

Monitoring Strategy 2019

This strategy will frame Natural England monitoring activity over the next 5 years, on land and at sea, carried out by us and those we work with to efficiently secure the evidence we need.

Acknowledgements

This strategy was commissioned by Natural England's Chief Scientist in 2018 to update and replace the 2013 Integrated Monitoring Strategy. Production of the strategy was led and authored by Oliver Grafton but its content is the result of much broader experience and learning shared by numerous colleagues through workshops, correspondence and conversation across Natural England and the wider Defra group. The author would like to acknowledge the help, support and input in this regard of:

(Natural England) the Chief Scientist Strategic Leadership Group, the Natural England Science Advisory Committee, Richard Alexander, David Askew, Christopher Bolton, Pete Brotherton, Andy Brown, Jonathan Brownett, Katherine Burgess, Christopher Burstow, Rob Cathcart, Stephen Chaplin, Susan Clark, Andy Cooke, Paul Cox, Humphrey Crick, Alison Darlow, Claire Edwards, Sarah Escott, Paul Green, John Holdsworth, Peter Holmes, Christoph Kratz, Pippa Langford, Rob Large, Debbie Leatherland, Rebecca Lodge, Jane Lusardi, Andy Nisbet, Gen Madgwick, Helen Michell, Michael Morecroft, Catherine Mowat, Ruth Oatway, Martin O'Hanlon, Rose O'Neill, Susannah Philips, Colin Prosser, Mat Shepherd, Dave Stone, Ruth Waters, Andy Webb, Jon Webb, Richard Wilson, Richard Wright, and Michael Young, as well as input from (Defra) Deborah Steele, Jemilah Vanderpump, (Environment Agency) Jessica Durkota, and (JNCC) Chris Cheffings, Julie Day, and Anna Robinson.

Contents

Summary	4
Our monitoring strategy	5
Our remit and purpose	5
Our unique contribution	5
Why we monitor	6
Our key questions	6
What we will monitor	8
How we will monitor	9
1. Our approach	9
2. Framing our programme	10
3. Founding evidence services	12
Appendix 1: 25 YEP indicators	14
Appendix 2: Key monitoring questions	17
Appendix 3: Monitoring principles	18
Appendix 4: Open biodiversity data	19
Appendix 5: Partnership offer	20

Summary

This document presents the 5 year strategy for Natural England investment in monitoring the natural environment and its benefits across England's land and sea. It explains why we monitor, what we will monitor and how we will monitor. It goes on to describe a range of broader supporting services needed to deliver efficient, progressive monitoring and ensure the data we gather are used well.

Natural England's purpose is to ensure the natural environment is conserved, enhanced and managed for the benefit of present and future generations. We aim to recover nature and help create a sustainable relationship between people and nature. To achieve this it is vital that Natural England continues to be recognised, respected and trusted for its expertise, and the provision of impartial evidence-based advice on the natural environment locally and nationally.

Our previous strategy was produced five years ago and our operating environment is now very different. The Government has published a new 25 Year Environment Plan, a new Environment Bill on its way, and the UK is in the process of withdrawing from the European Union. Our policy direction is shifting focus towards larger areas, longer timescales and greater public engagement. This, along with emergent technology, presents both opportunity and challenge for monitoring. This revised strategy frames Natural England's monitoring ambition and will help direct our resource and effort over the next five years.

We recognise the importance of building evaluation into our evidence programme to improve our effectiveness and build an understanding of what works and what doesn't. A robust approach to monitoring is central to this. We have a longer-term ambition to develop an integrated monitoring and evaluation strategy for Natural England.

Our Monitoring Strategy

This is the strategy by which Natural England will monitor the natural environment and its benefits across the land and sea of England over the next 5 years. It is a strategy for all of Natural England, complementing and building on the monitoring strategies and evidence plans developed for the Defra Group. This strategy sits above, informs and supports more detailed subject based strategies, plans and programmes, such as the Marine Monitoring Strategy and Protected Sites Monitoring.

Our remit and purpose

Natural England advises The Government on the natural environment. Our statutory purpose, enacted within the Natural Environment and Rural Communities (NERC) Act 2006, is to ensure the natural environment is conserved, enhanced and managed for the benefit of present and future generations. The Act states that this purpose includes:

- promoting nature conservation and protecting biodiversity;
- conserving and enhancing the landscape... for aesthetic, cultural and historic purposes as well as those carried out for habitat protection purposes;
- securing the provision and improvement of facilities for the study, understanding and enjoyment of the natural environment;
- encouraging open-air recreation and promoting access to the countryside and open spaces;
- contributing to social and economic well-being through management of the natural environment... [which may be achieved] by working with local communities.

Our unique contribution

Our staff are expert in environmental law, environmental science and conservation practice. Our authority and expertise underpin our unique contribution to Society. We integrate our national and local presence to bring together an understanding of what is happening locally and share lessons nationally. Equally, we bring together national evidence products and help apply these to support more local decisions and interventions. Natural England combines its environmental role, expertise and knowledge to:

- Provide Leadership: we are environmental leaders at national and local scale.
- Convene and Build Unity: through our connections we bring stakeholders together and help join aims, effort, assets, and resources.
- Provide Endorsement: through earned recognition we can promote best practice, co-develop standards, and accredit the practice of others.

