M., Gornall, R.J.) & Preston, C.D. 1995 Genetic variability in British populations of *Potamogeton coloratus* (Potamogetonaceae) *Plant Systematics and Evolution*, **197**, 71–85
- (Hollingsworth, P.M.), Preston, C.D. & (Gornall, R.J.) 1995 Isozyme evidence for hybridization between *Potamogeton natans* and *P. nodosus* (Potamogetonaceae) in Britain *Botanical Journal of the Linnean Society*, **117**, 59–69
- Hornung, M. & Reynolds, B. 1995 The effects of natural and anthropogenic environmental changes on ecosystem processes at the catchment scale *Trends in Ecology and Evolution*, **10**, 443–449
- Hornung, M., Bull, K.R., (Cresser, M.), Hall, J., (Langan, S.J., Loveland, P. & Smith, C.) 1995 An empirical map of critical loads of acidity for soils in Great Britain *Environmental Pollution*, **90**, 301–310
- Horrill, A.D., Kennedy, V.H., Paterson, I.S. & McGowan, G.M. 1995 The effect of heather burning on the transfer of radiocaesium to smoke and the solubility of radiocaesium associated with different types of heather ash *Journal of Environmental Radioactivity*, **29**, 1–10
- Howard, D.C. & Bunce, R.G.H. 1996 The Countryside Information System a strategic-level decision support system *Environmental Monitoring and Assessment*, **39**, 373–384 Also published in *Global to local ecological land classification*, edited by R.A. Sims, I.G.W. Corns & K. Klinka Dordrecht Kluwer
- Howard, D.M., Howard, P.J.A. & Howard, D.C. 1995 A Markov model projection of soil organic carbon stores following land use changes *Journal of*

- Environmental Management*, **45**, 287–302
- Howard, P.J.A. & (Robinson, C.H.)** 1995 The use of correspondence analysis in studies of successions of soil organisms *Pedobiologia*, **39**, 518–527
- (Hutchin, P.R., Press, M.C., Lee, J.A.) & Ashenden, T.W.** 1995 Elevated concentrations of CO₂ may double methane emissions from mires *Global Change Biology*, **1**, 125–128
- (Inglis, D.W.F., Choularton, T.W., Wicks, A.J., Fowler, D., Leith, I.D., Werkman, B. & Binnie, J.)** 1995 Orographic enhancement of wet deposition in the United Kingdom case studies and modelling *Water, Air and Soil Pollution*, **85**, 2119–2124
- (Johnston, G.), Dawson, A., (Walker, C.H.)** 1996 Effects of prochloraz and malathion on the red-legged partridge a semi-natural field study *Environmental Pollution*, **91**, 217–225
- (Kerslake, J., Kruuk, L.), Hartley, S.E. & (Woodin, S.)** 1996 Winter moth outbreaks on Scottish heather moorlands effects of host plant and parasitoids on larval survival and development *Bulletin of Entomological Research*, **86**, 155–164
- Kruuk, H. & (Jarman, P.J.)** 1995 Latrine use by the spotted-tailed quoll (*Dasyurus maculatus* Dasyuridae, Marsupialia) in its natural habitat *Journal of Zoology*, **236**, 345–349
- (Langan, S.J.), Reynolds, B. & (Bain, D.C.)** 1996 The calculation of base cation release from mineral weathering in soils derived from Palaeozoic greywackes and shales in upland UK *Geoderma*, **69**, 275–285
- (Last, F.) & Bunce, B.** 1996 Greenhouse gases, climate change and plant performance *Caledonian Gardener* 1996, 11–16
- Lawson, G.J., (Crout, N.M.J., Levy, P.E.), Mobbs, D.C., (Wallace, J.S.), Cannell, M.G.R. & (Bradley, R.G.)** 1995 The tree-crop interface representation by coupling of forest and crop process-models *Agroforestry Systems*, **30**, 199–221 Also published in *Agroforestry science policy and practice*, edited by F.L. Sinclair Dordrecht Kluwer
- Leith, I.D., Sheppard, L.J. & Cape, J.N.** 1995 Effects of acid mist on needles from mature Sitka spruce grafts Part II Influence of developmental stage, age and needle morphology on visible damage *Environmental Pollution*, **90**, 363–370
- Leith, I.D., Sheppard, L.J. & Murray, M.B.** 1995 Potential mechanisms of acid mist injury to red spruce *Environmental and Experimental Botany*, **35**, 125–137
- (Lynch, J.M.), Conroy, J.W.H., (Kitchener, A.C., Jefferies, D.J. & Hayden, T.J.)** 1996 Variation in cranial form and sexual dimorphism among five European populations of the otter *Lutra lutra Journal of Zoology*, **238**, 81–96
- (McClellan, C.J., Watson, P.M.), Wadsworth, R.A., (Blacklock, J. & O'Callaghan, J.R.)** 1995 Land use planning a decision support system *Journal of Environmental Planning and Management*, **38**, 77–92
- McGrorty, S. & Goss-Custard, J.D.** 1995 Population dynamics of *Mytilus edulis* along environmental gradients density-dependent changes in adult mussel numbers *Marine Ecology Progress Series*, **129**, 197–213
- Meharg, A.A. & (Blatt, M.R.)** 1995 NO₃ transport across the plasma membrane of *Arabidopsis thaliana* root hairs kinetic control by pH and membrane voltage *Journal of Membrane Biology*, **145**, 49–66
- Meharg, A.A. & French, M.C.** 1995 Heavy metals as markers for assessing environmental pollution from chemical warehouse and plastics fires *Chemosphere*, **30**, 1987–1994
- Meharg, A.A. & (Killham, K.)** 1995 Loss of exudates from the roots of perennial ryegrass inoculated with a range of micro-organisms *Plant and Soil*, **170**, 345–349
- Meharg, A.A. & Osborn, D.** 1995 Dioxins released from chemical accidents [Commentary] *Nature*, **375**, 353–354
- (Metcalf, S.E., Whyatt, J.D., Derwent, R.G.), Bull, K. & Dyke, H.** 1995 Spatial variability in emissions reduction strategies for sulphur and nitrogen in the UK *Water, Air and Soil Pollution*, **85**, 2619–2624
- (Michelsen, A., Schmidt, I.K., Jonasson, S.), Dighton, J., Jones, H.E. & (Callaghan, T.V.)** 1995 Inhibition of growth, and effects on nutrient uptake of arctic graminoids by leaf extracts – allelopathy or resource competition between plants and microbes? *Oecologia*, **103**, 407–418
- Michelsen, A., (Jonasson, S.), Sleep, D., (Havstrom, M. & Callaghan, T.V.)** 1996 Shoot biomass, delta¹³C, nitrogen and chlorophyll responses of two arctic dwarf shrubs to *in situ* shading, nutrient application and warming simulating climatic change *Oecologia*, **105**, 1–12
- Michelsen, A., (Schmidt, I.K., Jonasson, S.), Quarmby, C. & Sleep, D.** 1996 Leaf ¹⁵N abundance of subarctic plants provides field evidence that ericoid, ectomycorrhizal and non- and arbuscular mycorrhizal species access different sources of soil nitrogen *Oecologia*, **105**, 53–63
- (Mithen, R.), Raybould, A.F. & (Giamoustaris, A.)** 1995 Divergent selection for secondary metabolites between wild populations of *Brassica oleracea* and its implications for plant-herbivore interactions *Heredity*, **75**, 472–484
- Mobbs, D. & Cannell, M.G.R.** 1995 Optimal tree fallow rotations some principles revealed by modelling *Agroforestry Systems*, **29**, 113–132
- Monteith, J.L.** 1995 Accommodation between transpiring vegetation and the convective boundary layer *Journal of Hydrology*, **166**, 251–263
- Monteith, J.L.** 1995 A reinterpretation of stomatal responses to humidity *Plant Cell and Environment*, **18**, 357–364
- Monteith, J.L.** 1996 Drying patterns on roads in the Scottish Highlands *Weather*, **51**, 95–96, 98–99
- (Moody, S.A., Briones, M.J.I., Pearce, T.G.) & Dighton, J.** 1995 Selective consumption of decomposing wheat straw by earthworms *Soil Biology and Biochemistry*, **27**, 1209–1213
- (Moore, P.G.) & Weeks, J.M.** 1995 Observations on the natural history of some supralittoral and terrestrial talitrid amphipods from the Azores *Acoreana*, Suppl., 79–91
- (Moore, P.G., Rainbow, P.S.), Weeks, J.M. & (Smith, B.)** 1995 Observations on copper and zinc in an ecological series of talitroidean amphipods (Crustacea Amphipoda) from the Azores *Acoreana*, Suppl., 93–102
- Morecroft, M.** 1995 Air pollution and the nitrogen cycle *Geography Review*, **9(2)**, 7–10
- (Newbery, R.M., Wolfenden, J., Mansfield, T.A.) & Harrison, A.F.** 1995 Nitrogen, phosphorus and potassium uptake and demand in *Agrostis capillaris* the influence of elevated CO₂ and nutrient supply *New Phytologist*, **130**, 565–574
- Newsham, K.K., (Fitter, A.H. & Watkinson, A.R.)** 1995 Arbuscular mycorrhiza protect an annual grass from

- root pathogenic fungi in the field
Journal of Ecology, **83**, 991–1000
- Newsham, K.K., (Fitter, A.H. & Watkinson, A.R.)** 1995 Multi-functionality and biodiversity in arbuscular mycorrhizas *Trends in Ecology and Evolution*, **10**, 407–411
- Newsham, K.K., (Watkinson, A.R. & Fitter, A.H.)** 1995 Rhizosphere and root-infecting fungi and the design of ecological field experiments *Oecologia*, **102**, 230–237
- Newsham, K.K., (Watkinson, A.R., West, H.M. & Fitter, A.H.)** 1995 Symbiotic fungi determine plant community structure changes in a lichen-rich community induced by fungicide application *Functional Ecology*, **9**, 442–447
- Newton, A.C., (Cornelius, J.P., Mesen, J.F. & Leakey, R.R.B.)** 1995 Genetic variation in apical dominance of *Cedrela odorata* seedlings in response to decapitation *Silvae Genetica*, **44**, 146–150
- Newton, I.** 1995 The contribution of some recent research on birds to ecological understanding Presidential address to the British Ecological Society, Birmingham, December 1994 *Journal of Animal Ecology*, **64**, 675–696
- Newton, I.** 1995 Relationship between breeding and wintering ranges in Palaearctic-African migrants *Ibis*, **137**, 241–249
- Newton, I. & Dale, L.** 1996 Relationship between migration and latitude among west European birds *Journal of Animal Ecology*, **65**, 137–146
- (Nisbet, T.R.), Fowler, D. & Smith, R.I.** 1995 An investigation of the impact of afforestation on stream-water chemistry in the Loch Dee catchment, SW Scotland *Environmental Pollution*, **90**, 111–120
- (Norton, L.R.), Firbank, L.G. & (Watkinson, A.R.)** 1995 Ecotypic differentiation of response to enhanced CO₂ and temperature levels in *Arabidopsis thaliana* *Oecologia*, **104**, 394–396
- Pakeman, R.J., (Marrs, R.H.), Howard, D.C., Barr, C.J. & Fuller, R.M.** 1996 The bracken problem in Great Britain its present extent and future changes *Applied Geography*, **16**, 65–86
- Parish, T., (Bass, J.) & Sparks, T.** 1995 The contrasting invertebrate fauna of freshwater habitats in the Swavesey Fens of East Anglia *Freshwater Forum*, **5**, 163–177
- Parish, T., Lakhani, K.H. & Sparks, T.H.** 1995 Modelling the relationship between bird population variables and hedgerow and other field margin attributes II Abundance of individual species and of groups of similar species *Journal of Applied Ecology*, **32**, 362–371
- Pearson, B., Raybould, A.F. & Clarke, R.T.** 1995 Breeding behaviour, relatedness and sex-investment ratios in *Leptothorax tuberum fabricius* *Entomologia Experimentalis et Applicata*, **75**, 165–174
- (Pearson, S., Davison, A.W., Reiling, K.), Ashenden, T. & (Ollerenshaw, J.H.)** 1996 The effects of different ozone exposures on three contrasting populations of *Plantago major* *New Phytologist*, **132**, 493–502
- (Pienkowski, M.W., Bignal, E.M., Galbraith, C.A., McCracken, D.I.), Stillman, R.A., (Boobyer, M.G. & Curtis, D.J.)** 1996 A simplified classification of land-type zones to assist the integration of biodiversity objectives in land-use policies *Biological Conservation*, **75**, 11–25
- (Pollard, E.) & Moss, D.** 1995 Historical records of the occurrence of butterflies in Britain examples showing associations between annual number of records and weather *Global Change Biology*, **1**, 107–113
- Preston, C.D.** 1995 *Potamogeton x cognatus* Asch & Graebn at Loch Borrallie, west Sutherland (V.C.108), Scotland *Watsonia*, **20**, 415–417
- Preston, C.D. & (Stewart, N.F.)** 1995 *Potamogeton x suecicus* in Orkney *Orkney Field Club Bulletin 1995*, 38–40
- Pywell, R.F., Webb, N.R. & (Putwain, P.D.)** 1995 A comparison of techniques for restoring heathland on abandoned farmland *Journal of Applied Ecology*, **32**, 400–411
- Pywell, R.F., Webb, N.R. & (Putwain, P.D.)** 1996 Harvested heather shoots as a resource for heathland restoration *Biological Conservation*, **75**, 247–254
- Rafarel, C.R., Ashenden, T.W. & Roberts, T.M.** 1995 An improved Solardome system for exposing plants to elevated CO₂ and temperature *New Phytologist*, **131**, 481–490
- (Rasmussen, A.D., Krag, A., Bjerregaard, P.), Weeks, J.M. & (Depledge, M.H.)** 1995 The effects of trace metals on the apparent water permeability of the shore crab *Carcinus maenas* (L.) and the brown shrimp *Crangon crangon* (L.) *Marine Pollution Bulletin*, **31**, 60–62
- Raybould, A.F., (Goudet, J.), Mogg, R.J., (Gliddon, C.J.) & Gray, A.J.** 1996 The genetic structure of a linear population of *Beta vulgaris* ssp. *maritima* (sea beet) revealed by isozyme and RFLP analysis *Heredity*, **76**, 111–117
- Reading, C.J. & Clarke, R.T.** 1995 The effects of density, rainfall and environmental temperature on body condition and fecundity in the common toad, *Bufo bufo* *Oecologia*, **102**, 453–459
- Reading, C.J. & (Davies, J.L.)** 1996 Predation by grass snakes (*Natrix natrix* L.) at a site in southern England *Journal of Zoology*, **239**, 73–82
- Redpath, S.M.** 1995 Habitat fragmentation and the individual tawny owls *Strix aluco* in woodland patches *Journal of Animal Ecology*, **64**, 652–661
- Redpath, S.M.** 1995 Impact of habitat fragmentation on activity and hunting behaviour in the tawny owl *Strix aluco* *Behavioral Ecology*, **6**, 410–415
- (Redpath, C.J., Thirgood, S.J.) & Redpath, S.M.** 1995 Evaluation of methods to estimate field vole *Microtus agrestis* abundance in upland habitats *Journal of Zoology*, **237**, 49–56
- Reynolds, B.** 1996 Estimating the total deposition of base cations from throughfall measurements (Technical note) *Science of the Total Environment*, **180**, 183–186
- Reynolds, B. & (Edwards, A.)** 1995 Factors influencing dissolved nitrogen concentrations and loadings in upland streams of the UK *Agricultural Water Management*, **27**, 181–202
- Reynolds, B., Stevens, P.A., Hughes, S., Parkinson, J.A. & (Weatherley, N.S.)** 1995 Stream chemistry impacts of conifer harvesting in Welsh catchments *Water, Air and Soil Pollution*, **79**, 147–170
- Rothery, P.** 1995 The effect of sampling errors on testing for density dependence Appendix 3 to Dempster, J.P., Atkinson, D.A. & Cheeseman, O.D. The spatial dynamics of insects exploiting a patchy food resource 1 Population extinction and regulation *Oecologia*, **104**, 353–354
- Rothery, P., (Martin, A.R., Hiby, L. & Garside, S.)** 1995 Estimating foetal growth rate from cross-sectional samples of field data with application to pilot whales *Applied Statistics*, **44**, 163–172

- Rowland,A.P., Woods,C. & Kennedy,V.H.** 1995 Control of errors in anion chromatography applied to environmental research *Journal of Chromatography A*, **706**, 229–239
- Ruess,L., Sandbach,P. (Cudlin,P.), Dighton,J. & Crossley,A.** 1996 Acid deposition in a spruce forest soil effects on nematodes, mycorrhizas and fungal biomass *Pedobiologia*, **40**, 51–66
- Sanchez,A.L., Horrill,A.D., Singleton,D.L. & (Leonard,D.R.P.)** 1996 Radionuclides around nuclear sites in England and Wales *Science of the Total Environment*, **181**, 51–63
- (Shaw,T.M.), Dighton,J. & (Sanders,F.E.)** 1995 Interactions between ectomycorrhizal and saprotrophic fungi on agar and in association with seedlings of lodgepole pine (*Pinus contorta*) *Mycological Research*, **99**, 159–165
- Sheail,J** 1995 Elements of sustainable agriculture the UK experience, 1840–1940 *Agricultural History Review*, **43**, 178–192
- Sheail,J.** 1995 Nature protection, ecologists and the farming context a UK historical perspective *Journal of Rural Studies*, **11**, 79–88
- Sheail,J.** 1995 New towns, sewerage and the allocation of financial responsibility the post-war experience *Town Planning Review*, **66**, 371–387
- Sheail,J.** 1995 War and the development of nature conservation in Britain *Journal of Environmental Management*, **44**, 267–283
- Sheail,J.** 1996 From aspiration to implementation – the establishment of the first National Nature Reserves in Britain *Landscape Research*, **21**, 37–54
- Sheppard,L.J., Franssen,I & Cape,J.N.** 1995 Frost hardiness of Norway spruce treated with acid mist evaluation of the electrolyte leakage rate technique *Environmental and Experimental Botany*, **35**, 139–149
- Sheppard,L.J., Leith,I.D., (Smith,C.M.S.) & Kennedy,V.** 1995 Effects of soil chemistry on the response of potted Sitka spruce to acid mist in open-top chambers *Water, Air and Soil Pollution*, **84**, 347–366
- Shore,R.F., Myhill,D.G., Lhotsky,R. & (MacKenzie,S)** 1995 Capture success for pygmy and common shrews (*Sorex minutus* and *S. araneus*) in Longworth and pitfall traps on upland blanket bog *Journal of Zoology*, **237**, 657–662
- Shore,R.F., Myhill,D.G., Routledge,E.J. & Wilby,A.** 1995 Impact of an environmentally-realistic intake of cadmium on calcium, magnesium, and phosphate metabolism in bank voles, *Clethrionomys glareolus* *Archives of Environmental Contamination and Toxicology*, **29**, 180–186
- Shore,R.F., (Birks,J.D.S.), Freestone,P & (Kitchener,A.C.)** 1996 Second-generation rodenticides and polecats (*Mustela putorius*) in Britain *Environmental Pollution*, **91**, 279–282
- Skiba,U., (McTaggart,I.P., Smith,K.A.), Hargreaves,K.J. & Fowler,D** 1996 Estimates of nitrous oxide emissions from soil in the UK *Energy Conversion and Management*, **37**, 1303–1308
- (Smith,K.A., Clayton,H., McTaggart,I.P., Thomson,P.E.), Arah,J.R.M. & (Scott,A.)** 1995 The measurement of nitrous oxide emissions from soil using chambers *Philosophical Transactions of the Royal Society A*, **351**, 327–338
- (Smith,R.D.) & Marquiss,M.** 1995 Production and costs of nesting attempts in snow buntings *Plectrophenax nivalis* why do they attempt second broods? *Ibis*, **137**, 469–476
- Smith,R.I., (Anderson,C.W. & Rivadeneyra,I.C.)** 1995 Estimation of the uncertainty in crop loss predictions through statistical modelling of the AOT40 levels for ozone *Water, Air and Soil Pollution*, **85**, 1491–1496
- Smith,R.I., Hall,J.R. & Howard,D.C.** 1995 Estimating uncertainty in the current critical loads exceedance models *Water, Air and Soil Pollution*, **85**, 2503–2508
- Sparks,T.H. & Parish,T** 1995 Factors affecting the abundance of butterflies in field boundaries in Swavesey fens, Cambridgeshire, UK *Biological Conservation*, **73**, 221–227
- Sparks,T.H., Buse,A., & (Gadsden,R.J)** 1995 Life strategies of *Carabus problematicus* (Coleoptera, Carabidae) at different altitudes on Snowdon, north Wales *Journal of Zoology*, **236**, 1–10
- Sparks,T.H., Greatorex-Davies,J.N., Mountford,J.O., (Hall,M.L. & Marrs,R.H.)** 1996 The effects of shade on the plant communities of rides in plantation woodland and implications for butterfly conservation *Forest Ecology and Management*, **80**, 197–207
- Stevens,P.A., Norris,D.A., Williams,T.G., Hughes,S., (Durrant,D.W.H., Anderson,M.A., Weatherley,N.S.), Hornung,M & Woods,C.** 1995 Nutrient losses after clearcutting in Beddgelert Forest a comparison of the effects of conventional and whole-tree harvest on soil water chemistry *Forestry*, **68**, 115–131
- (Stevenson,M.J.), Bullock,J.M. & Ward,L.K.** 1995 Re-creating semi-natural communities effect of sowing rate on establishment of calcareous grassland *Restoration Ecology*, **3**, 279–289
- Stillman,R.A. & (Brown,A.F.)** 1995 Minimising effort in large-scale surveys of terrestrial birds an example from the English uplands *Journal of Avian Biology*, **26**, 124–134
- Sutcliffe,O.L., (Thomas,C.D.) & Moss,D.** 1996 Spatial synchrony and asynchrony in butterfly population dynamics *Journal of Animal Ecology*, **65**, 85–95
- Sutton,M.A. & Fowler,D.** 1995 Atmospheric deposition of nitrogen compounds to heathlands *Aarhus Geoscience*, **4**, 61–71
- Sutton,M.A., Fowler,D., Burkhardt,J.K. & Milford,C.** 1995 Vegetation atmosphere exchange of ammonia canopy cycling and the impacts of elevated nitrogen impacts *Water, Air and Soil Pollution*, **85**, 2057–2063
- Sutton,M.A., (Place,C.J., Eager,M.), Fowler,D. & Smith,R.I.** 1995 Assessment of the magnitude of ammonia emissions in the United Kingdom *Atmospheric Environment*, **29**, 1393–1411
- Sutton,M.A., (Schjorring,J.K. & Wyers,G.P.)** 1995 Plant-atmosphere exchange of ammonia *Philosophical Transactions of the Royal Society of London A*, **351**, 261–278
- (Svendsen,C.) & Weeks,J.M.** 1995 The use of a lysosome assay for the rapid assessment of cellular stress from copper to the freshwater snail *Viviparus contectus* (Millet) *Marine Pollution Bulletin*, **31**, 139–142
- (Tchoundjeu,Z.) & Leakey,R.R.B** 1996 Vegetative propagation of African mahogany effects of auxin, node position, leaf area and cutting *New Forests*, **11**, 125–136
- (Thirgood,S.J., Leckie,F.M.) & Redpath,S.M.** 1995 Diurnal and seasonal variation in line transect counts of moorland passerines *Bird Study*, **42**, 257–259
- (Thirgood,S.J.), Redpath,S.M., (Hudson,P.J., Hurley,M.H. &**

