Land Use Consultants

March 2009

Review of the extent and condition of Biodiversity Action Plan Habitats in the East of England

Prepared for
Natural England
by
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EXECUTIVE SUMMARY

Introduction

Land Use Consultants was appointed by Natural England in January 2009 to draw together an evidence base relating to the condition and extent of Biodiversity Action Plan (BAP) Priority habitats in the East of England region. In particular, this is to inform the partial review of the East of England Plan. The East of England Regional Assembly (EERA) is due to submit to Government a draft review of The Plan by the end of 2009. Government has indicated that the main purpose of the review should be to extend the life of the plan to 2031 and to consider further increases in housing provision.

A number of key national, regional and local policy drivers exist which require the collation of data relating to the condition and extent of Biodiversity Action Plan habitats. The East of England Plan includes policies which support biodiversity conservation, including:

- **Policy ENV 3: Biodiversity and Earth Heritage** requires that proper consideration is given to the effects of development on habitats and species outside designated sites. It also promotes the conservation, enhancement, restoration, reestablishment and good management of habitats and species populations in accordance with East of England regional biodiversity targets and the priorities established in the East of England Regional Biodiversity Network Map.

- **Policy ENV 1: Green Infrastructure** of the Plan states that '*Areas and networks of green infrastructure should be identified, created, protected, enhanced and managed to ensure an improved and healthy environment is available for present and future communities*'.

Despite a shift in policy focus towards the maintenance and enhancement of priory habitats outside of designated sites, relatively little targeted monitoring is undertaken across the Region, largely due to a lack of sufficient resources. Therefore this study reviewed a series of general, Region-wide information sources relating to the extent and condition of BAP habitats, but it also drew together a number of reports and data sources which have been developed at the sub-regional level, and which have investigated the condition of specific habitats.

Habitat Extent and Condition

A literature review reconfirmed a picture of historic habitat loss and degradation in the East of England, with relatively isolated fragments of remaining habitat isolated by agriculture and development. Improvements have been recorded in the condition of Sites of Special Scientific Interest (SSSI). In terms of biodiversity action plan habitats, there is evidence from across the region that suggests that habitats outside of designated sites are faring worse, with decreased and declining condition as the drive and resources for their maintenance is lacking. The following key points were identified for the study habitat groups.

Coastal Habitats

- Significant pressure as a result of coastal squeeze, with sea level rise eroding and inundating habitats restricted by sea walls and coastal development.
- Areas of BAP coastal habitats which fall out with designated sites threatened by lack of management, inappropriate development and recreation pressure.
- There is a lack of data relating to the location and extent of many of the coastal BAP coastal habitats.

Freshwater Habitats

- Historically, there has been extensive loss of wetland habitats across the region, although condition in SSSIs is generally improving. However, some freshwater habitats are faring significantly worse with, for example, less than 5% of SSSI rivers and streams (by area) in target condition regionally.
- There is evidence to suggest that freshwater habitats outside designated sites are faring significantly worse in terms of condition. Almost two-thirds of non-SSSI fens in Norfolk have been recorded in unfavourable condition and only one of 15 calcareous springs surveyed in Bedfordshire recorded in 'Proper Functioning Condition'.
- Reasons for poor condition include inappropriate management, reduced water quality discharge from water treatment works and agricultural runoff, and reduced water availability as a result of abstraction.
- Evidence also suggests areas of BAP habitat remain unrecorded, for example fen and reedbeds.

Grassland Habitats

- Significant declines in grassland BAP habitats have been reported even up to recent years. For example, 96% losses of Lowland Meadow BAP Priority Habitat in Hertfordshire and Suffolk between 1934 and 2003.
- Evidence from across the region indicated that the condition of grassland BAP habitats outside of designated sites is significantly lower than within such sites. For example, 69% of grassland County Wildlife Sites (CWSs) in Norfolk have been judged to be in poor or declining condition, with 10% declined to the point that they no longer warranted CWS status. Similar evidence was found relating to Calcareous grassland in Bedfordshire.
- Key threats and reasons for poor condition are largely due to land management, including the lack of appropriate management and agricultural improvement.

Heathland and Acid Grassland

- Regionally, the East of England Biodiversity Audit (EEBA) states that Lowland Heathland BAP Priority Habitat has undergone a 25-50% decline between1978-2003.

- In Bedfordshire, only 20% acid grassland CWSs monitored were found to be in favourable condition. In terms of Heathland, very little had been monitored but all was in unfavourable condition.
- However, a number of heathland restoration projects are underway such as in the Brecklands.
- Again, key threats relate to inappropriate management, as well as air pollution.

Woodland

- A large proportion of the Region's woodland BAP habitats fall outside of designated sites.
- Examples relating to wet woodland identified management as a key issue, with the majority of woodlands identified as in poor condition.

Although not subject to a specific assessment, drawing on Habitats Regulations Assessment of the East of England Plan, it is highly likely that further growth within the Region will place increased pressure on BAP Habitats both within and outside of designated sites.

The Way Forward

Green Infrastructure

A **Regional Green Infrastructure Framework** is required. This would seek to provide multifunctional benefits across the region and draw together aims within **ENV1 and ENV 3** of the East of England Plan drawing on the **Biodiversity Mapping Project**. In terms of biodiversity, this would assist in securing positive management of existing habitats, as well as the creation of further habitat and reduce fragmentation. This is recognised as a key requirement for adaptation to climate change, and it would deliver a range of other social, economic and environmental benefits. This 'multifunctionality' should assist in securing funding for delivery at the sub-regional level. The Strategy would aim to enable local delivery and interpretation, whilst ensuring mitigation and enhancement works required at the regional and national level are delivered.

Environmental Limits

Further work is required to take forward a method developed in the Haven Gateway on behalf of the East of England Regional Assembly and partners to understand **Environmental Limits** in line with National policy. Such an approach should aid both the planning process and delivery of mitigation.

Baseline and Monitoring

Despite policy and legislative drivers which require the collation and reporting of habitat data, resourcing for this is currently restricted. It is important that the most is made of existing mechanisms to optimise resources, such as the Biodiversity Action Reporting system (BARS) and County monitoring strategies for CWSs. However a simple, standardised and repeatable approach is required across the Region, with consistent methodologies employed

to produce comparable results. This would seek to collate baseline and monitoring data relating to:

- **Location and Extent of Biodiversity Action Plan Habitats**: a workshop approach may be appropriate to 'ground-truth' existing BAP habitat mapping.
- **Habitat Condition**: possibly through
    - Periodic survey of a sample of County Wildlife Sites across the region.
    - Monitoring through the BAP mechanism / process.

Other Key Habitat Issues

A Green Infrastructure approach would go some way to deliver enhanced **site / habitat management**. However, strong policy support should be provided to assist in the delivery of habitat maintenance and enhancement projects, including, for example, through the use of developer contributions.

Freshwater habitats should be given particular consideration given their importance within the East of England as a characteristic habitat (including their importance for tourism and recreation), the provision of ecosystem services such as pollution control, water supply and flood attenuation, and also their vulnerability to growth through abstraction and pollution. This may be provided through strong support to the implementation of water efficiency and recycling measures to minimise abstraction requirements.

This study did not include **agricultural habitats**. However, the importance of these habitats should not be overlooked and the baseline data and monitoring recommendations above apply. These habitats are of great importance given the extent of agricultural land in the East of England and potential to contribute towards ecological connectivity.

Key threats to **coastal habitats** arise due to climate change and coastal squeeze. Further recommendations relating to this are outside the scope of this study, with significant work to address this underway.

1. INTRODUCTION

1.1. Land Use Consultants was appointed in January 2009 by Natural England to draw together an evidence base relating to the condition and extent of Biodiversity Action Plan (BAP) Habitats in the East of England region. In particular, this is to inform the partial review of the East of England Plan. The East of England Regional Assembly (EERA) is due to submit to Government a draft review of The Plan by the end of 2009. Government has indicated that the main purpose of the review should be to extend the life of the plan to 2031 and to consider further increases in housing provision.

1.2. The East of England Plan[1] was published in May 2008. It sets out the development and growth for the region up to 2021. This includes delivery of a minimum of 508,000 houses by 2021, the scale and distribution of housing, priorities for biodiversity, landscape and the historic environment, as well as covering transport, green infrastructure, water, waste, flood risk and economic development. Ensuring that housing growth and economic growth occur in accordance with the principles of sustainable development (including biodiversity conservation) is a key tenet of the East of England Plan. To facilitate this, up-to-date information regarding the state of the regional biodiversity resource is required.

1.3. Despite this requirement, relatively little information exists regarding the condition and distribution of semi-natural habitats which occur outside of statutory protected areas (for example, Site of Special Scientific Interest)[2]. Indeed, around 50% of semi-natural habitat within the East of England occurs outside of SSSIs[3], including those within County Wildlife Sites (CWSs) or the wider countryside. By examining the condition of statutory protected sites alone it is therefore only possible to obtain a partial picture of the regional biodiversity resource.

STUDY AIM

1.4. The overall aim of this study was to draw together information sources relating to the condition of biodiversity in the wider countryside, and specifically the condition of BAP Habitats. This will be used by Natural England as an evidence base to inform the review of the East of England Plan.

1.5. Key elements of the study include the following:

1) Literature review of general information sources to determine the condition of BAP Habitats across the region and in comparison to the national picture.

[1] Government Office for the East of England (2008). *East of England Plan: The Revision to the Regional Spatial Strategy for the East of England*. [online] available at: http://www.goeast.gov.uk/goee/docs/193657/193668/Regional_Spacial_Strategy/EE_Plan1.pdf (accessed January 2009).

[2] Somerset Environmental Records Centre [SERC] (2007). *East of England Biodiversity Data Needs: Final Report*. East of England Biodiversity Forum.

[3] EERA, Scott Wilson and LUC (2008). *East of England RSS Review: Integrated Sustainability Appraisal Scoping Report. Topic Paper 2 – Biodiversity*. EERA

2) Literature review to identify the condition, extent and trends for five broad habitats classes (the 'Study Habitat Groups' incorporate a number of BAP Priority Habitats) within the East of England:

    (i) Coastal.

    (ii) Freshwater.

    (iii) Heathland and acid grassland.

    (iv) Neutral and chalk grassland.

    (v) Woodland.

3) Identification of broad options to address poor or declining condition of habitats in the East of England, particularly in relation to the potential impact of proposed growth supported by the East of England Plan.

4) To identify a series of case studies which exemplify habitat trends within the East of England.

2. LEGISLATIVE AND POLICY BACKGROUND

OVERVIEW

2.1. This section briefly reviews the legislative and policies background to this study, specifically:

1) The policy drivers which promote protection and/or enhancement of biodiversity and which require data on the condition and extent of BAP habitats.

2) The East of England Plan, including:

   a. Policies specifically promoting biodiversity conservation within the region.

   b. Policies which offer information as to the most likely locations and scale of growth proposed for the region.

POLICY DRIVERS REQUIRING INFORMATION ON BAP HABITATS

2.2. Eleven key national, regional and local policy drivers were identified by the East of England Biodiversity Forum[4] when considering the need for biodiversity information in the East of England (**Table 2.1**). Nine of these drivers require the collation of data relating to the condition and extent of BAP habitats.

Table 2.1: Key Policy Drivers Requiring Information on the Condition and Extent of Regional BAP Habitats

Policy driver	Key policy statements/ legislation	Geographical scale for which data on BAP habitats is required	Need (what is BAP habitat data required for?)
1. The Regional Planning Process	Planning and Compulsory Purchase Act, 2004; PPS11 Regional Planning	Regional	Regional Spatial Strategy; Regional Environment Strategy; indicators
2. Local Development Frameworks	Planning and Compulsory Purchase Act, 2004; PPS12 Local Development Frameworks	Local	Policy development; enhancement/mitigation planning; Annual Monitoring Report (AMR) indicator
3. Local Area Agreements	The Local Government White	Local	The proportion of Local Nature

[4] Somerset Environmental Records Centre [SERC] (2007). *East of England Biodiversity Data Needs: Final Report.* East of England Biodiversity Forum.

Policy driver	Key policy statements/ legislation	Geographical scale for which data on BAP habitats is required	Need (what is BAP habitat data required for?)
	Paper: Strong and Prosperous Communities (2006): National Indicator I 197: Improved Local Biodiversity		Conservation Sites where positive conservation management has been or is being implemented.
4. Development Control	Town and Country Planning Acts PPS9, Biodiversity and Geodiversity	Local	Sites, habitats & species material considerations in decisions; mitigation planning
5. Strategic Environmental Assessment	The Environmental Assessment Of Plans And Programmes Regulations 2004	Regional/ Local	Environmental baseline; monitoring requirement
6. Environmental Impact Assessment	Protected species legislation. Environmental Assessment Regulations. NERC duty.	Regional/ Local	Impact assessment on sites, habitats, species
7. Biodiversity Action Planning/ Biodiversity 2010 PSA Target	England Biodiversity Strategy "Working with the grain of nature" / Treasury-Defra PSA Target / European commitment	National/ Regional/ Local	Habitats and species action plans, target development, monitoring; outcome reporting
8. Appropriate Assessment (EU Habitats Directive)	Council Directive 92/43/EEC on the Conservation of natural habitats and of wild fauna and flora; Conservation (Natural Habitats, & c.) Regulations 1994 (as amended)	Regional/ Local	Natura 2000 sites and Ramsar sites. European protected species Monitoring.
9. SSSI Condition	Treasury/ Defra PSA	National	SSSI site quality

Policy driver	Key policy statements/ legislation	Geographical scale for which data on BAP habitats is required	Need (what is BAP habitat data required for?)
PSA Target	Target		
10. Agri-environment scheme support	EU Agricultural Regulations	Regional/ Local	Sites, BAP habitats and species
11. NERC Act Biodiversity Duty	Natural Environment and Rural Communities Act, 2006	Regional/ Local	Sites, habitats and species; indicator

EAST OF ENGLAND PLAN

Regional Policies Which Support Biodiversity Conservation

2.3. **Policy ENV 3: Biodiversity and Earth Heritage** of The Plan requires that, as well as the protection of designated sites, proper consideration is given to the effects of development on habitats and species outside designated sites. There is a focus on the further expansion of wildlife corridors. It also promotes the conservation, enhancement, restoration, reestablishment and good management of habitats and species populations in accordance with **East of England regional biodiversity targets** and the priorities established in the **East of England Regional Biodiversity Network Map** (**Figure 2.1**).

2.4. **Policy ENV 1: Green Infrastructure** of the Plan states that:

"Areas and networks of green infrastructure should be identified, created, protected, enhanced and managed to ensure an improved and healthy environment is available for present and future communities".

2.5. Green infrastructure is defined as the sub-regional network of protected sites, nature reserves, green spaces, and greenway linkages. The Plan identifies the following assets of particular regional significance for the retention, provision and enhancement of green infrastructure:

- The Norfolk and Suffolk Broads; the Norfolk Coast, Suffolk Coast & Heaths, Dedham Vale and Chilterns Areas of Outstanding Natural Beauty; and the Heritage Coasts.
- Areas of landscape, ecological and recreational importance, notably the CommunityForests (Thames Chase, Marston Vale and Watling Chase) , the Brecks, Epping Forest, Hatfield Forest, the Lee Valley Regional Park and areas around the Stour Estuary.

- Strategically significant green infrastructure projects and proposals, such as the Great Fen Project and green infrastructure projects around the fringes of Greater London.

2.6. **Policy ENV4** promotes the expansion of agri-environment schemes, including amongst other objectives, to increase the wildlife value of farmland.

2.7. **Policy ENV5** promotes the conservation of existing woodland that is of nature conservation value and also promotes the targeted planting of new woodland, including as part of Green Infrastructure and for the creation and enhancement of corridors. This lends support to the **Regional Woodland Strategy**[5], which includes a number of policies that can be considered directly relevant to the biodiversity context, including **Policy NE3**, which promotes the *"establishment and management of woodland within an integrated functional landscape to protect the historic environment and enhance biodiversity"*.

2.8. **Policy SS8: The Urban Fringe** requires Local Development Documents to *"set targets for the provision of green infrastructure for planned urban extensions"*

2.9. Finally, **Policy SS9** promotes environmental protection and management at the coast. It promotes conservation of the coastal environment and coastal waters, including the natural character, historic environment and tranquillity of undeveloped areas, particularly in the areas of coastline and estuary designated as sites of European or international importance for wildlife. The Policy also promotes pursuing opportunities for the creation of new coastal habitats, such as salt marsh and mudflat, in areas identified for managed realignment, and states that new development should not be permitted in such areas. Furthermore, the supporting text states that:

"Habitats which cannot be conserved in situ should be replaced by new areas of habitat in sustainable locations as close as possible to existing areas and, wherever possible, before the original site is lost."

Key Centres for Development and Change in the East of England

2.10. **Section 3** of the East of England Plan states that:

"One of the key ambitions of this RSS is to allow the region to accommodate higher levels of growth in sustainable ways. It does this in a number of ways including by focusing development on a group of significant urban areas, termed Key Centres for Development and Change in Policy SS3, together with the policies for the individual centres and through the approach to selective green belt reviews in Policy SS7".

2.11. In relation to BAP habitats the aspiration to achieve 'growth in sustainable ways' translates to the commitment noted in **Policy SS1: Achieving Sustainable Development** to bring about development which incorporates measures to adapt as far as possible to unavoidable climate change, and respects **environmental**

[5] Forestry Commission (2003). *Woodland for life: The regional woodland strategy for the East of England*. [on-line] http://www.woodlandforlife.net/wfl/documents/Woodland_for_Life.pdf [accessed January 2009]

limits. This includes the need for avoidance of 'environmental harm' or failing that appropriate mitigation/compensation.

2.12. **Policy SS3: Key Centres for Development and Change** identifies 21 locations where development should be concentrated across the region. These are listed in **Table 2.2** and illustrated in **Figure 2.2**.

Table 2.2: Key Centres for Development and Change

County	Key Centre for Development and Change
Bedfordshire	Bedford/Kemptson/Northern Marston Vale; Luton/Dunstable/Houghton Regis & Leighton Linslade.
Cambridgeshire	Cambridge; Peterborough.
Essex	Basildon; Chelmsford; Colchester; Harlow; Southend-on-Sea; Thurrock urban area
Hertfordshire	Hatfield and Welwyn Garden City; Hemel Hempstead; Stevenage; Watford.
Suffolk	Bury St. Edmunds; Ipswich; Lowestoft.
Norfolk	Great Yarmouth; Kings Lynn; Norwich; Thetford.

