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# The Humber Estuary: A comprehensive review of its nature conservation interest

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**The Humber Estuary: A comprehensive review of its nature conservation interest**

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## Abstract

The Humber Estuary is the largest British macro-tidal coastal plain estuary on the North Sea coast, and drains one fifth of England. It is one of the finest examples of an estuary of its type and is ranked as one of the top six sites in the UK for its waterfowl population, whilst its subtidal and intertidal habitats, fringing saltmarsh and reedbeds provide a valuable resource for a large number of rare or threatened mammals, fish, invertebrates and plants. The importance of the Humber has been recognised through statutory protection and in 1994 parts of the estuary were designated as Phase 1 of the Humber Flats, Marshes, and Coast Special Protection Area (SPA) and Ramsar site. In August 2000 English Nature consulted relevant parties on extensions to four of the Humber SSSIs, as well as a Phase 2 potential SPA (pSPA) and proposed Ramsar (pRamsar) site and the selection of the Humber Estuary as a possible Special Area of Conservation (pSAC).

Prior to the further progression of their designation proposals, English Nature has identified a need for a review of the national and international designations on the estuary under the auspices of the Humber Estuary Designations Project, with this document aimed at the collation and review of all relevant data on the current features of the Humber, identifying where possible, key data sources as well as highlighting gaps in current data and understanding.

The review area comprised of the Humber Estuary and its tidal rivers to the limit of tidal intrusion and surrounding coasts from the Lagoons SSSI near Easington on the north bank of the estuary, to the Saltfleetby-Theddlethorpe Dunes SSSI on the south bank (Lincolnshire coast) and included the sub-tidal component of the estuary. Within this area, key species and habitats were selected either on the basis of their inclusion on original and renotified SSSI citations or significance to the relevant EU Directives etc; Habitats and Species Directive (92/43/EEC), Wild Birds Directive (79/409/EEC) and the Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat. A small number of additional species identified as potentially nationally important were also included.

The findings of the review to assess the status of the various species and habitats, together with the methodologies used in the assessment are detailed in text.

The review identified some limitations in the availability of data and in particular, the differences in the quantity and quality of data between mega and microfauna, for instance between waterfowl and micro-moths, although even for waterfowl, which are regularly surveyed, the absence of a year-on-year low water dataset was noted as a potential issue for future management to address.



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# 1. Introduction

The Humber Estuary, at over 30,551 hectares is the largest British macro-tidal coastal plain estuary on the North Sea, and is one of the finest examples of an estuary of its type. Its ornithological value is demonstrated by its ranking as one of the top six sites in the UK for its waterfowl population and the estuarine system features a number of inter- and sub-tidal habitats, saline and freshwater lagoons, and reedbeds. There are records of over 80 species of fish in the estuary, including both sea and river lamprey, and Donna Nook on the south bank is home to an expanding breeding colony of grey seals. Adjacent inland sites also provide important feeding and roosting areas for waterfowl associated with the estuary.

The national, European and international importance of the Humber Estuary has long been recognised through statutory protection. At present the Humber Estuary has a total of ten Sites of Special Scientific Interest (SSSIs). In 1994 parts of the estuary were also designated as Phase 1 of the Humber Flats, Marshes, and Coast Special Protection Area (SPA) and Ramsar site. In August 2000 English Nature consulted owners, occupiers and other interested parties on extensions to four of the Humber SSSIs, as well as a Phase 2 potential SPA (pSPA) and proposed Ramsar (pRamsar) site and the selection of the Humber Estuary as a possible Special Area of Conservation (pSAC). Prior to the further progression of their designation proposals, English Nature has identified a need for a review of the national and international designations on the estuary under the auspices of the Humber Estuary Designations Project.

The major research element of this project has been carried out by the Institute of Estuarine and Coastal Studies (IECS) at the University of Hull on behalf of English Nature. The objective has been to collate and review all relevant data on the current features of the Humber SSSIs, SPA and Ramsar site (phase 1), pSPA and pRamsar site (phase 2) and pSAC, identifying where possible, key data sources as well as highlighting gaps in current data and understanding.

