Natural England's climate change risk assessment and adaptation plan (2015)

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NATURAL ENGLAND

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Preface

Climate change has long been recognised as a major threat to our environment, society and economy. Temperature has risen by about 1 °C in the last century, and is projected to continue rising, and rainfall patterns are changing. At the same time, sea level rise threatens our coastlines, causing erosion and inundation, and we are experiencing periods of extreme weather, leading to floods, droughts and heat waves. It is difficult to attribute individual events to climate change, but patterns are starting to emerge, especially for heavy rain storms, and the impacts of extreme events are a tangible example of the risks we face. Adapting to climate change and tackling its causes are therefore essential for the well-being of our environment and society.

This report is an update of Natural England's Climate Change Risk Assessment and Adaptation Plan, produced under the 'reporting power' of the Climate Change Act 2008 and published in 2012. It assesses the climate change related risks to our work and sets out how we will respond them. It includes actions that we can take to build resilience and help the environment to withstand change, but also recognises that the natural environment is dynamic and in some cases change is inevitable; so we will have to plan and manage for this.

While this report is primarily about responding to risks, it is important to recognise that there are also opportunities to manage the environment in ways that, as well as benefiting conservation, can help to reduce the impacts of climate change on people. For example, management of vegetation within catchments can help to reduce flooding by absorbing excess rainfall and reducing run-off, and can be an alternative to 'hard' engineering. Catchment management using natural vegetation can also reduce vulnerability to drought. Green spaces can help to reduce temperatures within urban areas and allowing the development of coastal marshes can help to protect against sea level rise.

The way we manage the natural environment can also help to mitigate climate change. Some habitats, particularly woodlands, wetlands and blanket bog are important carbon sinks and play a vital role in management of carbon dioxide, the most important greenhouse gas. Good habitat management, together with new habitat creation and restoration, can provide cost-effective means of reducing greenhouse gas concentrations, and Natural England has an essential role in delivering and supporting this.

Looking to the future, we are working with partner organisations across government, the private and charitable sectors to recognise the value of our natural capital and develop new approaches to managing it sustainably. Climate change adaptation and mitigation are essential elements of this.

1. Introduction

Natural England has undertaken a detailed mid-term review of its Climate Change Risk Assessment and Adaptation Plan (2012). We have achieved significant progress in implementing the 93 actions set out in our original Adaptation Plan, but there are still many areas of our work which require focussed attention. We have also adopted a new organisational structure, with a stronger emphasis on local teams. We have therefore used the opportunity of the mid-term review to develop an updated Adaptation Plan, which takes into account what we have already achieved, but provides a renewed focus around some priority actions, tailored to our new organisational structure. The mid-term review also enables us to incorporate actions which reflect new evidence on climate change impacts and best practice in delivering practical adaptation.

2. Background: Natural England and Climate Change

Natural England is a Non-Departmental Public Body, whose role is to conserve and enhance the natural environment for its intrinsic value, the wellbeing and enjoyment of people and the economic prosperity that it brings. Natural England was formally established on 1 October 2006 by the Natural Environment and Rural Communities (NERC) Act.

Our purpose, as set out in the NERC Act, is "to ensure that the natural environment is conserved, enhanced and managed for the benefit of present and future generations, thereby contributing to sustainable development". The Act states that this purpose includes:

- Promoting nature conservation and protecting biodiversity;
- Conserving and enhancing the landscape;
- Securing the provision and improvement of facilities for the study, understanding and enjoyment of the natural environment;
- Promoting access to the countryside, open spaces and encouraging open air recreation; and
- Contributing in other ways to social and economic wellbeing through management of the natural environment.

Our role is to advise and support the government's wider strategic policies and fulfil aims and objectives agreed with the Department for Environment, Food and Rural Affairs (Defra). In doing this we work closely with Defra, its Arm's Length Bodies (including the Environment Agency, Forestry Commission and Marine Management Organisation) and a wide range of partners across government, civil society and the private sector.

The Climate Change Act (2008) contains an Adaptation Reporting Power. This gives government the power to direct some organisations, those that have responsibility for critical infrastructure and services that people depend on every day, to report on how they have assessed the risks of climate change to their work, and what they are doing to address these risks. The Reporting Power is the primary lever available to government to ensure that organisations are aware of and preparing for the risks from climate change, in order to ensure that services essential to the country are secure for the long term future.

In addition to the organisations that were directed to report in the first round of the Reporting Power, a number of organisations voluntarily agreed to report. Natural England volunteered in the first round, because of the importance of climate change to our work, and the role we can play in tackling it. In a second round of reporting, a range of other organisations were invited to voluntarily report.

Climate change needs to be taken into consideration in all of Natural England's work for a number of reasons:

- **Fulfilling our statutory purpose to conserve and enhance the natural environment.** The natural environment is vulnerable to climate change. The Terrestrial Biodiversity Climate Change Impacts Report Card (2013) summarised the latest scientific research on observed changes in the natural environment that can be attributed to climate change and identified potential future trends. The Marine and Water Report Cards also highlighted similar changes for the marine and water environments. In combination, the projected changes are already having and will continue to have an increasingly significant impact on the landscape and ecosystems that are used and enjoyed by people. The evidence clearly shows that climate change presents a serious threat to the achievement of Natural England's objectives and its statutory purpose and we must respond in order to do our job effectively.

- **Delivering government policy and meeting statutory requirements.** Climate change adaptation is a statutory requirement of the Climate Change Act (2008) and the government approach is set out

in the National Adaptation Programme (2013) which commits Natural England to various actions to support adaptation of the natural environment. It is also required by the Biodiversity 2020 Strategy and the Common Agricultural Policy / Rural Development Programme. For us, this means incorporating adaptation to the risks presented by climate change into the management plans for our designated sites, National Nature Reserves (NNRs) and other responsibilities such as National Trails, agri-environment scheme delivery and Land Use Planning advice.

- **Supporting business and community resilience.** Our partners and customers, including national and local government are concerned about the impacts of climate change on communities and businesses; with the impact of extreme events such as flooding being of particular concern. Resilience is an important concept and one in which Natural England can use its expertise to help, whether at farm business-level or working with local planners on a catchment approach to reduce flood risk. There is a growing external recognition of the role that environmental management such as green infrastructure and catchment management can play to support adaptation.

3. How climate change is addressed within Natural England

Climate change affects almost all of our areas of responsibility, so it is essential that climate change adaptation is embedded in our wider work to protect and improve the natural environment at a local level. To enable this to happen a small group of nationally based based staff with specialist expertise provide leadership and coordination on climate change issues for the organisation, including developing the evidence base and tools and resources to support local Area teams and other national staff. This team also provides advice to government and other external partners and ensures we play our part in meeting national commitments, for example under the National Adaptation Programme.

For 2015-16 Natural England's Corporate Plan identifies the following priorities:

- To deliver on the core Biodiversity 2020 ambitions – in part by enabling a successful launch of the new Countryside Stewardship scheme;
- To make real progress on the ambitious programme of marine designations;
- Accelerated delivery of the England Coast Path;
- Effective delivery of planning and licensing duties and, through this, supporting sustainable economic growth.