2.13. Broadly these centres are encompassed by the Government's Growth Points and Growth Areas which were established in the Government's Sustainable Communities Plan[6]. Three Growth Areas and three Growth Points are located in the East of England Region (**Table 2.3** and **Figure 2.2**):

Table 2.3: Growth Areas and Growth Points in the East of England

Growth Areas	Growth Points
Thames Gateway (of which South Essex is within the East of England)	Haven Gateway
London-Stansted-Cambridge-Peterborough	Norwich
Milton Keynes – South Midlands (of which Luton and Bedfordshire are within the East of England)	Thetford

2.14. The quantum of development to be proposed within the review of the East of England Plan is not yet known. **Policy H1: Regional Housing Provision 2001-2021** of the current plan states that:

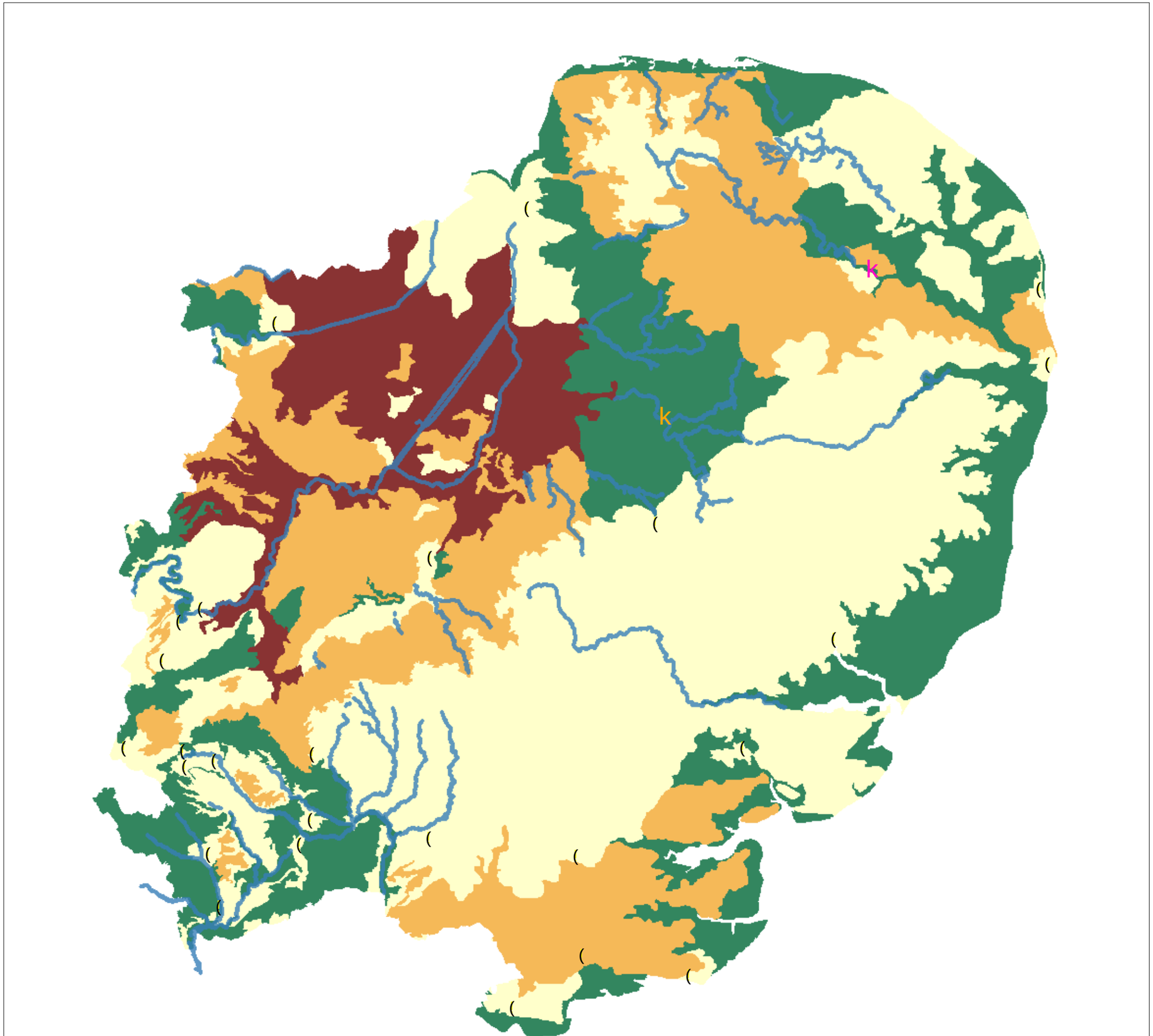
[6] Office of the Deputy Prime Minister [now DCLG]. (2003). *Sustainable Communities: Building for the Future* [on-line] http://www.communities.gov.uk/documents/communities/pdf/146289.pdf (accessed January 2009).

"...local planning authorities should facilitate the delivery of at least 508,000 net additional dwellings over the period 2001 to 2021. Taking account of completions of 105,550 between 2001 and 2006 the minimum regional housing target 2006 to 2021 is 402,540. District allocations should be regarded as minimum targets to be achieved, rather than ceilings which should not be exceeded".

2.15. In addition, significant associated employment and infrastructure development is proposed, including to accommodate traffic growth.

Review of the condition and extent of BAP Habitats in the East of England

Figure 2.1: Regional Biodiversity Network Map



Key

- Strategic River Corridors
- Buffer fragmented habitats
- Extend and link fragmented habitats
- Large scale habitat recreation and restoration
- Core Biodiversity Area

Growth Point

- k Norwich
- k Thetford
- (Key Centre for Development and Change

0 5 10 20 Km

Source: East of England Regional Assembly

Date: 17/02/2009

Revision: A

File: S:\4500\4564 Review of BAP Habitats in the East of England\GIS\Themes\ArcGIS9\4564_01_014_biodiversity_network_map.mxd

Norfolk

Cambridgeshire

Suffolk

Bedfordshire

Hertfordshire

Essex

LONDON

Review of the condition and extent of BAP Habitats in the East of England

Figure 2.2: Key Centres for Development and Change, Growth Areas and Growth Points

Key

County boundary

Growth Areas

Haven Gateway

London-Stansted-Cambridge-Peterborough

Milton Keynes and South Midlands

Thames Gateway

Growth Point

k Norwich

k Thetford

(Key Centre for Development and Change

0 5 10 20 Km

Source: DCLG & EERA

Date: 25/03/2009

Revision: A

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3. BIODIVERSITY IN THE EAST OF ENGLAND

CONTEXT

3.1. Despite significant urbanisation and agricultural land use, the East of England supports a diverse array of habitats. Key concentrations of semi-natural habitats are located along the region's coastlines including the north Norfolk area where tracts of sand dune, shingle and saltmarsh habitat occur. The coastline of south Suffolk and most of Essex also includes areas of extensive soft mud intertidal habitats, forming saltmarshes and mudflats.

3.2. A large area of the interior of the region (often referred to as the in the East Anglian Plain) including a large swathe of central Norfolk, the majority of Suffolk and north Essex are characterised primarily by intensive agriculture. Semi-natural habitats are highly fragmented in this area consisting of fens, small lowland meadows and ancient woodlands which, although small and isolated, may be amongst the richest in the country for flowering plants.

3.3. Other distinctive areas of semi-natural habitat include the Broads, a large wetland complex in east Norfolk and north-east Suffolk, extending over the lower valleys of the Rivers Bure, Yare and Waveney. The low-lying land in these valleys contains a number of habitats, both fresh and saline, including rivers and broads, floodplain fens and ronds (strips of land that lie between the river and flood embankment), drained marshes and valley sides.

3.4. The Chilterns provide a band of underlying calcareous rock, extending in to the region from Hertfordshire, and including areas of south Bedfordshire to the Norfolk/ Suffolk border. Within this area the majority of the region's chalk downland and scrub habitats occur. Where streams erupt from underlying chalk aquifers, spring-fed fens and meadows occur, as found in south in Bedfordshire.

3.5. The Brecklands occupy a large area spanning the western Norfolk/Suffolk border. This area is one of the most valuable inland areas for biodiversity in the East of England, as evidenced by national and international designations. Key concentrations of lowland heathland, lowland acid grassland and coniferous plantation woodland occur here. Another concentration of lowland heathland occurs along the Suffolk coastline in association with areas of coastal grazing marsh, and reedbeds.

3.6. The western half of Cambridgeshire and eastern margin of Norfolk form a very distinctive landscape referred to as Fenland. Fenland is intensively cultivated with little natural or semi-natural habitat remaining. However, key areas of high nature conservation value do occur in terms of swamp, fen meadow and neutral and improved grassland habitats.

3.7. Closer to Greater London, areas of southern Essex and Hertfordshire contain relatively large blocks of woodland habitat, including extensive stands of mature beech woods, significant areas of lowland mixed deciduous woodland and numerous large wood pastures and parklands.

GENERAL TRENDS AND THREATS

3.8. As frequently described within reports of the status of nature conservation within the East of England, biodiversity loss follows a similar pattern of widespread loss as elsewhere in the UK[7]. Drivers for this loss have generally related to agricultural intensification and development of housing, employment land and associated infrastructure. Other historic reasons for decline particularly in the East of England, have related to flood protection and land reclamation resulting in the loss of intertidal habitats, exacerbated further by climate change and sea level rise. These pressures have not only resulted in direct habitat loss, but also the fragmentation of habitats and the decline in quality of isolated habitat patches which are then more vulnerable to threats such as pollution, climate change, invasive species and inappropriate management.

3.9. Examples of the depletion of habitats and species in the East of England has been well documented, for example[8]:

- *The Suffolk Sandlings (heathland) have declined by 90% since 1783.*
- *Essex coastal grazing marshes have declined by 64% since the 1930s.*
- *97% of wetlands in the Fens have disappeared since the 1650s, with 40% lost since 1930.*
- *46% of saltmarshes on the Stour and Orwell estuaries has been lost since 1975.*
- *Over a hundred species have disappeared from the region in the last century.*
- *Farmland wildlife has suffered as agricultural production has increased dramatically.*
- *Brownfield sites in urban areas that have developed nature conservation interest continue to be developed for other uses.*

Review of SSSI Condition Assessment Data[9, 10]

3.10. The extent of SSSIs in the East of England is illustrated in **Figure 3.1**. As of 1st January 2009 78.2% of SSSI land in the East of England was recorded as being in target condition (assessed as being in 'Favourable' or 'Favourable Recovering' condition). The remaining 21.8% not in target condition corresponds to 28,000 ha of land[11].

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[7]Scott Wilson and Land Use Consultants(2008). *East of England RSS Review: Integrated Sustainability Appraisal Scoping Report. Topic Paper 2 – Biodiversity*. East of England Regional Assembly.

[8] East of England Regional Assembly and The East of England Environment Forum (2003) *'Our Environment, Our Future' The Regional Environment Strategy for the East Of England*

[9]English Nature (2005). *English Nature The East of England's Best Wildlife and Geological Sites: Identifying the challenge of bringing them into favourable condition*. English Nature.

[10]English Nature (2006). *Target 2010 - East of England: The condition of the region's Sites of Special Scientific Interest in 2005*. English Nature.

[11] Natural England. (compiled 1 January 2009). *SSSI condition summary*. [on-line] http://www.sssi.naturalengland.org.uk/special/sssi/reportAction.cfm?Report=sdrt18&Category=R&Reference=East+Of+England (accessed February 2009).

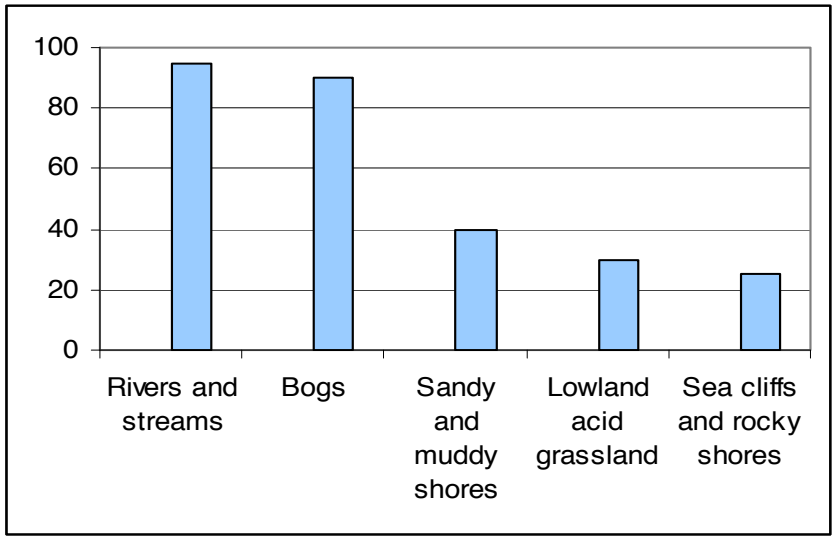
3.11. Nationally SSSIs are divided into 21 broad habitat types, 16 of which are found in the East of England. Of this figure, the five habitats which show the greatest area of SSSI land in non-target condition are as follows (corresponding Study Habitat Groups are in brackets):

- Sandy and Muddy Shore (Coastal).
- Lowland Neutral Grassland (Neutral and Chalk grassland).
- Lowland Broadleaved and Yew Woodland (Woodland).
- Fen Marsh and Swamp (Freshwater).
- Lowland Acid Grassland (Heathland and Acid Grassland).

3.12. 'Sandy and muddy shores' account for 61% (17,000 ha) of the 28,000 ha of SSSI land in the East of England which is not in target condition. If the relative proportion of SSSI land that each habitat accounts for is excluded from the analysis (i.e. by number of habitat parcels), the five habitat types in worst condition are Rivers and Streams, Bogs, Sandy and Muddy Shores, Lowland and Acid Grassland, and Sea Cliffs and Rocky Shores (**Figure 3.2**).

Figure 3.2 Percentage of SSSI Habitat Parcels in Unfavourable Condition

(Figures rounded to the nearest 5%):



3.13. Recent figures provided by Natural England which detail the area of SSSI land in non-target condition are presented in **Table 3.1**. This also lists key reasons for the failure of SSSI land in each county to meet target condition (based on an analysis carried out in 2005) and the percentage change in condition between 2005 and 2009.

Table 3.1: SSSI Condition by County 2005 - 2009

County	Percentage of SSSI land in favourable condition (by area) as of 2009[12]	Percentage change since 2005	Key issues accounting for non-target condition of SSSI habitats
Essex	58.1%	+1.5%	Coastal squeeze
Cambridgeshire	64.0%	+0.5%	Diffuse pollution together with inappropriate water levels
Suffolk	87.0%	+1.7%	Coastal squeeze
Norfolk	88.7%	-3.6%	Drainage of wetland sites and lack of scrub control on grasslands and heathlands
Bedfordshire	90.2%	+5.1%	Under-grazing, and lack of scrub control
Hertfordshire	91.0%	+25.5%	Inappropriate forestry and woodland management and deer/grazing browsing

3.14. As indicated by **Table 3.1**, there was a generally a moderate improvement in the condition of the Region's SSSIs between 2005 and 2009 with the exception of Norfolk (negative trend) and Hertfordshire (significant improvement). These trends must be interpreted with caution as the overwhelming majority of SSSI land in the Region (both by area and number of sites) is concentrated in Norfolk, Essex and Suffolk. This data also indicates that the majority of issues with condition relate to land management.

Habitat Fragmentation

3.15. Fragmentation of habitats is accepted as of significant concern within the East of England (and indeed nationally and internationally). Highly fragmented habitats are more vulnerable to declining condition, particularly in the light of climate change with the movement of wildlife required to enable adaptation to shifting climate zones and prevent localised extinctions.

3.16. As a result, The East of England Biodiversity Mapping Project was implemented to address this[13]. The project involved the identification of aggregations of existing BAP

[12] Natural England. (compiled 1 January 2009). *SSSI condition summary*. [on-line] http://www.sssi.naturalengland.org.uk/special/sssi/reportAction.cfm?Report=sdrt18&Category=R&Reference=East+Of+England (accessed February 2009).

[13] Catchpole, R.D.J. (2008). *England Habitat Network.* Natural England Briefing Note.

habitat and areas where BAP habitats are fragmented, isolated and those which exist in more urban settings. Each of these factors may impinge upon the ecological integrity of BAP habitats. Based on these factors, the East of England Biodiversity Opportunity Map (**Figure 2.1**) presented Biodiversity Enhancement Areas included three sub-zones where different conservations strategies may be appropriate:

- *Buffer fragmented habitats*: habitats in this zone are characterised by small patches of habitat which are highly fragmented in a landscape occupied by sizeable areas of non-rural land use. The East Anglian Plain Natural Area is suggested as typical this zone.

- *Extend and link fragmented habitats*: patches of habitat are larger, less fragmented and more rural than in the former category. The East Anglian Chalk Natural Area is highlighted as typical of this zone. It is suggested that valuable habitats are to be found in these areas, however, these are in need of restoration, recreation to reduce fragmentation.

- *Large scale habitat restoration*: of the three types of Biodiversity Enhancement Area this zones has relatively more priority habitat in fewer, larger sites. Recommended conservation actions include link sites and concentrating on large scale habitat recreations. The Fens Natural Area is given as a typical area.

3.17. In addition the Map identifies Core Biodiversity Areas (foci of semi-natural habitats), Urban Biodiversity Deprivation Areas (where biodiversity enhancement would particularly benefit local communities) and Strategic River Corridors (as key components of an ecological network).

Overview of BAP Habitat Condition

Review of the Regional Biodiversity Audit[14]

3.18. The East of England Biodiversity Audit ranked BAP Habitats in terms of priority for nature conservation in a national context. The audit assessed the following information for each of the 26 BAP Priority Habitats which are found in the region:

- Status [area] change in the last 25 years.

- The relative proportion of the national resource that the region holds.

- Future confidence in actions to conserve a habitat (through consultation).

3.19. Based on these three criteria, each habitat was assigned to a category of **Significance**. Habitats ranked as **'Major' or 'High'** were considered as being of particular importance in a national context. Those ranked as **'local'** were considered to be of regional conservation importance, given that they were characteristic of the region. **Table 3.2** indicates how each of the habitats which were considered relates to the Study Habitat Groups. This analysis must be treated with caution as a fifth of the habitats could not be assigned to a threat category owing

[14] East of England Wildlife Trust Consultancies (2002). *East of England Biodiversity Audit: A report for the East of England Biodiversity Forum*. East of England Biodiversity Forum.

to a lack of appropriate data to assess the three criteria above. However, 12 habitat types were ranked as being either 'Major' or 'High'. These are evenly distributed across the five Study Habitat Groups.

