

Research and Development Series

Natural Heritage Research and Development Strategy 2004 – 2009



RESEARCH AND DEVELOPMENT SERIES

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Contents

1 Overview	5
2 Why does Natural Heritage Carry out Research and Development?	5
Legal Remit	6
3 What is Natural Heritage Research and Development?	9
Definition of NH Research and Development	9
Procurement definition of Research	9
4 Goal	11
5 Objectives	11
6 Values	11
7 The Natural Heritage Research and Development Team	12
Role of Research and Development team	12
8 Strategic tools	13
9 Research Priorities	14
Table 1 Broad predicted research and development requirements of each Natural Heritage Strategic Plan (Draft) Theme area and how these relate across to the research programme Areas	15
Figure 1 Research and development programme areas	19
Table 2. Research and development programme areas	20
10 References	23
Appendix 1 – Action plan	34

1. Overview

This research and development strategy draws on the vast experience of staff within the Natural Heritage Directorate and beyond.

It is influenced by the tradition of scientific research and development activity commissioned and carried out by Environment and Heritage Service in the past, which has both underpinned our mission of protection and conservation of nature and which has provided significant direction to it.

Research and development skills and resources are finite and we need to deploy these strategically. This strategy provides an agreed research and development framework with outcome orientated goals and targets to:

- Identify research options and priorities.
- Formulate proposals.
- Explore funding arrangements.
- Manage projects.
- Report findings.
- Measure success.
- Predict future research requirements.

Further more it provides a broad series of research and development areas or programmes that are related to the Natural Heritage Strategic Plan.

2. Why does Natural Heritage carry out Research and Development?

Research is the backbone of Natural Heritage. It underpins the work of ALL the units within Natural Heritage, whether this research is carried out by our own staff, academic institutions or by other means. Development activity, which includes the use and management of the data we gather, is arguably the glue which holds the science information base together.

The information gathered through research is used on a daily basis by Natural Heritage staff to:

- Inform the delivery of the Northern Ireland Biodiversity Strategy.
- Make decisions on the impact of development on nature conservation, landscape and countryside matters.
- Inform the development of environmental policy.
- Formally protect or designate sites.
- Inform the monitoring and management of designated sites.
- Monitor changes in the natural environment as a whole.
- Facilitate sustainable use and enjoyment of the countryside.

To this end Natural Heritage Directorate (NHD) within Environment and Heritage Service (EHS) devotes considerable resources towards research, i.e. the gathering of knowledge, its analysis and application and to development, i.e. the storage of data and further interpretation and extrapolation through database and geographic information system applications.

The legal remit for such work is provided through the Nature Conservation and Amenity Lands (NI) Order (Box 1) and the Habitats Directive (Box 1). In addition the Northern Ireland Biodiversity Strategy makes several recommendations detailing the requirement for research and development activity. It highlights, for example, the requirement for biological recording in NI and also the need for monitoring or distribution and extent of broad and priority habitats. The Northern Ireland Biodiversity Strategy was adopted by the Government of Northern Ireland in August 2002.

Box 1. The Legal Remit for Research and Development

Directive 92/43/EEC (OJ:L206/7/92) on the conservation of natural habitats and of wild fauna and flora (Natura 2000)

Article 17

“1. Member states and the Commission shall encourage the necessary research and scientific work having regard to the objectives set out in Article 2 and the obligation referred to in article 11 (i.e. the requirement for surveillance). They shall exchange information for the purposes of proper coordination of research carried out at Member State and at Community level.

2. Particular attention shall be paid to scientific work necessary for the implementation of articles 4 and 10, and transboundary cooperative research between Member States shall be encouraged.”

The Nature Conservation and Amenity Lands (Northern Ireland) Order 1985 (1985 No. 170 (N.I. 1).

Part II, 3. (2) *“In exercise of its functions under paragraph (1) (and without prejudice to the generality to the generality of that paragraph), the Department may –*

(a) carry out, commission, or support by financial means or otherwise, such inquiries, investigations or researches as it considers necessary or expedient;”

The nature of the research is guided by nationally and locally agreed work programmes, namely the:

- Northern Ireland Programme for Government
- Department of Environment Corporate and Business Plan
- EHS Corporate and Business Plan
- Natural Heritage Strategic Plan 2003.

However, it is recognised that circumstances can change very quickly and as such the research programme needs to be robust and adaptable enough to adapt to rapidly changing circumstances.

Natural Heritage staff need to be able to look forward to anticipate what issues may become important in the future – known as “horizon scanning”. Networking with conservation professionals, attending conferences and keeping up to date with the latest research findings in scientific journals are essential to enable Natural Heritage staff to be aware of potential future threats and opportunities.

Recent examples of research carried out by Natural Heritage include a “Pilot Survey of Northern Ireland Semi-natural Grassland” which, drawing on the first Northern Ireland Countryside Survey and using aerial photography, has provided the recent impetus behind the grassland survey and designation programme. A related project that EHS funded in partnership with the other country agencies provided detailed grazing level information for nature conservation management of protected sites. More detailed research has provided crucial information on the ecology or population estimates of rare or threatened species or ecosystems e.g. Marsh Saxifrage *Saxifraga hirculus*, Freshwater Pearl Mussel *Margaritifera margaritifera* and Horse Mussel *Modiolus modiolus*. Such projects have significant value in the protection, management and restoration to favourable conservation status of Natura 2000 sites.

One of the most significant drivers of research in Natural Heritage is the Convention on Biological Diversity. This agreement manifests itself in the Northern Ireland Biodiversity Strategy and many projects that are procured have this as their main locus. Indeed, the recently established Quercus research partnership aims to link its outputs to Government responsibilities for biodiversity and nature conservation. Its principal aims are:

- To promote, publish and publicise high quality research in biodiversity and conservation biology;
- To establish and sustain innovative programmes of biological monitoring appropriate to the longer term ecological studies required to establish environmental change and its causes;
- To underpin habitat and species management.

