



3.13 Species overview

In the previous sections we highlighted the importance and population trends of species characteristic of each habitat type. However, some species are not readily associated with a single habitat type, as they use several habitats across the landscape. Here we provide an overview of England's species and their protection, including that afforded through site designation. We also present the major available trend data for each species group.

England's position at the edge of Europe, together with its complex geology, varied land-use and relatively wet and warm climate have resulted in a rich, distinctive mix of species, with representatives of Boreal, Baltic, central European, Atlantic fringe and Mediterranean zones. Limited opportunities for colonisation during interglacial periods mean that most terrestrial species groups have lower diversity here than in nearby continental Europe. In contrast, England's position on the edge of the European continental shelf means it is particularly rich in coastal and marine species.

England's species are probably the best studied in the world, with a history of recording by amateur naturalists dating back three centuries. This provides unrivalled opportunities to investigate changes in species' distributions and status.

3.13.1 International importance of England's species

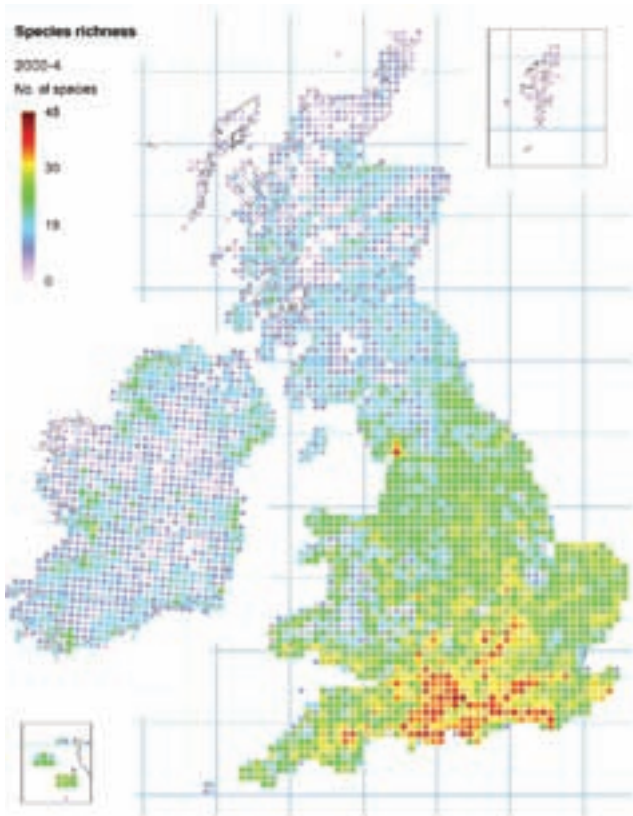
England has globally important populations of some species. Our coasts and seas support some of the most important breeding populations of seabirds in the world (Brown & Grice 2005). England's populations of non-breeding waders, wildfowl and gulls are also of global significance, which is reflected by the fact that three-quarters of England's SPAs are classified wholly or partially for them.

England holds internationally important populations of several species of bats. Bechstein's *Myotis bechsteinii*, barbastelle *Barbastella barbastellus*, and lesser *Rhinolophus hipposideros* and greater horseshoe bats *R. ferrumequinum* are of international conservation concern and are amongst our rarest bats. Some of these populations are significant in being the most northerly in Europe. At least 10% of the world population of Chinese water deer *Hydropotes inermis* is found in the east of England (Cooke & Farrell 1998; Ward 2005) which, despite this being non-native, is important as the species is in decline within its natural range (Battersby 2005).

Only two of England's amphibians and reptiles are of international significance, great crested newt *Triturus cristatus* and pool frog *Rana lessonae*. However, several species' populations (sand lizard *Lacerta agilis*, smooth snake *Coronella austriaca* and natterjack toad *Bufo calamita*) are important in a northern European context or because they demonstrate interesting patterns of genetic diversity at the edge of their range. England does not have any endemic freshwater fish, but eight of our species are of sufficient European importance to be listed in Annex II to the EC Habitats Directive.

Although we have a somewhat limited invertebrate fauna when compared with mainland Europe, England's fauna includes a unique biogeographical mix of species, including elements of northern, Baltic, central European, Atlantic fringe and southern species. There are currently considered to be no more than 12 endemic species of invertebrate in the whole of the UK. In addition, only eight species of invertebrates that occur in England are listed as internationally threatened by the International Union for Conservation of Nature (IUCN). However, some elements are better represented here than in mainland Europe, notably some Atlantic fringe species and also the fauna of veteran trees in our ancient woodlands and parklands, of which England holds a high proportion of the European resource. Our wetlands and coasts also have important populations of invertebrates. A very large number of species of invertebrate have the edge of their British or European range in England and are therefore especially sensitive to climatic and ecological changes.

Butterfly species richness (number of species per 10 km square) in Britain and Ireland 2000-2004



54 of the 56 resident UK species of butterfly occur in England. Species richness is highest in the south of England, particularly associated with calcareous vegetation (for example, Salisbury Plain, the Isle of Purbeck in south Dorset, the North Downs and South Downs), and elsewhere (for example Morecambe Bay Pavements in North West England).

Source: Fox *et al.* (2006)

There are thought to be 23 vascular plant species endemic to England, plus a further 21 Great Britain or 'Great Britain and Ireland' endemics that occur in England. A provisional assessment of 'international responsibility' (Cheffings & Farrell 2005) identified those plant species for which Great Britain is thought to support greater than a quarter of the European population. This includes the endemics, as well as species with restricted ranges in mainland Europe that are frequent in parts of England, for example English

scurvygrass *Cochlearia anglica*, northern marsh-orchid *Dactylorhiza purpurella*, ivy-leaved crowfoot *Ranunculus hederaceus* and spring squill *Scilla verna*. A large number of vascular plant species in England occur at or near the limits of their European range, including many Mediterranean-Atlantic and southern-temperate taxa at their absolute northern European limit (Preston 2007). The conservation value of these 'edge-of-range' species is considerable.

