evidence

NERC CITATIONS STUDY 2008

NERC Research Outputs Database 2003 – 2005: Bibliometric baselines

September 2008

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1 Executive Summary

- This is an initial report of bibliometric analyses of publications funded by the Natural Environment Research Council (NERC) over a 3-year period between 2003 and 2005.
- Just over one-third of NERC-funded research between 2003 and 2005 was published in journals assigned to the Earth Sciences journal category or research field.
- NERC-funded researchers have published comparatively more papers in the elite, multidisciplinary journals of Nature and Science than is typical for the UK (3.5% of NERC-funded publications have been published in these journals between 2003 and 2005 compared to 0.6% of the UK research output).
- Overall, NERC-funded research in Earth Sciences is more likely to have been cited than comparable papers published by the rest of the UK research base.
- NERC-funded research publications have a good impact compared to UK and world baselines. The average rebased impact of all NERC-funded research publications = 1.66 (world average = 1.0, UK average = 1.25 [*Environmental Sciences*, 2000-2004]). More detailed analyses have shown that the average rebased impact of NERC-funded research is above world average in all fields.
- The impact of publications in Animal Sciences, Environment/Ecology and Plant Sciences research fields is especially good. The impact of articles published in Animal Sciences journals is more than twice the world average. The impact of research published in journals assigned to the Environment/Ecology and Plant Sciences is almost twice the world average.
- The impact of NERC-funded research in all research fields has been above both the UK and world average throughout the 3-year period covered by this report and the current indications are that impact has increased, and was higher in 2005 than in 2003.
- The Impact Profiles® reveal consistent, similar patterns: less uncited papers and more well- and highly-cited research than other, comparable UK research indicating that NERC-funded research is internationally significant.
- More papers have been published from the Core Strategic Funding Mode than the other Funding Modes.
- Publications identified as arising from the Fellows Funding Mode have had greater impact than those from other Funding Modes.

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2 Introduction

2.1 NERC-funded publications: Research Outputs Database

The Natural Environment Research Council (NERC) has created and validated a database of research publications associated with projects that it has funded. The database covers the years 2002 to 2006.

NERC has commissioned *Evidence* Ltd to link the publication records of NERC-funded research from the Research Outputs Database (ROD) with bibliometric data so as to provide NERC with an enhanced information system and the potential for bibliometric analyses.

This report provides background bibliometric analyses and UK benchmarks to set the publication performance of NERC-funded research from a 3-year period between 2003 and 2005 into context.

2.2 Outline of analyses and report

This report compares recent publication data (3-year period 2003 to 2005) for NERC-funded research with similar UK research publications. The background data cover all sectors of the research community including higher education institutions (HEIs), hospitals and NHS trusts, companies, public sector research organisations and charities.

For the analyses, bibliometric data was sourced from Thomson Reuters, with whom *Evidence* has a strategic alliance. Thomson's Philadelphia-based subsidiary, Thomson ISI®, maintains the most complete international data on research journal publications and their citations. Citations are subsequent references made to an article by later publications. Highly cited work is recognised as having a greater impact and *Evidence* has shown that high citation rates are correlated with other measures of research excellence.[1]

World average impact data are sourced from the Thomson Reuters National Science Indicators 2006.

Evidence has performed a complete address reconciliation for the Thomson Reuters databases for the UK. This enables an accurate association of journal articles with institutions, using a combination of the name, address components and post-codes.

Using Thomson Reuters data, the following bibliometric information will be collated and assigned by *Evidence* to each publication record:

- Observed citation count for each paper i.e. the number of times the paper has been cited from publication to end-2006.
- Expected citation count for each paper i.e. the average number of citations to a paper in the same journal and published in that year.
- Annual citation counts i.e. the number of times the paper has been cited in any year.

It is expected that citation counts will typically be low for this dataset, given the relatively recent publication dates. This will be somewhat field-dependent: some biological research publications tend to accumulate citations rapidly over the first 2-5 years after publication. Analyses of data are increasingly informative with longer time bases.

Other work by *Evidence* has shown that citation counts in the first two years after publication are a general guide to long term impact for collections of papers (e.g. from research programmes) but this cannot be applied with absolute confidence to single papers.

Papers attracting a high relative number of citations, soon after publication and in the longer term, will be readily identifiable. Data for subsequent years can be readily added once initial identification and

indexing has been carried out, so as to build up patterns of citation behaviour specific to NERC publications.[2]

From the publication data, bibliometric analyses have been carried out for all the publications identified as funded by NERC and for those publications falling within specific fields. It is rarely possible to make sensible analyses on individual papers and gross averages are unlikely to be informative for management purposes. Mapping publications to research fields satisfactory for appropriate management comparisons is problematic. We use the Thomson Reuters journal categories because these are well-established and are informed by extensive Thomson Reuters work with the research community over the last twenty years. Papers may be allocated to one or more categories according to which journal the paper is published in. For example, papers published in the journal *Atmospheric Environment* are assigned to both Earth Sciences and Environment/Ecology. The Multidisciplinary journal category may include articles from prestigious journals such as *Nature* and *Science* although, recently, most papers from these 'multidisciplinary' journals have been assigned to specific categories based on the journal categories of the papers cited in the article.

The research fields used in this report were selected from the NERC-funded dataset as the top 10 most-frequently used of the 106 'Current Contents' journal categories to which publications are assigned by Thomson Reuters. This selection coincided with fields with an output of more than 100 papers over the 3-year period (with the exception of the final research field Physical Chemistry/Chemical Physics). The categories, ranked by most-used to less-frequently used, were:

- Earth Sciences
- Environment/Ecology
- Aquatic Sciences
- Biology
- Animal Sciences
- Multidisciplinary
- Plant Sciences
- Experimental Biology
- Microbiology
- Physical Chemistry/Chemical Physics

Journal lists and Thomson Reuters definitions for the five most frequently used research fields are given in Annex 1.

2.3 Data description

Dataset size affects year-to-year variability in impact (citations/paper), so samples with greater numbers of papers typically show less fluctuation. Citation data also tend to be highly skewed, with many zero-citation values and a few very high values. To address this, the report also uses the interquartile mean, calculated from a usefully-truncated range of values lying between the 25th centile and the 75th centile. There is currently no comparative benchmark for the UK or world. However, if considered alongside the overall average rebased impact, the interquartile mean can indicate whether the overall average is highly-slewed due to a few exceptionally-cited publications or whether the overall average is supported by a substantial body of well-cited publications.

Citation data provided by Thomson Reuters are assigned on an annual census date referred to as the Article Time Period. For the majority of publications the Article Time Period is the same as the year of publication but for a few publications (especially those published at the end of the calendar year in less main-stream journals) the Article Time Period may vary from the actual year of publication.

2.4 Data definitions

Papers: Thomson Reuters abstracted publications include editorials, meeting abstracts, book reviews as well as full journal articles.

Citations: the citation count is the number of times that a given publication has been cited since it was published.

Impact: impact is calculated by dividing the sum of citations by the sum of papers in the dataset (which for a single paper is its citation count). This can be done for papers within a specific research field such as Plant Sciences, or for a specific institution or group of institutions. Citation impact inevitably declines in the most recent years of any time-period as papers have less time to accumulate citations (papers published in 1996 will typically have more citations than papers published in 2001). Not all publication types are used in the calculation of impact: substantive journal articles and reviews are normally included but meeting abstracts and editorials are excluded.

Rebased Impact (RBI): rebased impact is raw impact normalised to the world average. For example, rebased impact for a sample in a given research field is the impact of the sampled publications in that field and year of publication divided by the impact for all world publications across that research field in the same year of publication.

2.5 Calculation of average rebased impact

The calculation of average rebased impact includes all substantive journal articles and reviews within the matched dataset and covers the full range of research fields associated with core activity. The citation counts for each paper are rebased against the appropriate world average for year and research field. Thus, a paper published in 2003 in a journal assigned to Earth Sciences is rebased to the world average in Earth Sciences for 2003.

Some journals are assigned to more than one research field. Two examples from the NERC-funded research output are the *Journal of Physical Oceanography* which is assigned to both Aquatic Sciences and Earth Sciences; and *Atmospheric Environment* which is assigned to Earth Sciences and Environment/Ecology. In such cases the citation count from these papers will be used in the calculation of average rebased impact more than once but rebased against each different field.

Thus, an article published in the *Journal of Physical Oceanography* in 2003 will be normalised for the 2003 world average impact in Aquatic Sciences and then again in Earth Sciences. This will result, most likely, in two different rebased impact figures which are both included in the average.

This methodology explains why the paper counts in the figures based on impact calculations may differ from those using the basic dataset.

[1] Adams J and Smith D. (2002) Maintaining Research Excellence and Volume. A report to the Higher Education Funding Councils. http://www.hefce.ac.uk/pubs/rdreports/2002/rd08_02/

[2] Adams J. (2005) Early citation counts correlate with accumulated impact. Scientometrics, 65 (3), 567-581.

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3 NERC-funded publications: the Research Outputs Database (ROD)

The Research Outputs Database (ROD) is the electronic collection point for output and performance data from research supported by public funds through the Natural Environment Research Council (NERC). Such data is used to provide an indication of NERC's strategic performance for NERC Council, its committees and the Office of Science & Innovation (OSI).

ROD collates information on the productivity of NERC's investments in:

- Research grants in Responsive Mode
- Research grants in Directed Programmes
- Fellowships
- Core Strategic research in Research and Collaborative Centres

Data for ROD is collected for financial years (1 April – 31 March), with the exception of publications data, which is collected on a calendar year basis (1 January – 31 December).

3.1 NERC-funded publications from ROD

The publications data for the years 2003, 2004 and 2005 inclusive were downloaded from ROD between December 2007 and February 2008 along with the relevant funding and identification data. The publications were filtered to download only those identified as being ISI journals (that is abstracted by Thomson Reuters). Data for the Funding Modes; Blue Skies, Fellows and Directed were available in Excel format, data for publications arising from Core Strategic funding were available as Word documents. NERC definitions for the Funding Modes are given in Section 6.1. In total, 8895 records were downloaded:

Table 3.1.1 Summary of 'ISI-journal' publications from ROD for 2003-05

Funding Mode	2000	2001	2002	2003	2004	2005	2006	Total number of papers†
Responsive				814	740	1105		2659
Core Strategic	6	5	5	1324	1377	1491	331	4539
Directed				324	278	395		997
Fellows				223	204	273		700
Total	**6**	**5**	**5**	**4688**	**2599**	**3264**	**331**	**8895**

† Total includes duplicated papers

The schematic diagram in Figure 3.1 outlines the process for matching the publications downloaded from the ROD to Thomson Reuters citation data. Initial matching was done using journal name, volume and pages; followed by a number of steps using various truncated forms of the article title along with some of the bibliographic data (where available). Finally, the databases held by *Evidence* were searched using article title words in combination rather than taking the article title as submitted to ROD. For example, a paper titled "Differential distribution of oystercatchers *Haematopus ostralegus* overwintering on the Wash, East England" might be identified using search terms "distribution" and "oystercatchers". The success of this final approach highlighted the numbers of papers with draft or inaccurate article titles on the ROD.

Table 3.1.2 details the outcome of the matching process.