In carrying out this wide-ranging review, it has been necessary to contact a number of organisations and individuals in order to ascertain information on the current status of individual species. The time and effort of these groups and individuals in reviewing their data records, collating information and providing advice for the review is greatly appreciated.

In particular key individual contributors have included:

Michael Archer, Henry Arnold, Harry Beaumont, Johnny Birks, Dave Bromwich, Graham Catley, Steve Cham, Peter Cook, Mike Coverdale, Andrew Credland, Roy Crossley, Callan Duck, Ray Eades, Andrew Grayson, Lionel Grooby, Ian Higginson, Colin Howes, Emma MacDonald, Robert Marsh, Roger Morris, John Newbould, Brian Redman, Rob Lidstone-Scott, Alfred McGowan, John Shelly, Peter Short, Gavin Thomas, Jon Traill and John Walker.

Whilst we have also had a great deal of assistance from:

Brough Ornithological Group, Biological Records Centre (Centre for Ecology and Hydrology, Monkswood), Doncaster Museum, East Riding of Yorkshire Council, English Nature (Grantham, Peterborough, Wakefield and York offices), the Environment Agency (Leeds, Newcastle, Willerby and York offices), the

Lincolnshire Naturalists Union, the Lincolnshire Wildlife Trust, the RSPB Blacktoft Sands Nature Reserve, the Sea Mammal Research Unit, the Vincent Wildlife Trust, the Wildfowl and Wetlands Trust, the Yorkshire Naturalists Union and the Yorkshire Wildlife Trust.

## **2. Methodology**

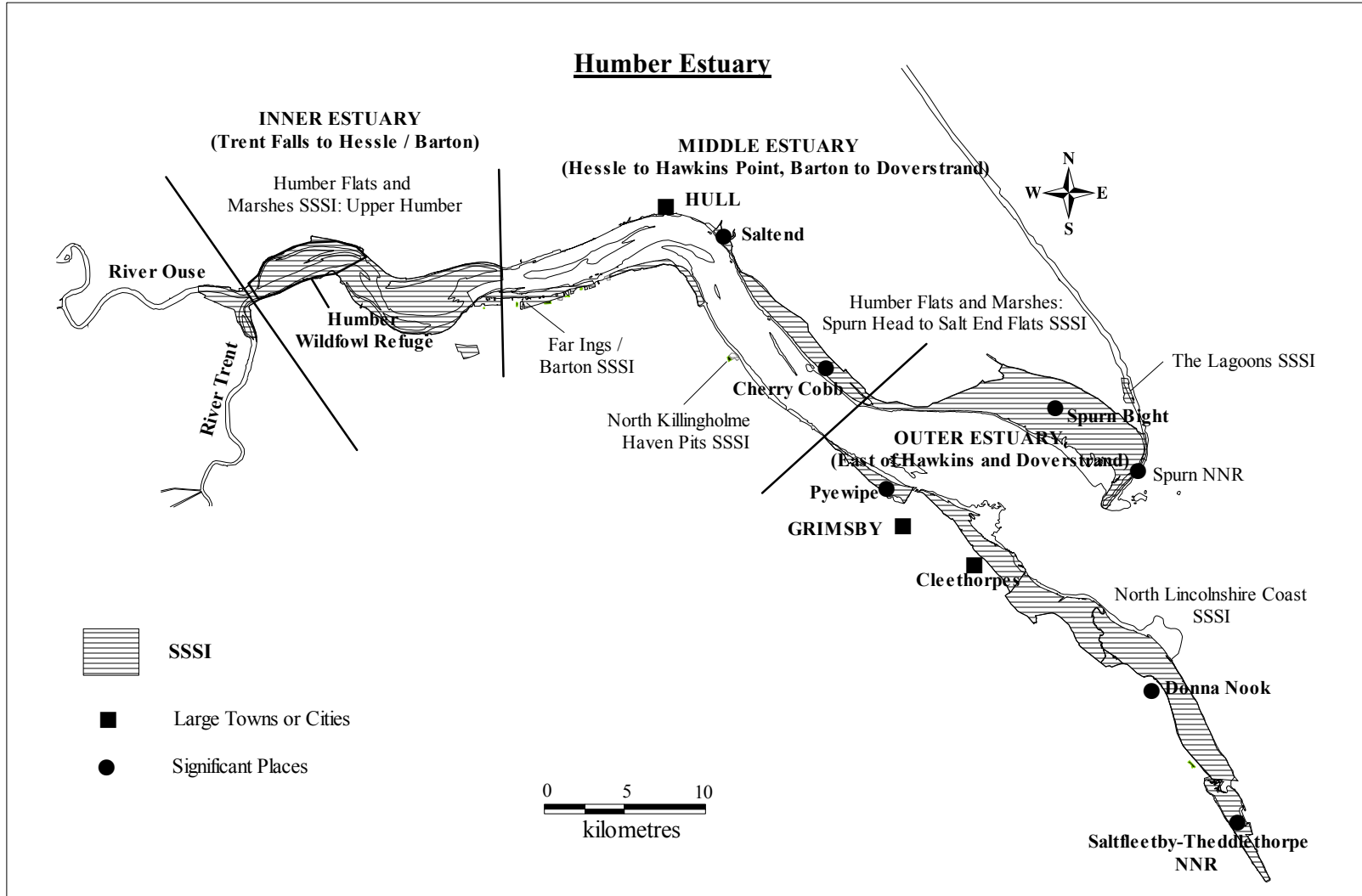
The review area comprised of the Humber Estuary and its tidal rivers to the limit of tidal intrusion and surrounding coasts from the Lagoons SSSI near Easington on the north bank of the estuary, to the Saltfleetby-Theddlethorpe Dunes SSSI on the south bank (Lincolnshire coast). The review area also included the sub-tidal component. A map of the review area can be seen on the following page (Figure 1).

