6 Responses

6.1 Introduction

Chapter 5 described the pressures acting upon the natural environment. This chapter deals with the responses that have been implemented to reduce or remove the impact of those pressures and also describes the effectiveness of these responses where the evidence is available. The responses examined here are those in which Natural England and its founding bodies have been involved. There have of course been further responses to the pressures upon the natural environment in which other bodies have played a leading role. This chapter begins by providing a brief history of the conservation and enhancement of the natural environment in England.

A number of approaches or levers have been used to conserve or enhance our natural environment depending on the nature and scale of the challenge: regulation, incentives, advice, policy advocacy, and practical action. In practice, a combination of these levers has generally been employed to deal with pressures and risks and, in some cases, all five mechanisms have been required to successfully reduce the impacts of pressures. Our responses have evolved as challenges have changed over time, and as we have learned what is effective. Each section in this chapter concludes with a case study that shows how our responses are currently developing, and demonstrates the more integrated and larger scale approaches required to meet current and emerging challenges.

Assessing and evaluating the effectiveness of the mechanisms that are used to protect the natural environment is critical if we are to demonstrate the effectiveness of hard-won legislation and other policies. Indeed, for some mechanisms monitoring is actually required by the legislation. For example, the funding from the EU for agri-environment schemes under the Rural Development Programme requires recipient states to monitor impacts. Similarly, the EC Directives require member states to provide periodic information on the condition of protected sites. The monitoring of other responses is often less comprehensive. Furthermore, the monitoring often does not provide explicit evidence of cause and effect – that is, there are measures of the inputs (for example number of applications or money spent) but not the outcomes in terms of evidence of impacts on the natural environment.

6.2 An historical perspective

The protection of the natural environment has a long tradition in England. There are many ancient laws that limit the use of common land (see Section 2.5.2) and protect game species from over-exploitation. However, most of the legislation and practice that exists to conserve biodiversity, protect landscape character and promote public access and enjoyment originated in the 20th and 21st centuries.

National Parks and Access to the Countryside Act 1949
The designation of areas of land and water as protected areas has been the cornerstone of conservation strategy, not just in England but in the rest of the world. A suite of such designations was introduced under the National Parks and Access to the Countryside Act 1949. These remain central to conservation strategy in England today, although the laws and policies that regulate protected areas have evolved in the past half-century, usually to give sites greater protection.

The most extensive of these designations in terms of area are National Parks and Areas of Outstanding Natural Beauty (AONBs), which cover 23% of England (see Section 2.3.1). These areas contain our finest landscapes and their designation is intended to protect natural beauty and, in the case of National Parks, promote public access.

The 1949 Act laid a duty on county councils to prepare definitive maps of rights of way in their areas. This has proved an immense task and the Wildlife and Countryside Act 1981 introduced a system of continuous revision. While the 1949 Act did provide for the creation of long distance routes (now known as National Trails), with the first route, the Pennine Way, opening in 1965, it failed to introduce a right of open access to mountain, moor, heath and down for which walkers' groups had long lobbied. The Countryside and Rights of Way Act 2000 finally provided for a right of access for open air recreation on such land and on registered common land. The right was introduced progressively across the country as maps were prepared, with the last area being completed in October 2005.

The 1949 Act also allowed for the setting up of National Nature Reserves (NNRs), which were owned or managed by the then Nature Conservancy, now Natural England. This designation was extended in 1981 to sites of national nature conservation importance owned or managed by other competent organisations.

In 1992, the aims for NNRs were set out as being to improve their management; to use this improved management skill to assist practice elsewhere; and to make them more available for people to enjoy, involving local communities in the process. Although the aims have subsequently been restated in other words, these broad intentions have remained at the forefront of Natural England's commitment to NNRs. Chosen to be among the scientifically most important wildlife sites, NNRs also have a research purpose, and many of the methods of habitat management now used were researched upon NNRs.

Sites of Special Scientific Interest

Although Sites of Special Scientific Interest (SSSIs) were originally seen as less important than NNRs, a legal obligation to notify local authorities about their location and importance was also established in 1949. SSSIs protect terrestrial and freshwater but not marine sites. The series of SSSIs continued to grow in the decades after 1949 and, by the 1970s, national and local scientific expertise was being deployed in the systematic identification and notification of SSSIs, using the 'Criteria for Key Sites' first set out in *A Nature Conservation Review* in 1977.

During the 1970s, although general concern about the impact of agricultural intensification had increased, the Nature Conservancy had few powers to influence SSSI owners' decisions over changes in land use, other than persuasion. The climate of opinion precluded the use of available compulsory purchase powers. Thus, despite increasing recognition of their importance, SSSIs were still being actively damaged or destroyed before, during and after notification.

The central role of SSSIs in nature conservation policy was not fully established until the Wildlife and Countryside Act of 1981. Among a broad range of conservation measures, the 1981 Act required that owners and occupiers of SSSIs were notified of the sites and their scientific interest. Owners and occupiers in turn were required to notify the Nature Conservancy Council (now Natural England) if any potentially damaging operations were to be carried out, such as conversion of grassland to arable or afforestation. Initially, compensation payments were made to SSSI owners and occupiers for not carrying out potentially damaging operations (prompting some landowners to propose activities they had little intention of carrying out). Over time, this arrangement evolved into the Wildlife Enhancement Scheme (WES) for payment for positive conservation management on SSSIs.

Changes in farming practice, and the rapid spread of car ownership post-war, led to many unforeseen pressures on both National Parks and nature reserves. By the 1960s, National Parks were being seen as victims of their own popularity, and the 1968 Countryside Act gave local authorities powers to establish Country Parks. These were to be located close to major centres of population and intercept visitors who might otherwise have journeyed further into the countryside. Over 300 have been created since, often in the process opening up previously private parkland or newly reclaimed derelict land.

In recent decades, various types of neglect and mis-management have become the principal cause of damage to SSSIs. Between 2000 and 2008, Government had a Public Service Agreement target to restore 95% of SSSIs to favourable or recovering condition (Defra 2008c). This has made improving management of SSSIs one of the core conservation activities of recent years. The Countryside and Rights of Way Act 2000 not only greatly increased the area of access land for countryside visitors, but also further strengthened the protection of SSSIs. This included giving a statutory duty to public bodies to further the conservation and enhancement of SSSIs, and English Nature (now Natural England) was given powers to ensure that appropriate management of SSSIs is carried out.

International protection

Following the Ramsar Convention in 1971, there has been a steady growth in international agreements and legislation relating to nature conservation. In most cases, this has involved the designation of a series of protected areas that meet international criteria, with overlapping designations at sites that qualify under more than one set of criteria. In addition to the Ramsar sites, which are internationally important wetlands, there are Special Protection Areas (SPAs) under the 1979 EC Birds Directive, Special Areas of Conservation (SACs) under the 1992 EC Habitats & Species Directive, Geoparks and a World Heritage Site. For the most part, the sites of international biodiversity or geodiversity importance are already designated under domestic legislation – all are SSSIs apart from marine areas. However, international agreements and legislation often bring higher levels of protection. For the first time, the Birds and Habitats Directives provided a mechanism for including significant areas of marine habitat within protected areas, one of the few conservation measures for the marine environment in place.

Species protection

In contrast to the approach for habitats, the protection of many species is not easily achieved through site designations. Designation does not ensure protection – for example capturing or killing species may occur without the permission of the notified site owner or manager. Furthermore, many uncommon and threatened species occur in the wider countryside outside of protected areas.

The first English law aimed at protection of wildlife because of concern over its conservation (there is earlier legislation relating to game and pest species) was the Seabirds Preservation Act of 1869, which came into force long before the concept of the nature reserve or protected area was developed. In practice, many laws regulate the exploitation of wild species, or the control of wild and introduced plants and animals deemed to be pests. There are, for example, specific Acts of Parliament relating to Seals, Deer, Badgers and Weeds. However, the most important legal instruments in terms of species conservation are the Wildlife and Countryside Act 1981 and the Conservation (Natural Habitats &c.) Regulations 1994, which give stringent protection to some of the most threatened species in England, many of which are also of Europe-wide conservation concern. Under these laws, activities that could threaten a listed species' survival at any locality (eg disturbance including by photography, and scientific research) are illegal without a licence from Natural England. Such licences are granted only under strict conditions, to avoid damage the species' survival prospects. These laws also require the regular review of the lists of protected species, so that species of emerging conservation concern can be added to the list. Those whose status has improved can be removed from such strict protection. Later, a further series of regulations was introduced to arrest the decline of the natural environment outside of the protected areas series, including the Hedgerows Regulations in 1997, Environmental Impact Assessment (EIA) for uncultivated land and semi-natural areas in 2002, as well as the Heather and Grass Burning Regulations and Code.

Other regulatory pathways have been used to solve conservation problems, including prohibitions and regulations not linked to specific sites or species. One of the main environmental concerns of the 1960s was the impact of pesticides, in no small part due to the publication of Rachel Carson's *Silent Spring*. In Britain, work by Derek Ratcliffe and others at the Nature Conservancy on peregrine falcons showed convincingly that the decline of predators such as birds of prey and the otter was due to the build up of toxic levels of pesticides in their bodies. Despite fierce opposition from the pesticide producers and users, eventually the compelling science led to the removal from use of persistent pesticides such as DDT, and in due course dieldrin and lindane. In addition to the setting up of a mechanism of pesticide approval – the licensing and monitoring of which continues to this day – the thorough scientific investigation of the problem did much to promote evidenced-based conservation and a respect for conservationists' views in government and industry.

Agri-environment schemes

In the 1970s and 1980s, there was increasing public concern about the impact that agricultural intensification was having upon landscapes and wildlife in the wider countryside outside of protected areas. The drainage and conversion to arable crops of grassland at Halvergate Marshes in the Norfolk Broads brought this issue into focus in the 1980s, not least because much of the damaging land use change was encouraged by government subsidies to farmers. The first incentive scheme that paid farmers for managing their land in an environmentally beneficial way was set up in 1987 when five Environmentally Sensitive Areas (ESAs) were established. The ESA scheme offered financial incentives to encourage farmers to adopt agricultural practices that would safeguard and enhance parts of the country of particularly high landscape, wildlife or historical value. The ESA scheme aimed to maintain and enhance the nature conservation, landscape and historical value of the key environmental features of an area and, where possible, improve public access to these areas. In signing up to a 10- year management agreement, farmers received an annual payment on each hectare of land entered into the scheme. Between 1987 and 1994, 22 ESAs were established in four stages, including very familiar landscapes such as the South Downs and Pennine Dales, as well as lesser known areas, such as the Clun, on the Shropshire-Wales border, and the Blackdown Hills which straddle the border between Devon and Somerset. These 22 ESAs covered around 10% of England's agricultural area.

In 1991, the Countryside Stewardship scheme was launched by the Countryside Commission as a pilot scheme. Outside of ESAs, this became the Government's main scheme for enhancing the wider countryside aiming, through the payment of grants, to improve the natural beauty and diversity of the countryside; to enhance, restore and re-create targeted landscapes, their wildlife habitats and historical features; and to improve opportunities for public access.

In 2005, a national agri-environment scheme, Environmental Stewardship, was launched. This scheme is open to all farmers and its primary objectives are wildlife conservation, landscape quality enhancement, protection of the historic environment, natural resource protection and improved public access, with genetic conservation and flood management as secondary objectives. The scheme takes a tiered approach. Entry Level Stewardship (ELS) is intended to provide improved countryside management through relatively simple activities and now covers over 50% of England's farmland. Higher Level Stewardship (HLS) is more relevant to farmland that is of high environmental value and, in return for higher levels of payment, much greater commitment to natural environment management is required.

Woodland

Conservation of woodland has been strongly associated with the powers of the Forestry Commission. The Forestry Act 1967 sets out the Forestry Commission's functions, requiring landowners to apply for a licence (with minor exceptions) to fell growing trees and giving the Commissioners powers to pay grants to private landowners for the establishment and management of woodland. The original Forestry Commission objective for forestry was timber production, but by the late 1980s the natural heritage value of woodland had become increasingly recognised as important. The Forestry Commission's Broadleaves Policy of 1985 recognised that broadleaved woodland should be maintained and enhanced. The Broadleaved Woodland Grant Scheme awarded higher rates of grant than were available for planting conifers and began to reverse the trend of replanting ancient woodland with conifers.

Changes to taxation legislation in 1988 shifted the emphasis in afforestation from large-scale conifer plantations to smaller scale broadleaf planting. The trend towards more multi-purpose forestry was reinforced in the 1990s through the Biodiversity Action Plan and production of the UK Forestry Standard (Kirby 2003b).

The change in the approach to ancient woodland, started in 1985, has recently been further consolidated by the publication of the Government's policy for England's ancient and native woodland, *Keepers of Time* (Forestry Commission 2005). This states that, "The existing area of ancient woodland should be maintained, and there should be a net increase in the area of native woodland". Defra's Planning Policy Statement 9 (PPS9) also strengthens protection of ancient woodland. Restoration of important open habitats (such as heathland or peatland) that had been planted with trees during the 1950s and 1960s is increasingly undertaken and a new policy framework for this is being developed during 2008.

Protection of individual trees is administered by Local Authorities through Tree Preservation Orders (TPO) under the Town and Country Planning (Tree Preservation Order) Regulations 1969 as amended and TPO Regulations 1999. Local authorities issue TPOs, and owners need to make an application to the Forestry Commission to fell trees covered by a TPO. Planning guidance also states that "aged and veteran" trees are important for biodiversity and "their loss should be avoided".

Landscapes

The limitations of confining protection to just the 'best' landscapes became increasingly obvious in the 1980s. This led to a new approach of assessing the landscape character of every area and the publication, in 1996, by the Countryside Commission and English Nature of a map showing the Character of England, landscape, wildlife and natural features. One key use envisaged for the map was in helping to identify where and how to tailor agri-environment schemes and other delivery mechanisms to the landscape character of each area.

In the 1980s, the Countryside Commission also recognised that most open-air recreation trips were not to specific sites, but to the wider countryside, particularly close to towns, with the public rights of way network being the single most important means of enjoying the countryside. From 1987, it began promoting the opening up of this network.

Freshwater

Our rivers, streams, lakes, ponds and canals currently pose some of the greatest challenges for natural environment protection. Our freshwaters have been afforded a similar level of protection to that afforded to terrestrial habitats. For example, our largest and most important lakes are included within the Lake District National Park and many freshwaters are SSSIs, SPAs, SACs or Ramsar sites. Similarly, a number of freshwater species such as the great crested newt *Triturus cristatus* and floating water-plantain *Luronium natans* are given strict legal protection. However, these measures do not solve the problems caused by the fact that our most important freshwaters are fed by water that has previously crossed other land. Land management and other activities elsewhere in the catchment can undermine conservation activities within protected areas due to point and diffuse sources of pollution. Although legislative control of water quality goes back to the Victorian period, laws and regulations that address the most severe natural environment problems are much more recent. In the past two decades, a wide range of regulatory mechanisms was introduced, such as the Water Resources Act 1991 and Water Act 2003, which control contamination. Added impetus to solving the problems of freshwater pollution was given in 2000 by the EC Water Framework Directive, which requires member states to restore or maintain freshwaters in "good ecological condition". The regulation of recent years has meant that many point sources of freshwater contamination have been cleaned, although this task is by no means complete. In contrast, diffuse water pollution from agriculture has proved to be a recalcitrant problem. In 2006, Defra launched a Catchment Sensitive Farming programme. This is aimed at improving the water quality in 42 catchments where farming practices most severely impact upon water quality, through a combination of advice and grant schemes administered by Natural England.