Figure 3.1: Schematic for process of assigning Thomson Reuters citation data to ROD publications

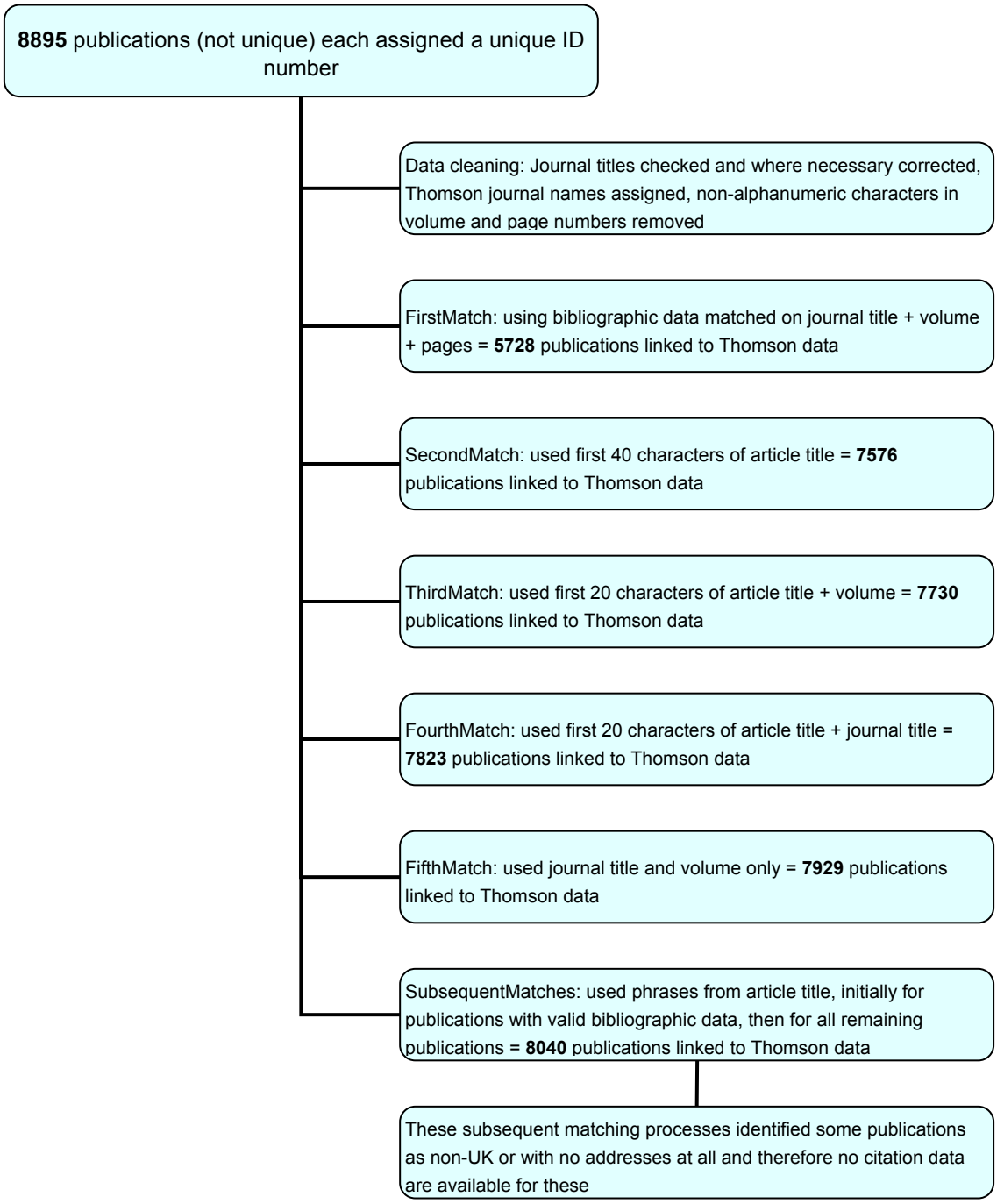


Table 3.1.2: Outcome of matching ROD publications to Thomson Reuters citation data

Designation		Total number of papers
matched	Linked to Thomson citation data, some of these will have been published outside the 3-year census period.	8042
not abstracted	These journal titles, although designated as ISI-journals on ROD, were not abstracted by Thomson, also includes 4 books.	372
non-UK/ no addresses/ missing	These publications either had only non-UK addresses or no addresses and consequently citation data is not currently available.	187
not found	These publications, despite being reported as in abstracted journals, could not be identified with a Thomson publication from the given information.	159
Invalid year	These articles were not published within the 3-year census period, many of those entered on ROD as 'in press' have been published in 2006 and 2007.	126
Conference Proceeding	The only records which could be found to match these article titles were conference proceedings and consequently citation data is not available.	9
Total		**8895**

All papers from ROD were accounted for in the matching process. The breakdown of 'matched' publications by publication year as reported on ROD (which was, however, found to be inaccurate for many records) is given in Table 3.1.3. Table 3.1.4 shows the same publications by Thomson Reuters database year (the year in which the paper was abstracted by Thomson Reuters. This may differ from the publication year but is used in bibliometric analyses).

Table 3.1.3 'Matched' publications by Research Outputs Database year

Funding Mode	2000	2001	2002	2003	2004	2005	2006	Number of matched papers†
Responsive				761	685	997		2443
Core Strategic	5	5	5	1191	1275	1383	230	4094
Directed				293	236	356		885
Fellows				208	178	232		618
Total‡								**8040**

Table 3.1.4 Matched' publications by Thomson Reuters Article database year

Funding Mode	1997-2001	2002	2003	2004	2005	2006	2007	Number of matched papers†
Responsive	16	29	623	685	931	159		2443
Core Strategic	12	6	1057	1196	1443	379	1	4094
Directed	5	14	227	244	334	61		885
Fellows		2	190	182	222	22		618
Total‡								**8040**

† includes duplicated publications within the Funding Mode

‡ includes duplicated publications between Funding Modes

3.2 Description of the dataset to be used in bibliometric analyses

The structure of the ROD is such that there are multiple occurrences of publications, within Funding Modes and within the collated database. In all, 1245 papers were recorded on ROD more than once; at the extreme end there was one paper with 7 occurrences.

As an example, there are three occurrences of a paper by Brierley AS et al. (2003) *Fisheries Research* **60**: 569-576; once from the Directed Funding Mode and twice from the Core Strategic Funding Mode: once from the British Antarctic Survey and once from National Oceanography Centre, Southampton. For bibliometric analyses, this paper (and the citations to it) would be counted once for the Directed Funding Mode and once for the Core Strategic Funding Mode. When considering the NERC-funded publications overall it would be counted once only.

Table 3.2.1 shows the unique paper count by Funding Mode.

Table 3.2.1 All publications by Thomson Reuters Article database year

Funding Mode	1997-2001	2002	2003	2004	2005	2006	2007	Number of papers*
Responsive	16	23	531	601	780	143		2094
Core Strategic	12	6	986	1108	1317	354	1	3784
Directed	5	14	211	205	288	56		779
Fellows		2	183	174	214	21		594
Total†								**7251**

* publications counted only once within Funding Modes

† includes duplicated publications between Funding Modes

The bibliometric analyses presented in this report will not cover conference proceedings, meeting abstracts, books, chapters in books or grey literature such as reports. It therefore captures only a specific part of the total output funded by NERC over the period, but this part is usually recognised as describing the most direct contribution to the research base. Table 3.2.2 excludes publications such as meeting abstracts which do have valid Thomson Reuters citation data but are not included in bibliometric analyses.

Table 3.2.2 shows the unique paper count for those publications which are used in bibliometric analyses – these are substantive journal articles and reviews.

Table 3.2.2 Journal articles and reviews by Thomson Reuters Article database year

Funding Mode	1997-2001	2002	2003	2004	2005	2006	2007	Number of papers* (all years/2003-2005)
Responsive	16	22	511	569	736	139		1993/1816
Core Strategic	12	6	942	1074	1268	337	1	3639/3284
Directed	5	14	203	193	280	55		750/676
Fellows		2	173	168	209	21		573/550
Total†			**1829**	**2004**	**2493**			**6955/6326**

* publications counted only once within Funding Modes

† includes duplicated publications between Funding Modes

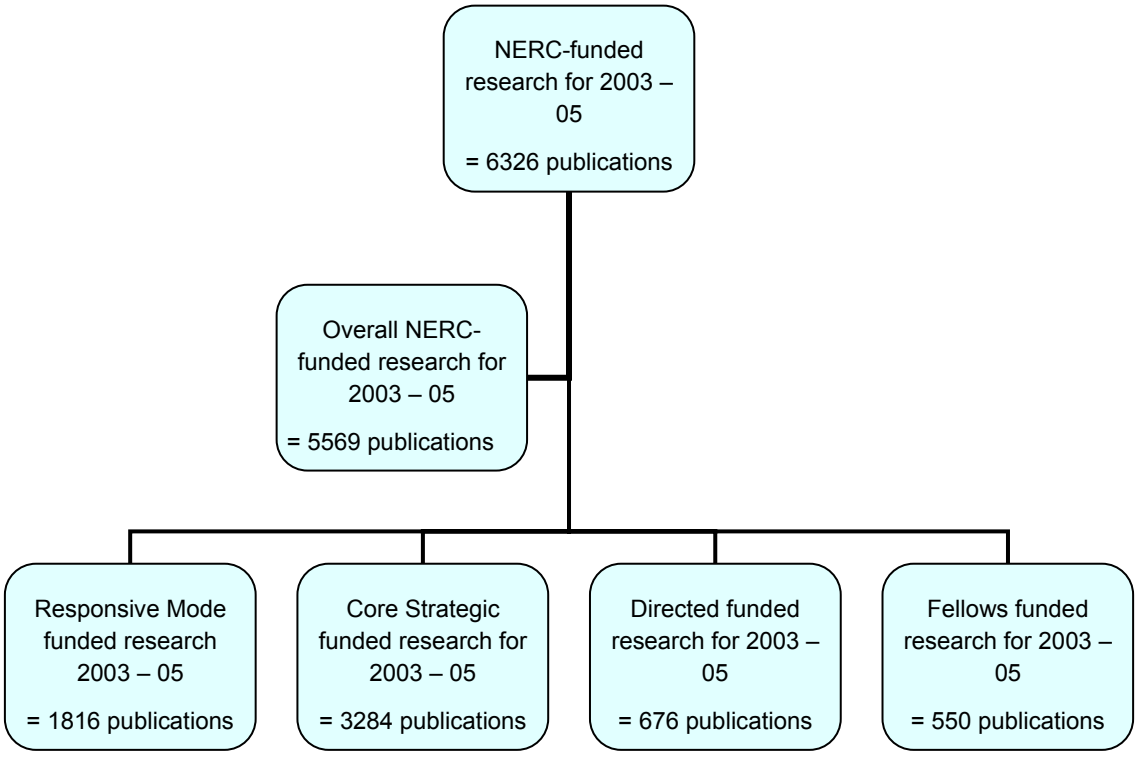
The subsequent bibliometric analyses cover publications in the census period 2003 to 2005 inclusive. The unique paper count for the NERC-funded dataset overall is 5569 journal articles and reviews (derived from total number of papers between 2003 and 2005 in Table 3.2.2 but counting each paper only once regardless of whether it was reported by more than one Funding Mode).

Summary

The datasets for the bibliometric analyses of NERC-funded research will use citation data from each journal article or review only once, both overall and within Funding Modes. The rationale behind this methodology is that the output from the Core Strategic Funding Mode is a dataset of *N* papers even if co-authored by more than one researcher supported by Core Strategic funding.

Total of 'matched' publications	8042	Table 3.1.2
Publications restricted to unique papers within Funding Mode	7251	Table 3.2.1
Publications restricted to substantive journal articles and reviews	6955	Table 3.2.2
Publications restricted to 2003-05 Thomson Reuters database year	6326	Table 3.2.2

For reference the unique paper counts for each Funding Mode and for NERC-funded research overall are given below:



The final dataset for the bibliometric analyses represents just over 90% of the publications (recorded as ISI-journals) reported on the ROD. No apparent biases have been introduced in the data matching process between years or between the Funding Modes.

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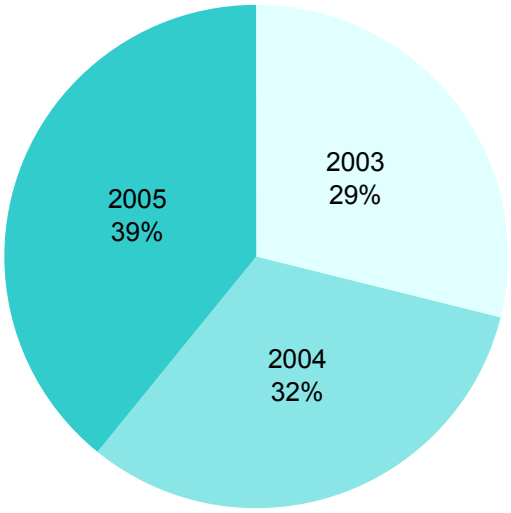
4 NERC-funded research – bibliometric indicators

Section 4 describes the basic characteristics of the NERC-funded publications dataset and compares it to those of the UK as a whole.

- The NERC-funded dataset used in this report comprises a total of 5882 publications from 900 journals for the 3-year period between 2003 and 2005 (Section 4.1). Of these, 5569 journal articles and reviews were used for bibliometric analyses.
- NERC-funded researchers have published comparatively more papers in the elite, multidisciplinary journals of Nature and Science than is typical for the UK (3.5% compared to 0.6% papers published between 2003 and 2005). In addition, the most frequently used journals by NERC-funded researchers are those which are leading journals in their respective research fields (Section 4.2).
- Just over one-third of NERC-funded research between 2003 and 2005 was published in journals assigned to the Earth Sciences journal category or research field (Section 4.3).
- Overall, NERC-funded research in Earth Sciences was more likely to have been cited than comparable papers published by the rest of the UK research base in this field (Section 4.4).
- NERC-funded research publications have a good impact compared to UK and world baselines (Section 4.5). The impact of publications in Animal Sciences, Environment/Ecology and Plant Sciences research fields are especially good (Section 4.5).
- The impact of NERC-funded research in all research fields has been good throughout the 3-year period covered by this report and the current indications are that impact has increased and is higher in 2005 than in 2003 (Section 4.6).

The indicators described in this section suggest that NERC-funded publications are of higher quality than those from the rest of the UK research base. The categorised impact profiles of these publications is analysed further in Section 5.

4.1 Annual publication output



The figure indicates the annual publication output from NERC-funded research for the three years 2003, 2004 and 2005. It is not possible to assess whether the growth in publication output is a true reflection of NERC-funded research or better compliance rates with ROD (see also Data Tables in Section 6).