Within this context two major challenges for climate change adaptation are 1) to ensure that we deliver our part of the Biodiversity 2020 commitment to ecosystem restoration contributing to climate change adaptation and mitigation and 2) to ensure that Countryside Stewardship delivers its cross cutting aim of climate change adaptation and mitigation. Much work remains to be done in both these areas.

Natural England's staff structure

Since April 2014, Natural England has focused its staff and resources more around local delivery, creating 14 Area teams to deliver across all Natural England's statutory remit including:

- biodiversity conservation, including Sites for Special Scientific Interest, Marine Conservation Zones, environmental land management schemes and landscape-scale initiatives;
- landscape and geological conservation, including partnerships with protected landscapes and designating new geological SSSIs;
- advice and licensing to developers, regulators, land managers and planning authorities to help deliver sustainable use on land and sea; and
- access and recreation work, including working with local authorities and landowners to create the England Coastal Path and increase the value of NNRs to local communities and the natural environment.

Area teams are also working at a landscape scale to build resilience into the wider countryside, are delivering in rural and urban areas for people and places and are securing the future protection of our national and internationally designated sites on land and at sea. Understanding climate change risks are therefore critical to Area team delivery.

Our national teams provide support and guidance to the Area teams across the wide remit of Natural England's work and cover:

- Terrestrial biodiversity
- Landscape, access and geodiversity
- Sustainable Development
- Marine
- Innovation and reform
- Evidence
- Specialist services

Understanding the strategic implications of climate change is important to all of these teams, alongside identifying ways in which specific identified climate change risks might be addressed.

4. Our Climate Change Risk Assessment

In 2012 Natural England undertook a climate change risk assessment of our objectives using a standard methodology and a wide range of evidence sources, including the scientific literature and UKCP09. We have undertaken a light touch review of this to reflect recent changes in scientific understanding. This assessment identified the following risks and opportunities:

- The importance of a risk to the delivery of our objectives based on their potential vulnerability to direct or indirect climate change impacts.
- The proximity of that risk (the nearness of the point in time at which we estimate that impacts will occur) to assess whether the risk could be managed under a business as usual approach or required specific action.
- The effort and resources required to respond.
- The time period required for an effective response.
- The likely positive and negative side-effects of a response on other objectives.

Since 2012, there has been further research to develop our understanding of the risks to the natural environment of climate change, some of which has been directly commissioned and published by Natural England. In undertaking this mid-term review, we have re-examined the priority risks identified in our 2012 report, to confirm their validity. Our assessment is that our priority risks remain valid and our confidence in the strength of evidence has increased.

Priority risks to Natural England's objectives

We have identified eight over-arching risks to Natural England's objectives and statutory purpose, which are listed below together with a summary of the evidence which underpins those conclusions.

i. Threats to conservation and recovery of priority threatened species and habitats

- Many species are unable to track changing climate space, as species tend to live within defined limits of temperature and precipitation. With climate change, the geographical position of these limits will change such that Species Recovery and Biodiversity Action Plan (BAP) objectives become compromised; particularly for species at the southern limits of their distribution in the England.
- Increases in soil moisture deficits and droughts. Climate change projections indicate reductions in summer precipitation and increased evapotranspiration. Habitats such as mires which are dependent on wet conditions are potentially at greatest risk, but the character of other habitats including woodlands and grasslands could see a shift in the balance between different species. Wildfire risk may also become greater in these conditions. There is significant uncertainty in projections of precipitation and interactions with winter rainfall and catchment hydrology are critical. There is, however, potential for a major impact even under present conditions; so this is a priority risk.
- Changes in interspecies interactions. Changes in climate can affect the productivity and survival of species in addition to changing the timing of their annual cycles. As a result species may alter their interactions with other species through changes in competitiveness, predator-prey relationships, parasitism and disease. A key issue is any change in the establishment or spread of non-native species including invasive species, pests and pathogens.
- Acidification in marine environments, resulting from high carbon dioxide concentrations in the atmosphere, threatens sensitive species and may lead to change in community structure. Although strictly not a climate issue, it is tightly linked because of the common causation in carbon dioxide emissions.
- Effects of hydrological extremes, particularly droughts, on freshwater ecosystems can threaten species of conservation concern.
- Policy and market responses to the global effects of climate change, primarily around the sustainability, supply and cost of food and energy.

ii. **Threats to the condition of protected sites (Sites of Special Scientific Interest (SSSI), NNRs, MPAs and Natura 2000 sites)**

- Tipping points in the interactions between climate and ecosystem responses may result in sudden loss of designated features. Tipping points may be crossed as a result of an extreme climatic event or series of events that push an ecosystem into an alternative stable state. An ecological "regime shift" could, for example, arise from a storm surge and coastal flooding event that transformed a coastal reed bed habitat into a salt marsh. Understanding the proximity of tipping points is an important area of research.
- Gradual change will reduce our ability to maintain our current SSSI objectives as habitat and species features adjust from those given in the citation. In the future it may mean that our current designations fail to protect habitats and species because the guidelines/legislation which support them do not reflect the current and future changes expected in the environment.
- Interactions between different aspects of environmental change combine to degrade protected sites. Climate change will interact with all the other pressures on ecosystems, including land use change, pollution and invasive species. These complex interactions are poorly understood and have the potential to reduce the capacity for designated features to adapt autonomously or to influence human adaptation interactions.

iii. **Threats to the conservation and enhancement of landscape character**

- Climate change could lead to significant changes in landscape character (including its historic environment, geological and biodiversity components) and the potential loss of some valued landscape features. Unless we understand the dynamic nature of landscapes and the potential impacts of climate change, this will compromise our ability to advise on the conservation and enhancement of landscape character.
- Our statutory role in relation to conserving and enhancing the special qualities of protected landscapes may need to adapt as the special qualities for which National Parks and AONBs were originally designated change or are lost.

iv. **Threats to sustainable land and sea management**

- Changes in rainfall patterns and intensity increases risks of soil erosion and diffuse pollution of fresh and coastal waters.
- Increased temperatures and acidification will affect fisheries and recreational use of the marine environment, in some instances to the detriment of our objectives.
- Changes in agricultural and land use practice in response to climate change (such as intensification, renewable energy), may lead to the unsustainable use and management of land, soils and water. This could have a negative effect on our incentives schemes and advice programmes, making it harder for us to secure the protection of vital ecosystem services.

v. **Threats to the protection of the natural environment through incentive schemes**

- Increased incidence of more extreme weather events compromises the ability of land managers to meet agri-environment objectives whilst maintaining farming businesses. For example, flooding damage to farm infrastructure and habitats managed under Environmental (Countryside) Stewardship.
- Warmer, drier summers and increased fire risk threaten the ability of land management to provide effective management to maintain priority habitats such as peatland.
- Changes to species abundance and distribution, and the composition of communities will make existing Countryside Stewardship programme options and prescriptions less effective.
- Sea level rise affecting inter-tidal and coastal habitats make existing scheme options and prescriptions unviable.