APPENDIX 4

- Aebischer, N.J.** 1995 Effects of necklace radio transmitters on survival and breeding success of red grouse *Wildlife Biology*, **1**, 121–126
- Thomas, A.H., (Chantrell, R.W., El-Hilo, M., Haycock, P.W. & O'Grady, K.)** 1995 Calculation of FMR in interacting fine particle systems *Journal of Magnetism and Magnetic Materials*, **151**, 54–58
- Thomas, J.A.** 1995 The conservation of declining butterfly populations in Britain and Europe: priorities, problems and successes *Biological Journal of the Linnean Society*, **56**, 55–72
- (Thompson, S.), Treweek, J.R. & (Thurling, D.J.)** 1995 The potential application of strategic environmental assessment (SEA) to the farming of Atlantic salmon (*Salmo salar* L.) in mainland Scotland *Journal of Environmental Management*, **45**, 219–229
- Thomson, A.G.** 1995 Airborne radiometry and a sheep grazing experiment on dune grassland *International Journal of Remote Sensing*, **16**, 981–988
- Thornley, J.H.M.** 1995 Shoot root allocation with respect to C, N and P: an investigation and comparison of resistance and teleonomic models *Annals of Botany*, **75**, 391–405
- Thornley, J.H.M.** 1996 Modelling water in crops and plant ecosystems *Annals of Botany*, **77**, 261–275
- Thornley, J.H.M., (France, J., Dhanoa, M.S. & Siddons, R.C.)** 1995 The effects of diffusion and viscosity on ruminant faecal excretion of markers in a simple compartmental model *British Journal of Nutrition*, **74**, 747–763
- (Tietema, A., Wright, R.F., Blanck, K., Boxman, A.W., Bredemeier, M.), Emmett, B.A., (Gundersen, P., Hultberg, H., Kjonaas, O.J., Moldan, F., Roelofs, J.G.M., Schleppei, P., Stuanes, A.O. & Van Breemen, N.)** 1995 Nitrex: the timing of response of coniferous forest ecosystems to experimentally-changed nitrogen deposition *Water, Air and Soil Pollution*, **85**, 1623–1628
- (Townend, J.) & Dickinson, A.L.** 1995 A comparison of rooting environments in containers of different sizes *Plant and Soil*, **175**, 139–146
- Wadsworth, R.A. & Brown, M.J.** 1995 A spatial decision support system to allow the investigation of the impact of emissions from major point sources under different operating policies *Water, Air and Soil Pollution*, **85**, 2649–2654
- Wadsworth, R.A. & (O'Callaghan, J.R.)** 1995 Empirical searches of the NELUP land use database *Journal of Environmental Planning and Management*, **38**, 107–116
- Wadsworth, R.A., Brown, M.J., Bull, K.R., (Metcalfe, S.E., Whyatt, D. & Powesland, C.)** 1995 A comparison of different ranking schemes for assessing the effect of large point sources of pollution in the UK *Water, Air and Soil Pollution*, **85**, 2613–2618
- (Walklate, P.J., Xu, Z.G.) & McLeod, A.R.** 1996 A new gas injection method to enhance spatial utilization within a Free-Air CO₂ Enrichment (FACE) system (Technical Advance) *Global Change Biology*, **2**, 75–78
- Wallace, H.L. & Good, J.E.G.** 1995 Effects of afforestation on upland plant communities and implications for vegetation management *Forest Ecology and Management*, **79**, 29–46
- (Walls, S.S.) & Kenward, R.E.** 1995 Movements of radio-tagged common buzzards *Buteo buteo* in their first year *Ibis*, **137**, 177–182
- Wanless, S., Harris, M.P. & Morris, J.A.** 1995 Factors affecting daily activity budgets of South Georgia shags during chick rearing at Bird Island, South Georgia *Condor*, **97**, 550–558
- Ward, L.K., (Hackshaw, A.) & Clarke, R.T.** 1995 Food-plant families of British insects and mites: the influence of life form and plant family *Biological Journal of the Linnean Society*, **55**, 109–127
- Wardlaw, J.C.** 1995 The effect of carbon dioxide on egg production in *Myrmica rubra* *Insectes Sociaux*, **42**, 325–328
- Wardlaw, J.C. & Elmes, G.W.** 1995 Trophic eggs laid by fertile *Myrmica* queens (Hymenoptera: Formicidae) *Insectes Sociaux*, **42**, 303–308
- Watson, A.** 1996 Internationally important environmental features of the Cairngorms, research, and main research needs *Botanical Journal of Scotland*, **48**, 1–12
- Weeks, J.M., (Rainbow, P.S. & Depledge, M.H.)** 1995 Barnacles (*Chthamalus stellatus*) as biomonitors of trace metal bioavailability in the waters of Sao Miguel (Azores) *Acoreana*, Suppl., 103–111
- Welch, D.** 1995 An early Scottish record of *Rubus arcticus* L. (Rosaceae) *Watsonia*, **20**, 418
- Welch, D.** 1995 Trends in the botanical composition of set-aside fields in north-east Scotland uncultivated for five years *Botanical Journal of Scotland*, **47**, 141–150
- Welch, D. & Scott, D.** 1995 Studies in the grazing of heather moorland in north-east Scotland VI: 20-year trends in botanical composition *Journal of Applied Ecology*, **32**, 596–611
- Welch, D., Scott, D. & Staines, B.W.** 1995 Survival rates and performance of multi-trunked trees in even-aged stands of Sitka spruce in western Scotland *Forestry*, **68**, 245–253
- Welch, R.C.** 1995 The galls of introduced oaks at Batsford Arboretum, Gloucestershire *Gloucestershire Naturalist*, no **8**, 1–5
- (Wilson, E.J.), Wells, T.C.E. & Sparks, T.H.** 1995 Are calcareous grasslands in the UK under threat from nitrogen deposition? – an experimental determination of a critical load *Journal of Ecology*, **83**, 823–832
- (Wright, J.F., Blackburn, J.H.), Clarke, R.T. & (Furse, M.T.)** 1994 Macroinvertebrate-habitat associations in lowland rivers and their relevance to conservation *Verhandlungen der Internationalen Vereinigung für Theoretische und Angewandte Limnologie*, **25**, 1515–1518
- (Wulff, A.), Crossley, A. & Sheppard, L.J.** 1996 Fine structure acid mist treated Sitka spruce needles: open-top chamber and field experiments *Annals of Botany*, **77**, 1–10
- Wyllie, I.** 1995 Potential secondary poisoning of barn owls by rodenticides *Pesticide Outlook*, **6**, 19–25

**Books, book chapters,
conference proceedings,
papers and summaries**

- (Allott, T.E.H., Battarbee, R.W., Curtis, C., Harriman, R.), Hall, J., Bull, K. & (Metcalf, S.E.) 1995 Sulphur deposition, present and projected critical load exceedances In *Critical loads of acid deposition for United Kingdom freshwaters* Report of the Critical Loads Advisory Group, sub-group on Freshwaters, 25–33 Penicuik Institute of Terrestrial Ecology
- Arah, J.R.M.** 1996 The soil submodel of the ITE (Edinburgh) Forest and Hurley Pasture models In *Evaluation of soil organic matter models, using existing long-term datasets*, edited by D S Powlson, P Smith & J U Smith, 225–230 (NATO ASI series I global environmental change vol 38) Heidelberg Springer
- (**Armstrong, A.C.**), **Caldow, R.**, (**Hodge, I.D.**) & **Treweek, J.** 1995 Re-creating wetlands in Britain the hydrological, ecological and socio-economic dimensions In *Hydrology and hydrochemistry of British wetlands*, edited by J M R Hughes & A L Heathwaite, 445–466 Chichester Wiley
- Arnold, H.R.** 1995 *Atlas of amphibians and reptiles in Britain* (ITE research publication no 10) London HMSO
- (**Ausden, M.**) & **Treweek, J.** 1995 Grasslands In *Managing habitats for conservation*, edited by W J Sutherland & D A Hill, 197–229 Cambridge Cambridge University Press
- (**Bardgett, R.D.**), **Marsden, J.H.**), **Howard, D.C.** & (**Hossell, J.E.**) 1995 The extent and condition of heather in moorland, and the potential impact of climatic change In *Heaths and moorlands cultural landscapes*, edited by D B A Thompson, A J Hester & M B Usher, 43–50 Edinburgh HMSO
- (**Barker, D.H.**), **Nordin, A.R.**), **Noraini, M.T.**) & **Bayfield, N.G.** 1994 Revegetating slopes for stability In *Proceedings of International Conference on Landslides, Slope Stability and the Safety of Infra-Structures, Malaysia, 1994*, 35–43
- Barr, C.**, **Fuller, R.**, (**Knell, P.**), **Morrison, M.**, **St Ville, C.** & **Walford, R.**) 1996 *Survey instructions for Land Use-UK 1996, a survey organised by the Geographical Association* Sheffield Geographical Association
- Barr, C.J.**, **Howard, B.J.**, **Gillespie, M.K.**, (**Carruthers, S.P.**), **Miller, F.A.** & **Pearce, K.I.**) 1995 Spatial aspects of incorporating agricultural information into radiological assessments In *Environmental impact of radionuclide releases*, 768–770 (IAEA-SM-339) Vienna International Atomic Energy Agency
- (**Bartley, M.R.**), **Basford, W.D.**, **Brain, P.**), **Christensen, C.**, **Lancashire, P.D.**), **Sparks, T.H.** & (**Welham, S.J.**), eds. 1995 *Field experiment techniques* (Aspects of applied biology 43) Wellesbourne Association of Applied Biologists
- (**Battarbee, R.W.**), **Allott, T.E.H.**), **Bull, K.**, (**Christie, A.E.G.**), **Curtis, C.**), **Flower, R.J.**), **Hall, J.**), (**Harriman, R.**), **Jenkins, A.**), **Juggins, S.**), **Kreiser, A.**), **Metcalf, S.E.**), **Ormerod, S.J.** & **Patrick, S.T.**) 1995 *Critical loads of acid deposition for United Kingdom freshwaters* Report of the Critical Loads Advisory Group, sub-group on Freshwaters Penicuik Institute of Terrestrial Ecology
- (**Baxter, M.S.**), **Ballestra, S.**), **Gastaud, J.**), **Hamilton, T.F.**), **Harms, I.**), **Huynh-Ngoc, L.**), **Liong Wee Kwong, L.**), **Osvath, I.**), **Parsi, P.**), **Pettersson, H.**), **Povinec, P.P.**) & **Sanchez, A.** 1995 Marine radioactivity studies in the vicinity of sites with potential radionuclide releases In *Environmental impact of radionuclide releases*, 125–141 (IAEA-SM-339) Vienna International Atomic Energy Agency
- Bayfield, N.G.** 1995 Species selection and management for slope revegetation projects In *Vegetation and slopes stabilisation, protection and ecology*, edited by D H Barker, 36–45 London Thomas Telford
- Bayfield, N.G.** & **McGowan, G.M.** 1995 Monitoring and managing impacts of ski development a case study of the Aonach Mor resort 1989–1995 In *Landscape ecology theory and application*, edited by G H Griffiths, 93–101 Aberdeen International Association for Landscape Ecology (UK)
- Bellamy, P.E.**, **Hinsley, S.A.** & **Newton, I.** 1995 Research on birds in small woods within an arable landscape In *Principles and tools for the study of landscape ecology – potentials and limitations*, edited by F Skov, J Komdeur, G Fry & J Knudsen, 38–41 Proceedings of the 2nd CONNECT Workshop on Landscape Ecology, 1993 (NERI Technical report no 131) Ronde National Environmental Research Institute
- (**Berg, M.P.**), **Anderson, J.M.**), **Beese, F.**), **Bolger, T.**), **Couteaux, M.-M.**), **Henderson, R.**), **Ineson, P.**), (**McCarthy, F.**), **Palka, L.**), **Raubuch, M.**), **Splatt, P.**), **Verhoef, H.A.** & **Willison, T.**) 1995 Effects of temperature and air pollutants on mineral-N dynamics in reciprocally transplanted forest soils In *Ecosystem manipulation*

APPENDIX 4

experiments scientific approaches, experimental design and relevant results, edited by A Jenkins, R C Fernier & C Kirby, 29–37 (Ecosystems research report no 20) Luxembourg Commission of the European Communities

(Berry J, Holland, M., Watkiss, P., Krewitt, W., Mayerhofer, P., Truckenmuller, A., Gressmann, A., Eyre, N., Hurley, F., Donnan, P.), Hornung, M., (Dreicer, M., Rabl, A., Curtiss, P., Lee, D., Johnson, C., Short, N., Downing, T. & Markandya, A.) 1995 *ExternE externalities of energy, vol 2 Methodology* (ExternE external costs of energy report no 2, EUR 16521) Luxembourg European Commission

(Berry J, Holland, M., Lee, D., McConville, A., Watkiss, P., Friedrich, R., Krewitt, W., Mayerhofer, P., Staiger, B., Truckenmuller, A., Eyre, N., Hurley, F., MacLaren, W., Tran, L., Waclawski, E.), Hornung, M., Howard, P., Howard, D., (Westrich, B., Wuest, W., Markandya, A. & Rhodes, B.) 1995 Coal fuel cycle *In ExternE externalities of energy, vol 3 Coal & lignite*, 29–348 (ExternE external costs of energy report no 3, EUR 16522) Luxembourg European Commission

Boorman, L.A. 1995 Environmental sensitivity in coastal habitats *In Hydrography and the environment*, 29–36 (Special Publication no 35) Dagenham Hydrographic Society

Boorman, L.A. 1995 Sea-level rise and the future of the British coast *In The changing coastline*, edited by N V Jones, 10–13 (Coastal zone topics process ecology & management, 1) Peterborough Joint Nature Conservation Committee & Estuarine and Coastal Sciences Association

Boorman, L.A. & (Hazelden, J.) 1995 Salt marsh creation and management for coastal defence *In Directions in European coastal management*, edited by M G Healy & J P Doody, 175–184 (Proceedings of the 5th Conference of the European Union for Coastal Conservation) Cardigan Samara Publishing

Boorman, L.A. & (Hazelden, J.) 1995 Salt marsh creation in south-east England *In Strategies and methods in coastal and estuarine management*, edited by M J Costello, J G Wilson, G O'Sullivan, L Duffy, C S Emblow, K S Kelly & I Kurz, 93 (Programme and abstracts of the 25th annual symposium of the Estuarine and Coastal Sciences Association) Dublin Environmental Sciences Unit, Trinity College

Boorman, L.A., (Hazelden, J., Andrews, R. & Wells, J.G.) 1994

Organic and nutrient fluxes in four north-west European salt marshes *In Changes in fluxes in estuaries*, edited by K R Dyer & R J Orth, 243–248 (ECSA22/ERF Symposium) Fredensborg Olsen & Olsen

Boorman, L.A., (Hazelden, J., Loveland, P.J.), Wells, J.G. & (Levasseur, J.C.) 1995 Comparative relationships between primary productivity and organic and nutrient fluxes in four salt marshes *In Comparative studies of salt marsh processes vol 3*, edited by J E Lefeuvre & R F Dame, 181–199 Rennes University of Rennes

(Britt, C.P.), Sparks, T.H., (McCollin, D. & Phillips, P.) 1996 The restoration of stock-damaged farm hedges comparison of various strategies for hedge repair and their effects on the hedge-bottom flora *In Vegetation management in forestry, amenity and conservation areas managing for multiple objectives*, edited by E J P Marshall, J L Morgan, I Willoughby, D V Clay, R Garnett, P D Putwain, R H Marrs, R F Pywell & T M West, 319–326 (Aspects of applied biology 44) Wellesbourne Association of Applied Biologists

Brown, M., Bull, K., Hall, J. & Ulyett, J. 1995 The Critical Loads Mapping Centre, ITE Monks Wood *In Acid rain and its impact the critical loads debate*, edited by R W Battarbee, 99–102 London Ensis

(Brown, R.H.A.), Cape, J.N. & (Farmer, J.G.) 1995 Chlorinated C1- and C2-hydrocarbons in the needles of Scots pine (*Pinus sylvestris* L) in three forests of northern Britain *In Naturally-produced pathogens*, edited by A Grimvall & E W B de Leer, 397–401 Dordrecht Kluwer

Bull, K., Dyke, H. & Hall, J. 1995 Exceedances of acidity and nutrient nitrogen critical loads [Poster] *In Mapping and modelling of critical loads for nitrogen – a workshop report*, edited by M Hornung, M A Sutton & R B Wilson, 158–159 Penicuik Institute of Terrestrial Ecology

Bunce, R.G.H. & Barr, C.J. 1995 The Great Britain Countryside Survey and its potential for coordination of vegetation and countryside data in Europe *In Landscape ecology theory and application*, edited by G H Griffiths, 21–23 Aberdeen International Association for Landscape Ecology (UK)

(Burnett, J., Copp, C.) & Harding, P. 1995 *Biological recording in the United Kingdom* London Department of the Environment

(Burnett, J., Copp, C.) & Harding, P. 1995 *Biological recording in the United*

Kingdom Summary Report London Department of the Environment

Buse, A. & Morris, M.G. 1995 The responses of montane beetles (Coleoptera) to climatic change *In Mountain zonality facing global change*, edited by A Breyer, 59–67 (EURO-MAB IV) Warsaw Institute of Geography and Spatial Organization, Polish Academy of Sciences

Cannell, M. 1995 *Forests and the global carbon cycle in the past, present and future* (Research report 2) Joensuu European Forest Institute

Cannell, M.G.R., Mobbs, D.C., Lindley, D., Deans, J.D. & Lawson, G.J. 1995 Optimal tree fallow rotations *In Agroforestry Modelling Workshop*, edited by G J Lawson & H W McIver, 6–9 Penicuik Institute of Terrestrial Ecology

(Carnol, M., Anderson, J.M., Beese, F., Berg, M.P., Bolger, T., Couteaux, M.-M., Dolan, S.), Ineson, P., (Raubuch, M. & Verhoef, H.A.) 1995 Effects of enhanced ammonium sulphate and roots on nitrate and cation leaching from forest soils *In Ecosystem manipulation experiments scientific approaches, experimental design and relevant results*, edited by A Jenkins, R C Fernier & C Kirby, 182–184 (Ecosystems research report no 20) Luxembourg Commission of the European Communities

Carss, D.N. & Marquiss, M. 1996 The influence of a fish farm on grey heron *Ardea cinerea* breeding performance *In Aquatic predators and their prey*, edited by S P R Greenstreet & M L Tasker, 133–141 Oxford Fishing News Books

