



Research Integrity

A response from the British Ecological Society to the House of Commons Science and Technology Committee

10 March 2017

The British Ecological Society: 'A world inspired, informed and influenced by ecology'

www.britishecologicalsociety.org

Founded in 1913, we are the world's oldest ecological society, with over 5,000 members worldwide. As the voice of the UK's ecological community, we communicate the value of ecological knowledge to policymakers and promote evidence-informed solutions. We fund over £300,000 of research through our grants programme each year.

As a learned society, we are also a significant publisher of scientific research. We publish five high-impact international ecology journals - *Journal of Ecology*, *Journal of Animal Ecology*, *Functional Ecology*, *Journal of Applied Ecology*, and *Methods in Ecology and Evolution* - and partner with Wiley to publish the open access journal *Ecology and Evolution*. Our journals are members of the Committee on Publication Ethics.

Summary

- The majority of flawed, irreproducible or incorrect research is the result of unsound practices, errors or lack of rigour, and only a small minority is attributable to deliberate misconduct or fraud
- Creating the right environment, culture and incentive structure within which research is conducted is essential, and the key driver of improved integrity. A scientific culture that incentivises and acknowledges multiple competencies, and avoids excessive "pressure to publish" should be promoted.
- Learned societies and scientific publishers have an important role to play in supporting greater research integrity. Three key issues that should be addressed are improving peer review, supporting effective data management, and enhancing reproducibility and repeatability of research.
- There is a clear role for both the research community – including institutions, learned societies and publishers – and Government to work collaboratively to create a research culture that promotes integrity, and in providing appropriate incentives and support for researchers. However, there is little appetite or argument for Government regulation of integrity in science in the UK.

The Extent of the Research Integrity Problem

1. The “Integrity in Research” POSTnote¹ provides a clear overview of the main issues associated with research integrity in the UK, and this response will not cover in detail all of the issues it identifies. We will focus on providing more detail on the key concerns raised by our members, and our role as a learned society and scientific publisher in addressing some of these issues.
2. We support the high level points raised by the Royal Society of Biology’s response to this inquiry. We agree with their conclusion that the majority of flawed, irreproducible or incorrect research is the result of unsound practices, errors or lack of rigour, and only a small minority is attributable to deliberate misconduct or fraud.

Causes and drivers of recent trends: research culture and incentives

3. While enhancing transparency and openness in scientific research and publishing, and improving processes such as peer review can support greater research integrity, creating the right environment, culture and incentive structure within which research is conducted is essential, and the key driver of improved integrity.
4. As highlighted in the POSTnote¹, the prevailing research environment in the UK, in which employment prospects and research funding (for example through the Research Excellence Framework) are strongly influenced by publication history, can create a “publish or perish” culture which can risk undermining research integrity. “Pressure to publish” has the potential to encourage the fabrication, alteration, omission or manipulation of data due to the perceived need to reduce research and publication timescales and demonstrate “positive” results perceived as more worthy of publication in high impact journals.
5. To mitigate this issue, a scientific culture that better incentivises and acknowledges multiple competencies, for example collaborative working, policy and public engagement, should be promoted.
6. Such a culture change would require collaboration between funders (including Government), publishers and the research community. The Research Excellence Framework (REF) – found by the Nuffield Council on Bioethics to be a “key driver for the pressure to publish in high impact journals”² – has an important role to play. The current consultation on the next REF³, informed by Lord Stern’s independent review⁴, contains a number of welcome proposals that could reduce the “pressure to publish”, including the decoupling of individual staff and outputs returned to the REF, and the introduction of greater flexibility in the number of outputs that can be submitted per individual.

¹ Parliamentary Office of Science and Technology (2017) *POSTnote 544: Research Integrity*

² Nuffield Council on Bioethics (2014) *The Culture of Scientific Research in the UK*.

³ HEFCE (2017) *Consultation on the second Research Excellence Framework*. <http://www.hefce.ac.uk/pubs/year/2016/201636/>

⁴ Stern, N. (2016) *Building on Success and Learning from Experience: An Independent Review of the Research Excellence Framework*, Report to the Department of Business, Energy and Industrial Strategy.

The effectiveness of controls and regulation (formal and informal), and what further measures, if any, are needed

7. The POSTnote provides an overview of the range of formal and informal strategies for improving research integrity, including improving openness and transparency; oversight, training and sharing best practice, and realigning incentives for researchers. The Concordat to support Research Integrity⁵ is widely recognised and adopted by institutions and provides a powerful framework.
8. Learned societies and scientific publishers have an important role to play in supporting greater research integrity. Here we focus on three areas that have been raised as key issues by our members, and examples of measures that the BES and others are taking to address them: improving peer review, effective data management, and enhancing repeatability and reproducibility. Further examples of controls and regulation are highlighted in the Royal Society of Biology's response.

