Environmental Monitoring in Natural England 2012

www.naturalengland.org.uk

NATURAL ENGLAND

Contents

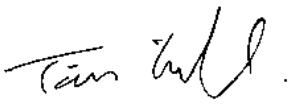
1 Foreword

Natural England is a science-led and evidence-based organisation, and we depend upon access to relevant data to support the full breadth of our work. Monitoring and surveillance data is a key part of this evidence as it provides feedback on the success or failure of policies and actions. This report describes the main themes being delivered within Natural England's Integrated Monitoring programme, illustrating this with examples of surveys we manage and detailed case studies. Environmental evidence is the product of actions by a wide range of bodies and this report highlights instances of effective working with, and support from, partners including Defra agencies, the voluntary sector, and industry. Through producing this report, we hope to raise awareness of our current Integrated Monitoring programme and to demonstrate the joint working in our approach.

Natural England has a leading role in developing science-led evidence on the natural environment; we commission work, undertake work ourselves and manage programmes on behalf of Defra. We also seek to inform and influence the evidence programmes delivered by others. Our main strength lies in the skill and competence of our staff and we will strive to enhance this capability. In concert with this we recognise and respect the strong contribution made by the voluntary sector in providing valuable data, especially on biodiversity.

The current evidence-base is struggling to keep pace with increasing demands and there is always pressure to extend and increase the scale and quality of data. In particular, the recent Government commitment to securing a stronger, more sustainable natural environment raises the expectation of the public that we can tell them about progress. This task is made more challenging as resources are reduced. More than ever before, Natural England and the wider evidence community must prioritise effort to make the best use of existing data and identify new ways to fill the most important evidence gaps.

In producing this report we are making a fresh start in being open and transparent about our monitoring programme and invite comments and engagement from within Natural England and from external partners. We hope this gives you an insight into the monitoring we do, and encourages you to access **our programme** and to engage with and influence its future development. We are especially keen to learn how you would prefer to receive future updates and information on this important area of evidence – please contact us via integratedmonitoring@naturalengland.org.uk.



Tim Hill,
Natural England Chief Scientist

2 Introduction

Understanding the state and trends in the environment is arguably the most important part of the role of a public funded body like Natural England. Fit for purpose information on the effectiveness of our advice and direct actions is essential if we are to ensure that we spend public money wisely. At its creation, Natural England inherited a range of legacy monitoring commitments and systems and our first step was to evaluate these, define our forward monitoring requirements and rationalise the range of parallel approaches and systems that we inherited. This work led to the creation of an integrated monitoring strategy. Since launching the strategy in 2010, Natural England has brought its entire evidence gathering together into a single programme[1] and is continuing to maximise efficiency through developing and supporting novel and more efficient approaches to environmental monitoring. To deliver our commitments, Natural England has, in 2012/13, allocated a core budget for monitoring of around £4.9 million, supplemented by £1.4 million that is available specifically for monitoring the outcomes of Environmental Stewardship. Within this report, we illustrate the breadth of our monitoring work and the differences, and similarities, in how we are approaching different requirements. Our aspiration is to have a better integrated set of monitoring activities that reduce overlap and improve the quality and accessibility of our monitoring evidence.

Why integrated monitoring?

The reasons for adopting an integrated approach to monitoring are both scientific and pragmatic; collecting multiple data types in a single location helps us to link the causes and effects of observed change, whilst developing standard approaches to data capture enables an individual observer to collect information that can be used for many purposes. For instance, the introduction of our Integrated Site Assessment programme has provided a framework for assessing the condition of Sites of Special Scientific Interest at the same time as the effectiveness of management under Environmental Stewardship, saving over a third of the staff resource previously allocated to these activities; and we estimate that the in-house management of our long-term monitoring network has reduced the overall cost per site by more than a third, relative to a model of contracted management. As it is likely that in future we will have fewer resources to deliver monitoring, to ensure continuity of evidence collection we must do more with less. To reduce our costs, in both staff time and money, we need to address cultural and practical barriers. These include developing effective organisational strategies to maximise the benefit of finite resources; allocating developmental time to pilot new approaches; and supporting the capacity building, both internal and external, needed to support wider implementation.

Why is integrated monitoring important?

Our aim is to deliver the evidence from monitoring and surveillance as efficiently and effectively as possible. Whilst progress is being made in integrating our programme it is important that we maintain continuity of business during this transition. Change does need investment and we have used staff time and some resources in a series of development projects designed to create and test new approaches that will give us better evidence in less costly ways.

[1] http://publications.naturalengland.org.uk/publication/2165645?category=11001

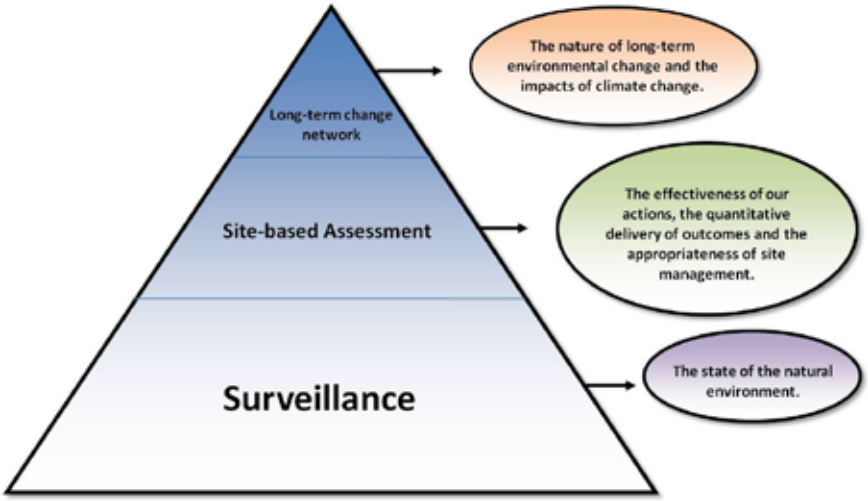
We believe that an integrated programme gives the following benefits:

- Cost savings within the overall flow of evidence from collection to user;
- Meeting the needs of multiple demands by developing standard approaches;
- Increased focus on our statutory priorities and the quality of evidence to support priority needs;
- Improved ease of access, and ability to use evidence;
- Stronger partnerships for data collection, sharing and use: there is a strong incentive to share within the Defra family and to work better with volunteer bodies and individuals.

How does integrated monitoring work in practice?

The basic principles underlying our integrated monitoring approach can be displayed schematically (Figure. 1). This shows that to understand the state of the natural environment and how it is changing, we undertake or support surveillance activities that gather data across many places (base of triangle); to understand the effectiveness of our interventions and trends in the extent and/or condition of designated sites and features, we monitor outcomes in targeted samples of places; and to understand environmental long-term responses to drivers of change, such as climate, we deliver detailed repeat monitoring at a few carefully chosen long term sites.

Figure 1: Schematic Representation of our Monitoring Approach: The Monitoring Triangle



Using the conceptual framework set out in the 'monitoring triangle' we looked at our existing and proposed monitoring activities and set out a hierarchy of priorities:

1 **Statutory surveillance and site monitoring** - especially to meet the reporting requirements of the Habitat and Wild Birds Directives; and maintenance and development of tools and systems associated with these;
2 **Reporting to Europe** (where not picked up above e.g. monitoring outcomes of agri-environment schemes);
3 **Reporting progress against key government priorities** (e.g. former PSA targets such as for the condition of SSSIs) – where not picked up above;
4 **Key Natural England organisational priorities** (i.e. to facilitate corporate reporting).

Monitoring themes

In this report, we describe progress with many of the monitoring and surveillance projects that have been developed to address these priorities. The work covers the full range of our activities and is presented within four broad themes.

- Part 1 describes the work we are doing to develop our capacity for surveillance of the natural environment (representing the base of the monitoring triangle, and for which most activity falls within priority 1).
- Part 2 describes the work we are doing to monitor our special sites, for which activity falls within priorities 1 to 3 depending on the type of site)
- Part 3 describes the work we are doing to monitor our Interventions (most of which falls within priorities 2 and 3).
- Part 4 describe the work we deliver to monitor and respond to change (priority varies with activity).

Developing partnerships with other statutory organisations, non-governmental organisations, and volunteers is critical to our success in tracking and understanding change in the natural environment. A wider partnership enables us combine the enthusiasm, skills and knowledge of volunteers with that of our staff and is a vital part of developing our strategy, in particular for our surveillance projects. Every species record made by a volunteer recorder that is subsequently stored on a system where we can use it potentially saves our own resources[2].

The accessibility of monitoring data is a key priority and we are working with partners to ensure that this is achieved. In particular we work closely with partners such as within the National Biodiversity Network (NBN), to develop mechanisms for data sharing; the NBN Gateway now contains over 80 million species records, and is an invaluable resource for researchers and conservationists; and our Monitoring Engagement with the Natural Environment (MENE) data is made available in a range of formats via our website, and has been accessed by over a thousand individual users since the online data viewer launch in 2011. We also make data available through the MAGIC website, with over 2,000 user sessions per day. In part 4 of this report we briefly describe the systems that we use or are developing to enhance access to our monitoring data.

Lastly, to enable anyone to keep abreast of our evidence work, including our monitoring programme, we have developed our Evidence Register, providing ready access to information about current projects and their outputs. The publication of reports on the Evidence Register ensures open and transparent access to our monitoring evidence and is widely used by thousands of individuals.

[2] It has been estimated that each record provided by a volunteer saves Natural England an average of £5, representing the time, skills and overheads used to produce the record'

3 Developing our approach to Habitat Surveillance in England

Background

The Government's Biodiversity 2020 strategy sets challenging targets for the conservation of habitats and species. To deliver against targets for the protection and enhancement of our remaining semi-natural habitats we need to know where they are, what condition they are in, how they are changing and whether current management is effective. We also need to know whether the network of habitats we have provides the functional and structural diversity required to meet the needs of characteristic species. This relationship between the pattern of habitat distribution, habitat structure and the species that utilise them is critical to an understanding of how we can secure and enhance biodiversity.

Figure 2: Lowland Heath Priority Habitat in Breckland, Norfolk.

An enhanced approach to the surveillance of both priority habitats and species is necessary to provide the information required to monitor and measure movement towards Biodiversity 2020 outcomes. In response Natural England is developing and trialling a more inclusive, representative and structured monitoring approach. The underlying principle and ultimate ambition is to establish an England-wide network of reference sites. At one scale these would be representative of broad habitat types or biotopes and, at another scale, representative of priority habitat types. The development of approaches that focus species and habitat surveillance as far as possible on the same sites will provide valuable information on whether the habitats (typically defined by communities of flora) are structurally diverse enough to support the characteristic fauna we would expect to thrive within them. And over time, a programme of repeat monitoring will allow more confident detection of change and assessments of trend in the extent and condition of habitats and their associated species. Although the underlying principles are shared, work to explore and develop detailed approaches for habitats and species have been advanced separately. The Habitat Surveillance Programme is focussed on developing and testing a structured surveillance approach to monitor priority habitat types, such as lowland heath (Figure 2 above).

Developing a Framework for Habitat Surveillance

Natural England staff already carry out, or commission, survey work to monitor the condition of terrestrial habitats on Sites of Special Scientific Interest (SSSIs) and on land under Higher Level Stewardship (HLS) agreement, through the Integrated Sites Assessment (ISA) programme. This potentially covers up to 70%[3] of the total area of semi-natural habitats known to occur within England (excluding woodland). A principle gap in our current evidence is the condition of priority habitat outside these sites, the remaining 30% that occur throughout the wider environment.

In 2012 Natural England commissioned work to provide statistical advice on how existing priority habitat could be sample surveyed to address this gap in our evidence (Figure 3). The outputs of this work are helping us assess the size of sample (i.e. number of survey sites) necessary to determine with confidence the overall condition of priority habitat in England and, over time, detect change at various geographic scales and possibly against particular site designations. The minimum requirement is to establish condition and detect change at a national scale for each of the terrestrial priority habitat types for which Natural England lead on monitoring and reporting (see text box below).

Natural England leads on monitoring and reporting for the following Priority Habitat Types:

- Lowland Calcareous Grassland
- Lowland Dry Acid Grassland
- Lowland Meadows
- Purple Moor Grass and Rush Pastures
- Upland Hay Meadows
- Calaminarian Grasslands
- Traditional Orchards
- Lowland Heathland
- Limestone Pavements
- Blanket Bog
- Inland Rock Outcrop and Scree Habitats
- Mountain Heaths and Willow Scrub
- Upland Calcareous Grassland
- Upland Flushes, Fens and Swamps
- Upland Heathland
- Coastal and Floodplain Grazing Marsh
- Lowland Fens
- Lowland Raised Bog
- Reedbeds
- Coastal Sand Dunes
- Coastal Vegetated Shingle
- Maritime Cliff and Slopes
- Saline lagoons
- Wood-Pasture & Parkland

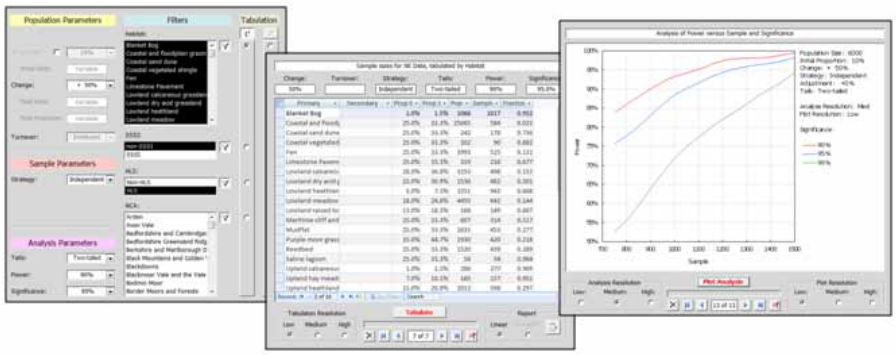


Figure 3: Development of a power analysis tool to support sampling of priority habitats.

[3] Based on an analysis of Natural England's BAP priority habitat inventories against SSSI boundaries and HLS Live Holdings (April 2012).

In parallel, Natural England ran two pilot projects throughout 2012 to explore how a representative sample of priority habitat might be identified and surveyed outside SSSI and HLS sites. One pilot was run in Yorkshire and the Humber and the other in the South West of England. A significant aim of both was to engage with local partnerships to explore and build on opportunities and benefits they might see adopting more structured and shared approaches to habitat surveillance. The pilots present a real opportunity to detect and evaluate the level of interest as well as test the practical ability of local partnership organisations to collaborate more closely with Natural England to target and survey priority habitat using common methods.

Each pilot began by selecting a group of priority habitats to target in the trial (Figure 4). They then identified a large number of candidate survey sites for each of these habitats using the priority habitat inventories, compiled by Natural England, augmented by local biodiversity community knowledge. Each pilot selected a random sample from these sites, sufficient in number to be representative of the total amount of each target habitat occurring outside SSSI and HLS. The pilots then conducted field work and methodological testing across as many of the sample habitat parcels as possible within a the single survey season window. The field work utilised standard survey methods developed by Natural England for ISAs on SSSI and HLS sites. The objective was to maximise compatibility with the ISA approach itself to ensure field data from the pilots could be used alongside ISA surveillance data gathered by our own staff. The ability to establish a universally compatible sample of data is a key component of our structured surveillance strategy, enabling national assessments of habitat condition as a whole and findings related to driving factors such as management.

Sample site distribution

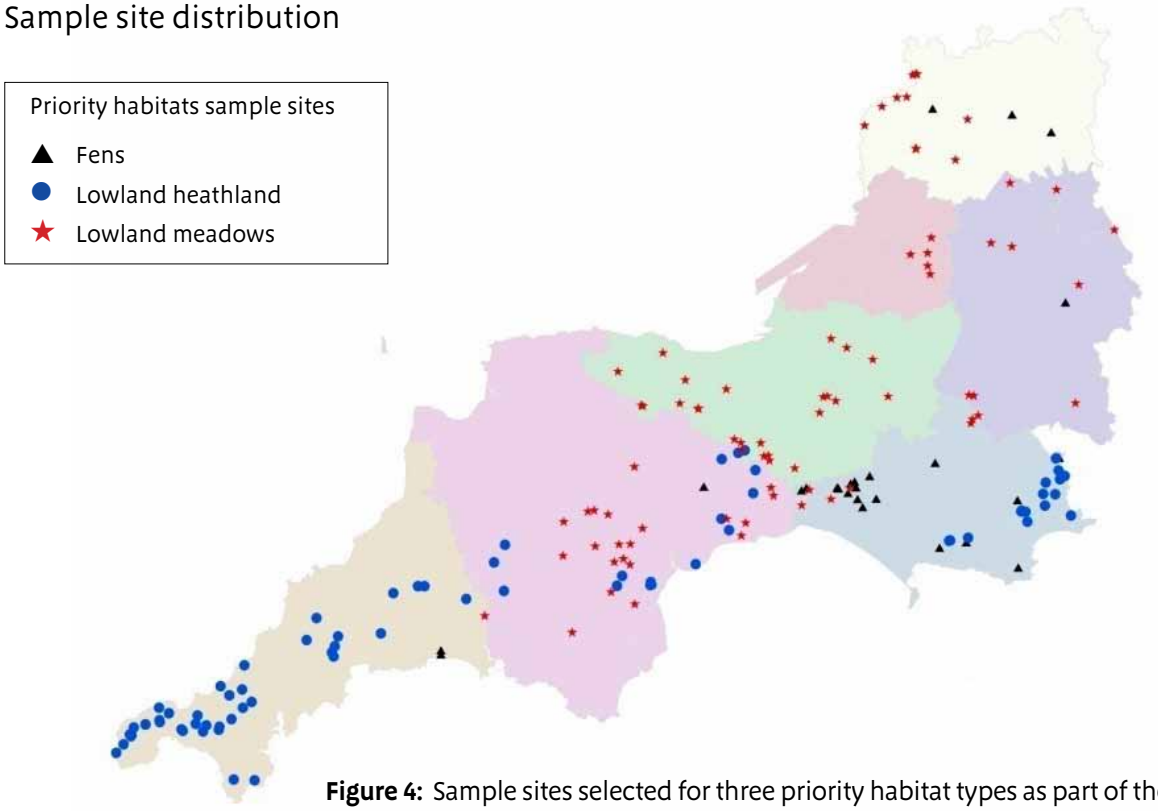


Figure 4: Sample sites selected for three priority habitat types as part of the South West Pilot.

The first objective of field survey was to determine and hopefully confirm the priority habitat present. This was important as many of the sample sites were unlikely to have been surveyed in this detail recently, or indeed at all. The surveyors recorded plant species frequencies within a number of quadrats randomly placed across homogenous strands of vegetation, to determine the National Vegetation Classification (NVC) communities present. This plant community data could then be interpreted using keys and tables provided by Natural England to confirm the priority habitats present, to discern the primary habitat.

The second objective was to collect measurements that would allow the condition of the priority habitat parcel to be determined. To do this surveyors undertook a condition assessment based on the Integrated Site Assessment method employed by NE staff on SSSI's and HLS sites. This approach is consistent with common standards monitoring methodologies[4]. The process involves recording attributes indicative of condition, such as the presence and frequency of positive and negative condition indicator species, sward height, bare ground and scrub cover.

Both pilots were required to complete field work in the summer of 2012 and report in December. The pilots allowed Natural England to gather important experience in relation to a range of complex logistical and methodological issues associated with surveying outside our own sites and whilst working with partners. In particular we gained valuable insight into survey planning, the practicality of securing permission to access other peoples sites, the clarity of survey methodologies required, approaches to data capture and management, and the quality and consistency of assessments carried out by a number of partners.

For those habitats and sites targeted, the pilots should offer valuable field data towards a condition baseline. The site surveys should also help us assess whether the data collected can contribute to an overall evaluation of whether appropriate habitat management is in place. In addition the experience gained from the pilots provides Natural England with valuable feedback on the accuracy of existing habitat distribution information, allowing refinement where appropriate. Within each pilot area the data collected should help evaluate the statistical robustness of the assessments and sampling approach. The resulting data will be incorporated into Natural England surveillance and monitoring databases from which they can be shared more readily with partners and, where appropriate, the public.

[4] http://jncc.defra.gov.uk/page-2217

Future developments

Natural England intends to build on the pilots, working with the partners and stakeholders involved, to review findings and learn lessons. If, as we hope, the approach is deemed to have potential for wider roll-out, we will seek to expand the trial to other areas of the country, moving us closer towards a complete national surveillance framework. In those areas used for the 2012 trial, we will be particularly keen to build on the pilot work by establishing an ongoing programme of site monitoring through partners, focusing on areas of habitats that are outside the current monitoring schemes of statutory agencies, to contribute to the ongoing development of a national network of structured habitat monitoring.

As this area of work develops, future Natural England support for local habitat surveillance is likely to be targeted at visiting a sufficient number of sites to track condition and detect change in priority habitats at the national scale. However, the preliminary work on identifying candidate sites may also provide a framework for stakeholders and partners to focus their own additional monitoring activity. In this vein the pilots should enable an assessment to be made of the feasibility of using structured sample based survey to monitor habitat condition and change within local landscapes. This is of particular relevance to areas being specially targeted for conservation action, such as Nature Improvement Areas (NIAs), offering an opportunity to compare these against regional or national trends.

In the longer term, we would like to combine the evolving structured habitat surveillance framework more closely with similar approaches being trialled for structured species surveillance. The objective would be to establish a comprehensive programme of monitoring for priority species and habitats targeted against a common network of sample/reference sites (both within and outside of statutory sites) grouped by broad habitat or biotope. We envisage working closely with national voluntary recording schemes and local record centres to establish and support these networks.

Delivering such a broad collaborative programme, requires some change in how our staff and partners, work with and think about habitats:

- The main shift is towards establishing a structured set of reference sites that can provide statistically valid information on trends in extent and condition of priority habitats. The primary aim would be to establish a nationally valid sample, but one that could be readily enhanced by local partnerships to assess habitat condition and change at more local levels.
- We will align our resources to deliver this efficiently and collaboratively, targeting effort at monitoring habitat on sites which lie outside SSSI or HLS (where habitat is already monitored) to establish a representative evidence base.
- We will encourage greater support from the voluntary community for habitat and species recording at reference sites which together form a structured network.
- We will support and encourage the uptake of new roles by local record centres, recording societies and schemes to work with us on these approaches.

4 Developing Natural England's species surveillance capacity

Background

Natural England uses information about individual plant and animal species to support a range of its delivery activities. Ensuring that the information we need is available requires effective planning and prioritisation of effort to gather and manage species data. Whilst such data is available for some taxa via regular surveys, undertaken by partners, others are less well surveyed. As a result, the development of a co-ordinated approach to the collection and management of species data is a priority.

Species information is currently used by Natural England to:

- Target actions such as designated site selection and management, Environmental Stewardship (ES) agreements, and species recovery programmes;
- Assess and report outcomes against site and scheme targets, programmes, European Union (EU) and United Kingdom (UK) policies, and geographic areas;
- Advise Defra and other external users of species information;
- Deliver casework relating to designations, development planning, impact assessment, and licensing functions;
- Detect large-scale changes in population numbers and distribution through surveillance datasets.

The highest priority elements derive from our two statutory requirements for species information, both relating to the Habitats Directive; the first is to ensure data are available to enable reporting on favourable conservation status of habitats and species and the second to support licensing activities for European protected species. These EU requirements must be given high priority as failure to provide the required evidence puts the UK Government at risk of infraction.

Most of the other requirements for species information are implied by legislation or are used to support domestic and European policy. A major driver is the targets set under the Biodiversity 2020 strategy, which includes the prevention of further human-induced extinctions of known threatened species. Understanding trends in population and distribution of these species is fundamental evidence that we will use to measure progress towards Biodiversity 2020 outcomes.

What species information do we need to support Natural England's core purposes?

Overall, our needs can be classified as:

- Presence/absence data;
- Change/trend information;
- Population quality/quantity; and
- Drivers of change.

The difficulty, and cost, of meeting these needs increases as one moves down the bulleted list. Traditionally presence (and sometimes absence) data has been most readily obtained, with much data derived from recording (often unstructured) by volunteers or partner organisations. Repeat assessments provide us with basic change information and this has been used to prioritise conservation actions, for example inclusion of species within red data lists, species of conservation concern and legislative annexes. Population measures require more structured assessments. Typically these have been derived from structured survey work, largely aimed at popular or easily identified taxa such as birds, butterflies and some mammals. Information on the drivers of change is the most complex to obtain, often requiring measurement of corroborative datasets and explored through research projects rather than surveillance.

How are these needs currently being met and how effective are they?

Natural England currently obtains species data through four basic mechanisms:

- In-house survey, directly or as part of other activities;
- Commissioned survey by specialist contractors, including large-scale partnership projects;
- Facilitating and mobilising data from structured surveillance by volunteer biological recorders; or
- Mobilising data from unstructured volunteer biological recording.

We currently use a mixture of all these mechanisms; however each mechanism has its strengths and weaknesses and varying suitability for meeting the information needs of our different functions.

Developing our capability and capacity for Species Surveillance

In 2010, a list of species listed under the Natural Environment and Rural Communities (NERC) Act section 41, together with Habitats Directive and Birds Directive species, and species notified on SSSIs, was compiled and analysed rigorously to identify the highest surveillance priorities for Natural England. The numbers in different taxonomic groups are shown in Figure 5, and in different rarity/distribution categories in Figure 6.

Figure 5: Numbers of priority species in different taxonomic groups (n=890)

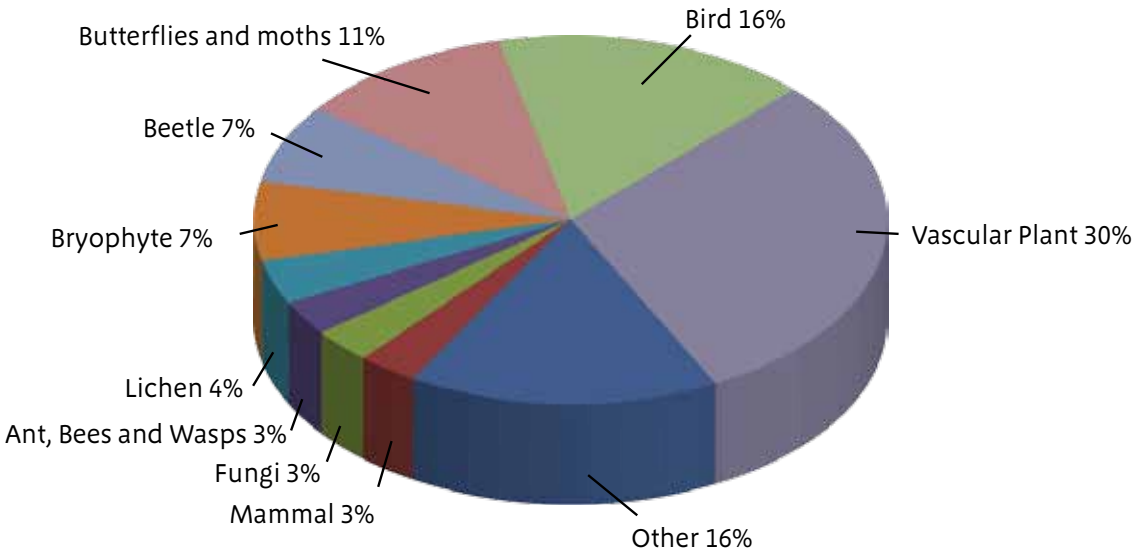
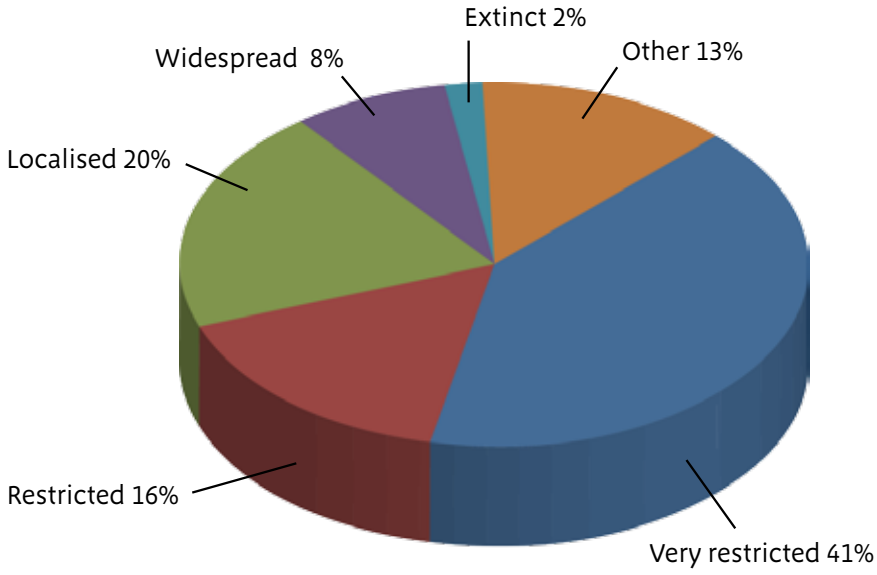


Figure 6: Proportion of priority species in different distribution/rarity categories. (Very restricted = occurs in less than 5 ten km^2; restricted = 6-15 ten km^2; localised = 16-100 ten km2; widespread = greater than 100 ten km^2.)



Several important conclusions emerged following this analysis, leading to an evaluation of the limitations of current approaches and the new opportunities that could be explored. The following themes emerged:

1 A high proportion of priority species occur on only a few sites (Restricted and Very Restricted distributions, Figure 7). This implied that we could potentially monitor them through a programme of in-house species surveillance, as preliminary analysis indicated around 50% of the known records would be on SSSIs and Higher Level Stewardship (HLS) agreements, where much existing staff activity is focussed.

2 A comparison of budgetary spend on different taxonomic groups against the numbers of priority species within those groups provided powerful evidence of an imbalance in effort that needed to be addressed in favour of some historically under-recorded groups, such as Fungi and lower plants.

3 To improve the surveillance of localised and widespread priority species we would need to continue to work with partners and volunteers, but in more structured ways. By this we mean developing surveillance approaches that provide robust empirical data to inform our key needs, as well as the needs of individual volunteers and recording groups.

4 Recent developments in online species recording were identified as offering potential benefits in terms of more efficient data capture, verification, and sharing that would support our needs and those of our partners.

Our response is to develop a new approach to species surveillance that will in the long-term enable us to re-balance our effort, with the objective of doing more to generate data on rare species in-house; to reduce spend on surveys delivered by external consultants; and to improve the quality and availability of data from volunteer recording.

