Natural England Chief Scientist's Report 2015-16

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Foreword

Decisions for the environment need to be informed by evidence and the impressive diversity of work described in this report illustrates the important role played by Natural England in conservation science.

Science and evidence in Natural England spans biodiversity, geodiversity and landscape in both terrestrial and marine environments, and is also about more than natural sciences: social science is vital to successful conservation. For example, it is essential to understand how cultural values affect peoples' willingness to engage, and the Monitor of the Engagement in the Natural Environment (MENE) programme provides sound evidence in this arena. In addition, we need to design innovative approaches to solving intractable problems. This Chief Scientist's report describes examples such as the population modelling approach to protecting great crested newts, the contribution of citizen scientists to monitoring, the Pantheon tool for assessing invertebrate communities, and technological inputs from earth observation. These are not isolated ideas, more a series of approaches guided by the direction of Natural England's conservation strategy. We need to embrace innovation if we are to succeed in today's financially and environmentally challenging climate. Importantly, evidence is also presented that signals the continuing importance of protected areas to England's biodiversity, illustrated by work to identify Impact Risk Zones that better safeguard our SSSIs.

I see at first hand the high quality science and evidence that Natural England produces in my role as chair of Natural England's Science Advisory Committee (NESAC). This formal committee of the Board, involving highly respected external academics from a range of disciplines, supports, challenges and oversees the quality of Natural England's evidence. Over the past year NESAC's work has included advice to the Board, and therefore to Ministers, on Brood Management for Hen Harriers, a discussion on the diversity of types of evidence to be considered in decision-making, and a seminar on Science and the Law.

Natural England's evidence is one part of a wider jigsaw where science supports our efforts to secure nature for the future. Partnership with Universities and other conservation organisations is evident throughout this report, and an outward-looking Natural England evidence programme is crucial. Two particular examples are the 2nd UK Climate Change Impacts Report Card for Biodiversity and the sharing of over 4,000 Natural England datasets as part of Defra's wider achievement of 8,000 open datasets.

The hugely significant evidence contribution detailed in this report is enabled only by the quality and diversity of Natural England's specialists. Dr Tim Hill, Chief Scientist, and his team encourage and support the very best evidential work to inform decisions. Scientific staff from thought-leaders to practitioners come together regularly to hone skills and exchange knowledge that underpins the strong evidence programme. I hope, in reading this report, you will recognise that Natural England's science and evidence programme is a vital resource for the future of nature conservation in England.

Dr Andy Clements
NESAC Chair & Board Member

Introduction

Welcome to Natural England's first Chief Scientist's report. One of my main aims as Chief Scientist is to set our scientific priorities and ensure that Natural England accesses and uses the best available science and evidence to provide sound, practical advice to customers, partners and members of the public. In doing this, I have the great privilege of seeing and learning about the wealth of amazing scientific work being carried out right across Natural England.

In this report we shine a spotlight on some of this work. The articles demonstrate the depth and breadth of our expertise in applying science and evidence that supports Government's ambition to develop a healthy natural environment that supports people's well-being and sustainable economic growth.

The backbone of our scientific expertise comprises some 120 specialists spanning a wide breadth of disciplines within the natural and social sciences. But our reputation as an expert, practical conservation organisation also comes from the significant expertise spread throughout Natural England, including the expert field ecologists in our Field Unit and the advisers in our 14 area delivery teams. More than two-thirds of our customer-facing staff are expert in at least one scientific discipline.

Although science and evidence work is deeply embedded across Natural England, it is co-ordinated and managed as a single, comprehensive programme. This maximises efficiency and ensures that our work is co-ordinated with the science and evidence work undertaken elsewhere in the Defra Group, with our volunteers and with our partners (which include over 50 academic institutions). Collaborative working plays a big part in what we do, and will continue to do so in future. By working with others we are able to innovate and share skills, knowledge and expertise, all of which delivers better quality, and more cost-effective, products and advice. You will see examples of this collaborative working throughout the report.

This report showcases Natural England's scientific work over the last two years. Creating the report was a joint effort, with staff from across Natural England contributing articles and sourcing material. I am also extremely pleased that some of our volunteers and sponsored students contributed to the report.

Their contribution to the development of science and evidence within Natural England cannot be understated. Finally I would like to thank the Editorial Group, without which this report would never have been published, in particular Nick Dales, Helen Doran, Nick Macgregor and Corrie Bruemmer.

Navigating the report

This report has five main sections, developed by bringing the science described in the articles under common themes:

- Monitoring the natural world, including the development of new monitoring methods
- Practical solutions we have developed that make a difference on the ground
- New approaches showing innovation in the development of science and evidence and the use of new technologies
- Sharing our science and evidence with others
- Capability and leadership in science and evidence

It is designed to have a magazine feel, not something that needs to be read in sequence from cover to cover. Authors were encouraged to submit articles of different lengths and style. Some are unashamedly technical and detailed, others take a more story-telling approach. Irrespective of their length or style, each describes a particular scientific advancement made during the period of the report. Where appropriate, hyperlinks are provided to more detailed information (eg published reports). References are shown in red superscript numbers with the full references shown in annex 1.

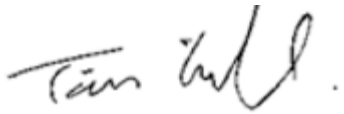
From reading the report I hope that you'll be able to see for yourself the scope of science, evidence and expertise that we have within Natural England and how it is used to support our delivery of conservation outcomes.

Natural England celebrated its tenth birthday this year and over this period we have made many significant advances in our science and evidence. The highlights have been many, but the list below shows just a few examples where Natural England, working with others, has made a real difference to our understanding of the natural environment and the social and economic context in which it sits:

- Through our Monitor of Engagement with the natural environment survey we know, for example, that there are some 3 billion visits to the countryside each year and the importance of greenspaces near to where people live
- We have used advanced techniques to accurately map and analyse miles of the new England Coast Path (472 miles to date and rising)
- We have reviewed the status of some 3,770 invertebrates and discovered that 39% of these are rare or scarce
- We have provided evidence underpinning the creation of 50 Marine Conservation Zones
- We have learned that agri-environment schemes are effective in halting the decline of farmland birds
- We have strengthened the evidence base relating to climate change and, working on our own and in collaboration with others, produced a number of scientific publications in this area of work
- We have made great strides in sharing our evidence more widely and easily met the Secretary of State's Open Data Target. We have made over 4,000 datasets available in the last year alone
- We have adopted and applied new techniques and technology, such as our innovative eDNA surveying techniques, alongside environmental modelling and habitat surveys, to build a landscape scale picture of great crested newts in the Woking area

Not bad for a ten year old! You can read about these highlights and many others in the report. Working in the area of science and evidence – and with such dedicated staff, partners and volunteers, is a joy and privilege. I hope you too capture a flavour of this as you read on.

If you have any comments on the structure and content of the report, I would be very happy to hear from you at **NEChiefSciReport@naturalengland.org.uk**



Tim Hill
Natural England Chief Scientist

To keep up to date with science and evidence developments in Natural England, you can follow me on **Twitter @NEChiefSci**.