Within this area, key species and habitats were selected either on the basis of their inclusion on original and renotified SSSI citations or significance to the relevant EU Directives etc; Habitats and Species Directive (92/43/EEC), Wild Birds Directive (79/409/EEC) and the Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat. A small number of additional species identified as potentially nationally important were also included.

### **Overview**

By necessity, the collation and assessment methodology varied considerably depending on the type and distribution of the interest feature. Data used for the project also varied widely in both quality and quantity due to availability constraints (see limitations section). For many of the bird species there were certain key data sets e.g. the Wetland Bird Survey (WeBS) core counts and the Low Water Counts Initiative, which were thought to be both reliable and most current, whilst for flora, recent NVC work carried out by Bullens Consultants and Tom Dargie were most suitable key sources. For fish species and marine invertebrates, data from the Environment Agency and CEFAS monitoring schemes were employed.

However, for most of the terrestrial invertebrates such comprehensive datasets (both temporal and spatial components) were not readily available, and both published and unpublished records from the LNU and YNU proved to be the most comprehensive data sources. These data were therefore used in combination with personal communication from key individual recorders in order to gain an indication of current status and distribution. Mammal records were generally collated from a variety of local sources in a similar manner, whilst data for the complex habitat features were generally drawn from the relevant sources used for the individual species assessments.



**Figure 1** Location map of the Humber Estuary and its related tidal rivers

## Assessment methods

**Mammalia:** Key texts were used as much as possible in the collation and assessment. Data was received from the Vincent Wildlife Trust and Colin Howes at Doncaster Museum for water voles, and SMRU and Lincolnshire Wildlife Trust for the two species of seal. Key individuals were consulted throughout the review.

**Avifauna:** The avifaunal component of the review has drawn heavily on data derived from the WeBS Core Count survey scheme (WWT, BTO, RSPB, JNCC), and the English Nature Humber Low Tide Count Initiative (Catley 2000). The WeBS scheme provides sectoral based data for the north and south bank of the estuary, as part of a co-ordinated national counting scheme, with over 20 years of data available. Figure 2 shows the Humber Estuary sectors and sub sectors as used in the WeBS core counts. Counts are conducted around high water on all estuaries and key wetland sites in the UK on a set Sunday each month, although there is scope for individual estuaries to be surveyed on a different date to the core date if conditions are unsuitable. As the counts are undertaken around high water, they are able to ensure a relative accuracy of counting, as waterfowl are relatively close to the estuary banks, but the draw back of this method is that the importance of low and mid shore sites for feeding is not necessarily covered, as flocks may be forced out of key feeding areas onto high water roosts.