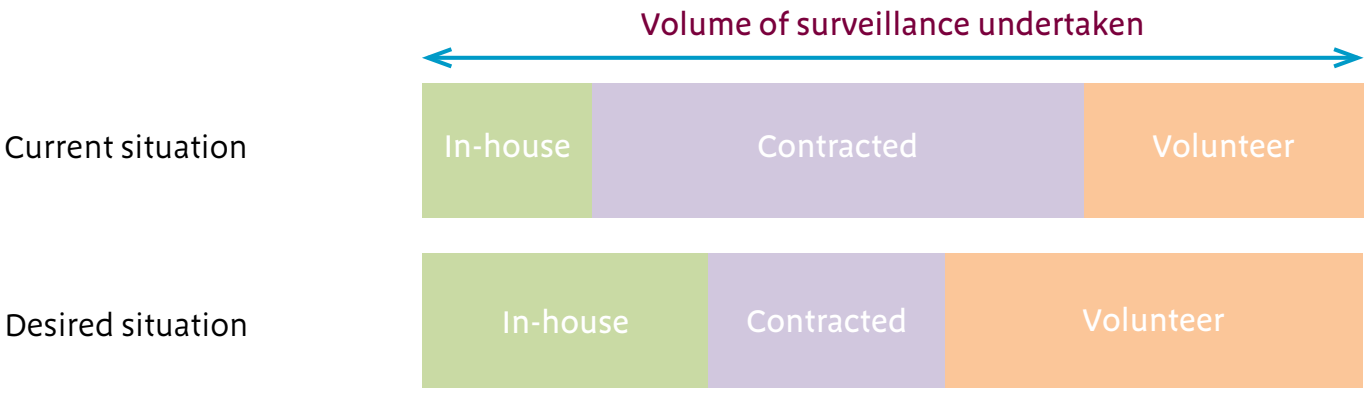


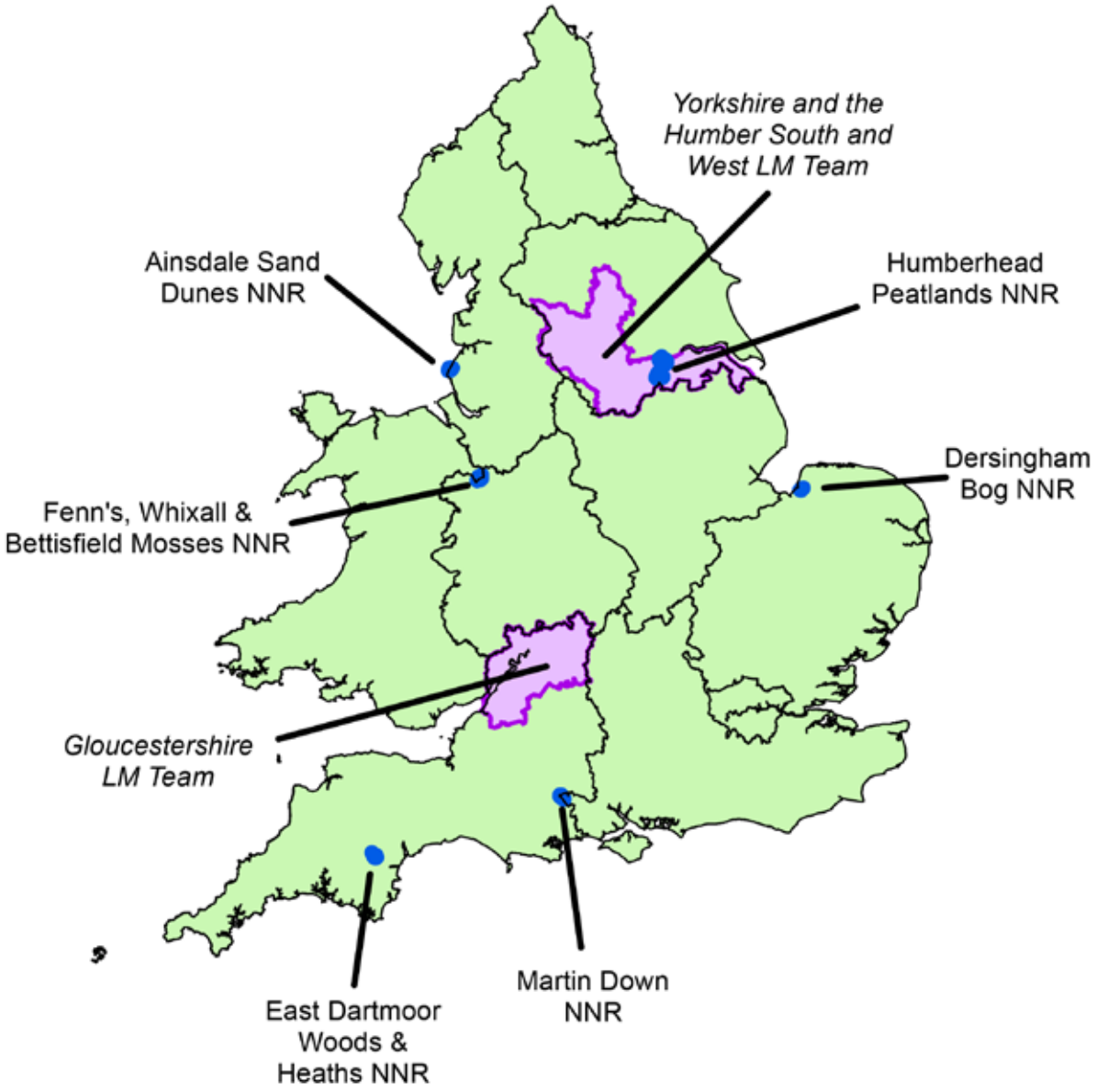
Figure 7: Contrasting current and future balance of Natural England effort on different forms of species surveillance.

There are four areas of development work addressing each of the four themes.

a) In-House Pilots

Natural England monitoring specialists are working with local delivery staff, national species Specialists, and Site Managers of six National Nature Reserves, to test the delivery of species surveillance alongside existing work on Sites of Special Scientific Interest (SSSIs), National Nature Reserves (NNRs) and HLS agreements. The pilot areas are shown in Figure 8.

Figure 8: The In-house Pilot: Participating Areas and NNRs.



Species records for restricted and very restricted distribution species, were obtained from the National Biodiversity Network (NBN) Gateway database, and assessed by each pilot area or NNR in order to decide which species could be surveyed on which sites.

This assessment and planning stage considered many factors such as:

- Data quality (age of records, geographic precision, possible erroneous records);
- Locally available data that could also be used (consulting with local experts, naturalists, volunteer groups and Record Centres);
- Consideration of recent, current or planned survey work by partners, to avoid duplication of effort and maximise learning opportunities for staff;
- Opportunities for combining surveillance with other planned visits to sites (particularly Integrated Site Assessments, described elsewhere in this report);
- Surveillance requirements of the different species (for example in which months could visits be carried out, methods required); and
- Training requirements for staff to be able to carry out the surveillance.

Field surveys started in late spring 2012 involving staff, volunteers and local experts. By mid-November nearly half of the 60-odd planned surveys were underway or had been completed, including of larvae of the Scarce Vapourer moth, *Orgyia recens*, on Humberhead Peatlands NNR at the end of May (Figure 9); of Round-leaved Whitebeam, *Sorbus eminens*, in the Gloucestershire Wye Valley SSSIs (Figure 10), and of Flamingo Moss, *Tortula cernua* on a site in South Yorkshire.

Figure 9: Surveyors during the Scarce Vapourer, *Orgyia recens*, larval survey.

Figure 10: Whitebeam (Sorbus sp.) leaves found at Wye Valley, including suspected Round-leaved Whitebeam, *Sorbus eminens*.

The in-house pilots have helped to identify issues that we would face when rolling-out such a programme of work across Natural England, including data quality, the capacity to include this work alongside existing commitments, and developing the required skill levels for participating staff.

b) Developing partnership agreements for delivery of surveillance

We are exploring how we can work towards a more balanced funding programme for the species surveillance that we support through funding arrangements with partners. For instance, 14% of the priority species in England are lichens, bryophytes or fungi, yet in 2010/11, we provided no funding support for the three key voluntary organisations that could co-ordinate monitoring of these groups.

Re-balancing our investment in this way will require a gradual shift in the types of activities and partners that we support, so that we are able to develop the evidence base on less well-known and less well-recorded species. In conjunction, we would seek to help partners build volunteer capacity for the monitoring of those species where we were reducing available support.

c) Structured Surveillance – the development of PondNet

We have been working with Pond Conservation and other partners to establish a representative network of pond survey sites and to develop survey methods that provide robust, statistically valid, data for a range of localised and widespread species associated with ponds. This approach brings together recording groups and organisations representing a wide range of taxon groups, to explore what is involved and what can be achieved by combining resources – for example delivery of integrated surveys of vascular plants and target invertebrates at the same pond.

A data exploration and statistical power analysis demonstrated that if sites were chosen randomly sample sizes would need to be large to detect national changes in the occurrence of all but the most widely recorded pond species (Great Crested Newts and Common Toads). Hence in designing PondNet, a balance was struck between the desire for a random sample and prior knowledge. By combining these different approaches, we can enable robust change detection for the greatest number of widespread and localised pond species, whilst seeking also to explore changes in pond quality through environmental measures.

Work in 2012/13 has focused on trialling methods in three Pilot areas – the New Forest, Cheshire and North-East Yorkshire, to establish the viability of the approach, including the ease with which it could be adopted by volunteers with or without dedicated support.

We are now extending the approach with a second trial aimed at evaluating the potential to deliver surveillance of lowland heathland species.

Online Recording

Despite the significant effort spent on species surveillance of various kinds by individuals, volunteer groups, non-governmental and public sector organisations such as Natural England, we still face many challenges when it comes to making best use of the data. Sharing data via the NBN Gateway facilitates much wider use, but for many getting it there in the first place is a big challenge.

We are supporting and participating in the development of new web interfaces to make the submission of data more straightforward. This includes developing clearer forms for capture and submission of species records, better integration between the submission processes and the verification or validation of records and the subsequent entry through the NBN Gateway.

5 Monitoring Engagement with the Natural Environment: The MENE Survey

Introduction

Natural England's purpose is defined in legislation to ensure that the natural environment is conserved, enhanced and managed for the benefit of present and futures generations, thereby contributing to sustainable development. We want people to be inspired to use and enjoy the natural environment, and to appreciate its intrinsic value.

In 2009, Natural England, Defra and the Forestry Commission commissioned the consultancy TNS to initiate the Monitor of Engagement with the Natural Environment (MENE) survey to support this area of work and provide a comprehensive dataset on people's use and enjoyment of the natural environment. For the purposes of this survey the term 'natural environment' includes not only the wider countryside and coastline but also the green open spaces in and around towns and cities.

MENE builds on a series of surveys carried out by Government and its partners between 1994 and 2005 that tracked participation in leisure day visits. These focused primarily on the extent of participation in visits and provided estimates of the volume of visits, but did not provide up-to-date and robust information on people's wider day to day use and enjoyment of the natural environment. Whilst the main focus of MENE is to capture information about people's visits to the natural environment, it also collects data on people who do not visit the natural environment and reasons for this, as well as explores the other ways that people engage with the natural environment such as watching wildlife and volunteering. In addition, MENE is the only survey of its type to be conducted over consecutive years, allowing for greater confidence when tracking trends over time. The objectives of MENE are to:

- Provide estimates of the number of visits to the natural environment by the English adult population (16 years and over);
- Measure the extent of participation in visits to the natural environment and identify the barriers and drivers that shape participation;
- Provide robust information on the characteristics of visitors and visits to the natural environment;
- Measure other ways of using and enjoying the natural environment; and
- Identify patterns in use and participation for key groups within the population and at a range of spatial scales.

How will Natural England and its partners use the findings?

Natural England uses MENE to support its remit of promoting public understanding, conservation and enjoyment of the natural environment in the following ways:

- To inform its work, and that of other interested parties, ensuring it is linked most closely to need.
- To evaluate the impact and effectiveness of this work.
- As an evidence source to assist policy makers; for instance:
  - the Natural Environment White Paper section on reconnecting people and nature uses MENE data to highlight the importance of local green space.
  - indicator development for the Public Health Outcomes Framework. Natural England is working with TNS to provide local authority level weights which will make the data more robust at local level.
  - indicator development for Biodiversity 2020.
  - to support indicators e.g. for Office for National Statistics' wellbeing work and NEWP.
- To enhance national and local understanding of the pattern of visits.

Survey Approach and Products

The MENE survey is incorporated in the TNS in-house Omnibus survey, where respondents are asked about visits they had taken in the seven days prior to the interview, as well as a series of other questions about their engagement with the natural environment.

Data collection began on the 6 March 2009 and is on-going. It involves weekly waves of interviews with a representative sample of the English adult population (aged 16 and over) in each wave. The MENE survey uses a form of quota sampling as the basis for contacting members of the public, where in each weekly wave around 800 interviews are undertaken across England.

MENE has now gathered spatial data on the origin and destination of over 36,000 visits taken across the country since March 2009 and this number grows each month. This development allows us to visualise geographic analysis of the survey data and understand more about the places people visit, how far they will travel and where the opportunities for enjoying the environment are in relation to where people live. Natural England will make these data publicly available in spatial report form, raw data and summaries at Local Authority level.

The survey results are made available in various forms:

- An annual report is produced to present headline findings. The report for the third year of fieldwork (March 2011-February 2012) was published in July 2012.
- A technical report is available providing full details of the survey methodology including approaches to sampling, grossing and weighting and estimates of confidence intervals
- Electronic data table viewer: interactive tool which allows detailed analysis of the MENE dataset.
- Monthly reports - brief summary reports which summarise the key figures and messages from the survey each month.

Other reports including previous annual reports and the results of additional data analyses are available from the MENE page[5] on the Natural England website.

[5] http://www.naturalengland.org.uk/ourwork/research/mene.aspx

Latest MENE results

The annual report published in 2012 summarises headline findings from the third year of the MENE survey. Where appropriate, comparisons have been made with the first and second years of the survey undertaken between March 2009 to February 2010, and March 2010 to February 2011, respectively.

Overview of visits to the natural environment

- During 2011/12, 42 per cent of the English adult population took a visit to the natural environment over the previous seven days. This is significantly higher than the proportion recorded in 2010/11 (39 per cent), but not significantly different from that recorded during the 2009/10 survey (43 per cent).
- The average number of visits taken per adult during 2011/12 was 65 – significantly higher than the average of 60 recorded in 2010/11, though significantly lower than the 2009/10 average of 69.
- The English adult population participated in an estimated 2.73 billion visits during 2011/12 (Figure 11). This is 10 per cent higher than the 2.49 billion visits estimated in 2010/11 but five per cent lower than the estimated 2.86 billion visits taken during 2009/10.
- Between March 2009 and February 2012, the English adult population participated in an estimated 8.08 billion visits to the natural environment.
- When asked about visits over the previous 12 months, just over half of the adult population stated that they normally visited the natural environment at least once per week (55 per cent), eight per cent had only made one or two visits and eight per cent of respondents claimed they had not taken a visit at all.

Figure 11: Volume of visits by general place visited (March 2011 to February 2012)

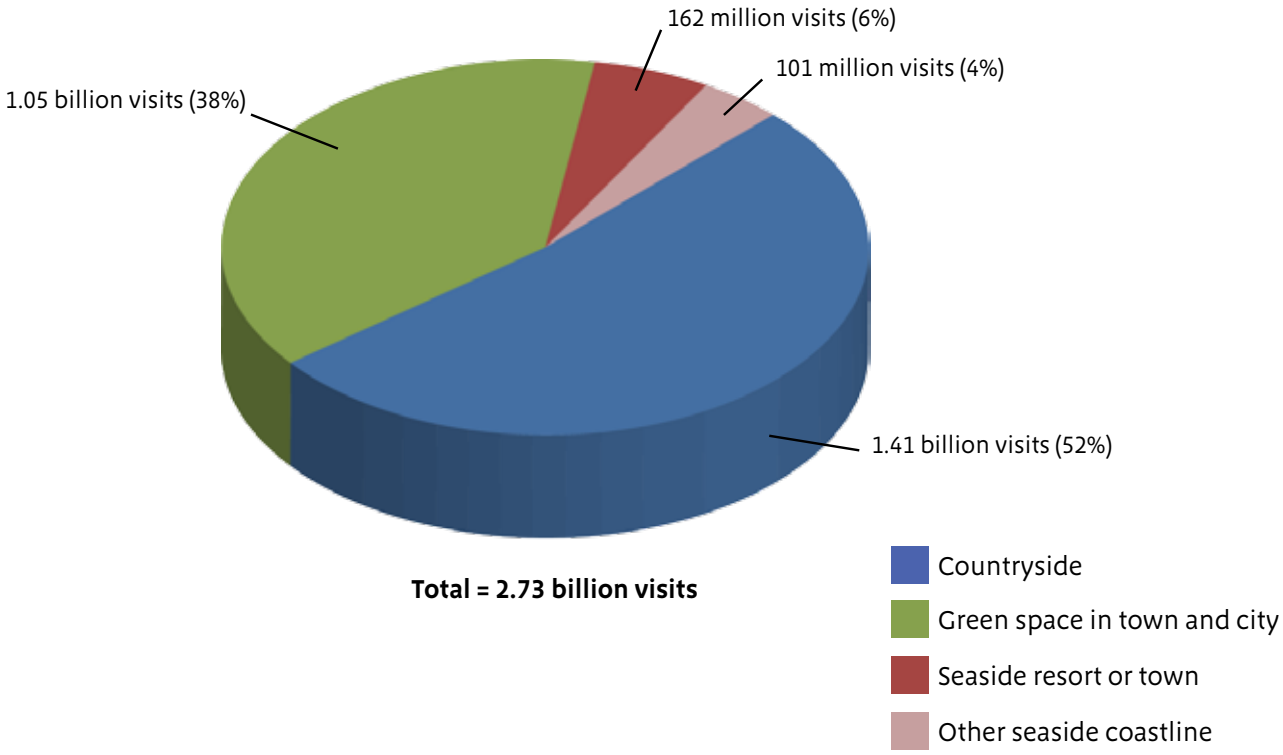
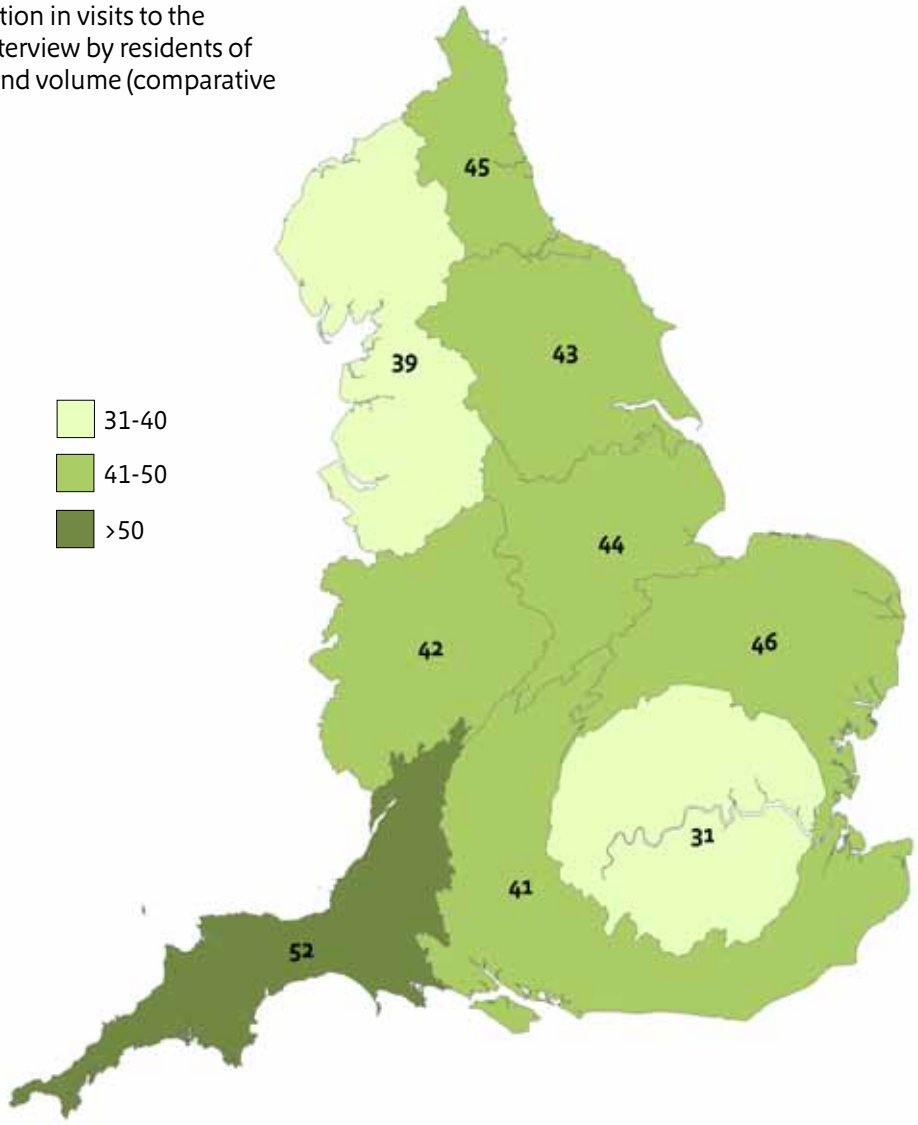


Figure 12: Cartogram showing participation in visits to the natural environment in week prior to interview by residents of each region (%) by proportion (colour) and volume (comparative size of region).



Who? A profile of people that do and don't visit

- The population groups with the largest proportions taking visits to the natural environment included people aged 25 and over, those in employment, and those in the ABC1 socio-economic groups.
- Overall levels of participation were significantly lower amongst the 65 and over groups, the BME (Black and Minority Ethnic) population and members of the DE socio-economic groups.
- People living in areas of greatest deprivation were least likely to have visited the natural environment in the previous seven days, whilst those in the least deprived areas were significantly more likely to have made such a visit.
- Levels of participation were highest in the South West (52 per cent) and lowest in London (31 per cent) and the North West (39 per cent) (Figure 12).
- Comparing volumes of visits in the first and third years of surveying, the most notable net decreases in visit taking were recorded amongst the DE socio-economic groups and unemployed people. However, the overall volumes of visits increased amongst those in the AB socio-economic group.

Where? The destination of visits

- Figure 13 provides an overview of the types of place visited.
- Just over half of visits to the natural environment were taken to the countryside (52 per cent), while 38 per cent were to green spaces within towns and cities. In total, 10 per cent of visits were taken in coastal locations.
- Volumes of visits to urban parks, paths, cycleways and bridleways, and playing fields increased significantly between 2010/11 and 2011/12. The increase in visits to urban parks particularly, made a considerable contribution to the overall increase in the volumes of visits across England between 2010/11 and 2011/12.
- Visits by those living in the most deprived neighbourhoods; 16-24 year olds; those in the DE socio-economic group; and the BME population, were more likely to be to urban destinations and places closer to home.
- Around two thirds of visits (68 per cent) were taken within two miles of the respondent's home, highlighting the importance of accessible local green space.

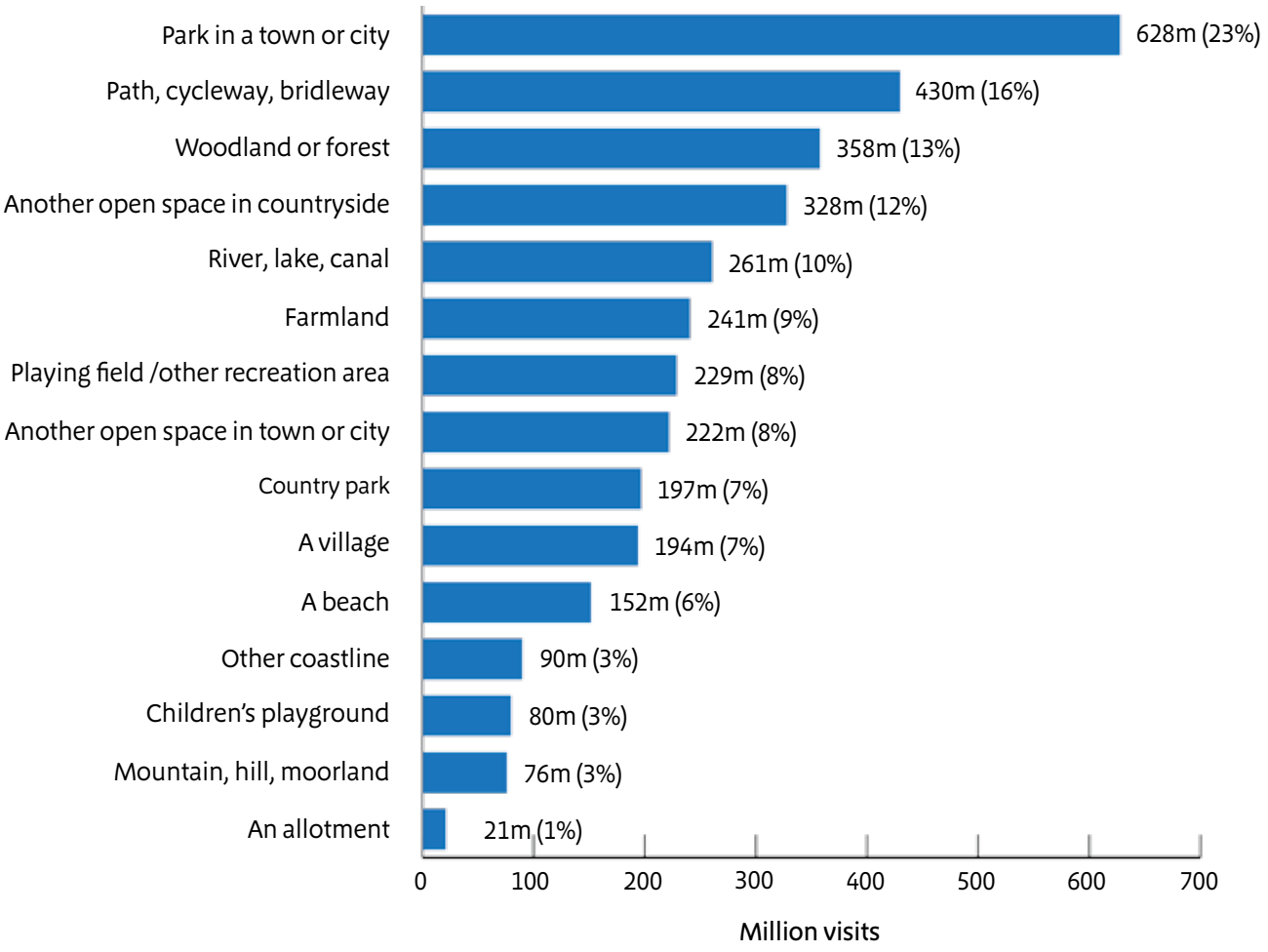
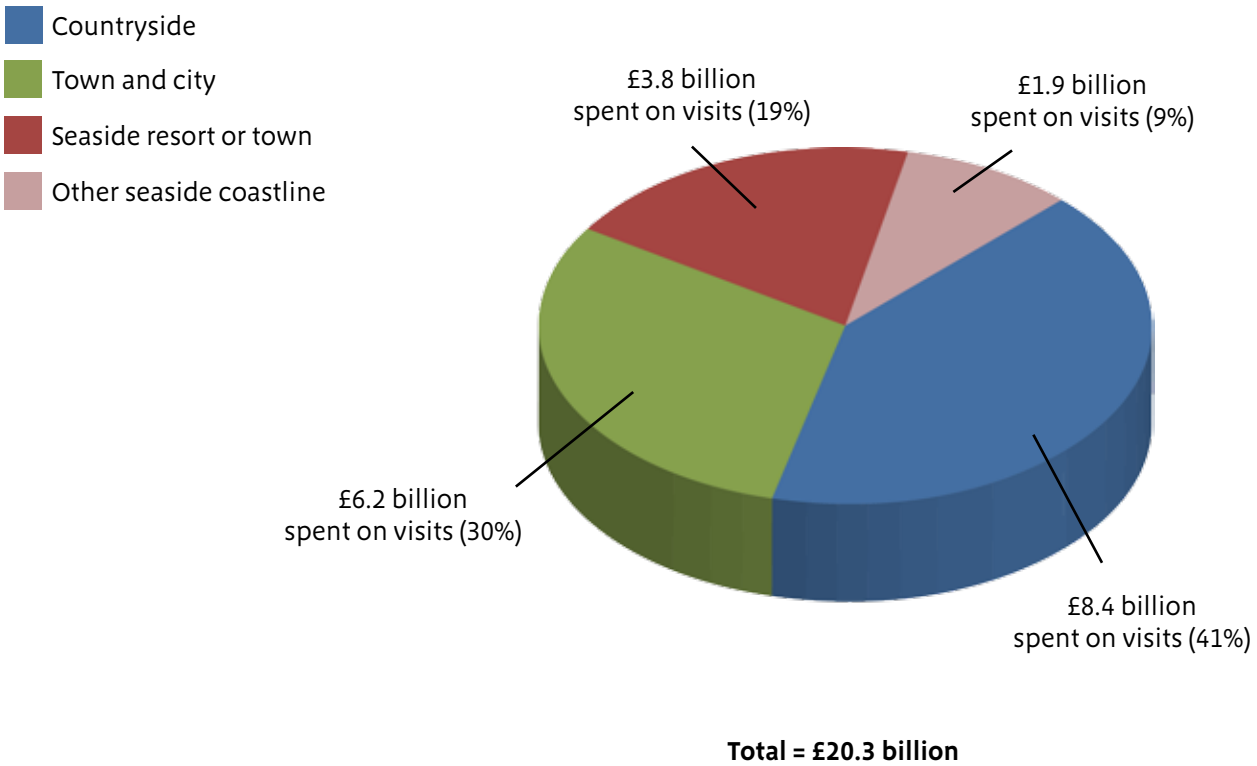


Figure 13: Type of places visited – specific (volume of visits March to February 2011/12 and percentage of total visits in this period) Q5 *Which of the following list of places best describes where you spent your time during your visit?* (Base: Random visit, weekly questions 2011/12 N=19,014). Note: Sum of totals is more than 100% as visits could have included more than one type of place.

What? A profile of visits

- The average visit to the natural environment lasted just under 2 hours.
- Walking remained the most popular activity and was part of over three-quarters of all visits (78 per cent), or approximately 2.1 billion visits overall. Walking with a dog was undertaken on 51 per cent of all visits (approximately 1.4 billion visits). Walking without a dog was the second most frequent activity, featuring in 27 per cent or around 725 million visits.
- In total 54 per cent of visits were taken by an adult on their own, while 22 per cent were taken with children present.
- Around a quarter (26 per cent) of visits incurred expenditure, with the average spend during these visits being around £28 per person.
- An estimated £20.3 billion was spent during visits to the natural environment in 2011/12 (Figure 14). In total, an estimated £58 billion was spent on visits between March 2009 and February 2012.

Figure 14: Distribution of expenditure on visits by destination type (%)
Q15 During this visit did you personally spend any money on any of the items listed on the screen? (Base: Random visit, monthly questions 2011/12 N=4,421)

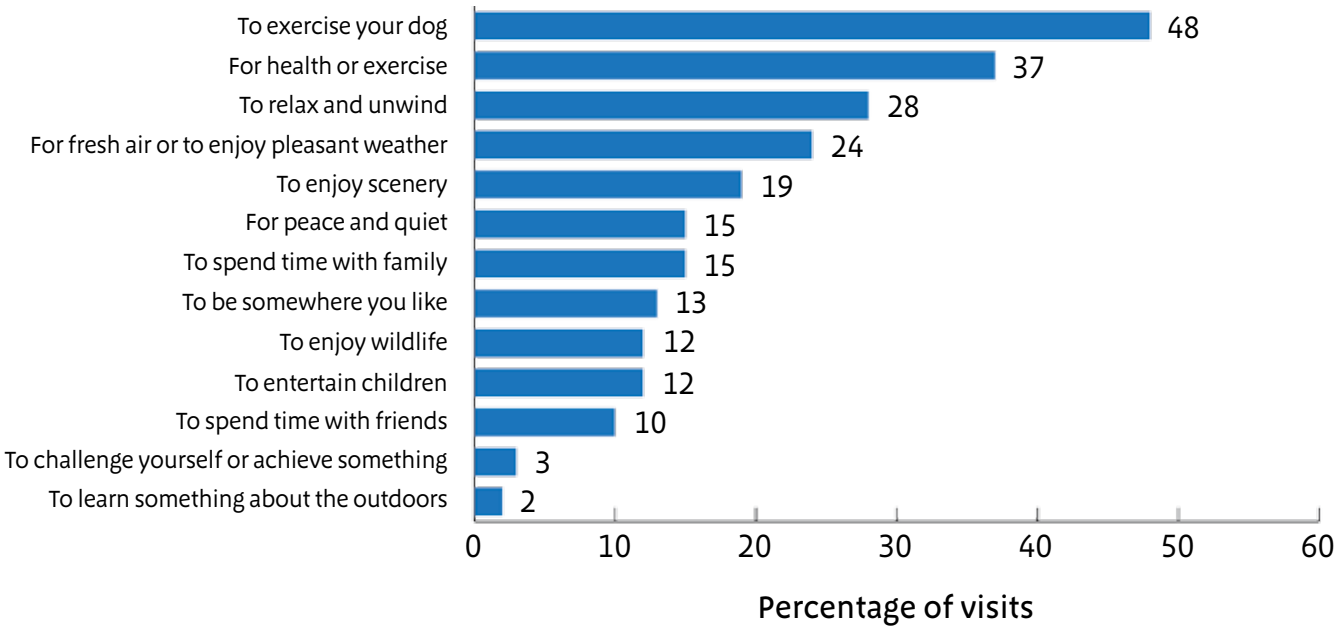


Total = £20.3 billion

Why? Reasons for visiting and not visiting

- Exercising dogs, personal health and exercise, relaxing and unwinding, enjoying fresh air and pleasant weather and enjoying scenery were the most frequently cited reasons for taking visits to the natural environment (Figure 15).
- Motivations were influenced by age - the likelihood that visits are taken for health or exercise, for fresh air or pleasant weather, to enjoy scenery, and to enjoy wildlife increases as a person gets older.
- Those aged 25 to 44 were more likely to attribute their visit to the need to entertain children and/or spending time with family (23 per cent each). Spending time with friends was more likely to be mentioned by 16 to 24 year olds (25 per cent).
- A significant increase was recorded between survey years in the proportions of visits where the motivation was for health or exercise (37 per cent in 2009/10 to 41 per cent to 2011/12).
- Those who had been on visits to the countryside and coast, particularly mountain and moorland or woodland were more likely to indicate that they had experienced a positive outcome than those who had been on visits to green spaces in urban areas.
- Infrequent visitors to the natural environment were most likely to cite being busy at work or poor weather as their main reasons for *not* visiting the natural environment more often. Poor health, old age or disability were mentioned by those who never visit the natural environment.