4.2 Journal usage

The twenty journals used most frequently by NERC-funded researchers are listed in Table 4.2a.

Publications in these more commonly-used journals total just under 1500 papers or one-quarter of the total output. The majority of these journals are ranked in the 'top' 20% (by Journal Impact Factor) of journals in their specific research fields. This indicates that the journals used by NERC-funded researchers contain papers that are well-regarded amongst their peers.

NERC-funded researchers have published comparatively more papers in the elite, multidisciplinary journals of *Nature* and *Science* than is typical for the UK (3.5% compared to 0.6% papers published between 2003 and 2005).

Table 4.2a: Journals in which NERC-funded researchers have published most frequently

Journal Title	Number of papers	Impact Factor 2006
Journal of Geophysical Research (all sections)	272	2.800
Geophysical Research Letters	180	2.602
Nature	113	26.681
Proceedings of the Royal Society B-Biological Sciences	99	3.612
Marine Ecology-Progress Series	98	2.286
Science	84	30.028
Quarterly Journal of the Royal Meteorological Society	74	2.045
Science of the Total Environment	68	2.359
Geochimica et Cosmochimica Acta	60	3.751
Earth and Planetary Science Letters	58	3.887
Journal of the Marine Biological Association United Kingdom	52	0.778
Atmospheric Chemistry and Physics	51	4.362
Journal of Animal Ecology	48	3.390
Journal of the Geological Society	46	2.287
Environmental Science & Technology	44	4.040
Environmental Pollution	43	2.769
Geology	43	3.477
Geophysical Journal International	42	2.353
Journal of Climate	41	3.419
Journal of Applied Ecology	40	4.527
Journal of Physical Oceanography	40	1.838

(ranked by total papers 2003-2005)

The journal impact factor is calculated by Thomson Reuters as the average number of times articles from the journal published in the past two years were cited in 2006. Thus, an impact factor of 2.0 means that, on average, the articles published in 2004 or 2005 have been cited

twice. Citing articles may be from the same journal; most citing articles are from different journals.

Table 4.2b lists the twenty journals with the highest journal impact factors used more than once by NERC-funded researchers. The list is dominated by 'review' journals as articles in such journals tend to be cited more frequently than articles in research journals. It also includes journals which may not reflect 'core' research activity for NERC-funded researchers, for example, medical journals such as the Lancet.

Table 4.2b: High-impact factor journals used by NERC-funded researchers

Journal Title	Number of papers	Impact Factor 2006
Science	84	30.028
Nature	113	26.681
Chemical Reviews	4	26.054
The Lancet	2	25.800
Nature Reviews Genetics	3	22.947
Nature Reviews Microbiology	4	15.845
Trends in Ecology & Evolution	34	14.125
PLOS Biology	8	14.101
Chemical Society Reviews	2	13.690
American Journal of Human Genetics	3	12.629
Current Biology	17	10.988
Proceedings of the National Academy of Sciences USA	21	9.643
FEMS Microbiology Reviews	3	8.691
Reviews of Geophysics	3	8.375
Trends in Microbiology	2	8.335
Trends in Biotechnology	2	7.843
Journal of the American Chemical Society	4	7.696
Ecology Letters	22	7.609
Current Opinion in Microbiology	3	7.445
Ecological Monographs	5	7.102

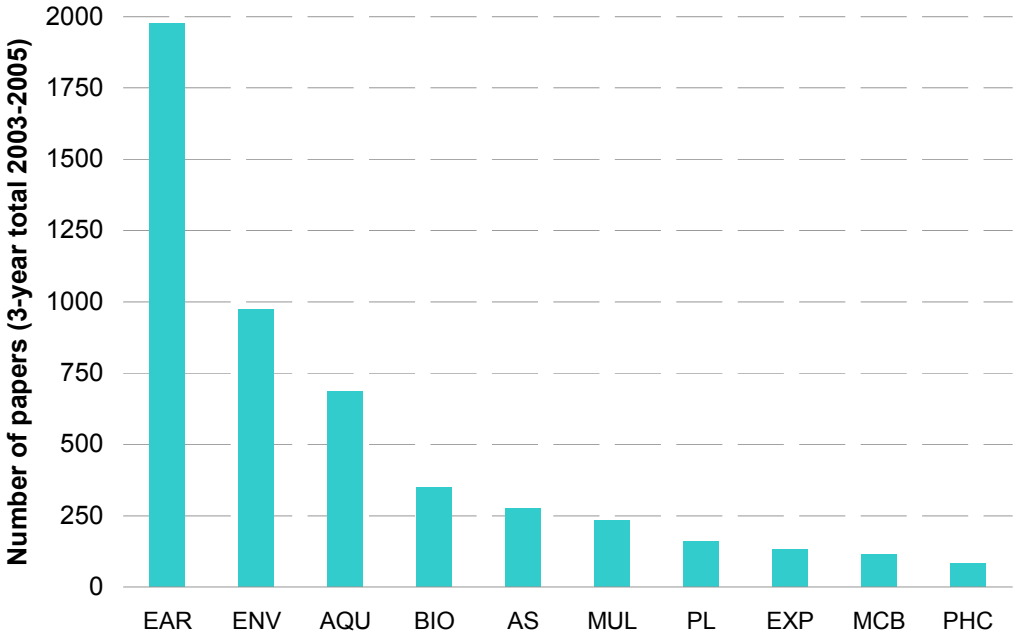
(ranked by journal impact factor for 2006)

4.3 Most frequently used research fields

Papers are allocated by Thomson Reuters to one or more research fields according to which journal the paper is published in (Section 2.2). Research published by NERC-funded researchers has been assigned to 69 of the 106 Current Contents journal categories or research fields used by Thomson Reuters.

Just over one-third of NERC-funded research between 2003 and 2005 was published in journals assigned to the Earth Sciences research field.

Other research fields frequently used by NERC-funded researchers for publication output include Environment/Ecology, Aquatic Sciences and basic Biology (an additional one-third of published research in total).



Key to Research Field codes			
EAR	Earth Sciences	MUL	Multidisciplinary science
ENV	Environment/Ecology	PL	Plant Sciences
AQU	Aquatic Sciences	EXP	Experimental Biology
BIO	Biology	MCB	Microbiology
AS	Animal Sciences	PHC	Physical Chemistry/Chemical Physics

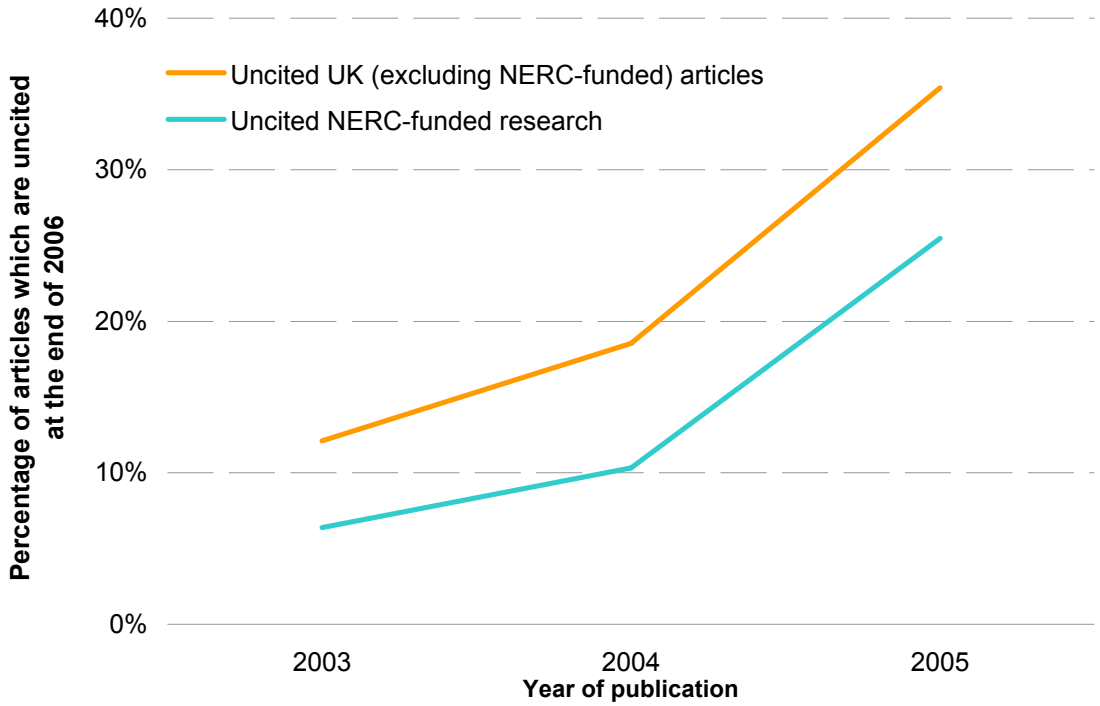
4.4 Percentage of publications which are uncited

Rates of citation accumulation are field-dependent. For the UK research base as a whole, ten years after publication there is a general plateau in citation profiles beyond which few additional citations would be expected. In biomedical sciences the plateau may be reached rapidly, often within 2-3 years after publication. A significant proportion of publications are never cited, however, and typically around one-third of UK output is uncited in any ten-year sample (the majority of uncited articles would be less than three years old).

The following figure indicates the relative citation time-trend for NERC-funded research and UK publications. To get a valid comparison, noting the differences in citation behaviour between fields, this analysis has been restricted to articles published in Earth Sciences. A comparison using all UK research articles would include a large medical and physical science background of little relevance to NERC.

NERC-funded publications account for around one-quarter of the total UK output in Earth Sciences so the UK data in the Figure below has excluded any articles which have been identified as NERC-funded.

Substantive journal articles in Earth Sciences



Overall, NERC-funded research is more likely to have been cited than comparable papers published by the rest of the UK research base. NERC-funded research is cited more quickly than other UK Earth Sciences research and this gain is sustained even in older papers.

4.5 Impact of NERC-funded research

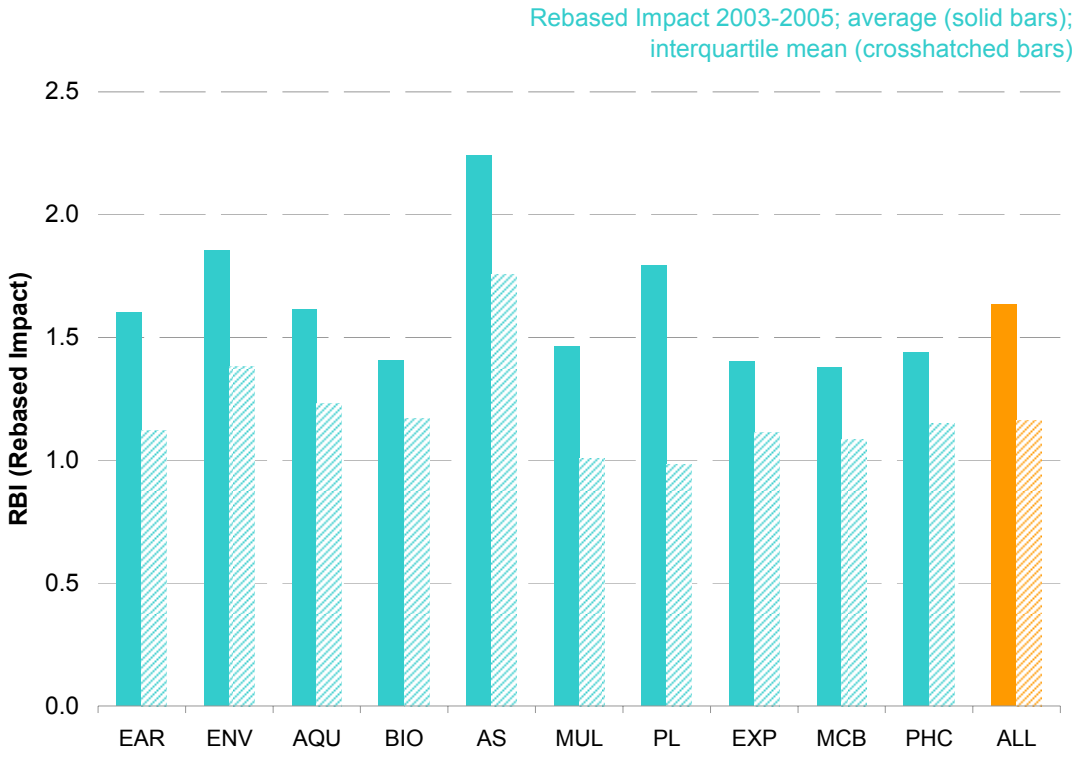
The relative impact of NERC-funded research publications is good.

Impact of research, an index linked to citation accumulation, is field-dependent. All data presented in this report are therefore impact normalised, or rebased, to the world average. This then allows appropriate comparison between years and between fields.

For example, the rebased impact (RBI) for NERC-funded research in Earth Sciences is the raw impact (citations/paper) of NERC publications in Earth Sciences for any specific year of publication divided by the raw impact (citations/paper) for all world publications in Earth Sciences and in the same year of publication.