vi. Threats associated with working with partners and local communities

- Potential human responses to climate change at national and international scales, including resistance to change, or desire to adapt in ways that damage the natural environment.
- Particular pressure on the coast where sea level rise and extreme events will increase coastal erosion, increasing the demand for hard defences.
- Increased demand for engineered flood solutions could lead to conflicting interests and questioning of Shoreline Management Plans and other spatial planning policies.

vii. Threats to our delivery of planning and sustainable land use responsibilities

- Unsustainable abstraction of water due to summer drought in water stressed areas may have a negative effect on designated sites and priority habitats and make it harder to secure new high quality conservation areas.
- Unsustainable responses, especially at the coast, which do not use an ecosystem approach, are likely to have adverse impacts on priority habitats or designated sites.

viii. Threats to access and engagement work

- Increased erosion of access routes including National Trails which will lead to increased maintenance requirements.
- Increased risk of wildfire from hotter, drier summers on areas of statutory open access land, resulting in prolonged closures of areas of open country to the public.
- Increased coastal erosion and flooding will result in "rollback" of the new Coastal Path and spreading room, but could restrict coastal access in some locations.

Potential opportunities

The risk analysis also identified a number of possible opportunities and these are also embedded within our Adaptation Plan. Most of these will need positive action to realise the potential benefits and this is an important element of adaptation. The most important potential opportunities include:

- Some priority species habitats might thrive under increasingly warmer and drier conditions, particularly those on drier heathland and grassland habitats.
- Some priority species and habitats may thrive through changes in interspecific interactions, for example increased competitive advantage.
- The opportunity to conserve rare and threatened species colonising new locations. These are likely to be those with southerly distributions.
- There is an opportunity to facilitate landscape change in ways that create valuable new landscapes that are more resilient to climate change and deliver improved benefits for society (sense of place, biodiversity and other ecosystem services).
- Increased opportunities to engage with society to help people understand that landscapes are inherently dynamic and to identify the best ways to accommodate future changes.
- Opportunity to develop advice and incentives for land managers to support sustainable management of the soils and water that underpin both ecosystem services and agricultural production.
- Opportunity to develop advice and support for farmers and marine stakeholders (e.g. fisheries, coastal tourism) seeking to adapt their business in a sustainable way.
- Climate change highlights the importance of a healthy natural environment and leads to a better understanding of ecosystem services by our partners and society. This means that measures to reduce current pressures on biodiversity, soil, water and the coast become higher priorities. This provides greater opportunity for Natural England to influence planning and agricultural land use and to deliver socio-economic adaptation and the development of better habitat networks and habitat creation, supporting a more joined approach.

- Opportunities for emissions mitigation through managing greenhouse gases and carbon stores within the natural environment, to increase the quality of these natural assets and their capacity for climate change adaptation.
- Opportunity to secure improved management of woodlands and other habitats providing inputs for energy crops or anaerobic digestion, to ensure that these mitigation initiatives are consistent with adaptation of the natural environment.
- The potential to bring forward innovative, environmentally beneficial development and a balance of land use appropriate to local climate adaptation requirements; providing a strong impetus for the delivery of multi-functional green infrastructure.
- Greater interest in using natural environmental solutions to help communities adapt to climate change. This may increase the provision of greenspace, street trees and water bodies increasing recreational opportunities.
- Increasing areas of land allocated for flood attenuation, particularly near settlements, could lead to the availability of greenspace near to where people live.
- Increased awareness and interest in the natural environment and in climate change impacts as a local, tangible issue may make it easier to engage people with the natural environment and to take action, for example, through volunteering.

5. What we achieved to date in implementing our Adaptation Plan

Over the last 2½ years, a significant amount of time has been spent building Natural England's evidence base on climate change and developing a series of tools and resources for our own staff and those of other organisations to implement. Key outputs have included:

- **Climate Change Adaptation Manual:** evidence to support nature conservation in a changing climate (2014) - produced in partnership with the RSPB, the Environment Agency and the Forestry Commission, this 220 page report summarises the latest evidence to identify the potential climate change impacts for 27 habitats and a range of suitable adaptation responses. The manual also provides a range of more general reference material including links to key evidence documents, explanation of adaptive management and a section on ecosystem services. A series of workshops have also been held to help conservation practitioners, including Natural England staff, use the manual. There are plans to develop the manual to include new evidence on species, historic environment features, green infrastructure and access.

- **National biodiversity climate change vulnerability assessment tool:** a GIS tool based on a 200 x 200 metre grid, This tool assesses priority habitats for their overall vulnerability to climate change by analysing their sensitivity to climate change and their adaptive capacity. Maps can be produced at various spatial scales and can be manipulated to assess the impact of increasing buffer zones, or new management agreements on overall vulnerability. This tool is being actively used by Natural England partners including Nature Improvement Areas (NIAs), Areas of Outstanding Natural Beauty (AONBs) and local authorities; and is one of the targeting layers used in the new Countryside Stewardship scheme. The tool is also being used by a variety of Natural England staff including Area teams and NNR staff.

- **National Character Areas (NCA):** In April 2014 Natural England completed a major project to create new up to date profiles for all 159 NCAs. Each NCA profile now includes a climate change section which identifies the main risks and opportunities to the features and ecosystem services identified in the profile. In addition nine detailed vulnerability assessments of individual NCAs have been published which also identify potential adaptation actions. These studies were for the following NCAs:
  - Cumbria High Fells
  - The Broads
  - The Shropshire Hills
  - Dorset Downs and Cranbourne Chase
  - Sherwood
  - South East Northumberland Coastal Plan
  - Humberhead Levels
  - South Downs National Park
  - North Kent

  The NCA profiles are a key tool for our Area team staff in highlighting areas particularly vulnerable to climate change impacts. Climate change considerations are also being included in individual NCA Countryside Stewardship targeting statements.

- **Terrestrial Biodiversity Climate Change Impacts Report Card (2012-13):** This is a concise, accessible summary report, underpinned by a series of detailed reviews. Natural England led the development of the report card including the editing of reviews and drafting of the summary on behalf of the Living with Environmental Change (LWEC) Partnership who include the Environment Agency and Defra. The Report Card was a close collaboration with over 40 academics working in the field of climate change and the natural environment and brings together the latest scientific research and evidence on the

observed and projected impacts of climate change on terrestrial biodiversity. The Report Card is proving an important resource for Natural England staff, but also policy and decision makers in the public, private and third sectors. An updated version of the Terrestrial Biodiversity Climate Change Report Card is planned for 2015. Natural England also contribute to the Marine and Water Report Cards.

- **Support to the National Adaptation Programme (NAP) and Climate Change Risk Assessment (CCRA):** We provided support and input to Defra in developing the National Adaptation Programme, particularly the Natural Environment theme. We have 16 actions in the NAP that we lead and have completed or made good progress on all of them. We have input into the CCRA through our first Climate Change Adaptation Plan and Risk Assessment and more directly through contributions to and writing chapters for the CCRA evidence report.

- **Training:** We have developed a series of training packages for our staff including e-learning through our intranet service. Support and training is available to individual teams within Natural England and there is a Climate Change Network to support knowledge exchange in the organisation.