Table 3.2: Prioritisation of Regional BAP Priority Habitats Undertaken in the East of England Biodiversity Audit

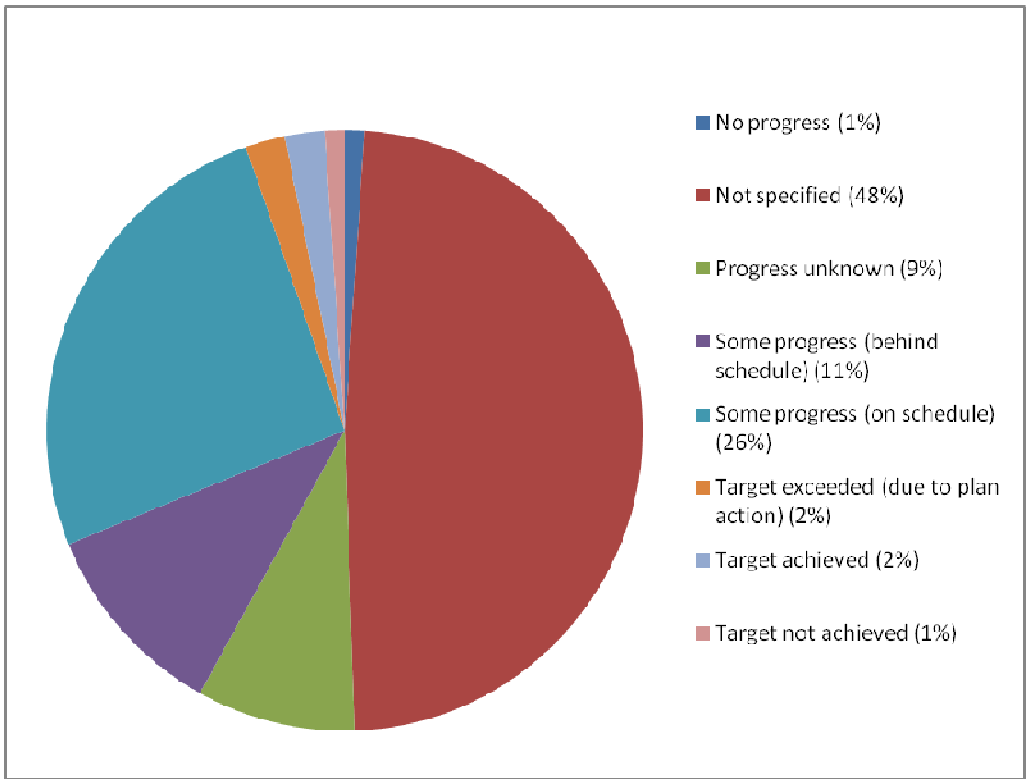
Study habitat	East of England BAP habitat	Assessment of conservation significance according to Regional Biodiversity Audit
Heathland/ Acid grassland	Lowland dry acid grassland	High
	Lowland heathland	High
Neutral and chalk grassland	Lowland meadows	Could not be assessed
	Lowland calcareous grassland	Local
Semi-natural woodland	Lowland beech and yew woodland	Could not be assessed
	Lowland mixed deciduous woodland	High
	Lowland parkland and pasture	Could not be assessed
	Wet woodland	High
Freshwater	Fens	Could not be assessed
	Reedbeds	Major
	Aquifer fed naturally fluctuating water bodies	High
	Chalk rivers	Could not be assessed
	Eutrophic standing waters	Local
	Mesotrophic lakes	Local
Coastal	Coastal and floodplain grazing marsh	Major
	Coastal saltmarsh	Major
	Coastal sand dunes	Local
	Coastal vegetated shingle	High
	Littoral and sublittoral chalk	Local
	Maritime cliff and slopes	Local
	Mudflats	Local
	Saline lagoons	Major
	Seagrass beds	Local

Review of BARS Data and Progress Towards Targets[15]

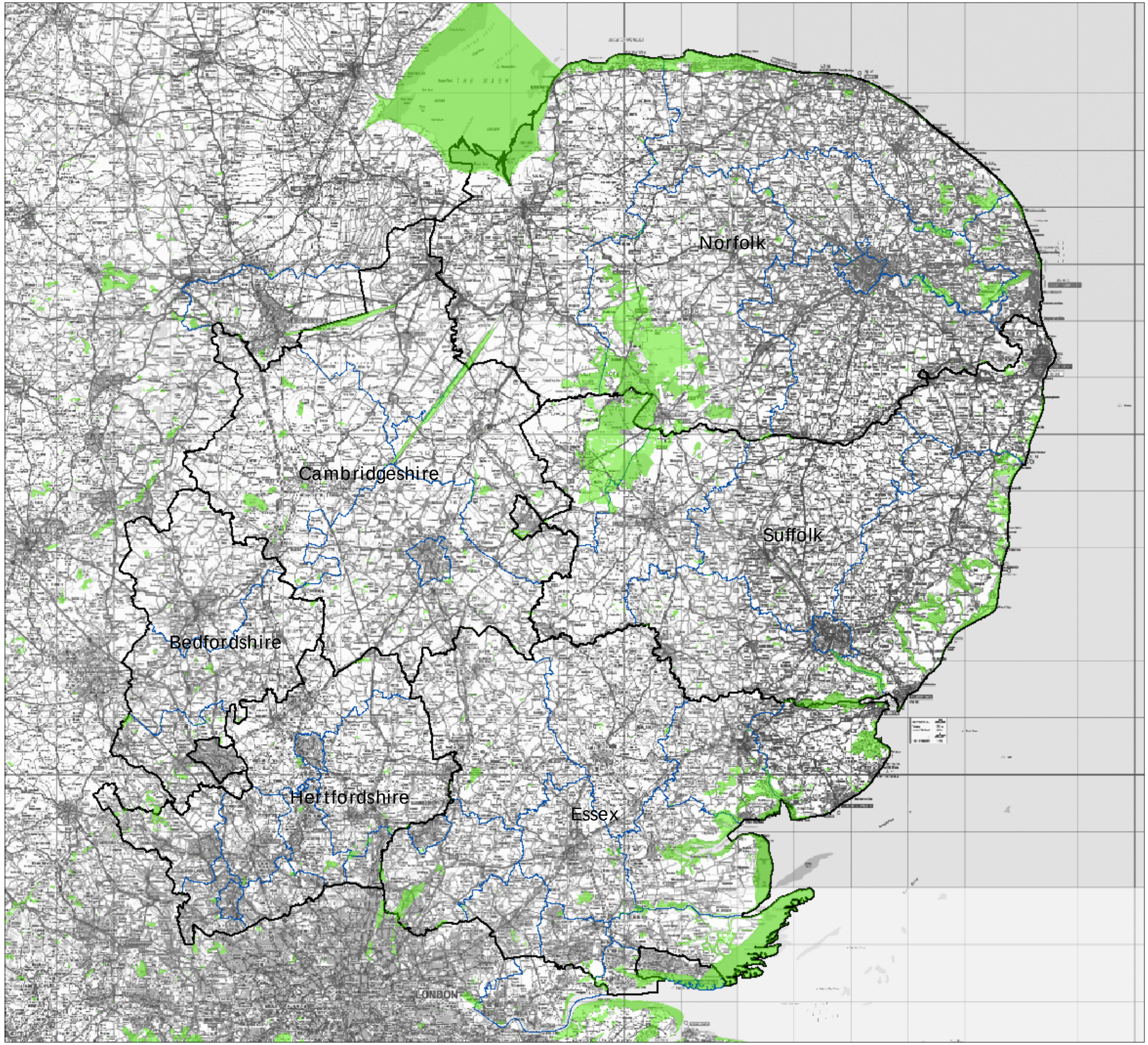
3.20. BARS is the UK's Biodiversity Action Plan reporting system, allowing for on-line reporting and analysis of Local BAP (LBAP) targets. This was reviewed to determine progress towards achieving LBAPs with regard to the Study Habitat Groups in the East of England. Of 93 textual Local BAP targets analysed, 57% of these progress was 'not specified' or it was stated that 'progress was unknown' (**Figure 3.3**). 54 numeric LBP targets were analysed, with progress information unavailable for 87% of these. In terms of the regional spread of the LBAP targets (both textual and numeric) which were analysed, no data was available for Suffolk, with little information available for Bedfordshire and Luton, and Hertfordshire. This limited the usefulness of the BARS information, and no regional trend can be identified.

3.21. Of the reported targets, roughly a third of textual targets reported either progress on schedule or that the LBAP target had been achieved or exceeded (**Figure 3.3**), with 10 percent indicating progress behind schedule. Given the lack of data, numerical targets are not discussed further. Habitat specific progress is described in **Section 4**.

Figure 3.3: Pie Chart Showing Progress Towards Meeting LBAP Textual Targets



[15]Biodiversity Action Reporting System. Targets by Area. [on-line]. http://www.ukbap-reporting.org.uk/outcomes/targets_area.asp (accessed January, 2009).



Review of the condition and extent of BAP Habitats in the East of England

Figure 3.1: Distribution of Sites of Special Scientific Interest (SSSIs)

Key

- County boundary
- Districts and Unitary Authorities
- SSSI

0 5 10 20 Km

Source: DCLG & EERA

Date: 25/03/2009

Revision: A

File: S:\4500\4564 Review of BAP Habitats in the East of England\GIS\Themes\ArcGIS9\4564_01_015_sssi_eoe_region.mxd

4. EXTENT AND CONDITION OF BIODIVERSITY ACTION PLAN HABITATS

4.1. The UK Biodiversity Action Plan (UK BAP) targets habitats and species of high ecological interest or of conservation concern and list actions required to conserve and enhance them within the UK[16]. Biodiversity Action Plans (BAPs) have been prepared nationally and at the county and district scale (the later are called Local Biodiversity Action Plans, LBAPs). Therefore, the BAP Priority Habitats found within the East of England reflect those notified nationally with the UK BAP and those which are considered to be of local conservation importance by one of the six county biodiversity partnerships. In total 26 BAP Priority Habitats have been notified within the East of England Region[17].

4.2. For the purposes of this Study the following five broad habitat groups (Study Habitat Groups) were investigated.

- Coastal Habitats.
- Freshwater Habitats.
- Grassland Habitats (Neutral and Chalk).
- Heathland and Acid Grassland.
- Woodland.

4.3. These incorporate 24 of the 26 BAP Priority Habitats found within the East of England. The Study Habitat Groups were identified by the Steering Group and were chosen in accordance with the current East of England Regional Biodiversity Targets habitat types. These are currently being reviewed and are to be disaggregated to their component UK BAP Priority Habitat types. The grouped habitats were used as these are appropriate for the identification of broad themes as required by the study on a regional basis. Agricultural habitats were omitted at the request of the Steering Group due to a lack of available data. Further information relating to the selection of the habitats, and how the Habitat Groups relate to the UKBAP Habitat types is provided in **Appendix 1**.

4.4. Further information relating to each of the Habitat Groups is presented below. The level of detail available varied considerably between Study Habitat Groups and the component UKBAP Habitat types.

[16] UK Biodiversity Partnership (2008). UK List of Priority Species and Habitats [on-line] http://www.ukbap.org.uk/NewPriorityList.aspx (accessed January, 2009)
[17] Somerset Environmental Records Centre [SERC] (2007). East of England Biodiversity Data Needs: Final Report. East of England Biodiversity Forum.

COASTAL HABITATS

Assessment in Comparison to the National Resource

4.5. In terms of extent, the East of England Biodiversity Audit (EEBA)[18] estimates that the East of England holds:

- 10-50% of the national resource of Coastal saltmarsh, Coastal vegetated shingle and Saline lagoons.
- Less than 10% of the national resource of Coastal sand dune, Littoral and sublittoral chalk, Maritime cliffs and slope, Intertidal mudflat and seagrass bed the region holds <10% of the National Resource.

4.6. It is also estimated that Coastal vegetated shingle, saline lagoons, Littoral and sublittoral chalk and seagrass beds have undergone a decline of up to 25% between 1978 and 2003[19].

4.7. Nationally, 91% of SSSI coastal habitats (by area) are considered to be in target condition. **Table 4.1** indicates the percentage of each SSSI broad coastal habitat type in target condition compared to the percentage in target condition for SSSIs in the East of England (habitat categories do not directly compare due to the data sources).

Table 4.1: Percentage of SSSI Land by Coastal Habitat Type Meeting Target Condition Nationally and Regionally.

% of SSSI broad habitat types by area in target condition (Nationally)[20]	% of SSSI broad habitat types by area in target condition (Regionally)[21]
Saline lagoons (93)	Not reported
Littoral rock (100)	Sea cliffs and rocky shores (70)
Maritime cliff and slope (91)	
Sand dunes (79)	Sand dunes and shingle (80)
Vegetated shingle (76)	
Inter-tidal mudflats and saltmarsh (90)	Sandy and muddy shores (60)

4.8. It would appear from the above comparison table that the condition of SSSI habitats within the East of England is considerably worse for Sea Cliffs and Rocky Shores and Sandy and muddy shores. The condition of SSSI habitats in the category Sand dunes and Shingle appear to be marginally better than the national picture.

[18] East of England Wildlife Trust Consultancies (2002). *East of England Biodiversity Audit.* EEBF

[19] Baily & Pearson (2001). cited in Natural England (2008). *State of the Natural Environment Report - Resource Document: Coastal Habitats*. [on-line] http://www.naturalengland.org.uk/Images/habitatcoastalrd_tcm6-4575.pdf (accessed March 2009).

[20] Natural England (2008). *State of the Natural Environment Report - Resource Document: Coastal Habitats*. [on-line] http://www.naturalengland.org.uk/Images/habitatcoastalrd_tcm6-4575.pdf (accessed March 2009).

[21] English Nature (2006). *Target 2010 - East of England: The condition of the region's Sites of Special Scientific Interest in 2005*

Regional Distribution

4.9. GIS inventories available from Natural England do not include Littoral and Sublittoral Chalk, Seagrass Bed or Coastal Saltmarsh. Available data is summarised in **Table 4.2** with the location of Coastal BAP Habitats illustrated in **Figure 4.1**.

Table 4.2 Distribution of Coastal Habitats in the East of England

Coastal Habitat	Area recorded in East of England* (EEBA#)	Broad location	Percent recorded within*:		
			SSSI	CWS	Wider Countryside
Maritime Cliff and Slope	1040 ha (42.9km)	East and west of Cromer (Norfolk), north and south of Lowestoft (Suffolk), around Felixstowe (Suffolk) and Southend-on-Sea (Essex).	83%	14%	3%
Mudflats	18,745 ha	Major estuaries including the Great Ouse (Norfolk), Breydon Water (Norfolk), Stour and Orwell (Suffolk), Colne, Crouch and Blackwater (Essex). In addition, around Holkham, Scolt Head and Blakeney Point (Norfolk).	97%	<1%	3%
Saline lagoons	129 ha (105 ha)	Pockets north and south of Southwold (Suffolk) and around Hunstanton (Norfolk).	89%	6%	5%
Coastal vegetated shingle	582 ha (989 ha)	Principally around Orford (Suffolk) and Blakeney Point (Norfolk)	92%	2%	6%
Coastal sand dunes	1098 ha (763 ha)	Norfolk at Holkham, Scolt Head and Blakeney Point, and north of Great Yarmouth	84%	5%	11%

* Information from NE GIS data # Information in brackets from East of England Biodiversity Audit

Progress Towards Regional LBAP Targets

4.10. 10 textual and 12 numeric targets (all from Essex and Norfolk) were identified on the BARS website. No information relating to progress had been submitted for any of these. The EEBA indicates that the feasibility of achieving of LBAP targets for the following coastal habitats may be 'difficult', further noting that there are few local actions specified within LBAPs:

- Coastal sand dunes.

- Coastal vegetated shingle.
- Littoral and sublittoral chalk.
- Maritime cliff and slopes.
- Mudflats.
- Seagrass beds.

4.11. For Coastal Saltmarsh and Saline Lagoons the EEBA expresses moderate optimism that LBAP targets may be achieved.

Assessment of Habitat Condition Based on Review of Available Literature

4.12. Natural England note that comparatively little information exists on the condition of coastal habitats outside the SSSI series[22]. It may be appropriate to infer that the condition of SSSIs represent a best case picture of the condition of BAP habitats outside of protected areas, with relatively strong policy mechanisms and legislation in place for maintenance in favourable condition. Coastal SSSIs in the East of England are in markedly poorer condition than the national picture, particularly, in relation to the broad habitat types Sandy and Muddy Shores, and Sea Cliffs and Rocky Shores. Regionally, Natural England have determined that the overriding factor explaining poor condition is 'coastal squeeze' (where intertidal habitats are trapped between fixed sea defences and rising sea levels) [23]. Nationally water pollution also accounts for 21% of SSSI land which is not in target condition[24].

4.13. The Norfolk BAP[25] notes the following with regard to extent and condition:

- **Costal Sand Dunes**: identifies areas not protected by designation, including *"…between Hemsby and Caiste,…. and the Hunstanton golf".*
- **Littoral and Sublittoral Chalk**: There is no evidence of a reduction in extent, although there is local evidence of species declines (for example, at the West Runton site.
- **Maritime cliff and slope:** *"Declines in quality of cliff top grassland through lack of management including increase in Alexanders (Smyrnium olusastrum).*

4.14. The Norfolk Wildlife Trust undertook a survey of the east Norfolk coast area[26] to identify the distribution of Maritime Cliff and Slope and Coastal Sand Dune BAP

[22] State of the Environment: Resource Documents. *Coastal Habitats*. [on-line]. http://www.naturalengland.org.uk/Images/habitatcoastalrd_tcm6-4575.pdf (accessed March, 2009).

[23] English Nature (2006). *Target 2010 - East of England: The condition of the region's Sites of Special Scientific Interest in 2005*

[24] Natural England (2008). *State of the Natural Environment Report - Resource Document: Coastal Habitats*. [on-line] http://www.naturalengland.org.uk/Images/habitatcoastalrd_tcm6-4575.pdf (accessed March 2009).

[25] Norfolk Biodiversity Partnership (no date). Biodiversity Action Plan for Norfolk. [on-line] http://www.norfolkbiodiversity.org/actionplans/ (accessed March, 2009).

