3.10 Urban and brownfield land

The development of urban areas represents extreme modification of the natural environment. The impact of this applies not only to the direct footprint of the built-up area, but also to the adjacent habitats within or close to the urban area. Species are able to exploit a wide range of niches in the urban environment from buildings to parks, gardens, areas of encapsulated countryside and previously developed or 'brownfield land', large expanses of which can also be found away from centres of population.

Brownfield or previously developed land that has not been subject to reclamation is rich in early successional habitats. It comprises mosaics of bare ground with, typically, very early pioneer communities on skeletal substrates (thin soils, low in plant nutrients), more established open grasslands, scrub and patches of other habitats, such as heathland, swamp, ephemeral pools and inundation grasslands. High quality examples include unmanaged flower-rich grasslands with sparsely-vegetated areas developed over many years on poor substrates (Harvey 2000). As a result of the increased awareness of the biodiversity interest of certain types of brownfield land, a new UK BAP priority habitat of 'open mosaic habitats on previously developed land' was recognised in 2007.

Gardens typically have an ecologically unusual assemblage of plant structure and diversity, with the majority of plant species being non-natives. A study of 267 urban domestic gardens across five UK cities recorded a total of 1,056 species making up the garden flora, of which only 30% were native (Loram *et al*. 2008). However, approximately 55% of the 20 most frequently recorded species were natives. Species richness was found to be greater in the garden habitats of cities compared to other city habitats (including limestone grasslands and urban brownfield sites). Gardens with few native plant species can be just as rich in invertebrates as those with many native plants (Smith *et al*. 2006). However, some non-native species have spread from gardens and created major problems when they invaded semi-natural habitats (see Section 5.3).

Urban trees

Urban trees provide nesting sites for birds and bats, may provide food in the form of berries, and support a wide variety of invertebrates, which themselves are a food source for other wildlife. They have a number of other environmental, social and health benefits. Trees filter out pollutants including ozone, nitrogen dioxide and particles. They also help to reduce erosion, improve water quality by intercepting pollution, and reduce groundwater run-off. Elsewhere, careful positioning of trees has led to energy savings by providing shelter, thus reducing heat loss from buildings during winter. They also provide shade in the summer, whilst the evapo-transpiration of water from the leaf surface has a general cooling effect on surrounding air.

Sources: Hewitt *et al*. (2002), Coder (1996)

3.10.1 Importance of England's urban habitats

The growth of urban areas might be seen simply as a threat to biodiversity. However, it also results in the creation of man-made habitats, in close proximity to where people live and work. Urban habitats and the wildlife they support are consequently the parts of the natural environment with which most people have greatest direct contact and are most familiar. Domestic gardens make up a significant proportion of urban green space, typically accounting for between 20% and 25% of the urbanised area of cities in the UK, and between 36% and 47% of the overall green space within them (Gaston *et al*. 2005). As such they are likely to make a major contribution to the maintenance of biodiversity and the provision of ecosystem services in urban areas.

3.10.1.1 Urban species

Some species that have suffered marked population declines in the wider countryside, such as the common frog *Rana temporaria*, song thrush *Turdus philomelos* and hedgehog *Erinaceus europaeus*, are found in significant numbers in urban areas and particularly domestic gardens.

Plants

Brownfield sites support a range of notable vascular plant, moss and lichen species. These often include species declining in the wider countryside, such as bee orchid *Ophrys apifera*, fragrant orchid *Gymnadenia conopsea* (on alkaline wastes), royal fern *Osmunda regalis* (in acid sandstone quarries), the lichens *Peltigera rufescens* (on lime waste and pulverised fuel ash), *Cladonia pocillum* (on calcareous wastes) and *Diploschistes muscorum* (on pulverised fuel ash), and petalwort *Petalophyllum ralfsii* (on pulverised fuel ash), a UK BAP priority species.

Birds

Some areas are important for birds that are primarily associated with previously developed or brownfield land such as little ringed plover *Charadrius dubius* and black redstart *Phoenicurus ochruros*, as well as more widespread, UK BAP priority species including song thrush, willow tit *Poecile montanus* and linnet *Carduelis cannabina*. The habitat provides secure breeding and feeding areas commonly absent from land under agricultural management.