Figure 15: Reasons for taking visits to the natural environment (%)
Q12 *Which of the following, if any, best describe your reasons for this visit?* (Base: Random visits, monthly questions 2011/12 N=4,421)
Note: Sum of totals is more than 100% as visits could have been taken for more than one reason.



Other engagement with the natural environment

- Overall, 94 per cent of the population took part in one or more of the other engagement activities asked about in the survey, with sitting and relaxing in the garden and gardening among the most frequently undertaken (Figure 16).
- Participation in these activities generally increased with age. Those aged 45 and older were especially likely to take part in sitting or relaxing in the garden (70 per cent compared to 59 per cent amongst younger age groups) and watching or listening to nature programmes on the television or radio (62 per cent compared to 43 per cent amongst younger age groups).
- Just under half (47 per cent) of the population strongly agreed that having open green spaces close to where they live is important, while 40 per cent strongly agreed that spending time out of doors was an important part of their life.
- The more frequently people visit the natural environment, the more likely they are to appreciate it and to be concerned about environmental damage. Frequent visitors are also more likely to engage in pro-environmental behaviours such as recycling and prefer to buy seasonal and locally grown food.
- Respondents were asked about the extent to which they were willing or able to change their current behaviour to address environmental concerns. Since the 2009/10 survey, the proportion of the population unwilling to change their lifestyle has significantly increased from 26 per cent to 32 per cent. Just 18 per cent of the population expressed their intention to make changes to their lifestyle.

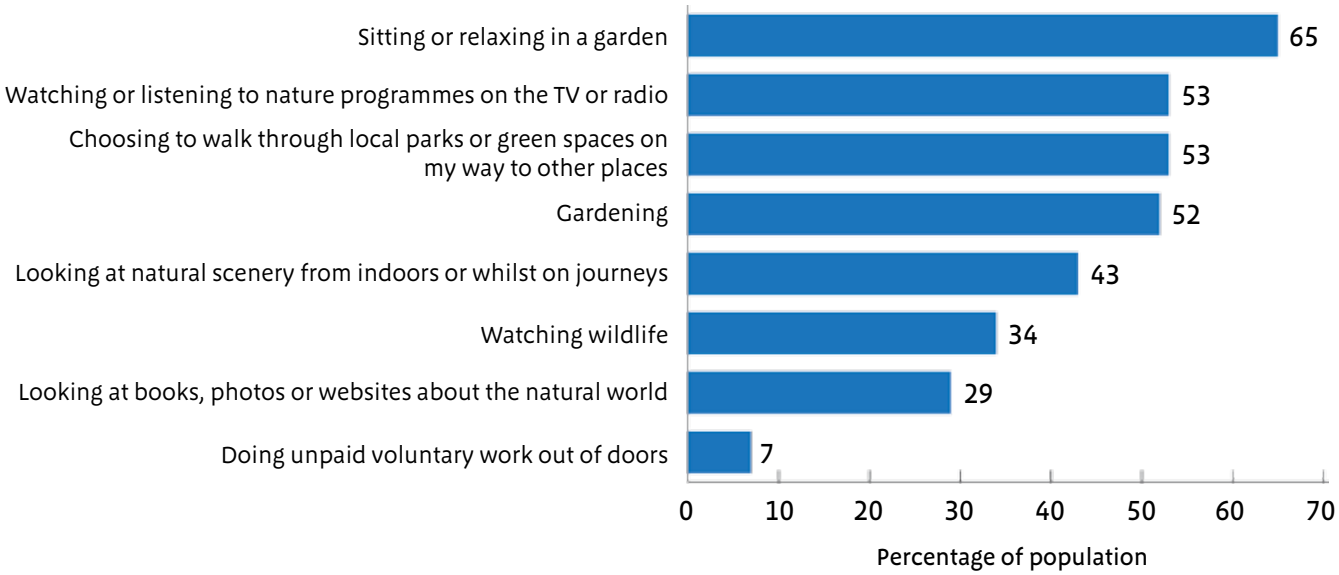


Figure 16: Engagement in other activities involving the natural environment (%)
E3 *Which of the following activities involving the natural environment do you take part in?*
(Base: All respondents, quarterly questions 2011/12 N=3,544)
Note: Sum of totals is more than 100% as respondents could have undertaken more than one activity.

6 Development and Delivery of the Integrated Site Assessment Programme

Background

Natural England has a statutory responsibility for monitoring the condition of Sites of Special Scientific Interest (SSSI) to agreed 'common standards[6] '. We use information about site condition to steer and, where needed, improve management and to deliver our commitments to improve the overall condition of the SSSI series. Natural England is also responsible for delivering the Environmental Stewardship Scheme through the Rural Development Programme for England (RDPE). The introduction of the Higher Level Stewardship (HLS) element of Environmental Stewardship in 2005 provided a targeted scheme that set out desired outcomes for each agreement clearly in the form of 'indicators of success (IoS)'. We need evidence for the effectiveness of HLS delivery to support formal RDPE evaluation as well as to demonstrate effectiveness in relation to wider policy initiatives such as Biodiversity 2020.

The similarities and potential synergies between these two monitoring requirements provided a clear opportunity to develop an integrated monitoring programme, to be delivered by Natural England staff. Here we describe the work Natural England has done to exploit this opportunity, through development and implementation of the Integrated Site Assessments (ISA) Programme.

ISA Development

The bulk of our SSSI delivery and HLS delivery commitments fall under our Land Management function. The decision to combine monitoring activities for these delivery areas into one programme of ISA had two main aims – to improve the comprehensiveness and quality of the data collected and to increase efficiency by adopting a more synergistic approach. The ISA programme has been designed to enable a single visit to monitor multiple land management activities and outcomes (covering both SSSI and HLS interests where appropriate); to provide systematic feedback to the land manager; and to improve data consistency and management enabling it to be used for multiple purposes.

The vision for the ISA programme was to enable us to:

- Assess the effectiveness of our advice and management interventions and to report on statutory and non-statutory indicators and responsibilities;
- Improve the quality of delivery through enhanced feedback to site managers, agreement holders and advisers;
- Ensure the management of SSSIs and HLS agreements is appropriate;
- Contribute to our wider responsibility to monitor the condition of the natural environment and identify long-term change.

[6] Common Standards Monitoring, JNCC

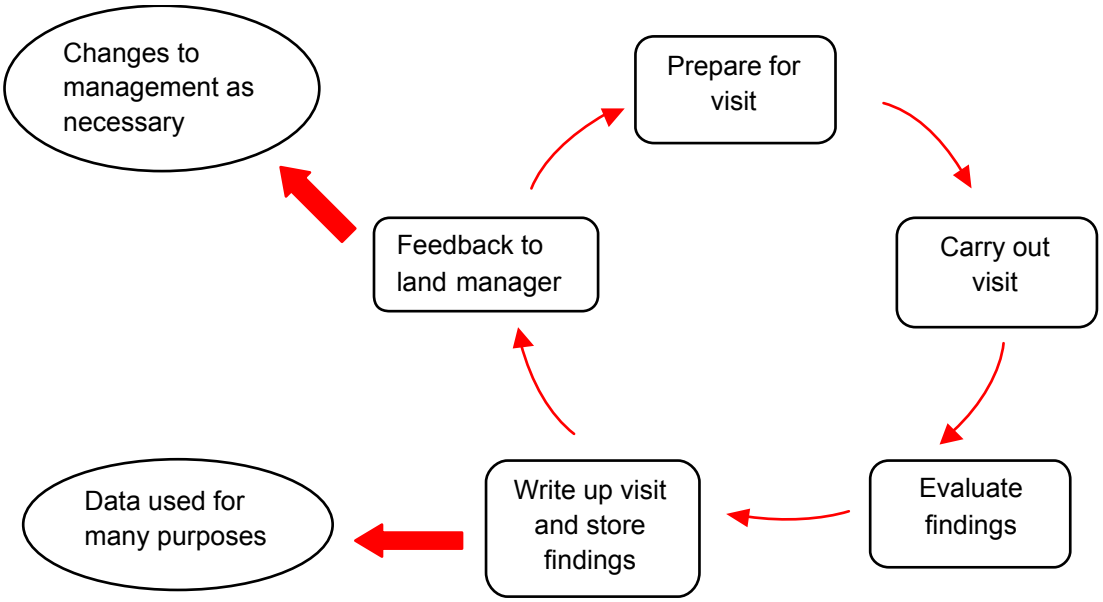
The main development phase of the ISA project was undertaken during 2009 and 2010, involving the development and testing of a standardised, flexible process for planning, undertaking and recording the outcomes of assessments. The ISA programme has been operational since April 2011.

The key features of the system are:

- Annually planned, risk-based programmes;
- A flexible and adaptable approach to planning the assessment;
- Greater consistency in the description and definition of attributes to be recorded;
- Standard forms for simple assessments and templates for site specific forms;
- Ability to tailor forms to reflect site specific targets set out in Favourable Condition Tables (FCT) and IoS;
- Set of common guidance and instructions; and
- Consistent recording of management and follow up practices.

The full ISA process is described in a manual with accompanying procedures and instructions that is available to all staff via Natural England's intranet. All the component parts are reviewed and updated as required. For straightforward assessments (often with single interest features), generic forms are available, whilst for more complex sites with multiple interest features a bespoke form building tool has been developed which allows users to create forms that match the features and condition attributes for the specific site or agreement. Quality Assurance is a key part of the programme and focuses on ensuring the correct processes are being followed and highlighting areas for improvement.

The process is circular, as shown below:



There are two 'levels' of assessment – rapid and detailed. Although the same attributes are assessed, they differ in the level of detail recorded in the field and hence the level of surveyor judgement that feeds into the assessment. Data are typically collected on:

- Feature condition;
- Feature extent;
- Management;
- Whether the 'feature' is meeting its objectives and targets;
- Action required.

Rapid assessments are designed to allow advisers to apply a greater level of professional judgement to their observations of feature condition and management. Rapid assessments may be preferred on less complex sites where summary results for a unit or option can be recorded with reasonable confidence following a structured walk.

Detailed assessments follow more structured methods, with attributes recorded at a set number of points, to produce robust quantitative information that can be compared with thresholds set in the FCT/IoS. Detailed assessments may be prioritised in particular circumstances, for instance where feature condition is felt to be borderline to allow a more accurate judgement to be made, where there is the possibility of challenge or legal proceedings, or where the information is needed to feed into thematic assessments or is relevant to wider monitoring needs.

The land management advisers who are responsible for the sites on a day to day basis carry out the majority of the assessments, seeking advice and/or guidance from specialists on complex or difficult sites.

For SSSIs, not all the assessments required are suitable for inclusion in the ISA programme. Natural England may not have the in-house skills or resources available to monitor some features or parts of features; for example direct assessment of invertebrate assemblages, water quality or bird numbers. Where these are SSSI features, data from other sources may be used, for instance from partners such as the Environment Agency or from volunteer recording schemes. For very specialised assessments that cannot be delivered in-house or by existing third-party data, external contractors may be employed to address gaps. This data is then fed into the assessment of SSSI condition.

Following a field visit the adviser will assess the data collected against targets set in the FCT's for SSSI and IoS for HLS . Where necessary, other corroborating data (for example from external surveys) will be sourced and factored in to the assessment. The data is then added to a bespoke database, and for SSSI's the condition assessment is added to the ENSIS system and can be accessed by the public.

Feedback to the land manager is also a key part of the process. Feedback should always be constructive and identify any areas for improvement or changes to management needed, together with recognition for appropriate management. This follow up process helps to ensure that any problems are addressed at an early stage and will maximise the likelihood that the management will deliver the desired outcomes, be it the IoS being met or favourable condition achieved.

Preliminary Results of the 2011/12 Programme

The ISA programme was implemented across Natural England from April 2011. In the first year, 3,900 ISAs were completed, comprising assessments of around 3,100 SSSI units and 800 HLS agreements with no SSSI interest. Of the SSSI assessments, about 1,000 were joint assessments that also took into account HLS management.

Due to delays in completion of the interim database for holding ISA data, it was not possible to input ISA data as the assessments were completed, as had been planned in the process design. Hence, after the database was completed in August 2011, it was necessary to undertake a retrospective exercise to capture the data. This relied on advisers supplying documentation to a central team for input to the database.

Of the 3,900 ISAs carried out in 2011/12, approximately 50% of the completed forms were supplied by advisers for inputting to the database; of these, the input team evaluated 80% and either entered, partially entered or rejected them depending on the quality and clarity of data presented on the form. For ISAs from April 2012, key users within local teams are inputting results from the forms as assessments are completed, with the aim of getting a complete record of all assessments.

Figures 17 and 18 show data from the 2011/12 assessments that were entered onto the database. Care is needed interpreting the results because of the complexity of the information and its constraints.

Figure 17: HLS assessments and their likelihood of meeting the IoS (RAG)

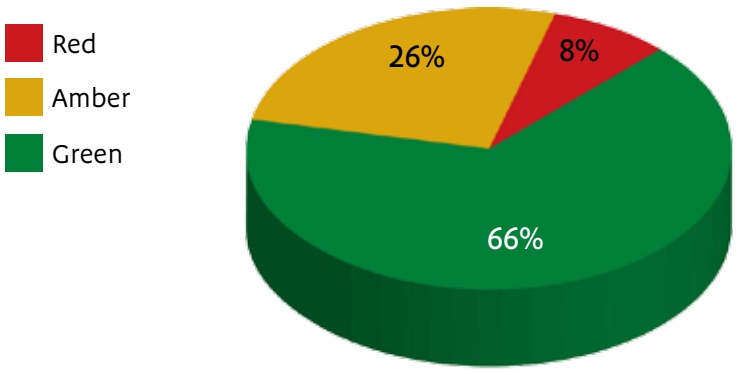
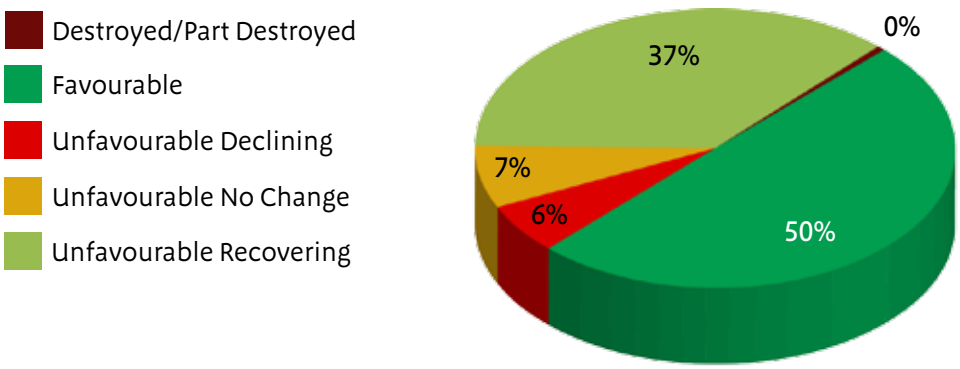


Figure 18: SSSI unit condition from ISA visits



For the data available from the first year, 66% of HLS Indicators of Success were assessed as likely to be met at the end of the agreement; for the remainder, assessments suggested agreements were unlikely to meet their IoS without further intervention. For the SSSI units assessed 50% were found to be meeting the targets set in the FCT's for favourable condition, whilst another 37% were judged on track to achieve favourable condition with time.

SSSI condition from ENSIS

As the amount of data held on the ISA database increases, it will be possible to undertake more detailed analyses of condition across features, and to explore the reasons for any patterns of adverse condition. For example, are there common reasons for red IoS assessments, or are assessments repeatedly failing on the same condition attributes? In addition bringing ISA data into a readily accessible format will enable Natural England to maximise its value by making it available for use within other monitoring frameworks (for example habitat and species surveillance).

Future developments

2011/12 was a year of learning for all involved in developing and delivering the ISA programme. Feedback from several parts of Natural England's business was considered by the project team and methodologies changed as necessary to ensure the programme is robust and fit for purpose. This review and challenge continues into 2012/13. Some of the priorities for further development include:

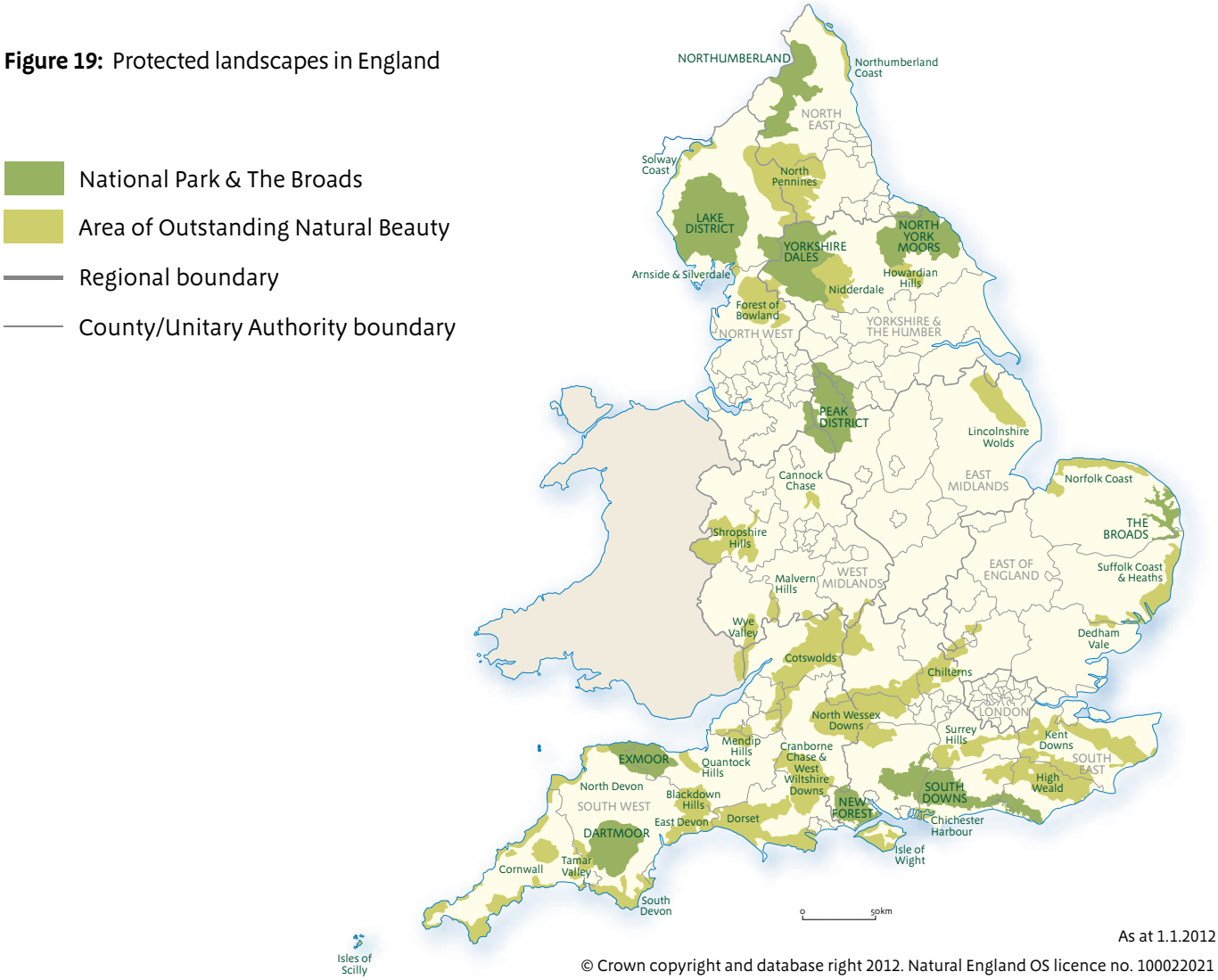
- Widening the scope of the ISA programme. Not all HLS options or SSSI features are currently assessable through ISAs, eg standing waters. These will need to be brought into the process over time to provide a more consistent methodology (currently SSSI features not included are monitored using the old forms etc) and to provide a fuller picture when analysing results.
- Various Land Management adviser training needs have been identified, both to reinforce aspects of the process and its methodologies and to enhance the field skills/species ID of those undertaking assessments.
- Improvements to database scope and functionality. The current ISA database was developed as an interim solution. A capital bid has been agreed with Defra for developing a longer-term solution that will help manage the end-to-end process, It is intended that by March 2013, we will have a system that enables forms to be specified, stable data input for all users, routine and bespoke reporting, and a secure, long term data repository.
- Exploring the requirements of other Natural England monitoring activities, so as to maximise the value of the data collected and minimise risk of duplicated effort.

7 Developing a Framework for Monitoring Environmental Outcomes in Protected Landscapes

Natural England has been working with partners to develop a framework for monitoring the environmental outcomes that occur in our finest landscapes – namely, National Parks and Areas of Outstanding Natural Beauty (AONBs). This article explains why the framework is needed and what has been achieved so far.

The first National Parks and AONBs - collectively referred to as our 'protected landscapes' - were designated in the 1950s. There are nine National Parks and 34 AONBs in England which, together with the Broads, cover about 23% of the country (Figure 19). They are designated for their natural beauty and, in the case of National Parks, also for their recreational value. Their management bodies share the statutory purpose of conserving and enhancing their area's natural beauty (and wildlife and cultural heritage too if a National Park), and National Parks must also promote opportunities for the public to understand and enjoy their special qualities. They set out their environmental objectives in statutory management plans that are reviewed at least every five years.

Figure 19: Protected landscapes in England



As at 1.1.2012

The need for a monitoring framework

There has never been a consistent approach to monitoring environmental outcomes in protected landscapes, and which their management bodies and others help to deliver by implementing the management plan for the area.

The monitoring framework has been established to address this gap, and also to provide evidence to help:

- Protected landscapes monitor the achievement of management plan objectives and to update these plans;
- Measure the 'state' or condition of the protected landscape;
- Understand how far the work that protected landscapes and others undertake in their areas meets the Government's aspirations, such as aspects of the Natural Environment White Paper.

How the framework is being developed

A small partnership team has produced a draft version of the framework. This team includes representatives from Natural England, Defra, the English National Park Authorities Association, the National Association for AONBs and English Heritage.

The draft framework focuses on datasets that represent aspects of natural beauty. However, it also includes information relating to recreation (linked to National Parks' second purpose); plus ecosystem goods and services, sustainable communities to reflect the wider benefits provided by protected landscapes and to provide some contextual data.

Figure 20: The East Devon AONB, one of the four pilot areas

The partnership piloted the framework with four protected landscape bodies from July 2011 to March 2012. These were the East Devon AONB (Figure 20), Lincolnshire Wolds AONB, Yorkshire Dales National Park Authority (NPA) and the South Downs NPA. These areas were chosen to reflect a range of broad landscape types, size, locations and management bodies, with varying resources and evidence bases.

Feedback from the pilots played a valuable role in helping to prioritise the range of data that Natural England and partners sourced for AONBs and National Parks. Natural England, English Heritage and Defra then cut the prioritised datasets to the boundaries of protected landscapes. The pilots also explored the use of local information that they could contribute to the framework.

The partnership held two workshops in March 2012 to discuss the pilot work and gather views on the type of data sourced. Natural England then shared the detailed data with AONBs and National Parks during summer 2012, including:

- Statistics on the area managed under Environmental Stewardship (ES) and the average annual values of current ES agreements;
- Statistics on the uptake of selected ES options that contribute towards the good condition of landscape elements and/or landscape character (Figure 21);
- Statistics and spatial data on heritage assets 'at risk' in each AONB and National Park (provided by English Heritage); and
- Statistics on the condition of Sites of Special Scientific Interest (SSSIs) (Figure 22).

Uptake of Higher Level Stewardship options for maintaining and restoring woodland		
National Park	**Option 'HC7' Maintenance of woodland (ha)**	**Option 'HC8' Restoration of woodland (ha)**
Dartmoor	257	290
Exmoor	100	170
Lake District	146	619
New Forest	150	195
Northumberland	62	90
North York Moors	256	172
Peak District	167	280
South Downs	973	206
The Broads	150	22
Yorkshire Dales	188	527

Source: Natural England, January2012

Figure 21: The uptake of Higher Level Stewardship options for the maintenance and restoration of woodland in National Parks as of early 2012. Woodlands are relatively rare in the Yorkshire Dales National Park, and therefore make a positive impact on landscape character out of proportion to their area. Maintaining these woodlands is a priority for the Dales Woodland Strategy; the regular provision of statistics under the framework can help the Yorkshire Dales National Park Authority to monitor this, and they will also be able to view the location of these options online in 2013.

This was the first time that a wide-ranging set of data was tailored to the boundaries of every protected landscape and provided in a coordinated way, complementing the existing on-line mapping and information services that Natural England provides. Defra have since produced economic profiles for each AONB as well, to feed into the 'sustainable communities' themes of the framework.

It is important that the interpretation of the statistics is informed by an understanding of local contexts. The management bodies, and their local partners, can supplement national data with local information, where available, to provide a fuller, more nuanced picture of environmental outcomes and trends in their areas.

AONB	Total area of AONB (ha)	Area under favourable condition (ha)	Area under 'unfavourable recovering' condition (ha)	% area in 'unfavourable recovering' condition
Arnside & Silverdale	4,028	2652	1350	99%
Blackdown Hills	655	126	407	81%
Cannock Chase	1,390	89	1251	96%
Chichester Harbour	3,611	763	2839	100%
Chilterns	3,203	2079	1082	99%
Cornwall	12,519	6169	5878	96%
Cotswolds	4,108	2073	1919	97%
Cranborne Chase & W. Wilts Downs	3,404	1461	1805	96%

Source: Natural England, July 2012

Figure 22: Statistics on the condition of SSSIs in a selection of AONBs

In November 2012, the partnership gathered feedback from protected landscape management bodies on how useful they had found the data. Most respondents said they were planning to use the information to review their management plans, with other popular uses including input to 'State of the Park/AONB' reports and background information for funding bids. Analysis of the responses has helped to inform which core datasets will be updated and how frequently they are provided in the longer term.

The partnership has also agreed the approach to identifying a 'menu' of environmental outcomes that can be measured, as far as possible, using the most relevant and readily available data. A small number may be ones that all protected landscapes can relate to; others will be of relevance to different areas. Individual National Parks and AONB management bodies can also define additional outcomes that are locally specific and relate to their management plan indicators which are not covered by the national information.

Natural England will coordinate the cutting of additional or updated datasets at the end of March 2013 and provide the key datasets to all protected landscapes by end May 2013. The partnership anticipates that the framework will continue to be refined over time, both in response to further feedback on how the data is being used and as new or updated data becomes available.

Improving the provision of national data to the protected landscape bodies will assist not just in the monitoring of environmental outcomes; it will also support their planning and reporting activities and, ultimately, help all those working or influencing activities in England's National Parks and AONBs to achieve the best environmental outcomes in these special places.

8 Progress towards a monitoring and surveillance programme for the marine environment in England

UK Marine Biodiversity Monitoring Research and Development Programme

This section briefly sets out the drivers underpinning our marine monitoring and surveillance work and the steps that Natural England is taking to meet these requirements, including our work in partnership with JNCC and others.

The UK vision for the marine environment set out in the UK Marine Policy Statement, 2011, is for 'clean, healthy, safe, productive and biologically diverse oceans and seas'. The UK high level marine objectives published in April 2009[7] set out the broad outcomes for the marine area in achieving this vision, including:

- Our understanding of the marine environment continues to develop through new scientific and socio-economic research and data collection.
- Sound evidence and monitoring underpins effective marine management and policy development.

In addition to these objectives the UK is party to a number of European-regional agreements and European Union obligations that require an element of surveillance and/or monitoring of England's seas. These include long established drivers such as the OSPAR Convention[8], Habitats and Wild Birds Directives; as well as newer ones such as the Marine Strategy Framework Directive (MSFD). National policy drivers include the UK Marine Science Strategy, the Marine and Coastal Access Act 2009 (MCAA) and the England Biodiversity Strategy: Biodiversity 2020, including halting biodiversity loss and ensuring our network of Marine Protected Areas is well managed, that will require monitoring and reporting.

To achieve the overall aim of conservation and sustainable management of marine biodiversity, these policy and legislative drivers place an obligation to gather and interpret evidence. This has a dual objective: to ensure that the status of marine biodiversity can be assessed and reported upon, and to inform adaptive management of activities.

Defra and its agencies recognise that funding to deliver a comprehensive surveillance programme to meet all these drivers, both existing and new, is challenging in the current financial climate, particularly with the high cost of survey work away from the coast. It is essential to look again at how surveillance and monitoring are undertaken in the marine environment to see where programmes can be better joined up and efficiencies delivered.

[7] http://archive.defra.gov.uk/environment/marine/documents/ourseas-2009update.pdf

[8] The Convention for the Protection of the marine Environment of the North-East Atlantic (the 'OSPAR Convention') was open for signature at the Ministerial Meeting of the Oslo and Paris Commissions in Paris on 22 September 1992.

At the UK level the Marine Science Coordination Committee (MSCC) has responsibilities to deliver the UK Marine Science Strategy; and to improve UK marine science co-ordination. This includes marine monitoring and surveillance activity which MSCC coordinates through the UK Marine Monitoring and Assessment Strategy (UKMMAS) partnership; of which Natural England is a member.

Natural England is a partner in the development of a UK Marine Biodiversity Monitoring Research & Development Programme (hereafter referred to as 'the programme') with other country agencies, led by JNCC. This programme sits within the UKMMAS framework and is undertaking research and development that will propose options to Governments for a coordinated and integrated system for marine biological monitoring, both in the wider marine environment and in protected areas. These recommendations will enable MPAs to be placed in the context of the wider environment.

The programme covers all biodiversity components from plankton to top predators and it is interested in understanding about impacts from any anthropogenic activities, encompassing all industries. Working through UKMMAS helps bring together the many potential partners, makes best use of existing work, and enables sharing of monitoring platforms and expertise.

The main areas of work are:
- Developing a strategic approach that allows for effective coordination and integration;
- Identifying monitoring requirements and options for each ecological component including seabirds, cetaceans and benthic habitats;
- Identifying how to use pressure and impact information in monitoring.