(Chambers, B.J., Cross, R.B.) & Pakeman, R.J. 1996 Recreating lowland heath on ex-arable land in the Breckland Environmentally Sensitive Area *In Vegetation management in forestry, amenity and conservation areas managing for multiple objectives*, edited by E J P Marshall, J L Morgan, I Willoughby, D V Clay, R Garnett, P D Putwain, R H Marrs, R F Pywell & T M West, 393–400 (Aspects of applied biology 44) Wellesbourne Association of Applied Biologists

(Coutts, M.P., Winter, J.A.) & Ashenden, T.W. 1995 Atmospheric pollution in forests of the South Wales coalfield *In Decline in Sitka spruce on the South Wales coalfield*, edited by M P Coutts, 5–9 (Forestry Commission technical paper 9) Edinburgh Forestry Commission

(Crout, N.M.J.), Mobbs, D.C., (Levy, P. & Bradley, R.) 1995 Modelling crop–tree

- competition using uncoupled crop and tree models In *Agroforestry Modelling Workshop*, edited by G J Lawson & H W McIver, 10–11 Penicuik Institute of Terrestrial Ecology
- Daniels, R E , Harrison, A.F., Parkinson, J.A., (Hall, G.) & Bayfield, N.G.** 1995 Disposal of oil in sandy coastal soils In *Proceedings of 2nd International Oil Spill Research and Development Forum*, 1995, vol 1, 123–134 London International Maritime Organization
- Deans, J D , (Diagne, O., Edmunds, W.M., Dreyfus, B , Gaye, G B., Sutherland, J.M.), Lindley, D.K., (Dione, M., Neyra, M., Sprent, J.I) & Mobbs, D C.** 1995 Tree growth and plant nutrients in the *Acacia* tree fallows system of land rehabilitation in the Sahel In *Caring for the forest research in a changing world*, edited by E Korpiolahti, T Salonen & S Oja, 118 (Abstracts of invited papers IUFRO XXth World Congress, 1995) Vienna IUFRO
- Dighton, J., Jones, H.E., Robinson, C.H. & Beckett, J.** 1995 *Dispersal of genetically modified microorganisms by abiotic factors and soil invertebrates* (Genetically modified organisms research report no 4) London Department of the Environment
- Eastwood, J A.** 1994 The estimation of LAI and the fraction of photosynthetically active radiation absorbed by chlorotic canopies using semi-empirical models a sensitivity analysis In *Proceedings of 6th International Symposium on Physical Measurements and Signatures in Remote Sensing*, edited by G Guyot, 651–658 Paris Centre National d'Etudes Spatiales
- Ellis, N.E. & Heal, O.W.** 1994 Biodiversity, land use and management the role of the farm household In *Grassland management and nature conservation*, edited by R J Haggard & S Peel, 261–263 (BGS Occasional symposium no 28) Reading British Grassland Society
- Elmes, G.W.** 1994 Social parasitism and biodiversity the example of *Maculinea* butterflies In *Les insectes sociaux*, edited by A Lenoir, G Arnold & M Lepage, 33 (Proceedings of the 12th International Congress IUSI, Paris, 1994) Paris Université ParisNord
- Elmes, G.W. & (Lepage, M.)** 1994 Biodiversity and social insects In *Les insectes sociaux*, edited by A Lenoir, G Arnold & M Lepage, 25 (Proceedings of the 12th International Congress IUSI, Paris, 1994) Paris Université Paris Nord
- Emmett, B.A. & Reynolds, B.** 1995 Critical loads for nitrogen to avoid eutrophication assessment of the mass balance approach using the Aber site, N Wales [Poster] In *Mapping and modelling of critical loads for nitrogen – a workshop report*, edited by M Hornung, M A Sutton & R B Wilson, 190–192 Penicuik Institute of Terrestrial Ecology
- Emmett, B A., Brittain, S.A., Hughes, S, Kennedy, V., Norris, D , Reynolds, B., (Silgram, M.) & Stevens, P A** 1995 Effects of enhanced nitrogen deposition in a Sitka spruce stand in upland Wales In *Ecosystem manipulation experiments scientific approaches, experimental design and relevant results*, edited by A Jenkins, R C Fernier & C Kirby, 1–5 (Ecosystems research report no 20) Luxembourg Commission of the European Communities
- (Ens, B.J.) & Goss-Custard, J D.** 1995 The effect of sea level rise on a migratory wader In *Climate change research evaluation and policy implications*, edited by S Zwerver, R S A R van Rompaey, M T J Kok & M M Berk, 827–830 Amsterdam Elsevier
- Eversham, B.C. & (Prendergast, J R.)** 1994 Patterns of biodiversity and the conservation of British insects In *Abstracts of the 5th European Congress of Entomology*, edited by D Reavey, 33 York University of York
- Eversham, B C. & (Skidmore, P.)** 1994 The insect fauna and conservation of lowland bogs in eastern England In *Abstracts of the 5th European Congress of Entomology*, edited by D Reavey, 187 York University of York
- Eversham, B.C. & (Telfer, M.G.)** 1994 Conservation value of roadside verges for stenotypic heathland Carabidae In *Abstracts of the 5th European Congress of Entomology*, edited by D Reavey, 188 York University of York
- Eversham, B C., (Skidmore, P. & Buckland, P C.)** 1995 Invertebrates as indicators of lowland bogs in eastern England some British bogs in a European context In *Threatened species and bioindicators at the pan-European level*, edited by I Valovirta, P T Harding & D Kime, 36–40 Proceedings of the 9th International Colloquium of the European Invertebrate Survey, Helsinki, 1993 (WWF Finland report no 7) Helsinki WWF Finland
- (Eyre, N., Holland, M., Watkiss, P., Friedrich, R., Krewitt, W., Mayerhofer, P., Hurley, F.) & Hornung, M.** 1995 Assessment of the coal fuel cycle In *ExternE externalities of energy, vol 1 Summary*, edited by M Holland & J Berry, 65–103 (ExternE external costs of energy report no 1, EUR 16520) Luxembourg European Commission
- (Feber, R E , Johnson, P.J , Macdonald, D.W.) & Firbank, L.G.** 1995 The effects of organic and conventional systems on the abundance of pest and non-pest butterflies In *Integrated crop protection towards sustainability?* edited by R G McKinlay & D Atkinson, 261–267 Farnham British Crop Protection Council
- Firbank, L.G. & (Wilson, P.J)** 1995 Arable weeds and set-aside a cause for conservation or a cause for concern? In *Insects, plants and set-aside*, edited by A Colston & F Perring, 19–28 London Botanical Society of the British Isles
- Firbank, L.G., (Clark, N.A. & Garstang, J.R)** 1995 Agronomic and environmental evaluation of set-aside under the CAP reform scheme In *Brighton Crop Protection Conference Weeds – 1995*, vol 3, 1019–1024 (Proceedings of an international conference organised by the British Crop Protection Council) Farnham British Crop Protection Council
- Firbank, L.G., Osborn, D. & Sheail, J.** 1995 An agenda for research into ecological aspects of rural sustainability In *Functional appraisal of agricultural landscape in Europe*, edited by L Ryszkowski & S Balazy, 267–272 (EUROMAB and INTECOL Seminar 1992) Poznan Research Center for Agricultural and Forest Environment
- Fowler, D.** 1995 Atmospheric inputs of nitrogen In *Mapping and modelling of critical loads for nitrogen – a workshop report*, edited by M Hornung, M A Sutton & R B Wilson, 128–141 Penicuik Institute of Terrestrial Ecology
- Fowler, D., Hargreaves, K.J & Skiba, U.** 1994 Measurements of methane and nitrous oxide emission from soils In *EUROTRAC annual report*, 207–214 Garmisch-Partenkirchen EUROTRAC
- Fowler, D , (Flechar, C) , Storeton-West, R.L., Sutton, M.A , Hargreaves, K.J. & Smith, R I.** 1995 Long term measurements of SO₂ deposition over vegetation and soil and comparison with models In *Acid rain research do we have enough answers?* edited by G J Heij & J W Erisman, 9–19 Amsterdam Elsevier
- Fowler, D., (Jenkinson, D.S , Monteith, J L. & Unsworth, M.H.), eds.** 1995 The exchange of trace gases between land and atmosphere *Philosophical Transactions of the Royal Society of London A*, 351(1696)
- Fowler, D., Leith, I D., Smith, R.I., (Choularton, T.W., Inglis, D. & Campbell, G.)** 1995 Atmospheric

inputs of acidity, sulphur and nitrogen in the UK In *Acid rain and its impact the critical loads debate*, edited by R W Battarbee, 17–25 London Ensis

Fowler, D., (MacDonald, J.), Leith, I.D., Hargreaves, K.J. & (Martynoga, R.) 1995 The response of peat wetland methane emissions to temperature, water table and sulphate deposition In *Acid rain research do we have enough answers?* edited by G J Heij & J W Erisman, 485–487 Amsterdam Elsevier

Freeman, C., (Gresswell, R., Lock, M.A., Swanson, S., Guasch, H., Sabater, H., Sabater, S., Hudson, J.), Hughes, S. & Reynolds, B. 1995 Climate change man's indirect influence on wetland microbial activity and the biofilms of a wetland stream In *Man's influence on freshwater ecosystems and water use*, edited by G Petts, 199–206 (IAHS publication no 230) Wallingford International Association of Hydrological Sciences

Fuller, R.M., Thomson, A.G., Eastwood, J.A., Yates, M., Sparks, T. & Warman, E. 1995 Remote sensing of intertidal habitats In *LOIS RACS(C) second annual workshop 1995*, edited by R J M Howland (LOIS publication no 54) Plymouth LOIS, Plymouth Marine Laboratory

(Gemmell, F.M., Millington, A.C., Wellens, J.), Wyatt, B.K. & Gerard, F. 1995 An assessment of the combined use of ATSR-2 and Landsat TM data for mapping humid tropical forest types in Bolivia In *RSS95 remote sensing in action*, edited by P J Curran & Y C Robertson, 829–838 (Proceedings of the 21st Annual Conference of the Remote Sensing Society, University of Southampton, 1995) Nottingham Remote Sensing Society

Gerard, F., Wyatt, B., (Millington, A. & Wellens, J.) 1995 Mapping tropical forest types on a continental scale using remote sensing a bottom-up approach In *RSS95 remote sensing in action*, edited by P J Curran & Y C Robertson, 821–828 (Proceedings of the 21st Annual Conference of the Remote Sensing Society, University of Southampton, 1995) Nottingham Remote Sensing Society

Gillespie, M., Howard, B., Culling, A., Howard, D., Luursema, K., (Bogdanov, G., Pronevich, V., Prister, B., Perepelyatnikov, G., Ratnikov, A., Vasiliev, A., Krasnova, Y., Bokova, M., Assimakopoulos, P., Aslanoglou, X., Stamouls, K. & Averin, V.) 1996 Site description In *Transfer of radionuclides to animals, their comparative importance under different agricultural ecosystems and appropriate countermeasures*, edited by P Strand,

B Howard & V Averin, 16–58 (Experimental collaboration project no 9, EUR 16539) Luxembourg Commission of the European Communities

Goss-Custard, J.D. 1995 Effect of habitat loss and habitat change on estuarine shorebird populations In *The changing coastline*, edited by N V Jones, 61–67 (Coastal zone topics process, ecology & management, 1) Peterborough Joint Nature Conservation Committee & Estuarine and Coastal Sciences Association

Goss-Custard, J.D. & (Willows, R I) 1996 Modelling the responses of mussel *Mytilus edulis* and oystercatcher *Haematopus ostralegus* populations to environmental change In *Aquatic predators and their prey*, edited by S P R Greenstreet & M L Tasker, 73–85 Oxford Fishing News Books

Gray, A.J. 1995 The Mersey estuary saltmarshes in relation to the national resource In *The Mersey estuary – naturally ours*, edited by M S Curtus, D Norman & I D Wallace, 69–73 Liverpool Mersey Estuary Conservation Group

Gray, A.J. 1995 Saltmarsh ecology In *A guide to understanding and management of saltmarshes*, edited by A R Toft & R J Maddress, 73–100 (R & D note 324) London National Rivers Authority

Gray, A.J. 1996 The genetic basis of conservation biology In *Conservation biology*, edited by I F Spellerberg, 107–121 Harlow Longman

Gray, A.J., Warman, E.A., Clarke, R.T. & Johnson, P.J. 1995 The niche of *Spartina anglica* on a changing coastline In *The changing coastline*, edited by N V Jones, 29–34 (Coastal zone topics process, ecology & management, 1) Peterborough Joint Nature Conservation Committee & Estuarine and Coastal Sciences Association

Gray, A.J., Raybould, A.F., Warman, E.A., Mogg, R.J., (Gliddon, C.J. & Goudet, J.) 1996 *Gene flow in natural populations of Brassica and Beta* (Genetically modified organisms research report no 8) London Department of the Environment

(Griffiths, G.H.), Eversham, B.C. & Lee, J. 1995 The production and interpretation of maps of beta diversity In *Landscape ecology theory and application*, edited by G H Griffiths, 193–196 Aberdeen International Association for Landscape Ecology (UK)

(Haines-Young, R.) & Bunce, R.G.H. 1995 Remote sensing, land classification and environmental survey In *Remote sensing in landscape ecological mapping*,

edited by B Delbaere & H Gulinck, 51–68 (European Collaborative Programme Workshop, EUR 16265) Luxembourg Commission of the European Communities

Hall, J. 1995 Critical load maps the UK and Europe In *Acid rain and its impact the critical loads debate*, edited by R W Battarbee, 37–42 London Ensis

Hall, J., Dyke, H., Brown, M. & Bull, K. 1995 Critical loads for nutrient nitrogen for soil-vegetation systems [Poster] In *Mapping and modelling of critical loads for nitrogen – a workshop report*, edited by M Hornung, M A Sutton & R B Wilson, 160–161 Penicuk Institute of Terrestrial Ecology

(Hands, M.R.), Harrison, A.F. & (Bayliss-Smith, T.) 1995 Phosphorus dynamics in slash-and-burn and alley cropping on ultisols of the humid tropics In *Phosphorus in the global environment transfers, cycles and management*, edited by H Tiessen, 155–170 (SCOPE 54) Chichester Wiley

Harding, P.T., ed. 1995 *Butterflies for the new millennium* Wareham Butterfly Conservation

Harding, P.T. 1995 Data for nature conservation in statutory and voluntary heritage agencies In *Managing ancient monuments an integrated approach*, edited by A Q Berry & I W Brown, 1–15 Mold Clwyd Archaeological Service, Clwyd County Council

Harding, P.T. 1995 The use of saproxylic Coleoptera in the selection of areas of relic forest in Britain In *Threatened species and bioindicators at the pan-European level*, edited by I Valovirta, P T Harding & D Kime, 163–166 Proceedings of the 9th International Colloquium of the European Invertebrate Survey, Helsinki, 1993 (WWF Finland report no 7) Helsinki WWF Finland

Harding, P.T. 1995 Who needs species data? The wider user community for data from the Millennium Project In *Butterflies for the new millennium*, edited by P T Harding, 11–12 Wareham Butterfly Conservation

Harding, P.T. 1996 Foreword In *Atlas of the dragonflies of Britain and Ireland*, edited by R Merritt, N W Moore & B C Eversham, v (ITE research publication no 9) London HMSO

(Harriman, R., Allott, T.E.H., Battarbee, R.W., Curtis, C.), Hall, J. & Bull, K. 1995 Critical load maps for

UK freshwaters In *Critical loads of acid deposition for United Kingdom freshwaters* Report of the Critical Loads Advisory Group, sub-group on Freshwaters, 19–24 Penicuik Institute of Terrestrial Ecology

(Harriman,R., Allott,T.E.H., Battarbee,R.W., Curtis,C., Jenkins,A.) & Hall,J.R. 1995 Critical loads of nitrogen and their exceedance in UK freshwaters In *Mapping and modelling of critical loads for nitrogen – a workshop report*, edited by M Hornung, M A Sutton & R B Wilson, 39–49 Penicuik Institute of Terrestrial Ecology

(Hazelden,J.) & Boorman,L.A. 1995 The role of salt marshes in linking terrestrial and marine ecosystems In *Strategies and methods in coastal and estuarine management*, edited by M J Costello, J G Wilson, G O'Sullivan, L Duffy, C S Emblow, K S Kelly & I Kurz, 47 (Programme and abstracts of the 25th annual symposium of the Estuarine and Coastal Sciences Association) Dublin Environmental Sciences Unit, Trinity College

Heal,O.W. 1994 Discussion In *Scottish Sustainable Systems Project – sustainable systems of land and water use in Scotland four case studies*, edited by T W Hegarty & M B Usher, 51–53 Edinburgh Scottish Office Agriculture and Fisheries Department

(Hengeveld,R., Edwards,P.J., Duffield,S.J., Kalin-Arroyo,M.T.), Bullock,J., Bunce,R.G.H., (Norse,E.A., Magurran,A., Natarajan,K., Pimm,S.L. & Ricklefs,R.E.) 1995 Biodiversity from an ecological perspective In *Global biodiversity assessment*, edited by V H Heywood, 88–106 Cambridge University Press for the United Nations Environment Programme

Hornung,M., Sutton,M.A. & Wilson,R.B., eds. 1995 *Mapping and modelling of critical loads for nitrogen – a workshop report* Penicuik Institute of Terrestrial Ecology

Hornung,M., Bull,K.R., (Cresser,M.), Hall,J., (Loveland,P.J., Langan,S.J.), Reynolds,B. & Robertson,W.H. 1995 Mapping critical loads for the soils of Great Britain In *Acid rain and its impact the critical loads debate*, edited by R W Battarbee, 43–51 London Ensis

(Hove,K., Hansen,H.S., Tiltnes,M.H.), Howard,B., Barnett,C., (Assimakopoulos,P., Karamanis,D., Logoyannis,A., Pakou,A.A., Koutsotolis,K., Nikolaou,E., Avenir,V., Zurankov,Z., Pyatnov,Y. & Shumilin,V.) 1996 Countermeasures In *Transfer of radionuclides to animals,*

their comparative importance under different agricultural ecosystems and appropriate countermeasures, edited by P Strand, B Howard & V Averin, 215–245 (Experimental collaboration project no 9, EUR 16539) Luxembourg Commission of the European Communities

Howard,B.J., (Hove,K., Strand,P. & Pronevich,V.) 1995 Aggregated transfer coefficients a simple approach to modelling transfer of radionuclides to food products from semi-natural ecosystems In *Environmental impact of radioactive releases*, 247–258 (IAEA-SM-339) Vienna International Atomic Energy Agency

Howard,B., Horrill,A.D., Howard,D., Barnett,C., Luursema,K., (Strand,P., Cooke,A., Skuterud,L., Amundsen,I., Bogdanov,G., Pronevich,V., Prister,B., Ratnikov,A., Vasiliev,A., Petrov,K., Jigareva,T., Krasnova,Y., Kruglov,S. & Averin,V.) 1996 Transfer and longterm behaviour of radionuclides in the food chain In *Transfer of radionuclides to animals, their comparative importance under different agricultural ecosystems and appropriate countermeasures*, edited by P Strand, B Howard & V Averin, 99–143 (Experimental collaboration project no 9, EUR 16539) Luxembourg Commission of the European Communities

Howard,B., Howard,D., Gillespie,M., (Burrough,P.A. & Arkhipov,A.) 1996 Modelling In *Transfer of radionuclides to animals, their comparative importance under different agricultural ecosystems and appropriate countermeasures*, edited by P Strand, B Howard & V Averin, 194–214 (Experimental collaboration project no 9, EUR 16539) Luxembourg Commission of the European Communities

Howard,B.J., (Johanson,K., Linsley,G.S., Hove,K., Prohl,G. & Horyna,J.) 1996 Transfer of radionuclides by terrestrial food products from semi-natural ecosystems to humans In *Modelling of radionuclide interception and loss processes in vegetation and of transfer in semi-natural ecosystems*, 49–72 (Second report of the VAMP Terrestrial Working Group, IAEA-TECDOC-857) Vienna International Atomic Agency

Howard,D.C. & Bunce,R.G.H. 1995 The value of national land use and wildlife databases for research and decision support systems In *Principles and tools for the study of landscape ecology – potentials and limitations*, edited by F Skov, J Komdeur, G Fry & J Knudsen, 94–97 Proceedings of the 2nd CONNECT Workshop on Landscape Ecology, 1993 (NERI Technical report no 131) Ronde National Environmental Research Institute

Howard,D.C., Reynolds,B. & Hornung,M. 1995 Landscape analysis of the aerial dispersal of pollutants In *Landscape ecology theory and application*, edited by G H Griffiths, 201–204 Aberdeen International Association for Landscape Ecology (UK)

(Hutchins,M.G., Wheater,H.S., Beck,M.B.) & Reynolds,B. 1995 The role of natural tracers in the understanding of catchment hydrochemistry within a conceptual hydrological framework In *Tracer technologies for hydrological systems*, 267–275 (IAHS publication no 229) Wallingford IAHS Press