England has just over half of the bryophyte species occurring in the European flora (with three endemic species). This is a much higher proportion than for flowering plants (less than a fifth), emphasising the importance of England for bryophytes in the European context. The only known world occurrence of the many-fruited beardless-moss *Weissia multcapsularis* is at two sites in England (both in Cornwall), and its strongest population is at risk and currently not designated. The British Isles are internationally renowned for their Atlantic communities of bryophytes (Church *et al.* 2004) and the Borrowdale Woodlands complex in Cumbria harbours some rich examples, with deceptive featherwort *Adelanthus decipiens*, rock fingerwort *Lepidozia cupressina*, straggling pouchwort *Saccogyna viticulosa* (all liverworts) and sparkling signal-moss *Sematophyllum micans*. Western rustwort *Marsupella profunda* is an oceanic liverwort found in England (Cornwall), but otherwise only known from Portugal and the Azores. The English populations are thought to be the largest in Europe.

Britain holds around one third of the European lichen flora and is of international importance for its high proportion of oceanic lichen species. Of particular significance are sheltered valley woodlands along the west coast where the combination of high rainfall, cool summers and mild winters favours the development of rich lichen communities. Many oceanic species, although not threatened in England, have a very restricted international distribution and some are included in the European Red Data List (Church *et al.* 1996). Ancient woodlands and open parklands are also significant for lichens on veteran trees.

Over 100 key sites in England have been identified as Important Fungus Areas because of their European importance and rich fungi assemblages (Evans *et al.* 2001). These complement the suite of Important Plant Areas (see box).

Important Plant Areas

Important Plant Areas (IPAs) are the most important places in the UK for wild plants. The IPA concept identifies a network of the most valuable sites for plant diversity as a basis for prioritising conservation action at the site and landscape levels.

The Global Strategy for Plant Conservation seeks to ensure the protection of 50% of the world's most important areas for plant diversity by 2010. Identifying IPAs is the first step towards achieving this.

IPAs have at least one of the following:

- a significant population of one or more species of international conservation concern
- an exceptionally rich flora in a European context
- an outstanding example of a habitat of international plant conservation and botanical importance.

To date 91 IPAs have been identified in England. Examples include The Lizard in Cornwall, Upper Teesdale in Durham and The Broads in Norfolk and Suffolk. The Atlantic coast of the South West is internationally renowned for assemblages of bryophytes and lichens, giving rise to a concentration of IPAs.

Number of IPAs in England (IPAs can have more than one group represented):

- Freshwater algae 3
- Marine algae 6
- Bryophytes 23
- Lichens 31
- Stoneworts 11
- Vascular plants 44

Source: Plantlife International (2008)

3.13.2 Number of species in England

It is difficult to produce a definitive list of the number of species in England, due to the discovery of new species and taxonomic changes. Table 3.19 shows current estimates for each group, which are subject to change and refinement.

About 550 bird species have been recorded in England. None of these are endemic to England. Some 236 species regularly breed or spend the non-breeding season in England. Many hundreds of non-native species have been found in the country but just 10 appear on the formal 'British List' because these have apparently self-sustaining populations.

England has an impoverished mammalian fauna compared with mainland Europe, with less than one-quarter of Europe's terrestrial mammals (Temple & Terry 2007). There are 64 terrestrial mammals and 22 (regularly occurring) marine species (Yalden 1999; Macdonald & Tattersall 2001). This includes 20 non-native terrestrial species of which, two (Chinese muntjac *Muntiacus reevesi* and red-necked wallaby *Macropus rufogriseus*) are not found elsewhere in Europe (Macdonald & Tattersall 2001).

The economic value of charismatic species

Otter *Lutra lutra* and water vole *Arvicola terrestris* are both UK BAP priority species. The otter population has increased in numbers and distribution over the past ten years, following a historical decline as a result of poisoning by organochlorine pesticides. Water voles were once a familiar sight throughout England but have declined significantly due to deterioration in habitat quality and predation by mink *Mustela vison*.

People in North Yorkshire were willing to make an average one-off payment of £10.92 towards the BAPs for the otter and water vole. If everyone over the age of 20 living in North Yorkshire was willing to make this average payment the total value that they placed on conservation of these species would be £5.8 million. This benefit for people in North Yorkshire alone is more than double the estimated present value of the cost of the action plans for conserving otters and water voles across the whole of the UK (£1.8 million). This indicates that not only that there is public support for conservation of the otter and the water vole, but that it is in the interests of society to conserve them.

Source: White et al. (1997)

Table 3.19 Estimated numbers of species in England

Species group	Estimated number of native species	UK BAP priority species (England)	Estimated number of non-native species
Birds	550	53	10
Mammals (terrestrial)	64	18	20
Amphibians	7	4	8
Reptiles (terrestrial and marine)	7	7	4
Freshwater fish	42	13	33
Invertebrates (terrestrial and freshwater)	40,000 *	380	474
Vascular plants (terrestrial and freshwater)	2,744	160	1,846
Bryophytes	935	76	18
Lichens	>1,700 *	98	n/a
Fungi	12,000 - 20,000 *	60	198
Marine mammals	22	17	0
Marine fish	>300 *	35	0
Marine plants/algae	>900 *	6	25
Marine invertebrates	>7,000 *	19	39

* Estimate for United Kingdom

(Source: Maitland & Lyle 1992, Arnold 1995, Church et al. 1996, Evans et al. 2001, Key et al. 2000, Macdonald & Tattersall 2001, Preston et al. 2002a, Church et al. 2004, Defra 2005c, Brown & Grice 2005, Hill et al. 2005, BRIG 2007)

No formal analysis has been made to define England's invertebrate fauna, but there are around 40,000 invertebrate species in the UK. Based on a sample study of 14 groups, Key *et al.* (2000) estimated that as many as 98% of Great Britain's invertebrate species may occur in England (Table 3.20). Within this, around 22% (range 8% to 40%) seem to occur only in England. This would equate to over 6,600 of the British invertebrate fauna being restricted to England.