Planning

In a densely settled country such as England much of our countryside and coast would be lost to development over time were it not for the Town and Country Planning system. In large part, the planning system has its origins in the years immediately following the Second World War. At that time, the rapid expansion of built development was seen as the main potential cause of damage to the countryside. A main purpose for the designation of National Parks, AONBs and SSSIs in 1949 was to identify sites where there should be a presumption in planning decisions against such development. Although in the following decades increasing weight was given to the protection of designated sites, with many potentially damaging developments on protected areas subject to public inquiry, nonetheless there was almost no statutory provision for conservation needs outside of SSSIs to be taken into account in the planning system. The situation was greatly improved in 1994 with the publication of Planning Policy Guidance 9: Nature Conservation (PPG9) which, as well as re-emphasising to planning authorities the importance of designated sites, also required them to consider wildlife outside of protected areas, both habitats and legally protected species. This was to be done primarily through Structure Plans and Local Plans, with a presumption that Environmental Assessment would be carried out over proposed development that could damage wildlife. Planning Policy Guidance 7: Planning and the Rural Economy (PPG 7) in 1992 provided guidance on the protection of National Parks and AONBs from major developments. A further significant step was taken in 2005 in Planning Policy Statement 9: Biodiversity and Geological Conservation (PPS9), which required the production of Regional Spatial Strategies and Local Development Frameworks, which give a consideration to all habitats, species and features of geological importance, both inside and outside protected areas. Most importantly, PPS9 required that places where biodiversity enhancement could take place be identified in the strategies and frameworks, along with measures of success.

Biodiversity

The signing of the 1992 Biodiversity Convention in Rio de Janeiro did not introduce new requirements for protected areas, but emphasised the need to halt the loss of global biodiversity. Progress in responding to our commitments under the Convention was rapid in the UK, and by 1994 a UK Biodiversity Action Plan (UK BAP) was published. In several important ways, this plan was a departure from established practice. Firstly, it was not prepared by government or a government agency, but was the result of a partnership that also included local government, voluntary bodies, business and the research community. The core of the work on BAP has been the delivery of conservation for priority species and priority habitats through action plans. Between 1995 and 1999, 43 Habitat Action Plans and 347 Species Action Plans were published relating to habitats and species in England. Such plans are not the only delivery frameworks for BAP. In 2002, the England Biodiversity Strategy *Working with the Grain of Nature*, was published in order to provide a framework for action in the main water and land use sectors. Local activity is co-ordinated through more than 170 Local Biodiversity Action Plans in England. Reporting on BAP activity in 2005 provided an overview of progress, and there is now a shift to a more integrated approach to habitats and species and an increase in the number of priority species in England to 943, and the number of habitats to 56.

Biodiversity funding in the UK

Biodiversity exhibits public good characteristics (i.e. it is **non-rivalrous** in consumption – one person's consumption does not reduce the amount available for others, and **non-excludible** – everyone is able to enjoy at least some of the benefits provided). This makes it very difficult for those that conserve biodiversity to earn sufficient returns on any investment. As a result, other things being equal, too few resources are likely to be allocated to biodiversity provision from society's perspective.

Biodiversity conservation in the UK is, therefore, very reliant on public funding and charitable donations. For example, recent research (GHK 2006) estimates that the cost of meeting the UK Biodiversity Action Plan targets is likely to exceed £670 million per year between 2005-2010. Public and Non Governmental Organisation (NGO) annual expenditure on biodiversity in the UK in 2005/06 was estimated at £551 million which suggests that a significant funding gap remains, despite a 60% increase in spending in real terms over the last five years.

Marine

Marine conservation has lagged behind that for our land and freshwaters, despite the high biodiversity importance of England's seas, which represent a high proportion of the shallow, flooded continental shelf of Europe. Under the National Parks and Access to the Countryside Act 1949, the only areas of sea that could be notified as SSSI were those that fell within a local authority jurisdiction. This meant that protection by designation was afforded only to a few estuaries and other relatively small inshore areas. The Wildlife and Countryside Act 1981 introduced an obligation of the Nature Conservancy Council (NCC) to notify Marine Nature Reserves (MNRs). However, the Act placed the onerous requirement on the NCC to accommodate the interests of all the other users of the sea before an MNR could be notified. As a consequence, in 27 years only one MNR has been designated in England: Lundy in the Bristol Channel. The 1992 Habitats Directive gave great impetus to marine conservation by requiring member states to notify SACs for 13 marine habitat types and 8 marine species. There are currently 28 SACs and 40 SPAs with marine components, while another 10 sites in UK offshore waters are being evaluated for their potential to become SACs.

Fishing has one of the greatest impacts upon the marine environment, particularly using trawls and other fixed gear, which leave the seabed heavily disturbed. In other parts of the world, no-take zones have been established as a mechanism for protecting special marine environments and providing a refuge where commercially fished species can breed, with the objective of replenishing commercial stocks outside the no-take zone. The first such no-take zone in England was established at Lundy in 2003, and the early signs are that it has benefited both biodiversity conservation and local fishermen.

Landscape-scale

The 1949 legislation was predominantly about protecting the best sites from urban development. We have since learnt that day-to-day management is just as important in securing the landscape and nature value of such sites. But we have also found that we need to secure the health of the natural environment as a whole if we wish to live sustainably and conserve biodiversity. Similarly, just protecting the best 20% of our landscapes leaves 80% unprotected. Recognising the character of our landscapes everywhere gives us a chance to maintain or enhance that character as necessary change, be it for urban development or as a result of changing market demands for food and fibre, takes place.

Access

In 1949, open air recreation, especially in the uplands, was for the enthusiast, not the masses, and the legislation was framed accordingly. The demands of mass car-borne visitors in the 1960s were seen as a threat to be corralled or minimised, not an opportunity to be grasped. Only when visitors stayed away en masse during the Foot and Mouth epidemic of 2001 were the benefits they brought to National Parks and the countryside generally realised. But competition for the public's leisure time has also grown since the 1960s. While open-air recreation in the natural environment is still a mass activity, it is no longer growing. As a result, if people are to enjoy the benefits to health and wellbeing that contact with the natural environment brings, and to support the protection of the natural environment in the future, simply providing the facilities will not be enough.

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6.3 Special sites and landscapes

This section assesses the evidence on the effectiveness of the designation of important landscapes and wildlife sites in conserving and enhancing their special interest.

6.3.1 Landscapes

Both National Parks and Areas of Outstanding Natural Beauty (AONBs) have, as part of their statutory purpose, to conserve and enhance their natural beauty, which includes landscape.

There is currently no national-level programme specifically for monitoring the landscape condition of National Parks and AONBs. However, using Countryside Quality Counts as an indicative measure, the majority of these protected landscapes are in good condition. At the Character Area level all of our National Parks fall within the maintaining or enhancing categories. Sixty-three per cent of the area of AONBs is considered to be maintaining its landscape character and 14% to be enhancing its landscape character.

Each National Park and AONB is expected to review and monitor its management plan every five years. There is no overall consistency with regard to indicators, so it is not possible to summarise information on a national basis. However, common condition indicators are currently being considered by National Parks and by AONBs.

National Parks and AONBs contain a large proportion of CRoW open access land (98%), common land (78%), and most Environmentally Sensitive Areas (74%). In particular, they demonstrate the inextricable links between biodiversity and landscape quality: National Parks and AONBs together cover 23% of England but contain over half (52%) of all SSSIs (27% within National Parks, 25% within AONBs).

The effectiveness of landscape designations can also be assessed using the condition of designated habitats that contribute to those landscapes (Table 6.1). However, the data for National Parks show that this evidence has to be interpreted carefully. The condition of SSSI heathlands and wetlands is better in National Parks than outside them. However, because heathlands and wetlands a) constitute such a large proportion (75%) of SSSI habitat in National Parks, and b) are in poorer condition than SSSIs overall, the condition of SSSIs in National Parks (75% favourable or recovering) is lower than that of SSSI land in AONBs (80%) and outside these protected landscapes (82%).

Table 6.1 : Condition of SSSI habitats within protected landscapes

Habitat	% SSSI area in favourable or recovering condition within NP	% SSSI area in favourable or recovering condition within AONB	% SSSI area in favourable or recovering condition outwith NP/ AONB
Coastal	70	88	92
Grassland	82	84	84
Heathland	73	75	67
Open Water	30	58	62
Wetland	74	77	57
Woodland	86	84	87
All SSSIs	75	80	82

(Source: Natural England, 2008)

Of England's 1,735 geo-features, 252 (15%) are within National Parks and 395 (23%) are within AONBs. Geodiversity sites are in better condition within National Parks (95%) and AONBs (90%) than outside them (82%).

The condition of Heritage Coasts and Biosphere Reserves can also be assessed via SSSI condition. SSSIs within Heritage Coasts (90%) and Biosphere Reserves (93%) are in better condition than SSSIs overall (80%).

A qualitative evaluation in 2006 (Land Use Consultants 2006) demonstrated that Heritage Coast teams were effective at the local level in intervening directly to conserve and enhance the coastal landscape, manage visitors and involve local communities. They gave some priority to reducing the impact of marine pollution, but otherwise focused on the marine environment less than the shoreline environment. The adoption of effective planning policies to help conserve the special qualities of Heritage Coasts has been rather patchy.

Protected landscapes can influence built development through the planning process. An analysis of land-use change in relation to development in protected landscapes over the past 20 years has shown that, within National Parks and Areas of Outstanding Natural Beauty, only two hectares of land have been converted to developed uses for every three that might have been expected in the period since 1985 (University of Sheffield 2007).

6.3.2 Nature Conservation Designations: SSSIs

Extensive use of SSSI data was made in Chapter 3 to assess the state of habitats. Here, we examine the effectiveness of the overall suite of SSSIs, designated for habitats, species and/or geodiversity, using the SSSI data as at 1 January 2008.

There are 4,114 SSSIs in England covering a total of 1,076,986 ha (8% of the total area of England). Of the English regions, the South West has the greatest number of SSSIs, while London unsurprisingly has the fewest (Table 6.2). The North West and Yorkshire & the Humber, which both have extensive upland and coastal areas, support the largest areas of SSSI, although the North East has the largest proportion of its area (one fifth) designated as SSSI. The West Midlands has the lowest proportion of its area designated as SSSI, a result largely of the absence of a coastline and relatively small areas of upland habitat.

Table 6.2 Regional distribution of SSSIs

Government Region	Number of SSSIs	SSSI area (ha)	SSSI area as % of Region area
North East	250	172,208	20
North West	440	268,987	18
Yorkshire and The Humber	374	227,012	15
East Midlands	392	165,228	10
West Midlands	442	28,557	2
East of England	565	185,240	9
London	36	5,517	3
South East	692	139,130	7
South West	969	201,730	8
Total	-	**1,076,986**	**8**

(Source: Natural England, 2008)

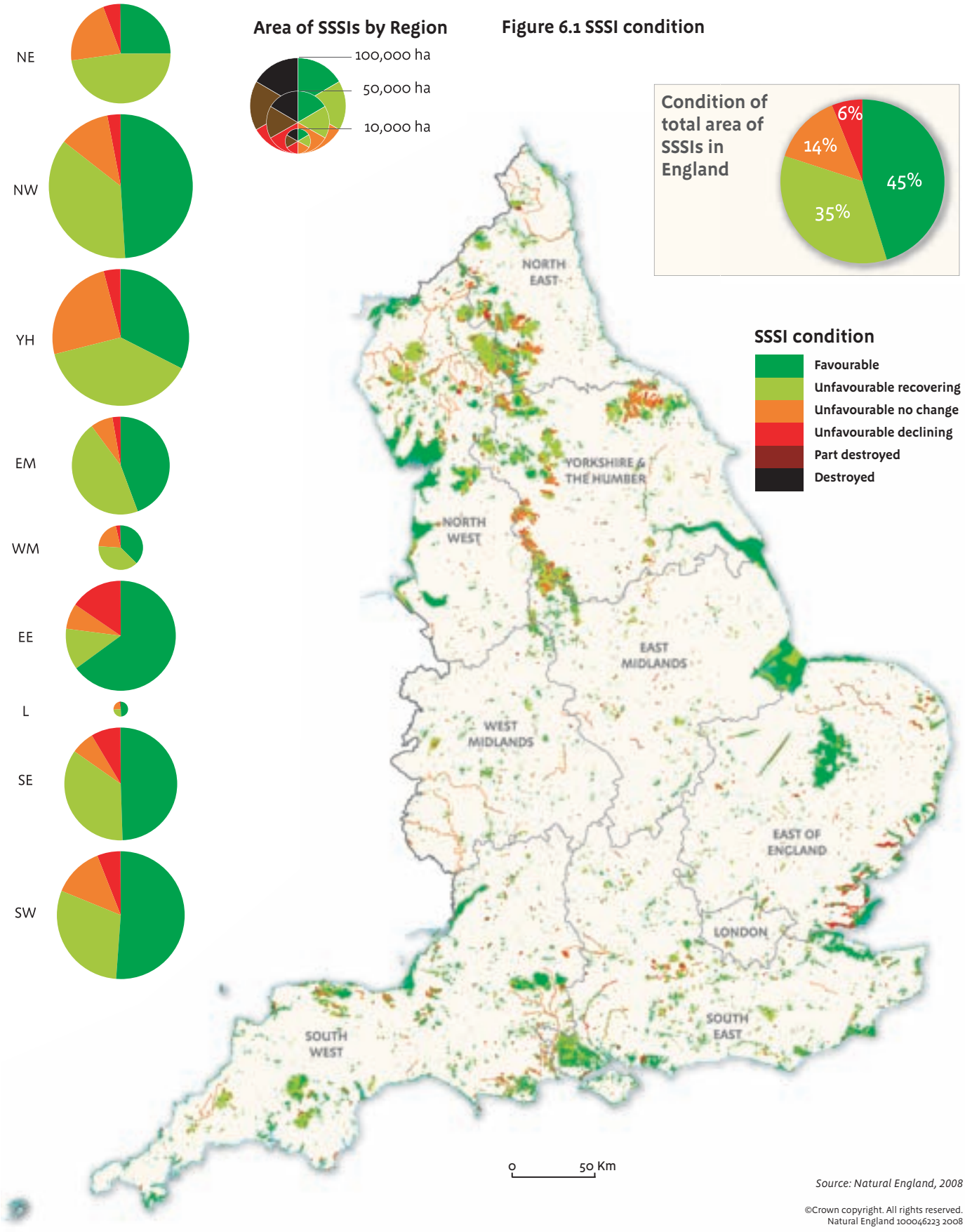
The majority of SSSIs are small, with 40% under 10 ha in size and 82% smaller than 100 ha. The largest SSSI is The Wash (62,046 ha) notified for coastal habitats and birds, and the smallest is Sylvan House Barn (0.004 ha), a lesser horseshoe bat *Rhinolophus hipposideros* roost in the Forest of Dean.

Overall, 80.0% of SSSIs by area are in favourable or recovering condition, (45.2% favourable and 34.8% recovering) (Figure 6.1). This proportion has increased from 58.3% in 2003 and 67.0% in 2005 to its current 80.0%.

Yorkshire & the Humber Region has the largest area and proportion of SSSI in unfavourable condition, due mainly to the poor condition of upland heathland and blanket bog (Figure 6.1). The East of England Region has the greatest proportion of SSSI area in favourable condition, and this is largely a result of the favourable status of two large SSSIs: The Wash and the Breckland arable SSSI.

Evidence presented in Section 3.2 demonstrates that the overall condition of habitats within SSSIs has improved since 2003. Where we are able to make comparisons at a national level, it is evident that habitats are in better condition within than outside SSSIs (grasslands and heathlands, see Sections 3.3.4 and 3.4.4). At a local level, SSSI fens in Norfolk are in better condition than fens in the wider countryside (see Section 3.8.4).

