3.8 Wetlands

This section covers the wetland habitats of blanket and lowland raised bogs, fens, reedbeds and grazing marshes.

Blanket bog only forms in situations with high rainfall, low evapotranspiration and flat or gently sloping land, which allow the growth of bog-mosses *Sphagnum* species. It is these waterlogged acidic conditions that leads to *Sphagnum* and associated plants forming blanket peat.

Lowland raised bogs develop at the heads of estuaries, along river floodplains and in topographic depressions. In England, lowland raised bogs are a particular feature of cool, humid regions such as the North West, but once occurred in other parts of the country. The surface of a 'natural' lowland raised bog is waterlogged, acidic and deficient in plant nutrients. This gives rise to a distinctive suite of vegetation types which, although low in overall diversity, support specialised plant assemblages dominated by a colourful range of *Sphagnum* mosses as well as vascular plants adapted to waterlogged conditions, such as cottongrasses *Eriophorum* species, sundews *Drosera* species and bog-rosemary *Andromeda prolifolia*.

UK BAP priority wetland habitats in England:

- Blanket bog
- Coastal and floodplain grazing marsh
- Lowland fens
- Lowland raised bogs
- Reedbeds
- Upland fens, flushes and swamps

3.8.1 Importance of England's wetlands

England holds approximately 40% of the UK's fen and lowland raised bog, and over half of the reedbed resource. Nine of the wetland types listed in Annex I to the EC Habitats Directive occur in England.

Coastal and floodplain grazing marsh is not recognised within the EC Habitats Directive explicitly, but some of its constituent grassland habitats are represented in two of the grassland communities listed in Annex I to the Directive. In addition, wetlands are recognised for their international importance for birds, and examples of all the listed habitats are classified as SPAs under the EC Birds Directive.

The term 'fen' applies to wetlands that receive water and nutrients from surface and groundwater sources, as well as from rainfall. This is the key feature of fens that separates them from bogs, which are exclusively fed by rainfall. Fens are found on soils that are at least periodically waterlogged, and comprise a wide range of wetlands occurring on both peat and mineral-based substrates. Fens are present within ill-drained valley bottoms and basins, floodplains, transitions to open water, dune grasslands and flushed or spring-fed slopes. They can be very small, such as calcareous spring fens a few metres square, dominated by low-growing sedges and mosses, through to tall floodplain fens extending to hundreds of hectares.

The term 'grazing marsh' describes flat, open, low-lying expanses of wet grassland, dissected by ditches. The habitat occurs in river and coastal floodplains that experience high water levels during winter. The grassland is extensively grazed or cut for hay or silage, with much of it having experienced some degree of agricultural improvement and of little value for biodiversity. Some grazing marsh complexes, however, still retain large areas of species-rich grassland.

Reedbeds are wetlands dominated by stands of common reed *Phragmites australis*, where the water table is at or above ground level for most of the year. They tend to include areas of open water and ditches, and small areas of wet grassland and carr woodland may be associated with them.

The economic value of wetlands

Wetlands are often complex ecological systems, whose structure and characteristics can provide humans with a range of direct benefits through extraction (eg fish or reeds) or non-extractive uses (such as recreation). Wetland ecosystem processes also provide us with ecologically related services, supporting or protecting human activities or human properties without being used directly (for example, flood risk management services, clean water, carbon storage services). In addition, we can expect there to be significant non-use values associated with these systems (such as biodiversity).

The stock of wetlands is, therefore, a multifunctional resource with potentially substantial economic value. However, the flow of benefits resulting from any wetland system is likely to be very context specific, with the 'value' of one wetland likely to be very different from that of another.

Of the many different functions that wetland ecosystems provide, an analysis (based on a review of a large number of wetland contingent valuation studies from across the world) found that willingness-to-pay estimates tend to be highest for flood control measures. The supply of water, water quality and biodiversity were the next most highly valued functions respectively. The study concluded that more work is needed to ensure the validity of existing value estimates before use in any future benefits transfer exercises.

Source: Brouwer *et al.* (1997)

3.8.1.1 Wetland species

Wetlands provide a home for specialised plants and animals, such as *Sphagnum* mosses and insectivorous plants in bogs, dragonflies and rare plants in fens, rich assemblages of water beetles in grazing marsh ditches, and rare breeding birds in reedbeds.