The overall rebased impact (RBI) of all of the NERC-funded research publications is 1.66 (where world average is 1.0). For comparison, the UK's average rebased impact relative to world baseline for the 5-year period 2000-2004 inclusive in Environmental Sciences was 1.25 (*Evidence* report for the Department of Innovation, Universities and Skills, **PSA Target Metrics 2007**, indicator 3.09, pg 54).

The interquartile mean RBI for NERC-funded research is 1.16 (there is currently no comparative benchmark for the UK or world). Taken into consideration with the overall average RBI, however, this figure indicates that some of the high average could be due to the positive skew of a few exceptionally-cited publications although the average is supported by a substantial body of well-cited publications.



The figure shows that the average rebased impact of NERC-funded research is above world average in all fields.

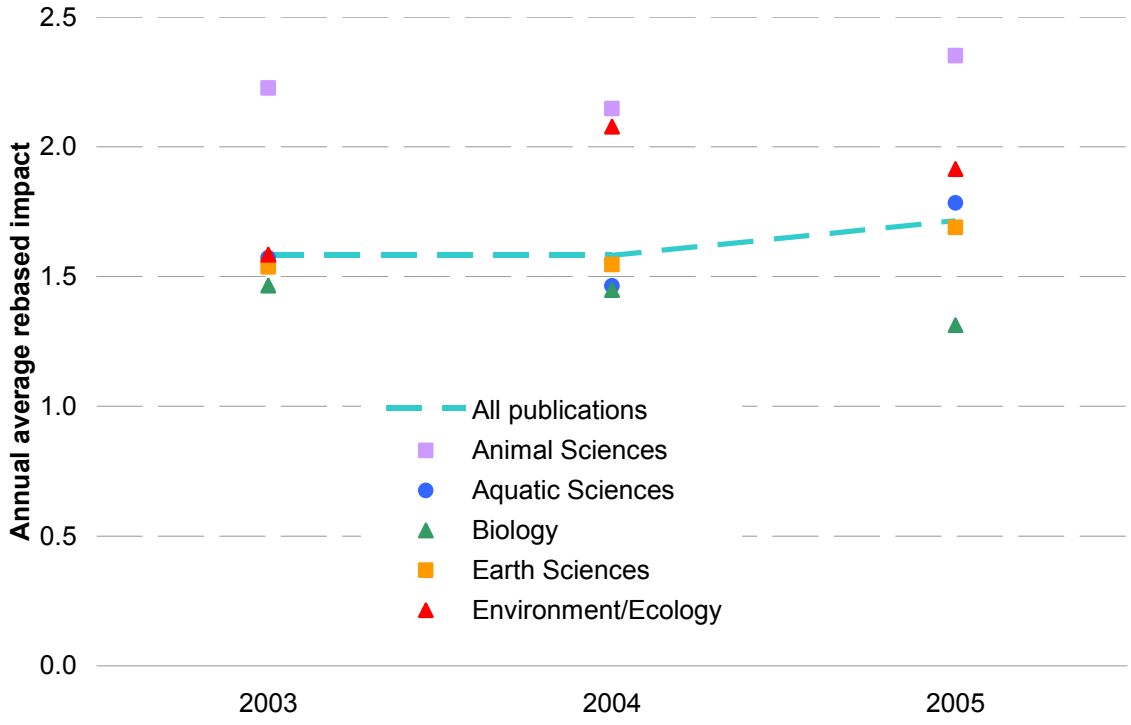
The impact of articles published in Animal Sciences journals is more than twice the world average.

The impact of research published in journals assigned to the Environment/Ecology and Plant Sciences research fields is almost twice the world average.

4.6 Has the impact of NERC-funded research changed during the 3-year period from 2003 to 2005?

Overall, the impact of NERC-funded research in all research fields has been good throughout the 3-year period covered by this report and the current indications are that impact has increased and is higher in 2005 than in 2003.

The figure below shows the annual average RBI for all publications and for the top five research fields (data are too sparse for other research fields). The world average benchmark is 1.0.



These data suggest that impact has improved consistently in Earth Sciences, the most-frequently used research field in NERC-funded research. That is, the core research base funded by NERC is well-regarded by peers and is an established leader in this field.

The impact of research published in the Biology research field has apparently declined though it has remained above the world average.

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5 Impact Profiles® of NERC-funded publications

Impact Profiles® enable an examination and analysis of the balance of published outputs relative to world average and relative to a reference profile.[3] This provides much more information about the basis and structure of research performance than conventionally reported averages in citation indices.

An Impact Profile® shows what proportion of papers are uncited and what proportion are in each of eight categories of relative citation rates, normalised (rebased) to world average (which becomes 1.0 in this graph). Rebased citation rates above 1.0 indicate papers cited more often than world average for the field in which that journal is categorised and in their year of publication.

Attention should be paid to:

- The proportion of uncited papers on the left of the chart
- The proportion of cited papers either side of world average (1.0)
- The location of the most common (modal) group near the centre
- The proportion of papers in the most highly-cited categories to the right, (≥4 x world, ≥8 x world).

What are uncited papers?

It may be a surprise that some journal articles are never subsequently cited after publication, even by their authors. This accounts for about half the total global output and almost one quarter of UK output. We cannot tell why papers are not cited. It is likely that a significant proportion of papers remain uncited because they are reporting negative results which are an essential matter of record in their field but make the content less likely to be referenced in other papers. Inevitably, other papers are uncited because their content is trivial or marginal to the mainstream or plain wrong. It should not be assumed that this is the case for all such papers.

There is variation in non-citation between countries and between fields. On the whole, relatively more engineering papers tend to remain uncited than papers in other sciences, indicative of a disciplinary factor as well as a quality/significance factor. There is also an obvious increase in the likelihood of citation over time but most papers that are going to be cited will be cited within a few years of publication.

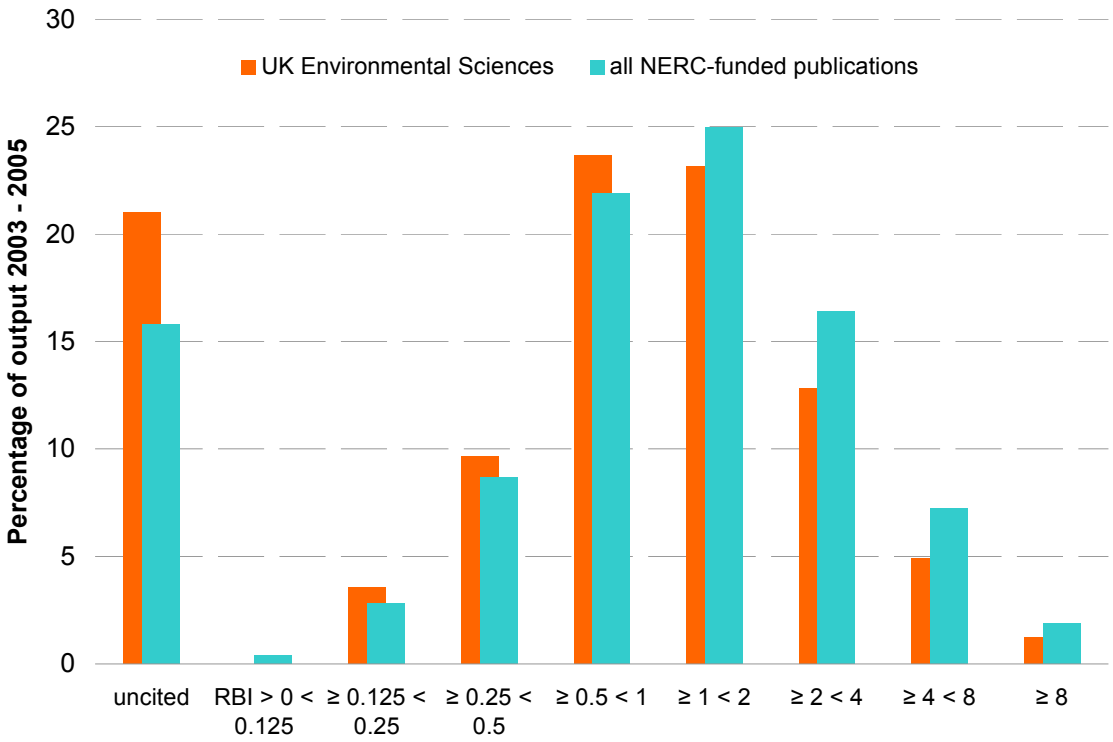
We work on the assumption that relative non-citation rates within a field are one of the indicators of the extent to which a body of work is regarded by others in the same field to be of greater or lesser significance to their subsequent work.

What is the threshold for 'highly cited'?

Thomson Reuters has traditionally used the term 'Highly Cited Paper' to refer to the world's 1% of most frequently cited papers, taking into account year of publication and field. In rough terms, UK papers cited more than 8 times as often as relevant world average would fall into the Thomson Highly Cited category. About 1-2% of papers (all papers, cited or uncited) typically pass this hurdle. Such a threshold certainly delimits exceptional papers for international comparisons but, in practice, is an onerous marker for more general management purposes.

After reviewing the outcomes of a number of analyses, we have chosen a more relaxed definition for our descriptive and analytical work. We deem papers that are cited more often than 4 times the relevant world average to be relatively highly-cited for national comparisons. This covers the two most highly-cited categories in our graphical analyses. About 5% of total UK papers typically pass this hurdle.

5.1 *Impact Profile® for all NERC-funded publications benchmarked against UK Environmental Sciences*

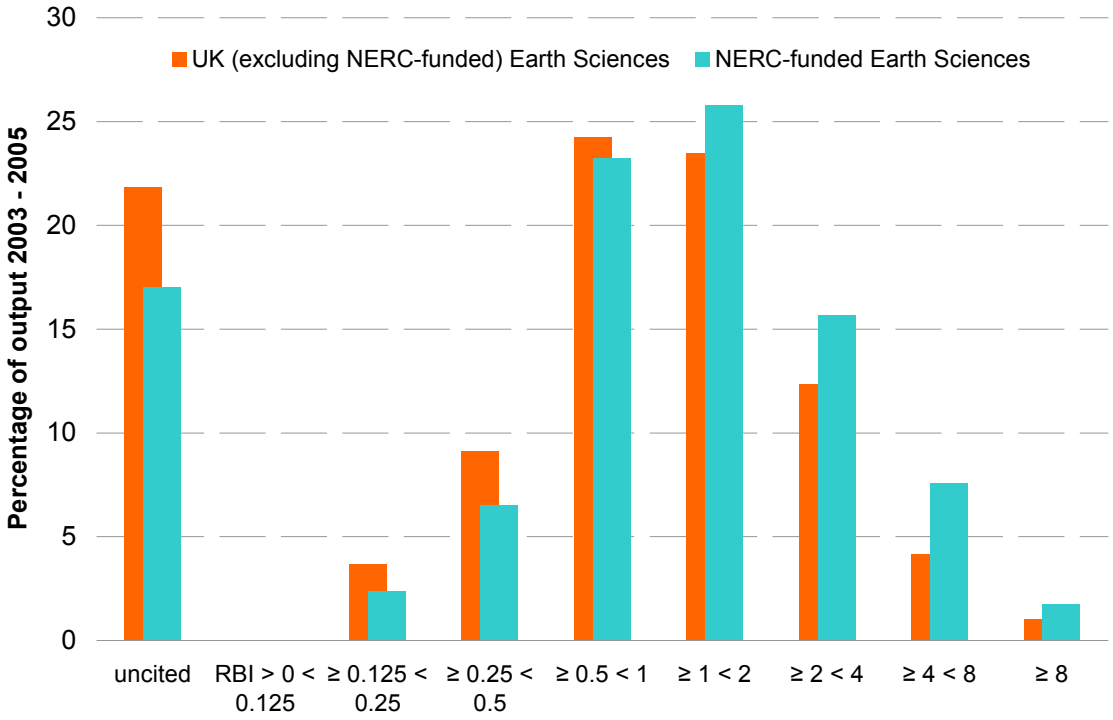


- NERC-funded research is internationally important - almost one-tenth (9.1%) of papers are highly-cited (cited more than 4 times the relevant world average).
- The modal group for NERC-funded research is above world average (1.0) at RBI 1–2 whereas it is below world average for UK *Environmental Sciences*.
- Relatively few of the NERC-funded papers are uncited in this 3-year sample. The UK typically has around one fifth of papers uncited.

The following Impact Profiles® show NERC-funded research in the five most frequently used research fields: Earth Sciences, Environment/Ecology, Aquatic Sciences, Biology and Animal Sciences benchmarked against the UK background in those fields (with NERC-funded research excluded as it has formed a substantial proportion of the UK research base in these fields).