The Quercus research centre was established in 2003 after an open tendering competition and has a programme agreed by a Management and Advisory Committee structure. Recently completed projects include an All-Ireland Review of Invasive species, a survey of the River Roe and Tributaries and ecology studies on habitats and species e.g. a survey of intertidal Sea grasses in Northern Ireland’s sea loughs Beds and Review of the Status of Atlantic Salmon respectively. In addition there are a number of ongoing projects including Population genetic structure and systematics of the Irish Hare, a species for which there is an All Ireland Species Action Plan and a Review of the Research Requirements of HAPs and SAPs.

Other projects that have gone on in the recent and more distant past have provided information on visitor patterns to Natural Heritage sites such as Country parks, given assistance with the writing of management or conservation plans, developed database and GIS models in support of the activities of a variety of Natural Heritage units and provided detailed datasets that have been used extensively in the development of policy and as an underpinning to other research initiatives e.g. the Northern Ireland Countryside Survey.

The notion of development activity is probably somewhat less easy to describe. Development activity in relation to Natural Heritage relates primarily to the large amount of primary data that is either collected by staff routinely as part of the “normal” work activities or data that is collected as part of (procured) research activity and then is used or further developed in other applications. The data could be biological records e.g. systematically collected bird data or locations of particular rare taxa, the data could be habitat based information e.g. results of surveys in lakes, littoral marine surveys, on going phase II grassland surveys, to name a few. The data could be spatial i.e. there is some element of geographic referencing to it. Much of the information we use routinely in support of the evidence base behind a particular course of action utilises geographic data.

The use of geographic data has grown significantly in recent years, to the extent that more or less everyone in EHS has access to “simple” geographic information systems (GIS). Maps in Action is currently the main vehicle for displaying such data to staff and allows relatively straightforward query and filtering of data layers. It is worth stressing that without the development activity in Natural Heritage this would not have been the case and indeed it is often said that people don’t know what GIS is used for until they don’t have it! GIS is a particular discipline which requires necessary technical expertise but also, in relation to Natural Heritage, its application to the biological and physical world.

The uses to which development activity has been put are wide and varied. Work in the GIS is perhaps the most obvious with its use in the designation process in the preparation of legal maps; its use to illustrate where damage has occurred on protected sites or where proactive management should be focused. Its link with Satellite navigation technologies has been a more recent development and in particular the use of Global Positioning Systems (GPS) with data logging facilities has revolutionised the way in which field based data can be collected. Now such systems are part of the tools of the field worker. The advancement and support of such technologies is an important and key development activity.

3. What is Natural Heritage Research and Development?

We are currently involved in three broad areas of research and development :

- **Basic Research** – A very small proportion of the research we carry out contains elements of basic research eg PhDs. We also use the “basic” research carried out by academic institutions or others as a primary source of information.
- **Applied Research** - The majority of the research we procure, or are involved in directly is applied. It is used to help address particular ecological issues and to develop policy. We also use the applied research carried out by academic institutions or others. This area also includes survey and monitoring, areas not traditionally viewed as research in the academic sense.
- **Development** – This involves all aspects of data storage, data manipulation, database creation, linkages to GIS technologies, the development and application of such technologies and the deployment of relevant information to end users.

A definition of what Natural Heritage research and development is would be useful at this point. The definition below frames what this document is about and will avoid potential confusion in the future, particularly in the area of research prioritisation.

Natural Heritage Research and Development is defined broadly as:

“Knowledge and data acquisition, analysis and development underpinning biodiversity and earth science action and access to and enjoyment of the countryside”.

It should be stressed that research and development activity in Natural Heritage is not restricted to that which we procure. A large amount of research is also carried out by in-house staff. However, note the EHS Procurement definition of a research contract (box 2). In addition it should be noted that Natural Heritage does not carry out research for its own sake, but to inform decision making.

Box 2 Procurement Definition of Research and Service Contracts

Research is defined according to the EHS procurement procedures as

“a service purchased from the research budget, where one exists, or which are otherwise formally identified within the organisation as research”

These are paid for out of the Conservation Science Research Budget.

Consultancy/Other Service Contracts gather existing data and produce an informed opinion, or according to the EHS procurement procedures,

‘the purchase of continuing, clearly defined and essentially routine services from an external provider on the basis of a contract of specified duration

Natural Heritage research and development encompasses a wide range of in-house and procured activities and includes the following (not exhaustive) examples:

- Small pilot studies - in-house or procured
- Reviews of scientific literature - in-house or procured
- Liaison and networking with others on research issues e.g. JNCC Inter Agency Working Groups - in-house
- Applied research projects e.g. molecular genetics work, species recovery research – procured
- Ongoing database and GIS development – procured or in-house
- Basic research projects - e.g. PhD's - procured
- Monitoring and survey based projects e.g. condition assessment of ASSI's - in-house or procured
- Questionnaires e.g. visitor surveys in country parks - procured
- Software development e.g. creation of databases to store and analyse scientific records - in-house or procured
- Primary biological recording including the production of distribution atlas, floras and systematic accounts – both in-house and procured (primarily through our partnership with CEDaR and the biological recording community)

4. Goal

The Goal of the Natural Heritage Research and Development Strategy is to coordinate the provision of high quality research and development which will underpin the work in conserving nature and the countryside.

5. Objectives

In relation to the goal of providing high quality underpinning research and development the following three objectives are highlighted:

1. Enhance the quality and co-ordination of the research and development we carry out and commission.
2. Effective dissemination of research and development outputs
3. Provide an overview of the likely or predictable research and development requirements for Natural Heritage over the next 3-5 years.