Improving Peer Review

9. Peer review – the evaluation of scientific publications by other scientists who are expert in the field – is the process by which the quality, validity and originality of research is evaluated prior to publication. The integrity of the scientific literature rests on a peer review system that is robust, independent and fair⁶. While peer review plays an important role in promoting the publication of high quality research, and has been shown to benefit both authors and reviewers, it is commonly recognised that it is not a perfect system, as highlighted by this committee's previous report⁷.
10. Peer review is widely argued to be subject to many systematic, often unconscious biases, for example in how editors assess manuscripts by author characteristics such as gender, rank, institutional affiliation or geographic location⁸. Scientific publishers should play an active role in minimising these biases. All BES journals ensure diversity on our editorial boards and our board members have been provided specific guidance around unconscious bias.
11. Across the breadth of scientific research, the peer review system itself is only as reliable as the individuals running it, and there have been a few deliberate attempts by editors to "play" the system, for example through "citation stacking" – disproportionately promoting personal papers or those from certain journals in order to artificially inflate citation rates and journal impact factors⁹. However, these are exceptions only and effective peer review management by societies and publishers minimises any risk of malpractice in this way.
12. This Committee's previous inquiry⁷ concluded that training in peer review for the next generation of authors and reviewers is important, yet that provision is poor. Many

⁵ Universities UK (2012) *The concordat to support integrity in research*

⁶ Baier, A. and Baker, L. (2013) *A Guide to Peer Review in Ecology and Evolution*. British Ecological Society.

⁷ House of Commons Science and Technology Committee (2011) *Peer Review in Scientific Publications: Eighth Report of Session 2010-12*. House of Commons: London.

⁸ Fox, C.W., Burns, C.S., Muncy, A.M. and Meyer, J.A. (2017) Author-suggested reviewers: gender differences and influences on the peer review process at an ecology journal, *Functional Ecology*, 31, pp270-280.

⁹ <http://retractionwatch.com/2017/02/17/editor-resigns-two-journals-considerable-citation-boosting-attempts/>

researchers have reported that this remains the case six years later. A survey by the publisher Wiley found that 77% of nearly 3000 reviewers surveyed expressed an interest in receiving further peer review training¹⁰. Improved formal training in peer review could help create a generation of scientists that are better at catching possible breaches of integrity. Training for early career researchers is especially important, as the greatest peer review burden, outside of the most high impact journals, falls on less senior scientists, potentially increasing the likelihood of issues not being detected.

13. Funders, learned societies, institutions and publishers can all play a role in improving peer review training. We have developed a guide to peer review⁶, which includes practical and ethical considerations, and run regular training workshops on peer review and other editorial roles. We have recently started mentoring new Associate Editors in our journals, to ensure that they are making the right decisions based on the reviews provided.
14. It is estimated that 15 million hours of time are wasted each year on peer review as articles are reviewed and re-reviewed at successive journals¹¹. Journals like *Ecology and Evolution* and *PLoS ONE*, which cascade articles and reviews from other journals can ease the burden on the reviewer community and there are examples of journals within disciplines setting up a peer review consortium, for example the Neuroscience Peer Review Consortium¹², which allows reviews to be transferred among a group of journals, across multiple publishers and platforms.
15. Additional measures being taken to improve the robustness of peer review include the use of software to detect plagiarism, such as iThenticate¹³, which while still requiring human interpretation, allow plagiarism to be detected at an earlier stage before reviewer time is wasted. We have recently introduced author contribution statements to BES journals, ensuring each author's role is clearly identified, and co-authors only listed when they have played a specific role.

Effective data management

16. Open publication of research data has been promoted as a method of supporting greater transparency and scrutiny of research. The *Concordat on Open Research Data*⁵ states that "Open access to research data is an enabler of high quality research, a facilitator of innovation and safeguards good research practice."
17. Learned societies can play an important role in promoting good data management and sharing. We believe that accessibility and preservation of data is important to the fostering of ecological science; in 2011 we formulated a data archiving policy to reflect this and from 2014 introduced a mandate that all data behind published material in our journals be archived in an appropriate public data repository. Authors may elect to have the data made available at the time of publication, or with an embargo period of up to one year. Exceptions

¹⁰ Warne, V. (2016) Rewarding reviewers – sense or sensibility? A Wiley study explained, *Learned Publishing*, 29, pp41-50.

¹¹ <https://rubrigblog.wordpress.com/2013/06/03/how-we-found-15-million-hours-of-lost-time/>

¹² <http://nprc.incf.org/>

¹³ <http://www.ithenticate.com/>

may only be granted in exceptional circumstances. BES journals are also integrated with Dryad¹⁴ – an ecological data repository – and we fund deposits to ensure there are limited barriers for our authors when archiving their data.