Jones,A.R. & Wyatt,B.K. 1995 Remote sensing for forest change and landscape planning In *Satellite remote sensing forest atlas of Europe*, edited by L Beckel, 246–247 Gotha Perthes

Kenward,R.E. 1996 Goshawk adaptation to de-forestation does Europe differ from North America? In *Raptors in human landscapes*, edited by D M Bird, D E Varland & J J Negro, 233–243 London Academic Press

(Kohler,H.-R., Dallinger,R., Simonsen,V.), Weeks,J.M. & (Vangestel,C.A.M.) 1995 *Progress report 1994 of BIOPRINT biochemical fingerprint techniques as versatile tools for the risk assessment of chemicals in terrestrial invertebrates* Second technical report Report from a workshop held in Monks Wood, UK, 1995, edited by J E Kammenga Silkeborg National Environmental Research Institute

(Kreiser,A.M., Patrick,S.T., Battarbee,R.W.), Hall,J. & (Harriman,R.) 1995 Mapping water chemistry In *Critical loads of acid deposition for United Kingdom freshwaters* Report of the Critical Loads Advisory Group, sub-group on Freshwaters, 15–18 Penicuik Institute of Terrestrial Ecology

Kruuk,H. & Carss,D.N. 1996 Costs and benefits of fishing by a semi-aquatic carnivore, the otter *Lutra lutra* In *Aquatic predators and their prey*, edited by S P R Greenstreet & M L Tasker, 10–16 Oxford Fishing News Books

(Lajtha,K.) & Harrison,A.F. 1995 Strategies of phosphorus acquisition and conservation by plant species and communities In *Phosphorus in the global environment transfers, cycles and management*, edited by H Tiessen, 139–147 (SCOPE 54) Chichester Wiley

Lane,A.M. 1996 Integrated environmental monitoring network development the experience of the UK Environmental Change Network (ECN) In *Global monitoring of terrestrial*

- ecosystems*, edited by W Schroder, O Franzle, H Keune & P Mandry, 91–95 Ernst
- Lawson, G.J. & (McIver, H.W.), eds.** 1995 *Agroforestry Modelling Workshop* Penicuik Institute of Terrestrial Ecology
- Lawson, G.J., Cannell, M.G.R. & (Wright, H.L.)** 1995 Introduction In *Agroforestry Modelling Workshop*, edited by G J Lawson & H W McIver, 1–5 Penicuik Institute of Terrestrial Ecology
- Lawson, G.J., (Crout, N.M.J., Levy, P.E.), Mobbs, D.C., Wallace, J.S., Cannell, M.G.R. & (Bradley, R.G.)** 1995 The tree-crop interface approaches to the coupling of forest and crop process-models In *Caring for the forest research in a changing world*, edited by E Korpiolahti, T Salonen & S Oja, 107 (Abstracts of invited papers IUFRO XXth World Congress, 1995) Vienna IUFRO
- Lawson, G.J., (Ngeh, C.P., Roby, A.J., Tchoundjeu, Z. & Jenks, J.)** 1995 Replanting degraded humid forest areas in Cameroon In *Caring for the forest research in a changing world*, edited by E Korpiolahti, T Salonen & S Oja, 119 (Abstracts of invited papers IUFRO XXth World Congress, 1995) Vienna IUFRO
- Lee, J. & Eversham, B.C.** 1995 Size, distribution and functional classification of organisms within landscapes In *Landscape ecology theory and application*, edited by G H Griffiths, 32–39 Aberdeen International Association for Landscape Ecology (UK)
- (Lorrain-Smith, R., Bell, M.), Bunce, R.G.H. & (Goodstadt, V.)** 1995 *The potential for extending forest cover in the lowlands of England and Wales* London Forestry Industry Committee of Great Britain
- (Luursema, K.G.), Howard, B.J., Howard, D.C. & (Averin, V.)** 1995 The application of GIS and geostatistics to assist in the interpretation of information about the Chernobyl accident In *Landscape ecology theory and application*, edited by G H Griffiths, 205–208 Aberdeen International Association for Landscape Ecology (UK)
- Manchester, S.J., Mountford, J.O., Pakeman, R.J., Pywell, R.F. & Treweek, J.R.** 1995 Experimental habitat restoration of arable land In *Field experiment techniques*, edited by M R Bartley, W D Basford, P Brain, C Christensen, P D Lancashire, T H Sparks & S J Welham, 175–181 (Aspects of applied biology 43) Wellesbourne Association of Applied Biologists
- (Marrs, R.H.) & Pakeman, R.J.** 1995 Bracken invasion – lessons from the past and prospects for the future In *Heaths and moorlands cultural landscapes*, edited by D B A Thompson, A J Hester & M B Usher, 180–193 Edinburgh HMSO
- (Marrs, R.H.), Pakeman, R.J. & (Lowday, J.E.)** 1995 Bracken control and heathland restoration in Breckland In *Brecken an environmental issue*, edited by R T Smith & J A Taylor, 166–172 Aberystwyth International Bracken Group
- (Marshall, E.J.P., Morgan, J.L., Willoughby, I., Clay, D.V., Garnett, R., Putwain, P.D., Marrs, R.H.), Pywell, R.F. & (West, T.M.), eds.** 1996 *Vegetation management in forestry, amenity and conservation areas managing for multiple objectives* (Aspects of applied biology 44) Wellesbourne Association of Applied Biologists
- (McClellan, C., Cherrill, A.) & Fuller, R.** 1995 The integration of three land classifications within a Decision Support System for land use planning In *Innovations in GIS 2*, edited by P Fisher, 137–149 London Taylor & Francis
- (McConnell, J.) & Conroy, J.W.H., eds.** 1996 Environmental history of the Cairngorms *Botanical Journal of Scotland*, 48(1)
- McLeod, A.R. & (Skeffington, R.A.)** 1995 The Liphook Forest fumigation project lessons and results In *Ecosystem manipulation experiments scientific approaches, experimental design and relevant results*, edited by A Jenkins, R C Ferrier & C Kirby, 353–359 (Ecosystems research report no 20) Luxembourg Commission of the European Communities
- (Merritt, R., Moore, N.W.) & Eversham, B.C.** 1996 *Atlas of the dragonflies of Britain and Ireland* (ITE research publication no 9) London HMSO
- (Miles, D.R.), Brown, N.J., Swetnam, R.D., (Armstrong, A.C., Rose, S.C.) & Mountford, J.O.** 1995 A wetlands GIS the aid to management policies In *AGI'95 Conference Proceedings*, 5 5 1–5 5 4 London Association for Geographical Information
- Milne, R.** 1995 Modelling mechanical stresses in living Sitka spruce stems In *Wind and trees*, edited by M P Coutts & J Grace, 165–181 Cambridge Cambridge University Press
- Mobbs, D.C. & (Crout, N.M.J.)** 1995 Linking HYBRID and PARCH for agroforestry modelling In *Agroforestry Modelling Workshop*, edited by G J Lawson & H W McIver, 12–14 Penicuik Institute of Terrestrial Ecology
- Morris, M.G. & Rispin, W.E.** 1994 Rotational management of grasslands and invertebrate diversity In *Grassland management and nature conservation*, edited by R J Haggard & S Peel, 205–209 (BGS Occasional symposium no 28) Reading British Grassland Society
- Moss, R., Catt, D.C. & Bayfield, N.G.** 1994 Sustainable land use in the Scottish uplands a case study In *Scottish Sustainable Systems Project – sustainable systems of land and water use in Scotland four case studies*, edited by W Hegarty & M B Usher, 3–8 Edinburgh Scottish Office Agriculture and Fisheries Department
- Newton, I.** 1996 Sparrowhawks in conifer plantations In *Raptors in human landscapes*, edited by D Bird, D Varland & J Negro, 191–200 London Academic Press
- (Nisbet, T.R.), Fowler, D. & Smith, R.I.** 1995 Use of the critical loads approach to quantify the impact of afforestation on surface water acidification In *Acid rain and its impact the critical loads debate*, edited by R W Battarbee, 116–118 London Ensis
- Pakeman, R.J.** 1995 Heathland and grassland management for conservation In *Managing ancient monuments an integrated approach*, edited by A Q Berry & I W Brown, 113–122 Mold Clwyd Archaeological Service, Clwyd County Council
- Pakeman, R.J., (Marrs, R.H.), Howard, D.C. & Barr, C.J.** 1995 Predicting the effects of climate and land-use change on the spread of bracken In *Brecken an environmental issue*, edited by R T Smith & J A Taylor, 69–72 Aberystwyth International Bracken Group
- Parr, T.W., Barr, C.J. & Wyatt, B.K.** 1995 The NERC (UK) Institute of Terrestrial Ecology ground data projects relevant to the Centre for Earth Observation In *Proceedings from a series of workshops on in situ data in the context of the CEO*, edited by A Tveito, 309–321 (CEO/152/1995) Ispra Centre for Earth Observation
- (Phillips, J.) & Watson, A.** 1995 Key requirements for management of heather moorland now and for the future In *Heaths and moorlands cultural landscapes*, edited by D B A Thompson, A J Hester & M B Usher, 344–361 London HMSO
- Preston, C.D.** 1995 *Pondweeds of Great Britain and Ireland* (BSBI Handbooks 8) London Botanical Society of the British Isles
- Pywell, R. & (Putwain, P.)** 1996 Restoration and conservation gain In *Conservation biology*, edited by I F Spellerberg, 203–221 Harlow Longman

- Pywell,R.F., (Nowakowski,N), Allchin,E.A. & (Aldous,E.)** 1996 Preliminary studies of the effects of selective herbicides on wild flower species In *Vegetation management in forestry, amenity and conservation areas managing for multiple objectives*, edited by E J P Marshall, J L Morgan, I Willoughby, D V Clay, R Garnett, P D Putwain, R H Marrs, R F Pywell & T M West, 149–156 (Aspects of applied biology 44) Wellesbourne Association of Applied Biologists
- Pywell,R.F. (Putwain,P.D.) & Webb,N.R.** 1996 Establishment of heathland vegetation on mineral workings In *Vegetation management in forestry, amenity and conservation areas managing for multiple objectives*, edited by E J P Marshall, J L Morgan, I Willoughby, D V Clay, R Garnett, P D Putwain, R H Marrs, R F Pywell & T M West, 285–292 (Aspects of applied biology 44) Wellesbourne Association of Applied Biologists
- Pywell,R.F., Wells,T.C.E. & Sparks,T.H.** 1996 Long-term dynamics of reconstructed species-rich grassland communities In *Vegetation management in forestry, amenity and conservation areas managing for multiple objectives*, edited by E J P Marshall, J L Morgan, I Willoughby, D V Clay, R Garnett, P D Putwain, R H Marrs, R F Pywell & T M West, 369–376 (Aspects of applied biology 44) Wellesbourne Association of Applied Biologists
- (Quaterman,P., Crookes,M.J.), Howe,P. & Dobson,S.** 1996 *Environmental hazard assessment nitrobenzene* Garston Building Research Establishment
- (Raubuch,M , Anderson,J.M., Beese,F , Berg,M P , Bolger,T., Couteaux,M.-M., Henderson,R), Ineson,P., (McCarthy,F , Palka,L., Splatt,P., Verhoef,H.A. & Willison,T.)** 1995 Ionic balances of reciprocally transplanted forest soils In *Ecosystem manipulation experiments scientific approaches, experimental design and relevant results*, edited by A Jenkins, R C Ferrier & C Kirby, 38–43 (Ecosystems research report no 20) Luxembourg Commission of the European Communities
- Raybould,A.F.** 1994 Routes for the transfer and spread of transgenes from UK crops to environment *Journal of Experimental Botany*, 45, Suppl , 42
- Raybould,A.F.** 1995 Wild crops In *Encyclopedia of environmental biology*, edited by W A Nierenberg, vol 3, 551–565 London Academic Press
- Reading,C.J. & Clarke,R.T.** 1995 The effects of density, rainfall and environmental temperature on body condition and fecundity in the common toad, *Bufo bufo* In *Abstracts of the 7th European Ecological Congress*, edited by A Demeter & L Peregouits, 195 Budapest Hungarian Biological Society
- Reynolds,B. & Stevens,P.A.** 1995 Soil and freshwater critical loads for forest and moorland sites in Wales In *Acid rain and its impact the critical loads debate*, edited by R W Battarbee, 128–135 London Ensis
- Reynolds,B , Radford,G.L. & Norris,D.A.** 1995 A provisional empirical nitrogen critical load map for terrestrial ecosystems in Wales [Poster] In *Mapping and modelling of critical loads for nitrogen – a workshop report*, edited by M Hornung, M A Sutton & R B Wilson, 188–189 Penicuik Institute of Terrestrial Ecology
- Reynolds,B., (Chapman,P.J.), French,M C., (Jenkins,A. & Wheeler,H.S.)** 1995 Major, minor, and trace element chemistry of surface waters in the Everest region of Nepal In *Biogeochemistry of seasonally snow-covered catchments*, 405–412 (IAHS publication no 228) Wallingford IAHS Press
- Reynolds,B., (Robertson,W.H), Hornung,M. & Stevens,P.A.** 1995 Forest manipulation and solute production modelling the nitrogen response to clearcutting In *Solute modelling in catchment systems*, edited by S T Trudgill, 211–233 Chichester Wiley
- Sheppard,L.J., Crossley,A., Carreira,J.A., Harrison,A.F., Reuss,L. & (Wulff,A.)** 1995 Reduction in stem area increment in Sitka spruce receiving acid mist in the field – possible causes In *Proceedings of BIOFOSP, Ljubljana, 1995*, edited by H Kraigher, F Batic, D E Hanke, R Agerer & D Gill, 15–21 Ljubljana Slovenian Forestry Institute
- (Sinclair,F.L., Jenkins,D.A , Grime,V.L , Adderly,W.P.), Emmett,B., (Verinumbel. & Adeogun,P.F.)** 1995 Planting spaced trees in northern Nigeria – yield, nutritional, meteorological and management implications In *Agroforestry Modelling Workshop*, edited by G J Lawson & H W McIver, 15–17 Penicuik Institute of Terrestrial Ecology
- (Singles,R.), Sutton,M.A. & (Weston,K.J)** 1995 Fine resolution modelling of ammonia dry deposition in Great Britain In *Acid rain research do we have enough answers?* edited by G J Heij & J W Erisman, 449–452 Amsterdam Elsevier
- Smith,R.I., Fowler,D. & Bull,K.R.** 1995 Quantifying the scale dependence in estimates of wet and dry deposition and the implications for critical load exceedances In *Acid rain research do we have enough answers?* edited by G J Heij & J W Erisman, 175–186 Amsterdam Elsevier
- (Soulsby,C.) & Reynolds,B.** 1995 Impact of source area liming on the hydrochemistry of an acidic headwater stream in upland Wales In *Geomorphology and land management in a changing environment*, edited by D F M McGregor & D A Thompson, 121–138 Chichester Wiley
- Sparks,T.H. & Carey,P.D.** 1995 Variability in “Indications of spring” an analysis of species response to climate over two centuries using the Marsham family data In *Proceedings of 6th International Meeting on Statistical Climatology, Galway, 1995*, 99–102 Galway University College of Galway
- Sparks,T.H. & Reynolds,B.** 1995 Patterns and changes in precipitation and stream water chemistry over ten years from Plynlimon, Wales In *Proceedings of 6th International Meeting on Statistical Climatology, Galway, 1995*, 649–652 Galway University College of Galway
- Sparks,T.H., Parr,T.W. & Wright,S.M** 1995 Modelling current and future distributions of native species In *Proceedings of 6th International Meeting on Statistical Climatology, Galway, 1995*, 517–520 Galway University College of Galway
- Sparks,T.H , (Dover,J.W., Warren,M.S.) & Cox,R.** 1995 How well can we model the distribution of butterflies at the landscape scale? In *Landscape ecology theory and application*, edited by G H Griffiths, 24–31 Aberdeen International Association for Landscape Ecology (UK)
- Sparks,T.H., (Gadsden,R.J.) & Roy,D.B.** 1995 ANCOVA – a forgotten asset? In *Field experiment techniques*, edited by M R Bartley, W D Basford, P Brain, C Christensen, P D Lancashire, T H Sparks & S J Welham, 47–54 (Aspects of applied biology 43) Wellesbourne Association of Applied Biologists
- Sparks,T.H., Bellamy,P.E., Eversham,B.C., Greatorax-Davies,J.N., Hinsley,S.A., Jones,S M. & Mountford,J O.** 1996 The effects of three hedge management treatments on the wildlife of a Cambridgeshire hedgerow In *Vegetation management in forestry, amenity and conservation areas managing for multiple objectives*, edited by E J P Marshall, J L Morgan, I Willoughby, D V Clay, R Garnett, P D Putwain, R H Marrs, R F Pywell & T M West, 277–284 (Aspects of applied biology 44) Wellesbourne Association of Applied Biologists
- Staines,B.W.** 1995 The impact of red deer on the regeneration of native

- pinewoods In *Our pinewood heritage*, edited by J R Aldhous, 107–114 Wreclesham Forestry Commission, Royal Society for the Protection of Birds, Scottish Natural Heritage
- Staines, B.W., (Balharry, R.) & Welch, D.** 1995 The impact of red deer and their management on the natural heritage in the uplands In *Heaths and moorlands cultural landscapes*, edited by D B A Thompson, A J Hester & M B Usher, 294–308 Edinburgh HMSO
- Stillman, R.A.** 1995 Bird associations with heather moorland in the Scottish and English uplands In *Heaths and moorlands cultural landscapes*, edited by D B A Thompson, A J Hester & M B Usher, 67–73 Edinburgh HMSO
- Stirling, C.M. & (Davey, P.A.)** 1995 Modifications of the photosynthetic response to elevated CO₂ by growth temperature and defoliation treatments In *Photosynthesis from light to biosphere*, edited by P Mathis, 961–964 Dordrecht Kluwer
- (Strand, P.), Howard, B. & (Averin, V.), eds.** 1996 *Transfer of radionuclides to animals, their comparative importance under different agricultural ecosystems and appropriate countermeasures* (Experimental collaboration project no 9, EUR 16539) Luxembourg Commission of the European Communities
- (Summers, R.W.), Moss, R. & Halliwell, E.C.** 1995 Scotland's native pinewoods – the requirements of birds and mammals In *Our pinewood heritage*, edited by J R Aldhous, 222–241 Wreclesham Forestry Commission, Royal Society for the Protection of Birds, Scottish Natural Heritage
- Sutton, M.A. & Fowler, D.** 1995 Continuous measurements of ammonia deposition to acidic moorland and application of a new inferential technique to describe ammonia exchange with the plant canopy In *Acid rain and its impact the critical loads debate*, edited by R W Battarbee, 162–168 London Ensio
- Sutton, M.A., Burkhardt, J.K., Guerin, D. & Fowler, D.** 1995 Measurement and modelling of ammonia exchange over arable croplands In *Acid rain research do we have enough answers?* edited by G J Heij & J W Erisman, 71–80 Amsterdam Elsevier
- (Sverdrup, H., De Vries, W.), Hornung, M., (Cresser, M., Langan, S.), Reynolds, B., (Skeffington, R. & Robertson, W.)** 1995 Modification of the simple mass balance equation for calculation of critical loads of acidity In *Mapping and modelling of critical loads for nitrogen – a workshop report*, edited by M Hornung, M A Sutton & R B Wilson, 87–92 Penicik Institute of Terrestrial Ecology
- Thomas, J.A.** 1994 Does the distribution or behaviour of North European insects reflect the ways in which man has managed the land since prehistory? In *Abstracts of the 5th European Congress of Entomology*, edited by D Reavey, 7 York Institute for Applied Biology, University of York
- Treweek, J.** 1995 Ecological impact assessment In *Environmental and social impact assessment*, edited by F Vanclay and D A Bronstein, 171–191 Chichester Wiley
- Treweek, J. & Veitch, N.** 1995 GIS for policy and land-use planning In *Principles and tools for the study of landscape ecology – potentials and limitations*, edited by F Skov, J Komdeur, G Fry & J Knudsen, 84–88 Proceedings of the 2nd CONNECT Workshop on Landscape Ecology, 1993 (NERI Technical report no 131) Ronde National Environmental Research Institute
- Treweek, J. R. & (Watt, T.A.)** 1994 Integration of nature conservation management with low input livestock production In *Grassland management and nature conservation*, edited by R J Haggard & S Peel, 210–216 (BGS Occasional symposium no 28) Reading British Grassland Society
- Ulliyett, J., Hall, J & Bull, K.** 1995 Mapping the potential sensitivity of freshwaters to acidification using catchment characteristics In *Acid rain and its impact the critical loads debate*, edited by R W Battarbee, 103–107 London Ensio
- (Valovirta, I.), Harding, P.T. & (Kime, D.), eds.** 1995 *Threatened species and bioindicators at the pan-European level* Proceedings of the 9th International Colloquium of the European Invertebrate Survey, Helsinki, 1993 (WWF Finland report no 7) Helsinki WWF Finland
- Veitch, N.** 1995 Geographical information systems a beginner's guide for landscape ecologists In *Principles and tools for the study of landscape ecology – potentials and limitations*, edited by F Skov, J Komdeur, G Fry & J Knudsen, 78–83 Proceedings of the 2nd CONNECT Workshop on Landscape Ecology, 1993 (NERI Technical report no 131) Ronde National Environmental Research Institute
- Veitch, N., Treweek, J.R. & Fuller, R.M.** 1995 The Land Cover Map of Great Britain a new data source for environmental planning and management In *Advances in environmental remote sensing*, edited by F M Danson & S E Plummer, 157–171 Wiley Chichester
- (Walsh, P.M., Halley, D.J.), Harris, M.P., (Del Nevo, A., Sim, I.M.W. & Tasker, M.L.)** 1995 *Seabird monitoring handbook for Britain and Ireland a compilation of methods for survey and monitoring of breeding seabirds* Peterborough Joint Nature Conservation Committee, Royal Society for the Protection of Birds, Institute of Terrestrial Ecology, Seabird Group
- Webb, N.R., (Hodkinson, I.D., Coulson, S., Bale, J.S., Strathdee, A.T. & Block, W.)** 1995 Life history and ecophysiological responses to temperature in arctic terrestrial invertebrates In *Global change and arctic terrestrial ecosystems*, edited by T V Callaghan *et al.*, 51–55 (Ecosystems research report 10, EUR 15519) Luxembourg European Union
- (Wellburn, A R., Robinson, D.C., Thomson, A.) & Leith, I D.** 1995 Influence of summer episodes of atmospheric O₃ on d5 and d9 fatty acids in lipids of Norway spruce during winter hardening In *Plant lipid metabolism*, edited by J-C Koder & P Mazliak, 450–452 Dordrecht Kluwer
- (Wellens, J., Millington, A.), Gerard, F. & Wyatt, B.** 1995 The potential of ATSR-2 satellite imagery for identifying and mapping different humid tropical forest ecosystems In *Multispectral and microwave sensing of forestry, hydrology and natural resources*, edited by E Mougou, K J Ranson & J A Smith, 77–84 (SPIE Proceedings series vol 2314) Bellingham, WA International Society for Optical Engineering
- (Wilson, E.J.), Wells, T.C.E. & Sparks, T.H.** 1995 Are high levels of nitrogen deposition affecting calcareous grasslands in the UK? Evidence from a spray experiment In *Ecosystem manipulation experiments scientific approaches, experimental design and relevant results*, edited by A Jenkins, R C Ferrier & C Kirby, 49–54 (Ecosystems research report no 20) Luxembourg Commission of the European Communities