Birds

Blanket bog is an important nesting or feeding habitat for rare upland breeding bird species, including golden plover *Pluvialis apricaria* and dunlin *Calidris alpina*. Grazing marshes are particularly important for declining wetland breeding birds, such as lapwing *Vanellus vanellus*, redshank *Tringa totanus*, snipe *Gallinago gallinago* and yellow wagtail *Motacilla flava* subspecies *flavissima*. Internationally important populations of wintering wildfowl also occur including Bewick's *Cygnus columbianus* subspecies *bewickii* and whooper swans *C. cygnus*, geese and ducks, especially wigeon *Anas penelope*. Reedbeds are particularly important for specialist species such as bittern *Botaurus stellaris*, marsh harrier *Circus aeruginosus*, bearded tit *Panurus biarmicus* and the globally threatened aquatic warbler *Acrocephalus paludicola*.

Vascular plants

A total of 653 vascular plant species have been found in fens, some of which are rare and restricted to this habitat (Wheeler 1993), and individual sites can have up to 550 species (Eades *et al*. 2003). A number of nationally rare or threatened plants, such as fen orchid *Liparis loeselii*, fen violet *Viola persicifolia*, fen ragwort *Senecio paludosus* and marsh saxifrage *Saxifraga hirculus* are now confined to a few sites.

Lower plants

The prime formers of bogs are mosses of the genus *Sphagnum* and their dominance in the living vegetation layer gives a bog its characteristically 'spongy' surface. The UK BAP priority species Baltic bog-moss *Sphagnum balticum* is primarily associated with the habitat and there are also six species of *Sphagnum* that are nationally rare or scarce.

Invertebrates

Many Red Data Book invertebrate species are specific to fens and several are restricted to just a few sites. The swallowtail butterfly *Papilio machaon* subspecies *britannicus* is found in association with certain tall fen communities in Broadland (East of England). The fen raft spider *Dolomedes plantarius* is only found at a few sites (see box), and is one of a number of rare spiders confined to fens. Rove and aquatic beetles are the largest groups found in wetlands generally; indeed, approximately a quarter of all beetles are dependent on wetlands (Eades *et al*. 2003).

Bogs support a range of unusual invertebrates. For example, Thorne and Hatfield Moors (Yorkshire & the Humber) have at least five national peatland rarities, including mire pill beetle *Curimopsis nigrita* and the ground beetle *Bembidion humerale*. Acidic pools on bogs support the most diverse dragonfly assemblages of any habitat in Britain (Brooks 1997) because their larvae are often the top predator in such acidic waters. The white-faced darter *Leucorrhinia dubia* is only found on bogs and the small red damselfly *Ceriagrion tenellum* is found on acidic valley bogs in southern England.

Fen raft spider

The fen raft spider *Dolomedes plantarius* is one of Britain's largest spiders and rarest animals. It is currently found at two locations in England – Redgrave and Lopham Fen NNR and the Pevensey Levels (and a third in Wales), but problems with water quality and quantity, and decline of traditional management practices, jeopardise these populations.

On the NNR, raft spiders are restricted to areas of fen dominated by great fen sedge *Cladium mariscus*, where they occur around the margins of pools that were created by traditional peat digging for fuel.

Since 1991, a Species Recovery Programme project has undertaken systematic monitoring and positive habitat management at Redgrave and Lopham Fen NNR, including re-instating rotational cutting of the great fen sedge, scrub removal, creation and deepening of ponds, and the introduction of an irrigation supply.

Sources: Smith (2000)

© Natural England/Peter Wakely

Marsh mallow moth

The marsh mallow moth *Hydraecia osseola* subspecies *hucherardi*, a UK BAP priority species, is confined to just two 10 km squares in this country, occurring on six sites in Kent and East Sussex. Two of these sites are along the Medway, the remainder on Romney Marsh.

First found in England in 1951, this species is also very local in Europe. The moth occurred widely on Romney Marsh in the 1950s and 1960s, but became scarcer from the late 1960s and into the 1970s.

Its foodplant, the nationally scarce marsh-mallow *Althaea officinalis*, must occur in large stands to support colonies of the moth, the caterpillar of which feeds within the rootstock.

The plant is not as widespread on Romney Marsh as it once was and has been lost through drainage and dredging of ditches, inappropriate grazing and trampling, spraying and competition from other plants.

Source: Butterfly Conservation (2000-2008a)

© Dave Green/Butterfly Conservation

3.8.2 Extent of habitat

It is estimated that there are 528,884 ha of wetland habitat, which is roughly 4% of England's land area (Figure 3.20). Blanket bog and grazing marsh comprise 93% of the wetland resource, with the other three habitats (fens, reedbeds and lowland raised bogs) combined contributing 7% of the total area. Wetlands cover just under half the total area of England's SSSI series.