The programme is pursuing two overall goals:
- How to most effectively do the monitoring in order to describe state, change, and an indication of cause; and
- How to do it cost-effectively.

By integrating these work areas and goals a more coherent monitoring programme will be developed; this will inform key reporting obligations, and support requirements for evidence based management advice as well as facilitating delivery of the programme in the most efficient manner. Efficiencies are expected from such things as shared survey platforms and efforts, common analysis and quality-assurance protocols. Delivering the programme in this manner is also intended to bring additional capacity and effectiveness in describing the state and trends of, and pressures on, marine biological components in a more cohesive way that will better inform status assessment and management advice. This is conceptually consistent with the approach of the MSFD and an ecosystem-based approach to understanding the marine environment.

Costs of monitoring in the marine environment are high due to platform (ship and aircraft) costs. However, such platforms can provide a base for multiple sampling techniques to be deployed at the same time. Integration, both amongst biodiversity schemes, and significantly between other marine monitoring schemes, will enable individual scheme platform costs per scheme to be kept down. Natural England and JNCC have already been engaged in measures to achieve these efficiencies and improved capability through forming partnerships with other organisations with an interest in biodiversity monitoring including the Environment Agency, Cefas and the Maritime & Coastguard Agency (see section 1.3.2 for more details). In addition the newly created Marine Biodiversity Evidence Coordination Board sponsored by Defra will now drive the process of seeking more efficient survey delivery.

Progress so far and future actions

So far work under the programme has consisted of:

- a review of international best practice for monitoring of MPAs.
- options for seabird and cetacean monitoring.
- development of pressure and impact information to inform sampling design.

Work is continuing to progress across all areas and the coming year will see a strong focus on developing the risk-based approach to monitoring; analysing power of detection for seabirds and cetaceans surveys, on developing case studies for habitat monitoring, on integrating work on development of indicators under the Marine Strategy Framework Directive and reviewing current monitoring practices for inshore marine sites. For the different ecological components being considered within the programme, partners will be in a position to draft options at an earlier stage than others; reports will therefore be produced in phases during 2013-2015 and possibly beyond.

In the next section, Natural England's existing site based monitoring of European Marine Sites, and coastal and marine SSSIs is outlined together with future plans for monitoring Marine Conservation Zones. In the future these programmes may need to be amended to fit within the delivery framework and recommendations set by the overarching UK Marine Biodiversity Monitoring Programme.

Monitoring of Marine Protected Areas

While Natural England is actively engaged in partnership working with JNCC and others to develop an overarching and comprehensive programme of marine biodiversity monitoring we are also continuing to deliver our core statutory monitoring work. The focus of this work is to monitor, assess and report on the condition of biodiversity within existing Marine Protected Areas (MPAs) in England's inshore waters.

Marine Protected Areas in England aim to protect biodiversity and geodiversity of our seas. The UK Governments have commitments under various multi-lateral environmental agreements (including CBD and OSPAR) and national policies to create a well-managed ecologically coherent network of MPAs by 2016. MPAs in England include SACs and SPAs with marine components designated under the Habitats and Birds Directives, SSSIs with marine components, Ramsar sites and Marine Conservation Zones[9]. In order to report on whether the network and individual sites are well-managed (i.e. meeting their conservation objectives) it is important to monitor the condition of MPA features and their contribution to favourable conservation status and good environmental status. Information from monitoring MPAs enables Natural England to provide conservation advice to regulators to enabling them to contribute to meeting conservation objectives and to make decisions on development proposals.

[9] http://jncc.defra.gov.uk/default.aspx?page=4549

The features designated within existing MPAs and recommended MCZs cover both habitats and species known to be rare, threatened or declining (for example on the annexes of the Habitats and Birds Directives, OSPAR list and section 41 list), representative broad-scale habitats and large scale topographic features (such as estuaries and large shallow inlets and bays). This wide range in the scale of feature types influences the approaches needed for monitoring condition.

The final configuration of the MPA network is currently unknown with further SPAs with marine components being identified over the coming years and MCZs being designated from 2013. The scale of the monitoring required will depend on these new designations and the type and number of features within each site but we expect that our monitoring programme will need to expand significantly to meet these new demands.

Most existing marine monitoring and surveillance activity occurs within existing MPAs (Natura 2000, SSSIs, Ramsar sites). Marine features within marine SAC/SPAs and coastal SSSIs and are subject to an ongoing programme of Common Standards Monitoring (CSM) with assessment cycles linked to reporting of Favourable Conservation Status. This includes identifying baselines and then monitoring trends in condition by reference to these. In addition to this, ongoing monitoring work is also underway in partnership with Defra, JNCC, Cefas and others to improve the evidence base to support MCZ and SPA designation. Examples of this work are described in Delivering in partnership on page 41.

Existing MPA 'monitoring' can be divided into 2 categories:

- Core Common Standards Monitoring
- Targeted 'Investigative' monitoring which focuses on identifying the effects of particular activities on features in MPAs.

Monitoring under both these categories is delivered through a series of strategic monitoring partnerships and where this is not possible through commercial contracts. Techniques employed range from remote survey methods such as aerial photography, lidar, and acoustic bathymetry surveys; as well as in situ sampling / ground truthing using remote video, grab sampling and direct observation including diving.

Our risk-based MPA monitoring programme

Since 2010 Natural England with Defra's support has substantially increased the resources available for monitoring. In addition we have developed and applied a risk-based approach to monitoring Marine SACs using a scoring system derived from:

1. a data priority score relating to when feature was last surveyed; and
2. a 'risk score' based on a structured assessment of the level of risk to features for six years in advance

Overall the higher priority is given to features identified as being at relatively higher risk due to anthropogenic activities and for which recent survey information is not available. Lower priorities are given based on a sliding scale where features have been identified as being at medium or low risk or for which more recent data is available. The overall effect of this prioritisation process together with the increased resources available is that all features should be surveyed at least once within the 6 yearly reporting cycle with those features subject to greater anthropogenic risk surveyed more frequently up to every 3 years.

Natural England intends to develop this approach further within the context of the Marine Biodiversity Monitoring Programme. In particular we wish to: include marine SPAs within the process and future MCZs, further examine which features / attributes should be assessed more frequently than once every 6 years, and whether there may be some features/attributes where a longer return period may be acceptable. Factors which will be considered through the process include: risks from anthropogenic pressures, and feature sensitivity. We will also investigate the feasibility of including more frequent but less intensive monitoring of some features within our programme to improve our understanding of temporal change.

Delivering in Partnership

Over the last four years Natural England has made significant steps towards delivering an expanded MPA monitoring programme in partnership with other monitoring organisations, particularly those within the umbrella of the UK Marine Monitoring & Assessment Strategy. This has been assisted by the development of our risk-based monitoring programme which predicts what monitoring will need to take place in future years, thereby enabling the alignment of our programme with those of other organisations.

Our partnership arrangements include enabling surveys to be planned and delivered in partnership with those who either share an interest in obtaining similar data or at similar locations. We do this by making use of shared platforms such as survey vessels; by designing surveys to deliver against several drivers; and utilising existing government vessels and expertise.

Outside of these strategic partnerships Natural England has increased its capability and capacity to undertake monitoring and survey work through several key initiatives including:

- Brigading staff responsible for monitoring and survey work into a single marine monitoring team and recruiting additional staff with applied knowledge of survey techniques.
- Re-invigorating natural England's dive team and ensuring that more staff can take part in boat based survey work, thereby making efficiencies in costs and improving staff skills and expertise.
- Establishing a framework contract which provides external expertise to undertake a range of biological monitoring and survey techniques.

These actions increase our own internal monitoring capability and thereby extend what we can contribute to working with others.

Specific arrangements that we have put in place to deliver more efficient data collection with other Defra 'arms length bodies' and others include:

- **Environment Agency**: Memorandum of Agreement on sharing monitoring information, providing Natural England Access to EA survey vessels, and securing an EA marine monitoring specialist seconded to Natural England to rationalise monitoring techniques. This is estimated to have saved NE approximately £80K annually.
- **Cefas**: Memorandum of Understanding enabling Natural England to make use of the Cefas Research Vessel Endeavour at reduced rates, as well as expertise of Cefas scientists especially in relation to baseline surveys of new SACs and data analysis and interpretation. This arrangement also enables Cefas to make more efficient use of their research vessel e.g. obtaining benthic ecological data at night during other surveys.

- **JNCC**: As well as contributing to the JNCC led Marine Biodiversity Monitoring Programme, we have undertaken joint surveys of new MPAs that cross the 12nm boundary.
- **Bathymetric survey**: Memorandum of Understanding promoting data exchange and survey collaboration between Natural England, MCA, Defra, JNCC, Cefas, BGS and UKHO;
- **Maritime & Coastguard Agency (MCA)**: In addition to the MoU above, a Memorandum of Agreement allowing Natural England to access MCA multibeam survey capability. The programme is quality assured by UK Hydrographic Office. This arrangement has facilitated extensive joint survey in areas where both Natural England and MCA have a current interest e.g. Lyme Bay cSAC.
- **Inshore Fisheries & Conservation Authorities (IFCAs)**: Natural England is strengthening existing partnerships and developing new ones, including a Memorandum of Agreement with Cornwall IFCA. Over the last two years Natural England has instigated a number of joint surveys with IFCAs utilising their local expertise and vessels to assess MPA areas within IFCA jurisdiction. Several of these surveys have also included Cefas scientists as part of wider partnership arrangements.
- **Marine Biological Association (MBA)**: Natural England supports the ongoing work of the MarClim programme hosted by the MBA, this programme focuses on rocky shore species as indicators of climate change.
- **Defra; JNCC; EA and Cefas**: In the Spring of 2012 Natural England undertook work as part of a wider partnership to undertake a significant amount of survey work to increase the evidence base for designating Marine Conservation Zones. This included survey work from Cefas and EA vessels using a range of survey techniques.

Case studies: baseline survey information for new SACs

Over the last four years a significant amount of work has been undertaken by Natural England to obtain baseline data relating to the extent and condition of features of marine SACs. Here we set out two case studies describing how this work has been undertaken in two very different sites:

Case study 1 - Obtaining Baseline Data for a new Special Area of Conservation: The example of the Lyme Bay to Torbay cSAC

Introduction

The Lyme Bay and Torbay candidate SAC (cSAC) lies off the south coast of England off the counties of Dorset and Devon. The site comprises two main areas containing Annex I 'reef' and 'sea cave' habitat. The areas are described as (from east to west):

- Lyme Bay Reefs; and
- Mackerel Cove to Dartmouth Reefs.

Figure 23 below illustrates the two separate regions of the cSAC

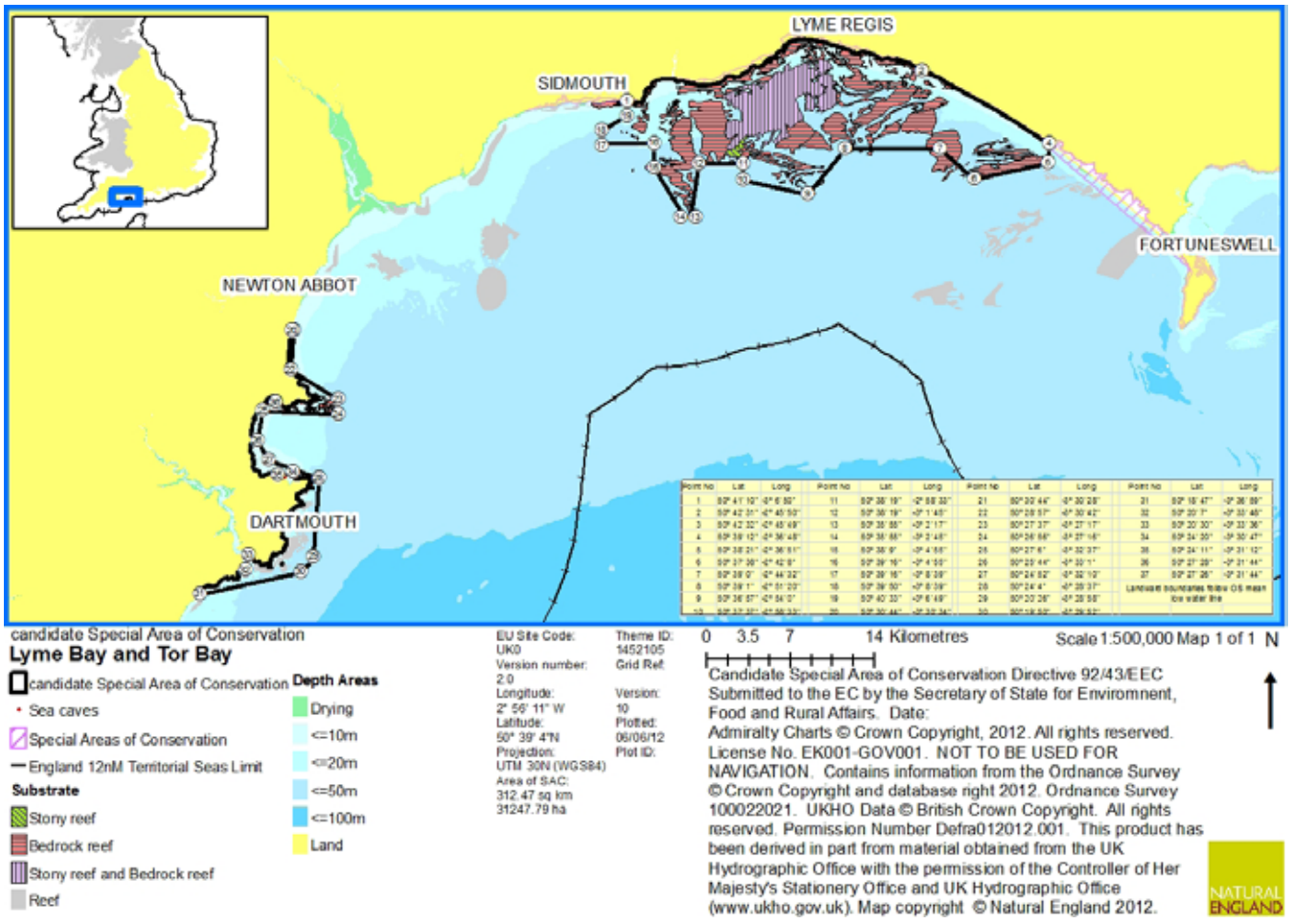


Figure 23: Map illustrating the site boundary for the Lyme Bay to Torbay candidate SAC. Both sections of the cSAC can be seen.

Reefs

Lyme Bay Reefs

The seabed in the Lyme Bay Reefs area comprises Bedrock reef - including igneous, chalk, mudstone and limestone examples); and Stony reef - pebbles, cobbles and boulders.

Mackerel Cove to Dartmouth Reefs

Geologically diverse reefs of slate, granite and sandstone, and biogenic Mytilus edulis reefs.

Sea Caves

Sea caves have been identified within Torbay area occurring in several different rock types from above the high water mark down to permanently flooded caves lying in the infralittoral zone[10, 11].

Pressures and threats to the site

Fishing activity has traditionally occurred widely across the site, particularly on the Lyme Bay reef site. In the last decade or so, fishing intensity has reportedly increased, specifically for potting and scallop dredging. Consequently for a number of years assessment and surveys have been conducted and collated in response to concerns about impacts on reef structure and biota, both by Natural England and wildlife conservation organisations[12].

Features of conservation interest:

Evidence collected from dive surveys, particularly Seasearch divers, and drop down video shows that the reefs support a wide variety of key species (such as hydroids, algae, sponges and corals). This includes a number of nationally important species such as the pink sea fan (Eunicella verrucosa) and the sunset cup coral (Leptopsammia pruvoti). A study undertaken by Hiscock & Breckels[13] found Lyme Bay to have particularly high species richness and identified it as a marine biodiversity "hot spot".

The different geology of the reefs creates a range of different habitats which adds to the site's diversity.

Evidence and monitoring for Lyme Bay protection

In response to concerns about increased fishing pressure, voluntary measures to stop scalloping in the area were introduced in 2006. A survey funded by Defra and NERC and conducted by Bangor University, assessed the recovery of the Lyme Bay reefs a year after the voluntary closure was introduced, using acoustic multibeam and drop down video surveys[14].

---

[10] Proctor C J, 2009. The Coastal Caves of Torbay. Report to Torbay Coast and Countryside Trust and Natural England. Volumes I and II.

[11] Natural England, 2010. Lyme Bay and Torbay SAC Selection Assessment Document, V2.5. Available at http://www.naturalengland.org.uk/Images/LBT-sad_tcm6-21650.pdf Accessed 21/08/2012

[12] Devon Wildlife Trust (DWT). 2007. Lyme Bay Reefs: A 16 year search for sustainability. Devon Wildlife Trust, available at http://www.devonwildlifetrust.org/i/DWT-LBR-report2.pdf. Accessed 21/08/2012

[13] Hiscock K, Breckels M, 2007. Marine Biodiversity Hotspots in the UK. A report identifying and protecting areas for marine biodiversity. WWF 200.

[14] Hiddink J, Kaiser M, Hinz H & Ridgeway A, 2007. Quantification of epibenthic fauna in areas subjected to different regimes of scallop dredging activity in Lyme Bay, Devon. School of Ocean Sciences, College of Natural Sciences, Bangor University.

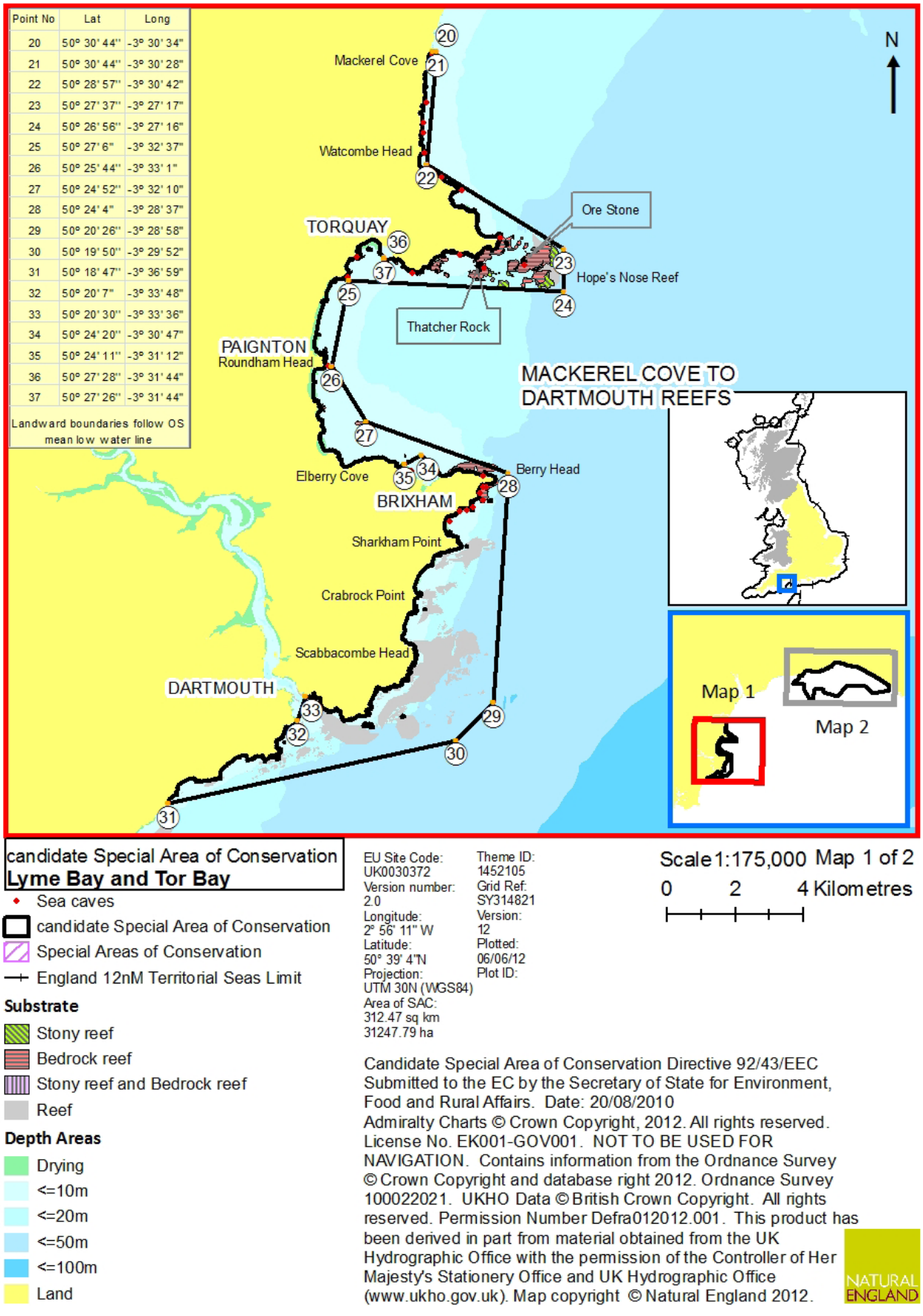
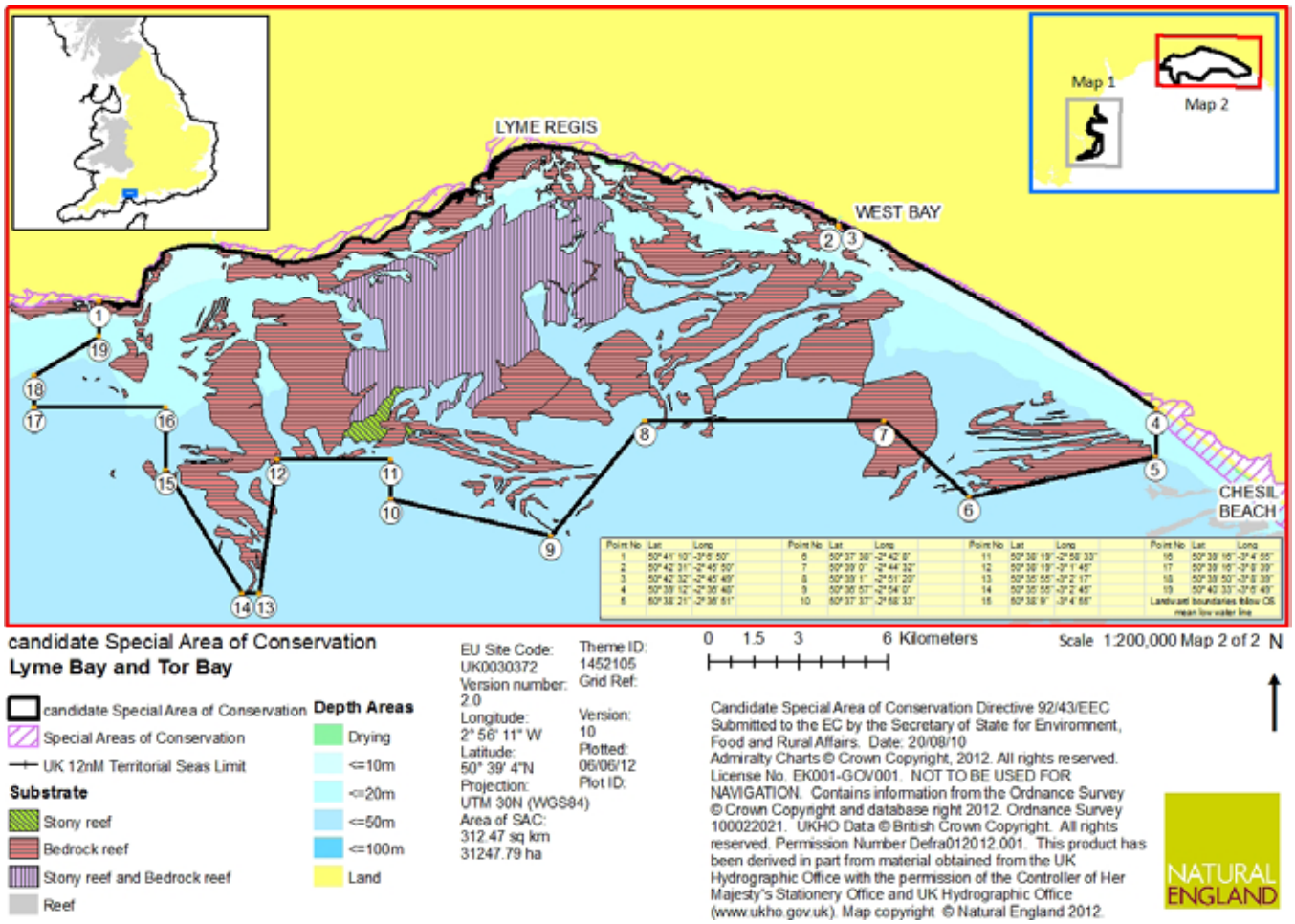


Figure 24: Map 1 of the Lyme Bay and Torbay cSAC, illustrating the reef habitats found within cSAC.

Figure 25: Map 2 of the Lyme Bay and Torbay cSAC, showing the reef habitats within the cSAC.



A larger area of reef was closed in 2008, and several pieces of additional research were commissioned to provide relevant authorities with the evidence necessary to introduce appropriate management measures that would conserve the features at risk and significantly, to support the designation of the site as a candidate marine Special Area for Conservation:

- Annual assessments of the recovery of the reef in the closed area through a Defra funded agreement (MB101) with the University of Plymouth from 2008-2010. The study focuses on recovery of sensitive, reef species, as indicators, which are often long-lived with low fecundity. Natural England has taken over the funding of this study in the last two years and we hope to continue the study so that we can fully understand what reef recovery "looks like" and how long it takes.

- Additional bathymetric surveys, commissioned in 2010 for a substantial area of Lyme Bay and again in 2011 specifically for reefs in the new proposed SAC, in partnership between MCA and Natural England. The key purpose of these surveys was to collect high quality multibeam acoustic data for an overarching baseline for the extent of rocky reef in the area of the bay proposed as an SAC. The quality of the data collected was very good and images for both bathymetry and backscatter were available at 1m resolution.

- Additional towed video surveys carried out by University of Plymouth, under contract to Natural England, in 2010 have provided baseline species and community data for Torbay.

- Interpretation of multibeam data from 2010 and 2011 was carried out as a partnership between Natural England and Cefas in 2011 resulting in a good quality, detailed map displaying confidences in the extent and presence of Annex 1 reef habitat in the proposed SAC. A biotope map based on the multibeam acoustic data (with additional point data from biological sample databases), distinguished, where possible, between exposed bedrock, stony reef and biogenic reef. Natural England are now working closely with the Devon and Severn IFCA to add greater confidence to areas of stony reef by carrying out further towed video surveys and refining feature boundaries.

The diversity and quality of the physical and biological data for Lyme Bay, produced initially in an ad-hoc way and more recently in a more targeted way, have ensured that the quality of the reef habitat in Lyme Bay and Torbay has been recognised and mapped. Work is continuing to assess the recovery of the closed area,. This work is also important due to the fact it is unique in terms of ongoing studies into recovery of rocky reef and associated sediments in temperate waters. Benefits beyond the direct protection of the reefs in Lyme Bay have been acquired through the survey processes described here. The collaboration and integration of the techniques have been successful and will provide a template for similar surveys which may inform survey design and management in other marine SACs with complex reef habitats.

Case study 2 - Obtaining Baseline Data for a new Special Area of Conservation: Haisborough, Hammond and Winterton candidate SAC

The Haisborough, Hammond and Winterton (HHW) candidate Special Area of Conservation (cSAC) lies off the north east coast of Norfolk (see Figure 26). The site crosses the 12 nautical mile boundary of inshore and offshore waters. It forms part of a wider complex of sandbank habitat, together with another SAC - Inner Dowsing, Race Bank and North Ridge cSAC. Both these sites have been accepted by the European Commission as candidate SACs (prior to formal designation as SACs by UK Government).

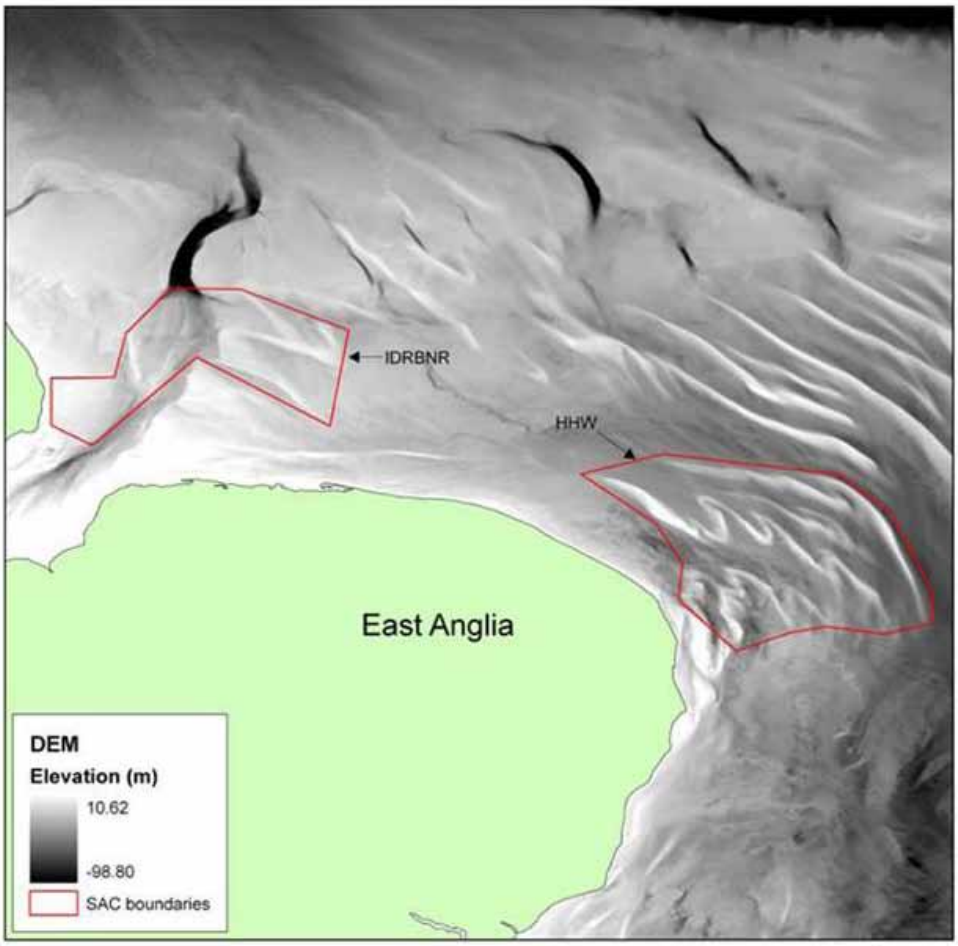


Figure 26: Map to show location of Haisborough, Hammond and Winterton candidate SAC (and also Inner Dowsing, Race Bank and North Ridge candidate SAC off the coast of East Anglia.