Figure 6.1 SSSI condition



Source: Natural England, 2008

6.3.3 Nature conservation designations: International sites

The term 'international sites' encompasses Special Areas of Conservation (SACs), Special Protection Areas (SPAs) and Ramsar sites. An area of 884,623 ha (6.6% of England) has at least one international nature conservation designation (Table 6.3). There are a further 247,000 ha within 16 marine SACs which fall below mean low water (5% of English waters). SACs are the most numerous international designation; SPAs are fewer but tend to be much larger.

There is regional variation in the distribution of international sites, with a much greater proportion of the northern regions being designated (Table 6.4). However, the South East and South West Regions have the largest number of SACs, and the East of England the largest number of SPAs and Ramsar sites (often the same sites with multiple designations).

Virtually all sites designated for their international importance for biodiversity are also notified as SSSI, so condition can be assessed using the SSSI data. However, for marine SACs, only the condition of those parts that are SSSI can be assessed through the SSSI condition data. Using this approach, 80% of international sites by area are in target condition (Figure 6.2), of which 45.4% is favourable and 34.6% is recovering.

Table 6.3 Extent of international nature conservation sites in England

International designation	Number	Area (ha)	% of total area of England
SAC*	240	735,152	5.5
SPA	81	713,454	5.4
Ramsar	70	360,571	2.7
Total land with at least one international nature conservation designation*	-	884,623	6.6
SSSI	4,114	1,076,986	8.1

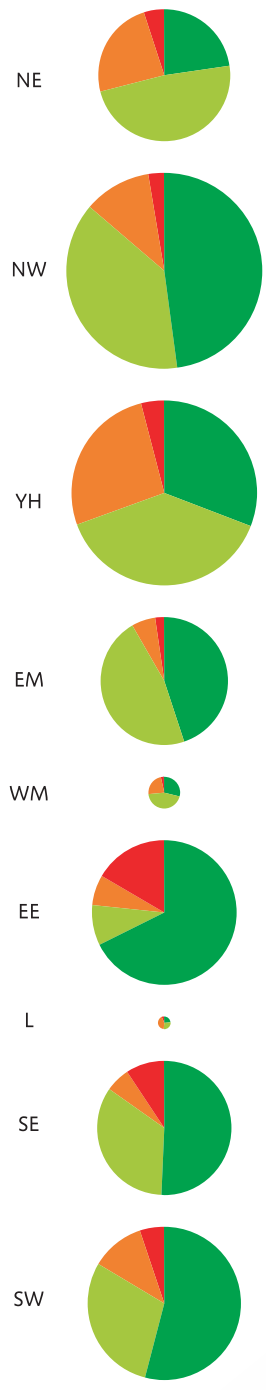
*Excludes the marine component of 16 SACs (c.247000ha)
(Source: Natural England, 2008)

In common with the SSSI condition statistics, Yorkshire & the Humber Region has the largest area and proportion of international sites in unfavourable condition, as a result of the poor condition of upland habitats. The North West and East Midlands Regions have the greatest proportion of international sites (by area) in favourable or recovering condition.

Table 6.4 Regional distribution of international designations

Govt. Region	Number of SACs	Number of SPAs	Number of Ramsar sites	Area covered by International designation*	% of Region area
NE	18	8	5	93,352	11
NW	39	9	11	188,968	13
Y&H	20	9	3	171,195	11
EM	9	3	2	89,419	6
WM	19	1	2	7,708	1
EoE	29	23	25	112,073	6
Lon	3	2	2	1,761	1
SE	51	19	16	97,638	5
SW	67	14	9	122,508	5
Total	**-**	**-**	**-**	**884,623**	**7**

*Excludes the marine component of 16 SACs (c.247000ha)
(Source: Natural England, 2008)



Area of international sites by Region

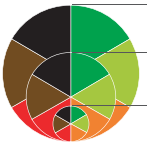
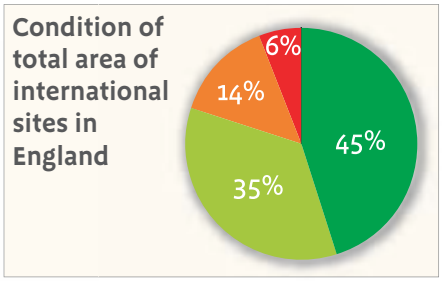
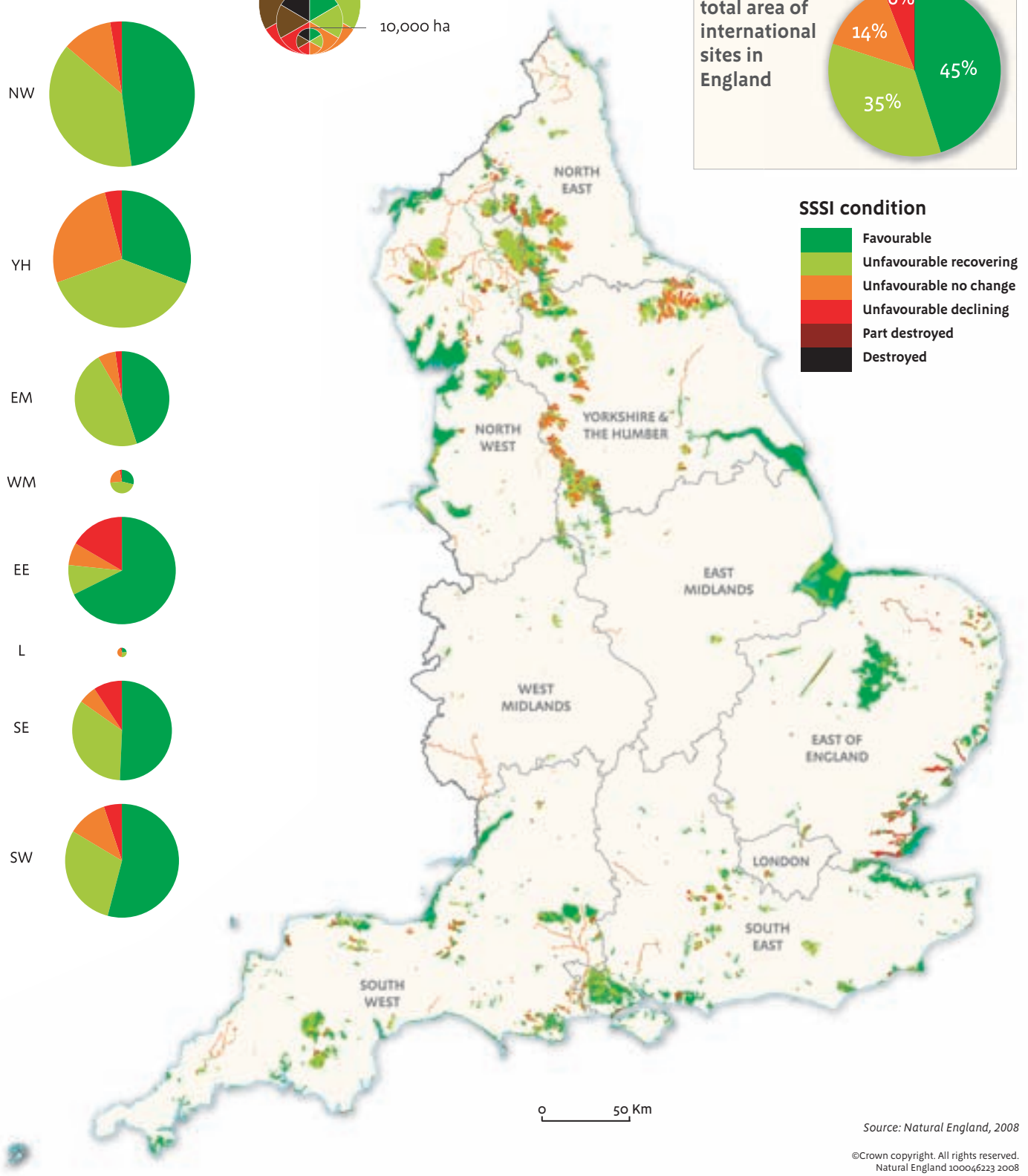


Figure 6.2 International site condition



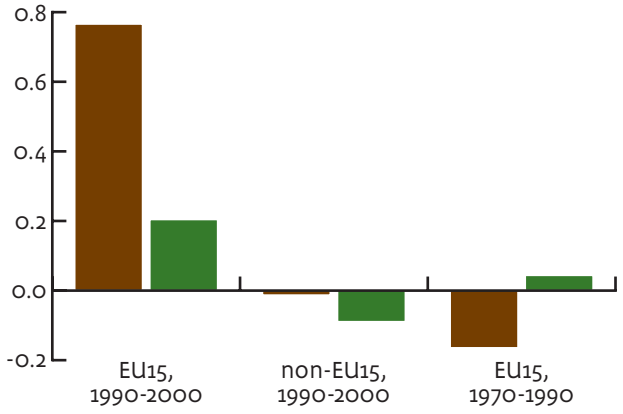


Source: Natural England, 2008

The impact of the Birds Directive

The impact of international policies on target species and habitats can be difficult to assess because the information on species numbers and habitat extent and quality is often absent or inconsistently collected. However, recent work by the RSPB (Donald *et al*. 2007) on the EU Birds Directive provides good evidence that it has been effective in conserving target bird species within the EC countries. The species listed on Annex 1 of the Directive were declining at a greater rate than other species prior to their protection, but have done significantly better afterwards (Figure 6.3). The evidence also shows that, outside the EU where the Directive does not apply, the same species have done no better than other species. A third important finding was that the Annex 1 species appear to have done better in EU countries that have designated a larger proportion of their total land area as SPA (Figure 6.4). These findings emphasise the critical importance of establishing adequate monitoring programmes to assess the impacts of conservation policy at domestic and European scale.

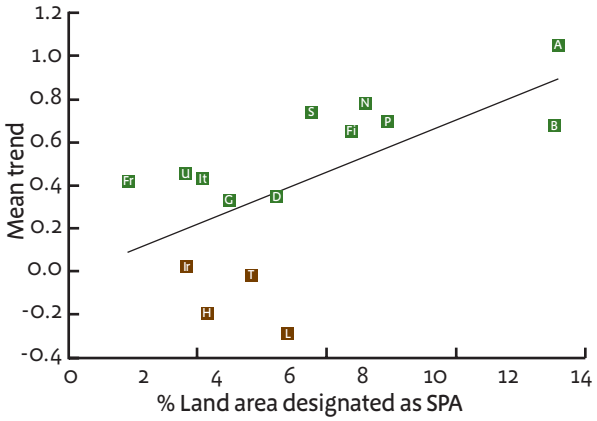
Figure 6.3 Mean population trajectory for Annex I species (brown) and non-Annex I species (green) in different parts of Europe and different periods.



Trends are calculated such that anything above zero indicates an increase, and anything below a decrease. EU15 relates to the first 15 Member States of the EU.

(Source Donald et al, 2007)

Figure 6.4 Relationship between mean trend across all species, 1990-2000, in each of the first 15 Member States of the EU and the percentage of total land area designated as Special Protection Areas. Trends indicated in green were significantly higher than zero. (Source Donald et al, 2007)



A	Austria	G	Germany	N	Netherlands
B	Belgium	H	Greece	P	Portugal
D	Denmark	Ir	Ireland	S	Spain
Fi	Finland	It	Italy	T	Sweden
Fr	France	L	Luxembourg	U	UK

This important evidence is available only because a large network of dedicated amateur and professional ornithologists collected the data across Europe.

6.3.4 National Nature Reserves

There are 221 National Nature Reserves (NNRs) and one Marine Nature Reserve in England, covering a total of 95,776 ha. The North East and East of England Regions have the highest percentages of land designated as NNRs, and the East of England the largest area (Table 6.5). NNRs tend to be larger sites, with over half (56%) being at least 100 ha in size. In contrast, only 18% of SSSIs are 100 ha or more in size.

Table 6.5 Regional distribution of NNRs

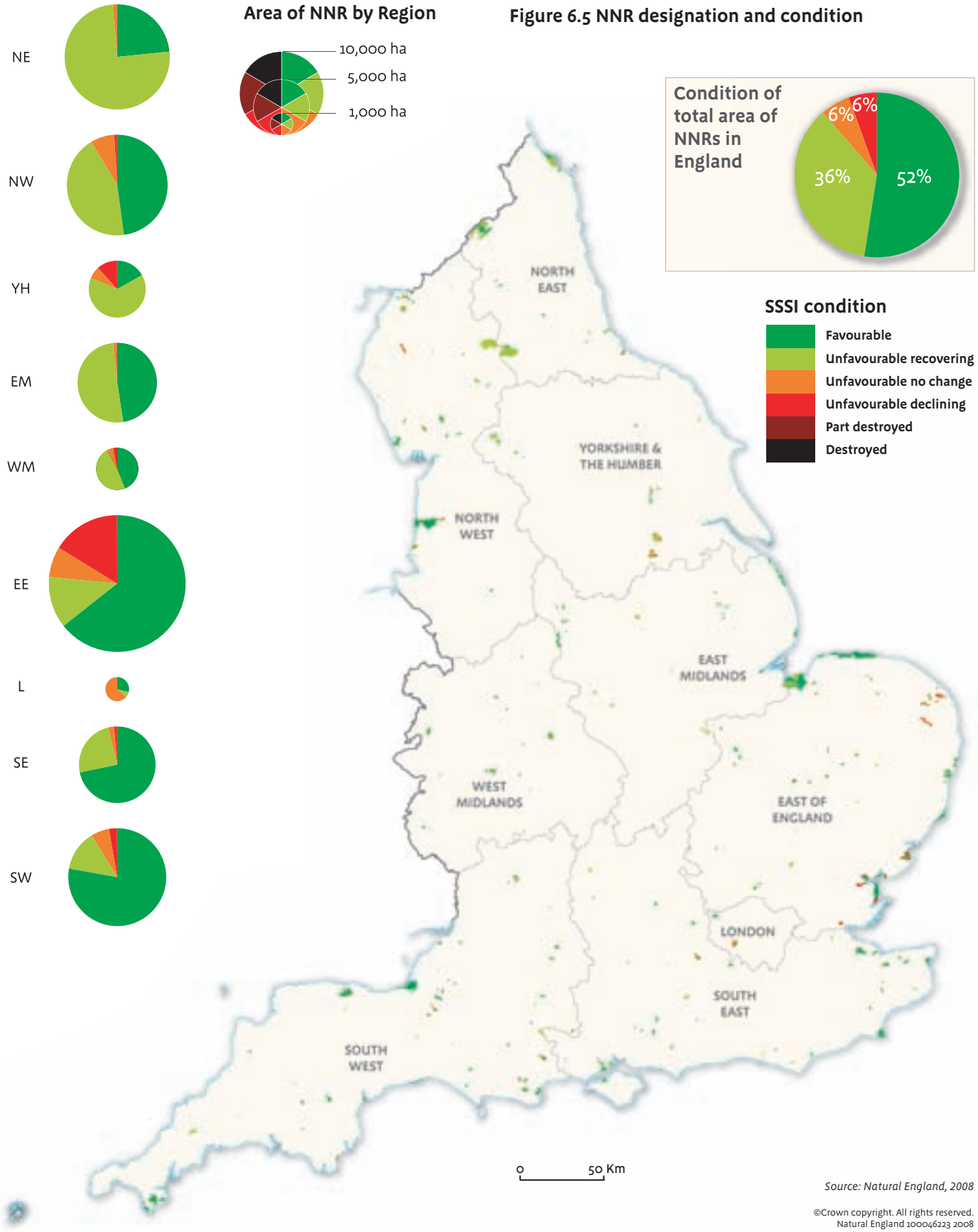
Govt. Region	Number of NNRs	NNR area (ha)	NNR area as % of Region area
NE	16	14639	1.7
NW	29	13645	0.9
Y&H	11	5095	0.3
EM	14	4000	0.3
WM	16	3272	0.3
EoE	48	28571	1.5
Lon	2	1142	0.7
SE	36	8837	0.5
SW	49	13510	0.6
Total	**221**	**92711***	**0.7**

*Excludes the sub-tidal Lundy Marine NNR (3,065 ha) as it lies outside regional boundaries.