Therefore, in order to gain a more accurate assessment of low water activity, the English Nature low water count data were also employed. Although this programme utilised a broadly similar methodology to the WeBS, but over the low water period, to date only one full year of data have been produced (1998/1999), and as such although producing more accurate figures on usage, the data do not have the temporal accuracy of the WeBS. In order to offset this factor to some degree, the Eco Surveys low water count data for the south bank from 1989/90 and the Tasker & Milsom low water data for the north bank from 1979 were also used in the assessment (Tasker & Milsom 1979; Eco Surveys 1991).

Additional published data was also used where available, for instance RSPB Blacktoft Sands Reserve reports and the Spurn Heritage Coast little tern reports, whilst data from various IECS reports were also used, in particular the baseline assessments for the north and south bank tidal defences (IECS 1993a & 1993b). Unpublished data was also employed where necessary, including personal communications from ornithologists around the estuary and personal observations by the authors of the avian component of the review, who have extensive experience of ornithological field survey on the Humber.

As well as the absence of long-term comprehensive low water data, a general paucity of breeding bird data was identified for the majority of the estuary and species, with exceptions for key sites such as Blacktoft and Far Ings and for species such as avocet, marsh harrier and bearded tit. A co-ordinated breeding bird census of the estuarine margins is therefore suggested as being an important management and assessment tool for the future, as well as a follow-up low water waterfowl survey programme.

For waterfowl components of the data review, 5 year mean annual peak maxima were employed where available. In most cases such data were available for species at the estuary and UK population levels, via the WeBS (Pollit *et al* 2003), and the most recent available 5 year period (1996/7 to 2000/1) was used, unless otherwise stated. Where this information was not available, the data used are described in the text. Biogeographic population estimates

are predominantly derived from Wetlands International (2002). National population thresholds for winter have generally been taken from Kershaw and Cranswick 2003 (wildfowl and selected waterbirds) and Rehfish *et al.*, 2003 (waders). These papers contain the figures expected to be adopted by the Avian Population Estimates Panel as part of their comprehensive review of avian national population thresholds, due for publication later this year (Helen Baker, JNCC, pers comm. 2003). National population thresholds for passage are those published in the annual WeBS report (Pollit *et al.*, 2003), unless otherwise stated.