Contract reports

- Anderson,L.S. & Bell,S.A.** 1995 *Definition of the researchable constraints to improved productive potential and sustainability of land use systems at the forest-agriculture interface* April 1995 72pp + 3 vols of annexes Overseas Development Administration
- Anderson,L.S. & Bell,S.A.** 1995 *Productivity of intercropped sorghum in relation to water and nutrient stresses in semi-arid agroforestry* May 1995 Overseas Development Administration
- Arah,J., (Vinten,A., Castle,K. & Christofi,N.)** 1995 *Microbial reduction of nitrate during transport through soils and subsols* Final report June 1995 20pp AFRC/NERC Joint Initiative on Pollutant Transport in Soils and Rocks
- Ashenden,T.W., Geissler,P. & Rafarel,C.R.** 1995 *Critical levels and loads of nitrogen for vegetation growing on different soils* Interim report July 1995 24pp Department of the Environment
- (Austin,G., Rehfish,M.M., Holloway,S.J., Clark,N.A., Balmer,D E.), Yates,M.G , Clarke,R.T., Swetnam,R.D , Eastwood,J.A., Durell,S.E.A.le V.Dit, (West,J R.) & Goss-Custard,J.D.** 1996 *Estuaries, sediments and shorebirds III Predicting waterfowl densities on intertidal areas* January 1996 179pp Energy Technology Support Unit
- Bacon,P.J., Hartley,S. & Webb,A.** 1995 *DeeCAMP1 GIS Overview of the Dee Catchment Management Plan geographical information system* May 1995 42pp
- (Baines,D.), Moss,R., (Andrew,M.) & Parr,R.** 1995 *Capercaillie breeding success in Scotland* September 1995 5pp Royal Society for the Protection of Birds
- (Baines,D.), Moss,R., (Leckie,F.) & Parr,R.** 1994 *Capercaillie breeding success in Scotland* Final report Scottish Natural Heritage, Royal Society for the Protection of Birds
- Barr,C.J., (Britt,C.P.) & Sparks,T.H.** 1995 *Hedgerow management and wildlife a review of research on the effects of hedgerow management and adjacent land on biodiversity* May 1995 130pp Ministry of Agriculture, Fisheries and Food
- Barr,C.J., Gillespie,M.K., (Miller,F) & Howard,B.J** 1995 *Agricultural practices around selected nuclear power plants* November 1995 Radiological Protection Group Industry Management Committee
- Barr,C.J., Howard,D.C. & Scott,W.A.** 1996 *The ITE Land Classification - applications in Scotland* March 1996 116pp Scottish Office Agriculture, Environment and Fisheries Department
- Bayfield, N.G.** 1994 *Proof of evidence Lingarabay Superquarry Public Inquiry* Redlands Aggregates
- Bayfield,N G** 1995 *Proof of evidence terrestrial ecology, Rock Characterisation Facility* UK Nirex Ltd
- Bayfield,N. & Taylor,P.** 1994 *St Cyrus small blue (Cupido minimus) survey 1994* December 1994 5pp Scottish Natural Heritage
- Bayfield,N.G., Conroy,J W.H & (Brandon,O.W.)** 1995 *Scoping study for Highlands and Islands Objective 1 environmental audit measure* June 1995 37pp Scottish Natural Heritage
- Bayfield,N., McGowan,G. & Moss,R.** 1995 *Exploring natural heritage resource renewability* April 1995 32pp Scottish Natural Heritage
- Bayfield,N., (Young,M.), Watt,A., (Barbour,D.), Thomas J , McGowan,G. & Waterhouse,C.** 1995 *Scottish Diurnal Lepidoptera Project progress report 1994-95* March 1995 34pp Scottish Natural Heritage
- Beresford,N.A., Barnett,C.L. & (Hove,K.)** 1995 *The applicability of AFCF countermeasures in the restricted areas of the UK* Interim report April 1995 9pp Ministry of Agriculture, Fisheries and Food
- Beresford,N.A., (Mayes,R.W.), Barnett,C.L., (Lamb,C.S., Wilson,P.J.) & Howard,B.J.** 1995 *Development of rapid techniques to assess the availability to food animals of radionuclides in or on feed* Final report September 1995 47pp Ministry of Agriculture, Fisheries and Food
- Boorman,L.A. & Garbutt,A.** 1995 *Large scale experimental set-back* Second annual report November 1995 15pp Ministry of Agriculture, Fisheries and Food
- Boorman,L.A., Pakeman,R.J. & Garbutt,R.A.** 1995 *Effects of environmental change on European salt marshes results from the UK sites at Old Hall Marshes, Essex and Stiffkey Marshes, Norfolk* Final report October 1995 50pp + Appendix 73pp Commission of the European Communities
- Brown,M., Dyke,H., Wright,S.M., Wadsworth,R.A., Bull,K.R., (Farmer,A.M., Barcham,S., Metcalfe,S.E. & Whyatt,D.)** 1995 *The relative contribution of different sulphur point sources to critical load exceedence on SSSIs in Britain* 17pp English Nature

APPENDIX 4

- Brown,M.J., Wadsworth,R.A., Chamberlain,H.M., Swetnam,R.D. & Bull,K.R.** 1995 *Modelling the effects of Ince power station on air quality* December 1995 Her Majesty's Inspectorate of Pollution
- Brown,M.J., Wadsworth,R.A., Chamberlain,H.M., Swetnam,R.D. & Bull,K.R.** 1995 *Modelling the effects of Ironbridge power station on air quality* December 1995 Her Majesty's Inspectorate of Pollution
- Brown,M.J., Wadsworth,R.A., Chamberlain,H.M., Swetnam,R.D. & Bull,K.R.** 1995 *Modelling the effects of Kingsnorth power station on air quality* December 1995 Her Majesty's Inspectorate of Pollution
- Brown,M.J., Wadsworth,R.A., Chamberlain,H.M., Swetnam,R.D. & Bull,K.R.** 1995 *Modelling the effects of Littlebrook power station on air quality* December 1995 Her Majesty's Inspectorate of Pollution
- Brown,M.J., Wadsworth,R.A., Chamberlain,H.M., Swetnam,R.D. & Bull,K.R.** 1995 *Modelling the effects of Pembroke power station on air quality* December 1995 Her Majesty's Inspectorate of Pollution
- Brown,M.J., Wadsworth,R.A., Chamberlain,H.M., Swetnam,R.D. & Bull,K.R.** 1995 *Modelling the effects of Ratchffe power station on air quality* December 1995 Her Majesty's Inspectorate of Pollution
- Brown,M.J., Wadsworth,R.A., Chamberlain,H.M., Swetnam,R.D. & Bull,K.R.** 1995 *Modelling the effects of Richborough power station on air quality* December 1995 Her Majesty's Inspectorate of Pollution
- Brown,M.J., Wadsworth,R.A., Chamberlain,H.M., Swetnam,R.D. & Bull,K.R.** 1995 *Modelling the effects of Rugeley power station on air quality* December 1995 Her Majesty's Inspectorate of Pollution
- Brown,M.J., Wadsworth,R.A., Chamberlain,H.M., Swetnam,R.D. & Bull,K.R.** 1995 *Modelling the effects of Tilbury power station on air quality* December 1995 Her Majesty's Inspectorate of Pollution
- Brown,M.J., Wadsworth,R.A., Chamberlain,H.M., Swetnam,R.D. & Bull,K.R.** 1995 *Modelling the effects of West Burton power station on air quality* December 1995 Her Majesty's Inspectorate of Pollution
- Brown,M.J., Wadsworth,R.A., Chamberlain,H.M., Swetnam,R.D. & Bull,K.R.** 1995 *Modelling the effects of Willington power station on air quality* December 1995 Her Majesty's Inspectorate of Pollution
- December 1995 Her Majesty's Inspectorate of Pollution
- Brown,N.J., Hankard,P., Bull,K.R., Ulyett,J.M. & (Powelsland,C)** 1995 *A GIS demonstrator for HMIP* April 1995 Her Majesty's Inspectorate of Pollution
- Bull,K.R., Hall,J.R., Brown,M.J., Dyke,H., Ulyett,J., Wright,S., Swetnam,R. & Wadsworth,R.** 1995 *National Critical Loads Mapping Programme* Interim report April 1995 Department of the Environment
- Bullock,J.M., Hodder,K.H., Manchester,S.J. & Stevenson,M.J.** 1995 *Review of information, policy and legislation on species translocations* October 1995 2 vols Joint Nature Conservation Committee
- Caldow,R.W.G. & Pearson,B** 1996 *The conservation and enhancement of biological diversity in farmland management the relationship between environmental characteristics and the distribution of wetland birds II* March 1996 46pp Minstry of Agriculture, Fisheries and Food
- Cannell,M G.R.** 1996 *NERC accountable grant for international scientific cooperation for work in the Man and Biosphere field* March 1996 Overseas Development Administration
- Cannell,M.G.R. & (Anderson,J.M.)** 1996 *Brazil forest biomass and nutrient research project (BIONTE)* Progress evaluation by science advisers, 27 November - 1 December 1995 January 1996 13pp Overseas Development Administration
- Cannell,M G R., (Mielkainen,K. & Oswald,H.)** 1995 *Evaluation of long-term forestry field experiments* 12pp Swedish University of Agricultural Sciences
- Cannell,M.G.R., Thornley,J.H.M., Milne,R., Brown,T.A.W., Howard,D.C., (Cruickshank,M.M., Tomlinson,R.W., Devine,P.M.), Harrison,A.F., Jones,H.E., Howson,G., Woods,C., Garnett,J., Garnett,M., Hargreaves,K.J., Fowler,D., (Hope,D., Billett,M.F., Heath,J., Kerstiens,G., Mansfield,T.A.) & Ineson,P** 1996 *Carbon sequestration in vegetation and soils* March 1996 Department of the Environment
- Cape,J.N.** 1995 *Aerosol processing by hill cloud* September 1995 29pp University of Manchester Institute of Science and Technology, for the Department of the Environment
- Cape,J.N.** 1995 *Effects of ozone on materials* Progress report December 1995 3pp AEA Technology
- Cape,J.N., Sheppard,L.J. & Binnie,J.** 1995 *Controlled fumigation of a Scots pine forest with ammonia* Final report July 1995 21pp Department of the Environment
- Carey,P.D. & Remes,K.** 1995 *The lizard orchid population of the Royal St George's Golf Club 1978-1994* Kent Trust for Nature Conservation, Royal St George's Golf Club
- Carreira,J.A. & Harrison,A.F.** 1995 *Effects of acidifying pollutant inputs on soil phosphorus chemistry, dynamics and availability for tree uptake their possible role in forest decline in Europe* May 1995 37pp Commission of the European Communities
- Carreira,J.A. & Harrison,A.F.** 1995 *Effects of acidifying pollutant inputs on soil phosphorus chemistry, dynamics and availability for tree uptake their possible role in forest decline in Europe* Final report November 1995 47pp Commission of the European Communities
- Catt,D.C., Moss,R. & Lees,M.L.** 1995 *Spatial modelling of capercaillie numbers in relation to changes in climate* Interim report Scottish Natural Heritage
- Cox,R., (Wright,J.F., Furse,M.T.) & Moss,D.** 1995 *RIVPACS III (River Invertebrate Prediction and Classification System) user manual* (NRA R&D Note 454) November 1995 National Rivers Authority
- Croft,J.M. & Preston,C.D.** 1996 *Species Recovery Programme fen violet (Viola persicifolia Schreber)* 3rd progress report March 1996 28pp English Nature
- (Crookes,M.J.), Howe,P.D. & Dobson,S** 1995 *Environmental risk assessment for short chain length chlorinated paraffins Risk assessment of existing substances for the European Commission* 50pp Department of the Environment
- Crossley,A., Sheppard,L.J., Harvey,F., Horsburgh,A., Cape,J.N. & Fowler,D.** 1996 *Impacts of acid mist on mature Sitka spruce* Interim report February 1996 Department of the Environment
- Cummins,R., (Gauld,J., Carter,S., Rees,T., Elston,D.) & Picozzi,N.** 1996 *Monitoring Environmentally Sensitive Areas in Scotland* report for 1994-95 February 1996 67pp Scottish Office Agriculture, Environment and Fisheries Department
- Daniels,R.E.** 1995 *Wytch Farm development impacts of increased NO_x*

levels on plant communities Update
August 1995 August 1995 7pp BP
Exploration Operating Co Ltd

**Deans, J.D., Lindley, D.K., Ingleby, K.,
(Sall, P.N., Diagne, O., Dreyfus, B.,
Neyra, M., De Lajudic, P., Detrez, C.,
Ngeh, C.P., Lindstrom, K., Nick, G.,
Raasanen, L., Sprent, J.I. &
Sutherland, J.M.)** 1995 *The selection
of fast growing trees for sustainable
production in the semi-arid zone*
Second activity report 1 January to 30
June 1995 12pp Commission of the
European Communities

**Deans, J.D., Lindley, D.K., Ingleby, K.,
Munro, R.C., (Sall, P.N., Diagne, O.,
Dreyfus, B., Neyra, M., de Lajudic, P.,
Detrez, C., Ngeh, C.P., Lindstrom, K.,
Nick, G., Rasanen, L., Sprent, J.I. &
Sutherland, J.M.)** 1996 *The selection
of fast growing trees for sustainable
production in the semi-arid zone*
Second annual scientific report 1
January to 31 December 1995 32pp
Commission of European Communities

Dobson, S., Howe, P.D. & King, K.B.
1995 *Draft Environmental Health
Criteria document on nonylphenol and
its ethoxylates* Interim report 35pp
Department of the Environment

**Dobson, S., Howe, P.D. &
Malcolm, H.M.** 1995 *Development of
a blueprint to assess risk to birds and
mammals in the terrestrial environment*
December 1995 52pp Her Majesty's
Inspectorate of Pollution

Eastwood, J.A. & Wyatt, B.K. 1995
Disturbance regimes from remote
sensing In *The influence of changes in
climate and carbon dioxide on biome
distribution* Final report of Phase 1 of
the TIGER IV 3b consortium, led by
F I Woodward NERC TIGER IV 3b

Ellis, N.E. 1996 *Agronomic and
environmental evaluation of set-aside
under the EC Arable Area Payments
Scheme a review of the literature*
February 1996 65pp Ministry of
Agriculture, Fisheries and Food

**Emmett, B.A., Brittain, S.A., Hughes, S.
& Reynolds, B.** 1995 *Nitrogen
processes in upland soils* Final report
May 1995 43pp Department of the
Environment

**Emmett, B.A., (Liversage, C.,
Silgram, M.), Kennedy, V., Sleep, D.,
Brittain, S.A., Hughes, S., Norris, D. &
Reynolds, B.** 1995 *Annual report for
the Aber Nitrogen Manipulation
Experiment 1994/95* 192pp National
Power, Powergen

(Evans, R.), Pywell, R.F. & (Smith, P.)
1996 *Environmental Term Commission
for Salisbury Plain Training Area An
Integrated Land Management Plan*

*(ILMP) for Salisbury Plain Training Area
framework report* February 1996
Defence Estates Organisation, Ministry of
Defence

Firbank, L.G., compiler. 1995
*Agronomic and environmental
evaluation of set-aside under the EC
Arable Area Payments Scheme* 1st interim
report May 1995 Ministry of
Agriculture, Fisheries and Food

Firbank, L.G., compiler. 1995
*Agronomic and environmental
evaluation of set-aside under the EC
Arable Area Payments Scheme*
November 1995 102pp + 4
appendices Ministry of Agriculture,
Fisheries and Food

Firbank, L.G., ed. 1996 *Agronomic
and environmental evaluation of set-
aside under the EC Arable Area Payments
Scheme* 3rd interim report March
1996 Ministry of Agriculture, Fisheries
and Food

Flechard, C.R. & Fowler, D. 1996 *Long
term measurements of dry deposition
fluxes of SO₂ and O₃ in the Baixo Vouga
estuary, Portugal, and Madrid, Spain*
Surface Resistance Emergency
Programme (SREMP) February 1996
Commission of the European
Communities

**Fowler, D., Flechard, C., Storeton-
West, R., Smith, R.I., Coyle, M.,
(Campbell, G., Stedman, J., Downing, C.
& Vincent, K.)** 1995 *Operation and
data assessment of rural sulphur dioxide
dry deposition monitoring network*
68pp Department of the Environment

French, D.D. 1995 *Use of GIS to predict
effects of environmental change on the
small mountain ringlet at Ben Lawers*
October 1995 13pp Scottish Natural
Heritage

French, D.D. & (Harris, M.G.) 1995
*Rock Characterization Facility (RCF)
badger monitoring, spring 1995* May
1995 24pp UK Nirex

French, D.D. & (Harris, M.G.) 1995
*Rock Characterisation Facility (RCF)
badger monitoring, autumn 1995*
November 1995 17pp UK Nirex

Friend, A.D., Murray, M.B. & Leith, I.D.
1995 *The likely impacts of rising CO₂
and temperature on European forests* 6-
month ECOCRAFT report Commission
of the European Communities

Fuller, R.M. & Brown, N.J. 1994 *A
CORINE map of Great Britain by
automated means a feasibility study*
Interim report April 1994 Department
of the Environment

**Fuller, R.M., Groom, G.B., (Ipulet, P.,
Mugisha, S., Pomeroy, D., Katende, A.,**

Bailey, R. & Ogotu-Olwajo, R.) 1995
*Darwin Initiative computers in
terrestrial ecology Sango Bay, Uganda*
Third six-monthly report covering work
done September 1994 to March 1995
April 1995 10pp Department of the
Environment, Darwin Initiative

**Fuller, R.M., Groom, G.B., (Ipulet, P.,
Mugisha, S., Pomeroy, D., Katende, A.,
Bailey, R. & Ogotu-Olwajo, R.)** 1995
*Darwin Initiative computers in
terrestrial ecology Sango Bay, Uganda*
Annual report April 1995 4pp
Department of the Environment,
Darwin Initiative

**Fuller, R.M., Groom, G.B., (Ipulet, P.,
Mugisha, S., Pomeroy, D., Katende, A.,
Bailey, R., Ogotu-Olwajo, R. &
Wandera, S.B.)** 1995 *Darwin Initiative
computers in terrestrial ecology, Sango
Bay, Uganda* Final report July 1995
47pp Department of the Environment,
Darwin Initiative