Both the type and extent of wetlands vary between regions. The regions that have extensive upland or coastal areas or major fluvial floodplains support the greatest area of wetland. The South West Region holds the largest proportion of lowland wetlands, of which the majority is coastal and floodplain grazing marsh on the Somerset Levels. Other important areas are concentrated in the South East and East of England Regions.

3.8.3 Protection

Wetland SSSIs cover 247,298 ha, representing 47% of the wetland resource in England (Figure 3.21 and Table 3.13). Grazing marsh is the least well represented with only 16% of the resource included in SSSI, whereas fens and lowland raised bogs approach 90% (Table 3.14).

Of the wetland in England, 179,188 ha (34%) has been designated as SACs under the EC Habitats Directive, including large proportions of the fen and bog habitats. Large areas (169,779 ha) have been classified as SPAs under the EC Birds Directive, particularly of blanket bog, grazing marsh and reedbed.

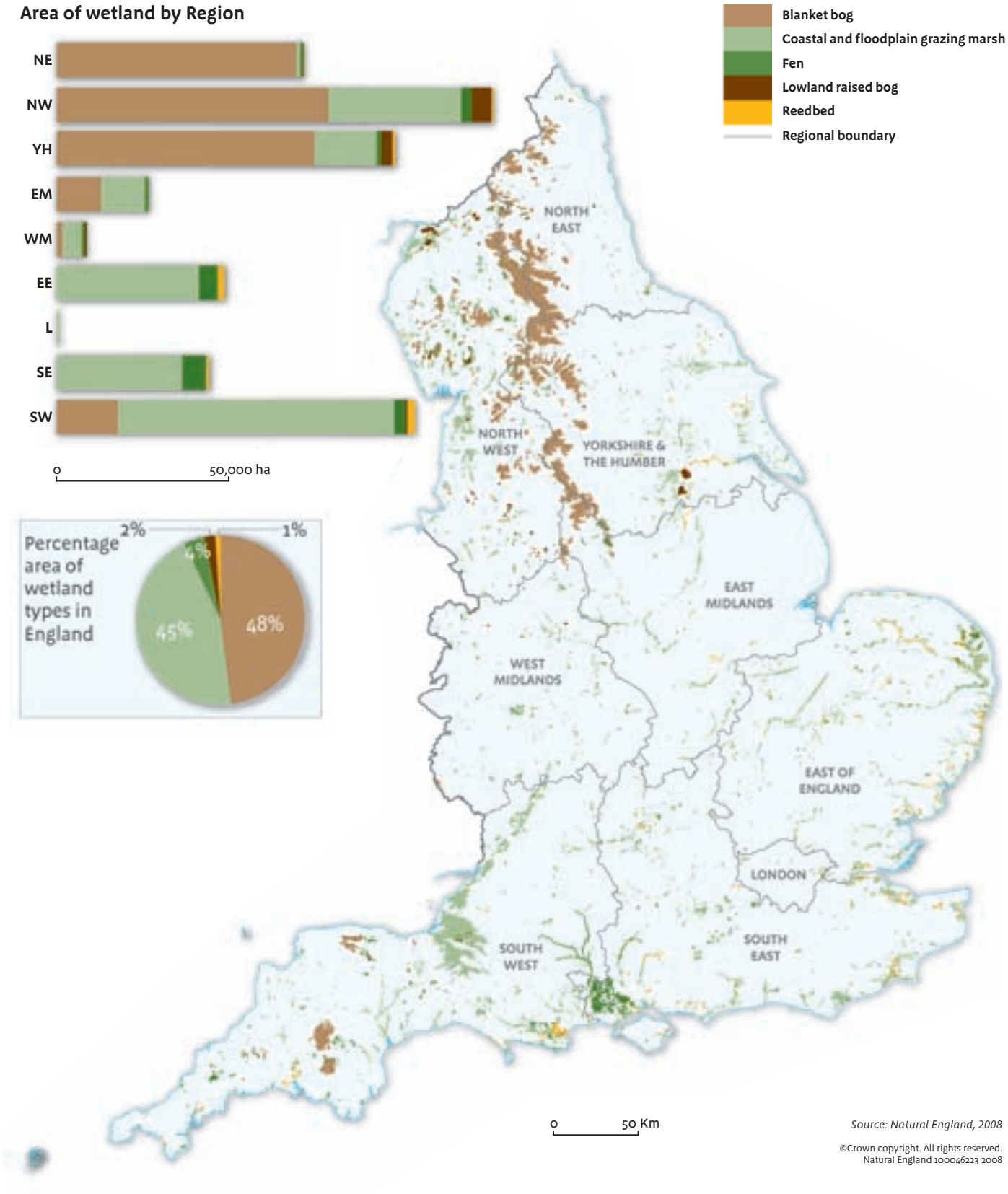
Table 3.13 Area of wetland under different designations