Source of Map: Cefas Report (C5432/C5441) (Whomersley et al, 2012)

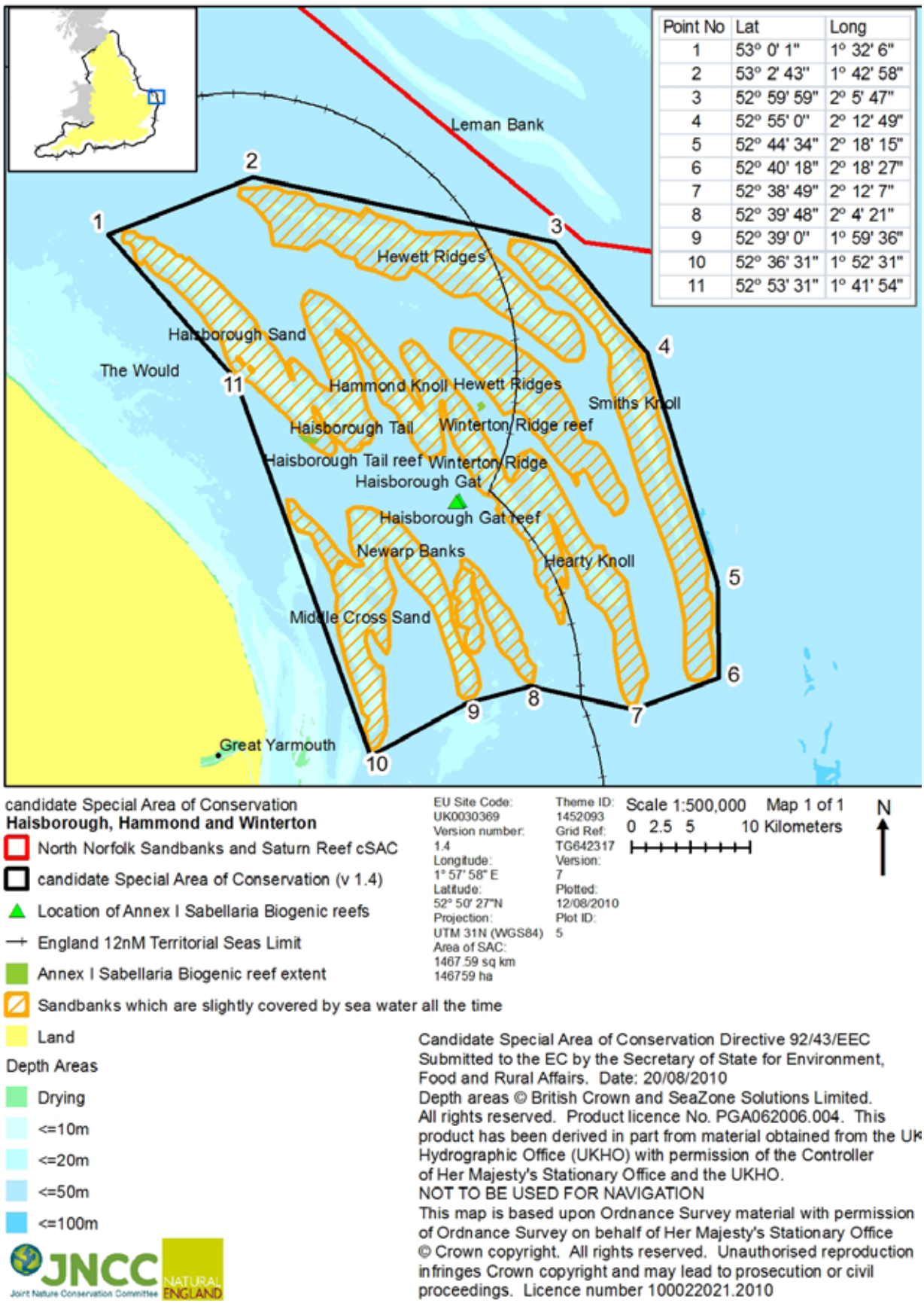


Figure 27: Overall Site Map of Haisborough, Hammond and Winterton SAC.

As the cSAC spans the 12 nautical mile inshore-offshore boundary the initial survey of the area was undertaken in partnership between different agencies - Natural England, the Joint Nature Conservation Committee (JNCC), Cefas, who provided the research vessel (RV Cefas Endeavour) as well as operational expertise.

Haisborough, Hammond and Winterton cSAC is designated for subtidal sandbanks (see Figure 28) and biogenic reefs, including Sabellaria spinulosa reef, built by the tube building Ross worm (see Figure 29). These habitats form a mosaic of different physical habitats within the site with correspondingly different biological communities occurring, for example on sandy bank tops, on the bank sides and towards the troughs. Towards the troughs where there is less water movement and sediments are more stable, S. spinulosa occurs (JNCC and Natural England, 2010). These aggregations of S. spinulosa form reefs which in turn allow the development of epifaunal communities, which are rich in species, (see Figure 29).

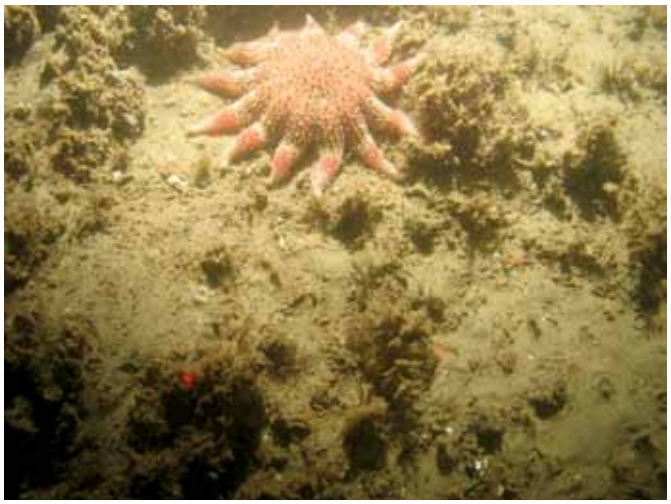


Figure 28: Subtidal Sandbanks with Sabellaria spinulosa, and Edible Crabs (*Cancer pagurus*)

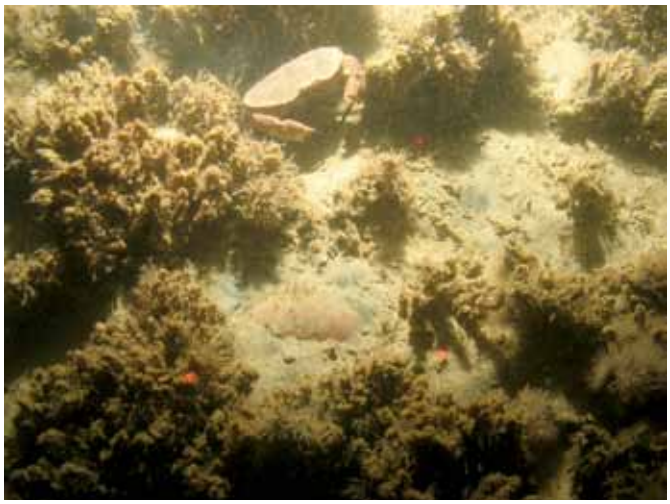


Figure 29: Subtidal Sandbanks with Sabellaria spinulosa, Common Sun Star (*Crossaster papposus*) and Brittlestars (*Ophiura ophiura*)

Before the site could be recommended by UK to Europe as a candidate SAC, it was necessary to identify and characterise the habitats present. An initial appraisal of the occurrence of Annex I sandbank habitat and Sabellaria spinulosa reef was completed, with data drawn from a range of sources including consultants, windfarm and aggregate surveys, dedicated survey and modelling with digitisation funded by the Marine Aggregate Levy Sustainability Fund. Two important datasets on the distribution of Sabellaria spinulosa reef were received; one from the Marine Aggregate Levy Sustainability Fund's East Coast Regional Environmental Characterisation survey and the other from the Baird gas storage & pipeline environmental characterisation.

Figure 30 shows the locations for the surveys undertaken by partners and others.

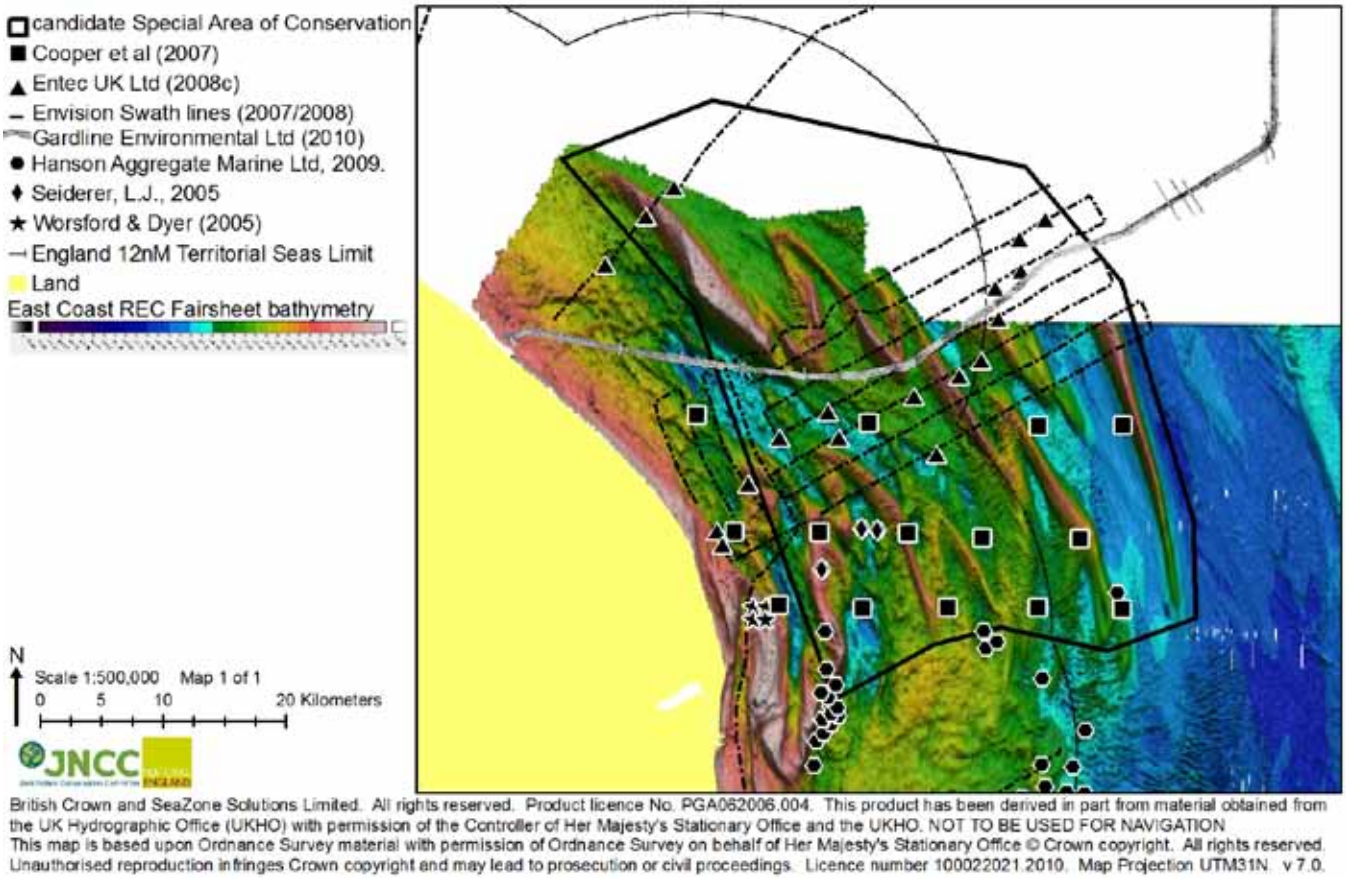


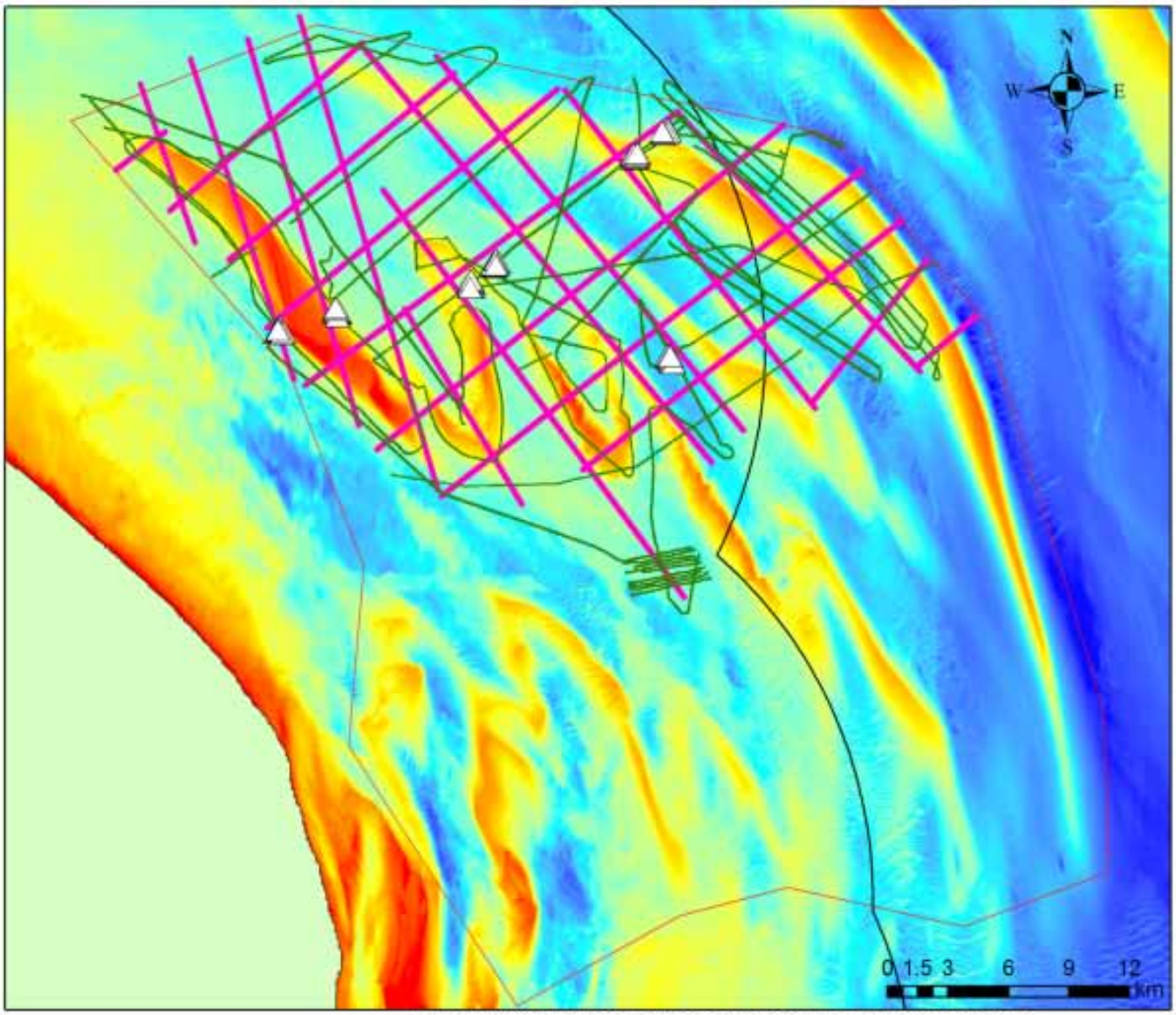
Figure 30: The distribution of survey sample sites at Haisborough, Hammond and Winterton candidate SAC for the surveys undertaken by partners and consultants

The survey work to obtain baseline data was undertaken by the JNCC, Natural England, and Cefas working in partnership. Initial field surveys obtained data on the extent and morphology of sand banks and the biogenic reef, as well as the composition of the communities present within the site. A range of marine survey techniques were used including the collection of acoustic data in the form of high resolution multibeam bathymetry, sidescan sonar and high resolution swathe bathymetry, and underwater video and still photography.

Ross's tubeworm *Sabellaria spinulosa* is distributed across the site and three *Sabellaria spinulosa* reefs have been identified. High resolution acoustic data ground-truthed with drop-down video and still photography was used to survey *Sabellaria spinulosa*. The video transects were reviewed and cross-referenced with known locations of reef. Assessments of tube height, aggregations, patchiness (percentage cover), extent and associated fauna were recorded and the observations were tested using pre-existing reef assessment[15].

An additional acoustic survey was later commissioned to complete the original survey design using the Environment Agency's (EA) research vessel, the *Humber Guardian*, to acquire data from the sections of the sand bank complex that were shallower than 15 m and inaccessible to RV *Cefas Endeavour*. The acoustic survey lines are shown in Figure 31.

[15] Joint Nature Conservation Committee and Natural England (JNCC and Natural England),(2010) Haisborough, Hammond and Winterton SAC Selection Assessment: Version 6.0 http://www.naturalengland.org.uk/Images/HHW-sad_tcm6-21630.pdf



Key

DEM

Elevation (m)

7.13

-58.72

Planned acoustic survey lines

Executed acoustic survey lines

Ground-truthing sample stations

cSAC Boundary

12 nm territorial limit

Figure 31: Planned and executed acoustic survey lines within the HHW cSAC boundary. Black line delineates the 12 nautical mile limit (source: Whomersley et al, 2012).

High resolution multibeam bathymetry and backscatter data was collected by Cefas, and also underwater video footage and still photographs for ground-truthing. The seabed was directly observed via a live feed from the camera to the deck of the survey vessel.

Ground-truthing was carried out using grab-sampling surveys to investigate biological communities on different parts of the sandbanks, with statistical analysis being carried out by Cefas. Although the final results of these surveys are yet to be reported preliminary observations of the infaunal data available to date indicates that Sabellaria spinulosa and juvenile mussels Mytilus edulis were the most abundant species encountered, numbering almost 10,000 and 6,000 individuals respectively. They, in conjunction with the annelids Lumbrineris gracilis, Polycirrus, Lanice conchilega, juvenile brittlestars Ophiuridae and Nemerteans, were the most frequently encountered taxa. Ground-truthing also investigated the unusual bed-forms in the east of the site. The remaining ground truthing effort was focussed on known Sabellaria reef in the two areas[16].

Additional data obtained by Cefas will assist with providing a more comprehensive baseline data set, and provide the basis for future monitoring work at the site in terms of both the habitats and biological communities present, which will be used to inform future management of the area.

[16] Whomersley, P, Barrio Froján,C, Alex Callaway, A, David Stephens, D and Vanstaen, K (2012) Baseline Survey of Inner Dowsing, Race Bank and North Ridge cSAC, and of Haisborough, Hammond and Winterton cSAC Cefas Report (C5432/C5441) (final interim version).

9 Standards for On-site Access and Engagement Monitoring

Introduction

Natural England delivers a broad programme of Access and Engagement projects focused in particular on local delivery and working closely with partners and local communities. Our ongoing statutory responsibilities include the development and implementation of Coastal Access, Open Access and National Trails. We also have a key role supporting public engagement and education using National Nature Reserves (NNRs).

It is important that we are able to monitor the impacts of our Access and Engagement programme, both to identify any impacts on other parts of our business such as conservation of biodiversity, and to obtain feedback that helps us deliver our responsibilities more effectively and efficiently.

Benefits, opportunities and impacts

Access to the natural environment through outdoor recreation can deliver a range of economic, social and environmental benefits and opportunities. These can include:

- economic leisure spend;
- support for domestic tourism;
- local regeneration;
- increased physical health and fitness;
- increased happiness and well-being;
- greater environmental appreciation;
- spiritual refreshment, quiet enjoyment, reflection, recreation and aesthetic experiences; and
- personal development.

We want to help increase opportunities for outdoor sports and recreation while enhancing the enjoyment, appreciation and protection of the sensitive environments in which they take place.

If managed well, access to the natural environment should result in better stewardship of the natural environment and should ensure that opportunities to experience and enjoy England's many natural assets are conserved and enhanced for present and future generations.

Recreation and leisure activities, if not managed properly, can result either directly or indirectly in a number of adverse impacts on the natural environment. Trampling and erosion of habitats, loss of vegetation, loss of tranquillity, disturbance to bird populations.

Positive access management is key to realising benefits and preventing or minimising any adverse impacts.

Evidence

Much of the strategic evidence required for monitoring access to the natural environment is delivered by the Monitoring of Engagement with the Natural Environment (MENE) survey, initiated in 2009 (see page 20). MENE provides a standard platform for gathering social evidence about visits to, and appreciation of, the natural environment at a national scale. However, MENE does not provide an adequate framework for monitoring impacts on individual sites, which would be needed to evaluate the wider impacts of access provision.

In response, the Standards for On-site Access and Engagement Monitoring project was established in 2011 to develop consistent methodologies and standards that could be used for site-based monitoring in various contexts.

Project objectives

The project set out to develop and test standard on-site visitor monitoring approaches with different levels of monitoring intensity (frequency and level of direct engagement with the public). Methods needed to be suitable for evaluating the access and engagement impacts of a range of Natural England delivery activities:

- Engagement through National Nature Reserves (NNRs);
- Provision of Open Access ;
- Provision of Coastal Access;
- Permissive Access delivered through Higher Level Stewardship (HLS); and
- Management of National Trails

The approaches developed needed to be flexible and adaptable to meet the needs of a wide range of schemes, projects and organisations and to enable long-term changes in how people access and engage with the natural environment to be monitored at the site level.

Development

The project has developed a two-tier approach, enabling the level of assessment to be tailored to local situation depending on the type of information and level of detail required. Rapid Access Assessments are designed to gather simple information in a single visit whilst the On-site Visitor Monitoring Toolkit methods involve collection of more substantive information from a minimum of 3 visits, capturing representative data on visitor activity and behaviour across a site (often involving direct interaction with visitors).

The project is currently at the pilot stage to test the newly adapted methods and guidance that have been developed in 2011. It is planned to carry out the pilot on an NNR in 2012 that has a range of access provision and designations to understand the effectiveness of the methods on the ground in meeting the needs of a range of schemes and gain feedback to inform resourcing of full scale delivery in the future.

Rapid Access Assessment

The Rapid method assesses the recreational impacts of access provision on specific designated sites, effectiveness of access provision and adherence to quality maintenance standards. The approach is designed to be compatible with Natural England's Integrated Site Assessment (ISA) programme, involving structured collection of basic information, for example recording standard attributes on a structured walk; this could be a linear or area-based assessment. The attributes to be recorded can be tailored depending on the type of access and guidance is available to help recorders through the process.

Rapid assessments would be suitable for assessing issues such as:

- Sites of Special Scientific Interest (SSSIs) and National Nature Reserves (Recreational impacts)
- HLS (Recreational impacts and effectiveness of provision)
- Open Access (Recreational impacts)
- Coastal Access (Recreational impacts & Quality Maintenance Standards)
- National Trails (Recreational impacts & Quality Maintenance Standards)

On-site Visitor Monitoring Toolkit

The Toolkit methodologies involve the use of robust social research techniques used previously and tested thoroughly on Open Access Land between 2006 and 2008[17].These techniques have been adapted for wider use. The Toolkit consists of a combination of intensive standard interview and observation survey methods that can be applied flexibly to a range of sites and schemes through collection of the following information:

- **Observation**: Levels and patterns of on-site activity through observation of the behaviour of visitors across a site to understand recreational impacts.

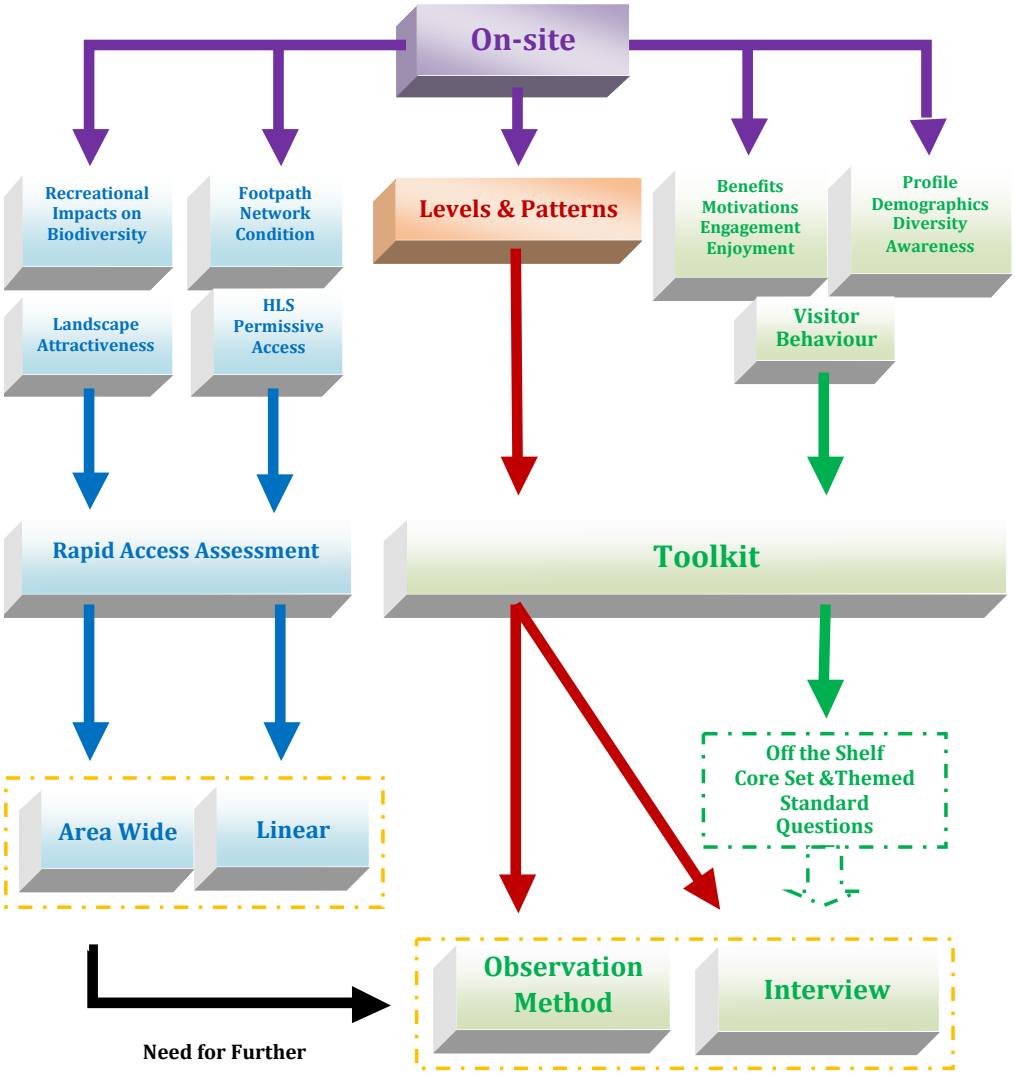
- **Interview**: Questionnaire designed to gather information on;
  - Group size, entry points and routes walked across a site;
  - Who is visiting, why they are visiting (motivations), where they are from and what activities they have undertaken?;
  - Understanding of scheme awareness, effectiveness and uptake;
  - The benefits of accessing and engaging with the natural environment to people and Biodiversity;
  - Visitor attitudes e.g. understanding the need to protect the natural environment.

The interview methodology is flexible. A standard set of core questions relevant to all schemes can be augmented by questions appropriate to specific themes. Questions are consistent with MENE ensuring compatibility between our approaches to off-site and on-site survey allowing MENE to provide contextual information to on-site findings.

Using standard observation and interview approaches ensures site data can be aggregated to evaluate impacts at various levels, for example all sites in a scheme, between schemes and sites, in a statistically robust way. This will maximise how the approaches complement each other, as each approach provides robust information that can underpin evaluation of data from the other.

[17] Johnson, C., Taylor, K., Houldin, C., Race, H. & Birtles, J. 2009. Countryside and Rights of Way (CROW) Act 2000 (Part 1): National Open Access Visitor Survey (2006-2008) - Executive Summary, AECOM and ASKen. Natural England Commissioned Report, Number, NECR036a.

Figure 32: Levels of On-site Access Monitoring



Guidance is available on all parts of the process including:

- How to undertake observation and interview surveys;
- How to select a set of themed 'off the shelf questions' to be combined with core questions to produce a tailored questionnaire;
- Developing a sampling approach;
- Carrying out a site evaluation to plan the survey;
- The number of survey days required and timing;
- Staffing of local monitoring activity and equipment required;
- Mitigate health and safety risks; and
- Gaining land owner permission.

The Toolkit would be suitable for assessing issues such as:

- Open and Coastal Access (recreational impacts, scheme uptake and awareness, health and well being benefits).
- National Trails (recreational impacts, scheme uptake and awareness, health and well being benefits).
- National Nature Reserves (recreational impacts, understanding effectiveness of visitor engagement and benefits to biodiversity and people).

Developing On-site Access Monitoring within the Integrated Monitoring Programme

Using this standardised approach, assessments can be incorporated within delivery of other elements of Natural England's Integrated Monitoring Programme. Opportunities include:

- Monitoring recreational impacts on statutory wildlife sites by observing signs of potential recreational disturbance;
- Adherence/compliance by the public to statutory Open and Coastal Access restrictions under the CROW Act;
- Establishing the effectiveness of NNR Access Management Plans;
- Assessing the effectiveness of HLS permissive access options;
- Implementing quality maintenance standards for National Trails and Coastal Access.

The Toolkit may be used for opportunities to gather visitor data and used in conjunction with a range of other Integrated Monitoring projects, including:

- Habitat and species surveillance;
- Thematic agri-environment monitoring;
- Protected area monitoring; and
- Long Term Monitoring Network (LTMN).

Changes in recreation can have impacts at site level or at a larger scale on specific species and habitats that are sensitive to access. The methods described here have the ability to monitor changes in levels and patterns of visitor use that can provide trend data over time which can be compared across sites and analysed against other datasets.

The **Area Wide Access Rapid Assessment** would record the following variables:

- Presence of visitors
- Presence of walkers with dogs and control level
- Level of visitor use (score at end of visit)
- Disturbance signs or event
- Presence of bare ground due to access effecting feature
- Evidence of trampling from access
- General public's level of adherence to Open Access restrictions
- Walkers with dogs level of adherence to Open Access and Coastal Access restrictions
- Level of recreational landscape feature attractiveness
- Evidence of misuse
- Evidence of vandalism or graffiti
- Public safety issues
- Presence of manmade strandline debris (litter)

This method can be combined with an ISA habitat assessment on a SSSI and/or HLS site.

The **On-site Visitor Monitoring Toolkit (Toolkit)** sets out a standard methodology for recording both observations of visitor activity across a site, and interviews with visitors present at a site and has been adapted from the Open Access Toolkit (see Open Access Review[18]). The new standard methods are designed to inform wider outcomes and scheme evaluation objectives rather than focused on individual schemes. The toolkit will provide us with information on:

- Integrated access management planning in relation to the effectiveness of statutory and discretionary restrictions on Open and Coastal Access Land and the effectiveness of access management on NNR sites.
- Whether people are inspired to value and conserve the important natural environments and habitats they are visiting.
- The benefits people gained from enjoying and accessing the natural environment in terms of health and well being.
- The awareness of the public to new access schemes in particular Coastal Access.
- Visitor profiles.
- Walkers with dogs on sensitive designated sites
- The impact and change of use from scheme implementation i.e. Open and Coastal Access
- The impact of visitor centres and promotional activity.
- A comparison of local activity with national findings.

[18] Taylor, K, Race, H, Little, S, Johnson, C and Anderson, P. (2010). Long-term Integrated Monitoring of Open Access Land, AECOM, AsKen and Penny Anderson Associates. Natural England, 2011.

10 Monitoring the Outcomes of Environmental Stewardship

Introduction

Environmental Stewardship (ES) has been the main Agri-Environment Scheme in England since 2005, and is a key element of the Rural Development Programme for England (RDPE). It is delivered through a series of component strands, comprising Higher Level Stewardship (HLS), Entry Level Stewardship (ELS), Organic Entry Level Stewardship (OELS) and Upland Entry Level Stewardship (UELS). These strands are designed to offer land managers a flexible and integrated framework that allows them to deliver the level of environmental management that is most appropriate for their farm business.

As part of RDPE, Defra is committed to reporting on ES via the Common Monitoring and Evaluation Framework (CMEF), a Europe-wide model for assessing outcomes. However, with its wide-ranging environmental objectives of conservation of wildlife, landscapes and the historic environment, protection of natural resources and provision of access, ES is also expected to make a substantial contribution to the domestic policy agenda, as set out in the Natural Environment White Paper (NEWP).

Natural England has worked with Defra to develop an ES Evidence Plan that provides the supporting evidence for reporting on RDPE and on the contribution made by ES to key domestic policy drivers, including Biodiversity 2020, Water Framework Directive and other NEWP commitments. Natural England leads on commissioning and management of the monitoring element of the ES Evidence Plan.