For each objective there is a list of the key issues that may affect it; key outputs and activities identified for the Research and Development Team and also NHD and an identification of the likely resource implications. These are listed together with the actions part of the Strategy and are appended, (appendix 1).

6. Values

In principle Natural Heritage research and development should relate to the policy interests of EHS and more particularly to NHD. It mustn't duplicate what is done elsewhere and should in general terms be driven by outcomes or the application to our business or policy needs.

It doesn't necessarily follow that all research and development should be short term or applied. Strategic research, e.g. Northern Ireland Countryside Survey and basic research e.g. PhDs, or the gathering of basic biological records is also important and is required to develop the knowledge base to underpin future more applied research.

The presumption is that NHD R&D should be

- High quality
- Co-operative
- Multi and interdisciplinary (where appropriate)
- Innovative (when necessary)
- Outcome orientated
- Good value for money and fit for purpose
- Published or otherwise disseminated to potential users

7. The Natural Heritage Research and Development Team

Natural Heritage has a dedicated Research and Development Team comprising of 5 members of staff. This Team coordinates research and development activity in its fullest sense across the Natural Heritage Directorate. This coordination is the most important function of the team and ensures that there is no duplication of effort, the most up to date methods and approaches are used, and that development activity and data results are effectively disseminated and used.

On the one hand the team manages an annual research budget for the procurement of research and development on behalf of Natural Heritage but is also involved in the ongoing management and development of several research partnerships to maximise their potential to deliver EHS business requirements. These include, for example, the Quercus research partnership, the biological records centre at CEDaR, future Northern Ireland Countryside Survey requirements and linkages with GB, UK or RoI research advisory type committees and steering groups.

As stated above, the goal of this strategy is to give direction to the research activities carried out by Natural Heritage. As such, it is the responsibility of all Natural Heritage staff to be guided by the strategy.

The role of the Natural Heritage Research and Development Team is to :

- Coordinate research and development across Natural Heritage and within EHS, to ensure maximum value for money is achieved
- Influence policy makers, research funding institutions, academics and central government of the research and development requirements of Natural Heritage; at the local, national or international level as appropriate
- Seek innovative means of meeting the increasing demand for Natural Heritage research and development e.g. the establishment of new research partnerships or exploration of possible mechanisms to harness external funding
- Foster an environment of excellence and ensure that research is founded on sound scientific principles
- Disseminate fully the information generated through research to the policy makers and practitioners to ensure that decisions are based on the latest available data
- Encourage and support the collection, collation and interpretation of primary biological data at a local, national and international level, where appropriate
- Manage three key research partnerships, Quercus, CEDaR and NICS
- Manage the Natural Heritage research programme

8. Strategic tools

This strategy recognises the considerable “tradition” of research procurement, dissemination and application of results to the business and policy requirements of EHS and indeed beyond. This strategy seeks to build on that and will use the following carefully targeted methods to achieve its goals.

- Ensure ‘relevant’ staff are skilled in research fundamentals, contract management and also up-to-date with latest research findings.
- Proactive engagement with relevant research and development networks and fora.
- Exploring funding issues and opportunities.
- Investigating further partnerships to enable rolling research and development programmes to be initiated.
- Maintaining flexibility, where possible, to changing requirements.
- Effective dissemination of research outputs, including the use of web publishing.
- Maintain effective library mechanisms to access basic research information.
- Creating the basic infrastructure to carry out research, where it is not feasible or cost-effective to commission it, such as laboratory facilities for taxonomic identification.
- Effective management of the Natural Heritage research and development budget.
- Co-ordination of how data is used, collected, applied, analysed across Natural Heritage and where appropriate beyond.
- Developing mechanisms to identify Natural Heritage research requirements and priorities.

9. Research Priorities

A method of prioritisation for research and development activity, particularly its procurement, is one of the actions highlighted within this strategy and requires careful and full consideration of all the issues to achieve full agreement across Natural Heritage Directorate. It will have to reflect the genuine higher priority of some projects e.g. in relation to pre infraction proceedings, but also take cognisance of the themes within the Natural Heritage Strategic Plan, other research strategies that may be developed by EHS as a whole or DOE and the fact that it is a Natural Heritage research budget not the budget of one or two particular Natural Heritage functional units. In addition it is noted that funding for procured research is used for those research areas for which the programme money was bid for in the past. In consequence, completely new research/work areas may require additional bids to be made.

Whilst the key to the Research and Development Strategy is identifying and prioritising the needs within available resources, it also needs to retain flexibility as emerging tasks can develop very quickly and opportunities to carry out certain types of research can present themselves outside any agreed programme. Indeed this is one of the strengths of the present and historic system of research procurement within Natural Heritage.

As a precursor to research and development prioritisation, broad research requirements emanating from each Natural Heritage Strategic Plan Theme have been predicted and these are outlined below (table 1). This list is not intended to be exhaustive, but rather gives an indication of the variety of research and development we may need to consider in the short to medium term, based on the strategic themes within the Natural Heritage Strategic Plan. It should be noted that this research and development strategy also identifies an action to more fully assess the research requirements emanating from the functional units across Natural Heritage in an attempt to more proactively focus the research and development of Natural Heritage. The identified research requirements (Table 1.) have been summarised together to give a series of Natural Heritage Research and Development "Programme Areas". These reflect the cross-cutting nature of research and development activity, and have been drawn up to provide a logical series of research areas which can be subsequently prioritised. These are illustrated in the pictogram below (Figure 1.).

These Programme areas equate to the general areas of research and development which Natural Heritage are involved in and one can see the clear overlap that exists between many of the areas. Indeed what is also clear is the cross cutting nature of some of the Programme Areas e.g. Data Management.