As there is no formal list of 'English' vascular plants, we present a provisional total produced for us for this report by the Botanical Society of the British Isles (BSBI), which estimated 2,744 native species. The total includes species, subspecies, micro-species, hybrids and (selected) cultivars known to occur (or to have occurred in the past) in England. However, our native flora has been hugely affected by the introduction of non-natives, including recently introduced species and 'cultivars' which are continuing to escape from gardens and become established in the wild.

To date there is no comprehensive list of fungi in England. A conservative estimate for the whole of the UK is about 12,000, but new species are being discovered each year and added to the national list, so the true number might be nearer 20,000 (Evans *et al.* 2001). Individual sites may support many species of fungi and the best recorded sites in Britain are Esher Common (Surrey) with 3,100 species and Slapton Ley (Devon) with 2,500.

Table 3.20 Number of invertebrate species within sample groups occurring in England and Great Britain

Invertebrate species group	England total (restricted to England)	Great Britain
Dragonflies	37 (9)	40
Grasshoppers/crickets	27 (11)	27
Ants	41 (13)	42
Bumblebees	25 (2)	25
Ground beetles	331 (108)	337
Click beetles	75 (29)	77
Snail killing flies	66 (7)	66
Lesser dung flies	27 (5)	27
Butterflies	54 (13)	56
Moths (noctuid)	303 (46)	313
Leeches	16 (2)	16
Harvestmen	23 (2)	24
Millepedes	48 (14)	48
Molluscs	171 (32)	174

(Source: Key *et al.* 2000)

3.13.3 Protection

Many species of birds, other animals and plants receive some protection directly through a variety of national legislation, notably the Wildlife & Countryside Act 1981 (as amended). Some species are subject to special protection under the aforementioned Act (those listed in Schedules 1, 5 and 8 of the Act). The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended) (the 'Habitats Regulations') list European protected species, including all cetaceans, marine turtles and bats, two other terrestrial mammals, two reptiles, two amphibians, one invertebrate and nine vascular plants. The Habitats Regulations transpose the relevant provisions of the EC Habitats Directive into national law, whilst the Wildlife and Countryside Act does the same for the EC Birds Directive.

Many species are also afforded protection through site designation. In some cases this is indirect, through the designation of SSSIs, SACs and Ramsar sites for important habitats. In addition, some SSSIs and SACs are designated specifically for their species interests and SPAs are classified specifically for birds. Ramsar sites are designated for internationally important wetland habitats and species.

In England, 1,517 SSSIs have been notified (in whole or in part) for species, with birds, invertebrates and vascular plants having the largest numbers (Table 3.21 and Figure 3.31). Some individual species or species groups are particularly strongly represented: of the 131 SSSIs notified for mammals, 63 (48%) are for bats and 41 (31%) for otter *Lutra lutra*, and of the 47 SSSIs notified for amphibians, 31 (66%) are for great crested newts.

Eighty-one SPAs have been classified for birds and 125 SACs designated for other species (Figure 3.32). The effectiveness of European site designations is examined in Chapter 6.

Table 3.21 Designated sites for species in England

Species group	Number of SSSIs with species as notified feature	Number of SACs or SPAs
Birds	570	81
Invertebrates	692	42
Mammals	131	36
Amphibians	47	24
Reptiles	59	0
Fish	29	25
Vascular plants	617	27
Non-vascular plants	184	12
All species	1,517	206

Note: A SSSI or SAC can have more than one species group interest and SPAs and SACs often overlap with more than one SSSI.

(Source: Natural England, 2008)