Priority Habitat types. A key objective of the survey was to identify previously unrecorded areas of BAP habitat and to propose further designation of CWSs and SSSIs, inferring an assessment of condition.

4.15. 17.4 km of coastline were surveyed in total of which 7.9 km (45%) was considered to meet the criteria for cliff and slope BAP Priority Habitat (cliff and slope) and 3.5 km (20%) Coastal Sand Dune BAP Priority Habitat (sand dune). A further, 5.9 km (34%) was considered to be too developed to support BAP habitat. Of the area surveyed all cliff and slope habitat and at least 2 km of sand dune (or 55%) was considered of a sufficient quality to warrant designation as CWSs.

CASE STUDY: THE EAST NORFOLK COAST

The Norfolk Wildlife Trust Survey of the non designated habitats along the East Norfolk Coast between Bacton and The Suffolk Border recorded the following key issues with regard to cliff slope and sand dune habitats:

- Both BAP Priority type are likely under-recorded.
- Both cliff and slope and sand dune habitats are dynamic, and therefore policies within Shoreline Management Plans which promote non-intervention and allow coastal processes to continue are necessary for maintenance of 'good' condition.

Within areas which were not considered of a sufficient quality to warrant potential designation as CWSs, 'intense urban pressure' and extensive seafront chalet development around the settlements of Caister, Bacton, Hemsby, Walcott, Great Yarmouth Haven were cited as reasons. In general, urban development causes fragmentation of coastal habitats through direct habitat loss. It can also lead to 'coastal squeeze' as habitats are unable to respond to dynamic costal processes (for example, erosion and deposition) as they are constrained by flood defence structures (for example, concrete sea walls).

Key Threats

4.16. Natural England observe the following key threats to coastal habitats:

- **Inappropriate development**, particularly from housing, industrial infrastructure and development on the coast.
- **Inappropriate coastal management**, particularly where sea defences and cliff stabilisation lead to over-stabilisation, interruption of coastal processes and loss of habitats due to coastal squeeze against sea defences.

[26] Norfolk Wildlife Trust (2008). *Survey of east Norfolk coast – identification of BAP habitats and potential County Wildlife Sites – 2007*. NWT

- **Water pollution** from both point (sewage/industrial) and wider agricultural sources (fertiliser/pesticide application), as well as acidification and nitrogen enrichment from atmospheric sources.
- **Changes in agricultural management practice**, especially unsuitable grazing management.
- **Climate change and rising sea levels** as a result of global warming.

4.17. Other pressures, such as **public access and disturbance** particularly from unsustainable recreational activities, or **exploitation** such as wildfowling or bait digging, may be significant locally.

CASE STUDY: ORPLANDS MANAGED REALIGNMENT, ESSEX

Managed realignment was identified as the only realistic way for the protection of this stretch of the coast whilst maintaining wildlife habitat. The sea walls were in a poor state with the maintenance costs over 20 years (1995-2015) estimated at £550,000 (a cost of £16,000/ha, with the land value being just £3,700/ha in 1995). In comparison the manage realignment scheme cost £70,000, with agri-environment schemes available for management by the landowners (grazing marsh £250/ha, and sett-a-side £525/ha.

The works were undertaken in 1995 and it has proved to be the best example of its time, with an excellent balance between saltmarsh and mudflat developing. The transition area from inter-tidal to terrestrial is significant in Essex terms, being rare due to the extent of coastal protection along the coastline.

Summary: Coastal Habitats

- The EEBA states that Coastal saltmarsh and Saline lagoon habitats are of 'major significance' on a national scale, based on their decline between 1978-2003 and the proportion of the national resource that the East of England contains.
- The exact regional extent of Littoral and sublittoral chalk, Seagrass bed and Coastal saltmarsh habitats could not be ascertained through lack of GIS data.
- In general, coastal habitats are well accounted for within protected areas. Between 88% - 97% overlap with SSSIs and CWSs. However, as evidenced by the Norfolk study, certain habitat areas (e.g. sand dunes

cliff and slope) fall outside designations.

- In general, there is a lack of data with which to examine the condition of, and/or identify specific threats to, the majority of coastal habitats within the 'wider countryside'.
- In terms of the condition of SSSIs, the East of England appears to fare worse than national picture, partly as a result of coastal squeeze, and also inappropriate development and public access.

FRESHWATER HABITATS

Assessment in Comparison to the National Resource

4.18. The EEBA estimates that the Region holds over 50% of the national resource of Reedbed habitat; between 10-50% Aquifer-fed naturally fluctuating water bodies and Eutrophic standing waters; and less than 10% of Mesotrophic lakes, and Purple moor-grass and rush pasture. Owing to a lack of data, The EEBA was not able to assess the status of Chalk River or Fen BAP Priority Habitat types in relation to the national resource.

4.19. Natural England[27] state that for the loss of wetland habitats from the 17th Century to the present day has been 'enormous', with the dramatic loss of fen habitats in this period cited as an example. At the regional scale, insufficient data was available for the EEBA to assess change of Reedbed, Fen, Chalk river, Eutrophic standing water and Mesotrophic lake habitats. Aquifer-fed naturally fluctuating water body habitats have declined in area by up to 25% between 1978 and 2003.

4.20. In terms of condition, Natural England's State of the Natural Environment report notes that nationally 69% (by area) of SSSI wetland habitats are in favourable or favourable recovering condition[28], although there is significant variation between the condition of different wetland habitats. For example, almost three-quarters of Reedbed is in target condition, whereas only 29% of Fen is judged to be in Favourable condition[29].

4.21. For 'open water' habitats (including lakes, ponds, canals and rivers), 55% of SSSI land (by area) is in 'favourable' or 'favourable recovering' condition, with those notified for their bird interest (for example, SPA and Ramsar sites) in the best condition (86% favourable or recovering). However, only 47% of 'standing water notified on account of habitat interest', 28% of 'rivers and streams' and 35% of 'canals' are in target condition.

[27] Natural England (2008). *State of the Natural Environment Report - Resource Document: Wetland Habitats*. [on-line] http://www.naturalengland.org.uk/Images/habitatwetlandrd_tcm6-4614.pdf (accessed March 2009).
[28] Natural England (2008). *State of the Natural Environment 2008*. [on-line] http://www.naturalengland.org.uk/publications/sone/sections.aspx (accessed March 2009).

[29] Natural England (2008). *State of the Natural Environment Report - Resource Document: Wetland Habitats*. [on-line] http://www.naturalengland.org.uk/Images/habitatwetlandrd_tcm6-4614.pdf (accessed March 2009).

4.22. Regionally, by percentage area of SSSI land and based on SSSI broad habitat reporting categories, 95% of 'Standing Waters and Canals' and 82% of 'Fen Marsh and Swamp' habitats are in target condition. This appears to be slightly better than the national picture although the habitat categories are not directly comparable. In terms of 'Rivers and Streams' SSSI land (by area) <5% are in target condition regionally, this appears to be substantially lower than the national average[30].

Regional Distribution

4.23. NE GIS mapping was only available at the regional scale for Purple moor-grass and rush pasture, and reedbed habitats. Available data is summarised in **Table 4.3** and the location of recorded Freshwater BAP Habitats are illustrated in **Figure 4.2**.

Table 4.3 Distribution of Freshwater Habitats in the East of England

Freshwater Habitat	Area recorded in East of England* (EEBA#)	Broad location	Percent recorded within*:		
			SSSI	CWS	Wider Countryside
Purple Moor-grass and Rush Pasture	5768 ha	Scarce regionally, with key areas around Breckland, Holkham, north of Norwich (Norfolk), Whittlesey (Cambridgeshire and east of Southend-on-Sea (Essex).	99%	0%	1%
Reedbed	28,023 ha	Key areas along the River Wensum at Norwich (Norfolk), the north Norfolk coast between Hunstanton and Cromer, the Norfolk Broads, the Suffolk coast between Southwold and Felixstowe, the Colne, Stour and Blackwater river estuaries (Essex), the Ouse Washes (Cambridgeshire) and Breckland (Norfolk/Suffolk).	99% there is overlap between SSSI and CWS data sources	11% there is overlap between SSSI and CWS data sources	None mapped

* Information from NE GIS data # Information in brackets from East of England Biodiversity Audit

Progress Towards Regional LBAP Targets

4.24. 26 textual (Cambridgeshire, Essex, Hertfordshire and Norfolk) and 15 numeric targets (Cambridgeshire, Essex and Norfolk) were reviewed for freshwater habitats in the East of England.

4.25. For textual targets, progress towards achievement of 12 HAPs (in Cambridgeshire and Norfolk) had been reported. Of these, Cambridgeshire targets mainly related to improving the condition of SSSIs, however, they also include the following target:

[30] English Nature (2006). *Target 2010 - East of England: The condition of the region's Sites of Special Scientific Interest in 2005*

- *"CPBAP 146 3 - Create at least one large wetland of at least 200ha including a major fen component by 2010".* In 2008 this target was exceeded.

4.26. Reedbed and Fen textual targets in Norfolk included:

- *"1/H1/T3 - Create an additional 600 hectares of new reedbed safe from future threat of sea level rise within Norfolk by 2010. This will be on areas of current low nature conservation interest"* (Some progress - behind schedule).
- *"1/H4/T1- Identify Norfolk fen sites in critical need of rehabilitation by 2005, and initiate restoration by 2010"* (Some progress – on schedule).

4.27. For numeric targets, progress reporting was available for three HAPs relating to pond creation projects and enhancement of chalk rivers in Cambridgeshire. BARS indicates that implementation is partly underway for all three HAPs, however, as of 2009 the HAPs were incomplete. For example:

- *"CPBAP 22.2 - Promote the pond restoration grant to achieve 5 restored ponds per district per year (30 in total)*". As of Jan 2009, 9 of a maximum of 90 had been restored.
- *"CPBAP 53.3 - Complete a 4km stretch of in-stream habitat enhancement as identified through the Cam Catchment feasibility study.*" As of Jan 2009, 0.15km had been enhanced.

4.28. Based on separate analysis (not using BARS data), the EEBA makes the following statements relating to the likelihood of freshwater LBAP targets being met:

- 'High optimism' in Reedbed HAPs.
- 'Moderate optimism' for Fen, Aquifer-fed natural fluctuation water body, Chalk river and Mesotrophic lakes HAPs.
- 'Low optimism' for eutrophic standing water bodies.

Assessment of Habitat Condition Based on Review of Available Literature

4.29. Based on National data sets, Natural England note that[31]:

"Comprehensive data on the condition of wetlands outside the SSSI network is not available for the whole of England...Overall, it is highly unlikely that non-statutory wetlands are in any better condition than SSSIs, in fact, they are more likely to be in poorer condition, given the legal protection afforded to SSSIs and the recent encouragement to positive management action on them".

4.30. The Bedfordshire BAP included the following conditions relating to the extent and condition of freshwater habitats:

[31] Natural England (2008). *State of the Natural Environment Report - Resource Document: Wetland Habitats*. [on-line] http://www.naturalengland.org.uk/Images/habitatwetlandrd_tcm6-4614.pdf (accessed March 2009).

- *"Most areas of reedbed are very small and the river margin reedbeds may cumulatively be the largest area of reed in the county."*
- *"There are...about 21.5 ha of discrete reedbed in the county; 20 ha of this was recently created at the Marston Vale Forest Centre."*
- *"In 1991 a field survey was undertaken to gather information on pond condition. This confirmed that not only the number of ponds had declined in the past 15 years but also the condition of the surviving ponds had deteriorated. Between 1976 and 1991 24% of ponds had deteriorated in quality."*

4.31. The Cambridgeshire BAP comments that:

- *"There is very little published information on the location and quality of [non-SSSI/ non-CWS] open water sites in the county."*

4.32. Limited literature was available relating to the condition of freshwater habitats across the East of England. A survey of non-SSSI fens in Norfolk carried out between 2005-2006 reported that almost two-thirds of sites identified were not in favourable condition. The main reasons cited for poor condition were under-management and abandonment, combined with, and often accelerated by, drainage and nutrient enrichment. Interestingly, the survey also revealed the presence of a significant number of small but high value sites not identified in the national fen inventory, indicating that the current inventory underestimates the extent of this habitat.

CASE STUDY: NORFOLK FENS

Swanton Abbott Low Common, Norfolk, exemplifies the need for ongoing management of sites to maintain their nature conservation interest. It consists of a mixture of habitats, including of wet and dry broadleaved semi-natural woodland, a small area of semi-open heath and an area of nutrient poor fen with a pond. Despite its small size, the site is very species rich, with notable species including heather, common spotted orchids, bog bean and star sedge.

Much effort has been made in recent years to restore the open fen and open heath, as well as the transitional zone between them. However, maintaining these open conditions has proved difficult and scrub has started to re-invade some areas. Regular cutting is required with the removal of arisings, or ideally grazing. However, this requires sufficient input of resources for ongoing management or availability of grazing animals.

4.33. A report on sustainability indicators in Bedfordshire[32] found that 68% of Bedfordshire's rivers and canals, by length, were of good biological and chemical water quality. Water quality was particularly affected by urbanisation due to runoff and poor habitat quality, with none of Luton Borough's rivers or streams of good biological quality. In terms of nutrient status, Bedfordshire rivers and canals have

[32] The Greensand Trust (2008) *Indicators of Sustainable Development in Bedfordshire*

higher levels of nitrates and phosphates when compared with the Regional picture, which is higher again than the national picture.

4.34. Furthermore, the Bedfordshire Biodiversity Partnership recently evaluated the quality and extent of 15 calcareous springs located in south Bedfordshire[33]. The survey assigned each of the streams to three categories reflecting their ecological condition: 'Proper Functioning Condition (PFC)', 'Functional - at risk' and 'Non-functional'. Only one of fifteen of the springs was assessed as being in PFC. The remaining 14 springs were rated as non-functional or at risk of becoming so. Failure of the majority of streams to meet PFC was attributed to lack of aquatic vegetation and consequent erosion of plant and animal communities by water flows.

4.35. Key threats to the maintenance of good condition in south Bedfordshire chalk springs are through to include:

- Erosion of banks and aquatic vegetation caused by excessive visitor pressure.
- Drought and abstraction caused by increased demand associated with housing growth in south Bedfordshire. This may poses a particular threat as many of the counties chalk springs are adapted to perennial water flow which could be interrupted at times of high water demand. This may be further exacerbated if climate change increases summer drought conditions.
- Additional pressures included litter and flytipping and agricultural pollution.

4.36. A further study by Bedfordshire Biodiversity Partnership examined changes in the number of freshwater ponds between 1902, 1976, 1991 and 2007 within a survey area representing 4% of the County. The study also assessed a sample of five ponds in the same study area using a detailed methodology for assessment of ecological quality. The survey revealed that between 1902 and 1976, 28 of a total of 142 (19.7%) ponds were lost. After this period the numbers of ponds created and lost roughly cancelled each other out. Several qualifiers were made relating to changes in pond habitat extent relating to the quality of pond habitat:

- Many ponds which were retained between surveys were declining in quality as a result of scrub encroachment and nutrient enrichment when on agricultural land.
- Newly created ponds may not be of equal nature conservation value as those that were lost.

4.37. The sample of five ponds revealed that only one pond met the ecological criteria required for designation as a CWS. The study recommends that attention should be directed at securing favourable conservation management in order to retain a desirable nature conservation condition in remaining ponds.

[33] BedsLife (2007). *Bedsprings: A survey of the quality and extent of Bedfordshire's calcareous springs.* [on-line] http://bedslife.org.uk/documents/BedSprings%20survey%20rpt%20short.pdf (accessed March, 2009).

Key Threats

48. The following key threats to wetland habitats were identified by Natural England[34] and within the EEBA:

- **Changes in agricultural management** including lack of appropriate management such as grazing, water level and ditch management practices. Collectively this may often lead to leading to succession to scrub and woodland.
- **Drainage and water abstraction** poses a significant threat, in particular for agriculture, flood defence and infrastructure / housing development in the lowlands.
- **Diffuse pollution** from both point and wider agricultural sources (fertiliser application) including nutrient enrichment of sites. Acidification and nitrogen enrichment from atmospheric sources also pose a threat.
- **Climate change** and associated increase incidence of extreme events could affect wetland systems within the region. There is much uncertainty over habitat specific effects and climate may give rise to a large range of effects. For example, excessive low flows may threaten habitats which are especially susceptible to drought (e.g. chalk rivers and aquifer fed systems) conversely increase prevalence of high flows may cause erosion/physical damage to other systems.

Summary: Freshwater Habitats

- The EEBA does not consider any of the regions freshwater BAP Priority Habitats to be of 'major significance' in relation to the national freshwater habitat resource. However, Aquifer fed naturally fluctuating water bodies were assessed as being of 'high significance':
- The exact regional extent of the following BAP Priority Habitats could not be determined through lack of GIS data:
  - Aquifer-fed naturally fluctuating water bodies
  - Chalk rivers
  - Eutrophic standing waters
  - Mesotrophic lakes
- Freshwater habitats are seemingly well accounted for within protected areas with 98.6%-100% overlapping with SSSIs and CWSs. However, this is based on only two freshwater habitats for which GIS data was available, and wider studies indicate there are areas of priority habitat which have not been accounted for, including small areas of fen and reedbed.

[34] Natural England (2008). *State of the Natural Environment Report - Resource Document: Wetland Habitats*. [on-line] http://www.naturalengland.org.uk/Images/habitatwetlandrd_tcm6-4614.pdf (accessed March 2009).

- In general data is lacking with which to examine the condition of, and/or identify specific threats to, the majority of freshwater habitats which occur within the 'wider countryside'.
- There is evidence to suggest BAP actions are having a positive effect on both the extent and condition of Reedbed and Fen BAP Priority Habitat types in Cambridgeshire and Norfolk. This may have regional significance as a large proportion of the East of England resource for these habitats is located in these counties. By way of contrast, evidence from a sample of Norfolk fen CWSs suggests that many are in very poor condition. Clearly BAP reporting may not reflect the condition of these habitats in the wider countryside.
- In respect of chalk rivers, evidence from Bedfordshire reports poor condition for a sample of sites which were surveyed. These habitats may be particularly vulnerable to water abstraction (exacerbated by future housing growth) in view of climate change.
- Evidence from Bedfordshire indicates a halt in decline in the extent of ponds in the wider countryside (following a rapid decline). However, their condition may be continuing to deteriorate.
- Although the habitat reporting categories are not directly comparable, there is an indication that regionally. Some freshwater SSSI habitats are faring better than the national picture. This excludes river and steam SSSIs, which appear to be faring substantially worse regionally than on a national basis.