Research Programme Areas can be summarised together to provide summary details of how research funding or effort is apportioned. In addition some of the programme areas could be further divided to provide further focus or detail. It is felt that those outlined provide the broad view of what the traditional view has been and how such activity is likely to continue in the near future.

These Programme Areas help in research prioritisation as they link to the Natural Heritage Strategic Plan themes and thus resource estimates can be established. There is an intrinsic danger with this approach however, which is related to the fact that not all research and development activity is procured, not all procured research is managed through the Conservation Science budget and the Natural Heritage Strategic Plan Themes encompass a wide

range of research areas making the estimates in some instances very broad or plainly misleading.

The table below (Table 2) articulates more fully the presented Programme Areas, together with their respective aims and implicit links to the NHSP themes. Further more, estimates of research expenditure against each Programme Area is presented, based on proportionate estimates of known programme budget expenditure in these areas.

Table 1. Broad predicted research and development requirements of each Natural Heritage Strategic Plan (Draft) Theme area and how these relate across to the research programme areas. (Information gained from discussions with ADs and responses to requests for the same.)

NHSP Theme	Subject Area	Research needs	R&D Programme Areas	
1. Conserving Biodiversity	NI Biodiversity Strategy	Monitor success of NIBS – repeat of NICS, develop biodiversity indicators	Biodiversity Research Socio-Economic Research	
	Priority habitats and species	Priority Habitat monitoring – NICS, Survey and monitoring of marine and terrestrial habitats	Biodiversity Research	
		Habitat and species ecology investigations	Habitat and Species Survey	
		Surveillance programmes etc	Biological Basics	
	Local Nature Conservation	Research to underpin work of urban Habitat Networks/ SLNCI	Biodiversity Research Socio-Economic Research	
	Introduced Species	Research to underpin implementation of all Ireland Invasive Species Review	Biodiversity Research Biological Basics Habitat and Species Survey	
	Biodiversity Information and Research	CEDaR/NBN data management/dissemination development	Manage results from NICS	Data Management
			Create basic infrastructure to encourage biological recording, its development, particularly in lesser known groups	Biological Basics
			Research that underpins wildlife protection policy and issues.	Biodiversity Research
	Wildlife protection	Research that underpins wildlife protection policy and issues.	Biodiversity Research	
2. Advice and Influence	Regulation of Development	Surveys and collating of data to support the identification of SLNCIs, Areas of Mineral Constraint and other designations used in Area Plans;	Habitat and Species Survey Earth Science Research Data Management	

2. Advice and Influence	Regulation of Development	Assessment of the effectiveness of EHS advice in relation to individual applications	Landscape, Countryside & Socio-Economic Research
		Research into the direct and indirect impacts of certain types of development, for example, windfarms and marinas.	Landscape, Countryside & Socio-Economic Research
	Non-planning consultations	Development in the areas of data sharing across Gov. Depts.	Data Management Technology Development
	Environmental Policy	Strategic research which helps underpin policy development.	Biodiversity Research Global impact research
	Environmental Policy	Research to assess effectiveness of gov environmental policy	Biodiversity Research Landscape, Countryside & Socio-Economic Research
3. Site Safeguard	Birds and Habitats Directive	Research and development underpinning the notification of sites of Community importance	Habitat and Species Survey Data Management Technology Development Biological Basics
	Birds and Habitats Directive	R & D activity in support of implementation of Habitats Directives	Habitat and Species Survey Data Management
	Other International Obligations	Assessment of the effectiveness of wetland policy in relation to RAMSAR sites	Biodiversity Research
	Statutory Nature Conservation Designations - National	Research and development underpinning the scientific rationale for site declaration including condition status at declaration	Habitat and Species Survey Biodiversity Research Monitoring of protected sites Data Management Technology Development
	Local Designations	Research and development underpinning the identification of sites of Local Nature Conservation Interest	Habitat and Species Survey Data Management Technology Development
	All subject areas in theme 3	Undertake periodic reviews of protected site network and assess, effectiveness of it and coverage	Habitat and Species Survey Data Management Biodiversity Research

4. Management and Protection of Designated Sites	Monitoring of N2K sites and ASSIs	R & D monitoring support activity, including exploration of efficient and effective methods for monitoring e.g. use of remote sensing	Monitoring of protected sites Data Management Technology Development
	Monitoring of N2K sites and ASSIs	Data storage-recall system development	Data Management Technology Development
	Monitoring of N2K sites and ASSIs	Condition assessment Quality Control research	Monitoring of protected sites
	Management of N2K sites and ASSIs	Provision of best advice on habitat management	Habitat and Species Survey Biodiversity Research
	Management of Nature Reserves	R & D monitoring support activity, including exploration of efficient and effective methods for monitoring e.g. use of remote sensing	Monitoring of protected sites Data Management Technology Development
	Management of Nature Reserves	Provision of best advice on habitat management	Habitat and Species Survey Biodiversity Research
5. Sustainable Use of the Countryside	The Sustainable Use of the Countryside	Development of the NI Landscape Character Assessment to inform measures for the protection of local landscapes	Landscape, Countryside & Socio-Economic Research
	The Sustainable Use of the Countryside	Development of techniques to measure and describe the impact of development of landscape character and quality	Landscape, Countryside & Socio-Economic Research Technology Development Earth Science Research
	The Sustainable Use of the Countryside	Continuation and refinement of the NI Countryside Survey	Landscape, Countryside & Socio-Economic Research Biodiversity Research
	The Sustainable Use of the Countryside	Collaboration with other agencies to determine the impacts of land use change brought about by changes in agricultural and forestry support	Landscape, Countryside & Socio-Economic Research Biodiversity Research
	Designation (and management) of Protected Landscapes	Development of advice to EPG on policy and legislative aspects of national parks and AONBs	Landscape, Countryside & Socio-Economic Research Biodiversity Research
	Designation (and management) of Protected Landscapes	Identification of socio-economic benefits of protected landscapes	Landscape, Countryside & Socio-Economic Research Earth Science Research
	Designation (and management) of Protected Landscapes	Landscape assessments to determine boundaries for future national park and AONB designations and to identify factors of change	Landscape, Countryside & Socio-Economic Research Biodiversity Research Technology Development
	Designation (and management) of Protected Landscapes	Effectiveness of management structures associated with protected landscapes	Landscape, Countryside & Socio-Economic Research Biodiversity Research