Figure 3.31 Distribution of SSSIs in England with species interest features

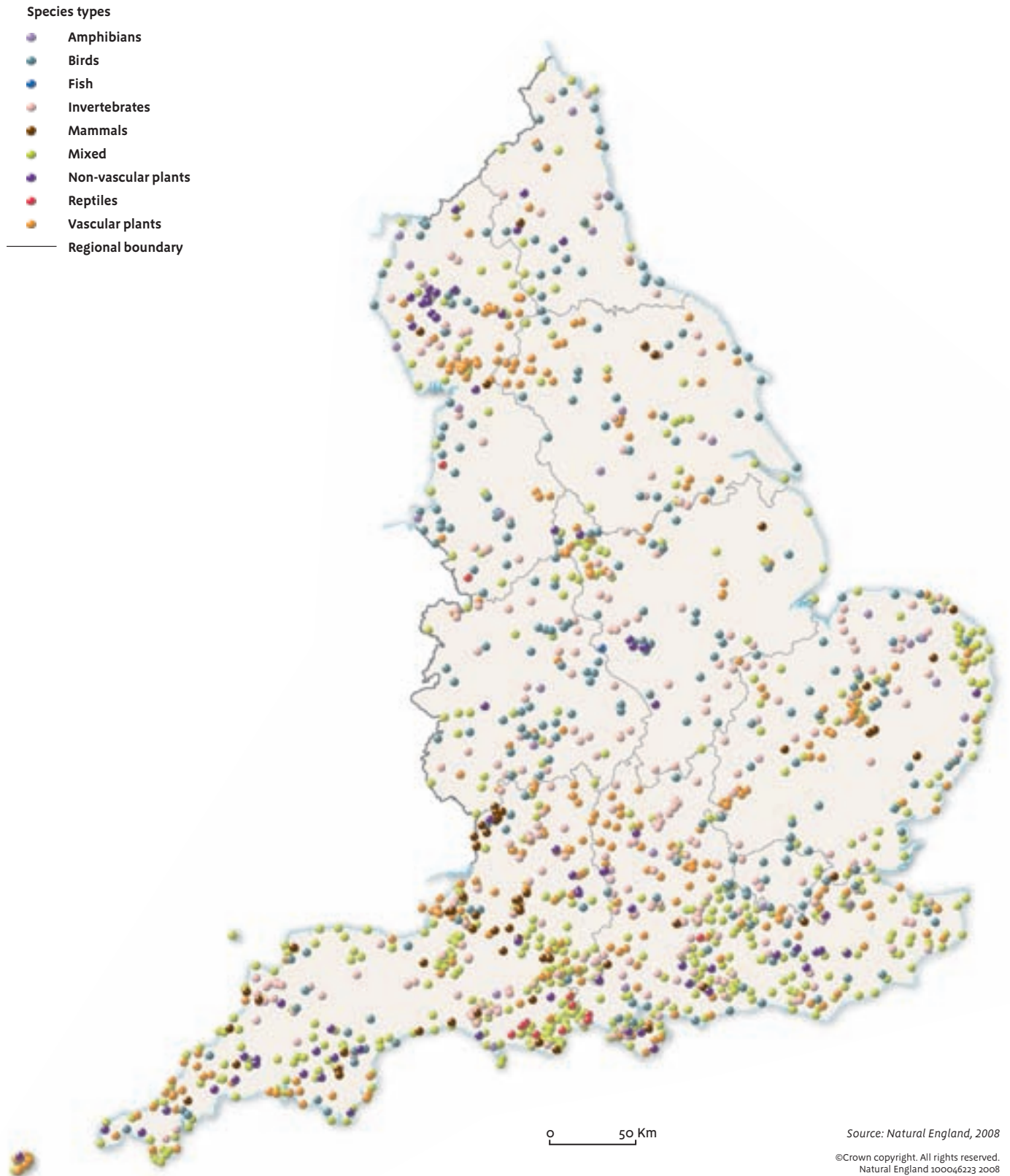
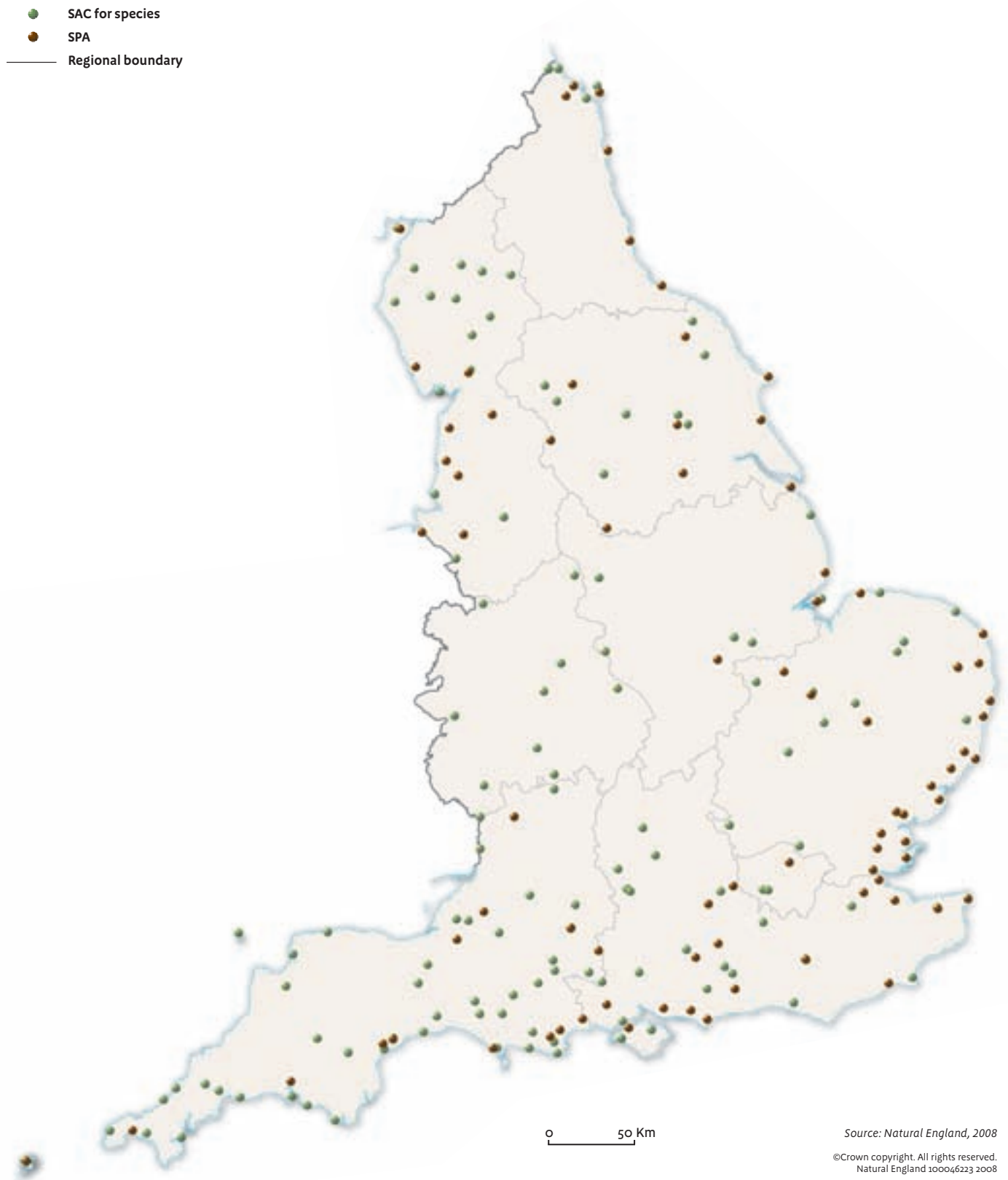