GRASSLAND HABITATS

Assessment in Comparison to the National Resource

4.38. The UK BAP website states that cover of Lowland meadow habitat type in England and Wales is between 5,000 and 10,000 ha[35]. However, a recent estimate by Natural England places national extent of this habitat at 20, 378 ha[36]. For Calcareous grassland habitat, the UK BAP website estimates there to be between 33,000 and 41,000 ha across the UK, whereas Natural England estimates there to be 53,945 ha within England. The extent of Coastal and Floodplain Grazing Marsh habitat (referred to as Grazing Marsh from hereon) is unknown for the UK, it was estimated in 1994 that England holds 200,000 ha. However, only a small proportion of this

[35] UK Biodiversity Action Plan. Lowland Meadows. [on-line] http://www.ukbap.org.uk/UKPlans.aspx?ID=10 (accessed March, 2009).

[36] Natural England (2008). *State of the Natural Environment Report - Resource Document: Grasslands*. [on-line] http://www.naturalengland.org.uk/Images/habitatgrasslandrd_tcm6-4576.pdf (accessed March 2009).

grassland was classed as semi-natural (supporting a high diversity of native plant species: c. 5,000 ha)[37].

4.39. The State of the Environment report notes that between 1990 and 1998 changes in extent of the broad habitat Calcareous Grassland has undergone a 20% decline nationally and the broad habitat Neutral Grassland a 10% increase. It is estimated that 20,000 ha of Grazing Marsh was lost between 1940 and 1980, with well-documented losses in the Greater Thames Estuary[38].

4.40. The EEBA states that the East of England holds between 10-50% of the national resource of Grazing Marsh BAP Habitat, but that this has undergone a 25-50% decline between 1978 and 2003. It estimates that up to10% of the national Chalk Grassland resource is contained within the region. The change in the extent of Chalk and Neutral Grassland over the past 25 years could not be assessed owing to a lack of data. However, it does report 96% losses of Lowland Meadow BAP Priority Habitat in both Hertfordshire and Suffolk between 1934 and 2003.

4.41. Natural England note that nationally 90% of Calcareous grassland SSSI land, 80% of Neutral grassland SSSI land and 69% of Grazing Marsh (all by SSSI area) are in target condition[39]. This compares with regional figures of 75% for Calcareous grassland SSSI land and 70% for Lowland Neutral Grassland SSSI land[40].

Regional Distribution

4.42. Available data is summarised in **Table 4.4** and the extent of recorded grassland BAP habitats is illustrated in **Figure 4.3**.

Table 4.4 Distribution of Grassland Habitats in the East of England

Grassland Habitat	Area recorded in East of England* (EEBA#)	Broad location	Percent recorded within*:		
			SSSI	CWS	Wider Countryside
Neutral grassland	8373 ha	Fairly evenly distributed yet highly fragmented. Key concentrations occur in Norfolk and Cambridgeshire.	95%	5%	<1%
Calcareous	2364 ha	From Luton (Bedfordshire)	85.3%	22.1%	

[37] UK Biodiversity Action Plan. *Coastal and Floodplain Grazing Marsh*. [on-line] http://www.ukbap.org.uk/UKPlans.aspx?ID=10 (accessed March, 2009).

[38] Thornton and Kite, (1990) cited in Natural England (2008). State of the Natural Environment Resource Paper: Wetland Habitats. [on-line] http://www.naturalengland.org.uk/Images/habitatwetlandrd_tcm6-4614.pdf (accessed March 2009).

[39] Natural England (2008). *State of the Natural Environment 2008*. [on-line] http://www.naturalengland.org.uk/publications/sone/sections.aspx (accessed March 2009).

[40] English Nature (2006). *Target 2010 - East of England: The condition of the region's Sites of Special Scientific Interest in 2005*

Grassland Habitat	Area recorded in East of England* (EEBA#)	Broad location	Percent recorded within*:		
			SSSI	CWS	Wider Countryside
grassland		north west to Breckland (Norfolk).	there is overlap between SSSI and CWS data sources	there is overlap between SSSI and CWS data sources	
Coastal and floodplain grazing marsh	39,434 ha (51,706 ha)	Large areas of this habitat type include the Ouse and Nene Washes (Cambridgeshire), the river Great Ouse (Bedfordshire/Cambridgeshire), the Waveney valley (Suffolk/Norfolk border), the valley of the Wensum (Norfolk), the Norfolk Broads, the River Stour (Essex/Suffolk border), the Chelmer and Crouch (Essex), the Lea (Hertfordshire/Essex border)	28.6%	17.2%	54.3%

* Information from NE GIS data # Information in brackets from East of England Biodiversity Audit

Progress Towards Regional LBAP Targets

4.43. For grassland habitats in the region, 18 textual targets (relating to Bedfordshire, Cambridgeshire, Hertfordshire and Norfolk) and nine numeric targets (relating to Cambridgeshire and Bedfordshire) were identified within BARS.

4.44. Of the textual targets progress reporting was available for six HAPs (33%) from Cambridgeshire and Norfolk. These include three HAPs in Norfolk relating to Grazing Marsh and two HAPs in Cambridgeshire relating to Lowland meadow. Examples include:

- Norfolk HAP: *"1/H7/T1 - Maintain the existing extent of coastal and floodplain grazing marsh (29,500 ha) and its quality"* (Target achieved in 2006).
- Norfolk HAP: *"1/H7/T2 - Rehabilitate 2,950 ha (10% of the total resource in Norfolk) of grazing marsh habitat in intensive management by 2010.coastal and floodplain grazing marsh resource by 2010"* (Some progress, behind schedule).
- Cambridgeshire HAP: *"CPBAP151.2 Ensure that all County Wildlife Sites identified for their neutral grassland interest are in favourable condition by 2010"* (Some progress – behind schedule).

4.45. In terms of numeric targets, progress had been reported for two HAPs (22%) in Cambridgeshire including:

- *"CPBAP149.3 - Restore 30ha of calcareous grassland of wildlife value on existing sites by 2010"* (As of January 2009, 30.3ha was restored).

4.46. The EEBA assigns 'moderate optimism' that the county LBAPs for Neutral grassland, Chalk grassland and Grazing Marsh may be met.

Assessment of Habitat Condition Based on Review of Available Literature

4.47. Based on National data sets Natural England note that[41]:

"...comparatively little information exists on the condition of grasslands outside the SSSI series. However a recent survey of 500 enclosed semi-natural grasslands revealed that the percentage in favourable condition is significantly lower than for equivalent grassland within SSSIs across four of the priority types[42]. Overall 79% of enclosed semi natural grasslands surveyed were in unfavourable condition."

4.48. Statements relating to the condition of grassland habitats within County BAPs included:

Bedfordshire BAP[43]

- *"Whilst almost 70% of the SSSI lowland meadows are in favourable condition the situation of the many small CWS sites is worrying. A sample survey of 580 ha of the estimated 1285 ha of the habitat within CWS has revealed just 4% in favourable condition."*

Essex BAP[44]

- *"Coastal grazing marshes have declined in Essex by as much as 72% since the 1930s. Particularly hard hit have been the areas along the Thames and around the Dengie peninsula where conversion to arable and urban use have been the main causes of loss."*

Hertfordshire BAP[45]

- *"There are over 80 known unimproved neutral grasslands remaining in the county but only about a quarter of these are fields or groups of fields greater than 5 ha in extent."*

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[41] State of the Environment: Resource Documents. *Grassland.* [on-line]. http://www.naturalengland.org.uk/publications/sone/resource_docs.aspx (accessed March, 2009).

[42] Hewins, E.J., Pinches, C., Arnold, J., Lush, M., Robertson, H., and Escott, S. (2005). *The condition of lowland BAP priority grasslands: results from a sample survey of non-statutory stands in England.* English Nature Research Report: 636. Peterborough: English Nature.

[43] Bedfordshire and Luton Biodiversity Action Plan (2008). Lowland Meadow [on-line]. http://bedslife.org.uk/documents/HAP%202008%20lowland%20meadow%20DRAFT.pdf (accessed March, 2009)

[44] Essex Biodiversity Action Plan http://www.essexbiodiversity.org.uk/Data/Sites/1/GalleryImages/pdf/Essex%20BAP/HABITATS.pdf

[45] Hertfordshire Environmental Forum (2006). A 50 Year Vision for the wildlife and natural habitats of Hertfordshire. [on-line] http://www.hef.org.uk/nature/biodiversity_vision/chapter_07_neutral_grass.pdf (accessed March, 2009)

- *"The current extent of unimproved chalk grassland in Hertfordshire is only 177 ha, scattered over more than 30 sites (Hertfordshire Habitat Survey)."*

Norfolk BAP[46]

- *"The loss of calcareous grassland in Breckland is linked to the dramatic loss (22,000 ha in the 20th century) of heathland and dry grassland. Many of the surviving areas have declined in quality as sheep grazing has ceased and rabbit populations declined due to myxamytosis."*

- *"Many remaining calcareous grassland sites are small in size and isolated from other sites, exacerbating the problems of management and vulnerability to external threats, such as agricultural spray drift."*

4.49. Norfolk Wildlife Trusts undertook a study to assess the condition of grassland CWSs across the county[47]. A sample of 60 such sites was assessed between 2005 and 2008. Key findings of the study were that:

- The majority of the sites assessed (69%) were recorded as being in poor or declining condition with only 5% of the sites judged to be in good or excellent condition.

- 10% of the sites within the sample were in such poor condition that they no longer met the standard for designation as a CWS.

- The key factor accounting for poor condition across all sites was neglect (lack of management) resulting from insufficient resources including finance. Specifically, this related to lack of funding to carry out restorative works such as scrub clearance or fencing to permit grazing. Additionally, in many cases site owners found it prohibitively expensive to cut and remove hay arisings, leading to gradual enrichment of grasslands and loss of species diversity.

4.50. A study undertaken by the Bedfordshire Biodiversity Partnership to assess the quantity, quality and distribution of lowland calcareous grassland in the County revealed the following information[48].

- 303 ha of calcareous grassland were classed as being of a sufficient quality (defined as corresponding to NVC communities CG1-CG9).

- 778.5 ha of additional calcareous grassland habitat were in a condition that could be restored to CG1-CG9 community type (i.e. not currently meeting BAP Habitat specifications).

[46] Norfolk Wildlife Trust (2007). *Norfolk Biodiversity Action Plan* [on-line] http://www.norfolkbiodiversity.org/actionplans/habitat/LCgrassland.asp#Status

[47] Norfolk Wildlife Trust (2008). *The State of Norfolk's Magical Meadows: A Norfolk Wildlife Trust Report*. NWT

[48] BedsLife (2007). *Calcareous Grassland Habitat Opportunities Survey Report*. Bedslife.

- Approximately 2792.8 ha of calcareous soils habitat were degraded or altered to the point that lowland calcareous grassland would need to be completely recreated.

4.51. Scrub encroachment was recorded as the predominant threat to calcareous grassland in Bedfordshire with 162 ha of 303 ha of habitat which classed as being in sufficient condition affected by this threat.

CASE STUDY: LOWLAND MEADOW SITES IN SUFFOLK

Lack of appropriate management (usually mowing or grazing) is a chronic issue affecting the condition of lowland meadows across the East of England. Without management the quality of species rich grassland can deteriorate relatively quickly through succession to scrub.

In Suffolk, securing appropriate funding to carry out management of non-designated lowland meadow sites is further complicated by the fact many sites are small and although of high value to wildlife, individually, they do not meet the standard to qualify for Higher Level Stewardship funding from Natural England.

It may be the case that funding schemes need to be developed which target smaller CWSs and smaller lowland meadow sites which are surrounded by intensive farmland. Poor condition in individual CWSs may not be a comparable conservation priority to SSSI condition. However, the incremental deterioration of numerous small non-designated lowland meadows sites might have a cumulative effect on grassland biodiversity which may ultimately further fragment and isolate even the best SSSI sites. Positive conservation management of lowland meadow sites can also help contribute to an "Econet approach", particular where there are clusters of such sites within river valleys.

CASE STUDY: THWAITE COMMON COUNTY WILDLIFE SITE, NORFOLK

The site includes dry, neutral grassland, formerly with a short, species-rich sward, as well as damp grassland supporting southern marsh orchids. Mature trees and scrub are scattered across the site, which also contains a rare tufa mound, formed by chalk deposits where a spring surfaces.

Until 1999, this part of Thwaite Common was managed by grazing with ponies and occasionally cattle. In 1999, the fences were removed and grazing ceased. Some areas have been topped and others occasionally cut for hay, but the site has been largely unmanaged since 1999.

As a result grasslands have become rank, and scrub has increased across the site. The damp areas have become rank and heavily invaded by common reed. The large size of the dry grassland areas make cutting for hay under the existing Countryside Stewardship scheme too expensive, whilst the wet areas are simply too wet to manage by mowing. It has not been possible to re-establish grazing due to the legalities of attempting to re-establish the fences.

Key Threats

4.52. Key threats to Calcareous Grassland and Neutral Grassland identified within the EEBA include the following:

Chalk Grassland

- **Agricultural improvement** including use of pesticides, fertilisers and re-seeding, ploughing-up of habitat.
- **Lack of appropriate management** including the unavailability of suitable grazing animals, or **overgrazing** including by rabbits.
- **Scrub encroachment** including invasive species such as Cotoneaster.
- **Recreational pressure** including erosion and soil compaction.

Neutral Grassland

- **Nutrient enrichment** including drift of agri-chemicals, direct application of fertilisers in addition to nutrient inputs from grazing animals.

- **Lack of management** including scrub encroachment and abandonment of annual cutting/grazing management.
- **Inappropriate management** such as overgrazing by domestic animals and rabbits.

Coastal and Floodplain Grazing Marsh

- **Inappropriate management** including insensitive management of water levels to maintain wet meadows and flood defences which prevent the annual flooding cycle.
- **Agriculture** including conversion of grazing marsh to arable land, and discontinuation of traditional grazing management in favour of silage or hay cutting.
- **Pollution** of ground water and surface water including nutrient enrichment.
- **Climate change** including a range of direct ecological changes caused by hotter drier summers and warmer wetter winters. Also indirect effects including loss of Grazing Marsh to management realignment projects designed to adapt to sea-level rise.

Summary: Grassland habitats

- The EEBA states that Coastal and floodplain grazing marsh is of 'major significance' on a national scale, based on their decline between 1978-2003 and the proportion of the national resource that the East of England contains.
- Based on available GIS data, 99.8%-100% of Lowland meadow and Calcareous grassland are located in protected areas. By contrast, GIS data indicates that 54.3% of Grazing Marsh is located outside of protected areas.
- National data suggests grassland habitats in the 'wider countryside' are in significantly worse condition than those within designated sites. The habitat is highly fragmented.
- Evidence from Norfolk suggests that a high proportion of CWS Lowland Meadow sites are in unfavourable condition. It is likely that the same can be said of calcareous grassland CWSs, however, no specific data on condition could be sourced. Evidence from Bedfordshire suggests that there are significant opportunities for restoration or recreation of calcareous grassland.
- Calcareous and Neutral grasslands in the East of England are faring worse than national picture based on the condition of SSSI land. No data was located with which to compare Grazing Marsh to the national baseline.

- Key threats relate to a lack of appropriate management and agricultural enrichment and pollution.

HEATHLAND AND ACID GRASSLAND

Assessment in Comparison to the National Resource

4.53. Natural England calculate there to be 72,331 ha of the broad habitat type Lowland Heathland and 12,202 ha Acid Grassland UK BAP Priority Habitat type in England[49]. The EEBA estimates that the region supports up to 10% of the national resource of Lowland Heathland, and around 10-50% of the national resource of Lowland Acid Grassland.

4.54. Natural England estimate that between 1990 and 1998 the area of Acid Grassland declined by 18% nationally, and Dwarf shrub heath by up to 500ha[50]. Regionally, the EEBA states that Lowland Heathland BAP Priority Habitat has undergone a 25-50% decline between1978-2003 (no data was available for Acid grassland).

4.55. In terms of condition, Natural England estimate that nationally 73% of both Heathland SSSI land and Acid Grassland SSSI land (by area) are in target condition. The figures for the East of England habitats are in the same region, at 80% for Heathland SSSI land and 70% for Acid Grassland (by area)[51].

Regional Distribution

4.56. Available data is summarised in **Table 4.5** with the location of recorded Heathland and Acid Grassland Habitats illustrated in **Figure 4.4**.

Table 4.5 Distribution of Heathland Habitats in the East of England

Grassland Habitat	Area recorded in East of England* (EEBA#)	Broad location	Percent recorded within*:		
			SSSI	CWS	Wider Countryside
Heathland	8411 ha (4,190 ha within SSSIs)	Major concentrations occur around Breckland (Norfolk) and the Sandlings (Suffolk).	72%	22%	6%
Acid grassland	9568 ha (3,700.96 ha within	Breckland and the North Norfolk Coast (Norfolk) and the Sandlings (Suffolk)	92%	4%	4%

[49] Natural England (2008). *State of the Natural Environment Report – Resource Document: Heathland habitats*. [on-line] http://www.naturalengland.org.uk/Images/habitatheathlandrd_tcm6-4577.pdf (accessed March 2009).

[50] Natural England (2008). *State of the Natural Environment 2008*. [on-line] http://www.naturalengland.org.uk/publications/sone/sections.aspx (accessed March 2009).

[51] English Nature (2006). *Target 2010 - East of England: The condition of the region's Sites of Special Scientific Interest in 2005*

Grassland Habitat	Area recorded in East of England* (EEBA#)	Broad location	Percent recorded within*:		
			SSSI	CWS	Wider Countryside
	SSSIs)	account for the main concentrations; virtually none in Cambridgeshire			

* Information from NE GIS data # Information in brackets from East of England Biodiversity Audit

Progress Towards Regional LBAP Targets

4.57. 13 textual targets relating to Heathland and/or Acid Grassland were identified on BARS. However, only four targets (relating to Norfolk) contained progress information. Of this number, examples include:

- Norfolk HAP: *"1/H6/T3 Seek to increase the extent of heathland by 10% from the current estimate of 2,500ha (Brecks and rest of the County) by 2006. The larger part of this 250ha to come from former heath currently under recent secondary woodland or conifer plantation, and all to be managed as sustainably as possible"* (Target achieved- however there is a shortfall of funding for ongoing management of the newly created area).