Why we monitor

The evidence we gather through monitoring increases our expertise and supports the delivery of environmental policy for the land and sea of England. Evidence informs our understanding of the natural *environment*, its *benefits*, our *choices* and helps *evaluate* our success. Long term, it helps us understand trends and risks, informs what we report, prioritise and plan in response. Day-to-day, it guides our land and sea management choices, permitting decisions, engagement, advice and advocacy at various scales.

Looking forward, Natural England will have an important role helping measure impacts of the Governments 25 Year Environment Plan. We will lead on the development and reporting of indicators that relate to our core purpose (Appendix 1). Some of these we monitor already, while others will need to be developed further before they can be used. We similarly need to inform the delivery and report on the impact of our own, complementary Conservation Strategy.

Natural England will help convene and inform local partnerships to prepare and present landscape based conservation priorities. We will also help develop and implement large national environmental management programmes. To these ends we need monitoring to inform and evaluate Local Natural Capital Plans and local expressions of the Nature Recovery Network. We need monitoring to inform and evaluate success of the New Environmental Land Management System and Environmental Net Gain. Our own monitoring will offer some of the evidence needed, but moving forward Natural England will increasingly advise on and accredit monitoring carried out by others.

Our key questions

We need answers to some fundamental questions about nationally important features, assets and functions of the natural environment and landscapes, their benefits and how people use and value them. Our key questions, which are presented in more depth in Appendix 2, form an important cycle of knowledge management for Natural England, as illustrated in Figure 1. The core purpose of our overall monitoring programme is to gather the evidence we need to answer these questions and track change over time.