Figure 3.32 Distribution of SACs with species interest and SPAs in England



3.13.4 Condition

3.13.4.1 Trends in species groups

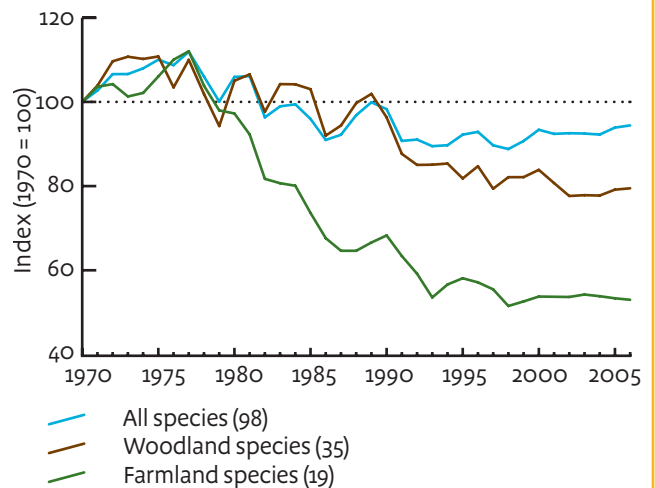
The quality of data on the state of species in England varies greatly between groups. Long-running monitoring datasets are available for birds, bats, butterflies, moths and vascular plants. However, for many other groups, there are few time-series datasets, especially for species that are not of economic or sporting importance. For some species, many of the existing data are anecdotal. Here we present the significant trend data for species not covered in the earlier habitat sections.

Birds

Nearly all wild bird species in England are monitored annually or periodically by the Government's wildlife conservation agencies and their voluntary sector partners the British Trust for Ornithology (BTO), Royal Society for the Protection of Birds (RSPB) and Wildfowl and Wetlands Trust (WWT). Therefore, there exists an extremely strong body of evidence for change in our wild bird populations and this allows us to examine both species-specific and broader changes. Bird populations are considered to be a good indicator of the wider state of biodiversity because they occupy a wide range of habitats, they tend to be near the top of the food chain and there are good long-term data available. Consequently, populations of wild birds in England feature as one of the headline indicators in the England Biodiversity Strategy (Defra 2006c). The England Biodiversity Strategy's all-species indicator (Figure 3.33) shows that, following a low point in the late-1990s, the population index of 98 breeding bird species in England had recovered to 6% below the 1970 baseline in 2006 (Defra 2008a).

However, the habitat-related indicators for breeding woodland and farmland birds (described in Sections 3.5.4.1 and 3.6.4.1, respectively) show different trends to the all-species indicator (Figure 3.33). Since 1970, woodland birds and, in particular, farmland birds have decreased. In recent years all the indicators have levelled off. However, for both woodland and farmland birds, it is the specialist rather than the generalist species that have shown the major declines. The relevant habitat sections describe the trends in urban birds since 1994 (Section 3.10.4.1) and seabirds since 1986 (Section 3.12.4.1).

Figure 3.33 Population trends of wild birds in England, 1970 to 2006



(Source: BTO, RSPB, JNCC, Defra 2008a)

The wintering wetland birds indicator (Figure 3.34), covering species that winter on England's inland and coastal wetlands and open waters, doubled between 1975/76 and 1996/97, but has since been relatively stable at around 180% of the 1970/71 baseline up to 2004/05 (Defra 2008a). The index for wintering wader species (including for example oystercatcher *Haematopus ostralegus* and curlew *Numenius arquata*) has increased by around 50% since 1984/85, whilst that for wildfowl (including for example mute swan *Cygnus olor* and pink-footed goose *Anser brachyrhynchus*) follows the all-wintering wetland birds indicator, but with a more pronounced peak in 1996/97. Some birds have shown massive increases (for example gadwall *Anas strepera*, light-bellied brent goose *Branta bernicla* subspecies *hrota* and whooper swan *Cygnus cygnus*), whilst others have suffered varying degrees of decline (Defra 2008a).

High alerts (more than 50% decline) have been triggered for European white-fronted goose *Anser albifrons* subspecies *albifrons* over the medium- (10 years) and long-term (25 years) up to 2004/05 (Maclean & Austin 2008). A further seven species have triggered medium alerts (more than 25% decline): dark-bellied brent goose *Branta bernicla* subspecies *bernicla* (medium-term), mallard *Anas platyrhynchos* (long-term), pintail *Anas acuta* (long-term), scaup *Aythya marila* (short-term - 5 years), eider *Somateria mollissima* (short-, medium- and long-term), goosander *Mergus merganser* (short-term) and purple sandpiper *Calidris maritima* (short- and medium-term). The distributions of many species are changing, with a general shift away from south-western sites to those in the north and east, in line with expectations from global climate change (see Section 5.2).

In addition, many essentially 'southern' species, including Mediterranean gull *Larus melanocephalus*, little egret *Egretta garzetta*, woodlark *Lullula arborea* and Dartford warbler *Sylvia undata*, are thriving and extending their distributions northwards. All of these species' UK distributions are concentrated in England.

Many of the rare bird species that are subject to intensive conservation action are also doing well. The stone curlew *Burhinus oedipnemos*, for example, has steadily increased in numbers from 149 breeding pairs in 1994 to an estimated 347 pairs in 2006 (Natural England & RSPB unpublished data); a direct result of Natural England and its partners' conservation action for birds.

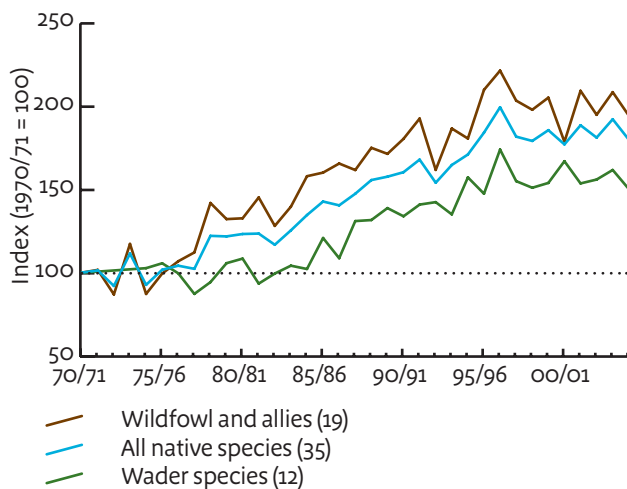
Plants

Although very few species have been lost from England as a whole in recent decades, there appear to have been a considerable number of extinctions at local (county) scale (Marren 2000, 2001; Preston 2000; Preston *et al.* 2002b; Walker 2003, 2007). A detailed analysis by Walker (2003) found an average extinction rate at county scale of one species every two years for the 20th century as a whole, with the highest rates occurring in lowland counties and in southern and eastern England. Further analysis by Walker (2007) showed an overall increase in average extinction rates during the 20th century, with the highest rates being recorded since the 1960s.