- **Partnership working:** We have continued to build strong relationships with our partners including the Environment Agency, Marine Management Organisation and Forestry Commission. We play a key role in supporting Defra with the delivery of the National Adaptation Plan, actively support and contribute to the Climate Change Risk Assessment (CCRA) and support the Climate Change Adaptation Sub-Committee. We work very closely with LWEC, Climate UK, NGOs and academic institutions to support climate change research and sharing of good practice.

Natural England is also beginning to embed climate change thinking into its mainstream delivery. Key areas of success include:

- Incorporation of climate change into the new agri-environmental scheme launched in 2014 (Countryside Stewardship).
- Development of a methodology to incorporate climate change into National Nature Reserve Management Plans using the CMSi software, using our NCA profiles and Adaptation Manual.
- Work to deliver Biodiversity 2020 Objectives 1c and 1d, which seek to support adaptation through the restoration and protection of key priority habitats.
- Incorporation of climate change adaptation and ecological network research into the Improvement Programme for England's Natura 2000 Sites (IPENS) project, to plan for a better future for our Natura 2000 sites.

There are also areas of challenge for Natural England in the next few years which will require resource and effort to embed climate change in delivery. These include:

- Incorporating climate change considerations within protected sites.
- Supporting our Area teams to work with local partners to consider climate change within spatial planning decisions, particularly in regard to the use of green infrastructure.
- Incorporation of climate change considerations within marine protected areas and our wider work on sustainable seas through the Marine Strategy Framework Directive.
- Working to help deliver Biodiversity 2020, particularly Outcome 1d.
- Ensuring the new Countryside Stewardship programme maximises the opportunities to secure climate change adaptation benefits.

A detailed list of the work we have undertaken since 2012 to deliver our Climate Change Adaption Plan is listed in Appendix 1.

6. Our Adaptation Priorities for 2015-17

We have used our mid-term review to produce a more focussed Adaptation Plan which concentrates on a series of key priorities that can be easily communicated to our local Area Teams and national teams. The actions identified are those which we believe build on our successes, and will not only address some of the challenges and risks we have identified, but are likely to have the most significant impact in terms of Natural England's ability to consider and address climate change risk in its delivery.

The summary table below provides a list of twenty four actions which have been arranged around our delivery priorities. The eleven actions identified in blue font are those actions in which the responsibility for delivery is equally shared between national and local Area teams. A small group of national staff with climate change expertise will maintain overall responsibility for coordinating the delivery of these actions and reporting. They will also continue to maintain a strategic overview in seeking to address the risks presented by climate change to the natural environment and Natural England's objectives.

A more detailed version of this table which links the actions to the risks identified and the actions already delivered to address these issues can be found in Appendix 2. This table also provides more detailed information on the overall ownership of each action and the teams who will support its delivery.

Action Text in blue are actions that will require input from Area Teams	**By December 2017**
Biodiversity	
We will continue to incorporate measures to address climate change risks into the roll-out of our National Nature Reserve (NNR) Management Plans.	Around one fifth of Natural England NNR plans are reviewed each year. By December 2017 more than 3/5ths of NE's NNRs (currently totalling 143 but subject to change) will have been reviewed taking into account climate change considerations. We will develop a similar methodology to that for NNR habitats to address risks to notified species based on recent research. We will also address risks to other types of features, such as access and historic structures, as these issues are included within the Adaptation Manual. We will continue to use our NNRs as demonstration sites for adaptation techniques.
We will ensure climate change is factored into the review of the National Nature Reserve estate and future acquisition plans.	Climate change will have been considered in the strategic review of NNRs and in the consideration of any future extensions, acquisitions and disposals; including our support for NNRs managed by other organisations. We will consider how our work on species, refugia and ecological networks could be applied to the role NNRs play as donor and recipient sites for species translocation and introduction.

Action Text in blue are actions that will require input from Area Teams	By December 2017
We will design, implement and promote agri-environment scheme options which deliver climate change adaptation benefits.	We will develop monitoring to enable us to assess uptake of the climate change relevant options within Countryside Stewardship's targeted areas, as part of the overall monitoring programme. We will consider the evidence as the Rural Development Plan for England (RDPE) proceeds and review the content and payment rates of relevant options. We will up-skill our advisers to make them aware of how to use climate change relevant options to help manage risk.
We will develop our understanding and further support projects around farm resilience to the impacts of climate change, whilst also linking to relevant initiatives such as Catchment Sensitive Farming.	We will work with Defra to ensure climate change adaptation is included within guidance material and within messages and actions.
We will work to help deliver Biodiversity 2020, in particular Outcome 1d: restoring at least 15% of degraded ecosystems as a contribution to climate change mitigation and adaptation.	We will work with a range of partners and through Defra's Terrestrial Biodiversity Group to help deliver this outcome, as part of the overall Biodiversity 2020 Strategy. We will continue to support partnerships in providing climate change information when doing the Biodiversity 2020 1c self-assessment process.
We will build appropriate climate change adaptation into our conservation objectives for marine, biological and geological protected sites (e.g. for SSSI favourable condition tables, and European Site Conservation Objectives).	We will take account of climate change when developing thinking on strategic objectives e.g. favourable conservation status (FCS) and appropriate wild bird populations. We will develop a methodology and approach for assessing the risks of climate change to notified features and how these might be addressed through a hierarchy of management measures, conservation objectives or notification amendments.
We will ensure that climate change is considered in the designation of new biological and geological SSSIs and in the review of SSSI boundaries and citations.	We will develop a work programme to undertake a review of designated sites linked to the existing review programme of SSSI boundaries and citations. We will continue to progress our Detailed Notification Review (DNR) work and develop longer term solutions though our Designations Strategy and Conservation Strategy work.
We will ensure that climate change vulnerability is used to inform the conservation status of species and their subsequent management.	We will update our Adaptation Manual to include recent research on the potential impacts of climate change on species.
Landscape and Geology	
We will ensure that climate change threats and opportunities are reflected within our landscape and landscape character work.	We will continue to promote the use of National Character Area Profiles. We will develop further research proposals to improve our understanding of the impacts of climate change on landscape character.