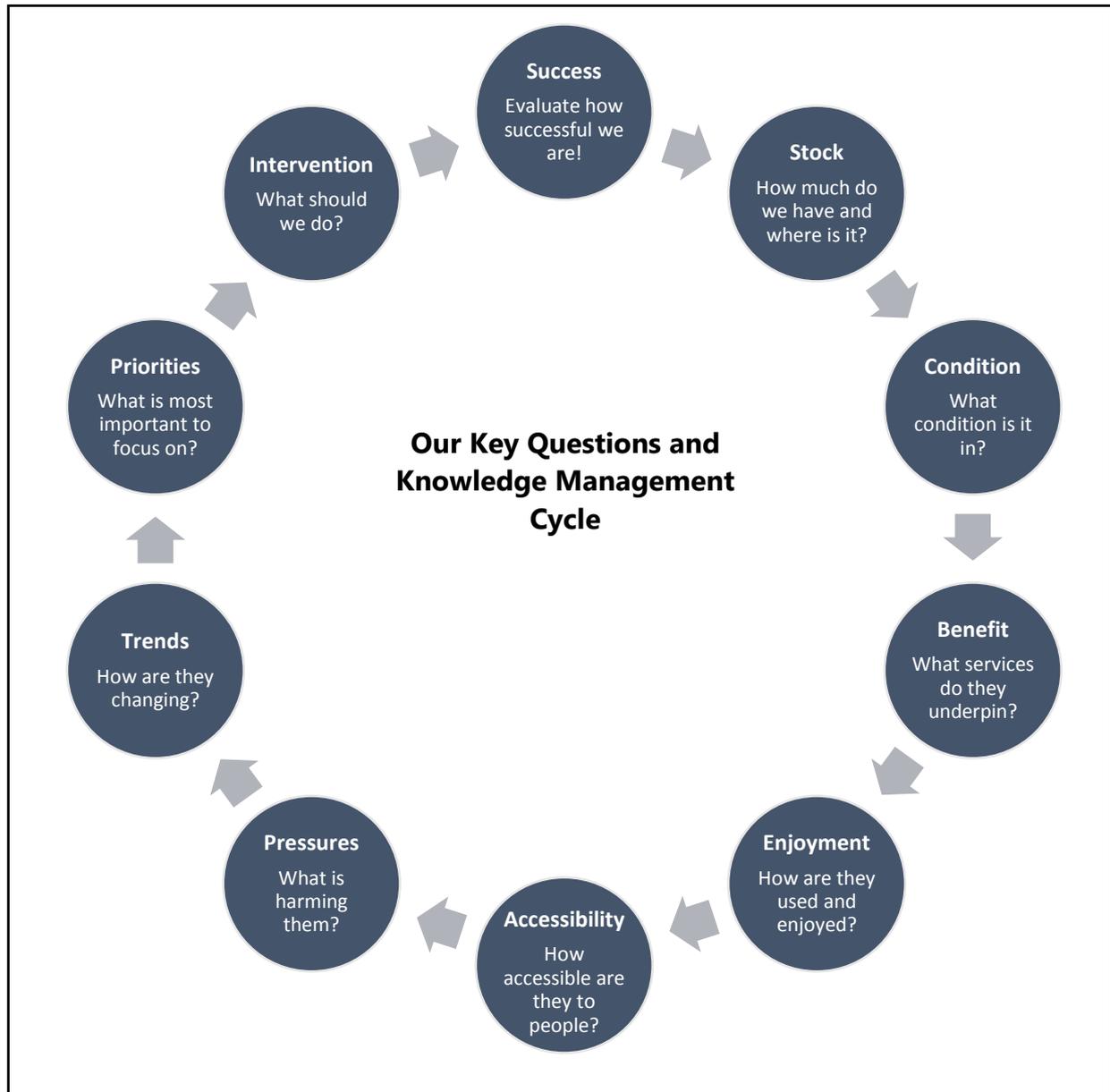


Figure 1 Our Key Questions and Knowledge Management Cycle

What we will monitor

As a statutory conservation advisor, Natural England has an interest in all the evidence Society needs to sustain and enhance the health, benefit and enjoyment of the natural environment and landscapes of England. Our role will vary across the breadth of this interest. In addition to directly commissioning and conducting monitoring activity ourselves, we want to grow our role in advising, influencing and accrediting the monitoring activity others carry out. To be efficient we must prioritise *what* we measure, *where*, *how well* and *how often*. It is important that our delivery programmes and individual projects retain a clear understanding of the big picture, our key monitoring questions and what Natural England contributes.

Natural England's particular strength lies in developing an expert understanding of the natural environment and landscapes of England and how, as a nation, we benefit from and enjoy these over the longer-term. We have an accumulated knowledge of, and responsibility for, the nation's network of protected sites. We also lead on the monitoring and evaluation of land management agreements across England¹. Beyond this we positively advise on, guide and influence the monitoring activity and contribution of others, setting standards and describing best practice.

We will invest in monitoring activity that helps us better understand and describe to others the following;

Species: The distribution, status, trends and threats to GB species that occur throughout England to help inform and prioritise the work needed to protect, recover and enhance their outlook thus sustaining a healthy, functional, biodiverse natural environment.

Habitats: The distribution, extent and condition of important habitat types (classifications) to help maintain, restore and increase the amount of healthy functional ecosystems and services (natural capital assets) and improve the natural environments resilience to pressures including climate change.

Landscape: Important aesthetic, cultural and historic landscapes across England and how these are changing.

People: What people understand and value about the natural environment across England, how they access and enjoy it and how this is changing.

Recovery: The opportunities and risks for important features and functions of the natural environment, landscapes and their benefits nationally and also at more local regional, landscape and catchment scales, to inform plans and guide collaborative efforts to protect, enhance and recover them (e.g. Protected Sites, Nature Recovery Networks and Natural Capital Plans).

Outcome: How important features of the natural environment, landscapes and their benefits respond to and are impacted by our decisions and interventions. This is critical to determine how effective

¹ The current Agri-Environment Monitoring & Evaluation Programme

and successful we are being at protecting and enhancing the natural environment, landscapes and their benefits (e.g. Environmental Land Management and Net Gain).

How we will monitor

1. Our approach

The monitoring principles in Appendix 3 will guide the approach taken by all our monitoring projects and activities. Reflecting these principles, we aim to achieve the following;

We will be strategic: We will prioritise a strategic programme of activity to monitor the natural environment, landscapes and their benefits, helping us detect how these are changing over time, and determine the effectiveness of our interventions. This programme must help us meet our statutory responsibilities as well as inform our delivery and evaluation of Government policy on the natural environment and its benefits. We will use our resource and capability efficiently, only conducting new surveys when existing available data do not provide the certainty we need. Where we conclude new data are needed, we will use monitoring approaches, methods and scales appropriate to the nature and geography of the features we seek to measure. We will be consistent in our use of techniques, but may employ different techniques at different scales to maximise efficiency. We will, though, strive to maximise the collective compatibility and utility of data collected across individual monitoring projects, programmes and investments. Typically we will use more rapid, less detailed techniques at broader scales. We will use evidence from this to inform and target a more efficient amount of intensive, rigorous methods locally. Where possible we will extend surveys beyond land management parcels/units and beyond sites, estates or designations to better assess features and benefits across larger, landscape scales and attain counterfactuals to surveys of our interventions.

We will collaborate: Our monitoring projects and activities will be integrated and collaborative to achieve more. Activities within our overall monitoring programme will be designed to cooperate, complement and enhance one another. Aligning survey activities and work in partnership with others will maximise our collective ability and impact.

We will lead: Our monitoring programme will further enhance our reputation as natural environment experts. We will share our methods, tools and approaches to inform and influence the monitoring carried out by others. We will provide thought leadership and invest, where we can, to help research and develop new ideas, techniques and approaches to monitor and measure the natural environment and its benefits.