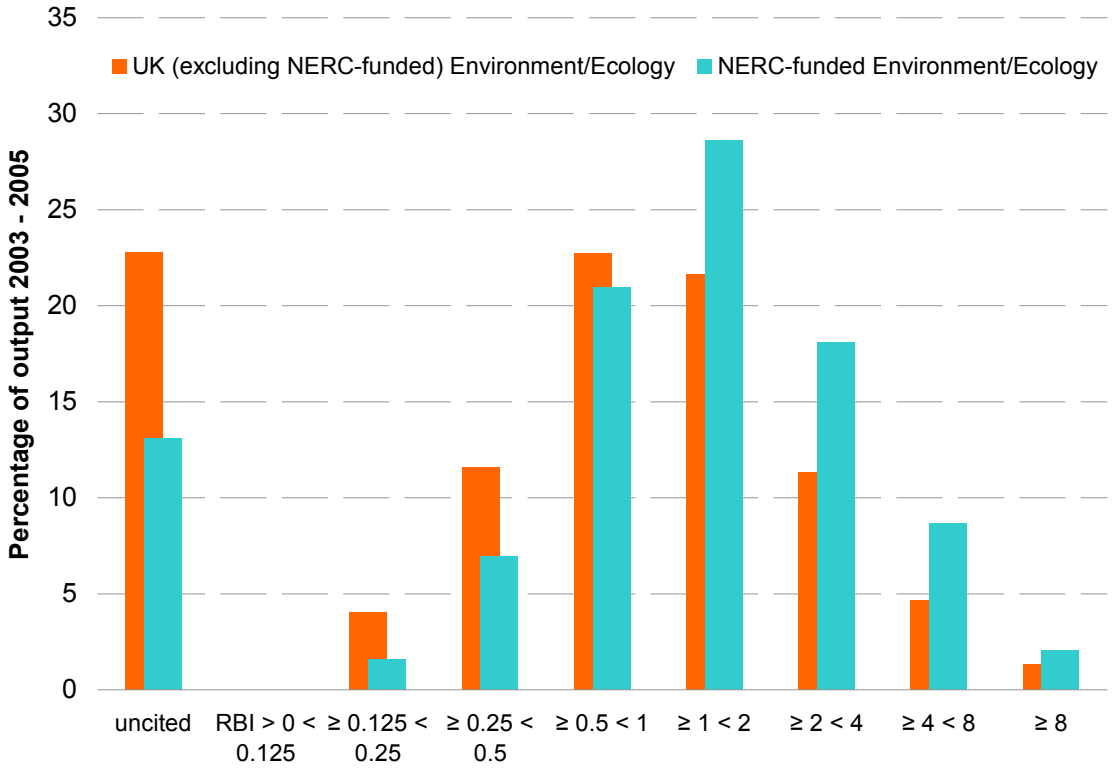
Broadly, the Impact Profiles® all indicate similar patterns: less uncited papers and more well- and highly-cited research than the rest of the UK indicating that NERC-funded research is internationally significant.

5.2 *Impact Profiles® for publications in Earth Sciences: NERC-funded research benchmarked against other UK research*



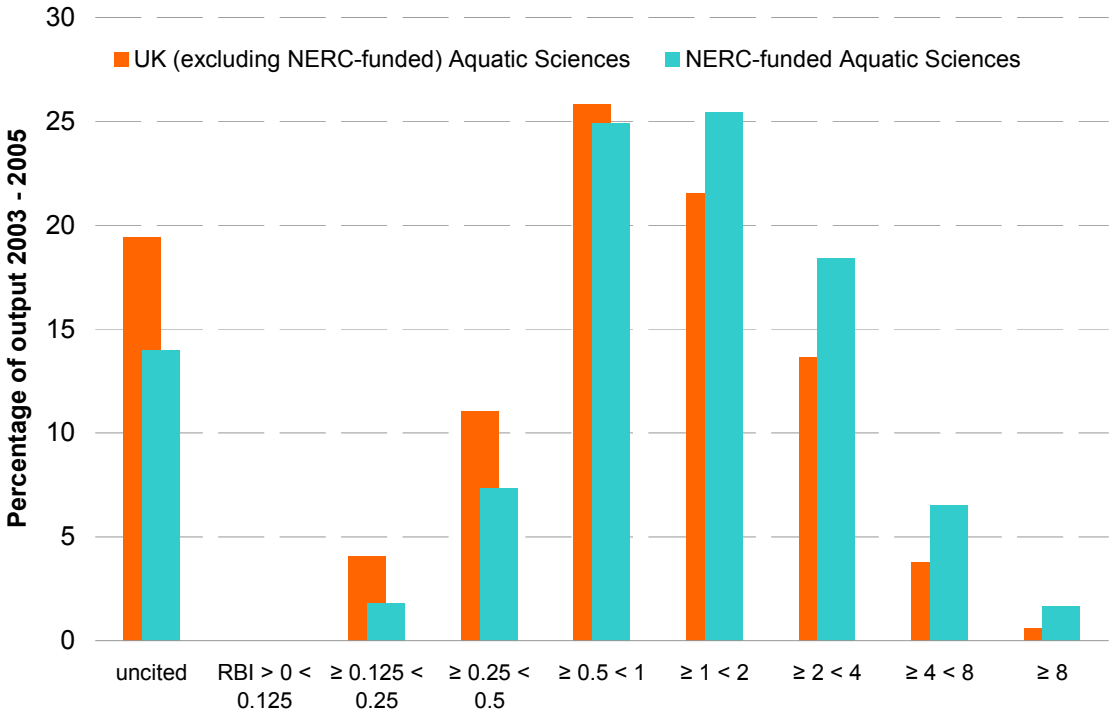
- Research published by NERC-funded researchers in Earth Sciences had greater impact than similar research published by other UK researchers. Over 9% of papers were highly-cited (cited ≥ 4 times the relevant world average) compared to 5% for the rest of the UK.
- The modal group for NERC-funded Earth Sciences research is above world average (1.0) at RBI 1–2. The proportion of cited papers above the world average (1.0) is 50.9% (other UK = 41.1%).
- NERC-funded research in Earth Sciences has a greater proportion of papers cited above world average and fewer papers cited below world average than the rest of the UK.
- In all impact categories above world average (to the right of the figure), NERC-funded publications perform better than the rest of the UK, indicating that Earth Sciences research funded by NERC is much more frequently cited than similar publications from the rest of the UK.
- In all impact categories below world average (to the left of the figure) NERC-funded Earth Sciences has a much lower percentage of papers than the rest of the UK. There is a lower percentage of uncited NERC-funded papers than for other UK research in this area (17.0% compared with 21.9%).

5.3 Impact Profiles® for publications in Environment/Ecology: NERC-funded research benchmarked against other UK research



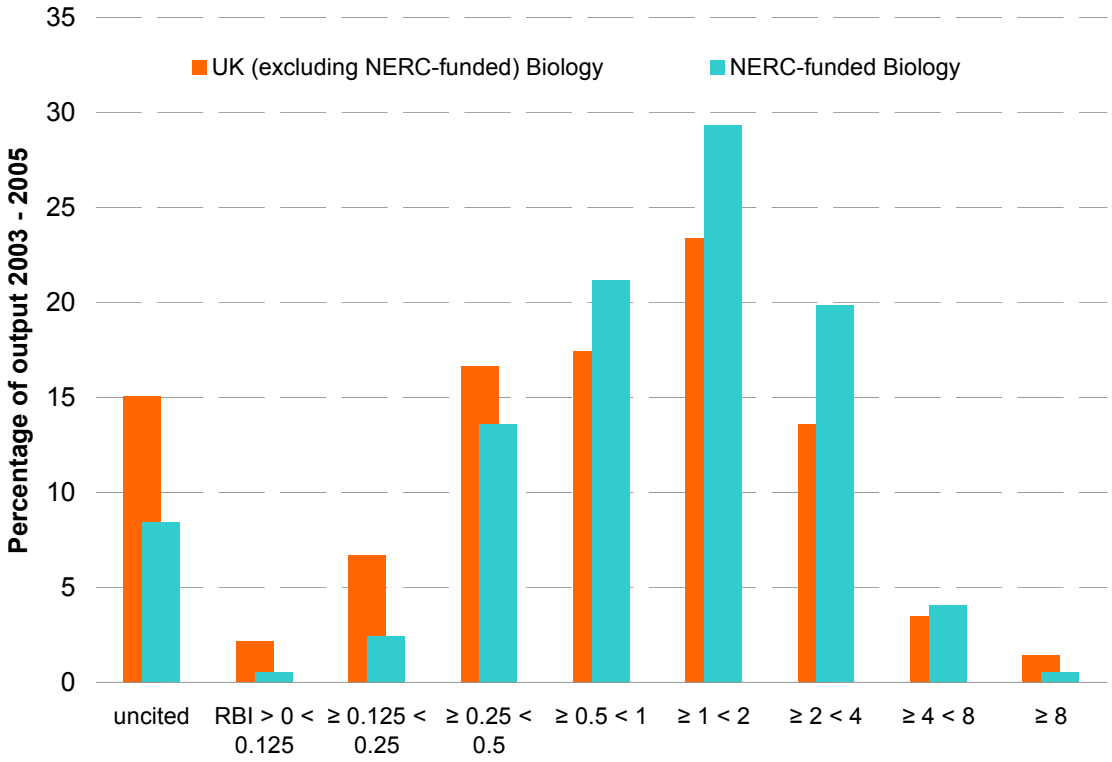
- Research published by NERC-funded researchers in Environment/Ecology had greater impact than similar research published by other UK researchers. Almost 11% of papers were highly-cited (cited ≥ 4 times the relevant world average) compared to 6% for the rest of the UK.
- The modal group for NERC-funded Environment/Ecology research is clearly above world average (1.0) at RBI 1–2. The proportion of cited papers above the world average (1.0) is 57.4% (other UK = 38.9%).
- NERC-funded research in Environment/Ecology has a greater proportion of papers cited above world average and fewer papers cited below world average than the rest of the UK.
- In all impact categories above world average (to the right of the figure), NERC-funded publications perform better than the rest of the UK, indicating that Environment/Ecology research funded by NERC is much more frequently cited than similar publications from the rest of the UK.
- In all impact categories below world average (to the left of the figure) NERC-funded Environment/Ecology has a much lower percentage of papers than the rest of the UK. There is a lower percentage of uncited NERC-funded papers than for other UK research in this area (13.1% compared with 22.8%).

5.4 *Impact Profiles® for publications in Aquatic Sciences: NERC-funded research benchmarked against other UK research*



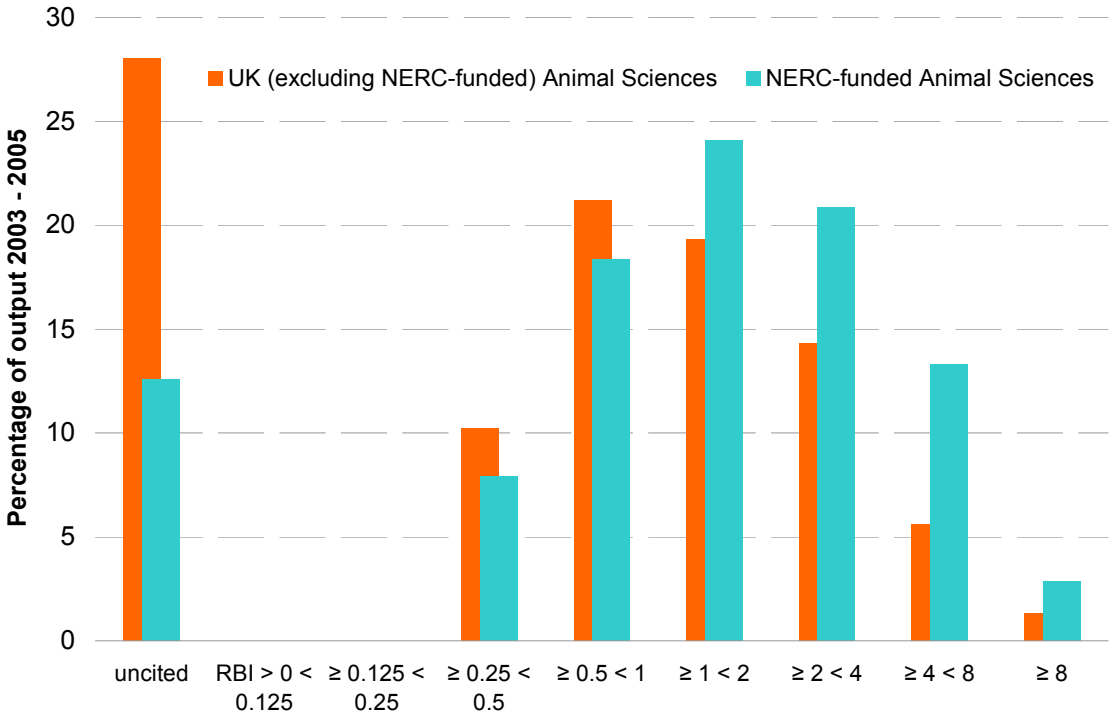
- Research published by NERC-funded researchers in Aquatic Sciences had greater impact than similar research published by other UK researchers. Over 8% of papers were highly-cited (cited ≥ 4 times the relevant world average) compared to nearly 4.5% for the rest of the UK.
- The modal group for NERC-funded Aquatic Sciences research is above world average (1.0) at RBI 1–2. The proportion of cited papers above the world average (1.0) is 52.0% (other UK = 39.6%).
- NERC-funded research in Aquatic Sciences has a greater proportion of papers cited above world average and fewer papers cited below world average than the rest of the UK.
- In all impact categories above world average (to the right of the figure), NERC-funded publications perform better than the rest of the UK, indicating that Aquatic Sciences research funded by NERC is much more frequently cited than similar publications from the rest of the UK.
- In all impact categories below world average (to the left of the figure) NERC-funded Aquatic Sciences has a lower percentage of papers than the rest of the UK. Also, there is a lower percentage of uncited NERC-funded papers than for other UK research in this area (14.0% compared with 19.4%).