(Source: Natural England, 2008)

As virtually all NNR is notified as SSSI, we can use SSSI unit condition data to assess NNR condition. NNRs are in better condition than SSSI, with 88.6% by area in favourable or recovering condition, compared with 80% for all SSSIs. There is regional variation in NNR condition, with the largest area of NNR in unfavourable condition occurring in the East of England Region.

Figure 6.5 NNR designation and condition



Source: Natural England, 2008

6.3.5 Land management schemes in protected areas

The decline through the 1970s and 1980s of traditional land management practices that moulded many of our protected landscapes and habitats created the need for schemes that rewarded low intensity land management. Since that time large areas of protected sites have come under the management of these schemes, as shown in Table 6.6. Almost one third of the area of National Parks is under an Environmentally Sensitive Area (ESA) agreement, which reflects the high proportion of National Parks that were also designated as ESAs. AONBs, which were less well covered by ESAs, were often targeted for Countryside Stewardship scheme agreements and as a result around a quarter of land in AONBs is in this scheme. The Wildlife Enhancement Scheme (WES), which is restricted to SSSIs, is in place on around a quarter of the area of SSSI, with roughly similar proportions on SPA and SAC. Ramsar sites are not well-covered by the schemes, a result of their largely estuarine or open water nature. The Woodland Grant Scheme (WGS) has been taken up in small quantities in some protected areas; Ramsar sites and SPAs, which tend to feature large areas of wetland, have very low uptake of the WGS. As ESA, Countryside Stewardship and WES agreements on protected areas run their course, the expectation is that many will be renewed into the Higher Level Stewardship scheme.

Table 6.6 Area (ha) and percentage (in parentheses) of protected areas in land management schemes

	Higher Level Stewardship scheme	Environmentally Senstive Areas scheme	Countryside Stewardship scheme	Wildlife Enhancement scheme	Woodland Grant scheme
National Park	55,920 (5)	322,780 (31)	199,230 (19)	151,910 (14)	12,580 (1)
AONB	114,100 (6)	157,740 (8)	480,610 (24)	96,060 (5)	41,450 (2)
SSSI	73,890 (7)	131,260 (12)	196,320 (18)	249,980 (23)	25,570 (2)
SAC (without marine SAC area)	46,830 (6)	100,080 (14)	127,700 (17)	207,870 (28)	10,230 (1)
SPA	43,070 (6)	60,680 (9)	111,450 (16)	158,060 (22)	3,260 (<1)
Ramsar	10,700 (3)	14,760 (4)	28,300 (8)	8,450 (2)	280 (<1)
NNR	2,110 (2)	5,190 (6)	7,820 (8)	13,300 (14)	3,990 (4)

The schemes are not exclusive, eg SSSI land may have both an ESA and a WES agreement.
HLS and CS figures are based on the area of the complete holding rather than the specific area in agreement.

(Source: Natural England, 2008)

Great Fen Project

In lowland England, wetland habitats are now often isolated, surrounded by intensively managed and drained agricultural land, starved of water and unable to function hydrologically. This problem is evident in the East Anglian fens between Peterborough and Huntingdon, where Woodwalton Fen and Holme Fen National Nature Reserves are the final remnants of the last great East Anglian wetland, which was drained in the mid-19th century.

Continued drainage of surrounding agricultural land and the lack of connectivity between the reserves threaten the long-term viability of these remnant habitats and their associated species. In order for these to function more naturally, we need to undertake conservation not site by site but at a landscape-scale.

In a ground-breaking approach, a partnership was established in 2001 to create an enveloping 'waterland' of 3,600 ha around the existing NNRs – The Great Fen Project. In creating this new landscape, the Great Fen Project aims not only to connect Woodwalton Fen and Holme Fen NNRs to create a very large site with conservation benefits for wildlife, but also to help address the increased need for flood protection in the area for 70,000 ha of farmland, together with local homes and businesses. It will also create socio-economic benefits for people including much increased local community involvement and opportunities for access and recreation.

This is a long-term project managed in partnership by the Environment Agency, Huntingdonshire District Council, Middle Level Commissioners, Natural England and the Wildlife Trust for Bedfordshire, Cambridgeshire, Northamptonshire and Peterborough.

The project has gained wide support from the local population, businesses, and local and national government. It has raised £17 million in 6 years, 80% of which has come from private sources or charitable grants such as the Heritage Lottery Fund, and has secured 1,700 ha of farmland adjacent to the NNRs.

6.4 Species

Targeted action to conserve or manage particular species of wildlife takes a number of forms. These include control and management of potentially damaging works through licensed activities, action to manage impacts of invasive species, and action to promote recovery of target species populations.

6.4.1 Licensing

Legislation that gives legal protection to species has been introduced in England for a variety of reasons. These include game management and poaching, managing wildlife exploitation, managing pests and vermin, reducing animal cruelty, managing non-native and destructive imported animals and nature conservation. Natural England, as a licensing authority, has a remit to administer species conservation legislation. This involves:

- Administering wildlife legislation to enable appropriate management, scientific studies, and nature conservation.
- Providing sound, science-based advice on wildlife and management to assist those wishing to undertake works that might threaten protected species, while maintaining and enhancing the natural environment.
- Issuing licences, where a valid justification exists, for scenarios including damage to property, enabling scientific research projects, protecting public health and undertaking positive nature conservation projects including reintroduction schemes. The application of strict conditions and guidance is aimed at ensuring minimal impact on populations.

In the financial year 2006/07, Natural England issued 7,724 licences, which is a 14% increase on the previous year's figures. The majority of licences are issued to enable surveys and monitoring of protected species, which provide data and inform the development and planning sector. Where development impacts on protected species, licences are issued to undertake mitigation to ensure that species are not negatively affected. In 2006/07, 1,620 licences were issued that involved mitigation in relation to development or other works.

Great crested newts and development

Local and national surveys have established rates of great crested newt colony loss in England at between 0.5% and 4% a year during the 1960s to 1990s. In the past, development destroyed both great crested newt ponds and surrounding habitat and caused remaining habitat to become increasingly fragmented.

The provisions within the Wildlife and Countryside Act 1981 and the Habitats Regulations 1994 mean that undertaking development that has direct impacts on great crested newts is an offence. Natural England issues licences for mitigation works to ensure that development is not detrimental to the newt population.

The number of licences issued concerning great crested newts has risen dramatically over the last decade, from fewer than 50 licences in 1995 to over 400 in 2005. However, pond loss with the movement of large numbers of newts is now less common (Edgar & Grifiths, 2004). More and smaller newt populations are now being found prior to development and appropriate conservation action is being taken.

Legislation, combined with targeted communication that clearly explains both the legislation and best practice solutions, has resulted in greater public awareness and better protection for great crested newts.

Bats and timber treatment industry

Many bats rely on buildings for shelter and this, together with their colonial habits, make them vulnerable to a wide range of human activities. *In situ* remedial timber treatment with organochlorine insecticides and some fungicides has been a significant cause of bat mortality in England. Research (eg Racey & Swift 1986; Boyd *et al*. 1988) has shown that bats kept in wooden cages treated with lindane, formerly a common insecticide in treatment fluids, died within a few days even if the cage had been treated two weeks previously.

The Wildlife and Countryside Act 1981 afforded protection to bats against the killing or injuring of bats and damage or destruction of their roosts. This legislation, combined with an effective publicity campaign about bats and their protection, means that timber treatment companies are now aware of both the legislation and alternative treatments (synthetic pyrethoids) which are known to be relatively harmless to bats. This dramatic shift in awareness and practice, including work at appropriate times of the year, has ensured that timber treatment is no longer a major factor impacting on bat populations.

6.4.2 Practical action for species

6.4.2.1 Invasive species

Practical action to conserve or enhance native species populations takes a number of forms. The threat to native species from invasive species (see Section 5.3) can be effectively addressed through control or eradication of invasive species, as illustrated by the Lundy seabird recovery project (below).

© NHPA/Andy Rouse

Lundy seabird recovery project

Burrow-nesting seabird populations on the island of Lundy have declined dramatically with no Manx shearwater *Puffinus puffinus* chicks found since 1959 or Atlantic puffin *Fratercula arctica* for 20 years (Lock 2006). Predation on eggs and chicks by rats *Rattus* species was one of the key reasons for the decline. A rat eradication programme for the island using poison bait stations was initiated in 2002 for two winters. No evidence of rats has been found since February 2004.

There are early signs that the breeding seabirds will return: in 2006, the first puffin fledgling was observed on the island in 20 years.

Control of Australian swamp stonecrop at Brown Moss SAC, Shropshire

Brown Moss SSSI, part of the internationally important West Midlands Meres and Mosses, is a series of shallow pools that support an important suite of marginal and wetland plant species, including the rare aquatic plant, floating water-plantain *Luronium natans* for which the site is designated an SAC. The site has suffered from a number of pressures, such as scrub encroachment, nutrient enrichment and excessive goose grazing. By 2002 the most obvious problem was the extensive growth of the Australian swamp stonecrop *Crassula helmsii*, an introduced invasive plant. The shallow margins and fluctuating water levels that characterise the site and provide such a good habitat for native plant species proved ideal for the spread of this weed which soon covered extensive areas of the shore in mats up to 15 cm thick.

During the winters of 2003 and 2004, the *Crassula* problem at Brown Moss was tackled through a combined mechanical and chemical approach with a three-fold purpose: to reduce or remove the impact of *Crassula* upon native plants, to recover floating water plantain (not seen for some years), and to trial a new approach to management. Work was undertaken during the winter to minimise the risk of herbicides affecting native species. Machinery was used to remove as much *Crassula* from the site as possible and any remaining fragments of *Crassula* were spot-treated with herbicide at regular intervals. By removing most of the material mechanically, the amount of chemical used was much reduced.

© Chris Walker

Initial results were very encouraging with a range of desirable plants recolonising the newly exposed substrate. Then, in 2006, floating water plantain was recorded at the site for the first time in a number of years. The longer term success of the work is unpredictable: *Crassula* is still present though at much lower abundance and, although regular management will be required, this should be at a much reduced level. The work has demonstrated that even with this most aggressive of weeds, it is possible to mitigate impacts by careful management – but this is likely to be costly and ongoing.

6.4.2.2 Species recovery

By the early 1990s, it had become clear that, despite decades of conservation work, many plants and animals had continued to decline in numbers, and it was feared that several species would disappear completely, even some that were once numerous. A new strategy had to be developed to tackle this concern and attempt to reverse these declines.

In 1991 English Nature, now Natural England, launched its Species Recovery Programme (SRP) and developed plans that aimed to achieve the recovery of threatened species to a point where their populations were self-sustaining in the wild. In 1994 the UK BAP was published and this included a commitment to develop action plans for threatened species. Using the SRP model, 391 UK Species Action Plans were published by 1999. These plans set targets for the recovery of a wide range of species including less charismatic groups such as fungi, lower plants and marine invertebrates. The action plans have been delivered through national steering groups and local biodiversity partnerships and have captured the public's imagination and brought new resources into biodiversity conservation.

Notable successes include the reintroduction of the large blue butterfly *Maculinea arion* and the red kite *Milvus milvus*, and more recently the pool frog *Rana lessonae* and the interrupted brome *Bromus interruptus*, all of which had become extinct in the wild in England. The BAP recovery targets have also been exceeded for a range of species including the lesser horseshoe bat *Rhinolophus hipposideros*, bittern *Botaurus stellaris* and Deptford pink *Dianthus armeria*. In general, the targeted approach has been more successful in achieving the recovery of species that have become restricted in range than those that are widespread. BAP work in the future will aim to achieve better integration of species into habitat-based delivery to secure better outcomes for more species.

Red kite re-introduction

In the mid 1980s, the red kite was one of the three globally threatened bird species found in Britain, and hence one of our highest conservation priorities. It was lost as a breeding species from England in the late 1800s as a direct result of human persecution. A small population survived in remote parts of central Wales but the bird remained vulnerable as long as it was restricted to just one small area. There were no signs of natural recolonisation of suitable lowland countryside in central and eastern Britain and so the Nature Conservancy Council and the RSPB embarked on an ambitious reintroduction programme. The first young birds, imported mainly from Spain, were released between 1989 and 1994 in the Chiltern Hills, where the red kite is now well established in the wild. Following this success, additional breeding populations have now been established at three new sites: Rockingham Forest in Northamptonshire, Harewood House in Yorkshire and the Derwent Valley, close to the edge of urban Gateshead in north-east England. There are now well over 400 pairs of red kites in England and numbers are increasing rapidly.

The latest release project in north-east England has made great efforts to involve the community in the work of re-introducing the red kite, using the popularity of this spectacular species to raise awareness of local conservation issues. For example, local primary schools have adopted individual birds released as part of the project, often giving them popular names to go with their wing-tag number. This has helped to highlight some of the serious problems that red kites and other birds of prey still face in England. The death of one adopted bird as a result of illegal poisoning had a huge impact when reported in the local media, and has done much to focus attention on this problem. In another initiative, a local bus company has introduced a 'red kite' bus service, running from Newcastle city centre through the red kite release area in the Derwent valley to Consett. The buses are covered with larger than life red kite images, and it is hoped they will encourage more people to get out and see the birds for themselves using public transport.

Following on from the success of the red kite project, Natural England is now also involved with re-introductions to help restore populations of corncrake and cirl bunting to parts of their former ranges, and a new project to re-introduce the white-tailed eagle to East Anglia is currently being developed.

6.5 Wider countryside

There has been growing recognition of the impact of land use change and intensification on the wider countryside outside the best and protected sites. In response to this, a number of measures have been introduced, including both regulation and incentives.

6.5.1 Regulation

The current evidence for the effectiveness of the environmental regulations described below is not comprehensive, but some assessments can be made. The forthcoming results of Countryside Survey 2007 should enable more thorough assessment in the future.

6.5.1.1 Hedgerows Regulations

The Hedgerows Regulations 1997 make provision for the protection of important countryside hedgerows in England and Wales. Before removing any hedgerow to which the Regulations apply, a land manager must notify the local planning authority. The hedgerow may then not be removed if the local planning authority serves a hedgerow retention notice.

During a review of the Regulations in 2003, a sample of Local Authorities responded to a Defra questionnaire on their implementation. The responses showed that 25% of the removal notices had resulted in the issue of a retention notice (Defra 2003). The biodiversity criteria for identifying 'important' hedgerows are stricter than for the hedgerow BAP definition, but historical and cultural values are also considered in judging importance. A small number of prosecutions (18) have also been taken.

6.5.1.2 Environmental Impact Assessment Regulations

The Environmental Impact Assessment (Agriculture) (England) (Number 2) Regulations came into force in 2006 (replacing the earlier 2002 Regulations) and are intended to ensure that activities (or 'projects') designed to increase agricultural productivity do not have significant negative environmental effects on uncultivated land and semi-natural areas. They are also intended to stop negative environmental effects arising from large-scale changes to rural land holdings (an addition to the 2002 Regulations), such as addition or removal of field boundaries and re-contouring of land.

Since 2002, 891 applications to undertake projects have been processed. Over half of these (61%) were considered to fall outside the scope of the Regulations, 31% fell within the scope of the Regulations (i.e. the land in question was semi-natural and/or uncultivated) but the work proposed was not considered to have a significant effect, while 8% of applications were either considered to propose a potentially significant negative effect and were required to provide an Environmental Statement, or were withdrawn. To date, no Environmental Statements have been produced, the applicants deciding to abandon the planned work. The area of land for which Environmental Statements have been requested is 580 ha. In addition to the application process, 305 tip-offs concerning potential breaches of the Regulations have been received by Natural England. The majority of these have resulted in no further action. However, 19 re-instatement notices, covering 81 ha, have been served, which require the land manager to restore the site to its original state, and seven of these cases have resulted in prosecution.