We will analyse: We will continue to develop and enhance our data analysis capabilities. Our aim is to use modern statistical and modelling techniques to help our business work areas use more and conclude more from monitoring data. Traditionally individual work areas have commissioned bespoke survey activity to gather all the evidence they need and will use themselves. Our ambition is for all work areas to contribute to and make use of a more integrated strategic monitoring programme, broadening the range of data sources they make use of. Better integration of

monitoring methods and data across our projects and with external partners will help us make more use of the data society has paid for. Modern analytical approaches are key to helping us realise the advantages in applying a wider range of less bespoke data to specific areas of work.

We will evaluate: As part of a broader, organisation wide, approach to appraise success, we will evaluate the effectiveness of our monitoring programme and survey activities, building an active cycle of learning and improvement. We will be open and honest about the strengths and limitations of our monitoring programme and data, helping maintain our reputation and integrity as experts.

Resources: We want to reduce the dependency of our monitoring programme on grant in aid funding. To that end we will explore and take advantage of opportunities to generate income from our monitoring capability, tools and expertise. We will carefully balance our pursuit of income alongside our strategic interest in supporting and growing evidence gathering and use by partners, stakeholders and wider society, many of whom are likewise seeking to broaden their income.

Impact: We want our staff, customers and wider Society to find and use our monitoring data more often to help make wiser choices about the natural environment and its benefits. Efficient data management is fundamental to grow use of our monitoring data. The data we collect will be appropriately checked, described and promptly made available for use by others. All survey data Natural England collect or commission directly, as well as data we help others collect, should be shared openly in line with our open data position statement, included in Appendix 4.

2. Framing our programme

Our monitoring programme will look different, incorporating new methods and approaches. Our overall programme must comprise a variety of monitoring activity that responds to different needs. The tiered framework below will help us be clearer about the intended purpose and focus of individual monitoring activities. This framework will help us consider and balance our longer-term strategic need for consistent and structured data with typically shorter-term operational priorities for evidence and respond to current opportunities and risks.

Tier 1: Sentinel surveillance

The Sentinel Tier of our programme comprises long-term monitoring activity designed to maintain a watch over the natural environment and landscapes of England, their benefits and how people use and value them. These activities form a calculated, long-term programme of structured, unbroken monitoring designed to answer our key monitoring questions at national and more local scales as far as we are able. We aim to monitor as many features and aspects as we can. In any given period achieving this ambition will be constrained by several important factors;

- Understanding: Our ability to single out and monitor features and aspects of the natural environment and landscapes of England, their benefits and how people use and value them is limited by our current level of understanding. As our understanding evolves so will what we want to monitor and how.

Monitoring Strategy 2019

- **Measurability:** Some of the things we understand are important and would like to measure are difficult to detect, identify and quantify either due to their nature, our capability, or both.
- **Resource:** Resource available in any given period is finite. The resulting need to prioritise what we do may mean we are unable to monitor some features and aspects we would like to, even if they are readily measurable.

Sentinel activities will typically be planned and managed centrally. They will comprise nationally comprehensive, consistent, and structured survey projects and programmes which we intend to operate and maintain long-term. These will be the primary means for understanding status, change, and the nature of change in the natural environment and landscapes, their benefits and how people use and value them. Sentinel Surveillance Activity may include;

- Supporting national and GB species surveillance and recording activities
- Mapping the location and extent of habitats and natural capital assets
- Maintaining a long-term monitoring network
- Monitoring of Protected Areas and Landscapes (e.g. SSSIs) on land and at sea
- Monitoring engagement with the natural environment
- Monitoring risks and detecting new threats to provide early warning

Tier 2: Outcome monitoring

The Outcome Tier of our programme covers monitoring activities intended to help evaluate the impact and success of work intended to achieve positive outcomes for the natural environment, landscapes and their benefits. These monitoring activities will be consistent and designed to suit the scale and duration of each project being assessed. This monitoring tier forms the core of our active learning cycle for continuous reflection, improvement and advancement. Outcome Monitoring Activity may include;

- Assessment of Protected Areas (e.g. SSSIs) on land and at sea
- Evaluation of national Environmental Land Management programmes
- Species recovery programme (and species reintroductions) monitoring
- Landscape/catchment scale project monitoring (e.g. Nature Recovery Networks & Local Natural Capital Plans)
- Monitoring as part of Net Gain and Licencing
- Monitoring Protected Landscapes
- Targeted survey and monitoring to inform national and international reporting

Tier 3: Agile monitoring

The Agile Tier of our programme covers monitoring activity carried out in response to opportunities and risks, as these emerge. Typically these activities will be planned and delivered over shorter periods. They may be exploratory or developmental, testing new ideas or approaches, some of which might lead to new Sentinel or Outcome Monitoring activity. They may include important one off investigations (e.g. to support a public enquiry) or in response to a steadily mounting risk (a likelihood of change needing confirmation) or sudden opportunity (e.g. a decision by a partner). This

Monitoring Strategy 2019

tier also includes opportunistic monitoring that third parties are willing to do with little or no direct involvement or support from ourselves. Examples of Agile Monitoring Activity may include;

- Short-term investigative and research based monitoring projects
- Surveys in response to emergent risks and events (local as well as national)
- Surveys in response to infrequent or intermittent or localised priorities

3. Founding evidence services

Delivery of an effective Monitoring Programme in line with this Strategy depend on our capability and capacity to operate a number of founding evidence services efficiently;

Evaluation: We aim to establish an active learning cycle for continuous reflection, improvement and advancement by placing evaluation at the centre of what we do. We will adapt and develop our monitoring activities in response to lessons about what works and what does not. We will be open about the certainty, strengths and weaknesses of our data to maintain our professional integrity and reputation.