Action Text in blue are actions that will require input from Area Teams	By December 2017
We will continue our proactive partnership work with the National Parks, Areas of Outstanding Natural Beauty (AONBs) and Nature Improvement Areas (NIAs), to share knowledge and expertise on climate change adaptation.	We will continue to input into the National Park and AONB Management Plans and NIA Action Plans. We will continue to engage on climate change issues with National Parks England.
We will assess how we can build climate change adaptation planning into landscape scale conservation, translating that into action on the ground.	We will publish practical advice based on our research work on ecological networks and refugia.
Marine	
We will seek to consider and develop indicators of climate change where issues overlap with our statutory marine monitoring programme, to assess condition of features in Marine Protected Areas (MPAs). These include changes in salinity, sea temperature and acidity where highlighted as important supporting processes to features.	We will continue to deliver our marine monitoring programme to assess the condition of features in MPAs. We will consider indicators for temperature and salinity where considered important supporting processes for MPA features, with an established baseline for the indicators used.
We will ensure that climate change adaptation principles are factored into the management of Marine Protected Areas by considering ways to increase resilience of climate-sensitive species and habitats.	We will consider ways to increase resilience of climate-sensitive features during development of management measures for protected sites. We will also assess the utility of producing a marine-focused climate change adaptation section for a future version of the Climate Change Adaptation Manual.
Access and Engagement	
We will work with our local partners to ensure that the implications of climate change are factored into the maintenance and infrastructure plans for the management of National Trails and Coastal Access.	The next version of the Climate Change Adaptation Manual will include specific access related advice to support the management of National Trails and Coastal Access.
We will work to gain a better understanding of the implications of climate change on our partners' management of greenspace and access infrastructure, directly and through the changes in visitor and recreational patterns, and disseminate research findings to support the work of partners.	The next version of the Climate Change Adaptation Manual will include a specific section on the management of recreational access and the management of green infrastructure. The Living with Environmental Change (LWEC) Health Report Card, which is in development, will bring together extant research on the health impacts of climatic change. It is due for publication in 2015.
Land use Planning	
We will support local authorities to ensure strategic plans take account of climate change impacts on the natural environment.	We will continue to promote the vulnerability mapping tool and Adaptation Manual to partners and local staff.
We will work with our partners to deliver sustainable approaches to coast and flood management which showcase the value of natural interventions to deliver adaptation.	We will disseminate the findings of our research project on the impact of flooding and where appropriate incorporate key findings into our revised Adaptation Manual.

Action Text in blue are actions that will require input from Area Teams	By December 2017
We will build and promote the value of Green Infrastructure in supporting climate change adaptation by working with partners to share good practice.	We will continue to promote the vulnerability mapping tool and Adaptation Manual to our green infrastructure and land use partners. The next version will include specific material for those audiences.
Research, evidence and monitoring	
We will continue long term programmes that monitor the impacts of climate change on ecosystems, habitats and species; and how people engage with the natural environment.	We will continue with our monitoring programmes, particularly the Long Term Monitoring Network at NNRs and use the data to inform our delivery work, partners and the public. We will work with Defra to define specific monitoring and reporting requirements for the RDPE. We will continue to support Monitor of Engagement with the Natural Environment (MENE) and explore further opportunities to develop the survey and trend data to better monitor the impacts of climate change on visits, attitudes and behaviours.
We will continue to build an evidence base to inform ourselves and our partners to changes in ecosystems, species distribution and abundance caused by climate change.	We will continue to provide thought leadership and to work closely with our partners in government, academia and conservation organisations. To develop our evidence base and to share research findings through publications and events on climate change impacts and adaptation with respect to landscape, biodiversity and society's responses to these.
We will continue to maintain strong relationships with the climate change research community and contribute to the marine and terrestrial biodiversity report cards	We will work with the research community to update and publish the terrestrial biodiversity report card in 2015 and seek to develop a process for future updates. We will support a climate change interest group in partnership with the British Ecological Society. We will continue to support the Marine Climate Change Impacts Partnership through Phase III of its business plan (2015-2020).
Corporate Services / Learning and Development / Estates	
We will provide basic training on climate change and develop practitioner level training appropriate for particular roles.	Introductory climate change training will be integrated with wider training on strategic issues available to all Area teams. Practitioner training will up-skill staff to deliver climate change commitments within their specific roles, for example farm advice.
We will develop and work through our internal climate change network to support knowledge transfer and delivery.	We will continue to expand the climate change network with a programme of regular events to disseminate new research and practical advice and to support Area teams.
We will ensure resilience planning for key parts of the Natural England NNR estate to enable us to cope with disruption from extreme weather events.	Plans to respond to extreme weather events (flooding, heat waves) will be included in our NNR Emergency Response Plans.

Appendix 1: Review of Progress in implementing Natural England's Climate change risk assessment and adaptation plan (2015) - Summary of Success and Challenges

Land Management

Key successes

- Natural England has worked with Defra to embed climate change into NELMS (Countryside Stewardship) and the advice package for advisers that accompanies it.
- We have used our climate change biodiversity vulnerability mapping tool to inform the spatial targeting of the incentive scheme.
- Our 2014 Adaptation Manual is providing our advisers and other land managers with advice on adaptation for particular habitats.
- In October 2014 we piloted a bespoke climate change training course for our own land management advisers (Dorset & Hampshire Area team) and will seek to roll this out to other Area teams.
- We continue to work with Climate Ready and the Farming Advice service on addressing land management issues.
- We have developed some experimental work on farm resilience planning.
- We have undertaken research around land management and carbon sequestration, including a soils mapping project that was used to inform NELMS (Countryside Stewardship) spatial targeting.
- We have undertaken research to look at the impact of agri-environmental schemes on climate change resilience.

Challenges

- Ongoing uncertainty around the implementation of Countryside Stewardship options.
- Weakening of 'greening component' of Single payment.
- Requirement for ongoing training of Natural England land management advisers on climate change adaptation.

Landscape and Biodiversity

Successes

- All 159 National Character Areas (NCAs) include a statement about climate change threats and opportunities
- Nine reports published on individual National Character Areas exploring their climate change vulnerability and suggested adaptation actions – include the Humberhead Levels, South East Northumberland. Sherwood Forest and Shropshire Hills.
- Development and use of the National Biodiversity Climate Change Vulnerability Mapping tool by ourselves and by other partners including Nature Improvement Areas and Local Authorities.
- Engagement with Nature Improvement Areas to ensure they consider climate change in their action plans
- Production of 2012-13 Terrestrial Biodiversity Climate Change Impacts Report Card on behalf of LWEC, working with 40 academics
- Research work undertaken on landscape scale conservation actions and links to adaptation actions undertaken in England and in partnership with other European conservation agencies.

Challenges

- Limited engagement with National Parks and AONBs on climate change issues.
- No work undertaken on landscape change and implications of climate change, due to cuts in the Countryside Quality Counts programme.
- Limited progress on addressing how climate change might be incorporated into conservation objectives of SSSIs (and other designated Natura 2000 sites), and implications for boundaries and citations.
- To identify resources to develop action plans that effectively deliver Biodiversity 2020 Objective 1c and Id which seek to deliver climate change adaptation through habitat restoration.

Marine

Successes

- 27 Marine Conservation Zones have been approved, which will contribute towards developing an ecologically coherent network of marine protected area. These will form a key mechanism to respond to the challenges of climate change within the marine environment.
- Natural England is a partner and contributor to the Marine Climate Change Impacts Partnership, with NE staff attending six-monthly Steering Group meetings and contributing to Working Group projects on climate change and fisheries adaptation.

Challenges

- There is a need to consider how Marine Protected Areas could be made 'climate smart' to address adaptation and respond to changes brought to the sites as a result of climate change, including changes in species community composition.