Designation	Total area (ha)	% of total area
Total resource *	528,884	100
SSSI	247,298	47
SAC	179,188	34
SPA	169,779	32
Ramsar	44,986	9
NNR	25,333	5
Within National Park	143,431	27
Within AONB	111,894	21

* Data for wetlands outside designated sites are not complete and the resource total may change with further survey work

(Source: Natural England, 2008)

Figure 3.20 Extent of wetland in England



Source: Natural England, 2008

3.8.4 Condition

By area, 69% of SSSI wetland is in favourable or recovering condition (Figure 3.21). Of this, 21% (52,308 ha) is in favourable condition and 48% (118,671 ha) is recovering.

Over 80% of reedbed is in favourable or recovering condition, compared with around 60% of lowland raised bog and fen (Table 3.14).

In the uplands, dominated by blanket bog, the main causes of unfavourable condition in wetland SSSIs are overgrazing, burning and drainage, which contribute to the adverse reasons in 58%, 36% and 23% respectively of the total area. In the lowlands the causes are more evenly spread, with the main contributory reasons being water pollution (29% of the total area), drainage (21%) and inappropriate water levels (17%).

Comprehensive data on the condition of wetlands outside the SSSI network are not available for the whole of England. Results of a sample survey of grazing marsh being restored under agri-environment schemes estimated that roughly two-thirds (approximately 7,000 ha) was in good condition, when assessed against features required by breeding waders or ditch condition (Dutt 2004). A recent sample survey of non-SSSI fens in Norfolk reported that 31% were in favourable or recovering condition, compared with 51% for SSSI fens in the county (NWT 2006).

3.8.4.1 Trends in wetland birds

Recent national surveys have shown marked declines for a number of characteristic wetland birds over the last 20 years (Wilson *et al*. 2005), although some have recently fared better following historical declines. There have been major declines in the breeding populations of wading birds. Between 1982 and 2002, 61% of breeding snipe, 40% of lapwing and curlew *Numenius arquata*, and 21% of redshank were lost from lowland wet grassland sites (Wilson *et al*. 2005). Historically, these birds were widespread nesters in the uplands and on lowland wet grasslands across the countryside, with some species, particularly lapwing, also nesting on spring-cropped arable land.

A disproportionate number of lowland wet grassland species breed on a very small number of well-managed sites, the majority of which are SSSIs or within Environmentally Sensitive Areas (Wilson *et al*. 2005). The Lower Derwent Valley, Nene and Ouse Washes, North Kent Marshes, the Broads (Norfolk and Suffolk), and Somerset Levels hold 25% of the lowland wet grassland resource, but support 40% of lapwings, 71% of snipe and 57% of redshank breeding in this habitat. This highlights the importance of nature reserves and designated sites for breeding waders and the extremely unfavourable situations outside these areas, where half the lowland wet grassland sites surveyed in 2002 held no breeding waders at all (Wilson *et al*. 2005).

Trends in wading birds more characteristic of the uplands, particularly blanket bog, are mixed, with numbers of breeding golden plover stable, whilst dunlin and curlew breeding populations are both declining (Sim *et al*. 2005).