Professional Development: Natural England staff are recognised for their expertise and knowledge of the natural environment, ecology and nature conservation. A well-managed surveillance and monitoring programme will help us maintain and grow our expert role and reputation. A robust staff management approach to technical resilience and succession planning in parallel is needed to maintain our institutional capability to deliver.

Resource Management: We need sufficient resource to deliver the monitoring needed and achieve the aims of this strategy. Previously we have relied heavily on Grant In Aid (GIA) from central Government. Our GIA allocation has reduced significantly over the last 10 years. To secure the level of resource needed we will; firstly, more fervently set out the business case for Government investment and implications for not investing; and secondly, grow the amount of resource we secure from alternative sources, including income generation from professional services.

Planning & Administration: We need to establish clear responsibilities and simple procedures to achieve our aims and objectives. Our monitoring strategy will sit at the heart of business planning and resource allocation decisions. All future monitoring activity must be compatible with and help deliver this strategy. We will grow use of data available from the full range of existing NE and wider Defra Group monitoring projects. We aim to grow closer collaboration between NE monitoring projects and with those of key partners.

Data Management and Sharing: Efficient and capable data management is central to effective sharing and re-use of data. We will process, store and share data from all our monitoring activity quickly and consistently in line with our Open Data Position (Appendix 4). We will improve our management of species data, habitat data and social science data, agreeing where these will be held and shared and investing in this. In part this will involve developing a set of standard routes and protocols for new species, habitat and social science data.

Monitoring Strategy 2019

Data Analysis and Use: We must make greater and more efficient use of the monitoring data we and the wider Defra Group invest in and generate. We will use modern statistical/analytical approaches and develop standard products, tools, models and other approaches that help us use more and different data to inform common operational decisions. We will grow the capability and capacity of our staff to confidently discover, evaluate, acquire and use data from a wider range of sources, both internal and external, as part of their day to day work.

Partnership: We will continue to maintain and develop strong working relationships across the science and environment sectors, collaborating across shared interests to gain the greatest benefit from new thinking, technologies, data and evidence. Our corporate partnership offer (Appendix 5) provides a starting place from which we can build collaborative working relationships with external bodies. The basis of our collaboration will be less about the need to save money or only access funding for the activities that we want to pursue. We will be innovative about what we have to contribute and how the combined effects of collaboration across shared priorities can be realised.

Innovation: We are world leaders of innovation. Horizon scanning networks helps us focus on the future not just the present. We will continue to identify and determine new and emerging technologies and societal shifts that are most relevant. We aim to become more efficient in our approach to research and assimilation of these, focusing on what is attainable in the short term. To proactively engage and influence change, we will set out our own future desires and needs for technology developers to innovate solutions, requiring a new forward-looking partnership approach to engaging with the research and innovation sector.

Appendix 1: 25 YEP indicators

The emerging indicator framework comprises 66 indicators arranged in 10 broad themes (A-K) related to the goals in 25 Year Environment Plan and commitments to protecting and improving the global environment. Natural England anticipates leading or *advising* on indicators detailed in the table below.

Indicator	Precis
NE Leads on...	
B6 Natural functions/Degree of naturalness of waters and wetlands	This indicator will track changes in the natural functions of components of the whole water ecosystem (including for example river headwaters, wetlands, standing water bodies). It will show the outcomes of actions to restore more natural river morphology and underlying hydrological and water quality processes and to control invasive species. The indicator will use data available from relevant monitoring of designated sites and priority habitats. Further methodological development will be needed to apply this approach to the full range of water and wetland habitat types and to explore new methods including Earth Observation.
D1 Quality, quantity and connectivity of habitats	‘Making space for nature’; an independent review of England’s wildlife sites and the connections between them by Professor Sir John Lawton proposed the principles of more, bigger, better and more joined areas for wildlife as a way forward. This indicator seeks to measure progress towards implementation these principles, including consideration of ecosystem functions and process. Building such resilience is necessary as an adaptation pressures and drivers of change such as to climate change. Importantly, this indicator would assess ‘quality and condition’ and not just range and extent, which is often a missing attribute. Data are available to measure some aspects of this indicator such as extent of some habitats, but further work is required to assess quality of habitats beyond protected sites and reliable methods for connectivity assessment need to be further tested. Importantly, this indicator would assess ‘quality and condition’ and not just range and extent, which is often a missing attribute. Some indicators of aspects of ecosystem functions and processes are available but these are not comprehensive. New methods of Earth Observation together with development of indicators of favourable conservation status and long term site-based monitoring offer good opportunities to develop this indicator.
D2 Extent and condition of protected sites – land, water and seas	Extent and condition of protected sites - areas of land, inland water and the sea that have special legal protection to conserve important habitats and species in England. These include our Sites of Special Scientific Interest, Marine Protected Areas including Secretary of State controlled waters, Special Areas of Conservation, Special Protection Areas and Ramsar sites. Condition is assessed against relevant common standards agreed by the UK conservation agencies.
D5 Conservation status of our native species	This indicator will use information from IUCN species status assessments across terrestrial, freshwater and marine species, depending on available data. The overall numbers (% of species) in each threat category provides a snapshot of extinction risk posed: the more classified as least concern the better, progressively worsening as vulnerable, endangered, critically endangered, regionally extinct. A simple index will be constructed to summarise this information. Assessments will be repeated (4-6 year intervals) to allow updates on status and charting change. Assessments are currently undertaken for Great Britain and not England only.