Access and Engagement

Successes

- The coastal access scheme has been developed with climate change in mind, providing 'spreading room' to adapt to future erosion and flooding of the designated route.
- Worked with Met Office to update the Fire Severity Index applied to the management of open access land.
- Implications of climate change and health including the implications for outdoor recreation has been considered in the new LWEC Climate Change Impacts Health Report Card.
- Training has been provided to access and engagement staff on climate change issues.

Challenges

- To ensure that the potential implications of climate change on the management and maintenance of National Trails is considered in the new sustainable management model for National Trails.
- Develop material on the management of access and recreation for the Adaptation Manual.

National Nature Reserves

Successes

- Natural England piloted a methodology to incorporate climate change into the review of NNR Management Plans which includes vulnerability of the site's features and links to the relevant sections of the Adaptation Manual. It is currently being rolled out as part of the five year programme of NNR Management reviews.
- 30 NNRs have now joined the Long Term Monitoring programme measuring climate, soils, vegetation, and fauna.

Challenges

- Ensure that climate change is considered in the review of NNRs been undertaken to consider future extensions, acquisitions and disposals.
- Incorporate work being undertaken on species, refugia and ecological networks to look at the role of NNRs as donor and recipient sites for species translocation and introduction.

Sustainable Land Use

Successes

- Climate Change has been included in the Land Use toolkit used by our Sustainable Land Use / Development advisers through climate change and green infrastructure specific pages.
- A research project has been commissioned to evaluate the impact of our planning advice that will also include climate change issues.

Challenges

- There is a need to develop bespoke training for our land use advisers for use in strategic planning, pre-application work and final submission stages.
- Inclusion of material on green infrastructure and spatial planning in the Adaptation Manual.
- Look for opportunities to promote the role of green infrastructure in adapting the urban environment to climate change.

Strategic Actions

Successes

- Climate Change is a key theme in the new Strategic Direction.
- An annual report is produced to show progress in implementing Natural England's Adaptation Plan.
- We have produced climate change training modules on Skillsport and developed a Climate Change Network to share knowledge and research on climate change across the organisation.

Challenges

- To ensure that there are climate change targets incorporated in the annual corporate plan to support implementation of the Adaptation Plan.
- Support Area teams by offering support and bespoke advice for their staff.

Evidence

Successes

- Research projects have also been undertaken on resilience. These areas are linked to refugia, invasive species, habitat drought impacts, use of palaeo-ecological evidence, landscape characteristics and the development of ecological networks; with some academic papers published on these topics.
- Research work has also been done to look at the approach of nature conservation practitioners in selecting adaptive responses in the UK and in Europe, with papers produced and key findings incorporated within the adaptation manual.
- Natural England and its partners have been involved in a major research programme on Species Conservation which reviewed the conservation threat assessment of the s41 list of species of principal importance for conservation in England. The report is due for publication shortly and the findings will be used to inform our future work and will be incorporated into the Adaptation Manual.
- A new research project began in August 2014 to look at the impacts of storms and flooding on the natural environment.

Challenges

- More focused monitoring is required to assess the effectiveness of adaptation measures.
- Development of phase 2 of the Adaptation Manual to incorporate our knowledge around green infrastructure, access, spatial planning, marine and the historic environment.

Business and Estate

Successes

- Development of Carbon Standards to support the management of travel and estates to reduce our carbon foot print.
- Extreme weather events are included within Natural England's business resilience planning.

Challenges

- Natural England no longer manages its offices, which are now incorporated within the wider Defra estate.

Appendix 2: Natural England's climate change risk assessment and adaptation plan - Action Plan: January 2015-December 2017

This table sets out an update of the reduced suite of actions drawn together for this report. If you require an update on all of the actions listed in our first report, please contact Natural England.

Lead team in bold

Actions	Climate Change risks addressed	Responsibility for delivery	What have we achieved December 2014	What will we achieve by December 2017
Biodiversity delivery				
1. We will continue to incorporate climate change risks into the roll-out of our National Nature Reserve (NNR) Management Plans.	Threats to the condition of protected sites. Threats to conservation and recovery of priority threatened species and habitats.	**Landscape, Access & Geodiversity – NNRs** Climate Change team Area Teams	We have piloted a methodology to incorporate climate change into the review of National Nature Reserve (NNR) Management Plans which includes vulnerability of the sites' habitat features and links to the relevant sections of the Adaptation Manual. This is being rolled out as part of the programme of five year reviews of NNR Management plans. This approach has been piloted on four reserves and has subsequently been rolled out as reserve plans undergoing scheduled reviews. It includes a research function (see action 19). Climate change considerations have also been included in the NNR Management Standard being rolled out to all NNRs in England, including those managed by other organisations.	Around one fifth of Natural England NNR plans are reviewed each year. By December 2017 more than 3/5ths of NE's NNRs (currently totalling 143 but subject to change) will have been reviewed taking into account climate change considerations. We will develop a similar methodology to that for NNR habitats to address risks to notified species based on recent research. We will also address risks to other types of features, such as access, and historic structures as these issues are included within the Adaptation Manual. We will use our NNRs as demonstration sites for adaptation techniques.
2. We will ensure climate change is factored into the review of the National Nature Reserve estate and future acquisition plans.	Threats to the condition of protected sites. Threats to conservation and recovery of priority threatened species and habitats.	**Landscape, Access & Geodiversity – NNRs** Area Teams Climate Change team	Consideration of climate change threats and opportunities have been written into the process for assessing possible extensions (or reductions) to our NNR estate (particularly coastal and wetland sites).	Climate change will have been considered in the strategic review of NNRs and in the consideration of any future extensions, acquisitions and disposals; including our support for NNRs managed by other organisations. We will consider how our work on species, refugia and ecological networks could be applied to the role NNRs play as donor and recipient sites for species translocation and introduction.
3. We will design, implement and promote agri-environment scheme options which deliver climate change adaptation benefits.	Threats to sustainable land management.	**Terrestrial Biodiversity** Area Teams Climate Change team	Natural England has worked with Defra to embed climate change into the New Environmental Land Management Scheme (NELMS), now titled Countryside Stewardship and the advice package for advisers that accompanies it. We have used our climate change biodiversity vulnerability mapping tool and Climate Change Adaptation Manual (2014) to inform the spatial targeting of the incentive scheme and to provide advice to advisers and other land managers on adaptation actions for particular habitats. In October 2014 we piloted a climate change training course for our own land management advisers (Dorset & Hampshire Area team) and will seek to roll this out to other Area Teams in 2015. We also ran a number of regional workshops to introduce the Climate Change Adaptation Manual to reserve managers and advisers.	We will develop monitoring to enable us to assess uptake of the climate change relevant options within Countryside Stewardship's targeted areas, as part of the overall monitoring programme. We will consider the evidence as the Rural Development Plan for England (RDPE) proceeds and review the content and payment rates of relevant options. We will up-skill our Countryside Stewardship advisers to make them aware of how to use climate change relevant options to help manage risk.