6. Enjoyment and Appreciation of the Countryside	The provision of access to the countryside and Urban green spaces	Development of advice to EPG on policy and legislative aspects of access to the countryside, including Occupiers' Liability.	Landscape, Countryside & Socio-Economic Research Access to the Countryside
	The provision of access to the countryside and Urban green spaces	Collaboration with other agencies to determine the health and socio-economic benefits of countryside recreation.	Landscape, Countryside & Socio-Economic Research Access to the Countryside
	The provision of access to the countryside and Urban green spaces	Visitors surveys of Waymarked Ways and other long-distance footpaths	Landscape, Countryside & Socio-Economic Research Access to the Countryside
	The provision of access to the countryside and Urban green spaces	Research into the socio-economic profile of countryside recreation activists and the needs of minority/disadvantaged groups	Landscape, Countryside & Socio-Economic Research Access to the Countryside
	The provision of access to the countryside and Urban green spaces	Assessing the impact of recreational activities on the countryside and wildlife	Landscape, Countryside & Socio-Economic Research Access to the Countryside
7. Working with Others	Disseminating Information and Raising Awareness	Determination of effectiveness of the message EHS delivers – do people change?	Landscape, Countryside & Socio-Economic Research Biodiversity Research
	Disseminating Information and Raising Awareness	Development of new means of communicating results and the environmental message...	Technology Development Data Management
8. Best Practice	Staffing and Staff Management	Assessment of expert training areas required and development of ways of delivering such training on an ongoing basis	Landscape, Countryside & Socio-Economic Research Biodiversity Research Biological Basics
	Continuous Improvement	Development of information technology in the areas of data sharing and GIS capability, both within NH-EHS but also across Gov Depts and beyond	Technology Development Data Management
9. Earth Science		Research underpinning ESCR, including monitoring and site management requirements, and dissemination.	Earth Science Research

Figure 1. Research and Development Programme Areas.

Note that many programme areas overlap and that the Data Management area overlaps with All areas. The relative size of the boxes is NOT significant.