These figures indicate that the Regulations have achieved protection of more than 600 ha of environmentally valuable land that would otherwise have been damaged or destroyed. It is also likely that the existence of the Regulations has deterred damaging projects, but it is not possible to measure the extent of this effect.

Since October 2006, the Regulations have included a 2 ha size threshold. The aim of this threshold was to decrease the regulatory burden on landowners and bring the Regulations more into line with other EIA Regulations, both in the UK and elsewhere in the EU. However, a large number of valuable semi-natural habitats and traditional orchards survive on sites smaller than 2 ha and these, therefore, have no protection unless they are have a statutory designation (eg SSSI) or are under an agri-environment scheme agreement. It is not yet clear what impact the thresholds have had on these important sites.

6.5.2 Grazing Management

Grazing by domestic and wild animals has a significant impact on the natural environment. Both undergrazing and overgrazing can cause adverse changes in habitats.

6.5.2.1 Overgrazing and cross-compliance

Overgrazing, resulting from increased livestock numbers (driven by headage payments) and changes in feeding practices, has been a significant pressure on the natural environment, principally in the uplands (Thompson *et al*. 1995; Palmer 2005). The regulatory response has targeted both the owners of damaged SSSIs, and those in receipt of livestock subsidy and now the Single Farm Payment (SFP). Under the SFP scheme there is a cross-compliance requirement to avoid overgrazing of semi-natural habitats. Incentive payments to reduce stocking levels and to restore upland vegetation, particularly on moorland, have been part of the agri-environment schemes since the late 1980s.

In the initial years of cross-compliance, there was an emphasis on advice and encouragement rather than enforcement and penalties. This changed from the mid 1990s with the imposition of stocking limits on graziers and the use of financial penalties if these were exceeded.

Although these mechanisms have been in place for many years, their impact until 2005 was limited by the continuing financial incentives provided by headage payments. An additional obstacle has been the status of much moorland as common land – this has caused difficulty in administering both cross-compliance and SSSI regulation, as well as in developing effective agri-environment scheme agreements. It is hoped that the Commons Act 2006 will reduce the scale of these problems.

Between 1996 and the end of 2005 (when the Single Payment Scheme was introduced), 199 overgrazing cases covering 105,059 ha of land were investigated. The majority of cases were in the north Pennines and south west (Figure 6.6). The number of ongoing unresolved overgrazing cases has declined in recent years, while the number subject to management prescriptions has increased (Table 6.7). The number of new cases declined very markedly in 2007 (Table 6.8), despite Natural England carrying out an extensive survey of upland commons in England.

Although overgrazing remains a major reason for the poor condition of large areas of upland SSSIs, the use of tightly focused agri-environment scheme agreements on SSSIs, backed up by regulation, is now addressing this. In 2003, overgrazing was a serious problem on 205,700 ha of SSSI land, whereas this has now been reduced to 64,300 ha.

Table 6.7 Unresolved overgrazing cases and cases subject to management prescriptions

Date	Open overgrazing cases	Cases subject to management prescriptions
31 December 2004	-	18
31 December 2005	64	22
15 October 2006	61	24
15 October 2007	56	34

(Source: Natural England 2008)

Table 6.8 New overgrazing cases

Period	Number of new overgrazing cases
31 December 2004 – 31 December 2005	26
1 January 2006 – 15 October 2006	22
16 October 2006 – 15 October 2007	3

(Source: Natural England 2008)

Figure 6.6 Overgrazing cases 1989-2008

Source: Natural England, 2008

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6.5.2.2 Re-introducing traditional grazing

The specialisation of agriculture and the development of highly bred, fast-growing animals grazing on re-seeded, chemically fertilised grassland has led to a loss of diversity in livestock breeds and the undergrazing or abandonment of much of our remaining lowland species-rich grassland, wetland and heathland. Driven by both the SSSI PSA target and UK BAP targets, the re-introduction of grazing is being encouraged on such sites, particularly through agri-environment schemes. Where appropriate, the use of traditional breeds is also being encouraged, helping to achieve not only the right kind of grazing, but also helping to boost the declining numbers of our native breeds of cattle and sheep.

The Grazing Animals Project (GAP) was developed in 1997 to aid the development of grazing that meets the needs of nature conservation. GAP is a UK-wide partnership of practitioners and advisers from the nature conservation, agricultural and livestock sectors. It runs a wide range of services such as advisory publications, a newsletter and an enquiries service. GAP's aim is to help to develop environmentally, economically and socially sustainable grazing systems that will help to rejuvenate both the countryside and rural communities. GAP has also developed the concept of Local Grazing Schemes, of which the Limestone Country Project in the Yorkshire Dales is a good example.

Limestone Country Project

The Limestone Country Project started in 2002 with the aim of encouraging farmers to re-introduce native cattle breeds to the Ingleborough, Malham and Wharfedale areas of the Yorkshire Dales National Park. Over the past forty years, the number of cattle had decreased markedly, with a corresponding increase in sheep numbers, bringing about undesirable changes in the vegetation in the internationally important grassland, fen and limestone pavement habitats. By reducing the number of sheep and re-introducing hardy cattle, the project aimed to achieve a balance that allowed all the plant life in the area to flourish. The project encouraged 17 farms to join. The farms entered whole farm conservation plans, with the project providing financial support for changes needed to convert from sheep to a mixed livestock system, including re-introduction of hardy cattle (such as Belted Galloway, pictured) and changes to farm infrastructure, such as buildings and water supply.

The project was led by a partnership of nature conservation and farming interests including Natural England, Yorkshire Dales National Park Authority, Rare Breeds Survival Trust, National Beef Association, Grazing Animals Project, National Trust, European Union LIFE fund and most importantly, the area's farmers.

The plants expected to benefit most from the changes in grazing were those selectively grazed by sheep and those less tolerant of hard grazing. On the grassland these included bloody crane's-bill *Geranium sanguineum* and rock-rose *Helianthemum nummularium*, the foodplant of the scarce northern brown argus *Aricia artaxerxes* butterfly and on limestone pavement species such as limestone fern *Gymnocarpium robertianum* and angular Solomon's seal *Polyganatum odoratum*. Monitoring results suggest that the vegetation is responding in different ways, with the clearest effects on limestone pavement, where plant diversity is higher under cattle grazing than sheep grazing, but highest where grazing is excluded (Smith 2008). Early results from grazing trials on grassland are also suggesting that higher diversity of desirable plants is associated with cattle grazing compared with sheep grazing, giving grounds for optimism about future changes resulting from re-introduction of cattle to these internationally important limestone grasslands.

One of the principal aims of the Project was to help the farmers sustain a viable financial livelihood. By working with local auction markets, butchers and restaurants the project has developed specialist markets for this 'specially farmed' beef, to provide farmers with a ready outlet for their beef at a premium price compared with intensively produced beef. The project also developed the 'Limestone Country' brand to help promote local meat, and 'Limestone Country' meat is now available from a variety of outlets including online retailing from a local butcher.

6.5.2.3 Deer grazing in woodland

There are six species of deer in England, two of which (red *Cervus elaphus* and roe *Capreolus capreolus*) are native and one (fallow *Dama dama*) which is such a long-standing introduction that it is effectively part of our cultural heritage. High populations of deer can cause serious impacts on semi-natural woods, damaging the ground flora, the shrub layer, and the ability of the woodland to regenerate.

Fencing deer out of woods is not a practical option except in small blocks because it is difficult to get the deer out of the fenced area, and fences are expensive to erect and maintain. Also, low levels of deer browsing can be beneficial, so fencing them out entirely may not be desirable, even in nature conservation terms. To be effective deer management needs to be done at a landscape-scale across multiple land holdings, therefore requiring landowners and woodland managers to co-operate with each other and act in partnership.

The Deer Initiative, established in 1995, is a broad partnership of statutory, voluntary and private interests who have a common interest in healthy, sustainable, well-managed populations of deer in England and Wales. It has a small number of staff who undertake the recommendations of the partnership, including co-ordination of deer management groups, provision of deer awareness seminars at a regional scale and provision of advice at national level.

One of the benefits of such a co-ordinated approach is evident on protected sites. In 2005, of the 22,000 ha of woodland SSSI in England in unfavourable condition, 8,000 ha (36%) was unfavourable as a result of damage by deer. By 2008, this figure had dropped to 4,000 ha (22% of woodland in unfavourable condition), a significant reduction that is largely a result of regional activity, such as the Marches project in the Welsh Borders, led by the Deer Initiative.

6.5.3 Land of outstanding scenic, historic and scientific interest conditionally exempt from Inheritance Tax

Exemption from Inheritance Tax is available for land of 'outstanding scenic, historic and scientific interest' in return for agreed public benefits: the conditions of the exemption. Wherever possible, property of this kind remains in private hands and its owners are encouraged to retain and care for it, and display it to the public. Owners agree to undertake specific actions to maintain the land, preserve its character; provide reasonable public access, and publicise the access and the undertakings.

Since 1975, 98,600 ha have been designated in England as land of outstanding scenic, historic or scientific interest conditionally exempt from capital taxes at 167 properties. A further 17 cases are currently under consideration for designation.

'Outstanding land' encompasses a wide range of properties such as small farms, individual woodlands, historic parkland and wildlife sites as well as extensive estates. It is found in every region in England and in almost every Character Area. Over a third of this land lies in National Parks, another third in AONBs. Currently designated 'outstanding land' covers 147 separate SSSIs, 937 km of public rights of way and over 245 km of permissive paths.

Failure to comply with conditions will result in the loss of conditional exemption. 'Outstanding land' is inspected periodically (usually every five years). Currently, 12 properties are identified as not satisfactory, and programmes of work are being agreed to bring them back into compliance with the conditions of exemption. For some properties, this is simply a matter of improving their reporting procedures. For others some remedial works are required, for example to repair landscape features such as ha-has or to arrest scrub encroachment. Since 2000, 16 properties that were identified as not satisfactory have been brought back into compliance.

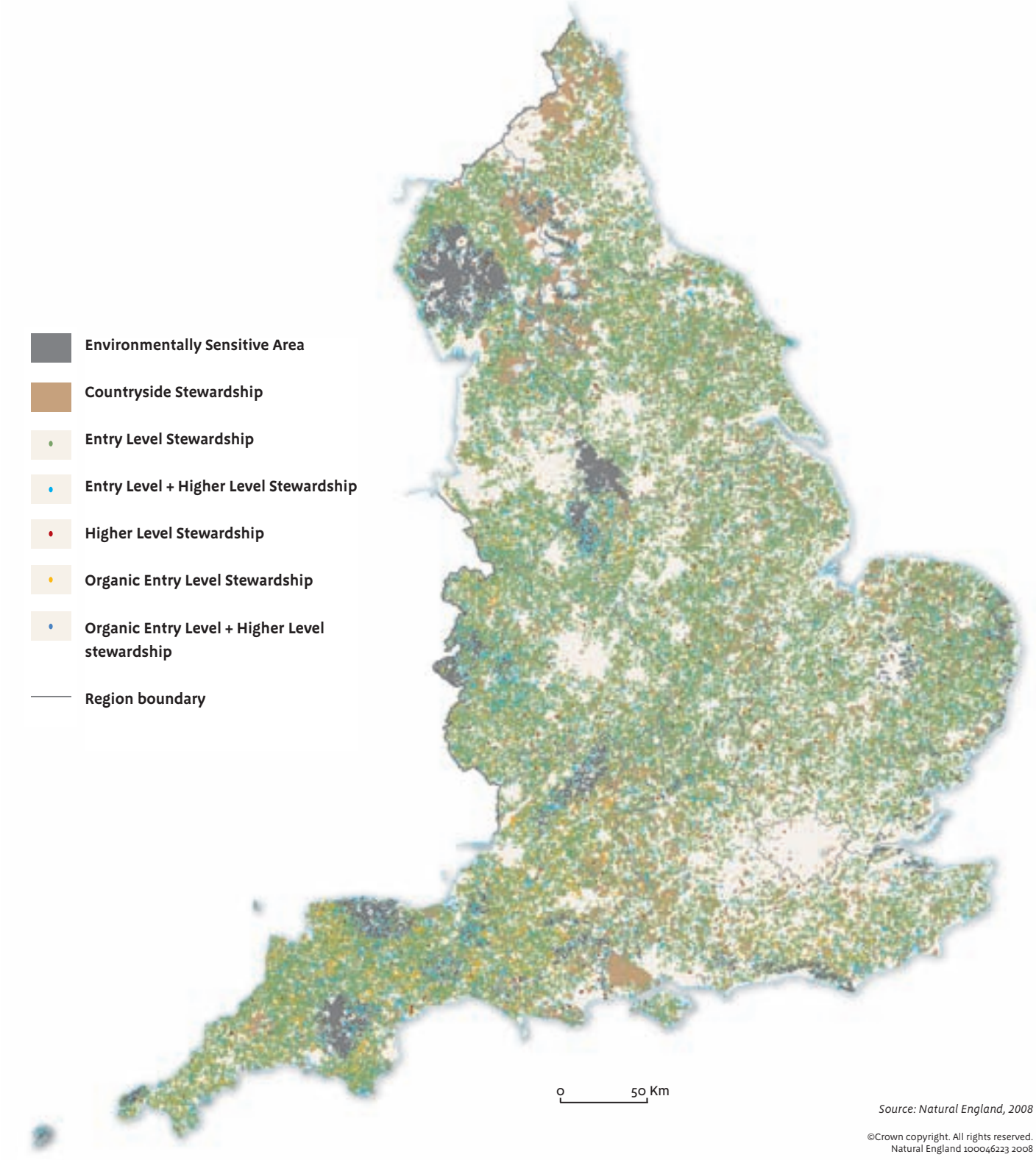
6.5.4 Agri-environment incentive schemes

From the late 1980s, incentive schemes have been introduced to encourage environmentally beneficial land management in the wider countryside. There are currently some 6 million ha within agri-environment agreements, representing approximately 65% of the farmed area of England.

Around 12,500 land managers had an Environmentally Sensitive Area (ESA) agreement when the scheme closed in 2005, with 650,000 ha under ESA management. Shortly before it closed to new agreements in 2005, the Countryside Stewardship scheme had over 1,600 agreements with land managers covering 530,000 ha of land. This included 33,000 ha of grass margin (over 61,000 km measured in a straight line), 234,000 ha of permanent lowland and upland grassland under beneficial management and 51,000 ha of grassland reverted from arable cultivation. An extensive programme of capital works restoring and maintaining valuable environmental features covered over 30,600 km of hedgerow and 2,100 km of dry stone wall (Defra 2007g). Based on coincidence mapping of UK BAP Priority Habitat Inventories and ESA and Countryside Stewardship, it is estimated that currently 55% of the total area of terrestrial UK BAP habitat in England is being managed under ESA or Countryside Stewardship agreement.

These schemes have now been replaced by the Environmental Stewardship (ES) scheme. Its primary objectives are to conserve wildlife, maintain and enhance landscape quality and character, protect the historic environment and natural resources, and promote public access and understanding of the countryside. It also has the secondary objectives of genetic conservation and flood management.

Figure 6.7 Uptake of agri-environment scheme agreements



Source: Natural England, 2008

6.5.5 The effectiveness of Environmentally Sensitive Areas and Countryside Stewardship

While measures of uptake provide some indication of the impact of the schemes, more detailed monitoring is required to assess whether the management encouraged under agri-environment agreements is truly effective in achieving desired outcomes for the natural environment. The most recent assessment of the Environmentally Sensitive Area (ESA) and Countryside Stewardship schemes' performance (Ecoscope 2003), which reviewed the results of detailed monitoring programmes, found that, in the broadest terms, ESAs had successfully maintained the wildlife value of target habitats, but that there was little evidence for enhancement, while management under Countryside Stewardship was more likely to achieve enhancement. Both schemes were considered to have been generally successful in meeting landscape and historic objectives. Specific examples of impacts determined from the monitoring programme are given for arable biodiversity, semi-natural grassland and the historic environment.