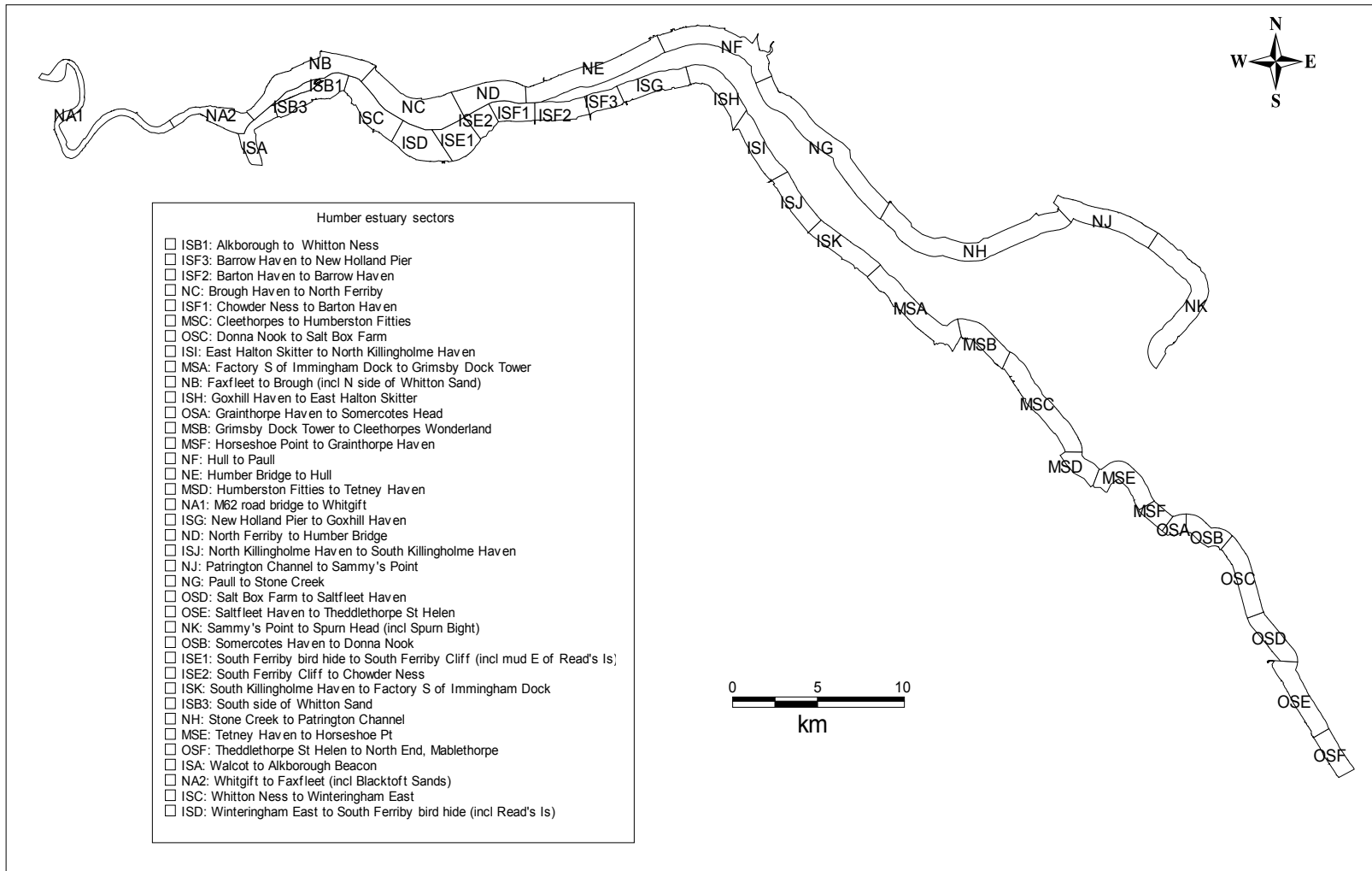
At a sectoral level, the WeBS data have also been employed, where possible using the most recent available 5 year mean annual peak maxima. However, in some instances a 5 year run of data has not been available and it has been necessary to use a minimum of 2 years, where this has been the case it is stated in text. Where specific one-off data have been used, for instance for a site or species not covered by WeBS, or an area which is a sub-division of the WeBS sector, then this has been indicated with the relevant data source.

Where applicable, attempts have been made to provide values and importance levels for different species activities at a Humber level - i.e. wintering, passage and breeding. However as already noted, there are no estuary-wide data for breeding usage, which has meant that assessments can only be made of breeding importance for species that are generally restricted to sites or habitats which are routinely (or even occasionally) surveyed for breeding use, such as bearded tit, marsh harrier and avocet. It has not been possible to quantify or assess the populations of breeding waterfowl such as redshank, oystercatcher or mallard although these species are known to breed in the estuary.

For some species of wader there are clear passage periods (outside the main wintering period), and for these it has been possible to extract WeBS data at both a national and a local level in order to derive an assessment of passage usage, and wader data has then been split where possible into winter, passage and breeding periods. However, for a number of species, although a passage population can be determined at a local level, it has not been possible to identify the associated national population (or *vice versa*), and in these instances, the absence of comparison data is indicated by 'insufficient data'. For wildfowl, although some degree of migration may be undertaken by some species, the timing or extent of these movements is unclear within the context of the Humber, and so this component has been identified as 'not applicable'.