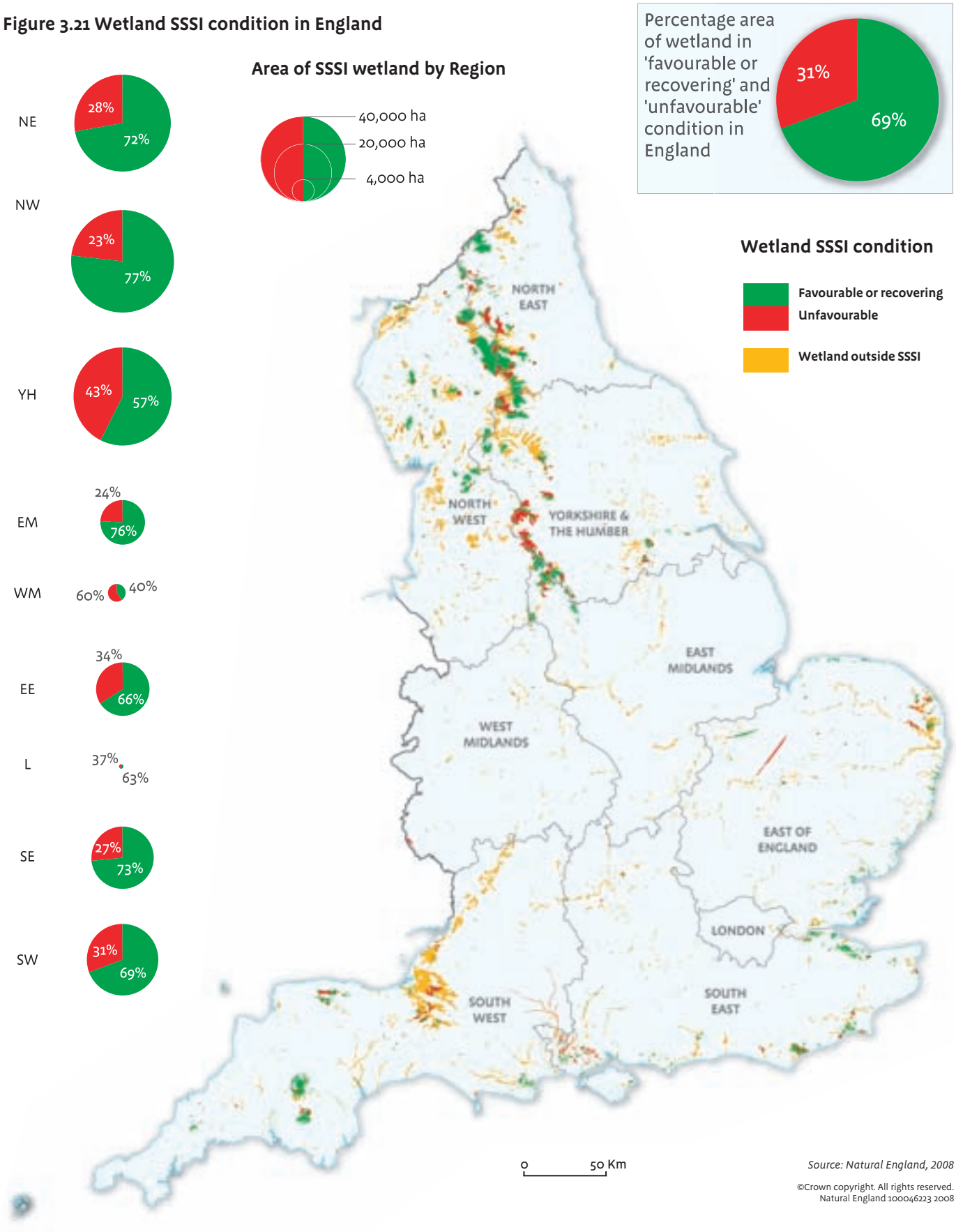
Table 3.14 Extent of SSSI notification and condition by wetland types

Habitat	Total resource (ha)	Area SSSI (ha)	% of resource within SSSI	% of SSSI area in favourable or recovering condition
Blanket bog	255,308	176,140	69	70
Coastal & floodplain grazing marsh	235,046	37,288	16	69
Fen*	21,927	19,533	89	60
Lowland raised bogs	10,227	8,949	88	63
Reedbed	6,378	5,388	84	81
Total	**528,884**	**247,298**	**47**	**69**

* Areas given for fen are significant overestimates, because the total includes other habitats existing within the mosaic.

(Source: Natural England, 2008)

Figure 3.21 Wetland SSSI condition in England



Source: Natural England, 2008

Snipe

Snipe *Gallinago gallinago* breeding in lowland wet grasslands in England and Wales declined by 61% between 1982 and 2002. This figure masks some even sharper declines (90%) in central and southern regions (East Midlands, West Midlands, South East and South West), whilst in the north of England snipe have faired a little better with declines of between 40 to 50%.

Around 16% of the lowland wet grassland waders recorded in 1982 were snipe, but by 2002 this had fallen to 6%. Most were concentrated in the East of England (64%), especially on the Ouse and Nene Washes, and in Yorkshire & the Humber (15%), primarily in the Lower Derwent Valley.

Source: Wilson *et al.* (2005)

3.8.4.2 BAP Wetland Action Plan threats

The main issues posing a threat to wetlands are (BRIG 2006a):

- **Changes in agricultural management practice,** especially lack of appropriate management such as grazing, water level and ditch management practices. In the uplands, overgrazing and burning practices have had a significant impact on vegetation, whilst lowland wetlands have suffered from lack of management, leading to succession to scrub and woodland.
- **Drainage and water abstraction,** in particular for agriculture, flood defence, and infrastructure and housing development in the lowlands, and to improve the quality of grazing in the uplands.
- **Diffuse pollution** from both point and wider agricultural sources (fertiliser application) leading to nutrient enrichment of sites, as well as acidification and nitrogen enrichment from atmospheric sources.