6.5.5.1 Arable biodiversity

While one or two ESAs offered management options on arable land (eg Breckland and the South Downs), it wasn't until the launch of the Arable Stewardship Pilot Scheme in 1998, and the subsequent introduction of arable options into Countryside Stewardship nationally in 2003 that arable options became widely available. The success of these options has been considerable with evidence for their beneficial effects for wildlife:

- Arable schemes have increased the national breeding populations of rare bird species (Aebischer *et al*. 2000), for example, the cirl bunting (Peach *et al*. 2001).
- Arable schemes can deliver key resources required by more common and widespread bird species and so enhance local numbers and productivity. (Bradbury *et al*. 2004; Stevens & Bradbury 2006)
- Arable schemes are effective in conserving arable plant diversity for both common as well as a range of "UK rare and threatened species" (eg Walker *et al*. 2007; Critchley *et al*. 2007). A good example of this is arable plant conservation in Breckland ESA (see below) .
- The most commonly used option, tussocky grass margins, provides fewer benefits than the pollen and nectar option or wild bird seed option, but it still provides substantially more benefits than a conventional crop (Meek *et al*. 2002).
- Provision of food resources and nesting habitat for bumblebees through arable options had a beneficial effect on populations at a landscape scale (Pywell *et al*. 2006).

Arable plant conservation in Breckland

There was early recognition of the need to protect arable biodiversity in the Breckland region of East Anglia. A review of the conservation requirements of the rare plants characteristic of Breckland (Watt 1971) identified a sizeable group of species that were small, mostly annual and found on disturbed ground, with three species apparently dependent on cultivation for their survival (dense silky-bent *Apera interrupta*, Breckland speedwell *Veronica praecox* and fingered speedwell *V. triphyllos,* pictured). Prior to the establishment of the Breckland ESA, these plants had been in rapid decline. Two management options for arable field margins were included in the Breckland ESA when this was established in 1988. These prescriptions were informed by the success of several pilot projects and by the research work done by the Game Conservancy Trust, which demonstrated that unsprayed areas of cereal fields adjacent to field margins also benefited grey partridge chicks and the insects that they feed on. The two options were for uncropped wildlife strips (uncropped, cultivated field boundary strips) and conservation headlands (cereal headlands in which pesticide and herbicide inputs are restricted).

Monitoring over seven years showed that over half the uncropped wildlife strips were judged as having developed 'vegetation characteristic of the specialised conditions of Breckland'. Repeat monitoring in 2002/3 showed that it has been possible to maintain substantial populations of rare arable plants on uncropped wildlife strips for 16 years within this ESA. The report's conclusions also suggested that further refinement of the management and better targeting by soil type would further improve the results. This evidence has been important in developing more effective guidance for management of arable margins in Environmental Stewardship (ELS and HLS), and in particular, allows more effective targeting of HLS options.

6.5.5.2 Semi-natural grassland

Most agreements involve maintenance, restoration or re-creation of grassland, and monitoring of grassland has been the most comprehensive of any habitat. Much of the more recent monitoring effort has been driven by the need to report on scheme contributions to the targets for Priority Habitats in the UK Biodiversity Action Plan:

- Schemes support a much higher proportion of semi-natural grassland than the English countryside as a whole. Approximately 16,500 ha of the five priority grassland types (lowland meadow, upland hay meadow, lowland dry acid grassland, purple moor-grass and rush pastures and lowland calcareous grassland) were being managed under scheme agreement (Carey *et al*. 2002, 2005).

- Compared with the fate of grasslands in the wider countryside, priority grassland types under agri-environment agreement were almost twice as likely to be in good condition than those outside such agreements (Hewins *et al*. 2005). This was particularly marked for purple moor-grass and rush pastures.

- Schemes have been successful in maintaining the quality of priority grassland habitats (Ecoscope, 2003), but evidence for enhancement is mixed. Some ESAs showed positive changes, for example Dartmoor hay meadows (Kirkham *et al*. 2006), whilst others showed signs of deterioration, such as upland hay meadows in the Pennine Dales ESA (Critchley *et al*. 2004).

6.5.5.3 Historic environment

Monitoring in individual ESAs from the late 1980s through to the mid 1990s suggests that the condition of historic environment features was maintained in all ESAs investigated except one where monitoring was inconclusive (Ecoscope, 2003). There was, however, little evidence of positive management of the historic resource. Monitoring of Countryside Stewardship suggests that over 70% of agreements monitored were effective in at least maintaining the historic value. It was felt overall, however, that Countryside Stewardship was less effective than ESA in protecting the historic environment, particularly in upland landscapes where almost half of the Stewardship agreements studied were judged not to be maintaining or enhancing the historic value.

In Heritage Counts 2005 (English Heritage 2005b) it was reported that, over a five-year period, more than £90 million had been spent on historic environment features. This included over 7,700 km of traditional landscape boundaries, more than 96,400 ha of parklands, in excess of 2,800 historic farm buildings and the protection of 132,000 ha of archaeological features, through measures such as scrub control.

Historic parkland and traditional farm buildings have benefited significantly from schemes. Schemes are helping to restore over a quarter of the area of historic parkland extant in 1918 (110,892 ha under agreement out of a total of 407,867 ha), resulting in significant benefits to landscapes and also likely to be benefiting the typical wildlife of parklands, particularly dead wood invertebrates and bats. Restorative works include returning arable land to permanent grassland, protection of veteran trees, tree planting and re-introduction of grazing.

An evaluation of the effectiveness of scheme agreements in restoring traditional farm buildings was carried out in 2002 (ADAS 2003), in which the key criteria for a successful restoration were that the building under restoration was of historical significance, the nature of the building must not be compromised by the restoration and that both the structure and fabric of the building must not be altered internally or externally. The results suggested that, overall, considerable benefits had been achieved to the traditional building resource in some key landscapes, although examples of inappropriate restoration, poor value for money and questionable after-use of buildings were noted in some ESAs.

6.5.6 The effectiveness of Environmental Stewardship

One of the key objectives for the Environmental Stewardship scheme, particularly Entry Level Stewardship (ELS), is the widespread uptake of appropriate options at a national scale. The 2003 evaluation of agri-environment schemes cited the relatively limited coverage as a reason that ESA and Countryside Stewardship had not yet been able to stabilise or reverse losses amongst many groups of taxa dependent on very widespread habitats, such as most farmland bird species. The evaluation also noted that the use of generic management prescriptions in Countryside Stewardship and ESA for some habitats did not allow enough flexibility to enhance, or in some cases, even maintain ecological quality. It was concluded that effective management of these habitats needed a flexible approach that could be 'fine tuned' to achieve the desired environmental outcomes, and this approach was built into the design of Higher Level Stewardship (HLS).

Environmental Stewardship agreements are expected to make a significant contribution to national biodiversity objectives, historic environment, access and resource protection objectives. Maintenance and enhancement of landscape character and quality will be dependent upon the appropriate selection of options aimed at other environmental objectives, that also provide landscape benefit through integrated land management and/or delivery at a landscape-scale. The HLS scheme is also now the major source of funding for land management on SSSIs, so has a significant role in achieving the SSSI PSA target. In future, Environmental Stewardship is likely to be an important tool in helping habitats and species adapt to climate change by buffering, linking and extending areas of existing good quality habitat. The schemes are funded by the EU and a further £2.9 billion has been secured as part of the Rural Development Programme for England 2007-2013.

Environmental Stewardship was launched in 2005, with a parallel programme of evaluation. The results of this evaluation (Boatman *et al*. 2007) were fed into the Environmental Stewardship Review of Progress. This Review, managed by Defra and Natural England, recommended changes in scheme policy, design and delivery which will be implemented over the next two years.

Uptake of ELS and Organic ELS (OELS) options has been heavily biased in favour of certain options, particularly field boundary (hedges, ditches and walls) management and management plans. The maintenance of field boundaries and their distinctive patterns will be contributing to and strengthening the overall structure and character of landscapes. While modelling of environmental outcomes indicates that significant benefits will be made, the low uptake of some options, particularly those that address management of the cropped area of arable fields, has raised concerns that the some key objectives will not be met (Butler *et al*. 2007a; Butler *et al*. 2007b). The objectives for biodiversity, notably those for farmland birds, are not likely to be achieved if current patterns of uptake continue. Recent work on farmland birds has also suggested that greater uptake of 'in-field' options would be beneficial (Vickery *et al*. 2007).

The amount of change to current practices achieved by ELS is not yet clear. Responses to a participant questionnaire suggested that, in most cases, farmers had chosen options that involve little or no change to their existing practices (Boatman *et al*. 2007), although 38% of responses to questions about specific options suggested that some change in management would be required.

In the baseline environmental assessment of ELS and OELS, the environmental quality of features being managed or the parts of farms chosen for ELS management options was found to be good and in a few cases very good (Boatman *et al*. 2007). When compared with non-scheme land, for some features there appeared to be positive selection of better quality examples for scheme entry, such as the presence of historic environment features, grassland botanical diversity and hedge height and width, while for others, such as species-richness of hedges and aquatic flora, little or no difference was found.

In terms of conservation and maintenance of the historic environment, at the end of December 2007 more than 4,500 ELS and HLS agreements included historic environment options, covering around 79,000 ha of land and protecting more than 375,000 sq m of traditional farm buildings. The most popular options are for managing archaeological features on grassland, which covers 60,000 ha, and the maintenance of traditional farm buildings. However, almost 15,000 hectares (more than 950 scheduled monuments) have had measures put in place to reduce or remove the impact of cultivation on buried archaeological features. All of these options, and many others, will maintain or improve the condition of features through appropriate management. Other options, such as the maintenance or restoration of stone walls or hedgerows, also make a positive contribution to the conservation and enhancement of the historic environment and the maintenance of landscape quality and character of the wider landscape.

In terms of its contribution to UK BAP targets, it is estimated that HLS is currently maintaining or enhancing 5.6% of the total area needed to meet the revised 'maintain extent' targets for the UK BAP Priority Habitats for which Natural England **is** lead partner, (based on the correspondence of Habitat Inventory land and uptake of appropriate HLS management options). The most significant progress to date through HLS has been in maintaining the extent of lowland heathland (11% of the total resource); lowland calcareous grassland (8%); and limestone pavements (9%). Least progress has been made towards targets for lowland raised bog and coastal vegetated shingle, where less than 1% of the total known resource is being managed under HLS. For additional habitats for which HLS is expected to be the major delivery mechanism but Natural England **is not** the lead partner, HLS currently is maintaining or enhancing (on average) 10.4% of the total area needed to meet the revised 'maintain extent' targets. The most significant progress to date has been made maintaining the extent of lowland meadows (27%) and upland hay meadows (27%). Least progress has been made towards targets for purple moor-grass and rush pastures (<3%).

One of the first detailed monitoring reports on the effectiveness of HLS is a study of the targeting of management options designed to manage or restore species-rich grasslands (Hewins *et al*. 2008). This found clear indications that the design of HLS is resulting in improved identification and prioritisation of grassland features and, generally good targeting of management. The study also revealed, however, that in a few cases, funding had been targeted inappropriately, for example at species-poor grassland which did not have a restoration plan that was likely to deliver the desired benefits. This emphasises that success in conserving species-rich grasslands is dependent upon first correctly identifying the type of grassland and its restoration potential, and then ensuring the suitability of the specific management plan negotiated for each site.

Environmental Stewardship – a new approach to targeting

Environmental Stewardship (ES) is a multi-objective scheme and the key to ensuring that it makes the maximum possible contribution to these objectives is effective targeting, especially for the more complex environmental management typically involved in HLS agreements. Previous agri-environment schemes have either been targeted at specifically designated areas (ESAs), or scored applications against pre-defined criteria (Countryside Stewardship). Natural England is now in the process of moving to a fully spatial approach to targeting HLS agreements. In this approach the priority locations for each of the scheme primary objectives are mapped (using the best available datasets at a national scale). These are then overlaid to produce a multi-objective map that identifies where agreements should be targeted and, within agreements, which options should be prioritised, in a clear and consistent way. This will provide land managers and stakeholders with clarity on what to expect from the scheme in the longer term. This approach will be supported by a more proactive approach to delivering HLS, in which Natural England, working with partners, will actively seek out agreements on holdings with the features that are likely to deliver most environmental or other public benefit.

6.6 Freshwater environment

This section assesses a range of responses to pressures on the freshwater environment. Of all the broad habitat types, freshwater is subject to the greatest range of competing demands. It is important that any responses to pressures recognise these demands in the search for solutions which are truly sustainable.

6.6.1 Responses to pollution: England Catchment Sensitive Farming Delivery Initiative

Levels of organic pollution and industrial pollution in freshwaters have generally been decreasing in recent decades as a result of a decline in heavy industry and progressive investment in the treatment of sewage (Mainstone *et al*. 2008). Significant progress has been made in reducing phosphorus loads through improved treatment at major sewage works under the Urban Waste Water Treatment Directive and (for SACs and SSSIs) under the Habitats Directive and national designated site legislation. However, actions to control diffuse sources and smaller point sources of phosphorus, silt loads from the catchment, and sheep dip and other agrochemical impacts are in their early stages.

As the treatment of point source effluents has been increasingly improved, the contribution of diffuse sources to residual pollution problems has become increasingly apparent, much of it from agriculture (see Section 5.6). The England Catchment Sensitive Farming Delivery Initiative (ECSFDI), part of Defra's Catchment Sensitive Farming Programme, was launched in 2006 in 42 priority catchments. Its aim is to reduce diffuse water pollution from agriculture to levels that are consistent with the ecological sensitivity and uses of rivers, groundwaters and other aquatic habitats. Catchments were selected using risk-based maps for nitrates, phosphorus and sediment pollution, combined with a list of SACs and SSSIs at risk of diffuse water pollution from agriculture (Figure 6.8).

The ECSFDI promotes land management that follows best practice in the use of fertilisers, manures and pesticides; good soil management; and protection of watercourses from faecal contamination, sedimentation and pesticides.

The initiative covers around 40% of agricultural land in England, within which there are around 50,000 farm holdings. Advice is being delivered by 42 Catchment Sensitive Farming Officers and specialist advisers through one-to-one farm visits, workshops, seminars and demonstrations. In the initial two-year period the project had a budget of £21.8 million for provision of advice, research and capital grants. Defra funding is now confirmed for an additional three years, through to 2011.

Between autumn 2006 and spring 2007, a wide range of advice was delivered to farmers, tailored to the needs of each catchment. This included 270 group events (workshops, farm walks and drop-in clinics) attended by 4,200 farmers and their advisers, and 3,000 one-to-one farm visits within the priority catchments. The broad areas of advice offered were: soil management and protection; nutrient management; manure management; farmyard infrastructure; whole farm appraisal, and promotion of the capital grant scheme. This advice was followed up to ensure that, wherever possible, it results in action on the farm.

There were over 1,100 applications to the capital grant scheme, of which 739 applications were successful. The main items funded were watercourse fencing, concrete yard renewal, roofing for stock gathering areas and farm tracks.

Water-quality monitoring and modelling will provide estimates of improvements in this area. Interim modelling results from a limited number of catchments predict significant reductions in diffuse pollution within the highest risk areas of the catchments. A full evaluation of the first two years of the ECSFDI will be available during 2008.

In all catchments, Environmental Stewardship is the main mechanism for supporting land management practices that mitigate diffuse water pollution from agriculture. Early analysis of targeting and uptake is encouraging, suggesting that ELS options likely to reduce such pollution have a higher take-up in Catchment Sensitive Farming areas than outside. For example, 50% of agreements featuring the option 'Management of high erosion risk cultivated land' are in Catchment Sensitive Farming areas.