The assessment periods used in this document follow those of WeBS. For waders, the winter period is classed as November to March inclusive, with spring passage covering the April to June period inclusive and autumn passage from July to October inclusive. No set period is set for breeding, and for this review, data are used where evidential. For wildfowl the 'wintering' period runs from September to March inclusive, with again no set period for breeding and data are therefore used where evidential. It should be noted that the figures for wildfowl presented in the annual WeBS report (Pollit *et al.*, 2003) are based on a full year's count. Those presented for wintering wildfowl in this report are based only on counts for the winter months (September to March inclusive) derived from the raw data. . In addition, in a few cases (eg; wintering pochard) the figures presented within this report are higher than those in the 2000/01 WeBS report (Pollitt *et al.*, 2003). This is the result of the absence of figures for the North Killingholme Haven Pits WeBS count sector from the calculation of Humber totals in the WeBS report.

(WeBS data were supplied by the Wetland Bird Survey (WeBS), a joint scheme of the British Trust for Ornithology, The Wildfowl and Wetlands Trust, Royal Society for the Protection of Birds and Joint Nature Conservation Committee (the last on behalf of the Countryside Council for Wales, Department of the Environment Northern Island, English Nature and Scottish Natural Heritage).



**Figure 2** Humber Estuary sectors and sub sectors as used in the WeBS core counts



**Amphibians and Reptiles:** Key texts were used for all of the amphibian and reptile species and additional data were provided by Henry Arnold of the Biological Records Centre at the Centre for Ecology and Hydrology, Monkswood.

**Fish:** Key primary data sources were from the Environment Agency's 'Database and atlas of freshwater fishes in the UK' (Davies *et al* 2002) as well as work carried out by IECS on power station fish impingement at sites in the middle Humber Estuary. CEFAS data were also reviewed, but was found not to cover the species included in the Humber data review. In addition, there has been personal communication with the Environment Agency's Fisheries Officers and Giles Bartlett of the North Eastern Sea Fisheries Committee, and general texts on fish ecology such as Whitehead *et al* (1989) and Wheeler (1969) have also been used.

**Marine Invertebrates:** Much of the assessment has drawn from data derived from the Environment Agency's Quinquennial Monitoring Programme (1980-1995) as well as data from their Routine Monitoring Stations. In addition, key texts have included a series of the Environment Agency's Water Quality Reports for the Humber with historical data from the Humber Estuary Committee (1982), covering the period 1961-1981, the NRA hovercraft surveys and Barnett (1984).

Additional information has been derived from the Marine Nature Conservation Review (MNCR) database, and any raw data obtained has been analysed using the statistical software PRIMER to help refine community types using cluster analysis and to assess habitat diversity where necessary.

**Terrestrial and Freshwater Invertebrates:** Given the breadth of the group and the specialist identification and recording issues, the data has been drawn from a number of sources, largely amongst the community of amateur entomologists that are the main contributors to conservation data. The data has been submitted via the County Recorders for Lincolnshire and Yorkshire respectively, and include records previously trawled as part of the Development of the Invertebrate Site Register by the Nature Conservancy Council in the 1980's. Part of this data has been collated and compiled by Roger Morris of English Nature for use in the review. In addition, both the Lincolnshire Naturalists Union and the Yorkshire Naturalists Union were contacted directly, with requests for appropriate data from relevant county recorders organised through a single point of contact. Data from both Unions were considered to be of particular importance for this group of species, as in most cases they represented the most comprehensive and up to date spatial and abundance data available for the species in the region.

For the Lepidoptera component, data were gathered from a series of key texts, with Beaumont (2002), Spence (1991) and Sutton & Beaumont (1989) being used for the north bank and Johnson (1996) for the south bank. In addition to scientific and common names (following Bradley 2000), the Bradley and Fletcher number is given, in order to allow ease of cross-reference. Personal communication was also undertaken with entomologists, including those trapping and recording moths around the estuary, as well as records from the authors own trapping records.

**Flora:** The assessment of the floral assemblage and relative species abundance around the estuary has drawn heavily on the NVC surveys undertaken by Bullen Consultants in 2001 (Humber margins) and Dr Tom Dargie (Lincolnshire coast) in 2001 (Dargie 2002a & 2002b),

with area assessments made from these data. In addition, for individual species, key references included Crackles (1990), Stewart *et al* (1994), and Preston *et al* (2002), in conjunction with personal communication from P. Cook (Recorder VC61). Advice was also sought from Simon Leach, English Nature's botanical advisor.