Monitoring Strategy 2019

<p>G1 Changes in landscapes and waterscapes</p>	<p>This is a composite indicator of changes in landscape and waterscape character in England. It includes three key aspects: changes in landscape character in National Character Areas; changes in the public’s perceptions of landscapes; and, changes in landscape character of designated landscapes (National Parks and Areas of Outstanding Natural Beauty). The indicator will build on an approach that has been developed to assess the impacts of agri-environment schemes on landscape in 159 National Character Areas, including aspects such as field patterns and boundaries, traditional farm buildings, semi-natural habitats, agricultural land use, historic features and woodland/tree cover. Further work is required to include the consideration of waterscapes in this approach. We will also develop the ability to report on designated landscapes using this method. Information on changes in the public’s perceptions of landscapes will be collected using Natural England’s Monitor of Engagement with the Natural Environment (MENE) survey, which will be updated in 2019 following a Strategic Review.</p>
<p>G2 Heritage features of designated sites and scheduled monuments</p>	<p>This indicator is a composite measure that seeks to assess the changes in the condition of geological heritage features of Sites of Special Scientific Interest (SSSIs) and the condition of Scheduled Monuments. It will use information from SSSI condition assessments and information from the Heritage at Risk Register.</p>
<p>G3 Enhancement of green/blue infrastructure</p>	<p>This indicator will be developed from work on a new framework of standards for the quantity, quality, accessibility and functioning of green and blue infrastructure. This includes areas designated as Green Belts. Green/blue infrastructure can make an important contribution towards adaptation to climate change. The indicator will also use information from Natural England’s Monitor of Engagement with the Natural Environment (MENE) survey, which will be updated in 2019 following a Strategic Review.</p>
<p>G4 Engagement in the natural environment</p>	<p>This indicator aims to track the changes in peoples’ engagement with the natural environment. It will measure time spent in natural spaces (freshwaters, coasts and woodland alongside other natural places) and people’s levels of care and concern for the environment. It will be measured using Natural England’s Monitor of Engagement with the Natural Environment (MENE) survey, which will be updated in 2019 following a Strategic Review.</p>
<p>G5 People engaged in social action for the environment</p>	<p>This indicator aims to track the extent of people’s social action for the environment such as environmental volunteering, participation in conservation work and donations to environmental organisations. It will be measured using Natural England’s Monitor of Engagement with the Natural Environment (MENE) survey and information collected by voluntary bodies.</p>
<p>G6 Health and well-being benefits</p>	<p>This indicator aims to show changes in the health and well-being benefits that the natural environment provides for people. These can include benefits for mental and physical health that are gained from accessing nature, but also benefits such as improvements in air quality, climate regulation (e.g. urban cooling) and noise mitigation that people obtain whether they access nature or not. Part of this indicator will be measured using Natural England’s Monitor of Engagement with the Natural Environment (MENE) survey. Further research on health and well-being benefits is in progress.</p>