Actions	Climate Change risks addressed	Responsibility for delivery	What have we achieved December 2014	What will we achieve by December 2017
4. We will develop our understanding and further support projects around farm resilience to the impacts of climate change, whilst also linking to relevant initiatives such as Catchment Sensitive Farming.	Threats to sustainable land management.	Area Teams **Terrestrial Biodiversity** Climate Change team	We have developed some experimental work on farm resilience planning, based on research around land management and carbon sequestration, including a soils mapping project that was also used to inform NELMS spatial targeting. Through this work we have developed the concept of Farm Resilience Plans and have put these forward to Defra for potential inclusion in the advice element of the new RDPE. We continued to work through our Catchment Sensitive Farming programme and also through the Climate Ready and Farming Advice Service.	We will work with Defra to ensure climate change adaptation is included within guidance material and within messages and actions. We will continue to work through our Catchment Sensitive Farming programme and also through the Climate Ready and Farming Advice Service.
5. We will help deliver Biodiversity 2020, in particular Outcome 1d: restoring at least 15% of degraded ecosystems as a contribution to climate change mitigation and adaptation.	Threats to sustainable land management.	**Terrestrial Biodiversity** Area Teams	We have developed site level criteria for defining the areas that will help deliver this outcome that we are progressing with a range of organisations such as the Nature Improvement Areas, Wildlife Trust, National Trust, National Parks, AONBs and RSPB. These principles set a clearer framework for the types of locations and areas we are envisaging for restoration of degraded ecosystems.	We will work with a range of partners and through Defra's Terrestrial Biodiversity Group to help deliver this outcome, as part of the overall Biodiversity 2020 Strategy. We will continue to support partnerships in providing Climate Change information when doing the Biodiversity 2020 1C self-assessment process.
6. We will build appropriate climate change adaptation into our conservation objectives. (e.g. for SSSI favourable condition tables, and European site Conservation Objectives).	Threats to the conservation of features of protected sites. Threats to conservation and recovery of priority threatened species and habitats.	Area Teams **Terrestrial Biodiversity**	We have adopted a Strategic Standard for European site Conservation Objectives; ensuring they remain responsive to wider environmental change. .	We will take account of climate change when developing thinking on strategic objectives e.g. favourable conservation status (FCS) and appropriate wild bird populations. We will develop a methodology and approach for assessing the risks of climate change to notified features and how these might be addressed through a hierarchy of management measures, conservation objectives or notification amendments.
7. We will ensure that climate change is considered in the designation of new SSSIs and in the review of SSSI boundaries and citations	Threats to the conservation of features of special interest. Threats to conservation and recovery of priority threatened species and habitats.	Area Teams **Climate Change team**	We are implementing our Notification Strategy which includes a boundary and feature review of all SSSIs, ensuring that climate change adaptation is considered. We have input into revised SSSI guidance that will take into account climate change issues.	We will develop a work programme to review designated sites linked to the existing review programme of SSSI boundaries and citations. We will continue to progress our Detailed Notification Review (DNR) work and develop longer term solutions though our Designations Strategy and Conservation Strategy work.
8. We will ensure that climate change vulnerability is used to inform the conservation status of species and their subsequent management.	Threats to conservation and recovery of priority threatened species and habitats.	**Climate Change team**	Natural England have been partners in a major research project looking at the implications of climate change for over 3,000 species. The Risks and Opportunities report will be published in 2015.	We will update our Adaptation Manual to include recent research on the potential impacts of climate change on species.

Actions	Climate Change risks addressed	Responsibility for delivery	What have we achieved December 2014	What will we achieve by December 2017
Landscape & Geology				
9. We will ensure that climate change threat and opportunities are reflected within our landscape and landscape character work.	Threats to the conservation and enhancement of landscape character.	**Landscape, Access & Geodiversity** Climate Change team Area Teams	All 159 National Character Areas include a statement about the climate change threats and opportunities for that area. We have also published nine reports on individual National Character Areas, exploring their climate change vulnerability and suggesting adaptation actions. These are for the Cumbria High Fells, the Broads, the Shropshire Hills, Dorset Downs and Cranbourne Chase, Sherwood, South East Northumberland Coastal Plan, Humberhead Levels, South Downs National Park and North Kent.	We will continue to promote the use of the NCA Profiles. We will develop further research proposals to improve our understanding of the impacts of climate change on landscape character.
10. We will continue our partnership work with the National Parks, Areas of Outstanding Natural Beauty (AONBs) and Nature Improvement Areas (NIAs) to share knowledge and expertise on climate change adaptation.	Threats to the conservation and enhancement of landscape character.	**Climate Change team** Area Teams	We have revised all of our issues papers to ensure that sound and up to date advice is embedded in all our responses to strategic plans, so that they take account of climate change. These include National Park and AONB Management Plans and NIA Action plans. We are also a member of the ENPA Climate Change Group.	We will continue to input into the National Park and AONB Management Plans and NIA Action plans. We will continue to engage on climate change issues with National Parks England.
11. We will assess how we can build climate change adaptation planning into landscape scale conservation, translating that into action on the ground.	Threats to the conservation and enhancement of landscape character.	**Climate Change team** Area Teams	We have undertaken a series of research projects on ecological networks, the role of refugia and experience from large scale conservation projects in the UK and in Europe.	We will publish practical advice based on our research work on ecological networks and refugia.
Marine				
12. We will seek to consider and develop indicators of climate change where issues overlap with our statutory marine monitoring programme, to assess condition of features in Marine Protected Areas (MPAs). These include changes in salinity, sea temperature and acidity where highlighted as important supporting processes to features.	Threats to sustainable sea management.	**Marine**	We have developed an extensive marine monitoring programme, linked to the JNCC-led marine biodiversity monitoring programme.	We will continue to deliver our marine monitoring programme to assess the condition of features in MPAs. We will consider indicators for temperature and salinity where considered important supporting processes for MPA features, with an established base line for the indicators used.
13. We will ensure that climate change adaptation principles are factored into the management of Marine Protected Areas by considering ways to increase resilience of climate-sensitive species and habitats.	Threats to sustainable sea management.	**Marine** Climate Change team	The Marine Conservation Zone (MCZ) Project has now designated 27 MCZs, and 21 are being considered in a second tranche in 2015.	We will consider ways to increase resilience of climate-sensitive features during development of management measures for protected sites. We will also assess the utility of producing a marine section for the next version of the Climate Change Adaptation Manual.