Invertebrates

In recent years, the interest in the conservation importance of brownfield land has grown as many sites have been found to harbour a particularly species-rich invertebrate community including scarce or rare species (Eyre *et al*. 2002; 2003). In particular, they provide vital habitat for many invertebrate species which require bare ground for basking and nesting, and nectar sources for feeding adults, especially aculeate *Hymenoptera* and *Coleoptera*. Between 12% and 15% of all nationally rare and nationally scarce insects are recorded from brownfield sites (Gibson 1998). At least 40 invertebrate species are wholly confined to brownfields and at least 18 of the UK BAP priority invertebrate species have key populations on brownfield sites (Mountford & Strachan 2007). Non-native plants contribute to the value of the habitat for invertebrates because their extended flowering season provides food for nectar-feeding species over a longer period (Bodsworth *et al*. 2005).

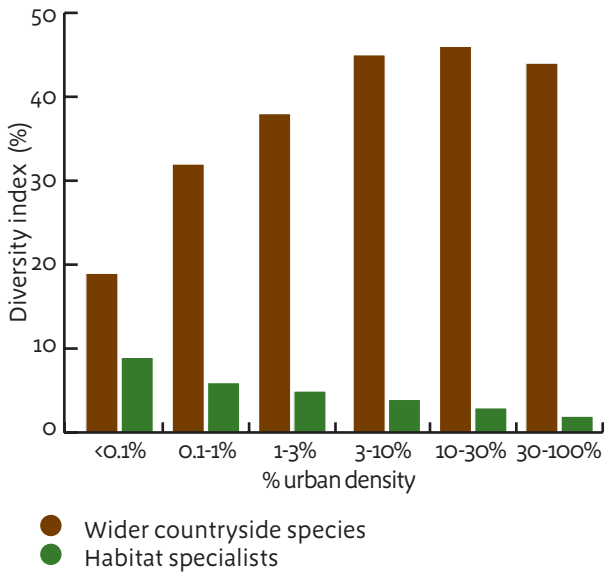
Canvey Wick, Essex

Previously developed (but unused) as an oil refinery, Canvey Wick SSSI has a combination of open sandy soils and nectar-rich plants (many non-native) that is ideal for many invertebrates. Recent surveys have revealed around 1,300 invertebrate species, including 30 Red Data Book species and UK BAP priority species such as the shrill carder bee *Bombus sylvarum* (pictured below) and the solitary wasps *Cerceris quinquefasciata* and *C. quadricincta*.

Source: Buglife (2008a)

The *Butterflies for the New Millennium* recording scheme has shown that wider countryside species occupy a range of urban habitats, while habitat specialists tend to be absent from such areas (Figure 3.23). Indeed, 'wider countryside' butterfly species may now be more likely to be found in suburban areas than in rural areas. This may reflect the high structural and botanical diversity of suburban gardens and parks, compared to the rather uniform conditions created and maintained by intensive agriculture across much of lowland England (Fox *et al*. 2006).

Figure 3.23 Chart showing an index of butterfly species richness in different urban density bands



(Source: Fox *et al*. 2006).

Bats

Certain species of bat, such as serotines *Eptesicus serotinus*, pipistrelles *Pipistrellus* species and Leisler's bats *Nyctalus leisleri*, make use of cavities and internal building voids for hibernation and breeding. In fact, more than half the known summer roosts of common *Pipistrellus pipistrellus* and soprano pipistrelle *P. pygmaeus* are in buildings less than 30 years old. Their association with man-made structures has rendered bats vulnerable to developments and improvements on buildings, and yet also provides an opportunity for people to observe nature on their doorstep.

3.10.2 Extent of habitat

England is one of the most densely populated and urbanised land areas on earth, with urban land cover projected to rise from 10.6% in 1991 to 11.9% in 2016 (DETR 1996). In 2006, there were an estimated 62,700 ha of previously developed land of which an estimated 34,900 ha (55%) were vacant or derelict (DCLG 2007). Buglife's *All of a Buzz in the Thames Gateway* project has provided an extensive assessment of the invertebrate interest of brownfield land. The project assessed 5,046 ha of previously developed land in the Thames estuary during 2005 to 2007; the results show that 24% of sites (55% of the total habitat area) are likely to support a high level of invertebrate biodiversity (Buglife 2008b).

Although there is lack of data concerning the exact extent of gardens, it is generally estimated that garden cover for England and Wales is around 400,000 ha (Gilbert 1989).

3.10.3 Protection

SSSIs in England include approximately 39,000 ha of land (Figure 3.24) in, or within 500 m of, urban areas. Few, if any, of these SSSIs include domestic gardens. No information is available at present on the extent of the new UK BAP priority habitat (open mosaic habitats on previously developed land) that has been notified as SSSI, although there are examples, such as Canvey Wick SSSI and former quarry or mine sites.