The publication of the New Atlas of the British and Irish Flora (Preston *et al.* 2002a) has shown how the composition and distribution of the British (and English) flora has changed (Figure 3.35). Species associated with arable habitats, heathland, calcareous grassland, montane habitats, bogs and acid grassland have declined since the 1930s, whereas species associated with woodland, rivers and streams, standing open waters, improved grassland and built-up areas and gardens have apparently increased (Preston *et al.* 2002b, 2003). Within this broad picture, it is important to note that some groups (for instance woodland herbaceous plants) have declined.

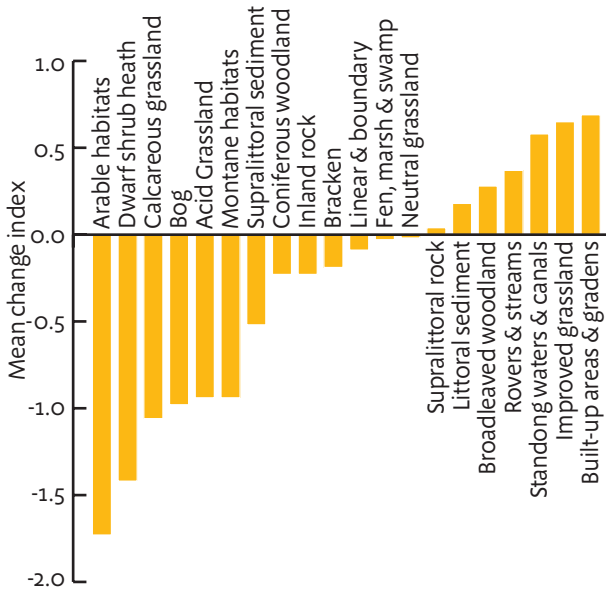
For some declining species, designated sites are vitally important, with virtually all their populations on SSSIs, for example late spider- *Ophrys fuciflora*, early spider- *O. sphegodes* and burnt *Orchis ustulata* orchids.

Figure 3.34 Populations of wintering waterbirds in England, 1970/71 to 2005/06



(Source: BTO, RSPB, JNCC, Defra 2008a)

Figure 3.35 Mean change in plant species by different broad habitat type



Graph shows the 'average' change index for species associated with different broad habitats over the last 40 years in the UK. A positive value indicates a relative increase, a negative value a relative decrease.

(Source: CEH, BSBI, Defra 2003)

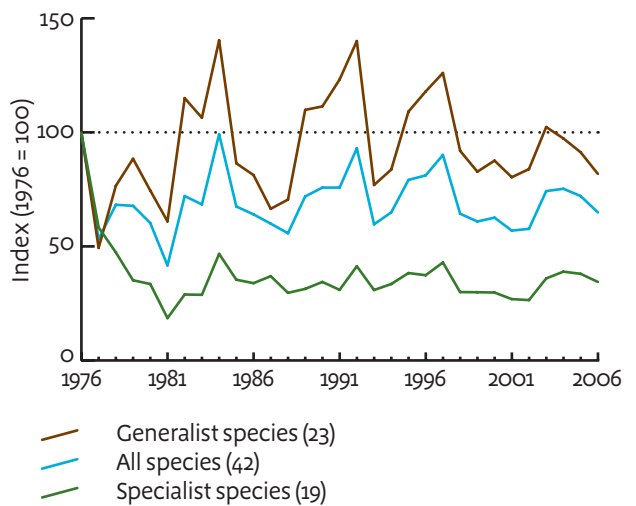
Invertebrates

Our knowledge of trends is limited to a few easily observable groups, notably butterflies, moths and bumblebees.

Butterflies are good indicators of the state of the environment because they are easily monitored and respond rapidly to changes in their habitats and environment. They play a complementary role to birds by providing an indicator of the state of the environment at a finer scale. Populations of butterflies in England now feature as one of the headline indicators in the England Biodiversity Strategy (Defra 2006c).

The *Butterflies for the New Millennium* recording scheme found that three-quarters of butterfly species have declined in distribution over the last 25 years (Fox *et al.* 2006). The UK Butterfly Monitoring Scheme, which assesses numbers of 42 species on a network of over 675 sites in England, shows that there have been major fluctuations in abundance since the scheme began in 1976 (Figure 3.36).

Figure 3.36 Population trends of butterflies in England, 1976 to 2006



(Source: Butterfly Conservation, CEH, JNCC, Defra 2008a)

Butterfly numbers have fluctuated from year-to-year according to weather conditions and natural cycles (Defra 2008a). The constant wet weather of 2007 caused numbers of several species to fall to their lowest ever recorded numbers. Over the past 30 years, habitat specialists have fared worse and, after a rapid decline to 1981, have remained low, being at 37% of the 1976 baseline in 2006. In contrast, wider countryside generalists have fluctuated around the 1970 baseline, but with a decline since 2003 to around 80% of the 1970 baseline by 2006. Some of the generalist species have also extended their breeding ranges substantially in England over recent decades (for example Essex skipper *Thymelicus lineola*, comma *Polygonia c-album*, speckled wood *Pararge aegeria* and gatekeeper *Pyronia tithonus*).