**Fuller, R.M., Thomson, A.G.,
Eastwood, J.A., Yates, M., Sparks, T. &
Warman, E.** 1995 *Further development
of airborne remote sensing techniques
cover classification in intertidal zones
and river corridors* Final report (LOIS
publication no 51) September 1995 2
vols Vol 1 published by NRA as R&D
Note 472, vol 2 as R&D Project record
509/06/SW National Rivers Authority

**(Furse, M.T.), Clarke, R.T.,
(Winder, J.M., Symes, K.L.,
Blackburn, J.H., Grieve, N.J. &
Gunn, R.J.M.)** 1995 *Biological
assessment methods controlling the
quality of biological data Package 1 The
variability of data used for assessing the
biological condition of rivers* April
1995 139pp National Rivers
Authority

**(Furse, M.T., Symes, K.L., Winder, J.M.),
Clarke, R.T., (Blackburn, J.H.,
Gunn, R.J.M., Grieve, N.J. & Hurley, M.)**
1995 *The faunal richness of headwater
streams stage 3 impact of agricultural
activity* Main report May 1995 2
vols National Rivers Authority

**Garnett, M.H., Ineson, P. &
Howard, D.C.** 1996 *Soil and
vegetation carbon stores in UK uplands
Moor House case study* Progress report
1995-1996 March 1996 66pp
Department of the Environment

Good, J.E.G., Norris, D.A. & Daniels, A.
1995 *ESA research on upland scrub in
Wales* Annual report June 1995
50pp Ministry of Agriculture, Fisheries
and Food

**Good, J.E.G., (Humphrey, J.W.,
Masters, P.J., Willis, R.W.M.,
Clough, D., Harris, I., Nixon, C.J.),
Norris, D.A., Radford, G.L. &
(Thomas, T.H.)** 1995 *Upland*

woodlands in Wales Phase I report
October 1995 Countryside Council for Wales

Good, J.E.G., (Humphrey, J.W., Clough, D., Willis, R.W.M., Nixon, C.J., Harris, I., Roden, P.), Norris, D.A. & (Thomas, T.H.) 1996 *Upland woodlands in Wales (report on phase II October 1995 – March 1996)* March 1996 94pp + 32 figs Countryside Council for Wales

Goss-Custard, J.D., Stillman, R.A., McGroarty, S., Durell, S.E.A. le V. dit, Clarke, R.T., Caldow, R.W.G., (Norris, K.J., Johnstone, I.G. & Ens, B.J.) 1995 *Models of shellfish populations and shorebirds interim report* September 1995 30pp Commission of the European Communities

Gray, A.J., Raybould, A.F., Webb, N.R., Rispin, W.E., Mogg, R.J., Ward, L.K., Moyes, C., Warman, E.A., (Gliddon, C.J.), Elmes, G.W., Daniels, R.E. & Thomas, J.A. 1995 *Environmental impacts of genetically modified plants* First year report September 1995 43pp Department of the Environment

Greator, J.N. & Yates, T.J. 1995 *Butterfly Monitoring Scheme progress report for 1994/95* April 1995 27pp Joint Nature Conservation Committee

Hankard, P., Roy, D., Eversham, B.C., Osborn, D., Treweek, J. & Holland, R. 1995 *The development of a Comparative Environment Index* Interim report for circulation July 1995 15pp Department of the Environment

Harding, P.T., Preston, C.D., Eversham, B.C., Arnold, H.R., Croft, J.M., Forrest, W.A. & Burton, V.J 1996 *Support for the Biological Records Centre 1995/96 third annual report, part 1 – general services and output* March 1996 Joint Nature Conservation Committee

Harding, P.T., (Palmer, M.A., Ball, S.G. & Procter, D.) 1995 *UK Biodiversity Action Plan rationale for validation of a list of invertebrates of 'conservation concern' and for the development of national lists of priority species* (Part 2 of third annual report on support for the Biological Records Centre 1995/96) September 1995 Joint Nature Conservation Committee

Harris, M.P. 1995 *Isle of May seabird studies in 1995* Annual report September 1995 Published by JNCC as JNCC report no 251 Joint Nature Conservation Committee

Harris, M.P. 1995 *Seabird monitoring on the Isle of May – 1995* Scottish Natural Heritage

Harris, M.P. & Wanless, S. 1995 *Impacts of visitors on breeding seabirds on the Isle of May National Nature Reserve* September 1995 Scottish Natural Heritage

Harrison, A.F., Quarmby, C. & Sleep, D. 1995 *Aerial uptake and $\delta^{15}\text{N}$ in pollutant inputs to forests* June 1995 In *NIPHYSS – nitrogen physiology of forest plants and soils*, coordinated by E-D Schulze, 35–43 Final report for 1993 and 1994 Commission of the European Communities

Harrison, A.F., (Adams, B.), Barr, C.J., Bayfield, N.G., Benham, D., Coward, P.A., Daniels, R.E., (Davies, J., Hall, G.), Lindley, D.K., Parkinson, J.A., (Pickup, R.W.), Scott, R. & (Seaton, D.) 1994 *Disposal of oiled beach materials in sandy coastal environments, including low-grade dunes and dune pastures* First year progress report December 1994 46pp Department of Transport, Marine Pollution Control Unit

Harrison, A.F., (Adams, B.), Barr, C.J., Bayfield, N.G., Benham, D., Coward, P.A., Daniels, R.E., (Davies, J., Hall, G.), Lindley, D.K., Parkinson, J.A., (Pickup, R.W.), Scott, R. & (Seaton, D.) 1995 *Disposal of oiled beach materials in sandy coastal environments, including low-grade dunes and dune pastures – June 1995* Six month progress report, January–June 1995 June 1995 Department of Transport, Marine Pollution Control Unit

Harrison, A.F., Lindley, D.K., Barr, C.J., Bayfield, N.G., Benham, D., Coward, P.A., Daniels, R.E., (Davies, J.), Garnett, J.S., (Hall, G.), Parkinson, J.A., Poskitt, J.M., Rossall, M.J., Scott, R., Williams, D.L. & Wilson, D.R. 1996 *Disposal of oiled beach materials in sandy coastal environments, including low-grade dunes and dune pastures – December 1995* Second year progress report (1995) March 1996 Department of Transport, Marine Pollution Control Unit

Hartley, S.E. 1996 *Vegetation dynamics in the Scottish uplands* Final year report 37pp Royal Society of Edinburgh

Hill, M.O., (Parry, M.L.), Wyatt, B.K., (Brignall, P., Orr, J., Downing, T., Hulme, M.), Bunce, R.G.H., Watkins, J., (Rounsevell, M.D., Mayr, T.R., Bradley, R.I., Sefton, C., Whitehead, P., Huntley, B. & Tompson, K.) 1995 *Landscape dynamics and climate change* Draft consortium report NERC TIGER IV 3a

Hinsley, S.A., Bellamy, P.E., Sparks, T.H. & Newton, I. 1996 *Birds in agricultural landscapes Review and analysis of ITE research on the birds of farm woodlands and field boundaries* March 1996 133pp Ministry of Agriculture, Fisheries and Food

(Holland, M., Johnson, C., Campbell, G., Lee, D., Stedman, J., Goodwin, J., Eyre, N., Hurley, F.), Hornung, M., Howard, D., (Markandya, A. & Nurick, R.) 1995 *Green accounting research project UK case study* 115pp Energy Technology Support Unit

(Holloway, S.J., Rehfish, M.M., Clark, N.A., Balmer, D.E., Austin, G.), Yates, M.G., Swetnam, R.D., Eastwood, J.A., Clarke, R.T., Durell, S.E.A. le V. dit, Goss-Custard, J.D. & (West, J.R.) 1996 *Estuaries, sediments and shorebirds II Shorebird usage of intertidal areas* January 1996 270pp Energy Technology Support Unit

Hornung, M., ed. 1995 *European Network of Catchments Organised for Research on Ecosystems (ENCORE)* May 1995 2 vols Commission of the European Communities

Hornung, M., Howard, D.C. & Brown, M.J. 1995 *External costs of energy generation ecological impacts* September 1995 AEA Technology

Hornung, M., Howard, D.C. & Lindley, D.K. 1995 *Summary report on the development of a library of default values for input variables to the mass balance equation* May 1995 7pp Department of the Environment

Hornung, M., (Kellomaki, S. & Larsen, J.B.) 1995 *International evaluation of Swedish research projects on the environmental impacts of wood fuel harvesting* 23pp Published by the Board as R 1995 43 Swedish National Board for Industrial and Technical Development

Howard, B.J., (Assimakopoulos, P.A., Crout, N.M.J., Mayes, R.W., Voigt, G., Vandecasteele, C.M., Zelenka, J., Hove, K. & Hinton, T.) 1995 *Transfer of radionuclides in animal production systems* Final report September 1992 – June 1995 90pp Commission of the European Communities

Howard, B.J., Beresford, N.A., Kennedy, V.H. & Barnett, C.L. 1995 *A review of current knowledge of the transfer of radiostrontium to milk and possible countermeasures* Final report 65pp Ministry of Agriculture, Fisheries and Food

Howard, D.C. & Howard, B.J. 1995 *GIS in radioecology – report on an introductory training course* August 1995 12pp European Commission

Howard, D.C. & Luursema, K. 1995 *Division of England and Wales into agro/ environmental regions using the ITE Land Classification* Report for 'Impact of changing farming practices' October 1995 Ministry of Agriculture, Fisheries and Food

- Howard, D.C. (Furse, M.T.) & Barr, C.J.** 1995 *Countryside Survey 1990 database documentation* April 1995 20pp Department of the Environment
- Hughes, S., Brittain, S.A., Reynolds, B., (Hudson, J.A., Hill, P., Crane, S., Hughes, A., Hill, T. & Freeman, C.)** 1995 *The Cerrig yr Wyn wetland manipulation study* Report for 1991-1995 October 1995 Welsh Office
- Hughes, S., Reynolds, B., (Hudson, J., Hill, P., Hughes, A.), Brittain, A. & (Freeman, C.)** 1995 *The Cerrig-Yr-Wyn wetland manipulation study Phase 2 experiment progress report for 1995* December 1995 28pp Welsh Office
- (Hulme, P.D., Nolan, A.J., Sibbald, A.R., Birnie, R.V.) & Moss, R.** 1996 *Fealar Estate, Perthshire a land use and management impact study* January 1996 128pp Scottish Natural Heritage
- Ineson, P. & Carnol, M.** 1995 *Nitrogen critical loads nitrification in forest ecosystems* Department of the Environment
- Jones, H.E. & Howson, G.** 1995 *Organic matter management in Eucalyptus forestry to enhance soil structure, stability and nutrition* Third annual report 1 November 1994 - 31 October 1995 Consolidated report 18pp Commission of the European Communities
- (Jones, H.E., Howson, G., (Madeira, M., Hellings, M., Herraez, L. & Schoute, J.F.Th.)** 1995 *Organic matter management in Eucalyptus forestry to enhance soil structure, stability and nutrition* Annual report 1 November 1994 - 31 October 1995 October 1995 135pp Commission of the European Communities
- Keiller, S.W., Buse, A. & (Cherrett, J.M.)** 1995 *Effects of sheep grazing on upland arthropods in Snowdonia and mid-Wales* Final report (no 6) October 1995 Countryside Council for Wales
- Kennedy, V.H., Sanchez, A.L. & Singleton, D.L.** 1996 *Desk study to examine the feasibility of using simple rapid techniques to assess radionuclide uptake by plants* Final report January 1996 70pp Ministry of Agriculture, Fisheries and Food
- Kennedy, V.H., Barnett, C.L., Dobson, J. & Howard, B.J.** 1995 *The transfer of radiostrontium to milk and possible countermeasures bibliography* Final report December 1995 164pp Ministry of Agriculture, Fisheries and Food
- Kenward, R.E. & (Pfeffer, R.H.)** 1995 *Saker falcons in central Asia* Final report of the pilot study May 1995 81pp National Avian Research Centre, Abu Dhabi
- (Ladle, M., Farr, I.S., Welton, J.S., Beaumont, W.R.C.) & Clarke, R.T.** 1994 *The occurrence of selected chemical pollutants (Simazine, Lindane and Permethrin) in river fish* Final report September 1994 66pp Department of the Environment
- Lane, A. & Adamson, J.K.** 1994 *Moor House Automatic Weather Station, monthly mean data, May 1991 - January 1994* March 1994 Cape Building Products Ltd
- Lawson, G.J., Mobbs, D.C., (Crout, N.M.J., Levy, P.E., Wallace, J.S., Gregory, P.J., MacDonald, K.J.), Cannell, M.G.R., (Bradley, R.G.), McIver, H.L. & (van Gestel, N.C.G.)** 1995 *Agroforestry modelling and research co-ordination* Annual report for June 1994 - June 1995 July 1995 113pp + 90pp appendices Overseas Development Administration - Forestry Research Programme
- (Le Duc, M.G.), Pakeman, R.J., (Marrs, R.H., Paterson, S & Putwain, P.D.)** 1996 *Integrated bracken control and vegetation restoration* Final report March 1996 152pp Ministry of Agriculture, Fisheries and Food
- Leith, I.D. & Fowler, D.** 1995 *Effects of enhanced nitrogen deposition on upland vegetation using open-top chambers* 23pp Department of the Environment
- Leith, I.D., Sheppard, L.J., Pitcairn, C.E.R., Sutton, M.A. & Fowler, D.** 1996 *Impacts of nitrogen deposition on upland vegetation* Interim report February 1996 Department of the Environment
- Lindley, D.K., Deans, J.D. & (Diagne, O.)** 1995 *Acacia tree fallows in Senegal* Final report on extension October 1995 Overseas Development Administration
- Lowe, J.A.H., Reynolds, B., Brittain, S.A., Hughes, S. & Fowler, D.** 1995 *Orographic enhancement of acidic deposition in Snowdonia* Report 1 July 1995 11pp Welsh Office
- Malcolm, H.M., Dobson, S. & Howe, P.D.** 1996 *Review of standard-setting procedures for air* February 1996 24pp Water Research Centre
- Malcolm, H.M., Howe, P.D. & King, K.B.** 1996 *Environmental fate and effects of zinc* February 1996 80pp Australia Department of Human Services and Health
- Marquiss, M. & Carss, D.N.** 1995 *Fish-eating birds research (1990-94), at the Institute of Terrestrial Ecology, Banchory Research Station Part I The diet of fish-eating birds in Scotland* 123pp Scottish Office Agriculture and Fisheries Department
- (McGee, E.J., Synott, H.J.), Kennedy, V.H., Horrill, A.D., (Nielsen, S.P., Johanson, K.J. & Veresoglou, D.S.)** 1995 *Radiation doses and pathways to man from semi-natural ecosystems* Final report September 1992 - June 1995 Commission of the European Communities
- McGowan, G.M.** 1995 *An assessment of the condition of alders (Alnus glutinosa) in the Spey Wellfield area* October 1995 15pp Grampian Regional Council
- McGowan, G.M. & Bayfield, N.G.** 1995 *A bioengineering scheme to revegetate and stabilise scree slopes at Fort William* October 1995 23pp Alcan Smelting and Power UK
- McGowan, G.M. & Bayfield, N.G.** 1996 *Aonach Mor management plan* March 1996 48pp Nevis Range Development Company
- McGowan, G.M. & (Gunn, I.D.M.)** 1995 *Environmental monitoring in the Spey Wellfield* 1995 December 1995 27pp Grampian Regional Council
- McGowan, G.M., (Holman, D. & Dagg, T.)** 1995 *Aonach Mor environmental audit 1995* October 1995 36pp Nevis Range Development Company
- (Miller, P.C.H.), Pywell, R.F., (Lane, A.G. & Tillet, N.D.)** 1996 *The control of injurious weeds in herb-rich grassland in Environmentally Sensitive Areas* Interim report January 1996 70pp Ministry of Agriculture, Fisheries and Food
- Moffat, T.J., (Cannell, B.), Thomas, A.H. & Bell, B.G.** 1996 *Scoping study to define a programme of work relating to data and quality assurance within the Environmental Diagnostics Thematic Programme* Final report January 1996 37pp Environmental Diagnostics Programme Working Group on Data and Quality Assurance
- Moss, D. & Cox, R.** 1995 *NATURA 2000 network database site data entry, editing and retrieval for PCs using dBASE software* 35pp Commission of the European Communities
- Moss, D. & Davies, C.** 1995 *Preliminary assessment of the state of flora, fauna and habitats in the West Atlantic Biogeographic Region* October 1995 European Environment Agency,

APPENDIX 4

- European Topic Centre on Nature Conservation
- Moss, D. & Roy, D.** 1995 *Habitat classification* November 1995 European Environment Agency, European Topic Centre on Nature Conservation
- Moss, D., Davies, C. & Roy, D.** 1995 *Maintenance and review of the CORINE biotopes sites database* November 1995 50pp European Environment Agency, European Topic Centre on Nature Conservation
- Moss, D., (Roekaerts, M.), Davies, C., Forrest, W. & (Nilis, R.)** 1995 *Implementation of Council Directive 79/409/EEC computerisation of data relating to Special Protection Areas* Final report September 1995 112pp Commission of the European Communities
- Moss, D., Rose, R. J., Conroy, J. W. H., Taylor, P., Roy, D. B., Hankard, P. & Eversham, B. C.** 1995 *Biogeographic pilot studies (Phase 1) West Atlantic biogeographic region* November 1995 27pp European Environment Agency, European Topic Centre on Nature Conservation
- Moss, R.** 1995 *Capercaillie in Craigmore Wood* 1995 December 1995 5pp Horsens Folkeblad A/S
- Mountford, J. O., Treweek, J. R. (eds), Barratt, D. R., Bodley, A., Dunbar, F., Green, I. Manchester, S. J., Sparks, T. H., (Gilbert, J. C., Gowing, D. J. G. & Spoor, G.)** 1996 *Assessment of the effects of managing water levels to enhance ecological diversity* Second annual report March 1996 53pp Ministry of Agriculture, Fisheries and Food
- Mountford, J. O., Treweek, J. R. (eds), Barratt, D. R., Manchester, S. J., McNally, S., Myhill, D. G., Pywell, R. F., Sparks, T. H., Walker, K., (Tallowin, J. R. B., Smith, R. E. N., Hodge, I. & Gowing, D. J. G.)** 1996 *Wetland restoration techniques for an integrated approach, phase III survey and experimentation* Third annual report March 1996 75pp Ministry of Agriculture, Fisheries and Food
- Moy, I. L.** 1995 *Wyth Farm development Cold Harbour vegetation survey* November 1995 11pp BP Exploration
- (Mugisha, S., Pomeroy, D.) & Fuller, R. M.** 1996 *Darwin Initiative computers in terrestrial ecology, Sango Bay, Uganda* Final report on extension March 1996 8pp Department of the Environment, Darwin Initiative
- (Neal, C.), Reynolds, B. & (Wilkinson, J.)** 1995 *The impact of conifer harvesting and replanting on upland water quality* R & D progress report for period February 1995 – June 1995 13pp Published by NRA as R&D Progress Report 502/3/W National Rivers Authority
- Newton, I., Dale, L., Freestone, P., French, M. C., Malcolm, H., Osborn, D., Wright, J., Wyatt, C. & Wyllie, I.** 1995 *Wildlife and pollution 1994/95 annual report* July 1995 42pp Published by JNCC as report no 248 Joint Nature Conservation Committee
- Parr, T. W.** 1995 *Information and indicators to give an overview of UK wildlife* Report on DOE Workshop to develop a framework and indicator criteria for reporting on UK wildlife April 1995 Department of the Environment
- Parr, T. W., Bunce, R. G. H., Hallam, C., Scott, A., Eversham, B. C., Harding, P., Roy, D., (Henderson, I. G., Baillie, S. R., Crick, H. Q. P., Furse, M. T., Harris, S. & Woivod, I. P.)** 1996 *Information and indicators to give an overview of UK wildlife* Final report January 1996 2 vols Department of the Environment
- Pearce, I., Lindley, P. & Holman, D.** 1995 *Assessment of sites S2 and S13 at Oakenhead Wood for invertebrates and mammals* September 1995 10pp Mott MacDonald
- Pearce, I. S. K., Conroy, J. W. H. & Holman, D. J.** 1995 *Preliminary habitat and otter surveys of routes for the Fochabers bypas* September 1995 13pp Holford Associates
- Pearce, I. S. K., Halliwell, E. C. & Lindley, P. J.** 1995 *Assessment of sites C, K, M and O at Moray East for birds, invertebrates and mammals* September 1995 11pp Mott MacDonald
- Pearson, B.** 1995 *1994-1995 Goatborn Peninsula winter shorebird survey* August 1995 25pp BP Exploration
- Pearson, B.** 1995 *Nightjar survey, Goatborn* September 1995 11pp BP Exploration
- Picozzi, N. & Conroy, J.** 1996 *Effect of the farm woodland schemes on birdlife* February 1996 In *Evaluation of the Farm Woodland Premium Scheme*, edited by J R Crabtree Scottish Office Agriculture, Environment and Fisheries Department
- Picozzi, N., Moss, R. & Catt, D. C.** 1995 *Breeding ecology of capercaillie in Scotland* Final report April 1995 51pp Forestry Authority
- Picozzi, N., Moss, R. & Catt, D. C.** 1995 *Habitat and diet of capercaillie in a commercial plantation in central Scotland* Final report March 1995 Scottish Forestry Trust
- Pitcairn, C. E. R., Leith, I. D., Sutton, M. A., Fowler, D., Binnie, J., Munro, R. C., Sheppard, L. J. & Rossall, M [J]** 1996 *Effects of ammonia on natural plant communities in an agricultural landscape* Interim report 22pp English Nature
- Preston, C. D. & Croft, J. M.** 1995 *Database and atlas of aquatic vascular plants in the British Isles Part II species accounts* May 1995 356pp National Rivers Authority
- Pywell, R. F.** 1994 *Potential costs of heathland restoration following the widening of the M3 motorway at Chobham Common, Surrey* RPS Clouston Ltd
- Pywell, R. F., (Evans, R. & Smith, P.)** 1996 *Environmental Term Commission for Salisbury Plain Training Area Ecological baseline survey framework document* February 1996 Defence Estates Organisation, Ministry of Defence
- Pywell, R. F., Bullock, J. M., Pakeman, R. J., Mountford, J. O., Warman, E. A., Wells, T. C. E. & Walker, K.** 1995 *Review of calcareous grassland and heathland management* Final report December 1995 173pp Ministry of Agriculture, Fisheries and Food
- Radford, G. L. & Bell, S. A.** 1996 *Tir Cymen evaluation and monitoring* Third interim report February 1996 5pp Entec UK Ltd
- Radford, G. L., Paterson, I. S. & Bell, S. A.** 1995 *Botanical monitoring of four exemplar compressor stations 1992 to 1995* December 1995 58pp British Gas
- Reading, C. J.** 1994 *Evaluation of reptile survey methodologies* 2nd interim report 3pp English Nature
- Reading, C. J.** 1996 *Colonisation of the Tollesbury 'set back' site by intertidal animals* Final report January 1996 35pp Ministry of Agriculture, Fisheries and Food
- Reading, C. J., (Buckland, S., Gorzula, S.), McGowan, G. M. & Staines, B. W.** 1994 *A review of the incidence of adder Vipera berus bites in man and domestic animals* March 1994 36pp Published in 1995 by SNH as Scottish Natural Heritage Review no 35 Scottish Natural Heritage
- Reading, C. J., (Buckland, S. T.), McGowan, G. M., (Gorzula, S., Jayasinghe, G.), Staines, B. W., (Elston, D. A. & Ahmadi, S.)** 1994 *Status of the adder Vipera berus in Scotland*