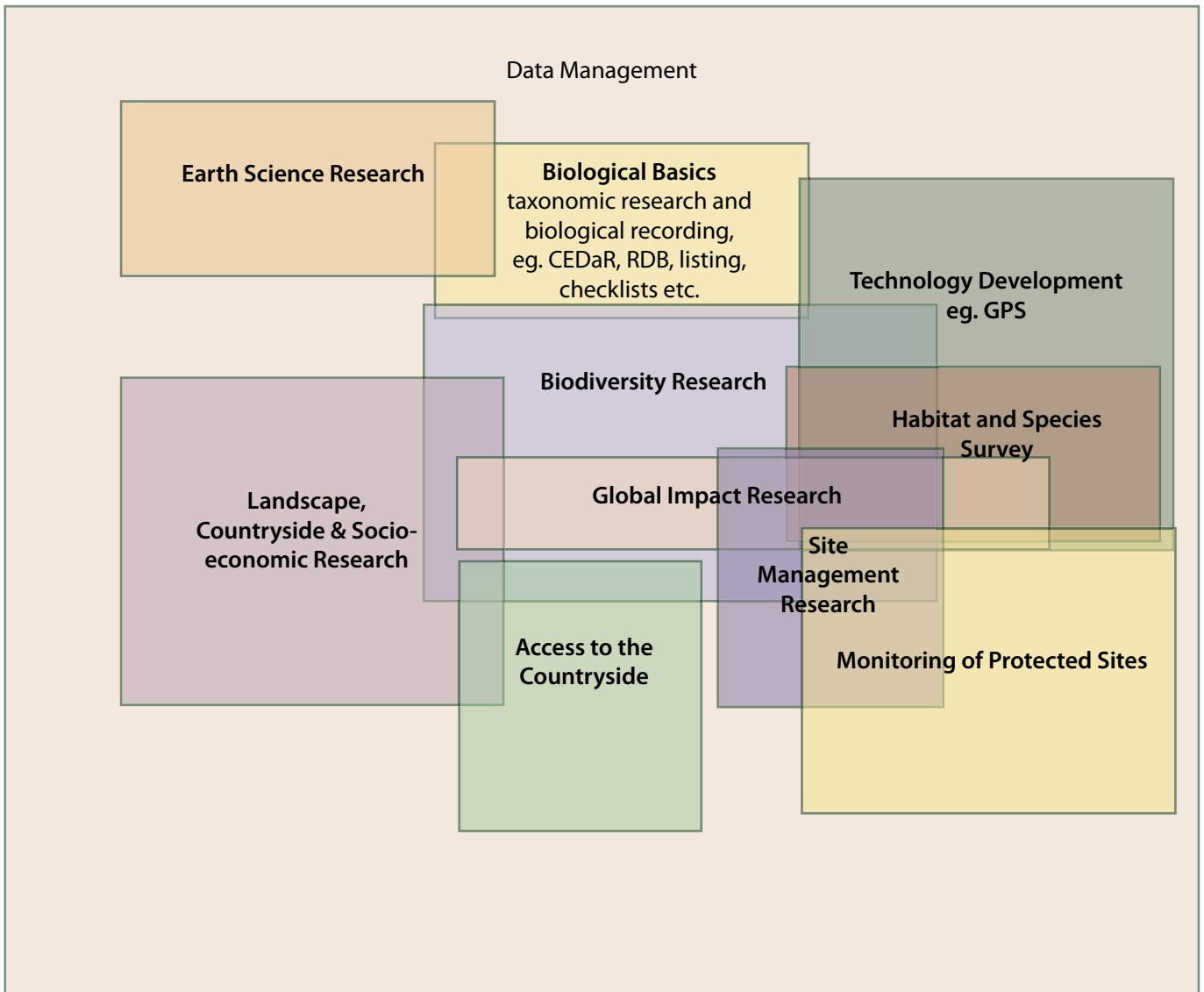


Table 2. Research and Development programme areas and the main and secondary NHSP themes to which they apply. Cost estimates are an indicative percentage cost (related to procured research) per annum against each area, which could provide the basis for prioritisation. *Cost percentage estimates are based on current levels of funding and on current levels of EHS client officer input for contract management. The total level is based on CS R&D budget plus additional programme monies directed to R&D in other functional units e.g. BDU or CDP. Figures do not include direct core funding of CEDaR and payments to JNCC which included elements of R&D and its coordination.¹Note that Earth Science research includes monitoring and site management relating to earth science and this is not included in the programme areas for "monitoring of protected sites" or "site management research".²This area is largely carried out within context of CEDaR business plan. ³NICS = Northern Ireland Countryside Survey. ⁴Wider countryside monitoring and that in relation to Habitats Directives would be included within the Biodiversity Research Programme. ⁵A proportion of "core" support of CEDaR includes this area and in addition part of the funding for JNCC involves support of biological recording software RECORDER 6. ⁶These estimates were calculated in late 2004. Budget changes mean the proportions do change.

Research Programme Area Name	Description	Aim	NHSP Theme Primary Link	NHSP Theme Secondary Link	*Cost estimates per annum/% of total budget available
Biological Basics	Taxonomic knowledge is the basis of much of our biodiversity agenda. This programme area includes the support and development of taxonomic research, biological recording and dissemination of taxonomic related data e.g. distribution, species status etc. Many of the CEDaR "Initiatives" are likely to be in this programme area.	To provide a clear and sound rationale for our biodiversity related work programmes	T1	T3	Recording ² Initiatives 3 Taxonomic research, listing, species status assessment, checklists 3 Surveillance 3
Habitat and Species Survey	This is largely the procurement of field survey support where this cannot be done in-house. It includes all habitat types and may often be carried out in conjunction with other broader biodiversity related research activities. Examples include surveys of rare taxa in support of ASSI designations, phase 1 surveys, surveys to identify SLNCIs, marine surveys etc.	To provide high quality habitat and species survey support.	T3	T1, T2	Survey in support of N2K sites 10 Survey in support of ASSI designation 5 Survey in support of identification of SLNCI 4

Earth Science Research	Research activity in the area of earth science, geomorphology, soil science etc, in support of both site based protection and developmental control. ¹	Provision of research support for Earth Science programme	T9	T2, T5	2
Biodiversity Research	This is a particularly broad research area and has many overlapping areas. It fundamentally relates to the gathering of scientific information to underpin the work of conserving the natural heritage of Northern Ireland. Particular research elements will include detailed research in support of the NIBS, Wildlife aspects, Introduced spp. It also includes large repeat environmental audits (NICS) ³ and most of the work carried out within Quercus.	To provide high quality, focussed research – in a broad sense – to underpin the work of conserving the natural heritage of Northern Ireland.	T1	T2, T3, T4, T5, T7	20 18 Quercus Other Biod
Monitoring of Protected sites	This is largely the procurement of monitoring support where this cannot be done in-house. It includes all habitat types and may be carried out in conjunction with other biodiversity related research activities. It also includes elements of research required to validate current condition assessment methodologies. ⁴	To provide additional, backup, emergency and expert knowledge in support of protected site monitoring support.	T4		15 Monitoring
Site Management Research	Investigations into best practice for site management often happens across the UK. This research area deals with the practical application of science to habitat and species management on protected sites. There is some overlap with the Biodiversity programme area and often individual projects address many aspects with the applied site application the end result.	To apply scientific knowledge in support of site conservation management	T4		4
Landscape, Countryside & Socio-Economic Research	Includes impact of development research, research into the socio-economic benefits of biodiversity, ecosystem approach research, assessment of effectiveness of protected areas, market research and other countryside wide policy research. There are links to some aspects of Broad Biodiversity research e.g. NICS	Provision of scientific information in support of Countryside wide research, market research and socio-economic research	T5	T1, T2, T7	3

Access	A variety of research needs apply to recreation in and access to the countryside. Also included in this area is research associated with visitor appreciation and enjoyment.	Provision of a sound rationale to underpin and test effectiveness of policy in relation to access to and enjoyment of the countryside.	T6		2
Impacts of global environmental change	Modelling of the potential effects of climate change, changing patterns of land use etc. Such research will usually be carried out in conjunction with other funding and research bodies.	To provide input into wider global impacts research			1 Monarch 3
Data Management	This includes development areas surrounding data storage infrastructure and ongoing support structures for large data sets e.g. Site monitoring data, CEDaR ⁵ and the National Biodiversity Network (NBN) and GIS. In addition it includes various purchases of software and mapping licenses and aerial photography	To provide efficient data management frameworks for Natural Heritage	N/A		1 2 3 NBN GIS support Aerial photo and other
Technology Development	Development of existing and introduction of new technologies, e.g. web mapping, web based database interfaces, GPS etc in support of the data we collect, analyse and then disseminate	To provide improved facilities for scientific data collection and interpretation	N/A		1 1 GPS support Other

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Appendix 1

Natural Heritage Research and Development Strategy – action plan.