4.58. Of four numeric targets, only one HAP for Cambridgeshire included progress information:

- *"CPBAP150.4 - Create 10ha of new acid grassland and heathland on former mineral extraction sites by 2010 (manage these sites to maintain some open sandy areas)*" - As of January 2009 4.6 of 10ha created.

4.59. The EEBA expresses 'moderate optimism' that regional LBAP targets for both Lowland Heathland and Acid Grassland will be achieved.

Assessment of Habitat Condition Based on Review of Available Literature

4.60. Based on national data of heathland habitat outside of SSSIs:

"A random sample of 104 non SSSI lowland heathland stands, both inside and outside of agri-environment agreements, was surveyed during 2005 and 2006 to provide baseline information on condition....No stand passed all the criteria on the assessment and therefore no stand can be considered to be in favourable condition"[52].

4.61. A report on sustainability indicators in Bedfordshire[53] reported that almost 80% of CWS Acid Grassland had been monitored with only 20% of this found to be in favourable condition. In terms of Heathland, very little had been monitored but all was in unfavourable condition.

[52] Hewins et. al. (2007). cited in Natural England (2008). *State of the Natural Environment Report – Resource Document: Heathland habitats.* [on-line] http://www.naturalengland.org.uk/Images/habitatheathlandrd_tcm6-4577.pdf (accessed March 2009).
[53] The Greensand Trust (2008) *Indicators of Sustainable Development in Bedfordshire*

4.62. Between1998-2003 the HLF funded Sandlings Walks Project progressed a range of nature conservation actions within the Sandling Heaths area in Suffolk. Suffolk Wildlife Trust's report on the project states the following achievements relating to Heathland management/restoration:

- Reducing encroachment of invasive species by clearing 130 ha of scrub and trees and 160 ha of bracken.
- Re-creating 100 ha of new heathland.
- Managing traditional grazing on 400 ha of heathland.

4.63. It is intended that continued management of Heathland habitats in the project area will be carried out with Environmental Stewardship funding. Additional land purchase for heathland recreation is to be progressed using funds from grant giving bodies.

4.64. A stakeholder workshop organised by Suffolk and Norfolk Biodiversity Partnerships reported the following points concerning Heathland habitats in the Breckland region:

- All the major heaths in the region have now been brought under grazing and heath restoration has progressed rapidly.
- Breckland benefits from the large population of rabbits inhabiting the area which create a varied sward through grazing.
- There has been an extinction of lichens in the Brecks which has been attributed to nitrogenous air pollution and inappropriate grazing.
- Progress towards restoration of Heathland habitats has been successful through effective partnership working.
- A key reason for poor condition of some Heathlands was identified as insufficient micro-scale habitat management.
- Heathland in the Brecks is now much 'grassier' than previously.
- A need was identified to progress 'landscape scale' Heathland restoration as lack of ecological connectivity between habitat patches is a threat to the integrity of isolated patches of heathland habitat.

CASE STUDY: EAST RUSTON COMMON CWS, NORFOLK

An area of lowland heath, once part of a much larger complex of heathland stretching along the edge of the Broads. Although heather, heath bedstraw and other heathland plants are still found, the site is now largely dominated by scrub.

The lack of grazing or regular cutting on the site has led to widespread scrub development, especially at the periphery of the site, where secondary woodland has now taken over. In the centre of the site, gorse dominates, although patches of heather can still be found. Oak and birch scrub has also developed in the centre of the site.

Without some drastic heathland restoration work to the centre of the site, this County Wildlife Site will soon become wooded and the heathland interest lost. Ideally, the centre of this site should be open, lowland heath, with scrub at the periphery.

Key Threats

4.65. Key threats to Heathland and Acid Grassland identified within the Regional Biodiversity Audit include the following:

Heathland

- **Nutrient enrichment**: This includes aerial borne enrichment, particularly in the form of elevated nitrogen concentrations and direct deposition of nitrogen. It also includes drift of agricultural fertilisers.
- **Lack of management and inappropriate scrub control**: Absence of appropriate grazing, cutting and controlled burning. In addition, the planting of coniferous plantations on open heathland.
- **Recreational pressure**: Physical damage to habitats through increased numbers of visitors and disturbance to sensitive fauna, particularly in areas of urban growth.
- **Isolation**: Across the region, many areas of heathland occur as relatively small patches distant from one another. Therefore, if species become extinct locally, there are no areas nearby for heathland species to migrate from and little chance of re-colonisation.
- **Development**: There is a high demand for land particularly in Essex and Suffolk.

Acid Grassland

- **Lack of management/inappropriate management**.
- **Pollution**: Aerial pollution, particular that resulting from increased nitrogen concentrations and associated deposition is a particular threat to this habitat.

Summary: Heathland and acid grassland habitats

- The EEBA states that both Lowland heathland and Lowland acid grassland are of 'high significance'.
- The extent of both habitats appears to be well documented. In addition, both habitats are well accounted for within the SSSI and CWS series, with only 4% and 6% (respectively) of both habitat types occurring outside of protected areas. However, both are fragmented.
- In general data is lacking with which to examine the condition of lowland heathland and acid grassland habitats which occur within the 'wider countryside'.
- Much of the additional literature which was available relates to the Brecks area and the Suffolk Sandlings, the majority of which is designated as SSSI land. Information from Natural England's State of the Natural Environment report indicates that nationally many non-designated lowland heaths may not be in favourable condition.
- Key threats relate to maintaining appropriate management. In addition, air pollution may result in altered floral composition such as decreases in lichens and increases in competitive grasses.

WOODLAND

Assessment in Comparison to the National Resource

4.66. England has 1,059,794 ha of forest or woodland[54], with 7.3% of the East of England supporting woodland [55]. The EEBA classified Lowland Mixed Deciduous Woodland and Wet Woodland in the Region as being of 'high nature conservation significance', containing between 10-50% of the nations resource. The audit states there has been up to a 25% decline in the extent of both of these habitats over the last 25 years. The audit also states that the region contains.

4.67. Natural England report that nationally 83% of Broadleaved, Mixed and Yew Woodland SSSI land and 86% of wood-pasture and parkland SSSI land (both by area) are in a favourable or recovering condition[56]. This compares to 77% of Lowland Broadleaved and Yew Woodland SSSI land (by area) in the East of England[57].

[54] Forestry Commission. (2001). *National inventory of woodland and trees – England.* Edinburgh: Forestry Commission.
[55] Forestry Commission. (2003). *Woodland for life: The regional woodland strategy for the East of England.* Forestry Commission.
[56] Natural England (2008). *State of the Natural Environment 2008.* [on-line] http://www.naturalengland.org.uk/publications/sone/sections.aspx (accessed March 2009).
[57] English Nature (2006). *Target 2010 - East of England: The condition of the region's Sites of Special Scientific Interest in 2005*

Regional Distribution

4.68. Data relating to the distribution of woodland within the Region is summarised in **Table 4.6** with the location of recorded Woodland BAP Habitat illustrated on **Figure 4.5**.

Table 4.6 Distribution of Woodland Habitats in the East of England

Woodland Habitat	Area recorded in East of England* (EEBA#)	Broad location	Percent recorded within*:		
			SSSI	CWS	Wider Countryside
Lowland beech and yew woodland	900 ha	Scattered across the region with main concentrations in the three southern counties. Minor clusters also in north Norfolk and west Suffolk	14%	24.8%	61.2%
Lowland mixed deciduous woodland	9,500 ha	Throughout the region but with a distinct concentration in Hertfordshire	Over 50%	20%	30%
Wet woodland	15,000 ha	Essex, Hertfordshire and Suffolk have the highest concentration	15%	35%	50%

* Information from NE GIS data # Information in brackets from East of England Biodiversity Audit

Progress Towards Regional LBAP Targets

4.69. 25 textual woodland targets have been established across the region, with the majority of these from Cambridgeshire and Norfolk. None were recorded from Suffolk or Bedfordshire. The progress of 11 were unreported, with progress unknown for a further three. For the remaining 11 targets some progress had been recorded, nine with progress on schedule and two with progress behind schedule.

4.70. 13 numerical woodland targets were identified within BARS. These were all from Cambridgeshire and Essex, with the conservation objectives relating to maintaining extent, increasing extent or achieving condition. Information was only available on one Cambridgeshire and Peterborough BAP target:

- "*CPBAP165.4 - Establish 100 ha wet woodland by 2010, and 200ha by 2015*". As of January 2009 up to 28 of 100 ha was underway.

Assessment of habitat condition based on review of available literature

4.71. The literature available to assess the condition of woodland across this region was limited to wet woodland habitats. The Hertfordshire Wet Woodland Survey[58] mentions that only a limited number of site were surveyed. It was concluded that

[58] Tranter, B. (2008). *An audit of wet woodlands in Hertfordshire.* Hertfordshire Biodiversity Records Centre.

generally the wet woodlands of Hertfordshire are poor in structure and species composition with few, if any, representative of National Vegetation Classification community types.

4.72. The wet woodland survey of the Waveney Valley[59] states that the biodiversity value of wet woodlands has been underestimated in the past and as a result much of this habitat has been lost. Many examples of inappropriate grazing levels were recorded including extensive evidence of poaching caused by livestock. Many of the Waveney Valleys wet woodlands are isolated and fragmented, leaving some communities confined to 'islands'.

CASE STUDY: WOODLAND SITES IN HERTFORDSHIRE

Broxbourne Woodland CWS is an ancient semi-natural woodland, most of which lies outside a SSSI and forms part of a larger National Nature Reserve.

The wood has been felled and replanted with conifers over the years, although still retains features of value including oak standards with hornbeam coppice, wet alder woodland in wet flushes, streams, acid grassland and heath. Key species are the purple emperor butterfly, great crested newt, and hawfinch, with historic records of nightjar.

A strategy has been developed with Natural England to remove the majority (90-95%) of the conifers, open up the streams, protect the wet woodland and flushes, and coppice hornbeam. Rare breed cattle are to be introduced to graze the woodland as wood pasture, to control bracken and encourage the spread of heather. Broadleaved trees will be planted to establish different age classes and structure.

Grant applications are currently being submitted to English Woodlands Grant Scheme and Environmental Stewardship Higher Level Scheme.

Whitney Wood, Stevenage is an ancient semi-natural broadleaf wood with oak standards and mixed understorey in private ownership (previously owned by Hertfordshire County Council). Although it lacked appropriate management in the past, it retained its structure and important features. Part of the site (outside woodland boundary) has been developed as housing. Recent reports have been received of brick rubble and sub-soil being dumped in the wood, a common problem of woodlands on the urban fringe.

CASE STUDY: ANCIENT SEMI-NATURAL WOODLANDS IN SUFFOLK

A widespread factor leading to decline in the condition of many ancient semi-natural woodlands (ASNW) across the East of England is excessive browsing and grazing pressure by deer[60]. Populations of wild deer have been increasing rapidly

[59] Piotrowski, S. (2006). *Wet woodland survey of the Waveney Valley.* Suffolk Wildlife Trust and the Forestry Commission.
[60] English Nature (2006). *Target 2010 - East of England: The condition of the region's Sites of Special Scientific Interest in 2005*

in the last 40 years and may now be higher than at any time in the last 1000 years[61]. Deer browsing and grazing limits regeneration of the canopy layer and shrub layer species, and may lead to a decline in diversity and abundance of woodland ground flora species.

The effects of deer browsing are not confined to BAP habitats in the 'wider countryside'; they equally threaten the condition of woodland SSSIs. However, the impact of deer browsing may be particularly acute on County Wildlife Sites and other undesignated ASNW sites with relatively few resources to carry out control of deer populations or for the erection of deer fencing. In addition, the control of deer populations is generally ineffective unless it is carried out across large enough areas to counteract subsequent immigration of additional deer.

Key Threats

4.73. The key threats to woodland habitats in the East of England regularly mentioned in literature resources are;

- **Overgrazing and over-browsing** caused both by wild animals (deer, rabbits, grey squirrels) and livestock.
- **Changes to woodland management**, particularly the cessation of tradition woodland management practices (e.g. coppicing and pollarding).
- **Inappropriate development** causing direct and indirect habitat loss through housing, urban and industrial developments.

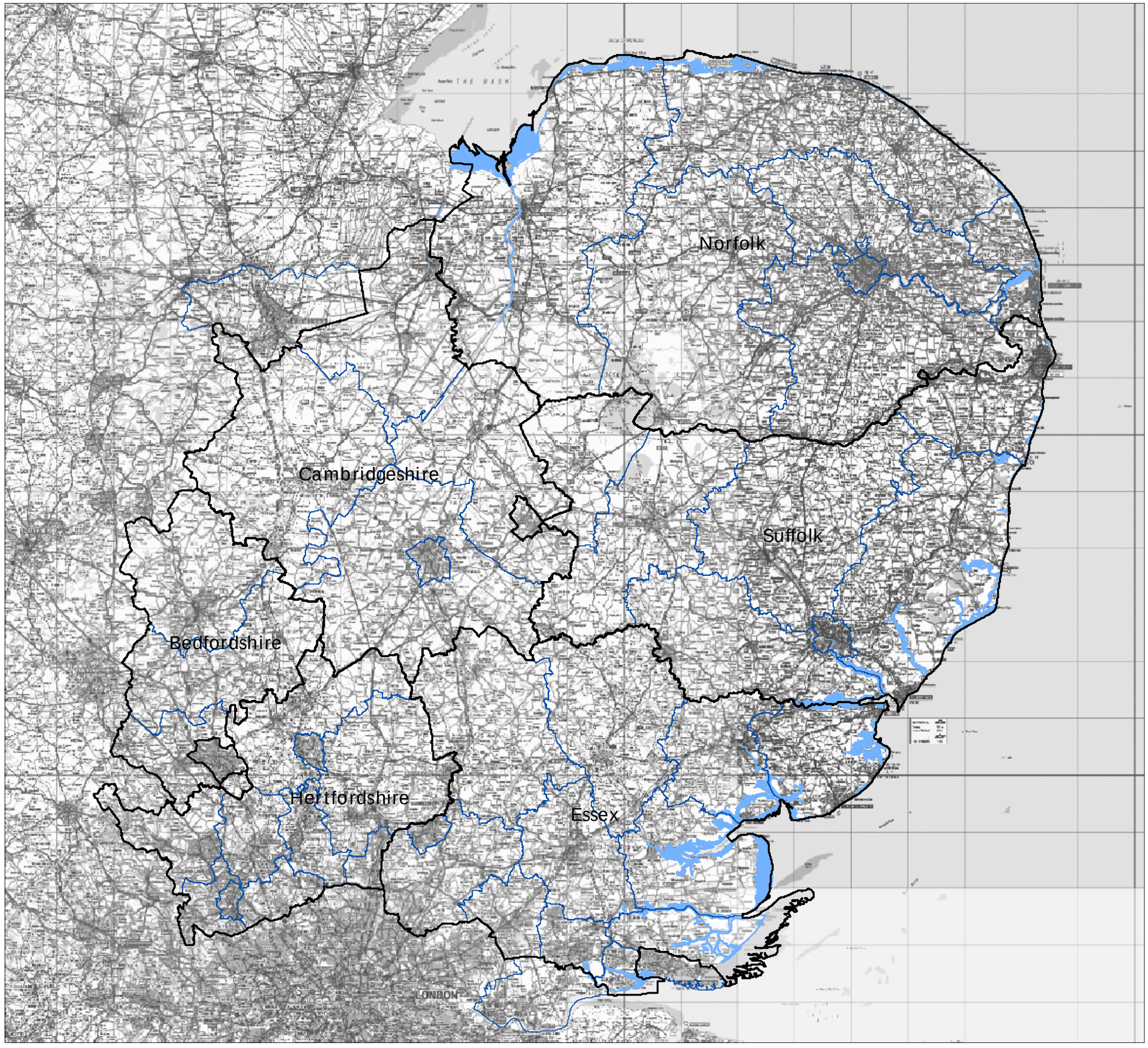
Summary: Woodland Habitats

- The EEBA states that both Lowland Mixed Deciduous Woodland and Wet Woodland are of 'high nature conservation significance' when compared to the national resource. The region contains between 10-50% of the nations resource for these BAP Habitat types.
- In general woodland habitats located within SSSIs in the East of England appear to fare marginally worse than the national picture. However, this statement only relates to assessment of the broad SSSI habitat reporting category Lowland Broadleaved and Yew Woodland and may, therefore, not be representative for other woodland habitats.
- The extent of Lowland Mixed Deciduous Woodland, Wet Woodland and Lowland Beech and Yew Woodland appear to be reasonably well documented, however, no data was available for Lowland Parkland and Wood Pasture. 61.2% of Lowland Beech and Yew Woodland, 21% of Lowland Mixed Deciduous Woodland and 22% of Wet Woodland

[61] The Deer Initiative et al. (no date). *The sustainable management of wild deer populations in England: An action plan.* [on-line] http://www.thedeerinitiative.co.uk/pdf/deerstrategyengland301204.pdf (accessed March 2009).

occurs outside of SSSIs and CWSs. Woodlands may therefore be more vulnerable to damage or neglect than other habitats in the East of England.

- In general data is lacking with which to examine the condition of woodland habitats occurring outside of SSSIs within the East of England. All of the literature sources which were available relate specifically to wet woodland.
- Threats identified largely related to woodland management, although wet woodland would also be particularly vulnerable to changing water levels or pollution.