Monitoring Strategy 2019

<p>G7 Environmental attitudes and behaviours</p>	<p>This indicator aims to track changes in people’s attitudes and behaviours relating to the natural environment, covering different socio-economic groups including children and young people. It will track attitudes such as intention to change lifestyle, satisfaction with levels of environmental action taken by key actors, and people’s connection to nature. It will also track change in behaviours in key policy areas, such as waste, water and energy. It will be measured using Natural England’s Monitor of Engagement with the Natural Environment (MENE) survey.</p>
<p><i>NE advises on...</i></p>	
<p>A6 Exceedances of damaging levels of nutrient nitrogen deposition on ecosystems</p>	<p><i>This indicator will show changes in average accumulated exceedance and percent of sensitive areas exceeding the internationally agreed threshold for damage (termed “critical load”) for nutrient nitrogen deposition across sensitive habitats. The damaging nutrient nitrogen comes predominantly from ammonia (NH3) but partly nitrogen oxides (NOx) and long range transport.</i></p>
<p>A7 Area of sensitive habitats exposed to damaging levels of ammonia in the atmosphere</p>	<p><i>This indicator tracks changes in UK land area affected by damaging levels of ammonia (NH3) in the air. It shows the percentage of UK sensitive habitats where air immediately above it exceeds the lower critical level threshold for ammonia of 1 µg/m3. Excess deposition of ammonia on natural ecosystems causes nutrient enrichment and changes in vegetation and soils. This indicator is therefore a measure of pressure on ecosystems from air pollution. Agriculture is the main source of ammonia emissions.</i></p>
<p>B3 State of the water environment</p>	<p><i>This indicator takes a broad overview of the condition of the water environment. It is composed of several metrics, including: percentage of water tests meeting good (or better) Water Framework Directive (WFD) status for ecology and chemistry; percentage of tests complying with WFD and meeting objectives for waters specially protected for specific uses such as shellfish harvesting and for nature conservation. Some of these data relating to protected sites are also included in D2. The indicator relates to freshwater bodies, wetlands, coastal waters and estuaries.</i></p>
<p>C6 Diverse seas: status of threatened and declining features</p>	<p><i>This indicator of diverse seas shows changes in the status of vulnerable features flagged for protection, either listed in national legislation or international agreements. These features include the features of conservation interest protected in Marine Protected Areas, Natural Environment and Rural Communities Act Section 41 habitats and species of principle importance for conservation, and the OSPAR threatened and declining features, amongst others. The overall indicator will be derived from the status of the individual features.</i></p>
<p>H4 Exposure and adverse effects of chemicals on wildlife in the environment</p>	<p><i>This indicator will track changes in the exposure of wildlife to harmful chemicals in freshwater, marine, coastal and terrestrial ecosystems. Data are currently available for some chemicals and some invertebrates, fish, shellfish, crustaceans, mammals, and birds of prey. Data for exposure of other species groups to chemicals may become available in the future. Further work is needed to develop indicators of the adverse effects of chemicals on wildlife populations which may be included in future.</i></p>

Appendix 2: Key monitoring questions

Stock	How much do we have and where is it? How are important natural environment features and landscapes distributed across the land and sea of England?	To understand our stock; location and quantity of the natural environment and landscapes.
Condition	What condition is it in? What condition are important natural environment features, functions and landscapes in and how resilient are they?	To establish the state, quality and durability of the natural environment and landscapes.
Benefit	What services do they underpin? What services do important natural environment features and functions underpin and how do we benefit?	To establish their worth; benefit and value to society, and identify Natural Capital benefits.
Enjoyment	How are they used and enjoyed? How is people's use, understanding and enjoyment of the natural environment and landscapes of England, and associated social well-being, changing?	To understand how people engage with and the distribution of benefits from the natural environment and landscapes.
Accessibility	How accessible are they to people? How accessible are landscapes and the natural environment to people across England?	To understand the distribution of accessibility to people across England.
Pressures	What is harming them? What pressures are harming the stock, condition, benefit, enjoyment and accessibility of our natural environment features and landscapes?	To understand what is harming the natural environment and/or limiting our success?
Trends	How are they changing? How does quantity, quality and durability of important features, assets and functions change over space and time?	To determine change; variation and transformation.
Priorities	What is most important to focus on? What are the most important natural environment features, functions and landscapes to focus on within the land and sea of England?	An overall assessment of what we know about their benefit, condition, pressures and effectiveness of interventions so far, to establish relative importance, urgency and prioritise intervention.
Intervention	What should we do? How and where should we act to protect, enhance and strengthen important features, assets & functions?	To inform intervention; target and prescribe.
Success	How successful are we? This is all about evaluation. Have we achieved our objectives? How effective have our interventions been? What might we do to improve them?	To determine our effectiveness in achieving a clear objective, to understand what works, what doesn't, learn and adapt.

Appendix 3: Monitoring principles

The following principles frame and guide our approach to monitoring the natural environment, landscapes and their benefits;

1. **Strategic:** A strategic, calculated, long term approach to monitoring will improve our efficiency and capability. Before commissioning any new monitoring survey, the applicability of data already available should be carefully considered. Any new monitoring should be conducted at the largest appropriate geographic scale and employ a variety of methods and techniques to better target effort and extrapolate results. It is important to actively learn from monitoring over time to continually improve efficiency.
2. **Collaborate:** Greater internal and external collaboration and partnership will increase our monitoring capacity and help us achieve more. Activities within our monitoring programme should be designed to cooperate, complement and enhance one another. Better aligning monitoring methods and activities across larger external partnerships will maximise our collective ability and impact.
3. **Lead:** Our monitoring programme can further enhance our reputation as natural environment experts and leaders. We should share our expertise, methods, tools and approaches to inform and influence the monitoring carried out by others. We can provide thought leadership to help others, as well as ourselves, focus research and develop new monitoring ideas, techniques and approaches.
4. **Analyse:** Improving how we integrate and analyse data will expand the utility of our monitoring programme and data. Better integration of monitoring methods and data across our projects and with those of our partners will help us make more use of the data society has paid for. Modern analytical methods and tools can help us make more use of data, offering new perspectives, extrapolating new indications and conclusions from wider sources and broader types of data.
5. **Evaluate:** Evaluating the success of our monitoring projects and survey activities will help us build an active cycle of learning and improvement. Being open and honest about the strengths and limitations of our monitoring programme and data will help us maintain our expert reputation and integrity.
6. **Resource:** By exploring and exploiting opportunities to generate income from our monitoring capability, tools and expertise we can reduce the dependency of our monitoring programme on grant in aid funding. It will be important to balance any pursuit of income against our interests in supporting and facilitating evidence gathering and use by partners, stakeholders and wider society.
7. **Impact:** Efficient data management is fundamental to growing use of our monitoring data and maximising its impact internally and externally. Our monitoring data must be appropriately checked, described and promptly made open for use by others. They should be easy to find, understand and apply to help our staff, customers and wider society use them regularly to inform choices about the natural environment and landscapes of England.