- Final report April 1994 84pp
Published in 1995 by SNH as Scottish
Natural Heritage Research, Survey and
Monitoring Report no 38 Scottish
Natural Heritage
- Reynolds, B. & Sparks, T.H.** 1995
*Assessments of soil critical loads
methodology & longterm trends in
streamwater chemistry* Final report
May 1995 33pp Department of the
Environment
- Reynolds, B., Howard, D.C. &
Hornung, M.** 1995 *Dynamic &
landscape modelling of critical loads a
demonstration project* April 1995
58pp National Power
- Rose, R.J. & Webb, N.R.** 1995
Heathland re-creation plan for Dorset
July 1995 3 vols English Nature
- Sanchez, A.L. & Singleton, D.L.** 1996
*Dietary study to assess intake of
radionuclides of people living close to
nuclear installations 1 Sellafield*
March 1996 26pp Ministry of
Agriculture, Fisheries and Food
- Sheppard, L.J., Crossley, A.,
Harvey, F.J., Cape, J.N. & Fowler, D.**
1995 *Long term effects of a field
exposure to acid mist on the
performance of a single Sitka spruce
clone* Final report July 1995 75pp
Department of the Environment
- (Smith, K.A., Christensen, S.),
Fowler, D., (Harriss, G.W.,
Clayton, H., Arah, J.H.M.,
McTaggart, I., Ambus, P.), Skiba, U.,
Hargreaves, K.J., Cape, J.N.,
(Wienhold, F.G., Frahm, H. &
Welling, M.)** 1995 *Emission and
sorption of the greenhouse gas nitrous
oxide by agricultural soils and natural
wetlands* Final report Commission of
the European Communities
- Snazell, R.G. & Ward, L.K.** 1995 *M3
Bar End to Compton proposals for
ecological monitoring, summer 1995*
April 1995 18pp Mott MacDonald
Civil Ltd
- Snazell, R.G., Rispin, W.E. &
Thomas, J.A.** 1995 *M3 Bar End to
Compton invertebrate monitoring
Arenthusa clump chalk grassland
restoration 1994* May 1995 74pp
Mott MacDonald Civil Ltd
- Stark, G., Watkins, J. & Barr, C.** 1996
*An analysis of Countryside Survey 1990
woodland data* March 1996 39pp
Department of the Environment
- Stevens, P.A., Bell, S.A., Brittain, S.A.,
Hughes, S. & Lowe, J.A.H.** 1995 *Soil/
plant interactions in lowland
grasslands – Great Orme study, final
report* September 1995 60pp
Countryside Council for Wales
- Stevens, P.A., (Ormerod, S.J.),
Reynolds, B., Lowe, J.A.H., Thomas, A.H.
& (Phillips, D.)** 1995 *Third quarterly
report for the Acid Waters Survey* May
1995 6pp National Rivers Authority,
Welsh Office, Countryside Council for
Wales, Forestry Authority
- Stevens, P.A., (Ormerod, S.J.,
Brewin, P.B., Buckton, S.T.),
Lowe, J.A.H., (Phillips, D.), Skotnicki, A.
& (Wilkinson, S.M.)** 1995 *Fourth
quarterly report for the Acid Waters Survey,
August 1995* August 1995 6pp
National Rivers Authority, Welsh Office,
Countryside Council for Wales, Forestry
Authority
- Stevens, P.A., (Ormerod, S.J.),
Lowe, J.A.H., (Phillips, D.), Thomas, A.H.
& (Wilkinson, S.M.)** 1995 *Fifth quarterly
report for the Acid Waters Survey*
November 1995 10pp National Rivers
Authority, Welsh Office, Countryside
Council for Wales, Forestry Authority
- Stirling, C.M., Ashenden, T.W. &
Williams, T.G.** 1995 *European Stress
Physiology and Climate Experiment
(ESPACE) – grass* Interim report
December 1995 20pp Commission of
the European Communities
- (Strand, P.), Howard, B. & (Averin, V.),
eds.** 1996 *Transfer of radionuclides to
animals, their comparative importance
under different agricultural ecosystems
and appropriate countermeasures*
Commission of the European
Communities
- (Strand, P.), Howard, B.J., (Skuterud, L.
& Averin, V.)** 1995 *Interim report
summarising progress of ECP9, 1 December
1994 – 31 August 1995* August 1995
4pp Commission of the European
Communities
- Sutton, M.A., Fowler, D.,
(ApSimon, H.M., Jarvis, S.C., Pain, B.F.,
Harrison, R., Lee, D.S.), Hornung, M.,
Bull, K. & Reynolds, B.** 1995 *Ammonia
Distribution and Effects Project (ADEPT)
distribution, deposition and
environmental impacts of ammonia
emitted by agriculture* First year interim
report September 1995 Ministry of
Agriculture, Fisheries and Food
- Sutton, M.A., Fowler, D., Burkhardt, J.K.,
Milford, C., Smith, R.I. & Storeton-
West, R.L.** 1995 *Sources and sinks of
ammonia in the United Kingdom* Final
report September 1995 Department of
the Environment
- Sutton, M.A., Fowler, D., Flechard, C.J.,
Milford, C., Nemitz, E., Singles, R.J.,
Smith, R.I. & Storeton-West, R.L.** 1995
*Exchange of atmospheric ammonia with
ecosystems in the United Kingdom*
Interim report September 1995
Department of the Environment
- Sutton, M.A., Fowler, D., Wyers, G.P.,
San Jose, R., Schjorring, J.K.,
Meixner, F.X. & Nefel, A.** 1995
*Exchange of atmospheric ammonia with
European ecosystems (EXAMINE)*
Interim progress report Commission of
the European Communities
- Thofner, I., McGowan, G.M. &
Bayfield, N.G.** 1996 *Survey of the
Benn A' Bhurd summit vehicle track
and reinstatement guidelines* January
1996 38pp Smiths Gore
- Thomas, J.A.** 1995 *Habitat creation for
butterflies beside the M40 in 1994*
August 1995 14pp Symonds Travers
Morgan
- Thomas, J.A.** 1996 *Management
proposals for Hembury Woods rough
grazings (sites X and Y)* March 1996
16pp English Nature, Butterfly
Conservation Society
- Thomas, J.A.** 1996 *The re-
establishment of the large blue butterfly
Maculinea arion in the UK historical
perspective and proposals for 1996-
2006* 19pp Butterfly Conservation
Society
- Thomas, J.A. & Curtis, R.J.** 1995 *M1
widening junctions 10-15 black
hairstreak survey 1995* 10pp Kelsey
Associates
- Thomas, J.A., Simcox, D.J. &
Curtis, R.J.** 1996 *The large blue
butterfly in 1995* January 1996 27pp
English Nature, Butterfly Conservation
Society
- Wadsworth, R.A., Brown, M.J.,
Chamberlain, H.M., Swetnam, R.D. &
Bull, K.R.** 1995 *Modelling the effects of
Aberthaw power station on air quality*
December 1995 Her Majesty's
Inspectorate of Pollution
- Wadsworth, R.A., Brown, M.J.,
Chamberlain, H.M., Swetnam, R.D. &
Bull, K.R.** 1995 *Modelling the effects of
Blyth power station on air quality*
December 1995 Her Majesty's
Inspectorate of Pollution
- Wadsworth, R.A., Brown, M.J.,
Chamberlain, H.M., Swetnam, R.D. &
Bull, K.R.** 1995 *Modelling the effects of
Cottam power station on air quality*
December 1995 Her Majesty's
Inspectorate of Pollution
- Wadsworth, R.A., Brown, M.J.,
Chamberlain, H.M., Swetnam, R.D. &
Bull, K.R.** 1995 *Modelling the effects of
Didcot power station on air quality*

APPENDIX 4

- December 1995 Her Majesty's Inspectorate of Pollution
- Wadsworth,R.A., Brown,M.J., Chamberlain,H.M., Swetnam,R.D. & Bull,K.R.** 1995 *Modelling the effects of Drakelow power station on air quality* December 1995 Her Majesty's Inspectorate of Pollution
- Wadsworth,R.A., Brown,M.J., Chamberlain,H.M., Swetnam,R.D. & Bull,K.R.** 1995 *Modelling the effects of Drax power station on air quality* December 1995 Her Majesty's Inspectorate of Pollution
- Wadsworth,R.A., Brown,M.J., Chamberlain,H.M., Swetnam,R.D. & Bull,K.R.** 1995 *Modelling the effects of Eggborough power station on air quality* December 1995 Her Majesty's Inspectorate of Pollution
- Wadsworth,R.A., Brown,M.J., Chamberlain,H.M., Swetnam,R.D. & Bull,K.R.** 1995 *Modelling the effects of Fawley power station on air quality* December 1995 Her Majesty's Inspectorate of Pollution
- Wadsworth,R.A., Brown,M.J., Chamberlain,H.M., Swetnam,R.D. & Bull,K.R.** 1995 *Modelling the effects of Ferrybridge power station on air quality* December 1995 Her Majesty's Inspectorate of Pollution
- Wadsworth,R.A., Brown,M.J., Chamberlain,H.M., Swetnam,R.D. & Bull,K.R.** 1995 *Modelling the effects of Fiddlers Ferry power station on air quality* December 1995 Her Majesty's Inspectorate of Pollution
- Wadsworth,R.A., Brown,M.J., Chamberlain,H.M., Swetnam,R.D. & Bull,K.R.** 1995 *Modelling the effects of Grain power station on air quality* December 1995 Her Majesty's Inspectorate of Pollution
- Wadsworth,R.A., Brown,M.J., Chamberlain,H.M., Swetnam,R.D. & Bull,K.R.** 1995 *Modelling the effects of High Marnham power station on air quality* December 1995 Her Majesty's Inspectorate of Pollution
- Ward,L.K.** 1995 *M3 Bar End to Compton botanical monitoring flood meadow restoration* 1995 December 1995 39pp Mott MacDonald Civil Ltd
- Ward,L.K.** 1995 *Species Action Plan New Forest Cicada (Insecta Cicadidae)* 10pp English Nature
- Ward,L.K.** 1995 *Species Recovery Programme – New Forest Cicada (Cicadetta montana Scopoli) (Hemiptera Cicadidae) progress report* 1995 December 1995 19pp English Nature
- Ward,L.K. & Snazell,R.G.** 1995 *M3 Bar End to Compton botanical monitoring Arethusa clump chalk grassland restoration* 1995 December 1995 81pp Mott MacDonald Civil Ltd
- Waterhouse,E.C.** 1995 *Bioassay experiments on the toxicity of oils to coastal plant species* May 1995 34pp Department of Transport
- Waterhouse,E.C.** 1995 *A survey of H15 communities in the Loch Portraim area, North Uist* April 1995 3pp Redland Aggregates Ltd
- Watt,A.D., Barbour,D.A. & McBeath,C.** 1995 *The invertebrate fauna associated with birch in spruce forests* Scottish Natural Heritage, Forestry Authority
- Watt,A.D., (Stork,N.), McBeath,C. & (Bolton,B.)** 1994 *Ecology of insects in Cameroon plantation forests* Forest Management and Regeneration Project ONADEF/ODA Mbalmayo, Cameroon Fourth consultancy report Overseas Development Administration
- Watt,A.D., Dick,J.McP., (Cornelius,J.P.), Newton,A.C. & (Hernandez,M)** 1995 *CATIE/ITE link – phase II Genetic improvement of Central American trees* Second annual report Overseas Development Administration
- Webb,A. & Bacon,P.J.** 1995 *DeeCAMP1 DRS, Deeside rivers survey recommendations to DeeCAMP clients* May 1995 34pp Scottish Natural Heritage, Dee Salmon Fishing Improvement Association, North-East River Purification Board, Grampian Regional Council
- Weeks,J.M.** 1995 *Techniques for evaluating the biological quality of rivers in the UK* May 1995 13pp Her Majesty's Inspectorate of Pollution
- Welch,D., Scott,D. & Watson,A.** 1995 *Monitoring the effects of snow fencing on vegetation, herbivores and soils at Glas Maol in 1994* 17pp Published by SNH as Research Survey and Monitoring Report no 35 Scottish Natural Heritage
- Welch,D., Scott,D., Staines,B., Stolte,A. & Marshall,K.** 1995 *Monitoring the effects of fencing out red deer at Ballochbuie Pinewood* Report for 1994 and 1995 October 1995 27pp Balmoral Estate
- Wilson,J.** 1995 *Consultancy visit to Projeto Bionte, 8–22 June 1995* July 1995 9pp Overseas Development Administration
- Wilson,J., Gillies,A., Newton,A., (Cornelius,J., Navarro,C., Hernandez,M., Kremer,A., Labbe,P. & Caron,H.)** 1995 *Assessment of genetic diversity of economically and ecologically important tropical tree species of Central America and the Caribbean implications for conservation, sustainable utilization and management* November 1995 34pp Commission of the European Communities
- Wilson,J., (Shiemo,P.N., Wainwright,J. & Newton,A.C.)** 1995 *Domestication of fruit trees and other non-timber economic species Kumba Forest Products (KFP) Project Annual report* May 1995 9pp Darwin Initiative
- (Wright,J.F.), Moss,D. & (Symes,K.L.)** 1995 *Moors river invertebrates data analysis* December 1995 English Nature
- (Wright,J.F., Furse,M.T.), Clarke,R.T., Moss,D., (Gunn,R.J.M., Blackburn,J.H., Symes,K.L., Winder,J.M., Grieve,N.J. & Bass,J.A.B.)** 1996 *Testing and further development of RIVPACS* 2 vols (77pp & 110pp) National Rivers Authority
- Wright,S.M., Brown,M.J. & Bull,K.R.** 1995 *Pollution hazard estimation system phase 1* July 1995 15pp Chapman & Hall
- Wyatt,B.K., Greator-Davies,N., (Billington,C. & Luxmore,R.)** 1995 *Harmonization of nomenclature for recording land use and land cover globally – interim report* October 1995 United Nations Environment Programme, Food and Agriculture Organisation
- Wyllie,I.** 1996 *Specialist advice and support for red kite project (final report)* February 1996 5pp English Nature
- Yates,M.G., Clarke,R.T., Swetnam,R.D., Eastwood,J.A., Durell,S.E.A.le V. Dit, (West,J.R.), Goss-Custard,J.D., (Clark,N.A. & Rehfish,M.)** 1996 *Estuaries, sediments and shorebirds I Determinants of the intertidal sediments of estuaries* 90pp Energy Technology Support Unit

APPENDIX 5

ITE publications

HMSO publishes for the Institute, and acts as an agent for a substantial backlist of ITE titles. Unless specified otherwise, all books are paperback with prices shown net (as per the Net Book Agreement), and are available from HMSO bookshops.

**Soil and soil/vegetation
interactions**

Cotton strip assay: an index of decomposition in soils (ITE symposium no 24)
A F Harrison, P M Latter & D W H Walton (eds)
176pp 1 870393 06 6 £12 50 1988

Land use science

Agriculture and the environment (ITE symposium no 13) D Jenkins (ed)
195pp 0 904282 73 3 £3 50 1984

The biology and management of the River Dee (ITE symposium no 14)
160pp 0 904282 88 0 £6 00 1985 D Jenkins (ed)

Britain's railway vegetation C Sargent
34pp 0 904282 76 7 £3 50 1984

Coast dune management guide D S Ranwell & R Boar
105pp 0 904282 93 7 £3 00 1986

Cumbrian woodlands (ITE symposium no 25) J K Adamson (ed)
94pp 0 11 701421 4 £7 10 1989

Ecology of blaeberry and its management in British moorlands
D Welch, D Scott, R Moss & N G Bayfield
39pp 0 870393 21 X 1994 £6 00

Environmental aspects of plantation forestry in Wales (ITE symposium no 22)
77pp 1 870393 02 3 £3 25 1987 J E G Good (ed)

A field key for classifying British woodland vegetation: Part I R G H Bunce
103pp 0 904282 68 6 £3 00 1982

A field key for classifying British woodland vegetation: Part II R G H Bunce
95pp 0 11 701417 6 £7 95 1989

Identification of ectomycorrhizas (ITE research publication no 5)
K Ingleby, P A Mason, F T Last & L V Fleming
112pp 0 11 701461 3 £30 00 1990

Land use change: the causes and consequences (ITE symposium no 27)
201pp 0 11 701553 9 £35 00 1992 M C Whitby (ed)

Managing set-aside land for wildlife (ITE research publication no 7)
146pp 0 11 701568 7 £9 95 1993 L G Firbank

	Moorland management: a study of Exmoor	G R Miller, J Miles & O W Heal
130pp	0 904282 79 1 £4 50	1984
	Pasture woodlands in lowland Britain	P T Harding & F Rose
94pp	0 904282 91 0 £5 00	1986
	Rural information for forward planning (ITE symposium no 21)	R G H Bunce & C J Barr (eds)
115 pp	1 870393 05 8 £5 50	1988
	The temperate forest ecosystem (ITE symposium no 20)	Yang Hanxi, Wang Zhan, J N R Jeffers & P A
189pp	1 870393 01 5 £7 50	1987
	Tropical trees: the potential for domestication and the rebuilding of forest resources (ITE symposium no 29)	R R B Leakey & AC Newton (eds)
284pp	0 11 701562 8 £40 00	1994
	The use of land classification in resource assessment and rural planning	R S Smith
43pp	0 904282 62 7 £3 00	1982
	Vegetation change in upland landscapes	D F Ball, J Dale, J Sheal & O W Heal
45pp	0 904282 64 3 £2 00	1982
	Bedford Purlieus (ITE symposium no 7)	G F Peterken & R C Welch (eds)
209pp	0 904282 05 8 £1 00	1975
	Birds of St Kilda	M P Harris & S Murray
42pp	0 904282 27 9 £6 50	1989
	Butterfly research in ITE	M L Hall
28pp	0 904282 46 5 £1 50	1981
	Conserving otters	D Jenkins
14pp	0 904282 44 9 £1 00	1980
	Heather in England and Wales (ITE research pub no 3)	R G H Bunce (ed)
40pp	0 11 701422 2 £2 95	1989
	<i>Spartina anglica</i> – a research review (ITE research publication no 2)	A J Gray & P E M Benham (eds)
80pp	0 11 701477 X £8 75	1990
	The status of the Atlantic salmon in Scotland (ITE symposium no 15)	D Jenkins & W M Shearer (eds)
127pp	0 904282 92 9 £3 00	1986
	Acidification and fish in Scottish lochs	P S Matland, A A Lyle & R N B Campbell
71pp	1 870393 04 X £3 50	1987
	Critical loads: concepts and applications (ITE symposium no 28)	M Hornung & R A Skeffington (eds)
134pp	0 11 701666 7 £30 00	1993
	Early diagnosis of forest decline	J N Cape, I S Paterson, A R Wellburn, J Wolfenden, M Mehlhorn, P Freer-Smith & S Fink
68pp	1 870393 07 4 £5 00	1988
	Effects of air pollutants on agricultural crops	F T Last, D Fowler & P H Freer-Smith
27pp	0 904282 90 2 £2 00	1985