## Limitations

The project has highlighted several gaps in data availability. The main problems occurred when reviewing the rarest and most restricted species and the reasons for this were thought to be largely attributable to the increased recorder effort required to locate and identify these species. In particular, there appears to be a discrepancy in the level of data recording between mega and microfauna, for instance between birds and micromoths, with in general a relatively complete dataset for waterfowl and occasional (not even annual) surveys for a small selection of sites along the coast for microlepidoptera.

The paucity of data for some groups (in particular insects) means that some records included in the study are not current and the presence of these species at various sites cannot be confirmed. Old invertebrate records have been included however, as they are indicative of the various assemblages, and a substantial proportion may be re-discovered given sufficient survey effort. In addition, the data used in this review largely reflects the intensity of recording and as a consequence the full range and variation of some groups cannot be defined.

Even for waterfowl, which are regularly surveyed, the absence of a year-on-year low water dataset means that high water data have had to be used in most cases to derive mean usage, with only single year data on low water feeding distribution available except on a few individual sites. However the most obvious absence of data for avifauna relates to breeding distribution on the estuary, with only a few key sites (predominantly nature reserves) having any data.

Where specific shortfalls have been identified these are highlighted in the text for the relevant features.

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### 3. Mammalia

#### Water vole *Arvicola terrestris*

**Key Sites:** Throughout the Humber Estuary and Lincolnshire coast.

#### Summary Status:

- Wildlife and Countryside Act: Schedule 5.
- Habitats Directive: not listed.
- Berne Convention: not listed.
- Red Data Book: not listed.
- Breeding Status in the Humber: Breeding.
- Planning Policy Guidance on Nature Conservation (PPG 9).

#### Description

The water vole *Arvicola terrestris* is found throughout lowland Britain along the banks of well vegetated water bodies such as rivers, streams, canals, lakes and ponds where it dives and swims with ease. Water voles tend to consume the coarser vegetative plant tissues rather than high energy fruits and seeds, and therefore avoid direct competition with other rodents (Strachan & Jeffries 1993).

This species is the largest of the British voles weighing between 200-350g (with males in general being slightly larger than females). They are often mistaken for the brown rat *Rattus norvegicus* which are similar in appearance and are also excellent swimmers. However, the water voles are distinguishable by a blunt muzzle and smaller rounded ears. Additionally, water voles are generally smaller than the brown rat and have a longer and well furred tail (Strachan 1998).

Water voles live in colonies, but will space themselves along a watercourse through a series of contiguous territories. These are established by the breeding females and frequent interactions between individuals determine social status. Low ranking females and juveniles are excluded from holding territories. Overall population density, season and habitat quality determines the length of territory range which varies from 30-150m for females, and 60-300m for males (with the latter larger sizes occurring when the population density is low and the habitat is poor) (Strachan 1998). Water voles become less territorial outside the breeding season.

#### Distribution within the Humber

The higher reaches of the Humber Estuary catchment are still thought to have a reasonable water vole population and water voles have been recently recorded on Holderness Drain outside Hull city boundary and on Old Fleet Drain (Marshall 2002). However, water vole records from the estuary and surrounding coast have been quite scarce, especially in recent years.

The inclusion of the water vole as a National Biodiversity Action Plan species has caused Planning Authorities, National Park Authorities, the Environment Agency, and British Waterways to commission data searches and field surveys to form the basis of appropriate riparian management policies (Howes 2001). The majority of work is being undertaken by commercial ecological contractors operating for developers in the context of ‘Environmental Impact Assessments’. Unfortunately, data from these numerous sources tends to be held by the respective clients and in general, is not placed in the public domain (Howes 2001).

Table 1 shows water vole records for the Humber region compiled from field data supplied by the Yorkshire Naturalists Union (C. Howes pers. comm. 2002); the Vincent Wildlife Trust, survey results 1996-1998 (J. Birks pers. comm. 2002), and the Wildlife Trusts survey for 1995-2002 (J. Birks pers. comm. 2002). Single records are also included from the Institute of Estuarine & Coastal Studies (L. Mander pers. comm. 2002 & N.D. Cutts pers. comm. 2002), Lincolnshire Wildlife Trust (L. Grooby pers. comm. 2002) and English Nature (R. Waters pers. comm. 2002).