5.5 Impact Profiles® for publications in Biology: NERC-funded research benchmarked against other UK research



- Research published by NERC-funded researchers in Biology had greater impact than similar research published by other UK researchers. However, unlike research in other fields it has been research in the well-cited categories (RBI ≥ 1 (world average) to 4) where NERC-funded research has made significant impact.
- The percentage of highly-cited papers (RBI ≥ 4) has been between 4.5–5% for both NERC-funded and other UK research in Biology. The modal group, at RBI 1–2, was also the same for both NERC-funded and UK research.
- NERC-funded research in Biology has a greater proportion of papers cited above world average and fewer papers cited below world average than the rest of the UK.
- This is the only research field in which NERC-funded publications have not out-performed the rest of the UK in all impact categories above world average (to the right of the figure). There have been fewer publications in the extremely highly-cited category relative to other UK research.
- There is a lower percentage of uncited NERC-funded papers than for other UK research in this area (8.4% compared with 15.1%).

5.6 Impact Profiles® for publications in Animal Sciences: NERC-funded research benchmarked against other UK research



- Research published by NERC-funded researchers in Animal Sciences had much greater impact than similar research published by other UK researchers. Over 16% of papers were highly-cited (cited ≥ 4 times the relevant world average) compared to nearly 7% for the rest of the UK.
- The modal group for NERC-funded Animal Sciences research was above world average (1.0) at RBI 1–2. The proportion of cited papers above the world average (1.0) is 61.2% (other UK = 40.6%).
- NERC-funded research in Aquatic Sciences has a much greater proportion of papers cited above world average and far fewer papers cited below world average than the rest of the UK.
- In all impact categories above world average (to the right of the figure), NERC-funded publications far out-perform the rest of the UK, indicating that Animal Sciences research funded by NERC is much more frequently cited than similar publications from the rest of the UK.
- In all impact categories below world average (to the left of the figure) NERC-funded Animal Sciences has a lower percentage of papers than the rest of the UK. Also, the percentage of uncited NERC-funded papers in this field is less than half of that for other UK research (12.6% compared with 28.0%).

[3] Adams J, Gurney K and Marshall S. (2007) Profiling citation impact: a new methodology. Scientometrics, 72 (2), 325-344.

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6 NERC-funded research – bibliometric indicators by Funding Mode

This section describes the bibliometric indicators split by the four Funding Modes: Core Strategic, Responsive Mode, Directed and Fellows. The Figures show the volume and rebased impact data by Funding Mode for the 3-year period between 2003 and 2005. Data tables showing number of papers, citations, raw impact and rebased impact are included at the end of this section.

- More papers are published from the Core Strategic Funding Mode than the other Funding Modes (Figure 6.1).
- Publications identified as arising from the Fellows Funding Mode have a greater impact than those from other Funding Modes (Figure 6.2).

6.1 Definitions of the NERC Funding Modes

The structure of reporting on the NERC Research Outputs Database was based on the NERC Funding Model in operation from 1995 to 2003.

Responsive Mode

Responsive Mode funds excellent, curiosity driven environmental research grants, free from boundaries, to provide the opportunity for freethinking, risk-taking and innovation. The main schemes are:

- Standard grants
- Small grants
- New Investigator

Fellowships

Fellowships provide an opportunity for outstanding environmental scientists to devote their time to research, developing their research careers, and producing work of international importance. Includes:

- Postdoctoral Fellows: 3-year awards for early career development
- Advanced Fellows: 5-year awards for mid-career development
- Senior Fellows: 5-year awards (now discontinued)

Directed Programmes

NERC Directed Programmes are directed at specific themes that are of high priority in meeting NERC's strategic aims. The programmes are designed to encourage scientific excellence and to deliver contributions to wealth creation/quality of life through basic and strategic research and training.

Core Strategic

Core Strategic funding is typically long term. It maintains expertise and knowledge in key areas of the environmental sciences, determined by Council. It supports excellent and relevant research, survey and monitoring; technology development; and the curation, interpretations, and supply of environmental data. It meets current needs and forms the basis for meeting future priorities.

Figure 6.1 Annual research output for NERC-funded research

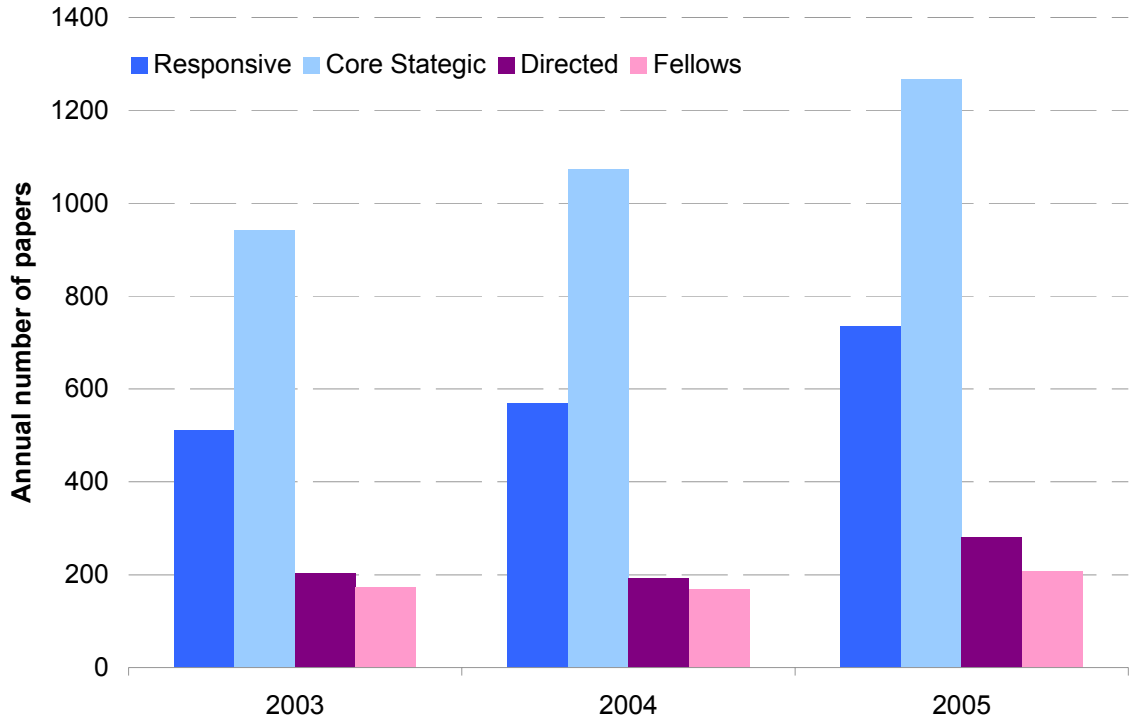
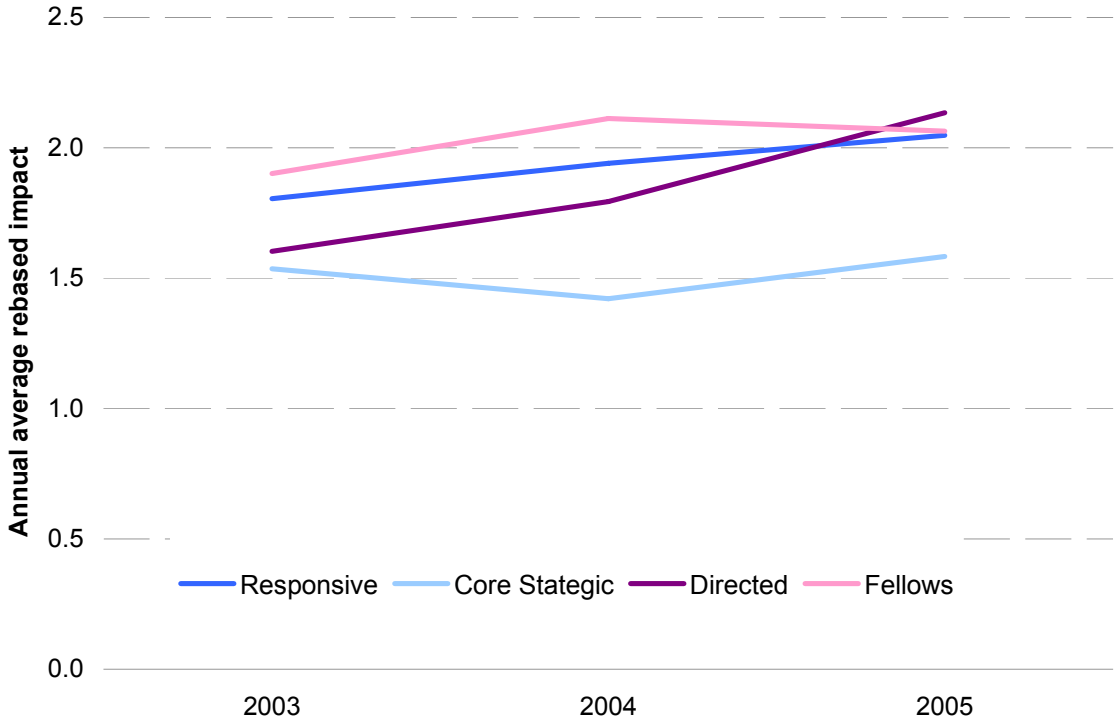


Figure 6.2 Annual rebased impact for NERC-funded research



6.2 Tables of bibliometric data

NERC-funded research: All Funding Modes

1 Count of papers	2003	2004	2005	Average
All research fields	**1606**	**1787**	**2176**	**1856**
By research field				
Earth Sciences	518	617	727	621
Environment/Ecology	290	269	374	311
Aquatic Sciences	201	237	235	224
Biology	108	117	114	113
Animal Sciences	77	98	95	90
Multidisciplinary	49	47	91	62
Plant Sciences	46	57	52	52
Experimental Biology	34	43	36	38
Microbiology	21	28	54	34
Physical Chemistry/Chemical Physics	24	14	43	27

2 Sum of citations	2003	2004	2005
All publications	**15975**	**11695**	**6716**
By research field			
Earth Sciences	5076	4008	2352
Environment/Ecology	3298	2484	1343
Aquatic Sciences	1591	1099	631
Biology	1412	1100	495
Animal Sciences	599	506	243
Multidisciplinary	843	562	426
Plant Sciences	687	333	211
Experimental Biology	1466	769	308
Microbiology	915	585	416
Physical Chemistry/Chemical Physics	223	72	144

3 Impact (cites/paper)	2003	2004	2005
All publications	**9.95**	**6.54**	**3.09**
By research field			
Earth Sciences	9.80	6.50	3.24
Environment/Ecology	11.37	9.23	3.59
Aquatic Sciences	7.92	4.64	2.69
Biology	13.07	9.40	4.34
Animal Sciences	7.78	5.16	2.56
Multidisciplinary	17.20	11.96	4.68
Plant Sciences	14.93	5.84	4.06
Experimental Biology	43.12	17.88	8.56
Microbiology	43.57	20.89	7.70
Physical Chemistry/Chemical Physics	9.29	5.14	3.35

4 Rebased impact	2003	2004	2005	Average
All publications	**1.61**	**1.61**	**1.75**	**1.66**
By research field				
Earth Sciences	1.54	1.55	1.69	1.59
Environment/Ecology	1.58	2.08	1.91	1.86
Aquatic Sciences	1.57	1.46	1.78	1.61
Biology	1.46	1.45	1.31	1.41
Animal Sciences	2.23	2.15	2.35	2.24
Multidisciplinary	1.95	1.76	1.40	1.70
Plant Sciences	2.27	1.28	2.11	1.89
Experimental Biology	1.81	1.24	1.41	1.49
Microbiology	1.63	1.23	1.33	1.40
Physical Chemistry/Chemical Physics	1.37	1.14	1.57	1.36