This section describes some of the monitoring activities undertaken under the ES Evidence Plan to generate evidence for the effectiveness of ES and its component parts. The complexity of ES, and the range of monitoring requirements set out in the CMEF, means that a range of projects focused on different objectives and target features, and at different scales, are needed to provide the comprehensive evidence-base required.

10a Agreement-scale monitoring of HLS

The ES Evidence Plan has identified the need for evidence of scheme outcomes to be generated at various scales, including landscape, management agreement and management option or environmental feature. Agreement and option level monitoring are of particular importance for reporting on CMEF indicators. As a result, in 2009, Natural England initiated a 3-year partnership project with the Centre for Ecology and Hydrology (CEH) to establish a baseline for monitoring the effectiveness of HLS Agreements.

Background

ES is a multi-objective scheme and, although management actions are targeted at specific features, most agreements address a range of features, as prioritised in local targeting strategies. It is only by looking at agreements in an holistic way, which considers the impacts of all management, that a judgement can be made about whether the schemes are delivering integrated benefits and maximising additionality and value for money.

Agreement Monitoring Project

Between 2009 and 2011 CEH undertook comprehensive baseline surveys of 180 HLS agreements. The sample was drawn from throughout England and was stratified to ensure adequate representation of key HLS option groups, addressing grasslands, arable and upland features. In each agreement a walkover survey was undertaken to map key habitats and other features; and their condition was assessed through structured data collection, typically using small quadrats. As the agreements sampled were new HLS agreements, the environmental data collection was primarily focused on providing a rigorous baseline that could be resurveyed at a later stage of the agreement, thereby enabling a quantitative evaluation of outcomes.

As the value of the baseline data collected in the field was primarily to enable actual outcomes to be assessed in the future, a desk-appraisal process was developed to provide a proxy assessment of the potential of each agreement to deliver the outcomes envisaged. The findings of the survey for each agreement were summarised and evaluated by an expert panel against a range of criteria including:

- Fit with the targeting framework
- Use of the management options
- Use of the management prescriptions
- Use of the indicators of success
- Use of capital works
- Option level outcomes
- Agreement level effectiveness

Clearly, these assessments of potential outcomes, which were carried out by an expert panel, assume that appropriate features will be managed and that the management options will be applied correctly by the land manager. They do not take into account factors such as non-compliance, sub-optimal management or any external factors (e.g. weather) that might have an impact upon the delivery of outcomes. Nevertheless, they do provide a measure of the quality of the agreement-building process and an indication of potential outcomes.

Results

Some indicative outcomes from the panel analysis are presented here, and full detail will be provided in the forthcoming Research Report.

To measure the effectiveness of agreement targeting, the panel was asked to assess each agreement in terms of its contribution to the priorities set out in the relevant target area or regional theme statement (Figure 33). 82% of the agreements were judged to have scored at least 3, meaning that the panel felt that the agreements made some contribution to the stated priorities, with the additional management justified, offering reasonable value for money and with few missed opportunities identified. For the remaining 18%, a score of 2 was allocated, meaning that the panel felt that although there was still some contribution to local priorities, the management was dominated by poorly justified approaches offering questionable benefit and with some opportunities missed.

The panel looked at the way management options had been applied to features. Here, in about 55% of agreements, it was felt that there were no major discrepancies between the features present and the options applied (a score of at least 3). However, in 45% of agreements the panel felt that there was at least one mismatch that could reduce the potential of the agreement to deliver all its desired outcomes. There were several possible reasons for this, the most likely of which was placing a feature in need of restoration into a maintenance option.

Prescriptions and Indicators of Success can, to some extent, be tailored by advisers to meet the objectives they are setting for the features present. These were assessed by the panel at the option scale, identifying significant differences between options in its assessment of the effectiveness of prescription and indicator framework (Figure 34). For some options, especially arable ones, the panel found that generic prescription sets provided an adequate framework for management. For more complex features, such as upland features and fens, the panel found the generic set had potential weaknesses, and felt that prescriptions needed to be tailored more to individual features.

The panel identified relatively few instances where indicators provided a comprehensive framework for assessing success. Typically less than 20% scored the maximum for this criterion, whereas for around 40% the panel felt that the indicators provided an inadequate framework for assessing success. This is not to say that success would not be delivered, but typically the indicators had been inadequately tailored to the feature or features present on the site. In contrast to prescriptions, the panel felt that the indicator frameworks used on many arable options were particularly weak.

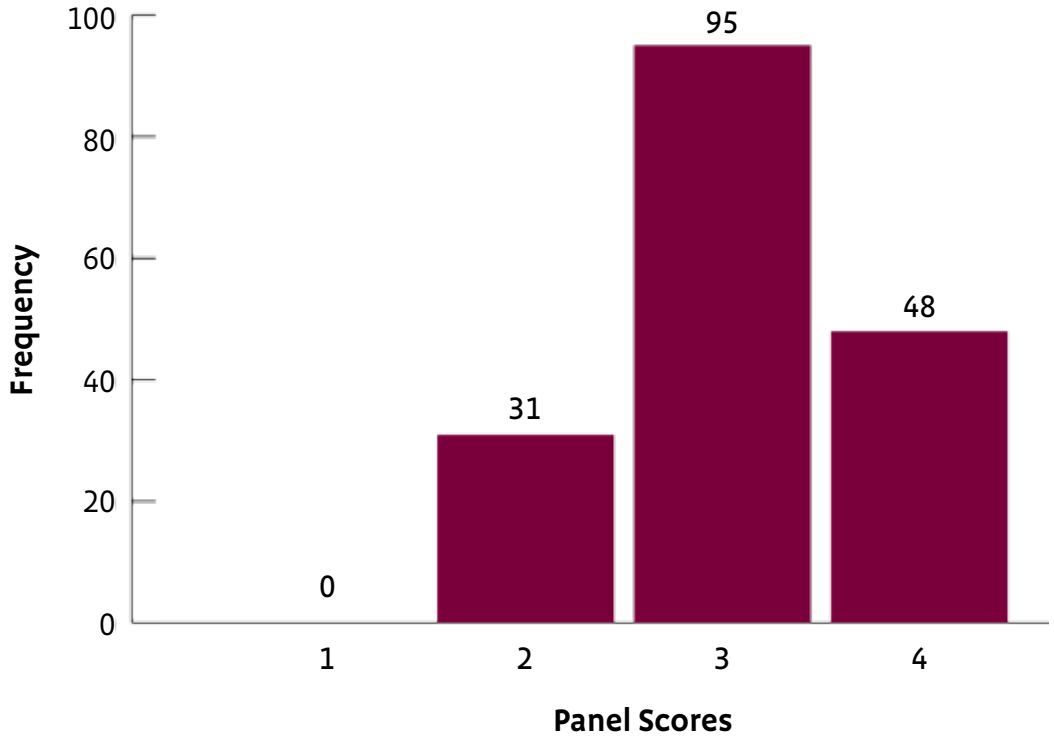


Figure 33: Appropriateness of Agreement Targeting. Summary of panel scores (1 to 4) for the 174 HLS agreements assessed as part of the baseline survey

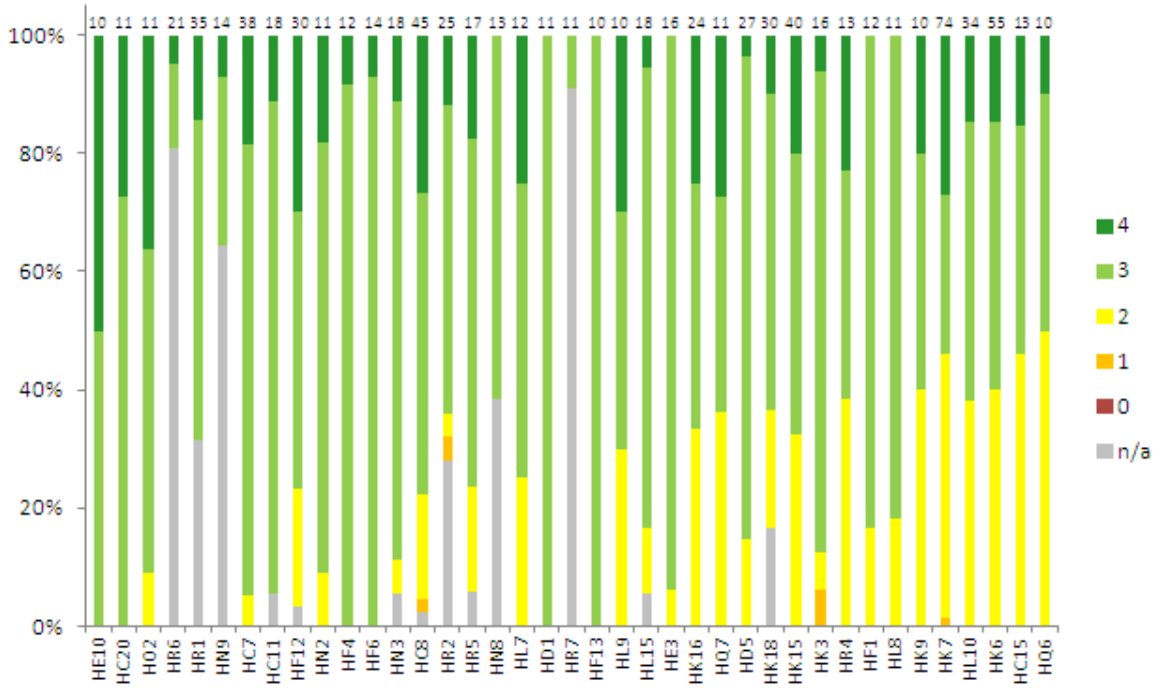


Figure 34: Prescriptions. Summary of panel scores (1 to 4) for options assessed on 10 or more occasions during the baseline survey. The bars show the relative proportions (percentages) in each scoring category and numbers above the bars give the actual number of times the particular HLS option was assessed

In assessing option level outcomes, the panel used all their available knowledge to evaluate the likelihood of each option on each agreement meeting its desired outcomes. Of the 39 options evaluated, around 26 appeared likely to meet most of their desired outcomes. Those options where the panel found the highest level of doubt included establishment of species-rich wildflower margins, fen restoration and management, maintenance of species-rich grassland and restoration of moorland. In some cases, the reason for this was incorrect use of options; in other cases it reflected complex situations where management proposals were poorly documented.

Taking all the data, the panel came to a judgement about the overall 'quality' of each HLS agreement (Figure 35). It judged that 75% of agreements were at least 'likely to be effective in achieving most outcomes, albeit with some significant weaknesses'. A further 18% were judged only effective in some areas and the remaining 7% were felt to have serious weaknesses.

From early in the delivery of the 3-year project, feedback was used to inform land management development work, including the 'Making Environmental Stewardship More Effective' (MESME) project, and the development and delivery of Natural England work on HLS quality. Natural England has recently implemented a programme of 'aftercare' that is designed to facilitate more structured engagement with agreement holders, enabling problems to be identified and rectified at an early stage.

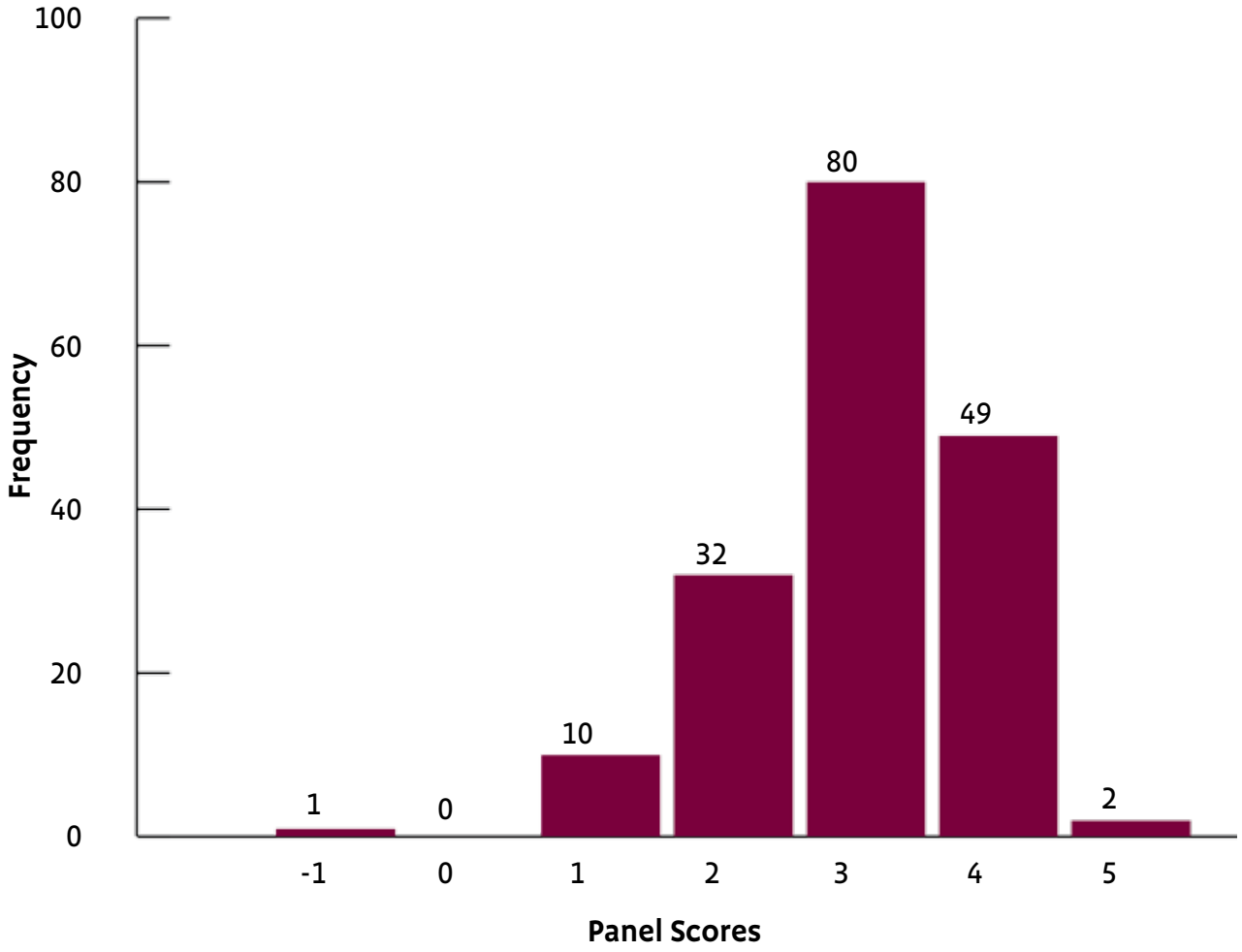


Figure 35: Agreement Level Outcomes. Summary of panel scores (-1 to +5) for the HLS agreements assessed as part of the baseline survey

Future Work

It is important that the panel process be recognised as a desk appraisal that uses a range of data from different sources to make judgements about the likelihood of outcomes being delivered. It is vital that these judgements are, in due course, validated through a quantitative assessment. This validation needs to take place at a point where there is a realistic chance of progress being measured: at least 5 years after the baseline survey.

Given the importance of HLS for delivering across a wide range of environmental agendas, and the need to report on outcomes to Europe, monitoring will remain a key element of scheme delivery. Findings from key projects such as the agreement monitoring project will be used to identify gaps or uncertainties in our evidence base with regard to effective strategies for management of specific options and features. These areas of uncertainty will be targeted for more rigorous research or monitoring effort, thereby feeding into further scheme development.

Most importantly, we will continue to integrate our ES monitoring effort with our wider integrated monitoring development, focusing in particular on developing links between monitoring scheme outcomes and our developing approaches to habitat and species surveillance.

10b Monitoring the impacts of Entry Level Stewardship

Background

When it was introduced in 2005, Entry Level Stewardship together with its organic counterpart Organic Entry Level Stewardship (hereafter ELS) were the first agri-environment schemes designed to provide environmental benefits across a high proportion of the farmed environment. It did this by encouraging mass uptake - offering all farmers the opportunity to participate by choosing simple environmental management options from a menu of options designed to support all scheme objectives. Given that delivery of a scheme on this scale was novel, it was of particular importance to develop an evidence base for the effectiveness of the management undertaken. In response, Natural England has developed a programme of monitoring of that will provide evidence on the effectiveness of the scheme across its environmental objectives and can respond to developments that affect the scheme as they occur.

A baseline assessment of ELS was undertaken during the initial 18 months of the scheme[19]. This monitoring focused on:

- Analysing patterns of uptake in relation to a range of spatial and farm economic factors;
- Exploring attitudes to the scheme of participants and non-participants via postal questionnaires and on-farm interviews;
- Undertaking baseline field assessments of a sample of agreements, to evaluate the appropriateness and placement of the options selected by the agreement holder.

This baseline assessment highlighted various issues with the initial pattern of ELS uptake, notably that it was dominated by relatively few options and especially by management of field boundary features. Levels of uptake of in-field arable options were comparatively low. The need to enhance levels of uptake of in-field options was identified as a priority if the scheme was to deliver effective outcomes for biodiversity and in particular, farmland birds. The findings of the baseline assessment informed a Review of Progress of Environmental Stewardship that was completed in 2007; this has driven various enhancements to the scheme delivery framework.

A number of changes were made to the ELS scheme during its first 5 years, either as a result of the Review of Progress or otherwise. These include:

- The withdrawal of Management Plan options in 2007, meaning that points scored through Management Plans had to be replaced with other management.
- The establishment in 2009 of the Campaign For The Farmed Environment in response to the withdrawal of compulsory set-aside in 2008, which has encouraged uptake of a wider range of management within ELS.
- Increased emphasis within Natural England and partners on delivery of advice (for example catchment sensitive farming) to land managers, often tailored to maximising ELS outcomes.

[19] http://randd.defra.gov.uk/Default.aspx?Menu=Menu&Module=More&Location=None&ProjectID=13825&FromSearch=Y&Publisher=1&SearchText=MA01028&SortString=ProjectCode&SortOrder=Asc&Paging=10#Description

- The launch in 2010 of Uplands Entry Level Stewardship (UELS) as a new member of the ELS 'family' of schemes, providing a new framework for support to farming in Severely Disadvantaged Areas, based on provision of environmental goods.
- The launch in 2010 of an Enhanced Training and Information Programme (ETIP), providing focused environmental advice to ELS applicants, especially at renewal. A key objective is to encourage uptake of specific 'bundles' of options that address priorities identified for a given farm situation.

With the first tranche of agreements approaching potential renewal in 2010, the opportunity was taken to commission a further tranche of monitoring, to establish progress from the baseline and provide a platform for monitoring the impact of enhancements to the scheme. The priorities for monitoring were reviewed in Spring 2010 and identified as:

- An assessment of outcomes so far based on resurveys of agreements included in the baseline assessment in 2005; and
- The establishment of a new baseline for agreements being renewed into the latest (post ETIP) ELS delivery framework, to enable ongoing evaluation and provide a basis for assessing whether enhancements to Environmental Stewardship are improving environmental effectiveness.

The ELS Monitoring Programme: Aims, Requirements and Initial Results

A monitoring programme was let by competitive tender to a consortium led by the Food and Environment Research Agency (FERA). A sequential programme of work commenced in late Spring 2011 to be completed in Spring 2013. The main period of data collection extended over the 2011 and 2012 field seasons and involved a combination of farm interview, telephone or postal questionnaire followed by a programme of field survey.

The first year of the 2-year programme was designed to provide evidence for:

- The environmental benefits provided by a sample of ELS agreements established in 2005/6, through field assessments of the 'condition' of options being delivered;
- Whether participation in ELS has had a positive impact on farmer attitudes to environmental issues and the role of ELS options in addressing them, relative to the baseline;
- Farmer intentions in respect of renewal of their ELS agreement, exploring attitudes and factors affecting option choice, before and after receipt of advice, across a range of farm types.

To meet this requirement, interviews were conducted with 90 ELS agreement holders in late Summer and Autumn 2011, with the sample drawn from those who had been surveyed for the initial 2005/06 baseline, to obtain information on changes in attitudes and management practices since the 2005/06 survey. A parallel programme of field survey gathered data on the condition and placement of features being managed. As far as possible these had also been surveyed as part of the baseline project. The data will provide evidence on changes since the 2005/06 baseline and for the current condition of the habitats and features being managed, with comparisons made with control features on the farm which were not included in the agreement.

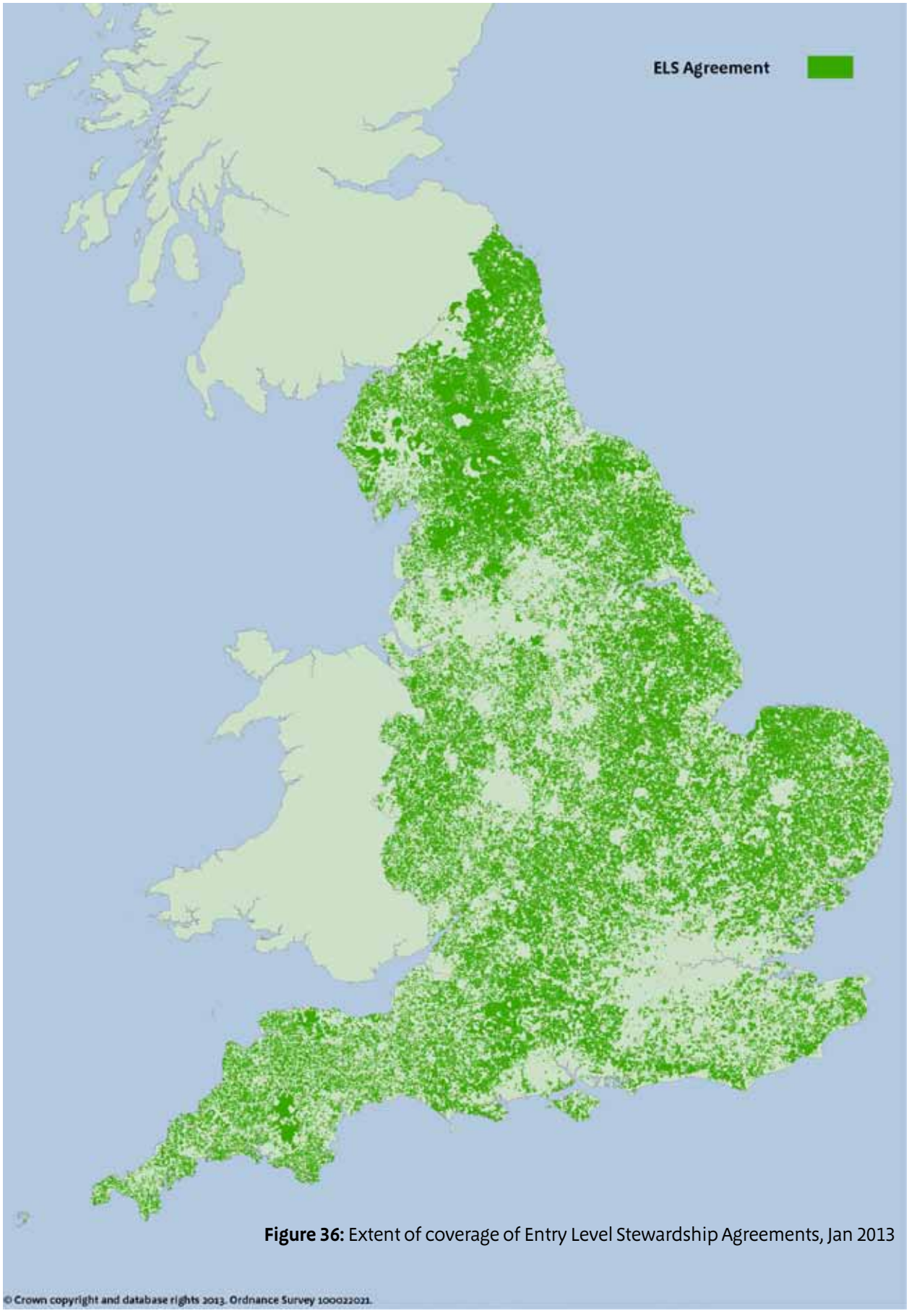


Figure 36: Extent of coverage of Entry Level Stewardship Agreements, Jan 2013

Initial analysis of the data gathered to obtain information on changes in attitudes and management practices, was presented in an interim report in July 2012. This indicates that there have been some changes since the 2005/06 survey. It suggests that agreement holders have become more likely to view their agreement in terms of the environmental benefits accruing than as a relatively easy way of enhancing their income and highlights an increasing awareness of the environmental aspects of the scheme amongst agreement holders. The perception that wildlife is the major beneficiary of the scheme has not only persisted, but seems to have increased despite recent efforts by Natural England to place more emphasis than previously on other objectives such as resource protection.

With regard to points allocations and payments, almost all of those responding to the postal questionnaire thought that the points allocations were about right, with no significant overall change of views since the baseline survey and three quarters thought that payment rates would cover their costs. Of those who gave reasons why payments did not cover costs, these were most often related to the cost of field boundary maintenance or restoration. In the baseline survey, numbers who thought there would be positive and negative impacts on the farm business were roughly balanced, but in 2011 numbers who thought there would be positive impacts of boundary and grassland management substantially outweighed those who thought there would be negative effects.

Most individuals did not change their views on the usefulness of advice between the two surveys, but where views did alter, there were similar numbers of changes in positive and negative directions. Although on-farm advice is now provided through the ETIP programme, only a small proportion of agreement holders had received ETIP advice at the time the survey was conducted, so these responses do not reflect a major impact of the programme.

There was a substantial increase in those reporting that they carried out conservation work outside the scheme between the baseline and 2011 surveys, from 34 to 59%. In addition, a majority of agreement holders said that they would have carried out the option management even if they were not in the scheme, and would continue if they left the scheme. Overall the responses suggest that the conclusion reached in the initial evaluation, that farmers choose options that they are already doing or are easy to do within their existing system, has not changed, and this is supported by data from other ongoing projects.

The second year of the programme focussed on:

- The environmental benefits provided by a sample of renewed ELS agreements from 2010, through an initial assessment of option selection, condition and placement;
- The quality of option delivery, including option condition and location, being provided by the renewed ELS agreements in comparison to the initial agreement;
- The role of ETIP in influencing option placement and management in renewed agreements;
- The potential effectiveness of ELS from 2010-15 in relation to the targets being set by Defra and Natural England.

A further 160 interviews were conducted in Spring 2012, with the sample drawn from three groups: agreement holders in the 2005/06 baseline group who were renewing their agreements; agreement holders not involved in the original survey who were renewing agreements; and new agreement holders. These groups were interviewed about option selection, placement and management and the factors affecting these issues (for example advice received), as applied to their renewed agreements.

The interviews covered:

- General farm statistics,
- Level of farmer awareness of Scheme objectives and environmental issues,
- Experience of Scheme promotion and promotional material,
- Attitudes to changes in ELS,
- Factors influencing options chosen,
- Factors influencing option placement/location,
- Barriers to uptake of desirable options,
- Experience and influence of training and farm advice and who provided it,
- Views on Scheme technical material,
- Participant perception of outcomes delivered/success of ELS to date,
- Role of Environmental Stewardship in strengthening commitment to environmental protection.

Many of the interview questions were similar to those asked in the original 2005/06 evaluation, to allow for direct comparison of responses.

The field survey programme for 2012 involved gathering data on the condition and placement of features being managed in agreements (renewals and new) that entered the scheme post-introduction of the ETIP programme and hence potentially had advice on environmental issues and priorities. It involved more detailed assessments than the 2005/06 baseline, particularly for grasslands, and focused on the following questions:

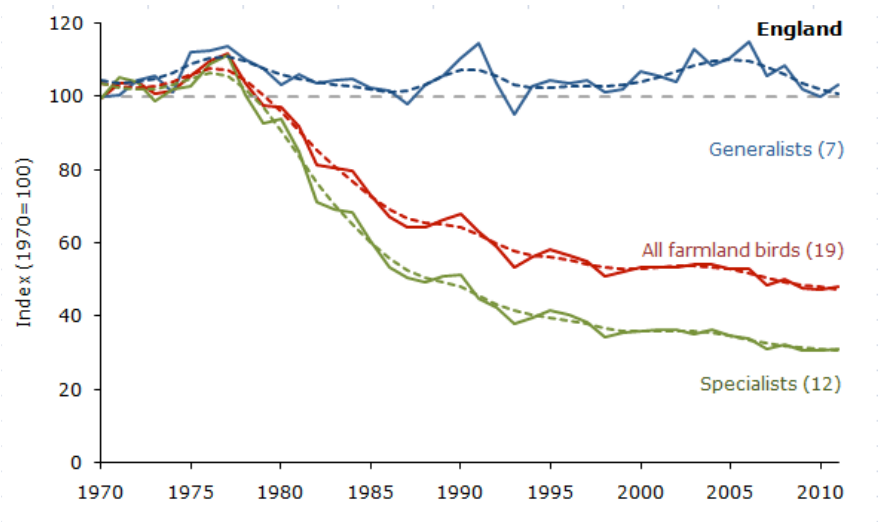
- Are habitats and features in a desirable state in relation to the option objectives?
- Is there a significant difference between the condition of habitats and features managed under agreement and those not managed under agreement?
- Is option choice linked to NE priority themes and option bundles?
- Are agreements likely to result in greater environmental benefits where advice has been received during the application process?
- Are option choices for agreements from 2010 onwards more appropriate than those made for the 2005/06 baseline agreements?

11 Monitoring the Responses of Farmland Birds to Agri-Environment Schemes

Introduction

Declines in bird populations associated with lowland farmland have been well documented. Once common and widespread species such as the grey partridge, lapwing and corn bunting have declined by over 50% since the mid-1970s, with some species suffering reductions of over 80%. This decline in birds is seen as indicative of a more widespread loss of biodiversity across England's farmed environment, for example in bumblebees, arable flora and brown hares. For this reason, a composite index of farmland bird abundance, the Farmland Bird Indicator (see Figure 37), was developed in 1999 and has been used by Government as a measure of the success of policies for conserving farmland biodiversity. The indicator is now at its lowest ever level, some 48% of its 1970 baseline, reflecting ongoing declines in many specialist farmland species.

Figure 37: Farmland Birds Index for England, 1970 to 2010



Source: RSPB, BTO, JNCC, Defra

Notes: This is the unsmoothed index. Figures in brackets show the number of species.

In 2010 the breeding farmland birds index in England (19 species) was less than half (a decline of 52 per cent) of its value in 1970. Most of the declines in farmland birds occurred between the late seventies and the early nineties, but the smoothed index shows a significant on-going decline of ten per cent between 2004 and 2009 for all farmland birds. The populations of farmland generalists shows a significant decline of 6 per cent and the farmland specialists declined significantly by 12 per cent over this period (based on the smoothed index).

Generalist species are: Greenfinch, Jackdaw, Kestrel, Reed Bunting, Rook, Woodpigeon & Yellow Wagtail

Specialist species are: Corn Bunting, Goldfinch Grey Partridge, Lapwing, Linnet, Skylark, Starling, Tree Sparrow, Turtle Dove & Whitethroat

Once the scale of the problem was recognised, Defra and Natural England worked in partnership with specialist bird organisations, including the Royal Society for the Protection of Birds (RSPB) and the British Trust for Ornithology (BTO), to deliver a concerted programme of research and monitoring to identify the causes of decline and develop appropriate remedial measures. The research concluded overwhelmingly that the main driver of the declines was agricultural intensification (see box below)[20]. Studies showed that farmland birds are affected in three main ways:

- Through loss of nesting habitat;
- Loss of food (especially invertebrates) for chicks; and
- Loss of food (especially seeds) for adult birds.

As a consequence, farmland birds now have fewer places to nest, produce fewer offspring and survive less well over the winter.

Birds make use of all the habitats provided on lowland farmland, and often utilise different resources from different habitats (for example nesting in hedgerows and foraging in fields). It is, however, those birds which make extensive use of arable and grass fields, for feeding and/or nesting, that have declined most markedly since the mid-1970s.