Objective 1 - *Enhance the quality and co-ordination of the research and development we carry out and commission*

Key issues affecting the objective

- Maintaining an appropriate level of involvement within UK and RoI research and development fora requires a considerable input of staff time. E.g UK BRAG, MOSAIC, NBRP, and others. The level of input is often required at more senior staff levels e.g. GD7 and above.
- Whilst most procured research and development is funded from the NH R&D budget, other programme budgets within NH are used for commissioned research. All sources of funding and the subsequent dissemination of such research needs active co-ordination.
- The increasing complexity of conservation issues and the huge amount of information gathered through research means that it is becoming more difficult for any one institution to handle a particular environmental or ecological issue, without co-operation with other government departments, NGO's or academic institutions.
- Current staff shortages are resulting in significantly reduced levels of data development support to others within NH and have resulted in the cessation of the central co-ordination of biological records within NH to CEDaR. This has possibly resulted in the failure to protect a site of conservation interest for an Annex II species.
- Research partnerships such as Quercus or CEDaR require a considerable amount of R&D team staff time to effectively manage. The ideal to pursue further partnerships as an efficient and economic way of achieving further research requirements must be balanced carefully with need for additional staff at the correct grade to manage.
- There are fewer people, either within EHS or outside, who have the necessary expertise to carry out some of the more specialised research work we require (Hopkins and Freckleton 2002, Mclean 2002, and Institute of Biology et al 2002).
- Natural Heritage staff often have to develop research projects and interpret research information, without training in the techniques involved in developing, managing and assessing research projects.
- Natural Heritage staff often do not have the time required to keep themselves up-to-date with current research in their field.
- Often individual client officers have the single responsibility to produce specification and manage significant contracts. Larger contracts should have steering groups/committees and the specification produced in collaboration with other key parties.
- Changes in staff can mean that research project management responsibility is passed from one client officer to another. Client officers who "inherit" existing research projects may not necessarily have the most suitable expertise within Natural Heritage to manage a particular project.

- Many scientific conferences take place outside the UK. While it is essential for staff to be kept up-to-date with the latest (and often as yet unpublished) research findings and to network with other conservation professionals and academics, there are issues in terms of staff time and cost in attending international conferences.
- It is becoming increasingly more expensive to carry out some types of research e.g. molecular genetics work.
- Natural Heritage is currently not making effective use of additional funding streams for research eg EU life funding etc. However, additional funding brings additional staffing implications both from the seeking of that funding and then the effective use of it.
- Historically the Research and Development Team has not had dedicated Admin support and key management tools such as the Research Database have not functioned effectively.

Key outputs and activities - Research and Development Team

- Produce a review of staffing levels and grades required to maintain effective involvement in fora and development of further partnerships e.g. Countryside Unit.
- Seek replacement of EHS personnel dealing with central management of data, its development and coordination across NH.
- Consider the funding sources within NH for R&D.
- Consider the establishment of a “research forum” for professionals, including other government departments and NGOs working in the field of nature conservation research in NI by March 06.
- Explore opportunities to access additional research funding streams by Dec 06.
- Review the contract with Quercus and make recommendations for further extensions and the development of other research partnerships, by IRC Oct 2006.
- Establish the current levels of specialist knowledge and identification skills for habitats and species within Natural Heritage and identify gaps. Examine ways to develop the specialist skills and knowledge of EHS staff and others in Northern Ireland by Oct 07.
- Establish whether current Natural Heritage related research areas are addressed within the research institutions in NI/RoI and identify the gaps by Oct 2007.
- Ensure ongoing support for library facilities within EHS.
- Develop a training programme for client officers on fundamentals of science research by March 2006.
- When staff change, ensure that the most appropriate member of staff is identified to become client officer for existing research projects – with immediate effect.
- IRC should identify those projects which require a steering group to

produce the specifications and manage projects which are complicated, technically challenging, large, cross-cutting or 'expensive'.

- Clearly define the role of the research team, the administrative side, contracts side in EHS finance, Departmental accountants and DFP in the process of procurement and management of research contracts and budgets, and identify and report weaknesses of the system or recommendations to IRC by Oct 2006.
- By March 2005 produce an improved specification for the research database and implement changes by March 2006.
- Produce a full procedures manual for NH R&D, to be circulated by March 2005 (an audit requirement).

Key outputs and activities - NHD

- Ensure that all scientific staff in Natural Heritage have an objective in their PPA to enable them to keep up to date with the current research in their field.
- Ensure that new client officers who inherit existing projects are given the support and time required to familiarise themselves with the project.
- Ensure that client officers are familiar with contract management procedures and if necessary attend training in this area.
- Ensure that all Natural Heritage staff are encouraged to attend relevant scientific conferences and network with other conservation professionals Resource implications.
- There is an ongoing requirement for a librarian and a library budget.
- There may be additional substantial costs if further partnerships are sought with academic institutions and additional staff will be needed for their management.
- There may be additional costs associated with staff training and attendance at conferences Dedicated admin staff are required to enable the Research and Development Team to manage the budget effectively.
- Additional staff may be required to effectively manage new partnerships and be involved in the relevant R&D fora.
- If additional funding streams are secured for research, this could actually increase the overall funding available for Natural Heritage Research Additional staff would be needed to manage such funding.