Review of the condition and extent of BAP Habitats in the East of England

Figure 4.1: Distribution of Coastal BAP Priority Habitats

Key

- County boundary
- Districts and Unitary Authorities
- Coastal habitats

0 5 10 20 Km

Source: Natural England

Date: 25/03/2009

Revision: A

File: S:\4500\4564 Review of BAP Habitats in the East of England\GIS\Themes\ArcGIS9\4564_01_016_bap_eoe_region.mxd

Review of the condition and extent of BAP Habitats in the East of England

Figure 4.2: Distribution of Freshwater BAP Priority Habitats

Norfolk

Cambridgeshire

Suffolk

Bedfordshire

Hertfordshire

Essex

LONDON

THE WASH

Key

County boundary

Districts and Unitary Authorities

Freshwater

0 5 10 20 Km

Source: Natural England

Date: 25/03/2009

Revision: A

File: S:\4500\4564 Review of BAP Habitats in the East of England\GIS\Themes\ArcGIS9\4564_01_016_bap_eoe_region_freshwater.mxd

Review of the condition and extent of BAP Habitats in the East of England

Figure 4.3: Distribution of Grassland BAP Priority Habitats

Key

County boundary

Districts and Unitary Authorities

Grassland

Norfolk

Cambridgeshire

Suffolk

Bedfordshire

Hertfordshire

Essex

LONDON

0 4 8 16 Km

Source: Natural England

Date: 25/03/2009

Revision: A

File: S:\4500\4564 Review of BAP Habitats in the East of England\GIS\Themes\ArcGIS9\4564_01_016_bap_eoe_region_grassland.mxd

Review of the condition and extent of BAP Habitats in the East of England

Figure 4.4: Distribution of heathland and acid grassland BAP Priority Habitats

Norfolk

Cambridgeshire

Suffolk

Bedfordshire

Hertfordshire

Essex

LONDON

Key

County boundary

Districts and Unitary Authorities

Heathland and acid grassland

0 5 10 20 Km

Source: Natural England

Date: 25/03/2009

Revision: A

File: S:\4500\4564 Review of BAP Habitats in the East of England\GIS\Themes\ArcGIS9\4564_01_016_bap_eoe_region_heathandacid.mxd

Review of the condition and extent of BAP Habitats in the East of England

Figure 4.5: Distribution of Woodland BAP Priority Habitats

Norfolk

Cambridgeshire

Suffolk

Bedfordshire

Hertfordshire

Essex

LONDON

THE WASH

Key

County boundary

Districts and Unitary Authorities

Woodland

0 5 10 20 Km

Source: Natural England

Date: 25/03/2009

Revision: A

File: S:\4500\4564 Review of BAP Habitats in the East of England\GIS\Themes\ArcGIS9\4564_01_016_bap_eoe_region_woodland.mxd

5. THE WAY FORWARD

POTENTIAL IMPACTS ASSOCIATED WITH THE EAST OF ENGLAND PLAN

5.1. The Scoping Report for the Habitats Regulations Assessment (HRA) of the East of England Pan Review[62] summarises the key impacts of growth in the East of England, as identified by the HRA of the existing East of England Plan[63]. Although this is specific to Natura 2000 and Ramsar sites, it is likely that similar issues would exist for BAP habitats outside these sites. However, habitats outside of designated sites are likely to be in worse condition, to be found in smaller, more fragmented areas, and are more widespread. Therefore they may be more vulnerable to impacts. Key issues identified in the HRA include the following:

- **Water Resources**: as a result of increased abstraction to meet new housing needs. The East of England is one of the driest in England with particular pressure during summer low flow periods. No significant additional water resource is available. Reduced water availability is likely to have significant impacts on BAP habitats.
- **Urbanisation**: increased threat of 'urban impacts' such as fly-tipping, pet predation, arson etc. In addition, development would be likely to threaten biodiversity action plan habitats which fall outside of designated sites and therefore receive low levels of protection, with a resulting potential decrease in habitat extent and increase in fragmentation.
- **Recreation**: specifically, impacts associated with trampling and erosion (for example, woodland, heathland and coastal habitats with fragile soils and/or plant species), progressive nutrient enrichment (dog-fouling), and disturbance to fauna.
- **Water Quality**: Particularly due to increased volumes of domestic / industrial waste water requiring treatment and discharge, with potential contamination and eutrophication issues.
- **Coastal squeeze**: Sea level rise resulting in the loss (erosion and inundation) of coastal habitats which are 'trapped' between the sea and flood defences / development.
- **Air quality**: Although internationally air quality is predicted to improve, there is potential for increased localised air pollution, for example along key transport routes with increased traffic movements.

[62] Scott Wilson (2008) *East of England Plan Review: Habitats Regulations Assessment Scoping Report*
[63] RPS (2007) *East of England Plan: Report of the Habitats Directive Assessment*

GREEN INFRASTRUCTURE AND BIODIVERSITY ENHANCEMENT

5.2. Key themes identified in relation to the condition of BAP Habitats within designated sites and the wider countryside include:

- Poor condition as a result of inappropriate and/or insufficient management.
- Threats from increased development (residential, employment and associated infrastructure) as a result of land-take, recreation pressure, and pollution.
- Potential increased fragmentation of already isolated habitats through development, and potentially agriculture.
- Potential implications of climate change and extinctions due to reduced dispersal ability.

5.3. Further growth within the Region, and the UK as a whole, is required and will proceed. It is highly likely that in places this will directly threaten certain BAP habitats, particularly outside of designated sites, with increased indirect impacts also certain, as need is determined to outweigh the value of the habitats. However, it the value of habitats in the provision of ecosystem services and recreation / amenity benefits is also recognised and ingrained within planning policy, and therefore a mechanism is required to balance these two issues.

5.4. A key initiative identified to address this is 'Green Infrastructure'. **Policy ENV1** of the East of England Plan places great emphasis on the implementation of a Green Infrastructure (GI) approach to mitigate further development impacts, as a cornerstone of sustainable development and the provision of multi-functional benefits including biodiversity enhancement.

5.5. In parallel, **Policy ENV3** requires the adoption of an ecological network approach, through the Biodiversity Mapping Project as a focus (along with regional biodiversity targets) for the '*conservation, enhancement, restoration, reestablishment and good management of habitats and species populations.*'

5.6. However, there is no direct link made between these two complementary strands (Green Infrastructure and Biodiversity Mapping). It is firstly recommended that the linkages between the two within The East of England Plan are reinforced, embedding biodiversity mapping within the GI approach, and ensuring that the other ecosystem services and community benefits are achieved. As well as addressing habitat loss, fragmentation and connectivity issues, an effective GI approach would take a multifunctional approach to provide, for example:

- Recreation and access to nature (whilst the provision of improved recreation and enhanced habitats would address recreation impacts on sensitive habitats).
- Economic benefits through visitor attraction, and associated employment provision including land management.
- Opportunities for local food production.

- Flood attenuation through the identification of land for wetland creation or enhancement (and therefore contributing to BAP targets).
- Water and air pollution control through 'filtration' by vegetation.

5.7. Secondly, the GI approach should be supported by the development of an **East of England Green Infrastructure Framework**. The East of England Plan should make reference to this Framework, which would seek to turn policy in to practice. This would assist in the identification and realisation of additional funding sources to implement biodiversity enhancements.

5.8. Such a Framework would also need to draw on other, sub-regional Ecological Mapping and GI Projects which are underway, such as:

- Norfolk Ecological Network Mapping (and subsequent sub-County / District level projects)
- Great Fens Project
- Thetford Green Infrastructure Study
- Haven Gateway GI Strategy
- Forest Heath
- Cambridgeshire
- North Hertfordshire
- Bedfordshire (sub-County GI strategies)
- South Essex Green Grid
- East London Green Grid

5.9. A regional strategy would aim to ensure that all the sub-regional strategies recognise biodiversity principles as a core component, whilst ensuring they also allow for mitigation and enhancement required at the regional level. This would provide the basis for local delivery in line with the Regional Framework.

ENVIRONMENTAL LIMITS

5.10. **Policy SS1 Achieving Sustainable Development** includes a requirement to respect environmental limits, and Policies ENV1 and ENV3 (amongst others) are key in delivering this in terms of the natural environment. Indeed 'living within environmental limits' is a central theme of Government policy for Sustainable Development, and concern was expressed within the Examination of the draft Regional Spatial Strategy that the proposed scale and location of growth could exceed the environmental capacity of the Region.

5.11. As a result, a study was undertaken in the Haven Gateway on behalf of East of England Regional Assembly and partners to identify a methodology to identify

environmental carrying capacity and assist spatial planning[64]. In terms of biodiversity, this included only an analysis of the condition of SSSIs due to data availability, but it was recognised that a more useful approach would require the analysis of CWS and BAP Habitats. Such an approach would be useful to identify limits of growth as well as potential mitigation options in terms of regional scale Green Infrastructure.

5.12. It is recommended that such an approach is subject to further research, to develop a method to inform regional planning (and mitigation) within the East of England with regard to biodiversity. Further detail with regard to data requirements are provided below.

BASELINE AND MONITORING

5.13. As summarised in **Section 2**, there are a number of policy and legislative drivers which require the collation and reporting of baseline and monitoring data relating to habitats in terms of both extent and condition. In more recent years, these have recognised the need to extend our knowledge base beyond the boundaries of designated sites, as the need for larger, interconnected areas of habitats in good condition has been recognised. However, the resources made available to achieve this have not kept pace with this change, and therefore attempts to collect such data have understandably been limited. It is key that resources are made available to enable the collation of a firm baseline and ongoing monitoring in terms of the location of habitats as well as condition. In particular, it is important that the most is made of existing mechanisms to make the best use of resources, such as BARS and County monitoring strategies for CWSs. This would be required to develop an effective GI Strategy and to identify and monitor Environmental Limits.

Location and Extent of Biodiversity Action Plan Habitats

5.14. It became clear during the course of the study that although the Natural England BAP Habitat GIS data provides the best known distribution of BAP Habitats at current, there are discrepancies or omissions. For example, for some UKBAP habitat types, no data was available (see **Appendix 1**). In other cases, locally based studies indicated that areas of habitat had not yet been mapped, for example coastal BAP habitats on the Norfolk coastal and fen habitats within Suffolk.

5.15. It is therefore recommended that the current baseline is subject to a 'ground-truthing' exercise. Given resourcing issues, an efficient approach to this may be to undertake workshops on a County basis involving relevant stakeholders, such as (but not restricted to) Local Authority ecologists and site managers / rangers, County Wildlife Trusts, Natural England, Environment Agency ecologists, RSPB, Forestry Commission ecologists / rangers, National Trust and relevant local wildlife groups.

5.16. The aim would be to produce a best estimate of location and extent of UKBAP habitats within the region, which would require updating as further information becomes available with regard to additional areas identified, areas of habitat loss and

[64] Land Use Consultants (2008) Environmental Capacity in the East of England: Applying an Environmental Limits Approach to the Haven Gateway

areas of habitat creation (for example, through local surveys, biological records, planning applications etc.).

5.17. This would need to be centrally led, possibly through the East of England Biodiversity Forum, to ensure a targeted and coordinated approach. In particular, it would be necessary to define the habitat types and definitions to be mapped (based on the disaggregated East of England priority habitats). In addition, preliminary investigations may be appropriate to determine whether this process may be further informed by Remote Sensing methodologies.

5.18. These recommendations are very much in keeping with the findings of the East of England Data Needs Report.[65]

Habitat Condition

5.19. A similarly coordinated approach would be required to ensure a region wide, approach to the establishment of a baseline of habitat condition and ongoing monitoring. However, the resource implications of this are potentially greater. Possible approaches which may be appropriate include:

- **Periodic survey of a sample of County Wildlife Sites across the region** involving a rapid assessment of condition. An appropriate, standardised, repeatable, and, importantly, rapid method would need to be developed and resources made available for sampling on a County basis.

- **Monitoring through the BAP mechanism / process.** Identification of BAP Habitats which are appropriate across the region (those with a common definition within the relevant LBAPs) and the establishment of common targets which can be adopted and collected within the relevant LBAPs on a regular basis utilising BARS (such as area under management, area created, or area judged to be in good condition following sampling survey etc.). This should make best use of the existing LBAPs to minimise additional resource requirements, but ultimately the resources available would define the scope. Again, a workshop of key stakeholders would assist in the development of appropriate habitats, targets and an approach.

Reporting

5.20. As a general comment, it would be essential that region wide reporting mechanisms and timescales were established in agreement with those responsible for data collation. As has been identified with the analysis of BARS undertaken for this study, an uncoordinated approach greatly reduces the usefulness of any data given the absence of data (due to varied progress or timescales with regard to reporting), and the great variation between the way data is collected and recorded.

Resourcing

5.21. Despite attempts to make best use of existing information and mechanisms, data collation and monitoring as required to meet legislative and planning requirements

[65] Somerset Environmental Records Centre (2007) *East of England Biodiversity Data Needs*

would require additional resources. These may be made available by Government through Local Authorities, Natural England or East of England Development Authorities, or other sources such as Developer Contributions. Further research will be needed to identify potential sources.

OTHER KEY HABITAT ISSUES

5.22. Further issues identified during the study are detailed below. Detailed analysis of these lie outside of this study but it is important that they are adequately considered within the development of mitigation and GI strategies.

- Habitat Management
- Freshwater Habitats
- Agriculture
- Coastal Habitats

Habitat Management

5.23. The lack of appropriate management to maintain the BAP habitats in favourable condition was identified as a concern for all Study Habitat Groups. Although management is not an issue for the Regional Spatial Strategy, enhancing and maintaining the condition of existing habitats will be likely to form a key mitigation measure to address increased growth and pressure on wildlife. This should at least in part be addressed by the development of Green Infrastructure strategies which allow for the maintenance of habitats within Open Space. It is likely that strong policy support will be required for the provision of resources to enhance existing sites specifically to address increasing pressures, for example through Developer Contributions. This would need to be determined at the local scale in terms of local priorities, but this may benefit from the development of a Regional approach to ensure consistency and to ensure local measures contribute towards the regional biodiversity strategy.

Freshwater Habitats

5.24. Freshwater habitats should be given particular consideration given their importance within the East of England as a characteristic habitat (including their importance for tourism and recreation), the provision of ecosystem services such as pollution control, water supply and flood attenuation, and also their vulnerability to growth through abstraction and pollution. Evidence has highlighted the vulnerability of these habitats within Natura 2000 sites and SSSIs, but also the potentially greater vulnerability of non-designated habitats which receive little protection.

5.25. As well as protection of habitats, it is therefore recommended that the East of England Plan requires that Local Planning Authorities give strong support to the implementation of water efficiency and recycling measures to minimise abstraction requirements.

Agriculture

5.26. This study did include agricultural habitats which fell outside of the study scope partly due to data availability. However, the importance of these habitats should not be overlooked and the baseline data and monitoring recommendations above apply. It is estimated that 75% of the East of England is agricultural land and this supports BAP Habitats include arable, grassland, hedgerows, and ponds. Furthermore, enhancement of agricultural land can be vital in enhancing the wider countryside for wildlife and addressing issues such as habitat loss, habitat degradation and fragmentation as a result of growth, whilst also assisting adaptation to climate change.

Coastal Habitats

5.27. The key threat to coastal habitats is as a result of climate change and coastal squeeze. Further recommendations relating to this are outside the scope of this study. Approaches to address this, such as Shoreline Management Plans (which in particular need to recognise the dynamic nature of coastal habitats) and managed realignment schemes, are in place.

APPENDIX I

1. METHODOLOGY

STUDY AREA

1.1. The study focused on the six counties which form the East of England Region: Bedfordshire, Cambridgeshire, Essex, Hertfordshire, Norfolk, and Suffolk. Administratively, the East of England also includes four Unitary Authorities Peterborough, Luton, Southend-on-Sea and Thurrock.

STUDY FOCUS AND DEFINITIONS

Biodiversity Action Plan Priority Habitats

1.2. The UK Biodiversity Action Plan (UK BAP) targets habitats and species of high ecological interest or of conservation concern and list actions required to conserve and enhance them within the UK[1]. Biodiversity Action Plans (BAPs) have been prepared nationally and at the county and district scale (the later are called Local Biodiversity Action Plans or LBAPs). Therefore, the BAP Priority Habitats found within the East of England reflect those notified nationally with the UK BAP and those which are considered to be of local conservation importance by one of the six county biodiversity partnerships. In total 26 BAP Priority Habitats have been notified within the East of England Region (these are listed in **Table 3.1**)[2].

1.3. For the purposes of this Study the following five broad habitat groups (from here on 'Study Habitat Groups') will be investigated. These incorporate 24 of the 26 BAP Priority Habitats found within the East of England:

- Coastal.
- Freshwater.
- Heathland and acid grassland.
- Neutral grassland and chalk grassland.
- Woodland.

1.4. The Study Habitat Groups were identified at a study inception meeting and were chosen on the following basis:

- Information on broad habitat types rather than individual BAP habitats was specified in the original project brief in accordance with the current East of England Regional Biodiversity Targets (currently these are being disaggregated to match UK BAP Priority Habitat types).

[1] UK Biodiversity Partnership (2008). UK List of Priority Species and Habitats [on-line] http://www.ukbap.org.uk/NewPriorityList.aspx (accessed January, 2009)

[2] Somerset Environmental Records Centre [SERC] (2007). East of England Biodiversity Data Needs: Final Report. East of England Biodiversity Forum.

- Data on both condition and extent is incomplete for a large proportion of the BAP habitats within the region. For example, it was found that regional data sets are only available from Natural England for 15 of the 26 BAP Priority Habitats which are present and these data sets have mostly 'low geographic precision' and 'medium' accuracy[3]. Therefore, information available to report on the extent of individual BAP Priority Habitats would have been incomplete. As and where more detailed information relating to specific BAP Priority Habitats types is available this will be incorporated under each of the Study Habitat Groups.

- The less technical focus on broad habitat groups is better suited to strategic level of information required by Natural England to influence the RSS.

- Discussing habitats in terms of broad functional groups should facilitate a pragmatic approach to the identification of themes for mitigating threats and improving the condition of habitats.

- The broad habitat types incorporate 24 of the 26 UK BAP Priority Habitats, this is on account of the omission of both hedgerows and arable field margin BAP Habitats. This was requested by the Steering Group owing to a lack of data on these habitat types.

1.5. There is some overlap between the Study Habitat Groups, for example, coastal and floodplain grazing marshes could conceivably be placed in the Coastal, Freshwater or Grassland Study Habitat Groups.

[3] *Ibid.*

Table 1: Study Habitat Groups, Corresponding East of England Regional Priority Habitat Types and UK BAP Priority Habitat Types.

Study Habitat Group	Draft disaggregated regional Priority Habitat types[4]	UK BAP Priority Habitat type	Mapping availability
Coastal	Coastal and floodplain grazing marsh	1) Coastal saltmarsh	Data not available
	Coastal sand dunes	2) Coastal sand dunes	GIS data available from Natural England
	Maritime cliff and slope	3) Coastal vegetated shingle	GIS data available from Natural England
	Saline lagoons	4) Maritime cliffs and slopes	GIS data available from Natural England
		5) Mudflats	GIS data available from Natural England
		6) Saline lagoons	GIS data available from Natural England
		7) Littoral and sublittoral chalk	Data not available
		8) Seagrass beds	Data not available
Freshwater	Reedbeds	9) Reedbeds	GIS data available from Natural England
	Fens	10) Fens	GIS data available from Natural England
	Purple moor-grass and rush pasture	11) Purple moor-grass pasture	GIS data available from Natural England
	Eutrophic standing water	12) Aquifer-fed naturally fluctuating water bodies	Data not available
	Mesotrophic lakes	13) Chalk rivers	Data not available

[4] Based on East of England Biodiversity draft disaggregated BAP Targets: Personal communication, 21st January 2009, Catherine Weightman (EEBF) [by email].