The key elements of intensification that were found to be important are:

- Switch from spring to autumn-sowing of cereal crops.
- Increased mechanisation (for example leading to larger fields, and more efficient crop harvesting and storage).
- Increased use of agrochemicals (pesticides and artificial fertilisers).
- Agricultural 'improvement' of grasslands (notably re-seeding and fertilisation of unimproved pastures, switch from hay to silage, drainage, and increased livestock densities).
- Farm and regional specialisation, and simplification of crop rotations leading to a general loss of mixed farmland (that is arable and grass in close juxtaposition);
- Loss and degradation of boundary habitats (for example hedgerows) and other non-farmed features (for example ponds).

The relative importance of each of these agricultural changes was different for different species, and has varied over space and time in some cases.

[20] JD Wilson, AD Evans & PV Grice (2009), Bird Conservation and Agriculture. Cambridge University Press

Development of agri-environmental measures

Addressing declines in farmland birds required the development of practical measures that could be deployed on working farms. Intensive research identified the habitats and resources within lowland farmland that were vital to their survival, and facilitated the development of a suite of management measures to deliver these requirements. Measures were tested in field trials or experiments and from 2002, were incorporated into English agri-environment schemes (Figure 38). The introduction of Environmental Stewardship in 2005 substantially increased the capacity of the schemes to benefit farmland birds, through the inclusion of both 'broad and shallow' Entry Level Stewardship (ELS) and targeted Higher Level Stewardship (HLS) elements. Environmental Stewardship was seen as the first scheme with the potential to reverse declines at a national scale[21].

Figure 38: Management measures for lowland farmland birds: benefits and availability with the English Environmental Stewardship scheme

Management measure	Main benefits	Availability within ES
Maintenance and creation of hedgerows, ditches, small wooded areas and ponds	Breeding and year-round foraging sites for many species	✓
Non-cropped field margins, corners and beetle banks	Invertebrate, seed and mammal-rich foraging habitats, often near to nest sites. Nest sites for several species, such as Grey Partridge and Yellowhammer.	✓
Low-input arable crops (including whole crop silage and undersown with grass) – whole/part fields or marginal strips (unfertilised and unsprayed 'Conservation Headlands', which may be uncultivated)	Invertebrate and seed-rich foraging habitats, and especially important for field-nesting species	✓
Flower rich margins, strips or blocks – established by natural regeneration (with or without cultivation) or through sown mixtures (eg nectar mix)	Invertebrate and seed-rich foraging habitats	✓
Summer fallows and nest plots in arable fields	Nest sites for field-nesting species, such as Lapwing and Skylark, and invertebrate and seed-rich feeding areas for many other species	✓
Low-input grass fields – whole/part fields or marginal strips	Nest sites for field-nesting species and year-round food resources for many species	✓
Overwintered stubble fields	Winter food for many seed-eating species. Following spring crop may be suitable for field-nesting species	✓
Wild bird seed mixtures	Food for many seed-eating species plus a source of invertebrates	✓
Supplementary seed provision	To plug the late winter-early spring 'hungry gap' for seed-easting species	*
Grass silage left to go to seed	Seed food from late summer until spring	*

Note: * available from January 2013.

[21] JA Vickery, RB Bradbury, IG Henderson, MA Eaton & PV Grice, (2004). The role of agri-environment schemes and farm management practices in reversing the decline of farmland birds in England. Biological Conservation 119: 19-39

The need for monitoring

Monitoring the response of farmland birds to Environmental Stewardship is important because they are a targeted outcome of AES policy at both national and international level and they are recognised as good overall indicators of the broad state of farmland biodiversity.

Many farmland birds appear on the 'Section 41' list of priority species in England, and the Farmland Bird Indicator is used by Defra as both a biodiversity and sustainable development indicator[22]. Farmland birds were also selected as a biodiversity impact indicator within the European Commission's Common Monitoring and Evaluation Framework for Rural Development programmes. This emphasis at national and international level on Environmental Stewardship as a means of addressing declines in farmland biodiversity places responsibility on Defra and Natural England to monitor responses. In view of this, a monitoring programme was developed by Natural England working closely with key partners.

This programme aimed to gather information on scheme effectiveness at three complementary scales:

- Management option;
- Farm (agreement); and
- Landscape.

This programme provides the evidence necessary to evaluate Environmental Stewardship delivery for farmland birds and to identify potential changes that could improve scheme effectiveness, efficiency and value for money. In the following paragraphs, we provide brief examples of how the programme has delivered such evidence.

Monitoring results – Option scale

The effectiveness of overwinter stubbles and wild bird seed mixtures, options designed to increase the provision of winter seed food on farmland, was studied by RSPB during winter 2007/08 on 54 farms in East Anglia and the West Midlands comprising HLS, ELS and control situations[23]. Wild bird seed mixtures provided by Environmental Stewardship hosted higher densities and a wider range of seed-eating birds than non-Environmental Stewardship game covers, although only limited additional benefits were observed for options in HLS compared to ELS. The study confirmed that the options attracted birds in good numbers, but outcomes could be optimised by improved management. As a consequence, a number of changes were made to the ELS wild bird seed mixtures prescription from January 2010 which were designed to increase their effectiveness, such as increasing the minimum block size.

[22] http://sd.defra.gov.uk/2011/01/biodiversity-indicators-and-wild-bird-populations/

[23] RH Field, AJ, Morris, PV Grice & A Cooke (2011). The provision of winter bird food by the English Environmental Stewardship scheme. Ibis 153: 14-26.

The effectiveness of fallow plots for providing nesting habitat for lapwings was explored through a project using BTO's volunteer recorder network[24]. Some 212 plots on 180 different farms were visited in 2007, covering similar options in Environmental Stewardship and the previous Countryside Stewardship Scheme. Overall, lapwings were recorded using 40% of the plots and showed evidence of breeding on 25%. Use was lower when plots were near woodland and breeding evidence most likely on plots with more bare ground. Whilst these issues are addressed in the management prescriptions, best practice was not always being followed. Again, the value of fallow plots could be increased by optimising placement of plots in the landscape and improved management.

The lapwing survey also provided evidence that fallow plots are used extensively by other declining species, including skylark, yellowhammer, linnet and grey partridge. A similar study of plots targeted at breeding stone curlews confirmed extensive use by non-target birds but in addition, studied usage by brown hare, carabid (ground) beetles, plants, butterflies and bumblebees, comparing the results to surveys in the surrounding crop and neighbouring fields[25]. All species groups except carabid beetles were more abundant or more species-rich on plots than within the crop, and plots were found to provide niches for rare arable plants. This confirmed that fallow plots designed for birds provide habitats for a range of farmland biodiversity.

Population declines in waders breeding on lowland wet grasslands are well documented. In England, nature reserves, site designation (Sites of Special Scientific Interest and Special Protection Areas) and HLS are the key mechanisms available to protect populations and promote recovery. In 2009/10 a survey by RSPB and Natural England visited 275 sites, many of which had also been surveyed in 1982 and 2002, enabling direct comparison of numbers across nearly 30 years. Overall, the survey found lapwing declined by 20% from 1982 to 2010, snipe had declined by 43% and curlew declined by 26%. Oystercatcher increased significantly by 146% and redshank increased by 25%.

Patterns and trends in the occupancy and density of waders were tested in relation to the presence of nature reserves, site designations and agri-environment schemes (AES). The likelihood of field occupancy by oystercatcher, lapwing, snipe and redshank was influenced positively by nature reserves and site designation, and for lapwing, snipe, curlew and redshank, by AES management. Occupancy varied between different schemes, but there was evidence of it being higher in fields managed under HLS. The effectiveness of AES for lowland wet grassland wader populations was enhanced by the presence of site designations and nature reserve status. Whilst further concerted conservation action is needed to recover breeding waders on this habitat, the study provides promising signs that HLS is a more effective mechanism than earlier AES.

Monitoring results – farm scale

Natural England commissioned the Game & Wildlife Conservation Trust (GWCT) to assess the performance of Environmental Stewardship between 2005 and 2008 on farms managed by members of the trust's Partridge Count Scheme (PCS) . The management options that PCS[26] members chose to implement were classified into groups based on the habitat that they provide

[24] D Chamberlain, S Gough, G Anderson, M Macdonald, P Grice & J Vickery (2009). Bird use of cultivated fallow 'Lapwing plots' within English agri-environment schemes. Bird Study 56: 289–297. [25] MA MacDonald, M Maniakowski, G Cobbold, PV Grice & GQA Anderson (2012). Effects of agri-environment management for stone curlews on other biodiversity. Biological Conservation 148, 134

[26] JA Ewald, NJ Aebischer, SM Richardson, PV Grice & AI Cooke (2010). The effect of agri-environment schemes on grey partridges at the farm level in England. Agriculture, Ecosystems & Environment 138: 55-63.

for grey partridges at different stages of their life cycle (that is, nesting habitat, brood-rearing habitat and overwinter cover). The study found that three groups of options had consistently positive effects - beetle banks, conservation headlands and wild bird seed mixtures. Whilst wild bird seed mixtures are a popular management option, beetle banks and conservation headlands currently have low uptake within AES, providing more evidence of the need to increase uptake of arable in-field options within Environmental Stewardship.

Monitoring results – landscape scale

Whilst ELS is recognised as the first AES with potential to reverse declines in national populations of widespread farmland birds, evidence from previous studies suggested that it would take several years for effects on national populations to be detected by the Breeding Bird Survey (BBS). To explore any early effects of the scheme, Natural England initially commissioned BTO to supplement the core BBS sample in 2005 and 2008, increasing the sample on English farmland to over 2000 1km-squares in those years. AES uptake data were collated and analysed with this data to assess the influence of specific management options and option combinations on bird population trends. The results showed limited evidence for short-term positive effects of Environmental Stewardship at national scale, although some species showed apparent region-specific population trends and responses. It was concluded that the initial pattern of option uptake was likely to be limiting the benefits of ELS, notably an insufficient uptake of critical in-field arable options. However, the study recognised that the time required for options to mature and the time-lags known to occur in bird population responses to environmental change, made it too early to reach definitive conclusions about the success or otherwise of ELS. [27, 28]

In 2011, Natural England asked BTO to explore a novel analysis using BBS data[29]. Rather than supplementing the BBS sample, BTO used aggregated BBS data from 2002-2004 as a pre-Environmental Stewardship baseline and from 2005-2010 as a post-Environmental Stewardship sample. The study found strong evidence for positive effects of management providing winter food resources (that is, Environmental Stewardship stubble and wild bird seed mixtures) on population growth rates across multiple seed-eating species, and at three landscape scales (1 km^2, 9 km^2 and 25 km^2). Eight out of 12 seed-eating birds showed a positive response to provision of winter stubbles at one or more scales. Management designed to provide breeding season resources (that is, grassland, field margin and boundary management) showed mixed patterns of positive and negative associations. The results for winter seed food options provide the first evidence of landscape-scale responses of widespread biodiversity to AES management, demonstrating that AES do have the potential to deliver national-scale effects on avian population growth rates, and emphasising the importance of targeting towards the factors that limit populations (in this case, winter food resources). The study suggests that a combination of the low uptake of key in-field options that provide winter seed and a failure to effectively cover the so-called late-winter 'hungry gap' period, explains the lack of national population responses. For this reason, as part of the latest suite of scheme changes (coming into effect from January 2013), a new option providing supplementary seed food from 1st January until the 31st March has been brought into ELS.

[27] Davey, C, Vickery, JA, Boatman, ND, Chamberlain, DE, Parry, HR & Siriwardena, GM 2010a. Assessing the impact of Entry Level Stewardship on lowland farmland birds in England. Ibis 152: 459–474. [28] Davey, C, Vickery, Juliet, Boatman, N, Chamberlain, D, Parry, H & Siriwardena, G 2010b. Regional variation in the efficacy of Entry Level Stewardship in England. Agriculture, Ecosystems and Environment 139: 121–128. [29] DJ Baker, SN Freeman, PV Grice & GM Siriwardena (2012). Landscape-scale responses of birds to agri-environment management: a test of the English Environmental Stewardship scheme. Journal of Applied Ecology 49 (4): 871-882

The future

All the studies described above suggest that reversing farmland bird declines at a national scale is possible if the quantity and quality of key options is sufficient. Natural England's response has been to work with partners to develop 'Farmland Bird Packages'. These establish a minimum quantity requirement for the delivery of management providing nesting habitat, invertebrate chick food and adult seed food within individual Environmental Stewardship agreements. The packages have been developed using the best available evidence and their effective deployment should result in a measurable increase in declining species at the agreement scale. Tailored packages were developed for both ELS and HLS (see Figure 39), reflecting their different roles in reversing farmland bird declines – HLS being targeted at core areas for the most rapidly declining, range-restricted species (for example, corn bunting, tree sparrow and grey partridge), with ELS more tailored towards declining species that still remain relatively ubiquitous (for example, skylark, yellowhammer and reed bunting)[30]. The packages have been widely promoted by Natural England and partners, including through the industry-backed Campaign for the Farmed Environment[31]. Monitoring their effectiveness at farm, agreement and wider landscape scale will be a key priority in the future.

Figure 39: ELS and HLS Farmland Bird Packages

Resource/habitat	Measure/ES options	ELS (minimum per 100 ha)	HLS (minimum per 100 ha)
Winter seed food	Wild bird seed mixture **or** Weed-rich overwinter stubble (**or** a combination)	2 ha **or** 5-10 ha	2 ha **or** 5-10 ha
Spring-summer in-vertebrate food	Conservation headlands Low input spring cereals (incl. undersown) Field corners Beetle banks Nectar mixtures Flower-rich margins	1 ha	2-3 ha
Places to nest in-field	Skylark plots **&/or** Fallow plots	20 **or** 1 ha	20 **plus** 2 ha (if appropriate)

An emerging priority is to investigate the effectiveness of AES as targeted on upland breeding birds. This subject has received little attention to date, which is surprising given the international significance of the English uplands for certain bird groups (over 140,000ha of upland habitats are designated as Special Protection Areas under the EU Birds Directive). To address this gap, Natural England has commissioned BTO to augment the Breeding Bird Survey in the English uplands by over 300 1km-squares in 2012 and 2013, as a precursor to carrying out similar analyses to those conducted for lowland farmland. This will enable the first national assessment of the effectiveness of AES measures for conserving upland breeding birds.

[30] R Winspear, P Grice, W Peach, J Phillips, N Aebischer, P Thompson, J Egan & M Nowakowski (2010). The development of Farmland Bird Packages for arable farmers in England. Aspects of Applied Biology 100: 347 – 352.

[31] http://www.cfeonline.org.uk/

12 HLS Monitoring Case Study: Assessing the Success of Management to Create Species-Rich Grasslands

Background

Environmental Stewardship, and Higher Level Stewardship (HLS) in particular, is the primary vehicle for delivering many of the objectives set out in Biodiversity 2020 (under which various species-rich grassland communities have been nominated as Priority Habitats for action) and the Natural Environment White Paper. Species-rich grasslands are estimated to have declined by 98% between 1930s and the present day. Targeted restoration and creation of species-rich habitats is a key element of restoring a more connected countryside that provides sustainable ecological networks for birds, invertebrates and other animals.

Option-level assessments provide an opportunity to develop a detailed understanding of scheme effectiveness. Within HLS, management option HK8 provides for the creation of species-rich grassland, typically from a starting point of arable or set-aside and occasionally from intensive grassland management. The option has been popular and as of September 2012, the uptake is over 4,500 hectares. The successful delivery of this option can provide significant biodiversity benefits, and it has been a priority for the agri-environment scheme monitoring programme to explore its effectiveness.

Approaches

Natural England commissioned two separate strands of work exploring the effectiveness of HK8. Both projects explored whether HK8 is succeeding in its objective of facilitating the creation of swards of Priority Habitat quality, but from slightly different perspectives.

In the first strand of the work, a survey of 81 grasslands was undertaken, focusing on sites that had been identified by Natural England land management advisers as cases where they believed there had been a good level of success. These sites were in HK8 or its equivalent options in one of the classic schemes. As this was not a random sample, the priorities were to survey the type and quality of the swards created, assess progress towards creation of a BAP community and to explore site and management factors that may have contributed to, or mitigated against, successful restoration. In effect we set out to demonstrate that the option could deliver its objectives.

The second strand of work reviewed progress on a random sample of 36 sites that had been managed under HK8 for around 5-years; whilst the aims of the field survey were similar to the first strand, the results would give a more representative indication of the quality of delivery of the option, overall.

Both projects involved walkover surveys of each field, recording indicator species and other vegetation attributes at a pre-determined number of 'stops'. This data allowed the 'target' habitat to be identified and progress towards priority habitat condition to be assessed using standard keys. For the 'random' element, detailed sward data were also collected from within 5 small quadrats (see Figure 40). In a significant proportion of cases, soil samples were collected for analysis, as well as information on management, including the techniques used to create the sward.

Results

Here we present a very brief commentary on some of the headline results from the project. Further details can be found in recently published papers[32,33].

Figure 40: Quadrat assessment of a sward created under HLS Option HK8

Firstly, keys developed for the HLS Farm Environment Plan (FEP) manual were used to make an assessment of each sward. These keys utilise the data collected by surveyors on presence and frequency of individual species to identify the type of grassland present and its condition. Of the targeted and random samples, 69 (85%) and 17 (47%) sites respectively had met the lower threshold for Priority Habitat. The nature of the habitats identified is shown in Figure 41. Thirty-two of the sites in the targeted sample (39% of the sample) and 6 of the random sample (17%) keyed out as meeting the threshold required in the FEP for Priority Habitat in good condition.

In both samples, examples were found where creation had resulted in swards that met the criteria for priority habitat in good condition. This demonstrates clearly that HLS can and is delivering benefits towards Biodiversity 2020 objectives. As would be expected, a higher proportion of the targeted sample met priority habitat criteria than the random sample, but it was still encouraging that in the latter, nearly 50% had already met the lower threshold for priority habitat, often within only 5 years of creation. There is also reason to believe that some of the swards where priority habitat was present but not in good condition will develop further, given effective management. In many cases these swards had sufficient species present, but at frequencies below the threshold of good condition.

Figure 41: Habitats found in each field survey, using FEP keys 2A and 2B

FEP Code/Grassland Type	Targeted Sample	Random Sample
G02 Semi-Improved Grassland	12	19
G04 Lowland Calcareous Grassland	35	6
G05 Lowland Dry Acid Grassland	1	0
G06 Lowland Meadows	30	10
G07 Purple Moor-Grass and Rush Pasture	2	1
G09 Upland Hay Meadows	1	0

[32] P. STEVENS and P. WILSON (2012), Species-rich grassland re-creation projects. A route to success? Aspects of Applied Biology 115, 53-60

[33] E.J. HEWINS, C. PINCHES and A.I. COOKE (2012) Creation of species-rich grassland: Evidence for the effectiveness of Environmental Stewardship. Aspects of Applied Biology 115, 89-96

Analysis was also undertaken to evaluate the methods used for sward creation, and to explore possible reasons for failure to develop a species-rich sward. Four main approaches had been used to create a sward – use of locally sourced species-rich seed mixtures, spreading of green-hay from high quality donor sites, commercial seed mixtures and natural regeneration. There were examples of successful creation using all methods, although natural regeneration may be effective only in specific circumstances.

The suitability of selection of sites for species-rich sward creation was tested in the random sample and 9 sites (25%) were judged to have failed one or more criteria, most frequently having levels of soil Phosphorus (P) in excess of what is recommended as suitable in scheme guidance. However, there were also examples of sites where progress was promising despite apparent low suitability and examples of sites where the outcome was disappointing to date given the apparently favourable site conditions. This perhaps suggests that in some cases, judgement could over-ride a mechanistic approach to site selection, when other site factors indicate high or low potential for success.

Taken together the results suggest that the prospects of successfully creating a species-rich grassland are maximised when several criteria are met, including selection of a suitable site, setting clear and appropriate objectives, ensuring a suitable seed source is available and delivering effective management at and following intervention.

Future Work

Natural England has used the outputs of this monitoring in training to reinforce guidance to land management staff on the application and targeting of the HK8 option. Both projects have also provided quantitative information on sward characteristics that will be used for the continued evaluation of this option. The approaches described here also demonstrate the value of case studies that consider individual management options in some detail; this provides a template for further explorations of the success of specific targeted and/or high value HLS options.

13 Monitoring the Catchment Sensitive Farming Project

The Catchment Sensitive Farming (CSF) Project

The Catchment Sensitive Farming (CSF) Project' delivers targeted support and practical solutions to enable farmers and land managers to take voluntary action to reduce water pollution. The project is part of the national response to meet the requirements of the Water Framework Directive and the conservation objectives of Sites of Special Scientific Interest. It is delivered in partnership by the Environment Agency and Natural England.

CSF delivery is focussed within priority catchments (http://www.naturalengland.org.uk/ourwork/farming/csf/cgs/catchments.aspx), and partnership with local government, non-government organisations, water companies and charities extends the influence of the project further.

There are 65 priority catchments throughout England. Each catchment has a CSF Officer who works locally with a catchment steering group comprised of local farmers and other stakeholders to deliver:

- One to one advice;
- Farmer workshops, meetings, demonstrations and walks;
- Grants towards the cost of pollution mitigation measures

Monitoring & evaluation strategy

Monitoring and evaluation are core to the CSF Project. They are used to measure progress towards the achievement of objectives and to assess the effectiveness of measures adopted in reducing water pollution. Monitoring and evaluation are considered on five levels (Figure 42).

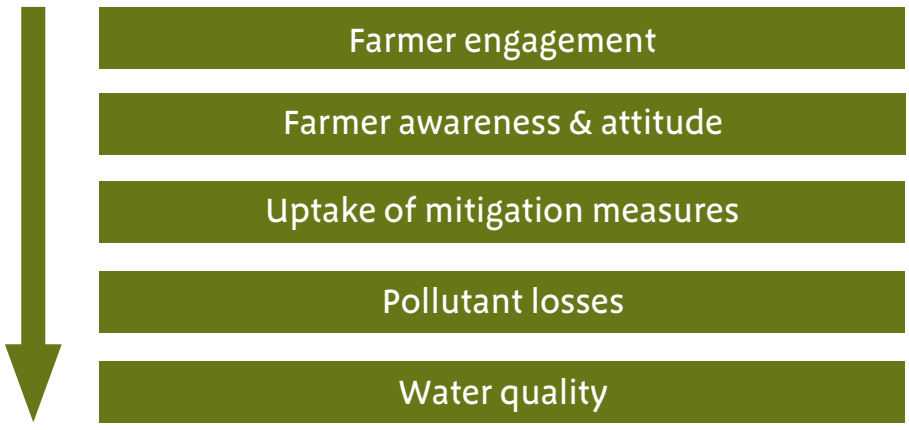


Figure 42: The five levels of monitoring and evaluation

The complex mix of processes by which the CSF Project brings about changes in agricultural management and hence delivers environmental benefits, makes measurement of success difficult:

- The confidence with which measured responses can be linked back to the CSF Project (for example cause and effect) decreases in moving down through the levels in Figure 41, due to the compounding effects of errors in estimation;
- External factors such as variation in weather and cropping patterns and other water quality pressures like point-source discharges add further complexity;
- The response time lengthens moving through the levels, since each is dependent on a response at previous levels.

Directing monitoring effort at all five levels maximises our ability to measure changes and to relate these back to the objectives of the CSF Project.

CSF evaluation is based on obtaining comprehensive data sets, generated specifically for the project, and a combination of existing and new data analysis methods, including:

- Tracking activity using a database of farmer engagement and advice delivery;
- Obtaining feedback using telephone surveys; feedback forms from recipients of advice; and undertaking case studies examining farmer awareness and attitudes;
- Follow-ups with farmers to assess the extent of uptake of advice given;
- Water quality monitoring - because of the large inherent variability in water quality and the strong link between diffuse water pollution and high-flow events, existing Environment Agency water quality monitoring was "enhanced" at key sites within selected CSF catchments (from monthly to weekly or twice-weekly, with event sampling at some sites), significantly improving our ability to detect changes; and
- Modelling to assess reductions in pollutant losses and improvements in water quality.

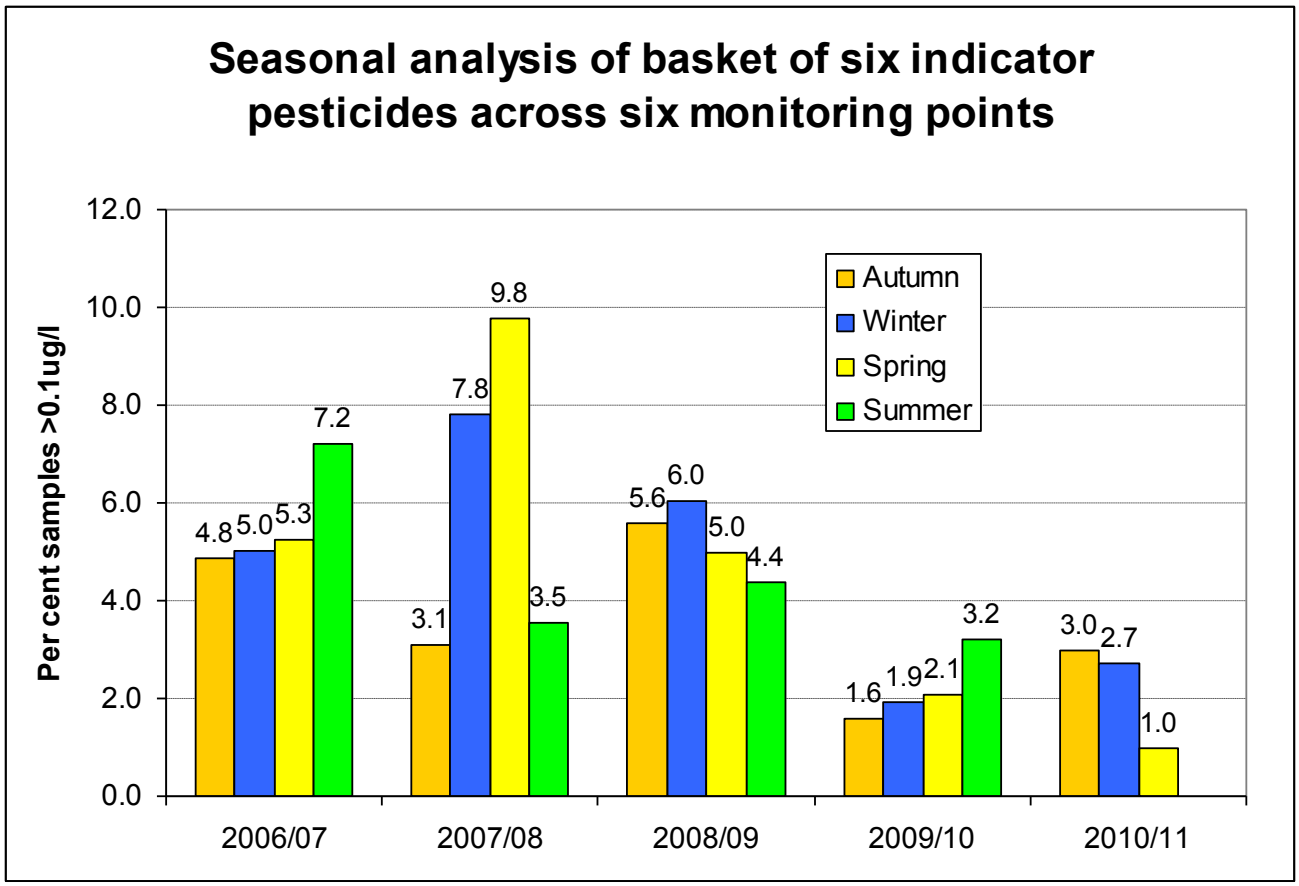
Results

Water quality

Pesticide data provide clear evidence of reductions from a 2006/07 baseline, at a catchment scale. Total Annual Load (26 per cent); Time Weighted Mean Concentration (28 per cent); and Flow Weighted Mean Concentration (31 per cent) all reduced significantly for the total of six indicator pesticides monitored across five CSF catchments. The proportion of samples exceeding 0.1 µg/l also reduced from 5.5 to 5.9 per cent in the first three crop years to 2.2 per cent in 2009/10 (Figure 43).

We are confident these reductions represent real improvements in water quality associated with CSF. A survey of farmers within the monitored catchments indicated that 51 per cent had changed their pesticide use as a result of the advice received. Every effort was made to isolate and exclude the effects of other influences that might otherwise contribute to, or conceal, improvements (e.g. area of arable land, pesticide use, and climatic conditions).

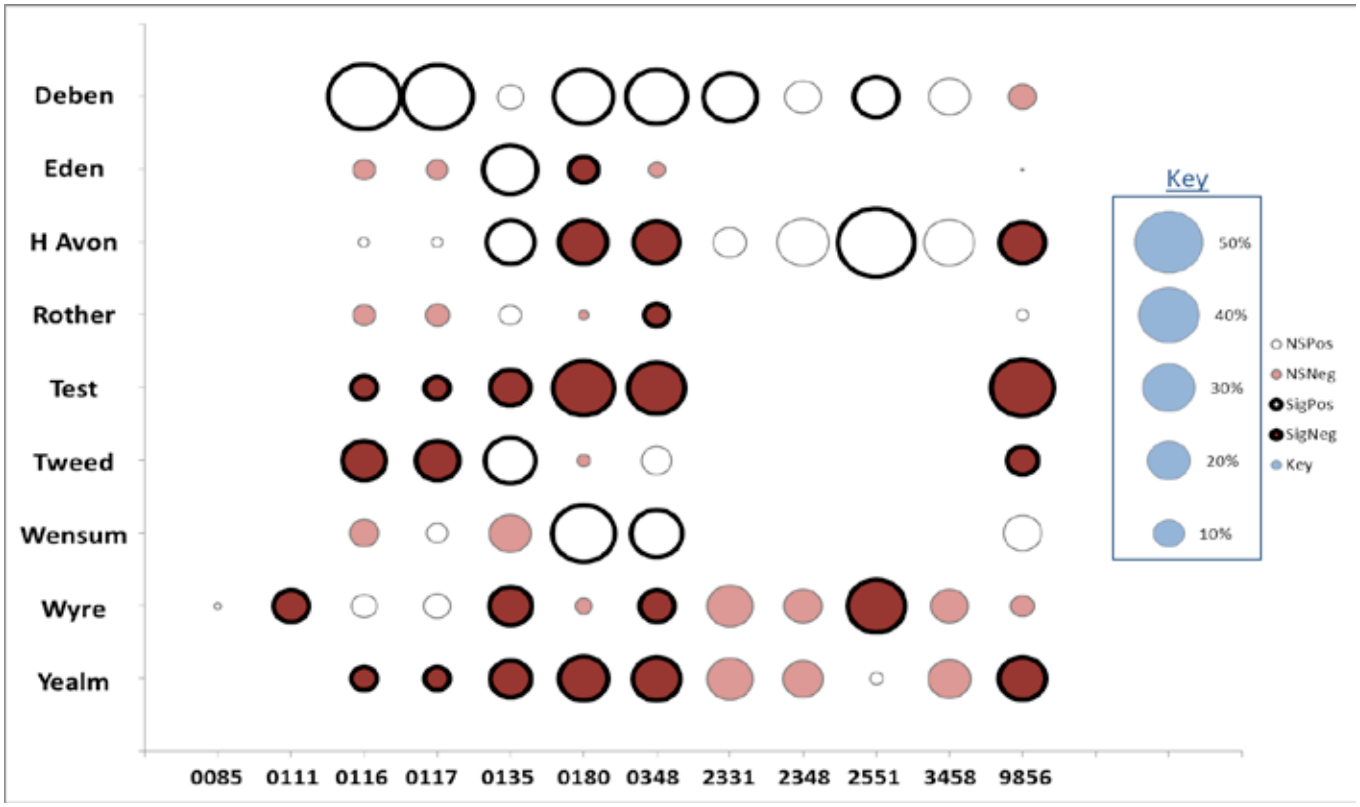
Figure 43: Proportion of pesticide samples exceeding 0.1ug/l across six monitoring points within five CSF priority catchments



After applying statistical analyses to factor out the influence of rainfall and other catchment-scale influences, improvements for nutrients, sediment and faecal indicator organisms are also apparent, at a sub-catchment scale (Figure 44). Six of the nine catchments showed a reduction in pollutant concentrations for more than half the pollutants monitored, while nine of the 12 pollutants showed a reduction in at least half of the catchments. Taking the results as a whole, the weight of evidence is that CSF has delivered a net improvement in water quality in the monitored catchments.