1 Tweed English Rivers including Lindisfarne
2 River Eden & Tributaries
3 River Waver & Biglands Bog
4 Bassenthwaite Lake
5 River Wyre
6 Yorkshire Ouse, Nidd & Swale
7 Yorkshire Derwent
8 East Riding of Yorkshire & North Lincolnshire
9 West Midlands Meres
10 Peak District Dales
11 River Eye
12 Lincolnshire Coast Rivers
13 North Norfolk Rivers
14 River Wensum
15 Bure, Ant & Muckfleet
16 River Nar
17 Little Ouse (Thetford Ouse)
18 Yare
19 Waveney
20 Gipping & Orwell
21 Deben, Alde & Ore
22 River Teme
23 River Lugg
24 River Wye (ex Lugg)
25 West Cornwall Catchments
26 River Camel Valley & Tributaries
27 Tamar-Tavy Estuary
28 Yealm & Erme Estuaries
29 Slapton Ley & Salcombe to Kingsbridge
30 Exe Estuary
31 Rivers Axe & Otter
32 Somerset Levels & Moors
33 North Somerset Moors
34 Dorset Stour
35 The Frome, The Fleet & part of Poole Harbour
36 Hampshire Avon System
37 Rivers Lambourn & Kennet
38 River Test
39 River itchen
40 Pevensey
41 East Rother & Walland Marsh
42 The Stour

Figure 6.8 Catchment Sensitive Farming priority catchments

Source: Natural England, 2008

6.6.2 Responses to abstraction

Natural England has been working with the Environment Agency and water companies to identify designated wildlife sites most affected by abstraction problems, including rivers, fens and lakes. Abstraction problems are not always self-evident and may be significantly under-recorded both in the designated sites network and in the wider freshwater environment. Solutions take a range of forms, including relocation of abstraction points, reducing licence volumes, leakage control and increased management of water demand (through, amongst other things, awareness campaigns and water metering). There is also scope to develop more innovative solutions that retain greater amounts of floodwaters in catchments in a way that makes them available for water supply purposes. Successful outcomes have been achieved on several key sites, including Redgrave and Lopham Fen NNR, where a public water supply borehole was moved to prevent drying out the springs that feed the site, and thereby supporting the recovery of the fen raft spider (see Section 3.8). The Till catchment in Northumbria provides a good example of collaboration and partnership helping to address abstraction pressures on a resource important both for wildlife and the local economy.

River Till and water abstraction

Part of the River Tweed system, the Till catchment rivers are clean rivers of high conservation and ecological value. The in-stream vegetation is of international importance and the blooming of the diatom *Didymospenia* in the headwaters draining the Cheviot is unique in England. The fish fauna is particularly significant with large migrations of salmon and the occurrence of the three British species of lamprey. As a result of its high value, the river is designated as an SSSI and SAC. The Tweed system as a whole also supports amongst the best stocks of wild salmon in Europe, and the salmon fishery is a mainstay of the local economy, contributing £13 million and supporting over 500 jobs.

When the site was notified as an SSSI in 1999 there were at least 24 abstractors along the river, using the water largely for potato irrigation. Investigation and modelling by the Environment Agency concluded that the volume consented for abstraction from the river was up to three times the ecological carrying capacity, potentially posing a significant risk to the flow of the river in summer and threatening the features of ecological and economic importance.

Close co-operation between the potato growers, the Environment Agency and Natural England revealed that the greatest need for water is in late May and early June, when the risk of potato scab is highest. In order to reduce abstraction, the growers were supported in pursuing other options for securing water, such as winter storage and more efficient irrigation techniques, and in the founding of the North Northumberland Agricultural Abstractors Group (NNAAG). In addition, work continues with farmers to reach long-term water-efficient and sustainable irrigation solutions, which include consented abstraction 'trading'. It is hoped that this collaborative approach will safeguard the ecology of the river and the salmon fishery, whilst allowing the potato growers to continue to run profitable businesses.

Asset Management Plans

The water companies' Asset Management Plans (AMP) are programmes of improvement and maintenance of the water supply and sewage treatment structure. They are currently approved by Ministers and Ofwat through five-yearly Periodic Reviews (the latest of which was PR04). One of the priorities for the natural environment in this process is to reduce the impacts of abstraction and achieve improvements in sewage treatment. Schemes are undertaken for the specific benefit of sites with national and European designations, as well as for environmental improvement in the wider freshwater (and marine) environment.

The funds allocated to effect these changes make AMP one of the largest investments in the natural environment in England. The current AMP4, which runs from 2005 to 2010, includes a programme for SSSIs worth almost £500 million over five years. This involves investigations into abstraction on 60 SSSIs, improved sewage treatment affecting 65 SSSIs and investigations into pollution on 49 SSSIs. AMP3 (2000-05) allocated a total of £190 million to SSSIs and SACs; this included 17 schemes to reduce abstraction and 34 for sewage improvements. Alongside these conventional AMP schemes, innovative partnership projects have been established in upland catchments by water companies and the environmental sector, with the aim of providing multiple benefits to both water users and the natural environment by modifying land management.

6.6.3 Flood management and drainage

The interaction between conservation of the natural environment and flood management has a long history. The Government's 1993 Strategy for Flood and Coastal Defence in England and Wales (MAFF 1993) was based on the presumption that natural river and coastal processes should not be disrupted except where human life or important man-made natural assets are at risk. Subsequent iterations of the Government's Strategy have culminated in Making Space for Water (Defra 2005f), which has a number of environmental themes. This forward-thinking strategy places considerable emphasis on land use and land management and their role in reducing or increasing flood risk. It also seeks to promote integrated catchment level schemes, with multiple benefits.

The Government inquiry into flooding published its interim conclusions at the end of 2007 (Cabinet Office 2007b). Amongst these was a recommendation that "Defra, the Environment Agency and Natural England should work with partners to establish a programme and framework to achieve greater working with natural processes, including the identification of appropriate sites and the development of more incentives for creating water storage, restoring the natural course of rivers and establishing green corridors."

Yorkshire catchments and flooding

A national catchment pilot in North Yorkshire led by Defra from 2004–2007 involved a number of partners, including the Environment Agency, Natural England and the Forestry Commission. The aim of the project was to investigate the potential for reducing flood risk through land use and land management changes at a catchment scale, while also pursuing resource protection, biodiversity and access opportunities.

A number of studies were undertaken in the catchment of the Rivers Skell and Laver upstream of the city of Ripon, where there had been flooding in 2000. The moorland peat in the upper catchment was severely eroded following the digging of grips in 1973. Modelling estimated that a programme of strategic grip blocking would result in a 15% reduction in peak flows at the confluence upstream of Ripon. The model also showed that a further reduction in flood levels could be obtained by re-profiling a large concrete gauging weir in the middle of the city. Both of these measures would have significant biodiversity benefit as well as reducing flood risk. In order to validate the model, background monitoring of river flow and rainfall is required. The Forestry Commission is continuing a study to assess the contribution of tree planting and woodland management to the rate of run-off during rainfall events in the catchment.

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Water Level Management Plans (WLMPs) are designed to restore and protect wetland SSSIs. They are implemented by the flood operating authorities (Environment Agency, Internal Drainage Boards and local authorities), working to annual targets set by Defra as part of their grant-aid for capital schemes. There are over 450 SSSIs where WLMPs are used to manage surface water for the benefit of wildlife. The Priority WLMP Programme, established in 2005, is currently working to restore appropriate water-level management on 104 of these SSSIs where it is a key contribution to achieving favourable condition.

Some of our most important wetland sites, such as the Norfolk Broads and Somerset Levels (pictured), are dependent on carefully managed water level regimes. For example, a £890,000 restoration scheme on the Halvergate Marshes, a 3,000 hectare SSSI in the Broads and part of the Priority WLMP Programme, has recently been completed. Delivered by the Broads Internal Drainage Board with assistance from English Nature and the Broads Authority, the project involved the automation of a water inlet from the River Bure and the widening of two feeder dykes so that water can be stored in the system. This will ensure that, in drought years, there is an adequate supply for the wetland's needs.

As well as development and implementation of WLMPs, the targets cover delivery of other measures to achieve the SSSI PSA target and creation of 200 hectares of priority BAP habitat.

6.6.4 Peatlands

The conservation of our internationally important peatlands, especially lowland raised bogs, presents a special challenge due to the degraded nature of many of these areas which are often now either worked out peat diggings or overgrown by birch woodland – indeed, peat is still being extracted from several English lowland raised bogs for horticulture. However, much has been achieved. For example, at Thorne Moor (pictured) and Hatfield Moor (which together cover over 3, 300 ha) in Yorkshire & the Humber Region, an £18 million Government grant was used to buy out the peat producers. Restoration is proceeding well at these sites, with the vast majority of the area now developing bog vegetation. Successful restoration works have also been achieved on other lowland raised bogs once subject to peat extraction, such as Wedholme Flow in Cumbria and Fenns, Whixall and Bettisfield Mosses on the Shropshire/Wales border. These large and complex sites will take decades to be fully restored to peat-forming and hence carbon-storage systems. However, the restoration of high water levels and sympathetic management of surrounding land should prevent further loss of carbon through peat wastage and erosion.

Integrated catchment management in the uplands

Management of water catchments to deliver multiple benefits is being undertaken by the water company United Utilities in the Forest of Bowland and the Peak District under the Sustainable Catchment Management Programme (SCaMP), in a partnership including RSPB, Natural England, Environment Agency, Forestry Commission, Peak District National Park Authority and Bowland AONB.

In the Forest of Bowland in Lancashire, and at Longdendale and the Goyt in the Peak District, work is underway to restore priority BAP habitats (particularly blanket bog) and 13,000 ha of SSSI within the 20,000 ha of land owned by United Utilities. Much of the catchment has suffered from the historical effects of overgrazing and drainage of blanket bogs and upland heathland. The main reason that this land is owned by the water company is to protect the quality of the raw water, which it supplies to its customers. Water quality supplied from some of the catchments has deteriorated in recent years, with increases in water discolouration noted, for example, at Hodder water treatment works.

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The Sustainable Catchment Management Programme received funding under the fourth periodic review of water prices (PR04) to enable United Utilities to develop an integrated approach to the management of these three catchments. There are two main objectives:

- To help achieve the SSSI PSA target and the UK BAP targets for priority species such as hen harrier and twite and for a range of upland, wetland and woodland priority habitats.
- To establish whether improving the quality of water abstracted from the catchment will reduce the costs of treatment.

As part of the project, Natural England and the RSPB are entering into long-term agreements with tenant farmers to implement more sustainable approaches to management of the land. The programme includes re-wetting of blanket bog through blocking moorland grips (pictured); altering the vegetation management regimes through changes to cutting, burning and grazing intensity; and restoring vegetation cover on bare ground. The programme is reliant on tenants receiving agri-environment payments to maintain viable incomes.

To date, over 70% of the SSSI land in the SCaMP areas is covered by funded management plans. In the Peak District, significant bare peat restoration work has started, with application of heather brash and geotextiles in advance of seeding with a nurse crop in 2008. So far 22 km of grip blocking has taken place in the Goyt and 8 km in Bowland, as well as the planting of 290 ha of woodland.

6.7 Spatial planning and development

This section assesses the use of the spatial planning system to address pressures on the natural environment and to develop green infrastructure. Evidence as to how well the natural environment is faring at the hands of the planning system is limited and mainly anecdotal.

6.7.1 The planning system

The development and other use of land (excluding agriculture and forestry) is managed through the spatial planning process. Planning decisions can have significant positive and negative impacts on the natural environment. Therefore, spatial planning has a major role to play in safeguarding and enhancing the state of the natural environment.

There is a hierarchy of planning policy with national, regional and local government tiers. The Government's Planning Policy Statements (PPS) provide a national steer to the spatial plans prepared at regional and local authority levels. Planning decisions are based principally on policies within the development plan, which comprises the policies set out in Regional Spatial Strategies (RSS) combined with the Development Plan Document (DPD) policies set out in the Local Development Frameworks (LDFs) prepared at local authority level.

The following are examples of safeguards for the natural environment built into planning policies at the different levels in the hierarchy.

Planning Policy Statement: At the end of 2007, the Government published its most recent PPS, on Planning and Climate Change. This has adopted many of the recommendations made by Natural England during the consultation process, and should help to ensure that planning policies and decisions at regional and local level will better secure both the mitigation and adaptation required to address climate change.

Regional Spatial Strategy: The East of England Plan includes a range of policies dealing with the natural environment. These include a policy for green infrastructure to be identified, created, protected and managed to ensure that an improved and healthy environment is available for the benefit of present and future communities. Another policy requires future policies, programmes and proposals to afford the highest level of protection to the East of England's best landscapes. A further policy requires planning authorities and other agencies to ensure that the region's wider biodiversity, geodiversity and natural resources are protected and enriched through the conservation, restoration and re-establishment of key resources.

Local Development Frameworks (LDF): As part of its LDF, High Peak Borough Council has a Supplementary Planning Document (SPD) that provides guidance for the design of new developments and alterations to existing developments, including associated landscape design. It supports Policy OC4 of the current Local Plan, which requires development in the countryside to be appropriate to landscape character. The aim of the SPD is to provide guidance on what that means for different Landscape Character Types in the Borough and how it can be achieved. The landscape types are based on those in the Landscape Character Assessment (Derbyshire County Council 2003). For each Landscape Character Type, this SPD identifies key characteristics and their implications for the siting, design and appearance of new development. This Supplementary Planning Document serves as a new approach to guiding development. It regards all landscapes as valuable and seeks to protect their essential character by making sure that the change that takes place supports rather than erodes landscape character.

6.7.2 Planning for Green Infrastructure

Natural England is involved, alongside the Department for Communities and Local Government, Defra and the Environment Agency, in assessing Growth Point and Ecotown bids (see Section 5.4.2), and setting and monitoring strict environmental conditions for them, such as provision of Green Infrastructure. Natural England believes that each Growth Point and Ecotown should be underpinned by a robust Green Infrastructure strategy.

Green Infrastructure can be defined as a strategically planned and delivered network comprising the broadest range of high quality green spaces and other environmental features. It should be designed and managed as a multi-functional resource capable of delivering those ecological services and quality of life benefits required by the communities it serves as well as those needed to underpin sustainability. Its design and management should also respect and enhance the character and distinctiveness of an area with regard to habitats and landscape types.

For example, the East London Green Grid concept aims to provide residents and workers with a network of green space that will improve their quality of life. The network of interlinked, multi-functional and high-quality open spaces would connect with town centres, public transport nodes, the countryside in the urban fringe, the Thames and major employment and residential areas. This would be achieved through the creation of new public spaces, the enhancement of existing open spaces and improvements to the links between them.

Thames Basins Heaths

In the Thames Basins Heaths on the borders of Hampshire, Surrey and Berkshire, Natural England has spear-headed a strategic approach to ensure that new housing addresses legal requirements to safeguard the internationally protected heathland areas. Because of their importance as a breeding habitat for scarce ground-nesting birds, such as nightjar (pictured), these fragmented heaths were classified as a Special Protection Area under the Birds Directive. The delivery of housing targets set for this part of the south east, however, was threatening the protection of these important sites, due to the potential impact on ground-nesting birds as a result of increased recreational pressure. Natural England promoted a strategy for the provision of alternative recreational space, which has been recognised by the South East Plan, and is now being progressed by the Regional Assembly and the relevant local authorities in the Thames Basin Heaths area. If adopted, the strategy will allow housing to proceed in accordance with the legal protection afforded by the Habitats Directive.