Study Habitat Group	Draft disaggregated regional Priority Habitat types[4]	UK BAP Priority Habitat type	Mapping availability
		14) Eutrophic standing waters (generally high in nutrients)	Data not available
		15) Mesotrophic lakes (usually low in nutrients)	Data not available
Neutral and calcareous grassland	Lowland meadows	16) Lowland calcareous grassland	GIS data available from Natural England
	Lowland calcareous grassland	17) Lowland meadows	GIS data available from Natural England
		18) Coastal and floodplain grazing marsh	GIS data available from Natural England
Heathland and acid Grassland	Lowland heathland	19) Lowland heathland	GIS data available from Natural England
	Lowland dry acid grassland	20) Lowland dry acid grassland	GIS data available from Natural England
Woodland	Native woodland	21) Lowland wood-pasture and parkland	Data not available
	Wood pasture and parkland	22) Lowland mixed deciduous woodland	GIS data available from Natural England
		23) Lowland beech and yew woodland	GIS data available from Natural England
		24) Wet woodland	GIS data available from Natural England
Not included	No analogue in draft Regional BAP	25) Cereal field margins	Data not available
Not included	No analogue in draft Regional BAP	26) Ancient and/or species rich hedgerows	Data not available

Habitat Extent

1.6. The extent of BAP habitats will be determined using GIS BAP habitat inventories provided by Natural England (see paragraph 1.26 for data limitations). Extent refers to both the area present and the distribution of a habitat type across the region. GIS was also used to calculate the area of each habitat type found within Sites of Special Scientific Interest (SSSIs), County Wildlife Sites (CWSs) and that which remained outside of any protected nature conservation site. For the purposes of the area outside of any form of nature conservation designation is referred to collectively as the 'wider countryside'.

Habitat Condition

1.7. The habitat definitions (ecological community descriptions) stated within the UK Biodiversity Action Plan are taken to be indicative of desirable target condition for each of the 24 BAP Priority Habitats[5]. Unlike for statutory nature conservation sites, there is no standard methodology for defining habitat condition.

1.8. Assessment of the condition (ecological integrity) of the Study Habitat Groups will be based on the following considerations (which broadly follow the approach used in the East of England Biodiversity Audit[6]):

- Positive or negative, current and/or future threats and trends to habitats (for example, overgrazing by deer currently threatens many woodlands and climate change induced sea-level rise is a future threat to the integrity of coastal habitats).

- Area specific and/or broad threats to habitats (for example, air pollution may be a broad threat to acid grassland habitats across the East of England whereas construction of a new settlement may pose area specific visitor pressure on neighbouring heathland habitat).

- The feasibility of restoring/creating/enhancing a habitat or maintaining its current conservation status (for example, it is unlikely that restoration of ancient woodland would be feasible despite the potential availability of land, however, restoration of many wetland habitat types is actively being pursued).

Monitoring Habitat Condition for SSSIs

1.9. Natural England operates a 'common standards monitoring' (CSM) protocol so that the condition of SSSI habitats can be cross compared even though the specific attributes constituting desirable condition for different SSSIs in

[5] UK Biodiversity Partnership. UK List of Priority Habitats [on-line] http://www.ukbap.org.uk/PriorityHabitats.aspx (accessed January 2009).

[6] East of Englanfd Wildlife Trust Consultancies (2002). *East of England Biodiversity Audit: A report to the East of England Biodiversity Forum.* EEBF

different habitats differ widely[7]. CSM assigns SSSI features to one of a small number of standard conditions, these are the state of the feature at a particular point in time:

- *Favourable condition*: the objectives for that feature are being met, it is in the state that we want;
- *Unfavourable condition*: the state of the feature is currently unsatisfactory.
- *Destroyed* (partially or completely): the feature is no longer present and there is no prospect of being able to restore it.

1.10. Assessment of the condition of BAP habitats within SSSIs in the East of England will form a key part of reviewing the likely condition of BAP habitats in the wider countryside. Reference will be made to the condition assessment categories above accordingly.

DATA SOURCES AND ANALYSIS

1.11. As discussed with the Steering Group and specified in the Study Brief information was collated from the following sources and was available in a range of formats:

- Available GIS data.
- Biodiversity Action Reporting System (BARS) data.
- Published research literature (this will incorporate published information on the condition assessment for Sites of Special Scientific Interest (SSSIs).
- Local Area Agreement reporting on National Indicator 197: Improved Local Biodiversity: proportion of local sites with positive conservation management. (None available on request).

GIS

1.12. Digital information indicating the extent of 16 of the 24 UK BAP Priority Habitat types was provided by Natural England. There are various limitations associated with spatial precision and accuracy of national BAP data sets, these are discussed in more detail under study limitations below.

1.13. Digital information specifying the location and habitat type for County Wildlife Sites (CWSs) in Bedfordshire, Cambridgeshire, Essex, Hertfordshire, Suffolk and Norfolk was made available to LUC by Natural England.

1.14. GIS maps were produced illustrating the distribution of BAP habitats across the region. In addition GIS was be used to calculate which proportion of each of the Study Habitat Groups falls within and outside of statutory

[7] JNCC (no date). *Common Standards Monitoring*. [on-line] http://www.jncc.gov.uk/page-2217 (accessed March, 2009).

protected areas and CWSs ('the wider countryside'). Use of the 'intersect' function on ESRI's ArcView was used for this purpose.

Biodiversity Action Reporting System (BARS)

1.15. Information is available on the UK Biodiversity Action Reporting System (BARS) relating to the progress towards achieving targets set by each of the county Biodiversity Partnerships[8] (LBAP targets).

1.16. BARS data was reviewed for all LBAP targets relating to the five Study Habitat Groups. Any targets not relating specifically to improving the condition of habitats were excluded from further analysis (e.g. 'provision of new interpretation at nature reserve X').

1.17. In terms of reporting on progress towards achieving LBAP targets, BARS categorises information in terms of those targets which are 'textual' (i.e. targets which specify an action which is not readily quantifiable) and targets which are 'numeric' (e.g. 'restore X hectares of habitat Y'). For numeric targets, BARs specifies whether the target relates to one of the following conservation aims:

- Maintain extent.
- Restoration.
- Achieving condition.
- Expansion.

1.18. For each of these categories a percentage is then used to express progress towards implementation. This information was used to provide information on the condition of the five Study Habitat Groups.

1.19. For textual targets BARS specifies whether the target falls into one of the following categories:

- No progress.
- Not specified.
- Progress unknown.
- Some progress (behind schedule).
- Target exceeded (due to plan action).
- Target achieved.
- Target not achieved.

[8] UK Biodiversity Action Reporting System (2008). *Targets by Area* [on-line] http://www.ukbap-reporting.org.uk/outcomes/targets_area.asp (accessed January, 2009)

1.20. Calculating the percentage of each BAP target which falls into the each of the above categories provides an indication of the condition of the five Study Habitat Groups in terms of progress towards targets.

Review of Available Literature Relating to the Condition and Extent of BAP Habitats

1.21. Relevant sources of literature were identified in the first instance by reference to the original Study Brief and through consultation with the Steering Group. Subsequently, data sources were identified by members of the East of England Biodiversity Forum, via internet searches and by reviewing the websites of the six county Biodiversity Partnerships. As a result 39 potential literature sources were identified (these are listed in **Appendix 11**). Eventually, 21 references were reviewed and included in the study. The remaining references were not reviewed owing to the fact they were not relevant to habitat condition or in some cases no further information could be located about a particular reference after a series of requests.

1.22. In terms of analysing the literature sources, the definition of habitat condition stated above was used to guide identification of relevant information relating to the condition of BAP Priority Habitats in the Region. The literature review considered ten core documents (sources A-J in **Appendix 1)** in addition to reviewing BARS data. These core documents provide general information on the condition and extent of BAP Habitats at the regional scale.

1.23. 21 further documents were then reviewed providing specific information of particular areas within the region or relating to one or more of the Study Habitat Groups. For each of the Study Habitat Groups the following information was compiled:

- Assessment of this habitat in comparison to the national resource.
- Distribution of habitat type across the region (GIS mapping) and estimate of area contained outside of statutory protected areas.
- Relevant regional BAP targets and progress towards meeting these (BARS data).
- Assessment of condition based on available literature.
- Key threats and opportunities.

1.24. To provide additional information, each of the county biodiversity action plans was also reviewed to extract any references to the condition of habitats on a county basis.

Local Area Agreement Reporting on National Indicator 197 'Improved Local Biodiversity'

1.25. At the time of compilation of the Scoping Report agreement of targets for NI197 in the East of England was at an early stage in development. Therefore, no information was available to inform this Study.

STUDY CONSTRAINTS AND LIMITATIONS

1.26. The Study has been limited by the following factors:

- Many of the published research reports which were reviewed focus on the county or district scale. These findings may not be representative of region at large.
- Limited data on extent and distribution of BAP habitats is available at the regional scale from Natural England and the data which is available is considered to be of 'low geographic precision' and 'medium' accuracy[9]. Much of the BAP Habitat data collated relates to designated sites and therefore may not include BAP Habitats outside of these sites.
- BARS data was found to be very limited & variable both in terms of geographic and habitat coverage.
- In 2007 the UK Biodiversity Partnership published a review of the UK BAP, revising the number of UK Priority Habitats from 45 to 65[10] to reflect new scientific research on national conservation priorities. To date many LBAPs have not been revised to reflect the reclassification of additional Priority Habitats types. In addition, in some instances GIS data available from Natural England has not yet been updated to reflect the addition/revision of new Priority Habitats. These habitats will be under represented by the study.
- Natural England Condition Assessment data provides a general guide to the overall condition of BAP habitats, however, it is limited in two respects. Firstly, it does not account for BAP Priority Habitats which occur outside of statutory nature conservation sites. Secondly, it may not be representative of all BAP Priority Habitats. Give that legal obligations exist to enforce favourable nature conservation management on SSSI land it might be expected that a greater proportion of BAP habitats would be in favourable condition within SSSIs than of BAP habitats in the wider countryside.

[9] *Personal Communication*. Richard Alexander, Natural England Evidence Team. [via email] 10th February 2009.

[10] Biodiversity Reporting and Information Group (2007). *Report on the Species and Habitat Review*. [on-line] http://www.ukbap.org.uk/library/BRIG/SHRW/SpeciesandHabitatReviewReport2007andAnnexes1-3.pdf (accessed January 2009)

APPENDIX 2

Luc ref.	Source	Title	Habitat	Geographical focus	Notes
1	BedsLife (2007).	"BEDSprings": a survey of the extent, quality and management of Bedfordshire's calcareous springs	Freshwater	Bedfordshire	Reviewed
2	Bedfordshire County Council (2008).	Indicators of sustainable development in Bedfordshire	All habitats	Bedfordshire	Reviewed
3	BedsLife (2007)	Survey of the Ponds of Bedfordshire	Freshwater	Bedfordshire	Reviewed
4	Cambridgeshire and Peterborough Biodiversity Partnership (2006).	Progress Report 2005.	All habitats	Cambridgeshire	This document did not contain information on habitat condition
5	Cambridgeshire and Peterborough Biodiversity Partnership (2006).	Ten Year Report 1996-2006.	All habitats	Cambridgeshire	This document did not contain information on habitat condition
6	Essex County Council (2008)	National Indicator 197 Information Note	Strategy document	Essex	This document did not contain information on habitat condition
7	Herts County Council	HMWT Reedbed Survey (again if this document contains details on resource change and/or habitat condition)	Freshwater	Hertfordshire	No further information was found about this document following enquires.
8	Herts County Council	Herts. Wet Woodland Survey (if this document contains details on resource change and/or habitat condition)	Woodland	Hertfordshire	Reviewed
9	Norfolk Wildlife Trust (2006)	Norfolk Fens Assessment 2005-2006: An assessment of non-SSSI fen sites outside the Broads	Freshwater	Norfolk	Reviewed
10	Suffolk and Norfolk Biodiversity Partnerships	Biodiversity Conservation in the Brecks: An Assessment of Progress to Date, Lessons Learned	Heathland/ Acid grassland	Norfolk	Reviewed

Luc ref.	Source	Title	Habitat	Geographical focus	Notes
	(2007).	and Priorities for the Future			
11	Norfolk Wildlife Trust (2007)	Norwich Ecological Network Mapping	All habitats	Norfolk	Reviewed
12	Norfolk County Council	Great Yarmouth Coastal Survey	Coastal	Norfolk	Reviewed
13	East of England Biodiversity Forum (2008).	East of England Biodiversity Delivery Plan.	Strategy document	Region	Reviewed
14	Catherine Weightman (pers. Comm).	Note on which LAA/ Local Targets have been set in the 6 East of England LA's supplied by Catherine Weightman	Strategy document	Region	This document did not contain information on habitat condition
15	EEBF (Catherine Weightman)	Report on condition of CWSs across region	All habitats	Region	No further information was found about this document following enquires.
16	East of England Regional Assembly [EERA] and East of England Environment Forum (2003).	Regional Environment Strategy for the East of England.	Strategy document	Region	Reviewed
17	National Trust (2008).	East of England Regional Nature Conservation Strategy	All habitats	Region	Reviewed
18	Forestry Commission	Countryside Survey - condition of woodland Keith Kirby	Woodland	Region	No further information was found about these documents following enquires.
19	Forestry Commission	Information on England Woodland Grant Scheme (EWGS)	Woodland	Region	
20	Forestry Commission	Heathland Opportunity Mapping	Heathland/ Acid grassland	Region	

Luc ref.	Source	Title	Habitat	Geographical focus	Notes
21	Forestry Commission	Ancient semi-natural woodland (ASNW) cluster mapping	Woodland	Region	
22	Suffolk Wildlife Trust (2003).	The Sandlings Walk - A step into history: Final Report 1998-2003	Heathland/ Acid grassland	Suffolk	Reviewed
23	Biodiversity News (2006).	Heathland creation attracts silver-studded blue - Issue 36 [Accessed 30/11/07]	Heathland/ Acid grassland	Suffolk	Reviewed
24	Suffolk County Council (2003).	Lowland Heathland [Accessed 10/01/2007] http://www.suffolk.gov.uk/NR/rdonlyres/9B3BFBE5-5D27-422A-8CB7-01E3BC506E89/0/lowlandheathland.pdf	Heathland	Suffolk	Reviewed
25	Norfolk Wildlife Trust (2008)	The State of Norfolk's Magical Meadows: A Norfolk Wildlife Trust Report	Grassland	Norfolk	Reviewed
26	Norfolk Wildlife Trust (date)	NWT Grassland CWS audit database	Grassland	Norfolk	Reviewed
27	Norfolk Wildlife Trust (date)	NWT Heath CWS audit database	Heathland/ Acid Grassland	Norfolk	Reviewed
28	Anon. (no date)	Trees in the Norfolk Fens: A brief history	Woodland	Norfolk	This document did not contain information on habitat condition
29	Wilkinson, T (2006).	Heaths and Wood-Pastures: aspects of landscape history of Norfolk Heathland	Heathland/ Wood pasture	Norfolk	This document did not contain information on habitat condition
30	Lambley, P (2006).	Report on a survey of selected orchards in Norfolk for lichens on behalf of the East of England apple and orchards project	Woodland	Norfolk	This document did not contain information on condition of broad habitats
31	Baker et al. (2005).	East of England Apple and Orchard Project: Survey	Woodland	Norfolk	This document

Luc ref.	Source	Title	Habitat	Geographical focus	Notes
		of mollusca and diatom surveys			did not contain information on condition of broad habitats
32	East of England Apples and Orchards Project (2006)	The condition of orchards in Norfolk	Woodland	Norfolk	This document did not contain information on condition of broad habitats
33	Stevenson, R. (2005)	Report on the bryophyte survey of selected orchards in Norfolk	Woodland	Norfolk	This document did not contain information on condition of broad habitats
34	BedsLife (2007).	Calcareous Grassland Habitat Opportunities Survey Report	Grassland	Bedforshire	Reviewed
35	Piotrowski, S (2006).	Wet Woodland of the Wavney Valley: 2006-2007	Woodland	Suffolk	Reviewed
36	Beds. Wet Woodland Working Group (2007)	Bedfordshire Wet Woodland Strategy	Woodland	Bedforshire	Reviewed
37	Meddings, A. (2004)	Peterborough Wet Woodland Strategy	Woodland	Cambridgeshire	Reviewed
38	Reference. provided by Forestry Commission	Huntingdon Wet Woodland Opportunity mapping study	Woodland	Cambridgeshire	No further information was found about these documents following enquires.
39	Reference. provided by Forestry Commission	Wensum - Wet Woodland Opportunity mapping study	Woodland	Norfolk	
A	Scott Wilson (2008)	East of England RSS Review: Integrated Sustainability Appraisal Scoping Report. Topic Paper 2 - Biodiversity	All habitats	Region	Reviewed

Luc ref.	Source	Title	Habitat	Geographical focus	Notes
B	Scott Wilson (2008)	East of England Plan Review: Habitats Regulations Assessment (Incorporating Appropriate Assessment) Scoping Report Draft	Natura 2000 sites	Region	Reviewed
C	Land Use Consultants & Terra Consult (2005)	East of England Biodiversity Mapping Project	All habitats	Region	Reviewed
D	East of England Wildlife Trust Consultancies (2002)	East of England Biodiversity Audit: A report for East of England Biodiversity Forum	All habitats	Region	Reviewed
E	English Nature (2005)	English Nature The East of England's Best Wildlife and Geological Sites: Identifying the challenge of bringing them into favourable condition	SSSIs	Region	Reviewed
F	Forestry Commission (2003)	Woodland for life: The regional woodland strategy for the East of England	Woodland	Region	Reviewed
G	SERC (2008).	Regional Biodiversity Forum Data Needs Report	Biological data	Region	Reviewed
H	Biodiversity Action Reporting System (BARS) (2008).	Local Biodiversity Action Plan (LBAP) reporting round on Biodiversity Action Reporting System	All habitats	Region	Reviewed
I	English Nature (2006).	Target 2010 - East of England: The condition of the region's Sites of Special Scientific Interest in 2005	All habitats	Region	Reviewed
J	Natural England (2008).	State of the Natural Environment 2008.	All habitats	National	Reviewed