NERC-funded research: Core Strategic Funding Mode

1 Count of papers	2003	2004	2005	Average
All research fields	**942**	**1074**	**1268**	**1095**
By research field				
Earth Sciences	291	367	408	355
Environment/Ecology	198	180	230	203
Aquatic Sciences	151	182	194	176
Biology	45	46	58	50
Animal Sciences	43	60	57	53
Multidisciplinary	30	23	61	38
Plant Sciences	30	30	25	28
Experimental Biology	13	18	11	14
Microbiology	8	16	25	16
Physical Chemistry/Chemical Physics	1	1	7	3

2 Sum of citations	2003	2004	2005
All publications	**8503**	**5871**	**3391**
By research field			
Earth Sciences	2891	2086	1260
Environment/Ecology	1977	1408	724
Aquatic Sciences	1217	751	473
Biology	475	360	222
Animal Sciences	243	264	126
Multidisciplinary	390	161	302
Plant Sciences	423	164	63
Experimental Biology	550	223	74
Microbiology	333	258	179
Physical Chemistry/Chemical Physics	9	11	6

3 Impact (cites/paper)	2003	2004	2005
All publications	**9.03**	**5.47**	**2.67**
By research field			
Earth Sciences	9.93	5.68	3.09
Environment/Ecology	9.98	7.82	3.15
Aquatic Sciences	8.06	4.13	2.44
Biology	10.56	7.83	3.83
Animal Sciences	5.65	4.40	2.21
Multidisciplinary	13.00	7.00	4.95
Plant Sciences	14.10	5.47	2.52
Experimental Biology	42.31	12.39	6.73
Microbiology	41.63	16.13	7.16
Physical Chemistry/Chemical Physics	9.00	11.00	0.86

4 Rebased impact	2003	2004	2005	Average
All publications	**1.54**	**1.42**	**1.58**	**1.51**
By research field				
Earth Sciences	1.58	1.40	1.59	1.53
Environment/Ecology	1.43	1.78	1.71	1.64
Aquatic Sciences	1.61	1.30	1.62	1.51
Biology	1.17	1.23	1.23	1.21
Animal Sciences	1.55	1.85	2.00	1.80
Multidisciplinary	1.40	0.93	1.45	1.26
Plant Sciences	2.14	1.20	1.33	1.56
Experimental Biology	1.72	0.96	1.10	1.26
Microbiology	1.29	1.10	1.16	1.18
Physical Chemistry/Chemical Physics	1.33	2.43	0.40	1.39

NERC-funded research: Responsive Funding Mode

1 Count of papers	2003	2004	2005	Average
All research fields	**511**	**569**	**736**	**605**
By research field				
Earth Sciences	164	188	280	211
Environment/Ecology	69	74	105	83
Aquatic Sciences	56	54	48	53
Biology	52	57	49	53
Animal Sciences	30	35	40	35
Multidisciplinary	15	25	29	23
Plant Sciences	14	22	20	19
Experimental Biology	19	22	24	22
Microbiology	9	8	22	13
Physical Chemistry/Chemical Physics	16	5	10	10

2 Sum of citations	2003	2004	2005
All publications	**6039**	**4658**	**2763**
By research field			
Earth Sciences	1671	1401	1002
Environment/Ecology	956	888	450
Aquatic Sciences	444	353	161
Biology	780	567	257
Animal Sciences	313	226	123
Multidisciplinary	263	421	156
Plant Sciences	327	151	87
Experimental Biology	740	442	184
Microbiology	458	231	191
Physical Chemistry/Chemical Physics	175	17	55

3 Impact (cites/paper)	2003	2004	2005
All publications	**11.82**	**8.19**	**3.75**
By research field			
Earth Sciences	10.19	7.45	3.58
Environment/Ecology	13.86	12.00	4.29
Aquatic Sciences	7.93	6.54	3.35
Biology	15.00	9.95	5.24
Animal Sciences	10.43	6.46	3.08
Multidisciplinary	17.53	16.84	5.38
Plant Sciences	23.36	6.86	4.35
Experimental Biology	38.95	20.09	7.67
Microbiology	50.89	28.88	8.68
Physical Chemistry/Chemical Physics	10.94	3.40	5.50

4 Rebased impact	2003	2004	2005	Average
All publications	**1.80**	**1.94**	**2.05**	**1.93**
By research field				
Earth Sciences	1.68	1.86	1.95	1.83
Environment/Ecology	1.83	2.70	2.32	2.28
Aquatic Sciences	1.59	2.02	2.24	1.95
Biology	1.71	1.53	1.64	1.63
Animal Sciences	2.86	2.71	2.80	2.79
Multidisciplinary	2.13	2.88	1.56	2.19
Plant Sciences	3.55	1.51	2.19	2.42
Experimental Biology	1.69	1.31	1.39	1.47
Microbiology	2.36	1.21	1.54	1.71
Physical Chemistry/Chemical Physics	1.61	0.75	2.58	1.65

NERC-funded research: Directed Funding Mode

1 Count of papers	2003	2004	2005	Average
All research fields	**203**	**193**	**280**	**225**
By research field				
Earth Sciences	79	74	97	83
Environment/Ecology	34	26	31	30
Aquatic Sciences	21	20	15	19
Biology	18	19	20	19
Animal Sciences	2	1	18	7
Multidisciplinary	3	2	1	2
Plant Sciences	3	6	9	6
Experimental Biology	0	2	4	2
Microbiology	3	5	16	8
Physical Chemistry/Chemical Physics	3	8	32	14

2 Sum of citations	2003	2004	2005
All publications	**2092**	**1526**	**1144**
By research field			
Earth Sciences	809	551	416
Environment/Ecology	411	187	151
Aquatic Sciences	128	71	71
Biology	353	255	87
Animal Sciences	22	2	0
Multidisciplinary	29	74	4
Plant Sciences	23	54	50
Experimental Biology	0	111	45
Microbiology	307	210	201
Physical Chemistry/Chemical Physics	23	44	101

3 Impact (cites/paper)	2003	2004	2005
All publications	**10.31**	**7.91**	**4.09**
By research field			
Earth Sciences	10.24	7.45	4.29
Environment/Ecology	12.09	7.19	4.87
Aquatic Sciences	6.10	3.55	4.73
Biology	19.61	13.42	4.35
Animal Sciences	11.00	2.00	0.00
Multidisciplinary	9.67	37.00	4.00
Plant Sciences	7.67	9.00	5.56
Experimental Biology		55.50	11.25
Microbiology	102.33	42.00	12.56
Physical Chemistry/Chemical Physics	7.67	5.50	3.16

4 Rebased impact	2003	2004	2005	Average
All publications	**1.60**	**1.79**	**2.13**	**1.84**
By research field				
Earth Sciences	1.66	1.84	2.31	1.94
Environment/Ecology	1.59	1.59	2.15	1.78
Aquatic Sciences	1.21	1.12	3.22	1.85
Biology	2.23	2.11	1.42	1.92
Animal Sciences	3.01	0.84	0.00	1.28
Multidisciplinary	1.25	4.55	0.72	2.17
Plant Sciences	1.17	1.98	2.94	2.03
Experimental Biology		3.16	2.09	2.63
Microbiology	1.78	1.59	2.09	1.82
Physical Chemistry/Chemical Physics	1.13	1.22	1.48	1.28

NERC-funded research: Fellows Funding Mode

1 Count of papers	2003	2004	2005	Average
All research fields	**173**	**168**	**209**	**183**
By research field				
Earth Sciences	69	66	66	67
Environment/Ecology	27	25	54	35
Aquatic Sciences	15	10	10	12
Biology	15	17	8	13
Animal Sciences	9	12	15	12
Multidisciplinary	3	2	12	6
Plant Sciences	4	3	5	4
Experimental Biology	6	7	6	6
Microbiology	2	3	3	3
Physical Chemistry/Chemical Physics	4	1	6	4

2 Sum of citations	2003	2004	2005
All publications	**2066**	**1481**	**772**
By research field			
Earth Sciences	813	632	311
Environment/Ecology	404	307	203
Aquatic Sciences	212	34	21
Biology	223	193	34
Animal Sciences	57	86	33
Multidisciplinary	167	9	29
Plant Sciences	14	18	40
Experimental Biology	288	93	66
Microbiology	74	49	15
Physical Chemistry/Chemical Physics	16	8	28

3 Impact (cites/paper)	2003	2004	2005
All publications	**11.94**	**8.82**	**3.69**
By research field			
Earth Sciences	11.78	9.58	4.71
Environment/Ecology	14.96	12.28	3.76
Aquatic Sciences	14.13	3.40	2.10
Biology	14.87	11.35	4.25
Animal Sciences	6.33	7.17	2.20
Multidisciplinary	55.67	4.50	2.42
Plant Sciences	3.50	6.00	8.00
Experimental Biology	48.00	13.29	11.00
Microbiology	37.00	16.33	5.00
Physical Chemistry/Chemical Physics	4.00	8.00	4.67

4 Rebased impact	2003	2004	2005	Average
All publications	**1.90**	**2.11**	**2.06**	**2.03**
By research field				
Earth Sciences	1.92	2.32	2.50	2.25
Environment/Ecology	1.82	2.61	2.11	2.18
Aquatic Sciences	2.76	1.07	1.52	1.78
Biology	1.69	1.78	1.46	1.64
Animal Sciences	1.74	3.01	2.37	2.37
Multidisciplinary	7.20	0.83	0.81	2.95
Plant Sciences	0.53	1.32	4.23	2.03
Experimental Biology	2.08	1.20	1.95	1.75
Microbiology	1.72	1.34	1.09	1.38
Physical Chemistry/Chemical Physics	0.59	1.77	2.19	1.52

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Annex 1: Journal lists and Thomson Reuters definitions for the top five most frequently used research fields

The following Tables show all journal titles used by NERC-funded researchers in the top five most frequently used research fields detailed in the main report (Section 4.3). **Journal titles in bold** are the five most frequently used by NERC-funded researchers within that research field.

A.1 Earth Sciences

The Earth Sciences category includes journals that deal with all aspects of geosciences, including geology, geochemistry, geophysics, mineralogy, meteorology and atmospheric sciences, hydrology, oceanography, petroleum geology, volcanology, seismology, climatology, paleontology, geography, remote sensing, and geodesy.

Journal list for Earth Sciences
AAPG Bulletin-American Association Of Petroleum Geologists
Advances in Space Research
Alcheringa
American Journal Of Science
American Mineralogist
Annales Geophysicae
Annals of Geophysics
Annals of Glaciology
Annual Review of Earth and Planetary Sciences
Applied Geochemistry
Atmosphere-Ocean
Atmospheric Chemistry and Physics
Atmospheric Environment
Atmospheric Research
Australian Journal of Earth Sciences
Basin Research
Boreas
Boundary-Layer Meteorology
Bulletin of Engineering Geology and the Environment
Bulletin of the American Meteorological Society
Bulletin of the Seismological Society of America
Bulletin of Volcanology
Canadian Journal of Earth Sciences
Canadian Mineralogist
Carbonates and Evaporites
Chemical Geology
Clay Minerals
Clays and Clay Minerals
Climate Dynamics
Climatic Change
Comptes Rendus Geoscience
Computers & Geosciences
Contributions to Mineralogy and Petrology
Cretaceous Fossil Vertebrates
Cretaceous Research
Deep-Sea Research Part II-Topical Studies in Oceanography

Journal list for Earth Sciences

Deep-Sea Research Part I-Oceanographic Research Papers
Doklady Earth Sciences
Earth and Planetary Science Letters
Earth Planets and Space
Earth Surface Processes and Landforms
Earth-Science Reviews
Economic Geology and the Bulletin of the Society of Economic Geologists
Elements
Environmental Fluid Mechanics
European Journal of Mineralogy
Geobios
Geochemistry Geophysics Geosystems
Geochemistry-Exploration Environment Analysis
Geochimica et Cosmochimica Acta
Geofluids
Geografiska Annaler Series A-Physical Geography
Geological Magazine
Geological Society of America Bulletin
Geology
Geo-Marine Letters
Geomorphology
Geophysical Journal International
Geophysical Prospecting
Geophysical Research Letters
Geophysics
Geostandards and Geoanalytical Research
Global and Planetary Change
Global Biogeochemical Cycles
Gondwana Research
Holocene
Hydrogeology Journal
Hydrology and Earth System Sciences
International Journal of Applied Earth Observation and Geoinformation
International Journal of Climatology
International Journal of Earth Sciences
International Journal of Remote Sensing
Journal of African Earth Sciences
Journal of Applied Geophysics
Journal of Applied Meteorology
Journal of Asian Earth Sciences
Journal of Atmospheric and Oceanic Technology
Journal of Atmospheric and Solar-Terrestrial Physics
Journal of Atmospheric Chemistry
Journal of Climate
Journal of Coastal Research
Journal of Environmental and Engineering Geophysics
Journal of Geochemical Exploration
Journal of Geodesy
Journal of Geodynamics
Journal of Geology
Journal of Geophysical Research-Atmospheres