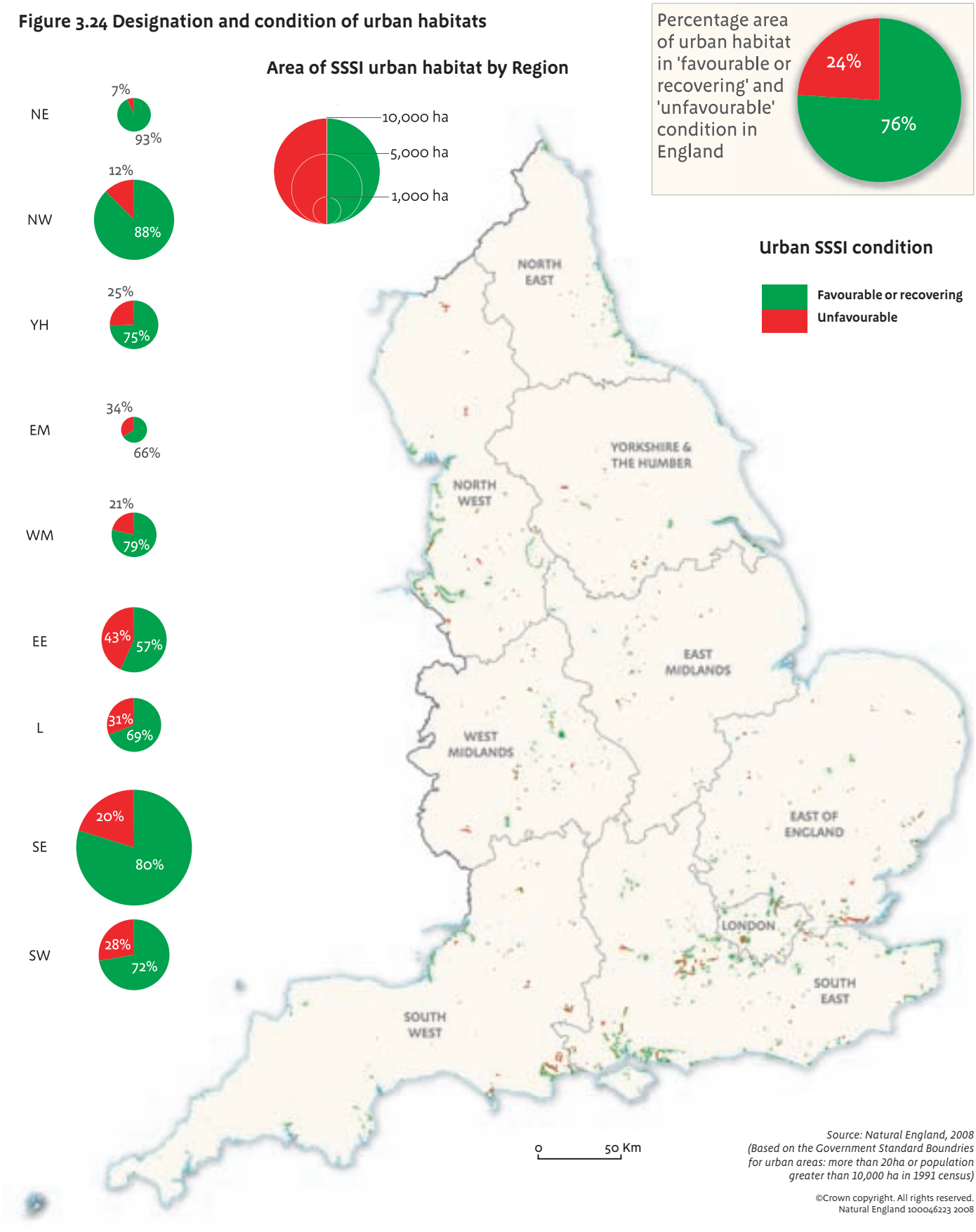
Most 'urban' SSSIs comprise patches of 'encapsulated countryside' or areas of semi-natural habitat on the urban fringe. As such, the majority are included in the other habitat sections of this chapter but a summary is provided here because the urban setting of these habitats may give them a significantly different character to examples in rural areas. Coastal habitats cover the largest area (42% of the urban SSSI total), which reflects the fact that many of our large towns and cities are adjacent to estuaries, but there are also significant areas of woodland (17%), grassland (11%) and heathland (12%), many of which are encapsulated within urban areas (Table 3.16).