Appendix 4: Open biodiversity data

January 2017

Natural England want to invest efficiently and effectively to support the collection and mobilisation of biodiversity data. We also want the majority of data we use to be open. This ambition is set out in our Open Biodiversity Data Position Statement, as follows;

We will use open data wherever possible in our advice and when making decisions. However there will be circumstances when we must use data that are not open, which may incur additional cost and reduce transparency.

Defra group will make all the biodiversity data it collects or commissions openly available within 2 years at the level of detail originally captured.

All biodiversity data collected or mobilised with support from public funding will be made openly available, optionally at a reduced level of detail within 2 years from capture, but fully open at the level of detail originally captured within 5 years.

Environmentally sensitive data will be made openly available at the same timescales wherever their detail can be reduced such that harm will not occur. Sensitivities will be regularly reviewed and records made fully open once they are no longer deemed sensitive.

We do not consider fully open data to include that which is licenced only for 'non-commercial use'. However we accept many partners currently require this, and we will use data licenced this way if there is no more open alternative."

Appendix 5: Partnership offer

We can only effectively address these issues by working in partnership with others. Natural England offers partners in the scientific community the following;

- **Impact and outcomes:** We provide evidence and expert advice to support strategy development, policy making and on-the-ground delivery to bring about real changes in real places.
- **Expertise and capabilities:** Natural England is both a user and a producer of evidence and we are experts in bridging between the two. We have numerous specialists and other experts covering a wide range of disciplines and application areas - including from ecology to economics and from sociology to soil science.
- **Data and information:** We also hold a wealth of data and information from a range of monitoring and other activities. We have already made much of our data available through data.gov.uk and we are strengthening our mapping, analytical and modelling capabilities. We are keen to work with others to help them access, make sense of and use our data holdings and collaborate in analysis and modelling and developing value-added information.
- **Sites and places:** We operate across the country in both towns and countryside; at the coast and out to sea. We oversee a network of 224 [National Nature Reserves \(NNRs\)](#), which can be used as 'outdoor laboratories'. We also designate and advise on management of protected areas such as sites of special scientific interest (SSSIs) and marine conservation zones (MCZs). We are rolling out the England Coast Path. We are prioritising action within 122 national Focus Areas where our local area teams connect with a wide range of stakeholders across government, business and civil society.
- **Opportunities for individuals:** We are increasing our engagement with the wider science and evidence community to help shape and deliver research, knowledge exchange, innovation, training and impact. We are keen to explore opportunities for closer collaboration, for example by hosting fellowships, internships, placements and secondments, running seminars and supervising students.
- **Convening:** Natural England is the statutory adviser on matters relating to our statutory purpose on the natural environment in England and this gives us a unique ability to bring stakeholders together and help increase impact across the UK and internationally. We can help others draw on this convening power to pull together consortia and partnerships of mutual interest and we can facilitate access to individuals and active groups active in the natural environment sector on land and at sea.
- **Facilities:** as mentioned above, our network of 224 National Nature Reserves provides access to an unrivalled suite of outdoor laboratories for field study, research, teaching and training. All of our NNRs are monitored and among these, we have particularly high quality monitoring data from 37 sites within the Long Term Monitoring Network. We also operate and have access to a range of monitoring, analytical and modelling services, including long-term habitat monitoring, spatial conservation planning, GIS modelling.

Monitoring Strategy 2019

Further information

Natural England evidence can be downloaded from our [Access to Evidence Catalogue](#). For more information about Natural England and our work see [Gov.UK](#). For any queries contact the Natural England Enquiry Service on 0300 060 3900 or e-mail enquiries@naturalengland.org.uk.

If you would like to know more about the proposals or ask any questions, please get in touch with:

Oliver Grafton

oliver.grafton@naturalengland.org.uk

To find out more about the work of Natural England, please visit www.gov.uk/government/organisations/natural-england

Copyright

This note is published by Natural England under the Open Government Licence v3.0 for public sector information. You are encouraged to use, and reuse, information subject to certain conditions. For details of the licence visit www.nationalarchives.gov.uk/doc/open-government-licence/version/3.

Please note: Natural England photographs are only available for non-commercial purposes. For information regarding the use of maps or data visit www.gov.uk/how-to-access-natural-englands-maps-and-data.

© **Natural England 2018**

ISBN 978-1-78354-542-1