A review of the state of Britain's **moths** has shown that 62 species have become extinct in the 20th century, but new species have colonised (Fox *et al.* 2007). Data from Rothamsted's network of light trap sites in Britain for the period 1968 to 2002 show that there has been a major decline in moth abundance, with overall numbers falling by almost one-third since 1968. Long-term population trends for 337 widespread larger moths show that 67% have declined in abundance since 1968, with over 20% decreasing so severely that they meet UK Biodiversity Action Plan and IUCN criteria for threatened species. For example, in 35 years there have been declines in figure of eight *Diloba caeruleocephala* (95%), lackey *Malacosoma neustria* (90%), cinnabar *Tyria jacobaeae* (83%) and magpie *Abraxas grossulariata* (69%). These commoner species underlie the food chains and ecosystems that maintain our diversity, and their declines suggest a widespread and pervasive environmental degradation.

For one species, the causes of population decline have been studied: the garden tiger's *Arctia caja* decline by 89% is linked to wetter winters and warmer springs, as expected from climate change predictions. This species is predicted to decline further in many areas as climate change continues.

In contrast, 89 species have colonised successfully, many of these feeding on non-native plant species in our gardens and parks. South East England has had more of the extinctions and colonisations. Sixty-nine widespread moth species in Britain have increased by more than 50% over the 35 year period. For example, the population of Blair's shoulder-knot *Lithophane leautieri* subspecies *hesperica* is 200 times higher than its 1968 level and it has spread from the Isle of Wight to Scotland since colonising England in 1951. This moth feeds on non-native cypress trees including Leyland cypress x *Cupressocyparis leylandii*.

The social **bumblebees** have declined in population size with only six of the 25 resident British species now considered common. Seven species are listed as priorities under the UK BAP (including the red-tailed *Bombus ruderarius* and shrill carder-bees *B. sylvarum*, and large garden *B. ruderatus* and carder bumble bees *B. humilis*), one of which, the short-haired bumble bee *B. subterraneus*, is now regarded as extinct in the UK. Two others, the mountain *B. monticola* and broken-belted bumble bees *B. soroensis*, are considered to be in serious decline (Benton 2006).

There has been a marked decline in range and species density of bumblebees since 1960 (Williams 2008). Widespread local species have been lost from large areas of southern and central lowland England, generally retreating northwards and westwards. Southern local species have retreated further south and east, and have become increasingly localised within their reduced range. Systematic recording work carried out since the 1980s through the Bees, Wasps and Ants Recording Scheme (BWARS) continues to indicate severe declines in populations of all except six widespread and common bumblebee species (Benton 2006).

Mammals

Legal protection and conservation initiatives have meant that in the last two decades the long-term decline of some species of mammal has slowed or even reversed. The Tracking Mammals Partnership (TMP) currently reports trends for 35 species (54% of our land mammal fauna). Sixteen species (46%) have increasing populations, 11 species (34%) are stable, and six species (17%) are declining (TMP 2008). For example, over the last ten years, otters have increased (Crawford 2003), as have a number of bat species.

The National Bat Monitoring Programme (NBMP), run by the Bat Conservation Trust, is the longest running multi-species monitoring programme for mammals in the UK. It currently produces population trends for 11 of the UK's 17 resident bat species. There have been significant increases in the populations of four bat species and no significant decreases in the others since the mid-1990s. Two species on the increase are UK BAP priority species: lesser horseshoe bat (44%) and common pipistrelle *Pipistrellus pipistrellus* (64%). Other species on the increase are Daubenton's *Myotis daubentonii* (27%) and Natterer's bats *Myotis nattereri* (36%). However, other species such as noctule *Nyctalus noctula* and brown long-eared bats *Plecotus auritus*, have been added to the UK BAP list due to concerns about future stability of their populations, based on recent trends (Bat Conservation Trust 2007, 2008). The mouse-eared bat *Myotis myotis* was known to breed in England until the 1970s and was declared extinct in 1990.

The National Dormouse Monitoring Programme (NDMP) has detected a significant downward trend in hazel dormouse *Muscardinus avellanarius* populations from the early 1990s to 2002 (Battersby 2005). Analysis shows that hazel dormouse populations have declined in abundance and distribution in all landscapes, except areas of southern England, where populations appear to be stable. The greatest change has been observed at the edge of the species' current range in Britain (Sanderson 2004).

Summary comparisons between trends in species groups

Repeated comprehensive surveys of species groups over the last 20 to 40 years allow comparison of population trends. There have been major declines in moths, butterflies and bumblebees, and also in woodland birds, farmland birds, arable plants and amphibians. In contrast, there has been a significant increase in wintering waterbirds.

In the past decade, there has been a levelling off in the long-term decline of a number of indicators including farmland birds and butterflies. However, the trend for some groups is still downwards. For example, the flora, birds and butterflies most associated with our woodland are all continuing to decline. There has been a particular decline in specialist species – those species that have very specific habitat requirements – revealed in the monitoring of plants, birds, bumblebees and butterflies. For example, the specialist grassland Duke of Burgundy butterfly (*Hamearis lucina*) has declined by 50% in the last ten years.

There have been major declines in populations of breeding wading birds on unprotected lowland wetland grasslands, notably the snipe (*Gallinago gallinago*) which is down by 90% in some regions.

In contrast, some of the trends over the last ten years show real increases. There have been major increases in heathland bird populations for example nightjar *Caprimulgus europaeus*, woodlark *Lullula arborea* and Dartford warbler *Sylvia undata* – and the last of these has increased its range by over 100% due to milder winters. Nevertheless, due to their low population sizes, these species remain vulnerable. Some wetland birds have shown massive increases (eg gadwall, whooper swan), the recovery of the otter has continued, and four bat species are increasing significantly.