Journal list for Earth Sciences

Journal of Geophysical Research-Biogeosciences
Journal of Geophysical Research-Earth Surface
Journal of Geophysical Research-Oceans
Journal of Geophysical Research-Solid Earth
Journal of Geophysics and Engineering
Journal of Glaciology
Journal of Hydrometeorology
Journal of Marine Systems
Journal of Metamorphic Geology
Journal of Micropalaeontology
Journal of Mineralogical and Petrological Sciences
Journal of Oceanography
Journal of Petrology
Journal of Physical Oceanography
Journal of Quaternary Science
Journal of Sedimentary Research
Journal of Seismic Exploration
Journal of Seismology
Journal of South American Earth Sciences
Journal of Structural Geology
Journal of Systematic Palaeontology
Journal of the Atmospheric Sciences
Journal of the Geological Society
Journal of Vertebrate Paleontology
Journal of Volcanology and Geothermal Research
Lethaia
Life and Environments in Purbeck Times
Lithos
Marine and Petroleum Geology
Marine Chemistry
Marine Geology
Marine Geophysical Researches
Marine Micropaleontology
Mathematical Geology
Meteoritics & Planetary Science
Meteorological Applications
Meteorologische Zeitschrift
Micropaleontology
Mineralium Deposita
Mineralogical Magazine
Monthly Weather Review
Natural Hazards
Nature
Near Surface Geophysics
Netherlands Journal of Geosciences-Geologie en Mijnbouw
Neues Jahrbuch fur Geologie und Palaontologie-Monatshefte
New Zealand Journal of Geology and Geophysics
Nonlinear Processes in Geophysics
Norwegian Journal of Geology
Ocean Dynamics
Ocean Modelling

Journal list for Earth Sciences

Organic Geochemistry
Palaeogeography Palaeoclimatology Palaeoecology
Palaeontology
Palaios
Paleoceanography
Palynology
Permafrost and Periglacial Processes
Petroleum Geoscience
Photogrammetric Record
Physics and Chemistry of Minerals
Physics and Chemistry of the Earth
Physics of the Earth and Planetary Interiors
Polar Research
Precambrian Research
Proceedings of the Geologists Association
Proceedings of the National Academy of Sciences of the United States of America
Proceedings of the Yorkshire Geological Society
Progress in Oceanography
Progress in Physical Geography
Pure and Applied Geophysics
Quarterly Journal of the Royal Meteorological Society
Quaternary International
Quaternary Research
Quaternary Science Reviews
Radio Science
Radiocarbon
Remote Sensing of Environment
Reviews of Geophysics
Revista Geologica de Chile
Russian Geology and Geophysics
Science
Scottish Journal of Geology
Sea Technology
Sedimentary Geology
Sedimentology
Seismological Research Letters
South African Journal of Geology
Studies in Palaeozoic Palaeontology and Biostratigraphy in Honour of Charles Hepworth Holland
Surveys in Geophysics
Tectonics
Tectonophysics
Tellus Series A-Dynamic Meteorology and Oceanography
Tellus Series B-Chemical and Physical Meteorology
Terra Nova
Theoretical and Applied Climatology
Transactions of the Institution of Mining and Metallurgy Section B-Applied Earth Science
Transactions of the Royal Society of Edinburgh-Earth Sciences
Weather and Forecasting

A.2 Environment/Ecology

Environment/Ecology is a broad category covering interrelated disciplines. It includes journals dealing with pure and applied ecology, ecological modelling and engineering, ecotoxicology, and evolutionary ecology. In environmental science, some of the many areas covered are environmental contamination and toxicology, environmental health, monitoring, technology, geology, and management. Other fields covered are soil science and conservation, water resources research and engineering, climate change, and biodiversity conservation. Regional naturalist resources are also covered in this category.

Journal list for Environment/Ecology

Acta Oecologica-International Journal of Ecology
Advances in Ecological Research
Agriculture Ecosystems & Environment
Ambio
American Naturalist
Animal Conservation
Annual Review of Ecology Evolution and Systematics
Archives of Environmental Contamination and Toxicology
Atmospheric Environment
Australian Journal of Soil Research
Basic and Applied Ecology
Biodiversity and Conservation
Biogeochemistry
Biological Conservation
Biology and Fertility of Soils
Boreal Environment Research
Catena
Chemosphere
Clays and Clay Minerals
Climate Research
Climatic Change
Conservation Biology
Critical Reviews in Environmental Science and Technology
Ecography
Ecological Applications
Ecological Economics
Ecological Modelling
Ecological Monographs
Ecology
Ecology and Society
Ecology Letters
Ecoscience
Ecosystems
Ecotoxicology
Ecotoxicology and Environmental Safety
Environment
Environment International
Environmental Chemistry
Environmental Chemistry Letters
Environmental Conservation
Environmental Geochemistry and Health
Environmental Geology

Journal list for Environment/Ecology

Environmental Health Perspectives
Environmental Pollution
Environmental Research
Environmental Science & Policy
Environmental Science & Technology
Environmental Technology
Environmental Toxicology and Chemistry
European Journal of Soil Biology
Evolutionary Ecology
Evolutionary Ecology Research
Frontiers in Ecology and The Environment
Functional Ecology
Geomicrobiology Journal
Global Change Biology
Global Ecology and Biogeography
Global Ecology and Biogeography Letters
Global Environmental Change-Human and Policy Dimensions
Ground Water
Health Physics
Hydrological Processes
Hydrological Sciences Journal-Journal des Sciences Hydrologiques
International Biodeterioration & Biodegradation
International Journal of Biometeorology
International Journal of Environment and Pollution
International Journal of Environmental Analytical Chemistry
International Journal of Water Resources Development
Isotopes in Environmental and Health Studies
Journal of Applied Ecology
Journal of Atmospheric Chemistry
Journal of Biogeography
Journal of Chemical Ecology
Journal of Coastal Research
Journal of Contaminant Hydrology
Journal of Ecology
Journal of Environmental Management
Journal of Environmental Monitoring
Journal of Environmental Quality
Journal of Environmental Radioactivity
Journal of Geophysical Research-Biogeosciences
Journal of Hydrology
Journal of Paleolimnology
Journal of Radiological Protection
Journal of the Chartered Institution of Water and Environmental Management
Landscape and Urban Planning
Landscape Ecology
Marine Biology Research
Microbial Ecology
Molecular Ecology
Molecular Ecology Notes
Nature
Nordic Hydrology

Journal list for Environment/Ecology
Oecologia
Oikos
Oryx
Pedobiologia
Perspectives in Plant Ecology Evolution and Systematics
Plant and Soil
Population Ecology
Proceedings of the National Academy of Sciences of the United States of America
Radiation Protection Dosimetry
River Research and Applications
Sarsia
Science
Science of the Total Environment
Soil Biology & Biochemistry
Soil Science Society of America Journal
Soil Use and Management
Stochastic Environmental Research and Risk Assessment
Systematics and Biodiversity
Trends in Ecology & Evolution
Vie et Milieu-Life and Environment
Water Air and Soil Pollution
Water and Environment Journal
Water Research
Water Resources Research
Water Science and Technology
Wildlife Society Bulletin

A.3 Aquatic Sciences

The Aquatic Sciences category covers journals from many water-related-fields, including discipline-specific aquatic sciences such as aquatic botany and toxicology, phycology, and marine ecology. Also covered are journals concerned with marine and freshwater biology, fisheries science, aquaculture, and oceanography.

Journal list for Aquatic Sciences
Advances in Marine Biology
African Journal of Marine Science
Aquaculture
Aquaculture Research
Aquatic Botany
Aquatic Conservation-Marine and Freshwater Ecosystems
Aquatic Living Resources
Aquatic Microbial Ecology
Aquatic Sciences
Aquatic Toxicology
Archiv fur Hydrobiologie
Biological Bulletin
Botanica Marina
Bulletin of the European Association of Fish Pathologists
Cahiers de Biologie Marine

Journal list for Aquatic Sciences

Canadian Journal of Fisheries and Aquatic Sciences
CCAMLR Science
Continental Shelf Research
Coral Reefs
Deep-Sea Research Part I-Oceanographic Research Papers
Deep-Sea Research Part II-Topical Studies in Oceanography
Diseases of Aquatic Organisms
Estuaries
Estuarine Coastal and Shelf Science
European Journal of Phycology
Fish & Shellfish Immunology
Fish and Fisheries
Fish Physiology and Biochemistry
Fisheries Management and Ecology
Fisheries Oceanography
Fisheries Research
Freshwater Biology
Harmful Algae
Helgoland Marine Research
Hydrobiologia
ICES Journal of Marine Science
Indian Journal of Marine Sciences
Journal of Applied Ichthyology-Zeitschrift fur Angewandte Ichthyologie
Journal of Crustacean Biology
Journal of Experimental Marine Biology and Ecology
Journal of Fish Biology
Journal of Fish Diseases
Journal of Marine Research
Journal of Marine Systems
Journal of Oceanography
Journal of Phycology
Journal of Physical Oceanography
Journal of Plankton Research
Journal of Sea Research
Journal of Shellfish Research
Journal of the Marine Biological Association of the United Kingdom
Journal of the North American Benthological Society
Limnologica
Limnology and Oceanography
Limnology and Oceanography-Methods
Marine and Freshwater Behaviour and Physiology
Marine and Freshwater Research
Marine Biology
Marine Biotechnology
Marine Chemistry
Marine Ecology-An Evolutionary Perspective
Marine Ecology-Progress Series
Marine Ecology-Pubblicazioni della Stazione Zoologica di Napoli I
Marine Environmental Research
Marine Pollution Bulletin
Marine Technology Society Journal

Journal list for Aquatic Sciences
Nature
Oceanography and Marine Biology
Oceanologica Acta
Ophelia
Reviews in Fish Biology and Fisheries
Science
Scientia Marina
Underwater Technology

A.4 Biology

The Biology category includes journals that individually cover a broad range of topics in the biological sciences. Journals covering specific areas in biology, such as general microbiology, protozoology, parasitology, biometrics, biological education, heredity, and evolutionary biology are also placed in this category.

Journal list for Biology
Acta Protozoologica
Applied and Environmental Microbiology
Astrobiology
Biologia
Biological Journal of the Linnean Society
Biological Reviews
Biological Reviews of the Cambridge Philosophical Society
Bioscience
BMC Evolutionary Biology
Conservation Genetics
Diversity and Distributions
Environmental Microbiology
European Journal of Protistology
Evolution
Evolution & Development
Evolutionary Biology
FEMS Microbiology Ecology
Folia Parasitologica
Genetics
Genome
Heredity
International Journal for Parasitology
Journal of Agricultural Biological and Environmental Statistics
Journal of Applied Microbiology
Journal of Eukaryotic Microbiology
Journal of Evolutionary Biology
Journal of Experimental Biology
Journal of Microbiological Methods
Journal of Molecular Evolution
Journal of Natural History
Journal of Systematic Palaeontology
Molecular Biology and Evolution
Molecular Phylogenetics and Evolution

Journal list for Biology
Nature
Nature Reviews Genetics
Organisms Diversity & Evolution
Paleobiology
PLOS Biology
Polar Biology
Proceedings of the National Academy of Sciences of the United States of America
Protist
Science
Symbiosis
Systematic Biology
Systematic Parasitology
Theoretical Population Biology

A.5 Animal Sciences

Journals in the Animal Sciences category cover basic animal science, animal behaviour, animal production science, poultry science, wildlife research, lab animal science, and zoology. Also covered are sub-disciplines of zoology such as primatology, mammalogy, herpetology, nematology, and malacology.

Journal list for Animal Sciences
Acta Chiropterologica
Acta Theriologica
Acta Zoologica Academiae Scientiarum Hungaricae
Amphibia-Reptilia
Animal Behaviour
Annales Zoologici Fennici
Ardea
Auk
Behavioral Ecology
Behavioral Ecology and Sociobiology
Behaviour
Belgian Journal of Zoology
Bird Study
Canadian Journal of Zoology-Revue Canadienne de Zoologie
Comparative Biochemistry and Physiology A-Molecular and Integrative Physiology
Condor
Developmental and Comparative Immunology
Emu
Ethology
Ibis
Integrative and Comparative Biology
Invertebrate Biology
Invertebrate Reproduction & Development
Invertebrate Systematics
Journal fur Ornithologie
Journal of Animal Ecology
Journal of Avian Biology
Journal of Comparative Physiology B-Biochemical Systemic and Environmental Physiology

Journal list for Animal Sciences
Journal of Experimental Zoology Part A-Comparative Experimental Biology
Journal of Field Ornithology
Journal of Helminthology
Journal of Invertebrate Pathology
Journal of Mammalogy
Journal of Molluscan Studies
Journal of Nematology
Journal of Ornithology
Journal of Zoology
Mammal Review
Mammalia
Marine Mammal Science
Nature
Ornis Fennica
Ornitologia Neotropical
Ostrich
Physiological and Biochemical Zoology
Proceedings of the National Academy of Sciences of the United States of America
Raffles Bulletin of Zoology
Science
Waterbirds
Wildlife Biology
Wildlife Research
Zoologica Scripta
Zoological Journal of the Linnean Society
Zoological Science
Zoology
Zootaxa