Biodiversity and population processes

Pollution

Pollution in Cumbria (ITE symposium no 16)			P Ineson (ed)
92pp	0 904282 96 1	£52 50	1986
Predatory birds, pesticides and pollution			A S Cooke, A A Bell & M B Haas
74pp	0 904282 55 4	£4 00	1982
Radionuclides in terrestrial ecosystems			K L Bocock
27pp	0 904282 42 2	£2 00	1981
<hr/>			
Climate change and rare species in Britain (ITE research publication no 8)			G W Elmes & A Free (eds)
28pp	0 11 701802 3	1994	£6 00
Climatic change, rising sea level and the British coast			L A Boorman, J D Goss-Custard & S McGrorty
(ITE research publication no 1)			
24pp	0 11 701429 X	£2 75	1989
Climatological maps of Great Britain			E J White & R I Smith
37pp	0 904282 69 4	£2 00	1982
Demonstrating climate change impacts in the UK			T W Parr & A Eatherall
18pp	1 870393 23 6	1994	£9 95
The greenhouse effect and terrestrial ecosystems of the UK			M G R Cannell & M D Hooper (eds)
(ITE research publication no 4)			
56pp	0 11 701488 5	£2 45	1990
<hr/>			
Atlas of mammals in Britain (ITE research publication no 6)			H R Arnold
145pp	0 11 701667 5	£12 50	1993
Biological recording of changes in British wildlife (ITE symposium no 26)			P T Harding (ed)
78pp	0 11 701560 1	£19 50	1992
Chemical analysis in environmental research (ITE symposium no 18)			A P Rowland (ed)
104pp	0 904282 98 8	£7 00	1987
Ecological mapping from ground, air and space (ITE symposium no 10)			R M Fuller (ed)
142pp	0 904282 71 6	£6 00	1983
Register of permanent vegetation plots			M O Hill & G L Radford
32pp	0 904282 86 4	£2 00	1986
Woodlice in Britain and Ireland: distribution and habitat			P T Harding & S L Sutton
152pp	0 904282 85 6	£5 00	1985

Global change

Integrating generic science

The following titles have been published by the Biological Records Centre at ITE Monks Wood, and are available from Publication Sales, ITE Merlewood

Provisional atlases

Provisional atlas of the insects of the British Isles: Part 4, Siphonaptera, fleas
72pp 0 900848 70 7 £1 00 1974 R S George

Atlas of the non-marine Mollusca of the British Isles M P Kerney
105pp 0 904282 02 3 £3 00 1976

Provisional atlas of the nematodes of the British Isles: Parts 1-3. Longidoridae, Trichodoridae and Criconematidae

D J F Brown, C E Taylor, B Boag, T J W Alphey & K J Orton-Williams
74pp 0 904282 04 X £2 00 1977

Provisional atlas of the insects of the British Isles: Part 8, Trichoptera Hydroptilidae, caddisflies (Part 1)

J E Marshall
35pp 0 904282 18 X £2 00 1978

Provisional atlas of the insects of the British Isles: Part 5, Hymenoptera: Formicidae, ants

K E J Barrett
51pp 0 904282 39 2 £3 00 1979

Provisional atlas of the lacewings and allied insects (Neuroptera, Megaloptera, Raphidioptera and Mecoptera) of Britain and Ireland

C W Plant
203pp 1 870393 18 X £6 50 1994

Provisional atlas of the marine dinoflagellates of the British Isles J D Dodge
142pp 0 904282 53 8 £4 00 1981

Provisional atlas of the mycomycetes of the British Isles

B Ing
104pp 0 904282 67 8 £1 00 1982

Provisional atlas of the marine algae of the British Isles

T A Norton
67pp 0 904282 89 9 £3 50 1985

Provisional atlas of the Sepsidae (Diptera) of the British Isles

A Pont
33pp 1 870393 00 7 £3 00 1986

Provisional atlas of the insects of the British Isles: Part 9, Hymenoptera: Vespididae, social wasps

M E Archer
18pp 0 904282 38 4 £2 50 1987

Provisional atlas of the centipedes of the British Isles A D Barber & A N Keay
127pp 1 870393 08 2 £7 00 1988

Provisional atlas of the ticks (Ixodoidea) of the British Isles

K P Martyn
62pp 1 870393 09 9 £4 00 1988

Provisional atlas of the click beetles (Coleoptera: Elateroidea) of the British Isles

H Mendel
89pp 1 870393 11 2 £5 50 1990

Provisional atlas of the Larger Brachycera (Diptera) of the British Isles

C M Drake
131pp 1 870393 14 7 £5 00 1991

Provisional atlas of the long-palped craneflies (Diptera: Tipulinae) of Britain and Ireland

A E Stubbs
134pp 1 870393 16 3 £5 00 1992

Provisional atlas of the Cryptophagidae-Atomariinae (Coleoptera) of Britain and Ireland

C Johnson
34pp 1 870393 17 1 £5 50 1993

Provisional atlas of the ptychopterid craneflies (Diptera: Ptychopteridae) of Britain and Ireland

A E Stubbs
91pp 1 870393 19 8 £2 50 1993

Final atlas

Atlas of the non-marine Mollusca of the British Isles M P Kerney
105pp 0 904282 02 3 £3 00 1976

Other title

Recent surveys and research on butterflies in Britain and Ireland: a species index and bibliography
P T Harding & S V Green
42pp 1 870393 15 5 £2 50 1991

New titles published by HMSO in 1995-96

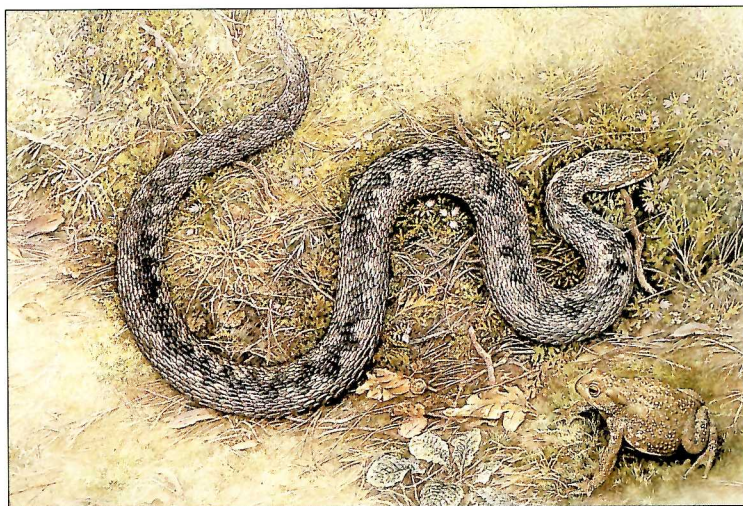
Atlas of amphibians and reptiles in Britain (ITE research publication no. 10)

H R Arnold

Almost 50 000 records of sightings of amphibians and reptiles have been collected since the 1940s. This atlas summarises all the data to give the most accurate picture available to date of the distribution of amphibians and reptiles in Britain.

Each species is described and a table gives habitat information where available. A map shows the species' distribution in Great Britain and the Channel Islands up to 1969 and from 1970 onwards. In all, 14 species are mapped, with notes on a further ten introduced species of limited or uncertain

40pp 0 11 701824 4 1995 £8.95



Atlas of the dragonflies of Britain and Ireland (ITE research publication no. 9)

R Merritt, N W Moore and B C Eversham

This volume contains not only the most comprehensive and complete set of distribution maps, but also information on all the resident and more frequent immigrant dragonflies in Britain and Ireland. It takes a look at the present and changing status of dragonfly species, provides new insight into their distribution, gives descriptions to aid recognition, and summarises aspects of behaviour and details of habitat. The information for the Atlas comes from the recording scheme set up at the Biological Records Centre 25 years ago which, apart from deepening our understanding of dragonflies, has focused attention on the need for conservation measures. This book includes important and notable discoveries made in the course of the research, and provides a history of conservation in Britain and Ireland and the context and rationale for future efforts. It is a book which will be of interest not only to amateur naturalists and field workers but also to students and professional biologists.

149pp

0 701561 X

1996

£15.95

**This report was published
by ITE during the year for
the Department of the
Environment**

Critical loads of acid deposition for UK freshwaters

This report by the Critical Loads Advisory Group, sub-group on Freshwaters, presents the first complete maps of critical loads for acid deposition for UK freshwaters. It presents the conceptual basis of the methodology used and differentiates between the base critical load for a site, as defined by the diatom model, and the critical loads for individual species, as defined by the Henriksen steady-state chemistry model.

80pp 1 870393 25 2 1995

APPENDIX 6

Environmental data network

The Institute holds many digital (and paper-based) databases, some held by individual scientists and some by EIC and other centres; some are live databases which are continually managed and extended by the addition of more data, and some form archives which are created after research projects have been completed.

The Environmental Information Centre (EIC) is one of seven designated data centres within NERC with the responsibility for implementing the published NERC policy on the management and exploitation of NERC's data resource. Based at ITE Monks Wood, EIC maintains standards of data management and accessibility within the Institute, and acts as the focus for a distributed data network of regional centres and science groups at each ITE station.

The Centre is custodian of a number of key national and European repositories of environmental data, covering land characteristics, the distribution and properties of flora, fauna and habitats, and the impacts of environmental change. EIC also undertakes research into the methods of environmental data acquisition, analysis and use, particularly the application of advanced information technologies like remote sensing and geographical information systems (GIS).

EIC comprises three component units

- The *Biological Databases Unit* compiles and manages spatially and temporally referenced databases on the biodiversity of the British Isles and databases on sites of importance for wildlife conservation in Europe
- The *Remote Sensing Unit* uses remote sensing for applications in ecology and land use, in particular natural resource management and land use planning
- The *Geographical Information Systems Unit* is developing and applying methods of spatial data analysis and modelling to

appropriate areas of the Institute's strategic science and commissioned research programmes. The Unit also undertakes technical developments in respect of the use of GIS in ecological research and the provision of technical support for the GIS centres at other ITE stations.

The Centre is home to the UK National Critical Loads Mapping Centre, which maintains a database of the vulnerability of the land surface of Great Britain to the effects of atmospheric pollution. EIC is a component of two European Topic Centres (on Nature Conservation and on Land Cover) within the European Environment Agency, and also the location for a data centre which services the needs of coastal ecologists in the NERC Land/Ocean Interaction Study (LOIS).

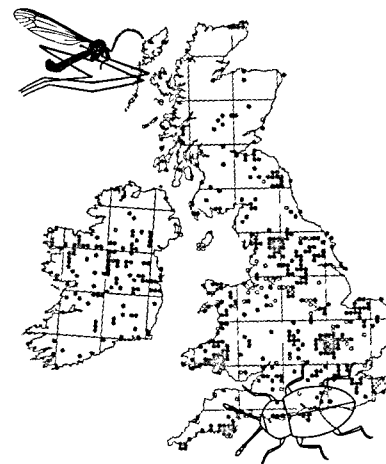
Outside EIC there are other research programmes developing large spatial and/or temporal databases which are linked into the data network. The largest of these programmes is conducted by the Land Use Section (LUS) at ITE Merlewood. The main function of the Section is to carry out research which explains the relationship between the distribution of plant species and human activities in Great Britain. The work includes field survey of land cover, landscape features and vegetation through monitoring of random sample points throughout GB (eg Countryside Survey 1990), and the main scientific activities are vegetation and land classification, like the ITE land classification based on environmental parameters such as climate, geology and topography. A

recent product of the Section's research is the Countryside Information System, a PC- and Microsoft Windows-based system providing easy and flexible access to information about the British countryside. In addition to research on the ecology of land use, the UK Environmental Change Network (ECN) long-term monitoring programme is a joint venture with 17 sponsoring agencies which is managed at Merlewood by a Central Co-ordination Unit. The Unit also runs two of the founding sites at Moor House/Upper Teesdale in the northern Pennines, and at Wytham Woods in Oxfordshire. ECN's role is to collect, analyse and interpret data from a network of representative sites on a selected set of variables likely to be driving and responding to environmental change. Because the scope of both these research programmes is geographically extensive and multidisciplinary, large datasets have been generated. For practical reasons, therefore, the databases are managed and maintained at Merlewood by dedicated data managers, who provide formal links to EIC and serve also the programme collaborators and other external customers.

In addition to the major database centres at Monks Wood and Merlewood, there are two national centres serving Scotland and Wales, and major customers such as the conservation agencies (Scottish Natural Heritage and the Countryside Council for Wales) and the Scottish and Welsh Offices. The Scottish Centre for Ecological Data (SCED), based at ITE Banchory, was established in 1993 to service requests for information that were specific to Scotland and its regions, to promote the range of ecological data available throughout ITE, and to provide expertise on national flora and fauna to help with the interpretation of the data. In the same way that SCED serves Scottish sectoral interests, so ITE Bangor serves requests for information in Wales and has direct access to the UK databases held by EIC and LUS.

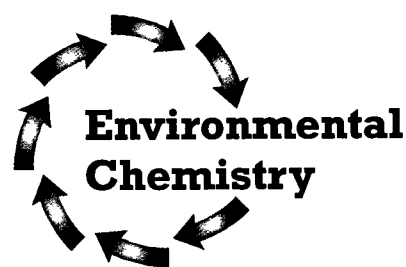
Database of the Biological Records Centre

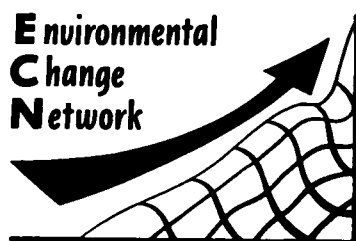
The database comprises distributions of biological species in the British Isles. The data incorporate the taxonomic code of the organism, together with geographical co-ordinates of its location, date of observation, information on habitat and conservation status. Over 6 million records covering 15 000 species are held in digital form as Oracle tables. The majority of the data are donated by volunteer recorders and are received by national recording schemes. The Biological Records Centre is also assisted in its core activities and database functions by the statutory Conservation Agencies through a support contract administered by the Joint Nature Conservation Committee. The database is used to publish distribution atlases and to provide computerised retrieval and mapping services to a wide user community. *Further information from EIC, Monks Wood*



Analytical Chemistry Databases

Since the creation of the two Analytical Sections at Merlewood and at Monks Wood in the late 1950s and early 1960s, over 300 000 biological samples have been analysed for over 2 million individual determinations. Most of the data at Merlewood relate to water, soil and vegetation analyses for major and minor nutrient and trace elements and the major ions. The data stored at Monks Wood relate to both vertebrate and invertebrate tissue, soils, water and vegetation for pesticide and toxic chemical residues. The data at these Stations are not stored in a structured computerised database, but information can be obtained from the leader of the Analytical Section at the respective Stations.





This list of databases and related information systems is not intended to be a comprehensive list but it provides information on the major corporate databases of the Institute.

Database of the UK Environmental Change Network

The Environmental Change Network (ECN) is a multi-agency, long-term monitoring programme for identifying and quantifying environmental changes associated with man's activities. It aims to distinguish man-made changes from natural variations and trends, and to give early warning of undesirable effects. ECN measurements are collected regularly at a growing number of network sites (currently 10 terrestrial and 37 freshwater) throughout the UK, using standardised protocols. The data cover a wide range of physical, chemical and biological parameters, including climate, air quality, water quality and flow, soil development and chemistry, invertebrates, vertebrates, vegetation, land use and site management practice. Oracle and Arc/Info are used to handle the resulting temporal and spatial database, incorporating meta-information on data specifications, origins and quality.

Further information from ECN, Merlewood

Database of Critical Loads of Atmospheric Pollutants

The database comprises estimates of the vulnerability of the land surface of Great Britain to the effects of atmospheric pollution (particularly acid deposition), on the basis of air quality and the sensitivity of receptor soils, geology, freshwaters and vegetation (trees, semi-natural vegetation and crops). The Critical Loads Database was developed by the amalgamation of data sets from the Institute of Terrestrial Ecology, the Soil Survey and Land Research Centre (SSLRC), Macaulay Land Use Research Institute (MLURI) and the University of Aberdeen. The database is managed by the Critical Loads Mapping and Data Centre (MADC) at Monks Wood and acts as the UK National Focal Centre for the Critical

Loads Advisory Group (CLAG), which was set up in 1991 by the Department of the Environment to develop a national critical loads and levels programme.

Data within the basic database correspond to each of the c 250 000 1 km squares of the British National Grid. The data are held in digital forms within Laserscan Horizon and Arc/Info GIS and within an Oracle database. The MADC uses the database to map particular receptor pollutant combinations which are then combined with current deposition loads or exposure levels for that pollutant to produce critical load or level exceedance maps. Areas of potential damage can be quantified from these maps and these form a basis for relating policy on pollutant emission abatements to environmental benefits.

Further information from EIC, Monks Wood

CORINE Biotopes Inventory

The database is a computerised inventory of sites of international importance for nature conservation in the European Union (EU) and Finland (data for other countries are in preparation). Records identify the location and extent of over 7000 sites, with descriptions of important habitats and biological species, rationale for notification and protection status. The inventory forms a layer of the European Union CORINE (Co-ordinated Environmental Information in the European Community) geographical information system on the state of the environment of the EU, co-ordinated by the European Environment Agency.

Further information from EIC, Monks Wood



Ecological Surveys of Great Britain

The database includes information collected in field surveys of selected 1 km squares of the British National Grid, representative of 32 distinct land classes (classified according to environmental characteristics such as geology, altitude and climate derived from maps) Information includes botanical data (occurrence and cover within quadrats), soil type and strata, and land cover, and the data have been collected from up to 508 sample squares, surveyed in 1978, 1984 and 1990 (eg the Countryside Survey 1990, sponsored by the Department of the Environment, the British National Space Centre, and the Natural Environment Research Council) The data are regarded as being representative of the land classes and, by classifying every 1 km square of the National Grid, it is possible to make statistical predictions of the ecological characteristics of each square [see Countryside Information System] The national database comprises the land class assignment for each of c 250 000 1 km squares of the British National Grid together with the characteristics of each land class The map data are held digitally within Arc/Info GIS and the attribute information and summary data on the and classification are recorded in an Oracle database

Further information from LUS, Merlewood

Countryside Information System

The Countryside Information System (CIS) is a PC-based information system running under the Microsoft Windows operating environment, developed under contract to the Department of the Environment It provides easy and flexible access to information on land cover, landscape features, vegetation, soils and freshwater animals from the Countryside Survey 1990 The CIS stores, analyses and displays data by the 1 km squares of the British National Grid Two types of data are held census data which are available for each 1 km square in the country (eg designated and administrative areas and boundaries, Land Cover Map) and sample data which are

referenced to the ITE land classification (eg land cover stock and change 1978, 1984 and 1990, and linear features stock and change 1984 and 1990) Any other types of census or sample data which can be related to the 1 km square framework can be used in the CIS Data can be output as hard copy maps, tables and simple charts, or copied within Windows to other spreadsheets, graphics or desktop publishing software

Further information from LUS, Merlewood

Land Cover Map of Great Britain

The Land Cover Map of Great Britain is a digital map derived from the classification of cloud-free satellite images from the American Landsat Thematic Mapper (TM) Seventeen key land cover classes were identified throughout Britain and, of these, eight classes were subdivided into, for example, upland and lowland variants, giving a total of 25 cover types The 25 land cover types include built-up areas, arable farmland, pastures and forestry, together with a variety of semi-natural vegetation types The classes are mapped on a 25 m raster overlay of the complete land surface of Great Britain The data are held in digital form as a 25 m raster overlay on the British National Grid and can be presented in a variety of digital exchange formats They can be summarised by 1 km squares (or other resolutions) of the National Grid and summary data are also held as Oracle tables

There are a wide range of users of the Land Cover Map in organisations concerned specifically with environmental impact assessments, pollution control, water resources management, policy and planning, and environmental management Its greatest potential can be realised through integration with other data, such as geology, soils, climate, biological records, agricultural statistics, and population census for use in decision support systems and geographical information systems

Further information from EIC, Monks Wood

© NERC copyright 1996

PRINTED BY BPC BLACKPOOL • GRAPHIC REPRODUCTION BY BORDERCOLOUR

ISBN. 1 85531 169 0



**Centre for
Ecology &
Hydrology**

ISBN 1 85531 169 0

Institute of Terrestrial Ecology

*Monks Wood, Abbots Ripton, Huntingdon, Cambs PE17 2LS
Telephone: (01487) 773381/8 Fax: (01487) 773467*