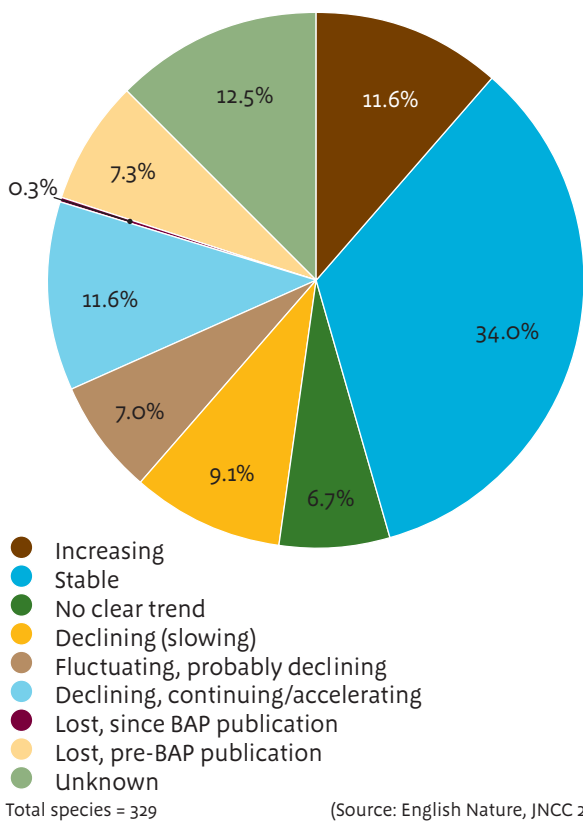
These repeated surveys also allow spatial comparison between groups. Overall, 71% of butterfly species have declined in range (number of occupied 10 km squares) between 1970-1982 and 1995-1999, substantially more than the range declines recorded for British birds (54% between 1968 to 1972 and 1988 to 1991) and plants (28% between 1954 to 1960 and 1987 to 1999). The greater range reductions of butterfly species may foreshadow similar declines in mammals, birds and plants, as insect populations typically respond more rapidly to adverse environmental changes (Thomas *et al.* 2004).

Research into other invertebrate groups (for example bumblebees and moths) shows similar declines (as described above). The decline in common widespread moths indicates wider changes that are likely to have knock-on effects on other species. Although the link between the decline of common moths and their predators and parasitoids has not been proven exclusively (Fox *et al.* 2007), there is growing evidence that demonstrates such links amongst farmland birds and their insect prey (Vickery *et al.* 2001; Benton *et al.* 2002). There is also a strong positive correlation between farmland moth abundance and the behaviour of bats that feed mainly on moths (Wickramasinghe *et al.* 2004).

3.13.4.2 Trends in UK BAP species in England

Reporting on the status of UK BAP priority species and habitats follows a three-year cycle with the first three reporting rounds taking place in 1999, 2002 and 2005. The 2005 assessment (Defra 2006c) indicated that of 329 BAP species in England, 38 (12%) were increasing, 112 (34%) stable, 91 (28%) clearly declining (Figure 3.37). Of 172 species for which data are available for 2002 and 2005 (and in some cases 1999), the trend has improved for 37 and deteriorated for 17.

Figure 3.37 Trends in BAP priority species in England in 2005



Trends in UK BAP species in England – 2005

Positive trends

Increasing trends were reported for 38 species including:

Stone curlew *Burhinus oedicnemus*, sand lizard *Lacerta agilis*, lesser horseshoe bat *Rhinolophus hipposideros*, otter *Lutra lutra*, ladybird spider *Eresus sandaliatus*, field cricket *Gryllus campestris*, silver-spotted skipper *Hesperia comma*, Adonis blue *Lysandra bellargus* and Killarney fern *Trichomanes speciosum*.

In 2002, the pool frog *Rana lessonae* and interrupted brome *Bromus interruptus* were reported to have been lost. They are now classed as ‘increasing’ following re-introductions.

Negative trends

Continuing declines were reported for over 60 species including:

Red squirrel *Sciurus vulgaris*, turtle dove *Streptopelia turtur*, spotted flycatcher *Muscicapa striata*, pearl-bordered fritillary butterfly *Boloria euphrosyne*, fen raft spider *Dolomedes plantarius*, freshwater white-clawed crayfish *Austropotamobius pallipes*, freshwater pearl mussel *Margaritifera margaritifera*, red hemp-nettle *Galeopsis angustifolia*, corn cleavers *Galium tricornutum*, juniper *Juniperus communis*, starfruit *Damasonium alisma* and grass-wrack pondweed *Potamogeton compressus*.

A further 30 species declines were reported as slowing.

Source: Defra (2006c)

3.13.4.3 BAP species action plan threats

The main issues posing a threat to a high proportion of species are (BRIG 2006a):

Habitat loss and degradation

- Agricultural intensification and changes in agricultural management practices (including lack of appropriate habitat management).
- Habitat destruction, fragmentation and development.
- Changes in woodland and forestry management practices.
- Drainage, water abstraction and inappropriate river management.
- Inappropriate coastal management and coastal squeeze.
- Sea fisheries practices.

Environmental pollution

- Atmospheric pollution (such as acid precipitation and nitrogen deposition) affecting the species composition of sites.
- Water pollution from both point and wider agricultural and industrial sources (including nutrient enrichment).
- Climate change and sea level rise as a result of global warming.

Other

- Intrinsic factors (such as poor recruitment, limited dispersal, low population size, slow growth rates and natural fluctuations).
- Invasive and non-native species.
- Recreational pressure and human disturbance.
- Changes in native species dynamics (including competition, disease, predation, and declines in prey and food sources).
- Natural disasters (such as droughts, floods and storms).
- Harvesting and collection of species (including hunting).
- Over-fishing and fisheries by-catch.

Chapter 3 Biodiversity**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 extent, distribution and condition of some habitats, especially outside of designated sites at national and regional levels.
- 2 Better evidence on marine habitats and species.
- 3 Better surveillance of mammals, fish, invertebrates, lower plants and fungi.
- 4 Evidence of links between habitat condition and species survival.
- 5 Analysis of long term trends in habitats and species and functional links between them.