Objective 2 - Effective dissemination of research and Development outputs

Key issues affecting the objective

- R&D outputs aren't always effectively disseminated to the relevant users within EHS and also to others wider a field. This has implications as it can result, for example, in duplication of work, wrong decisions made using old information, embarrassment for the Minister etc...
- How do we test the scientific credibility of R&D outputs which are to be published in the 'grey' literature? Who should be involved in the QA of R&D projects? Is there a need for scientific peer review panel?
- Research results date quickly and there is a need for a quick and effective mechanism for dissemination.
- There has been an increase in the number of procured research and development projects ongoing at any one time over the past number of years without a corresponding increase in R&D team staffing levels.
- Primary data that is collected under contract or EHS staff, isn't always centrally collated and thus cannot be effectively disseminated.
- Primary data cannot be accessed for technological or 'political' reasons e.g. EHS does not own the data or cannot be accessed quickly enough.
- Due to staff changes within the Research and Development Team, there is a backlog of information to be inputted onto the research webpages and/or in the publication of reports through the Research and Development Series.
- Recent changes in the EHS publishing 'house style' has resulted in a dramatic increase in staff time required to formally publish a report in the Research and Development Series.
- The requirement for OSNI copyright on maps published within EHS reports is an issue for already 'published' reports on the EHS website and for future reports.
- NH staff have insufficient time to prepare papers, present findings at conferences and in some instances lack relevant experience in such activities.
- Non-procured research work is being carried out by Natural Heritage staff on a day to day basis, the results of which should be more widely disseminated.
- There is an increased need to have "open" access to information.
- There is a need to ensure that the results of procured research carried out by Natural Heritage is peer reviewed (audit requirement).

Key outputs and activities - Research and Development Team.

- The R&D team, through the post contract evaluation process and in liaison with the client officer or other project officer, will ensure that the research and development results are disseminated by the most appropriate means. The preferred means is via the web.

- Publish an annual review of research or a compendium to be peer reviewed by the Internal Research Committee annually in March, the first by March 2005 (an audit requirement).
- Publish the backlog of suitable research projects, where there is an electronic copy, on the EHS web pages by March 2006. Those produced in the Research and Development Series will be deposited in the British Library. (audit requirement).
- Seek opportunities to formally publish research papers, perhaps with help from experienced members of staff or in partnership with academic institutions.
- Arrange at least 6 R&D seminars per annum, where invited speakers present recent research findings to NH staff and to other interested parties e.g., NGOs.
- Ensure contract specifications reflect the requirement that copyright issues are fully resolved prior to completion of the project and that species records and/or digital data should be presented in a form compatible with EHS systems.

Key outputs and activities - NHD

- Encourage NH staff to produce research papers or posters or present findings (this largely applies to in house research).
- Client Officer staff should be made aware of the full implications of project management, including the effective dissemination which may require proof reading, copyright issues etc.

Resource implications

- Production of fully published papers requires a significant time commitment which needs to be agreed in advance.
- Publishing of the backlog of R&D publications has been severely impacted by ongoing staff vacancies and difficulty in resolving copyright and 'style' issues.
- Administrative support would help in the coordination of dissemination.

Objective 3 - *Provide and overview of the likely or predictable research requirements for Natural Heritage over the next 3-5 years.*

Key issues affecting the objective

- Much of the research carried out in Natural Heritage is reactive. There is a need to become more proactive to anticipate what issues may become important in the future – known as “horizon scanning”.
- Some issues such as Climate Change are already happening and are likely to become more important in the future.
- The importance of environmental matters/issues in relations to policy making is likely to increase, as is the related assessment of the effectiveness of policy.
- There is an increasing requirement for primary data on species and habitats, such as that provided by CEDaR, to be used in modelling and in investigative research into ecological systems and processes.
- New and emerging research needs will and are emerging from local, national and international biodiversity processes, e.g. Northern Ireland Biodiversity Strategy, UKBAP, Convention on Biological Diversity.
- The risk of infraction from the Birds, Habitats and Water Framework Directive will continue to make research into aspects of these Directives a high priority.
- The potential creation of National Parks may increase the need for research into socio-economic benefits of the environment, carrying capacity of the environment and recreational use.
- If the UK becomes a signatory to the EU Landscape Convention, research into landscape issues may become a higher priority.
- The recent increase in the Natural Heritage staff quota in particular areas is likely to increase the demand on the Natural Heritage R&D budget, particularly research into marine and freshwater sciences, habitat restoration or species recovery, and country park facilities and usage.

Key outputs and activities - Research and Development Team

- Explore possibilities of carrying out a horizon scanning exercise with NI conservation professionals once a research forum is set up.
- Ensure that issue of climate change is addressed in relevant research projects - ongoing.
- Following the initiation of the CEDaR 5 year business plan, annually identify which CEDaR initiatives could be funded by research budget and present to IRC in autumn meeting.
- Carry out a review of the research requirements generated by HAPs and SAPs – ongoing.
- Carry out a costed review of the research requirements generated by the review of Birds and Habitats Directive by Oct 06.

- Carry out a review of the research requirements of Regional Ops once staffing structures within regional structure are implemented.
- Carry out a review of the research requirements of Countryside and Coast Unit by Dec 06.
- Monitor situation with National Parks and landscape convention and react if necessary.
- Monitor research needs in Marine area, explore possibility of reviewing R&D requirements, given EU and cross cutting, cross Gov dept need for knowledge.
- Produce an annual agreed research and development programme.

Key outputs and activities NHD

- Ensure that all Natural Heritage staff are encouraged to network with conservation professionals, attend conferences and keep up to date with the latest research findings in scientific journals opportunities.

Resource implications

- The Natural Heritage R&D budget is likely to come under much greater strain due to the results of the research reviews, increased staff numbers and the increasing number of priorities.
- The Natural Heritage R&D team is also likely to come under greater strain because of the above.



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