Actions	Climate Change risks addressed	Responsibility for delivery	What have we achieved December 2014	What will we achieve by December 2017
Access and Engagement				
14. We will work with our local partners to ensure that the implications of climate change are factored into the maintenance and infrastructure plans for the management of National Trails and Coastal Access.	Threats to access & engagement.	**Landscape, Access & Geodiversity** Climate Change team	We continue to implement the coastal access programme and we have ensured that adaptation of the coastal path to climate change is embedded into the overall approach. This includes specific powers in the legislation to adapt to erosion and flooding (by 'roll back' and the use of alternative routes). A new performance measure has been introduced for trail condition and work with our local partners. An audit of trail infrastructure and baseline assessment is underway.	The next version of the Climate Change Adaptation Manual will include specific access related advice to support the management of National Trails and Coastal Access.
15. We will work to gain a better understanding of the implications of climate change on our partners' management of greenspace and access infrastructure, directly and through the changes in visitor and recreational patterns, and disseminate research findings to support the work of partners.	Threats to access and engagement, greenspace and green infrastructure. Threats to human health.	Landscape, Access & Geodiversity **Climate Change team**	We have shared climate change evidence and advice through the Health and Natural Environment Digest, Green Infrastructure Partnership, Green Infrastructure Case Studies, Ecosystem Knowledge Network, our Spatial Planning responses, conferences, articles and via internal networks.	The next version of the Climate Change Adaptation Manual will include a specific section on the management of recreational access and the management of green infrastructure. The Living with Environmental Change (LWEC) Health Report Card, which is in development, will bring together extant research on the health impacts of climatic change. It is due for publication in 2015. We will continue to share evidence and tools.
Land Use Planning				
16. We will support local authorities to ensure strategic plans take account of climate change impacts on the natural environment. We will also work to ensure climate change thinking is incorporated in developing biodiversity offsetting work.	Threats to delivery of planning and sustainable land use. Threats to human health.	Area Teams Sustainable Development **Climate Change team**	The National Biodiversity Climate Change Vulnerability Assessment (NBCCVA) model has now been completed and is being promoted with our Area Teams and other local partners. We have produced climate change material for our internal Green Infrastructure and Land Use Toolkit Pages, to support our spatial planning advisers. We have input to the Biodiversity Offsetting project and its pilots.	We will continue to promote the vulnerability mapping tool and Adaptation Manual to partners and local staff.
17. We will work with our partners to deliver sustainable approaches to coast and flood management which showcase the value of natural interventions to deliver adaptation.	Threats to delivery of planning and sustainable land use. Threats to human health.	Area Teams Sustainable Development **Climate Change team**	Natural England have worked to ensure that coastal climate change adaptation issues are fully covered in guidance, toolkits and training as well as within demonstration projects; to give our staff resources to enable them to give appropriate advice to stakeholders and the wider public. We have also worked closely with the Environment Agency on flood risk management.	We will disseminate the findings of our research project on the impact of flooding and where appropriate incorporate key findings in our revised Climate Change Adaptation Manual.
18. We will build and promote the value of Green Infrastructure in supporting climate change adaptation by working with partners to share good practice.	Threats to delivery of planning and sustainable land use. Threats to work with partners and local communities. Threats to human health.	Area Teams Sustainable Development **Climate Change team**	We have worked with green infrastructure advisers to produce climate change pages for the Land Use Toolkit (an internal guidance database for our spatial planning advisers) and have promoted the Vulnerability Mapping tool to internal and external green infrastructure staff and partners.	We will continue to promote the vulnerability mapping tool and Adaptation Manual to our green infrastructure and land use partners. The next version will include specific material for those audiences.

Actions	Climate Change risks addressed	Responsibility for delivery	What have we achieved December 2014	What will we achieve by December 2017
Research, Evidence and Monitoring				
19. We will continue long term programmes that monitor the impacts of climate change on habitats and species; and how people engage with the natural environment.	Needing to have the evidence to inform action. Threats to access and engagement, greenspace and green infrastructure. Threats to human health.	**Evidence** Access and Engagement.	We are using our long term reference sites (32 sites, all but two are NNRs) to monitor habitat and species responses to climate change. A range of variables are being measured including climate, soils, vegetation and fauna. Links have been made with other organisations such as the Met Office and CEH who are using the sites for related work such as the COSMOS-UK soil moisture, temperature and solar radiation. We will use this data to inform future delivery programmes. We are also undertaking longer term monitoring projects through the environmental change biodiversity network and through partnerships with national and more local citizen science-based monitoring programmes (e.g. British Trust for Ornithology and Local Record Centres). Data is equally being generated from many of the sites for public use. Monitor of Engagement with the Natural Environment (MENE) evidence provides invaluable evidence on people's visits to the natural environment, their attitudes and environmental behaviours. We share this data and its findings with local government and others via the Public Health Outcomes Framework.	We will continue with our monitoring programmes, particularly the Long Term Monitoring Network at NNRs, using the data to inform our delivery work, partners and the public. We will work with Defra to define specific monitoring and reporting requirements for the RDPE. We will continue to support MENE and explore further opportunities to develop the survey and trend data to better monitor the impacts of climate change on visits, attitudes and behaviours.
20. We will continue to build an evidence base to inform ourselves and our partners to changes in ecosystems, species distribution and abundance caused by climate change.	Needing to have the evidence to inform action	**Climate Change team**	We continue to provide thought leadership and to work closely with our partners in government, academia and conservation organisations to develop our evidence base and share research findings on climate change impacts and adaptation with respect to landscape and biodiversity and society's responses to these.	We will continue to provide thought leadership and to work closely with our partners in government, academia and conservation organisations to develop our evidence base and share research findings on climate change impacts and adaptation with respect to landscape and biodiversity and society's responses to these.
21. We will continue to maintain strong relationship with the climate change research community and contribute to the marine and terrestrial biodiversity report cards	Needing to have the evidence to inform action	**Climate Change team**	We are working on a range of collaborative research projects including Chainspan and LWEC. We are also collating and reviewing examples of practical adaptation work with other conservation agencies across Europe under the auspices of ENCA. Results of a wider survey of conservation managers across Europe, which Natural England helped to design and coordinate as part of its role in the ENCA network has been published. We worked with academics and research organisations to produce a terrestrial biodiversity climate change impacts report card, published in 2013.	We will work with the research community to update and publish the terrestrial biodiversity climate change impacts report card (May 2015) and seek to develop a process for future updates. We will support a climate change interest group in partnership with the British Ecological Society. We will continue to support the Marine Climate Change Impacts Partnership through Phase III of its business plan (2015-2020).

Actions	Climate Change risks addressed	Responsibility for delivery	What have we achieved December 2014	What will we achieve by December 2017
Corporate services/ Learning & development/Estates				
22. We will provide basic training on climate change and develop practitioner level training appropriate for particular roles.	To have an organisation which is climate change literate	**Climate Change team** Area Teams	An on-line training package has been produced for all Natural England staff. An intermediate training package has been developed for our NNR and Environmental Stewardship advisers and has been piloted with a number of Natural England teams	Introductory climate change training will be integrated with wider training on strategic issues available to all Area teams. Practitioner training will up-skill staff to deliver climate change commitments within their specific roles, for example farm advice.
23. We will work through and develop our internal climate change networks.	To have an organisation which is climate change literate	**Climate Change team**	We have set up a Climate Change Community of Practice and network which hold regular meetings, present webinars and have access to key documents on Natural England's intranet.	We will continue to expand the climate change network with a programme of regular events (webinars), newsletters and blogs to disseminate new work, best practise and findings.
24. We will ensure resilience planning for key parts of the Natural England NNR estate to enable us to cope with disruption from extreme weather events.	Resilience of our Estate and offices	All teams	All teams are required to undertake Business Continuity Planning	Plans to respond to extreme weather events (flooding, heat waves) will be included in our NNR Emergency Response Plans.

Front cover photo:
Derwent Water, Lake District
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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.

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