Barriers to effective data management

18. There remain some barriers to improving data management and transparency. First, it is often reported by members that there is a lack of training provision in data management, especially for early career researchers, which can lead to significant variation in protocols and standards, and hence research integrity. Funders, institutions and publishers should work collaboratively to ensure that data management is embedded within researcher training, for example in PhD courses.
19. We have taken an active approach to supporting members and researchers publishing in our journals through publishing and promoting a free *Guide to Data Management in Ecology and Evolution*¹⁵, and running a number of training workshops. We are currently extending this support to cover good practice for the open publication and archiving of code¹⁶.
20. A second barrier is the lack of appropriate incentives for publishing data. While funders are increasingly making data sharing a condition of funding, many long term data sets have been accrued without major funding. Without appropriate recognition for publishing data (for example through the REF), researchers may be discouraged from making data openly accessible, where it may be reused by others for publication of research, sometimes without appropriate acknowledgement of the data collectors. We welcome the fact that the current REF consultation is exploring how to better incentivise effective data sharing and management.

Enhancing Repeatability and Reproducibility

21. The ability to repeat scientific studies and confirm (or not) their results is a central tenet of the research endeavour¹⁷. However, in recent years, growing concerns have been raised about the lack of replication of studies, and reproducibility of results, in a number of disciplines, most notably through the *Reproducibility Project* in psychology¹⁸.
22. These concerns over repeatability and reproducibility have also been raised within ecology. While scientific disciplines can differ in their level of repeatability, ecology faces particular challenges due to the context dependency of data collection, the inherent variability of natural ecosystems, and the economic and logistical constraints on conducting and repeating large scale ecological experiments^{17,19}.

Measures to improve repeatability and reproducibility

¹⁴ <http://datadryad.org/>

¹⁵ Harrison, K. (2014) *A Guide to Data Management in Ecology and Evolution*. British Ecological Society.

¹⁶ <http://www.britishecologicalsociety.org/workshop-best-practice-code-archiving/>

¹⁷ Schnitzer, S. A. and Carson, W.P. (2016) Would Ecology Fail the Repeatability Test? *BioScience*, 66 (2), pp98-99.

¹⁸ Nosek, B.A. *et al* (2015) Estimating the reproducibility of psychological science, *Science*, 349 (6251), DOI: 10.1126/science.aac4716

¹⁹ Borregard, M.K. and Hart, E.M. (2016) Towards a more reproducible ecology, *Ecography*, 39, pp349-353.

23. Incentives to improve data management and transparency, as outlined above, the provision of greater methodological detail in published research, and improved experimental design could aid repeatability in ecology and other disciplines²⁰. Funders could support enhanced reproducibility by being more willing to fund studies based on replicating previous research, as has been the case for the *Reproducibility Project: Cancer Biology*²¹.
24. As outlined above, researchers are incentivised to publish in high impact journals that emphasise novelty and positive results, rendering replications of previous studies, especially demonstrating negative results, harder to publish. A number of initiatives have been promoted to address this publication bias, with some researchers suggesting that a dedicated “negative results” section could be created in open access journals¹⁹. There are a number of general journals now available, for example *PLoS ONE*, or discipline-specific titles such as *Ecology and Evolution*, that have removed the focus on novelty that many other journals have, which means they are ideal outlets for these types of papers. However, authors still need to be incentivised appropriately by funders and/or institutions to ensure they are encouraged to publish all their results and not just those that support novel hypotheses.
25. Systematic reviews and meta-analyses are increasingly powerful and effective approaches to distilling information from multiple sources, they can also act to highlight problems within the corpus of available data. In ecology, the Collaboration for Environmental Evidence²² has pioneered the use of systematic review methodologies to synthesise evidence in a manner that minimises bias and provides more reliable information for decision making.

What matters should be for the research/academic community to deal with, and which for Government

26. As highlighted throughout this response, there is a clear role for both the research community – including institutions, learned societies and publishers – and Government to work collaboratively to create a research culture that promotes integrity, and in providing appropriate incentives and support for researchers. However we agree with the Royal Society of Biology’s response that there is little appetite or argument for Government regulation of integrity in science in the UK.

²⁰ Haddaway, N.R. and Verhoeven, J.T.A. (2015) Poor methodological detail precludes experimental repeatability and hampers synthesis in ecology, *Ecology and Evolution*, 5 (19), pp4451-4454.

²¹ <https://elifesciences.org/collections/reproducibility-project-cancer-biology>

²² <http://www.environmentalevidence.org/>