Sediment source tracing provides further evidence of the environmental outcomes from CSF. This technique uses the link between the geochemical properties of in-river sediment and those of its sources. Assuming different sources can be distinguished on the basis of their constituent properties or "fingerprints", the provenance of sediment can be established using a comparison of its properties with those of the individual potential sources. A 'case study' compared sources before and after mitigation within a sub-catchment of the Dorset Frome catchment and detected a statistically significant shift in the source of in-river sediments. This was associated with a 60 per cent reduction in channel bed storage. Together, the results indicate a significant response from the uptake of mitigation measures.

Figure 44: Influence of CSF advice activity on pollutant concentrations at selected locations within nine monitored catchments (January 2007 to September 2010), after adjusting for temporal variation in flow



Key to pollutant codes:
0085 – Biochemical Oxygen Demand; 0111 – Ammonia; 0116 – Total Oxidised Nitrogen; 0117 – Nitrate; 0135 – Suspended Solids; 0180 – Total Reactive Phosphorus; 0348 – Total Phosphorus; 2331 – Total Coliforms; 2348 – E. Coli; 2551 – Faecal Streptococci; 3458 – Faecal Coliforms; 9856 – Soluble Reactive Phosphorus

Note: The area of the circles in Figure 3 is proportional to the average percentage change in mean pollutant concentration. Filled circles indicate that concentrations decreased with increasing advice activity during the monitoring period; darker circles with thick borders indicate a statistically significant decrease in mean concentration whereas lighter circles with thin borders denote a non-significant effect. Unfilled circles indicate that mean concentration increased with increasing advice activity, with thicker borders indicating a statistically significant effect. A gap means that a pollutant was not a priority issue in a particular catchment.

Farmer engagement, awareness and advice uptake

The success of the CSF project is based upon effective farmer engagement, improved farmer awareness (of the available advice and support) and widespread uptake of advice:

- 9,023 farm holdings received CSF advice between March 2006 and March 2011 - this represents 38 per cent (by area) of all farm holdings within priority catchments and 62 cent (by area) within targeted sub-catchments.
- Farmers across the CSF catchments increasingly cite CSF as a source of advice for reducing water pollution – they are also increasingly aware of other advice sources (for example, Environmental Stewardship) sign-posted by CSF Officers.
- Feedback from advice recipients is very positive, in particular they value the one-to-one relationship with their adviser.
- 93,360 individual recommendations were made to reduce water pollution by March 2011, covering fertiliser, soil, and manure management, and to a lesser extent farm infrastructure, pesticides, livestock management and land use change.
- 58 per cent of recommendations (from one-to-one advice) had been implemented by the beginning of 2011.

Environmental modelling

Modelling techniques have been used to estimate pollution reductions outside of the monitored CSF catchments. The results show a strong spatial variation in environmental benefits. Exploring this variation has increased our understanding of the factors determining CSF effectiveness. The key factors are:

- High spatial coverage of advice;
- Advice strategies/practices targeting multiple pollution sources & pathways;
- High uptake or recommended practices; and
- Significant agricultural pollution sources.

Using this understanding, we have been able to identify geographic locations where CSF advice will be most effective and this has informed current CSF targeting. We are now developing the approach to enable us to identify packages of farm practices that will be most effective in different locations. The approach has significant potential to increase the environmental benefits of the CSF Project.

Future developments

Key future developments being explored for our evaluation are:

- Quantifying pollutant and catchment-specific responses through our enhanced water quality monitoring programme;
- Expansion of the sediment source tracing technique to other CSF catchments;
- Assessing the ecological response to CSF through analysis of Water Framework Directive datasets and targeted case studies;
- Quantifying the groundwater response using existing monitoring networks;

- Assessing the wider benefits of CSF, using an ecosystem services approach (including flood risk and climate change);
- Evaluating different CSF delivery mechanisms, including delivery through partnerships with local government, non-government organisations, water companies and charities; and
- Optimising future targeting and advice delivery using understanding from our modelling work.

A comprehensive report of the CSF evaluation can be downloaded at:
http://www.naturalengland.org.uk/ourwork/farming/csf/evaluation.aspx.

14 Natural England's Long-term Monitoring Network

In order to identify and explain the causes of long-term environmental change, Natural England is undertaking detailed monitoring of selected key sites across the country.

We need to understand what is driving environmental change in order to advise others on mitigation or adaptation actions and to plan and change management practices. Drivers of environmental change such as climate change and air pollution present a particular monitoring challenge, due to their widespread and cumulative impacts. The effects on environmental processes may be subtle and can be obscured by annual variability in many datasets meaning that trends may only be discernable over many years. Identifying change reliably and attributing it to the correct causes is vital and requires robust environmental data.

We are addressing this evidence need by developing a Long-term Monitoring Network (LTMN) on selected sites across England. We have ensured that the development of this network is linked to existing and proposed long-term monitoring, in particular the Environmental Change Network (ECN) run by the Natural Environment Research Council, with which the data management is shared.

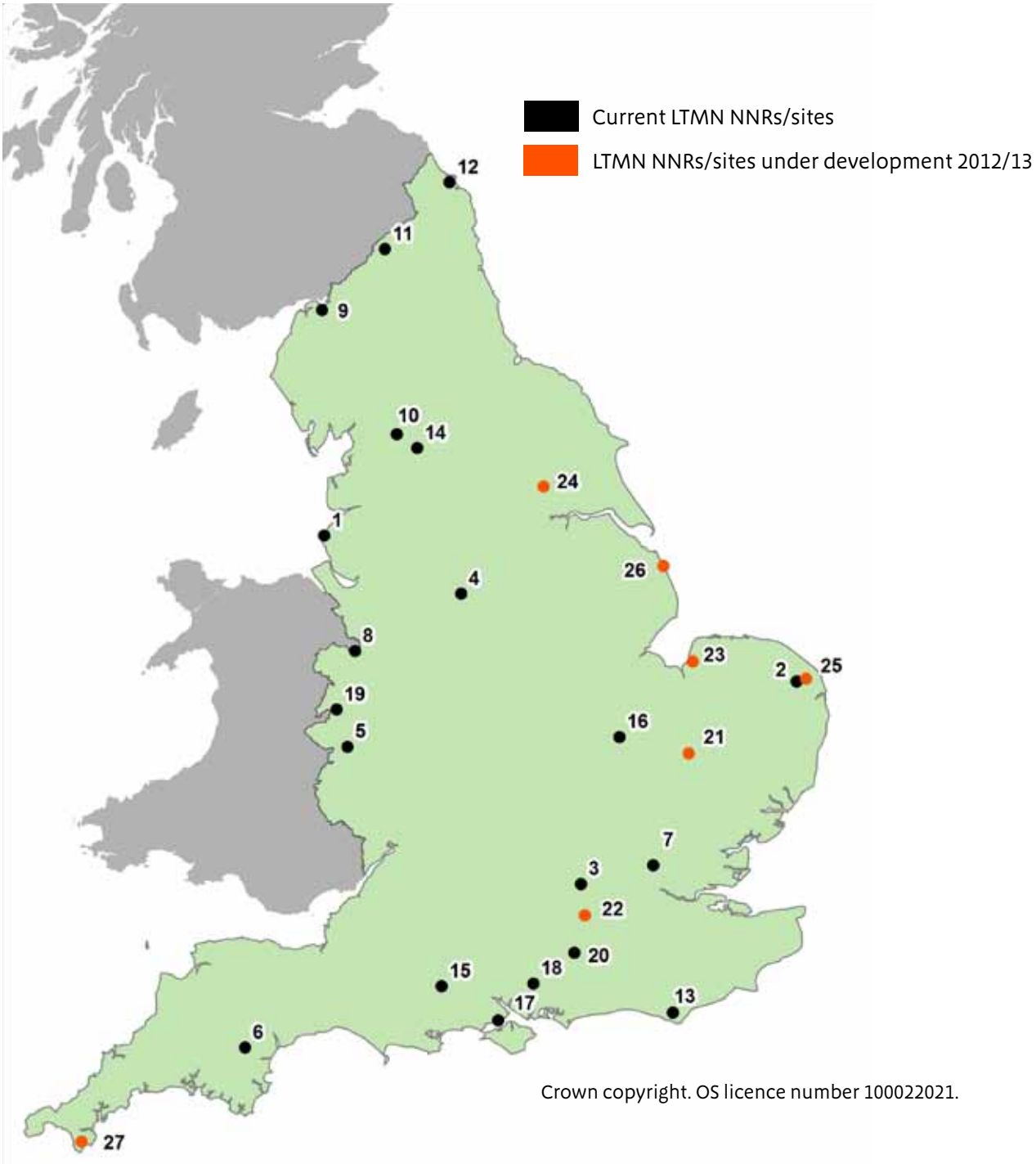
Box 1: Monitoring undertaken on LTMN Core Sites

At each core site data is collected on:

- Weather – most sites have an Automatic Weather Station
- Air pollution – diffuse ammonia and precipitation chemistry
- Butterflies
- Birds
- Vegetation
- Soils
- Land management activities

Above: soil sampling at Yarner Wood.
Left: Vegetation survey at Old Winchester Hill.

Figure 45: Long Term Monitoring Network NNRs and sites Established and under development 2012-13



1. Ainsdale Sand Dunes
2. Bure Marshes
3. Burnham Beeches
4. Derbyshire Dales
5. Downton Gorge
6. East Dartmoor Woods & Heaths
7. Epping Forest
8. Fenn's, Whixall & Bettisfield Mosses
9. Finglandrigg Woods
10. Ingleborough
11. Kielderhead
12. Lindisfarne
13. Lullington Heath
14. Malham Tarn
15. Martin Down
16. Monks Wood
17. North Solent
18. Old Winchester Hill
19. Stiperstones
20. Thursley

Development sites 2012-13

21. Chippenham Fen
22. Chobham Common
23. Dersingham Bog
24. Lower Derwent Valley
25. Ludham & Potter Heigham Marshes
26. Saltfleetby- Theddlethorpe Dunes
27. The Lizard

Core monitoring sites

Twenty core sites have been established so far and seven more will be established by the end of 2012/13. The sites are selected to represent a range of habitats of conservation interest and to give a broad geographical spread in England (thus allowing change to be assessed in relation to different air pollution impacts, predicted changes in climate and landscape types) (Figure 45). Due to the need to install and secure valuable equipment and gain regular access to the sites, most (19 out of the first 20) are on National Nature Reserves (NNRs). The majority are managed by Natural England with four managed by partner organisations. Fifteen of them include Special Areas for Conservation (Box 2 lists the habitats covered on LTMN sites).

At each core site, detailed monitoring of a range of variables is carried out using standard protocols (see Box 1). This allows for analysis and reporting from the network as a whole.

Box 2 - Habitats covered on LTMN core sites

Vegetation monitoring is focused on the following Priority Habitats:

- Broadleaved mixed woodland
- Heathland (upland and lowland)
- Upland blanket bog
- Lowland raised bog
- Lowland mires and fens
- Calcareous grassland
- Neutral grassland
- Sand dunes

Soil sampling and analysis

In 2011/12 the LTMN commissioned soil sampling and analysis at 9 core sites (see Figure 44). The sampling involved a revised protocol that took account of recent work on soil monitoring and soil biology, and samples were analysed for a range of physico-chemical and biological attributes.

The sampling and analysis of these soils provides illustration of the nature of the monitoring and its value in both the short and the long term. Whilst the value of the data in identifying long-term change will only be realised as sites are resurveyed, the datasets obtained are giving immediate insights into natural processes and highlighting possible indicators of change. In particular, the soil sampling has provided an opportunity to understand the relationship between habitats and soil carbon storage.

Figure 46 shows the results of an initial analysis of soil carbon storage across these sites. The findings underline the importance of lowland peat soils, such as those found at Finglandrigg Woods, for carbon storage. The results also show the importance of undisturbed soils under semi-natural vegetation as carbon stores; soils at Lullington Heath (heath and downland) stored almost as much carbon as Ingleborough (blanket bog). This may be because the blanket bog at Ingleborough was relatively shallow (approximately 60cm on average) while the Lullington soils had denser, organic pockets.

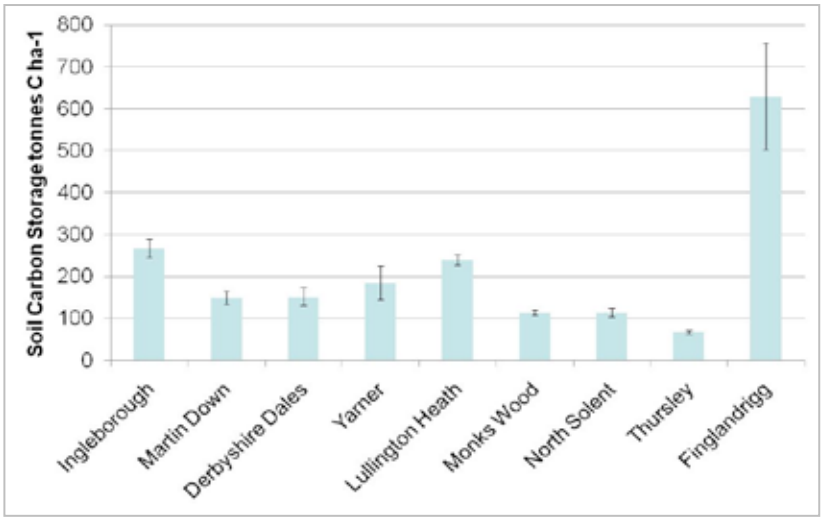


Figure 46: Soil carbon storage at 9 LTMN sites in England

The analysis of soil biological parameters suggest that these may be good ways of describing soils and that we may be able to identify significant changes in these variables sooner than we can for physio-chemical variables. Further work on the possible seasonal variation in the biological attributes would be valuable.

Further baseline monitoring was been carried out on more sites in autumn 2012. Much more analysis is needed on the data collected through LTMN, and Natural England will be publishing a full report on these findings in 2013.

Developing the LTMN

Natural England will continue to lead the development of the LTMN in a cost effective, integrated and collaborative way, with the aim of having 40 active core monitoring sites by the end of 2014. To reduce costs, Natural England is undertaking an increasing proportion of the site monitoring work itself; in 2012 baseline vegetation surveys on four sites were completed using our own staff, working with partners and volunteers, providing those involved with great opportunities to develop their field and identification skills.

The project will also aim, where appropriate, to identify, collate and analyse data from other widespread monitoring activities that could compliment, extend and validate findings from the core sites. Such activities include work done by Natural England (for example Integrated Site Assessments or the monitoring of Environmental Stewardship) and by our partners (for example Butterfly Monitoring Scheme).

15 Responding to Change – what does the future hold?

To achieve the desired outcome of 'a secure environmental future', Natural England requires evidence on the current state of the natural environment and an understanding of what we need to do today to secure the natural environment for tomorrow. To understand and plan for possible future change the Analysis Unit, part of the Evidence Function, operates a strategic analysis programme to identify big, cross cutting issues which could affect our delivery both now and in the future. This article describes how our analysis is used to inform Natural England's corporate priorities and the partnership working required with Defra and other agencies to access the evidence we need to make informed decisions about the future.

Strategic Analysis

The world around us is in a constant state of change. Strategic analysis helps us to think about what is changing and why. It asks how significant the changes could be for the natural environment and Natural England's outcomes[34] and what our response should be.

Strategic analysis focuses on the big, long term picture. This means asking questions about what social, technological, economic, environmental and political changes might happen, over the next 20 years, which could affect the natural environment and our ability to deliver environmental outcomes.

The evidence base for strategic analysis

Our evidence comes from two sources:

- Horizon scanning through a Defra-led futures research partnership with the Centre for Environmental Risks and Futures (CERF) at Cranfield University's School of Applied Sciences;
- An internal process of tracking new developments and thinking among key policy actors. These include government departments, academic institutions, think tanks and non-governmental organisations.

Working with Natural England's environmental specialists, we use the evidence to think through the implications for the natural environment and how we might respond to the risks and opportunities that may arise. The next two boxes explain a little bit more about our evidence bases and their contribution to strategic analysis outputs and products for colleagues across Natural England.

[34] Natural England's four outcomes are: A healthy, well-functioning natural environment; People are inspired to value and conserve the natural environment; Sustainable use of the natural environment; and A secure environmental future

The Defra futures research partnership – horizon scanning

The Defra-led futures research partnership with CERF commenced in 2011. It is a £1.8million project, supported by 12 partner organisations, including Natural England. One of the main outputs of the partnership is a Newsletter based around 13 'key factors' which reflect the most important topic areas shaping the future of the environment and partner organisations' interests by scanning a wide range of public and scientific media[35].

Examples of key factors include: consumer attitudes and behaviour; energy supply and demand; agriculture and rural communities; health and wellbeing; land use and land management and climate, environment and biodiversity.

The last CERF Newsletter identified the top five reoccurring cross cutting themes as:

- The preservation of Biodiversity
- New frontiers in resource extraction
- The growing importance of social spaces
- Climate change adaptation
- Disease and pathogen outbreaks

This year Natural England commissioned some bespoke scanning to look at which emerging issues had the potential to impact on our four outcomes. From this scanning, our analysis led to the development of five major themes which could impact on the natural environment in the future – called strategic challenges. These are:

- The degree to which our environmental goals are challenged by broad based issues e.g. climate change
- The application of technology in the achieving conservation goals
- Public engagement with; and more active involvement with the environment
- Should we review the way we 'do' conservation in what is an increasingly dynamic natural environment?
- The interdependence between resource security and a healthy, well functioning environment.

The Analysis Unit are in the process of studying these challenges in more depth as responding to these long term significant issues will help Natural England better prepare for future change. The insights from this work will feed back into NE's corporate planning cycle through refreshes of our Strategic Context and in scoping our long term evidence needs.

[35] Key words or 'tags' for horizon scanning information can be searched for via The Risk and Futures Partnership at Cranfield University. For more information on current research, or to request access to results, please contact: Fiona Lickorish, Principal Research Fellow – Horizon Scanning and Futures (f.lickorish@cranfield.ac.uk) or Anna Rathé (a.a.rathe@cranfield.ac.uk).

Tracking Key Policy Actors

Policy actor scanning is undertaken by members of the Analysis Unit and tracks short term intelligence from a range of policy actors from government departments, academic institutions, think tanks and non-governmental organisations. Using a standard template for data capture and a system of internal quality assurance, the policy actor scanning gathers information on cross-cutting themes which could impact on the Natural Environment and continues to build on our evidence base. By regularly reviewing this evidence we can determine whether a topic requires a deeper analysis – one such example being the strategic analysis of the Natural Environment White Paper.

Case study: Strategic analysis of the Natural Environment White Paper's implications for Natural England's business

The Natural Environment White Paper (NEWP) - titled 'The Natural Choice: securing the value of nature' - was launched in June 2011. It is the first comprehensive statement of government policy on the environment for over 20 years and signals a significant shift in the direction of environmental policy.

Natural England's Analysis Unit assessed the potential implications of the White Paper for Natural England's business. This internal report - 'The Natural Environment White Paper: The Natural Choice: Analysis of its implications for Natural England's delivery' - is the result of a comprehensive analysis of the implications of the NEWP for Natural England's delivery programmes.

The analysis was wide ranging but stated that the main implications for Natural England's delivery from NEWP require us to:

(a) bring resources and expertise from across delivery teams to maximise the delivery of benefits from ecosystem services over large scale targeted areas and
(b) achieve greater and more effective engagement with communities in all our work across our outcomes whilst remaining focussed on delivery.

Other policy actor scanning feedback analysis[36] supports the strategic challenges picked up by CERF, such as The Environmental Audit Committee report on a Green Economy or the think-tank Policy Exchange report on Nurturing Nature. However, this evidence base allows for strategic analysis of material relevant to business continuity too such as analysis of Civil Service Reform or the EU Commission's 2013 work programme.

[36] For more information on Natural England's strategic analysis work and policy actor mapping please contact: james.markwick@naturalengland.org.uk or rachel.bathurst@naturalengland.org.uk

Other more in-depth futures research from 2011/12 includes:

a) Future Scenarios for Marine Planning

The UK's marine environment is becoming increasingly utilised for fishing, energy, and ecosystem services. As such, the Marine Management Organisation (MMO) led a scenario-building project with Cranfield University to:

- Develop and understand a range of plausible future scenarios;
- Test current/ new policies against the scenarios to see if they are likely to be effective in the future;
- Identify challenges or opportunities that may arise in each scenario; and
- Create a focal point for debate and to support long-term planning in the marine environment.

Initial research focused on the East of England inshore and offshore planning areas over a twenty-year period, but will be used to inform policy making and planning throughout the UK.

b) Alternative Futures for River Basin Management

Natural England is on the steering group of a project led by the Environment Agency to develop alternative future scenarios focused on river basin management. The project considers the possible behaviour changes regarding level of governance and attitudes towards consumption. The scenarios will build a robust perspective on the long-term challenges to the water environment and help the Environment Agency and its stakeholders to test and develop management strategies for the environmental outcomes they want to achieve.

c) Green Food Project

The Green Food Project is a Defra co-ordinated, but external partner led, investigation of the issues surrounding the challenge of increasing food production and environmental quality, simultaneously. With Defra and Natural England, CERF Futures was asked to analyse an aspirational 'successful scenario', developed by Defra and partners describing an ideal food system and an overarching goal for 2050. CERF has led two workshops and a number of expert interviews to understand the actions and intermediate milestones that place the 'successful scenario' within reach. The work provides broad recommendations for decision makers concerning long-term impacts on the food system, as well as highlighting challenges and opportunities for political, technological, social, environmental, economic and legislative progress in a way that will inform discussion and development on policy issues.

That's all very interesting, but how does this feed into delivery?

Strategic analysis informs Natural England's corporate planning cycle by providing intelligence and insight (**what** it could mean for us) for the regular refreshes of our Strategic Context. This document explains the external conditions within which we are operating and the most significant policy themes that will affect our delivery. The Strategic Context is then used to inform Natural England's Delivery Framework 2012-2020 (which sets out **what we will do**) and subsequent Corporate Plan[37] (which describes **how we will do it**).

For copies of the CERF quarterly Newsletters or further information regarding Natural England's involvement in futures research please contact: helen.doran@naturalengland.org.uk

[37] The Corporate Plan 2012 – 2015 can be viewed at: http://publications.naturalengland.org.uk/publication/1147887?category=11001

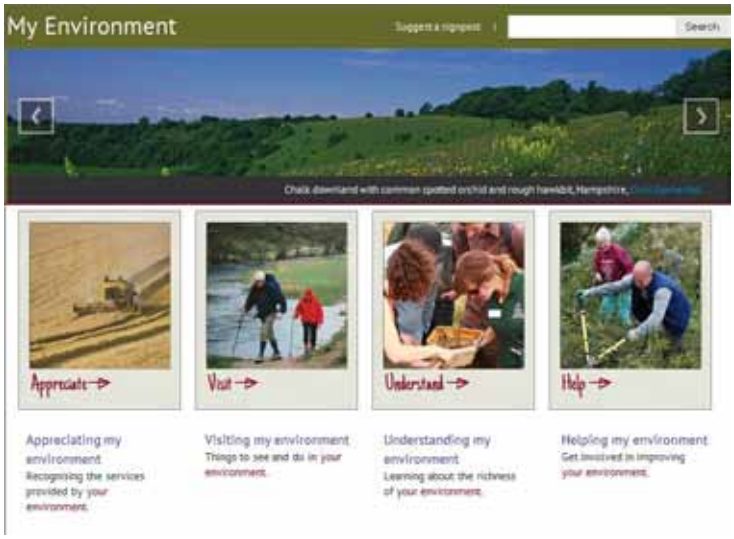
16 Making our data available

Natural England aims to make its environmental data as accessible as possible. We do this in the interests of transparency and to ensure that our evidence base is available to all stakeholders from scientists, government bodies and commercial companies to local partnerships, voluntary groups and individuals.

Our evidence base is made available through a range of different mechanisms. We provide internet-based interactive maps of environmental information (MAGIC and Nature on the Map) and ran the UK Biodiversity Action Recording System (BARS) until 2012, when the Joint Nature Conservation Committee (JNCC) took over as lead partner. We support greater provision of species data through the National Biodiversity Network and we routinely publish details of our evidence programme through our Live Evidence Register that is available on the Natural England website.

We also make over 100 Geographic Datasets available for download, as well as key monitoring datasets such as the Monitor of Engagement with the Natural Environment (MENE) survey data. This year has seen a number of step changes in the way we publish and publicise our data. Wherever possible we now make data available for commercial and non-commercial reuse under the Open Government Licence. The Open Government Licence provides a simple, free and perpetual licence for reuse, which makes it very simple for others to reuse our data and we believe this will allow new innovative uses of our data.

We have also piloted a new participative interactive map service, which allows users to comment on and improve the data that we provide as well as upload their own information. Technology like this can support local participation in decision making and we plan to make more use of approaches like this in the future. We also now routinely "tweet" to let people know about new publications and data updates and these have achieved a relatively wide following (in comparison to other tweets by Natural England) and we have revamped our Evidence Publications Catalogue.



We do recognise though that the range of different sources of environmental information can be confusing and that there are gaps in the information base that people need, for example, to help them get closer to their local environment and to nature. We will be delivering the commitment that was detailed in the Natural Environment White Paper, to provide a My Environment online service to help local people and communities find the information they need to allow people to explore, enjoy, protect and help improve nature in England. The service will start as web pages but will also be offered through other channels such as smart phone apps.

A simple signposting service was made available in December 2012 to help people find existing sources of information about the natural environment. Users will be able to rate that information and provide feedback on what else they require. Additional services will follow, including the ability to create maps of your local environment and add your own data. We are also upgrading the current MAGIC service to provide users with an up to date experience and to allow us to expand the services to meet future needs.

We strive to improve the quality and value of key datasets such as our protected site boundaries and habitat inventories. Current work in progress includes the application of "positional accuracy improvements" to protected site boundaries. We are also in the early stages of revamping our current separate habitat inventories and incorporating them into a single habitat inventory layer that will clearly identify each habitat and remove duplications between different layers, as well as providing the opportunity to improve the quality of the current datasets.

Case studies

MAGIC was a partnership project (including Defra, Natural England, English Heritage, Forestry Commission, Communities and Local Government and Marine Management Organisation) to develop the first web-based interactive map service to bring together environmental information from across different government organisations.

10 years after its launch over 3000 people a day use the service and these users generate more than 9 million maps a year from 188 different datasets. MAGIC is used for a wide variety of purposes ranging from the provision of information to land managers, for example, about the new Nitrate Vulnerable Zones and Environmental Stewardship, by schools, local authorities and by the geo-caching community. Users can choose which datasets they want to see on their map, can search by place names and post codes, carry out automated checks to see what's important in an area and they can view and download data.

Nature on the Map is Natural England's internet mapping application, which provides a choice of maps about nature and our work. In 2011 over 750 people a day used the service to access maps about:

- Nature Reserves and Country Parks (including National and Local Nature Reserves)
- Agri-environment Schemes to improve wildlife on farmland
- Sites which are protected because they are special for wildlife or geological features
- Wildlife habitats that are rare or threatened.

Nature on the Map has been designed to be easy to use. It has a simple set of navigation tools and the user can click on the map to access information about the location clicked. The example below shows the Sites of Special Scientific Interest (SSSI) map. By clicking on the SSSI boundary (shown in green on the map) you can find information such as the name and condition of the site.

The **National Biodiversity Network (NBN)** is a UK partnership initiative working to facilitate increased availability and use of information about wildlife (primarily species occurrence records). Natural England is a founding member of the charitable Trust which champions the NBN. Over the last decade the initiative has produced a framework of shared standards and tools which help capture, collate, qualify share and make use of species records.

The **NBN Gateway** is the web-based portal which provides access to species data mobilised by the NBN partnership. In August 2012 the NBN Gateway was sharing just under 80 million records held across 766 datasets.

The NBN provides an efficient way for Natural England to access species data from a wide range of sources as well as share those we hold ourselves. The NBN partnership continues to strive towards greater efficiency and effectiveness through ever more collaborative approaches to gathering, sharing and using data.

The **Biodiversity Action Reporting System** has been a feature of UK Biodiversity reporting for the past decade. More commonly referred to as BARS, the web-based system offers a way for local and national groups, organisations and partnerships to record specific actions they are taking to benefit habitats and species within the UK. Natural England is a founding partner and has had a lead role in its development and use over the last 12 years.

An entirely new version of the system was released in April 2012 and work is underway to build its content. Natural England is preparing an import of data representing management in place as part of agri-environment agreements. Natural England is also coordinating data contribution work by a range of other key biodiversity partners.

The system has a formal role to play in monitoring and reporting progress towards achieving national biodiversity objectives as part of the England biodiversity strategy, Biodiversity 2020. BARS can be used to explore the distribution of action within an interactive map and a range of cumulative summaries can also be quickly generated from the action records with various filters available.

For many years we have published interactive maps of environmental information for use by the public and other organisations. To date these map services have been designed to meet our own needs to make environmental information publically accessible. They have also been developed using traditional geographic information system technology that can be difficult for non-experts to use and is relatively expensive. We recognised the need to make our services participative (to allow the exchange of information with local communities), accessible (in areas where users do not have broadband) and easier to use and recently piloted a new Interactive Map service.

The objectives for the pilot were to develop a simplified, cost-effective framework for participative interactive maps and to seek feedback on the approach from potential users. We were able to publish a map of our current habitat inventories that users could comment on, add information that they had seen in their local environment and upload documents and photographs for everyone to be able to see.

17 Acknowledgements and Further Information

The successful development and delivery of many of the projects described in this report is dependent on maintaining strong partnerships with a wide range of local and national environmental stakeholder organisations including local records centres, conservation organisations, landowners and tenants. We are grateful to all the organisations who participate directly or indirectly in the delivery of our monitoring programme. Most importantly, many projects draw heavily on observations from volunteer recorders. Their contribution to our knowledge of the environment cannot be understated.

We are particularly grateful to Phil Smith of the Environment Agency for providing the article on monitoring the Catchment Sensitive Farming Scheme. The remainder of the articles have been produced by Natural England staff working in the Evidence, Land Management, Landscape and Biodiversity and Marine functions including Jen Ashworth, Andrew Baker, Liz, Bingham, Lesley Blainey, Andrew Cooke, Kathryn Dawson, Helen Doran, Sarah Escott, Oli Grafton, Phil Grice, Rob Keane, Andy Nisbet, Amanda Pearce, Chris Pirie, Keith Porter, Debbie Russell, Neil Sherwood, Gemma Smith, Pete Stevens, Margaret Street, Phillipa Swanton, Erica Wayman and Andy Webb.

Full details of Natural England's Evidence Programme can be found on our **Live Evidence Register**, and should you require further detail on any of the monitoring work described in this report , please contact us via our **Evidence Programme mailbox**.

Front cover: Vegetation monitoring on Old Winchester Hill, Hampshire.
© Natural England/Neil Sherwood

NATURAL ENGLAND

Natural England is here to secure a healthy natural environment for people to enjoy, where wildlife is protected and England's traditional landscapes are safeguarded for future generations.

www.naturalengland.org.uk

Catalogue Code: NE408

Natural England publications are available as accessible pdfs from: www.naturalengland.org.uk/publications

Should an alternative format of this publication be required, please contact our enquiries line for more information: 0845 600 3078 or email enquiries@naturalengland.org.uk