Table 3.16 Habitat types within urban SSSIs

Habitat		% of urban SSSI area	% of SSSI area in favourable or recovering condition
Woodland	Broadleaved, mixed and yew woodland	14	79
	Coniferous woodland	2	91
	Wood-pasture and parkland	1	97
Heathland	Lowland heathland	12	63
Grassland	Lowland acid grassland	4	48
	Lowland calcareous grassland	4	80
	Lowland meadows	3	70
Wetland	Fen	2	49
	Coastal and floodplain grazing marsh	3	66
	Reedbed	1	64
Open Water	Standing water	2	67
	Standing water for birds	4	95
	Rivers and streams	1	9
Coastal	Intertidal mudflat and saltmarsh	34	84
	Sand dunes	3	79
	Sub-tidal	2	100
	Maritime cliff and slope	1	97
	Littoral rock	2	100
Other		4	69
All SSSIs		-	77

(Source: Natural England, 2008)

Figure 3.24 Designation and condition of urban habitats



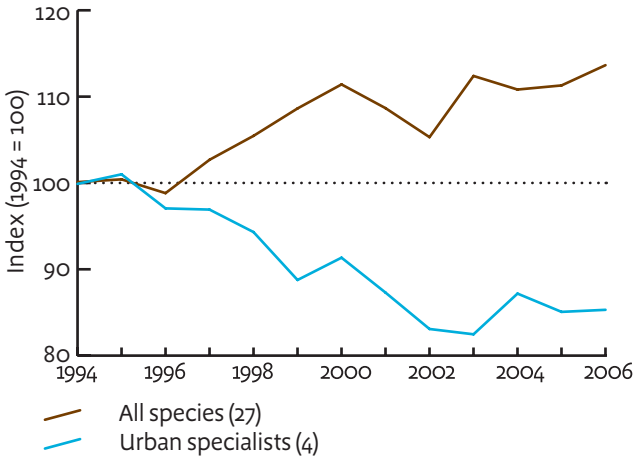
Source: Natural England, 2008
(Based on the Government Standard Boundries for urban areas: more than 20ha or population greater than 10,000 ha in 1991 census)

3.10.4 Condition

Of England's urban SSSIs, 76% by area are in favourable or recovering condition (Figure 3.24).

There are many adverse factors contributing to the area in unfavourable condition, due to the diverse range of habitats within urban SSSIs. However, undergrazing and inappropriate scrub control are the two principal factors, contributing to unfavourable condition in 28% and 22% respectively of the area of urban SSSIs. This reflects the relatively large proportion of heathland and grassland in urban SSSIs, which are vulnerable to these pressures. Similarly, the large areas of coastal habitat within urban SSSIs mean that coastal squeeze (where intertidal habitats are trapped between fixed sea defences and rising sea levels) is also a key factor adversely affecting 20% of the total area. This is exacerbated by the reduced opportunity for realignment of sea defences where there are major urban developments.

Figure 3.25 Population trends of breeding town and garden birds in England 1994 to 2006



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

3.10.4.1 Trends in urban birds

From 1994 to 2006, the overall populations of urban birds have increased by 14% (Figure 3.25), with the majority of the increase occurring before 2000 (Defra 2008a). Woodpigeons *Columba palumbus* have more than doubled in numbers over this period and there have been notable increases for green woodpecker *Picus viridis* (103%), goldfinch *Carduelis carduelis* (56%) (pictured), greenfinch *C. chloris* (36%), chaffinch *Fringilla coelebs* (47%), blackcap *Sylvia atricapilla* (45%), robin *Erithacus rubecula* (41%) and great tit *Parus major* (38%). However, urban specialists (such as swift *Apus apus*, house martin *Delichon urbicum*, collared dove *Streptopelia decaocto* and house sparrow *Passer domesticus*) have declined by 15% over this period (despite a 28% increase for collared dove), with house sparrow having fallen by a third.

3.10.4.2 BAP urban action plan threats

The main issues posing a threat to the new UK BAP priority habitat 'open mosaic habitats on previously developed land' (Mountford & Strachan 2007) are:

- **Redevelopment,** including housing (which is targeted at brownfield land), industrial and commercial use, and landfill.
- **'Reclamation'** of bare ground and early successional habitats as amenity greenspace, typically involving re-grading of landforms, burial of existing substrates beneath imported fertile soils, sowing of amenity grass mixtures, and planting of shrubs and trees.
- **Lack of suitable management,** leading to development of tall tussock grassland and scrub, at the expense of open, flower-rich grassland.