Access to Natural Greenspace Standard

Natural England is testing a new national assessment framework for ANGSt (Access to Natural Greenspace Standard), which builds on the ANGSt standard developed by English Nature and used in PPG17 as part of green space audits. The standard provides a clear guide for the provision of green space within regional and local authority development plans.

The ANGSt criteria are:

- No person should live more than 300 m from their nearest area of natural green space of at least 2 ha in size.
- There should be provision of at least 1 ha of Local Nature Reserve per 1,000 population.
- There should be at least one accessible 20 ha site within 2 km from home.
- There should be one accessible 100 ha site within 5 km.
- There should be one accessible 500 ha site within 10 km.

The 300 m standard (a straight-line distance) is based upon a requirement to provide green space within 5 minutes walk. Alternatively, it is possible to calculate actual distances covered within a 5 minute walk taking into account real walking routes.

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6.8 Marine and coastal environments

Historically, measures to conserve and enhance the marine environment have not been as developed as for the terrestrial environment. Evidence of the effectiveness of responses to date is also limited and largely anecdotal. However, the current Marine Bill could be as significant for marine conservation in England as the 1981 Wildlife and Countryside Act was for terrestrial nature conservation. It should provide improved nature conservation delivery mechanisms and greater integration of management of our seas.

The geographical scope of the Marine Bill is England, Wales and the UK offshore area. The Bill proposes legislation in four broad policy areas through:

- the introduction of a new marine spatial planning system;
- streamlining marine licensing mechanisms;
- making improvements to the management of marine fisheries; and
- delivering a new mechanism for the recovery and protection of nature conservation in the marine environment, primarily by enabling the establishment of a network of Marine Conservation Zones, a type of marine protected area.

Government intends to establish a new Marine Management Organisation (MMO), to act as a champion for sustainable management of our seas. It would be responsible for strategic planning, operating a marine licensing system, fisheries management, monitoring and enforcement, and data management.

6.8.1 Marine Protected Areas

Currently, Marine Protected Areas (MPAs) within England's territorial seas (out to 12 nautical miles) are composed of Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) designated under the Habitats and Birds Directives respectively, Ramsar sites and one Marine Nature Reserve.

Marine Nature Reserves (extending to 3 nautical miles offshore) can be designated using the Wildlife and Countryside Act 1981. However, only one Marine Nature Reserve (Lundy) has been designated in English waters.

Under the Habitats Regulations, the marine areas of SACs and SPAs are termed European Marine Sites. There are currently 28 SACs and 40 SPAs with marine components in England's territorial seas with work currently underway to identify further potential offshore sites (see Section 5.4.1.3) (including work by the JNCC beyond 12 nautical miles).

Effectiveness of Marine Protected Areas

In 2003, the UK, and subsequently Natural England, were commissioned by OSPAR to design a tool to assess the management effectiveness of existing MPAs (SACs and SPAs). Adapting a framework developed by the World Bank, the scorecard asked relevant authorities to consider and score aspects of MPA management, such as planning, process and achievement of ecological outcomes. Initial results from nine European Marine Sites in England in 2005-2007 revealed that, while the planning of management schemes was relatively effective, actual delivery of ecological outcomes scored less well. Reasons for this include increasing pressures on the marine environment, limited monitoring, insufficient resources and a lack of stakeholder engagement. Strengths included good compliance with regulations, good collaborative working between managers, and the existence of long-term management plans for many sites. In 2007, the OSPAR Commission accepted the scorecard as a tool to assess management effectiveness of MPAs in the OSPAR region (the maritime area of the North-East Atlantic).

6.8.2 Pollution

The Environment Agency regulates land-based effluent discharges to controlled waters (out to three nautical miles) through various domestic and European legislation dealing with issues such as Urban Waste Water, Bathing Waters and Pollution Prevention and Control. It has set up a programme to review all the permissions it issues that could have a significant effect on SACs and SPAs. This is in accordance with the provisions of the Habitats Regulations, and will run until 2010. Natural England has worked closely with the Environment Agency to develop joint guidance on relevant issues. This review continues to identify the main water quality concerns affecting designated sites, and has triggered management action in response.

In the wider marine environment, Defra (2005b) reported that levels of monitored contaminants have reduced significantly over recent years in response to implementing EC legislation on point source pollution control. However, implementation of the recently transposed EC Water Framework Directive will increase the number of pollutants requiring monitoring and control in the future.

The Maritime and Coastguard Agency is the lead organisation for response to marine incidents in the UK, and operates via the National Contingency Plan for Marine Pollution from Shipping and Offshore Installations (The National Plan). Natural England provides advice on the best action to take in order to reduce damage to marine conservation interests as a result of an incident or during recovery operations.

Response to the grounding of *MSC Napoli*

The natural environment was at risk following the deliberate grounding of the stricken vessel *MSC Napoli* approximately 1 mile from the coast at Beer Head, Devon in January 2007. The vessel had major structural damage and was carrying approximately 3,500 tonnes of heavy fuel oil, and a cargo that included significant quantities of hazardous chemicals. Natural England's role was to evaluate the potential risks to marine and coastal biodiversity around the Devon and Dorset coastline from any release of oil and chemicals, and to advise on suitable mitigation measures required. This stretch of the coastline is particularly rich in biodiversity and geodiversity, and includes a number of SSSIs, SACs, SPAs, a National Nature Reserve and a World Heritage Site.

A successful operation by salvers to remove oil and chemicals from the vessel over a prolonged period meant that a potentially disastrous pollution incident was averted. Only a relatively small amount of oil was spilled over the course of the incident, and damage to local wildlife was kept to a minimum.

6.8.3 Offshore renewable energy generation

Wind energy is a crucial element in delivering future renewable energy supplies in England (see Section 5.4.1). Natural England works proactively with government, developers and the Crown Estate at a strategic level to help guide wind-energy developments to the most appropriate locations and to ensure that natural environmental interests are taken into account in all wind-energy relevant strategies, policies and projects.

As an example, the London Array Offshore windfarm in the outer Thames area is, to date, one of the largest proposed windfarms (c250 turbines in 250 km^2 and 1 GW power). The outer Thames area supports internationally important numbers of red-throated diver *Gavia stellata* and the area is being considered as a possible marine SPA (see Section 5.4.1.3).

Following statutory consultation on the project's Environmental Impact Assessment, consent has been granted for a phased approach, with the initial partial build unlikely to significantly affect the red-throated diver population. Once constructed and operational, the effects will be closely monitored to inform whether or not a subsequent phase might proceed.

This development is a good example of partnership working with developers to achieve an acceptable outcome that will contribute to government's renewable energy generation targets while safeguarding internationally important nature conservation features.

6.8.4 Inshore fisheries

Where fishery management affects nature conservation interests, Natural England works closely with Sea Fisheries Committees and the industry. The Wash provides an example of where this joint working has led to the successful management of commercial fisheries, while safeguarding the wildlife interests (see box). It is hoped a similar sustainable fisheries approach will be adopted in other protected sites around the country where fisheries impacts have been identified, so that sites can be restored to, or maintained in, favourable condition.

Sustainable shellfish management in The Wash

The Wash is of exceptional importance to marine wildlife: it is designated as an SPA, Ramsar site, and SSSI, and forms part of The Wash and North Norfolk Coast SAC. Overfishing contributed to a collapse in shellfish stocks in the early 1990s with little signs of recovery for the next ten years. The number of natural mussel beds fell from over 30 in peak years to just one recorded bed in 1997. Cockle stocks also reached record lows. The impact on shellfish-eating waders (eg oystercatchers) and on the fishing industry was disastrous. Major die-offs of oystercatchers occurred in three separate winters in the 1990s with thousands of birds found dead. The cockle fishery was closed in 1997 because of the lack of stocks, and harvesting of mussels from the natural beds remained at unprecedented low levels for several years.

Following a series of scientific workshops, new research, new management measures and ten years of dialogue and partnership working between Natural England, the Eastern Sea Fisheries Joint Committee and the fishing industry, there has been a marked improvement in the health of both the wildlife and fisheries in the area. This work culminated in the development of Shellfish Management Policies setting out the sustainable management of the fisheries at the site.

In 2007 cockle stocks reached their second highest level since records began, and mussel stocks continue to recover and have reached levels not recorded since the late 1980s. Wader numbers are now generally similar to previous levels, although oystercatcher numbers remain around 50% lower than those present in the early 1990s. The successful management of The Wash has resulted in 15,000 ha of intertidal mud and sandflats within the SSSI now being assessed as recovering.

6.8.5 Port development and maintenance

Port development usually involves evaluation of the potential environmental impact under the provisions of the Habitats Regulations because the majority of ports lie within or adjacent to SPAs and SACs. Application of the Habitats Regulations has, in the past, sometimes resulted in compensatory habitat creation measures after development has been consented, on the grounds that there are no alternatives and that there are imperative reasons of over-riding public interest. One such case is highlighted below.

Port development taking account of EC Habitats Directive

Harwich Haven Authority undertook channel deepening between 1998 and 2000. A series of key impacts to the habitat of the Stour and Orwell SPA were identified, including increased tidal propagation, one-off reductions in the extent of inter-tidal habitat exposed on each tide, and accelerated erosion of inter-tidal habitats due to reduced sediment availability. As a result of these impacts, a package of compensatory measures was agreed which included managed realignment on 16.5 ha of arable land at Trimley (The Trimley Marshes Habitat Creation scheme) to offset the loss of tidally exposed mudflat (4 ha). In addition, a sediment replacement scheme, returning maintenance-dredged sediment within the Stour Estuary, was established as part of ongoing measures to offset sediment draw-down. Today, this sediment feeding programme involves some 600,000 wet tonnes per year. The success of the compensatory measures have been confirmed through the establishment of a major monitoring programme (Morris and Gibson, 2006).

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6.8.6 Coastal management planning

In order to tackle potential conflicts between competing interests in the coastal environment, integrated planning has been developed, specifically Coastal Habitat Management Plans and Shoreline Management Plans.

Coastal Habitat Management Plans (CHaMPs) are technical documents that have been prepared for SAC/SPA/Ramsar complexes where there are conflicts between flood management activities and the ecological requirements of sites. On these sites it may not be practical to maintain all features in their current location over a 30-100 year timescale. Operating authorities (usually the Environment Agency) and Natural England are responsible for preparing CHaMPs. CHaMPs quantify predicted habitat change (loss and gain) and recommend measures to prevent or offset habitat losses. These include modifying flood and coastal defence options to avoid damage, or identifying the necessary habitat restoration or recreation works to compensate for unavoidable losses.

Shoreline Management Plans are being developed around the English coastline. The aims of these non-statutory plans are to increase understanding of the long-term risks associated with coastal processes, and to inform sustainable policies for coastal defence that reduce risk to people and also to the developed, historical, and natural environments. CHaMPs provide information for Shoreline Management Plans on the requirements of the Birds and Habitats Directives. By incorporating the CHaMP recommendations, the Shoreline Management Plans should be compliant with the Habitats Regulations, and ensure that there will be no adverse effect on the SACs and SPAs.

6.8.7 Managed realignment

Coastal squeeze is already reducing the extent of saltmarsh in parts of England, with an estimated loss of over one per cent annually since 1994. This change is ongoing and unstoppable, but the impacts can be addressed by implementing strategies to restore intertidal habitat in selected areas of the coast. Managed realignment is a so-called 'soft engineering' technique. Rather than working against nature (for example by building high walls to keep the sea out) it is based on the landward migration or creation of intertidal habitats. New intertidal habitat provides space for floodwater and deposited sediment and so breaks the power of incoming tides and waves and reduces the risk of flooding within the estuarine system. Although more land is needed than a hard defence, the length of sea wall to maintain is reduced.

Currently, managed realignment is largely seen as a nature conservation response because very nearly all recent examples have been undertaken as a specific habitat-creation measure. However, managed realignment provides a wide range of benefits:

- sustainable and effective flood and coastal defence technique;
- long-term strategy adapting to sea level rise;
- more economically efficient than the policy of 'holding the line';
- habitat creation;
- reducing long-term costs of flood and coastal defence;
- potential benefits for biodiversity, landscape, public access, archaeological and local economies.

As an example, the Alkborough realignment on the Humber estuary, which is one of the largest in western Europe, is designed primarily to absorb tidal surges and to reduce pressure on flood defences elsewhere, yet also creates extensive wildlife habitat. This is an excellent example of a multi-functional approach that delivers a range of both wildlife and social benefits.

Although concerns about the loss of agricultural land and the reluctance to abandon hard sea defences continue to limit the use of managed realignment, between 1994 and 2007 there were 1,028 ha of realignment in the UK. Most of this was achieved by breaching or re-aligning sea-walls, with the rest achieved by regulated tidal exchange, ie where a sluice is put into the sea-wall to allow controlled seawater inundation. Monitoring of habitat development and species colonisation on realignment sites has shown that saltmarsh vegetation and associated fauna can colonise sites rapidly, although the rate of development is highly dependent on the elevation of the site relative to tidal range and the accretion or erosion of sediment (eg Boorman 2003). Despite this progress, however, the current rate of habitat creation is still not sufficient to achieve the UK BAP target of 'no net loss' of intertidal habitat.

The economics of managed realignment

Economic valuation of the benefits of the natural environment can have an important impact on the outcome of appraisals of different policy options.

For example, below are three case studies which attempted to identify and value all the costs and benefits of maintaining or enhancing existing flood defences (termed 'holding the line') versus managed realignment schemes. Managed realignment can generate intertidal habitats which provide numerous benefits for example to fisheries, nutrient recycling, carbon storage and biodiversity. In contrast holding the line can lead to the loss of intertidal habitats but would protect areas of agricultural land and preserve some adjacent freshwater habitats. The case studies below only involved the loss of agricultural land and possibly some freshwater habitat for a compensating gain of saltmarsh etc. People, property and nature conservation designated sites were not affected.

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1) A clear conclusion of a Poole harbour appraisal was that holding the line is very unlikely to be desirable when account is taken of the values of the services provided by the natural environment (EFTEC 2007).

2) A Humber estuary appraisal concluded that managed realignment can provide net benefits over a sufficiently long time period (generally greater than 25 years) relative to holding the line. They concluded "...given the caveats and using, for the most part, conservative assumptions and estimates, the Humber appraisal shows that limited managed realignment assessed over an extensive spatial and temporal scale and with non-constant discounting provides an economic efficiency gain." (Turner *et al.* 2007)

3) An appraisal in the Blackwater estuary concluded that over a 50-100 year timescale the benefits (the value of habitat created and carbon buried) is greater than the costs. Positive net benefits are achieved even when using a conservative value for habitat created. The analysis reveals that managed realignment can provide major benefits in carbon and nutrient storage plus habitat creation. (Shepherd *et al.* 2007)

Lundy No-Take Zone

The Lundy No-Take Zone was established in 2003. This 330 ha area is the only statutory No-Take Zone for nature conservation in England.

Within 18 months of its establishment, there were significantly higher numbers of lobsters (*Homarus gammarus*) in the No-Take Zone than in surrounding fished areas. By 2006, there were seven times more lobsters in the No-Take Zone than outside and they were significantly larger. For the first time in 2007, increased numbers of juvenile lobsters were seen in the fished areas around the No-Take Zone suggesting spillover, and an indication of the potential socio-economic benefits of Marine Protected Areas. It is hoped that the Marine Bill provisions will not only result in the establishment of many more Marine Protected Areas, including No-Take Zones, but also deliver further potential benefits from Marine Protected Areas for the fishing industry and communities.

Chapter 6 Responses

Evidence gaps

Areas where we believe we need more evidence on the condition of England's natural environment, how it is used and the most effective mechanisms to address the challenges we face.

1 **Better evidence on the individual and comparative effectiveness of specific mechanisms and response strategies.**

2 **Evidence on the requirements for landscape-scale adaptation to pressures.**

3 **Better evidence on the distribution, use and valuation of ecosystem services.**