**Table 1** Distribution of water voles within the Humber region.

Date	Locality	Grid Ref.	Notes	Source
24.05.1972	Welwick	TA/31	1 in ditch close to Humber foreshore	E.H. Wear D.B. Cutts
1973	Skeffling	TA/3718	Sightings in drains	E.H. Wear
09.04.1973	Spurn	TA/4016	1 seen	M. Limbert
09.04.1973	Kilnsea	TA/4016	In ditches	E.H. Wear
26.08.1973	Weeton Foreshore	TA/3518		E.H. Wear
01.09.1973	Welwick Foreshore	TA/3419		E.H. Wear
1974	Blacktoft Sands RSPB reserve	SE/8423	Has colonised new lagoons with many sightings throughout the year	A. Grieve
02.02.1974	Howdendyke	SE/7428		A. Shaw
02.02.1974	Saltmarshe Delph	SE/7724		A. Shaw
22.11.1974	Saltmarshe Delph	SE/7724		P. Kendall
Throughout 1979	Blacktoft Sands	SE/8423		S. Halliday
16.04.1979	Saltmarshe Delph	SE/7824	Seen	S. Halliday
21.04.1979	Swinefleet Common	SE/7717	3 seen	S. Halliday
01.05.1979	Swinefleet Drain	SE/7717	1 seen	S. Halliday
17.05.1986	Paull Battery	TA/1624		S.M. Lister
13.07.1986	Stone Creek	TA/2319		SHCS
17.05.1987	Thorngumbald Drain	TA/1725		S.M. Lister
14.10.1998	Hedon Haven, upstream of Paull Road Bridge/Pollard Clough	TA/173228		East Riding of Yorkshire Council (ERYC)
17.05.1999	Winestead Drain, Patrington Haven	TA/304205	Possible	East Riding of Yorkshire Council (ERYC)

Date	Locality	Grid Ref.	Notes	Source
17.05.1999	Burstwick Drain, Hedon Haven	TA/172279	Burrows	East Riding of Yorkshire Council (ERYC)
05.10.1999	Burstwick Drain, Hedon Haven	TA/172279	Possible water vole signs	East Riding of Yorkshire Council (ERYC)
-.08.1999	Hedon Haven - between Paull road and the tidal sluice	TA/170279	26 latrines	East Riding of Yorkshire Council (ERYC)
-.08.1999	Thorngumbald road, south side of the Drain	TA/177255	Possible	East Riding of Yorkshire Council (ERYC)
-.08.1999	Thorngumbald Drain, northern half of the drain	TA/171251	Runs	East Riding of Yorkshire Council (ERYC)
-.08.1999	Pasture Drain, south part of the Thorngumbald Drain	TA/171251		East Riding of Yorkshire Council (ERYC)
1996-1998		TA/200000	Water vole present within 10km <sup>2</sup>	Vincent Wildlife Trust
1996-1998		TA/200100	Water vole present within 10km <sup>2</sup>	Vincent Wildlife Trust
1996-1998		TA/300000	Water vole present within 10km <sup>2</sup>	Vincent Wildlife Trust
1996-1998		TA/300100	Water vole present within 10km <sup>2</sup>	Vincent Wildlife Trust
1996-1998		TF/400900	Water vole present within 10km <sup>2</sup>	Vincent Wildlife Trust
1995-2002		SE/700200	Water vole present within 10km <sup>2</sup>	Wildlife Trusts
1995-2002		SE/800200	Water vole present within 10km <sup>2</sup>	Wildlife Trusts
1995-2002		TA/100200	Water vole present within 10km <sup>2</sup>	Wildlife Trusts
1995-2002		TA/200200	Water vole present within 10km <sup>2</sup>	Wildlife Trusts
1999-2000	Thorngumbald Borrow Pit	TA/517425	Regular sightings of up to two individuals	N.D. Cutts, IECS
2001	Thorngumbald Borrow Pit	TA/517425	Single water vole sighted	L. Mander, IECS
2002	Winestead Drain	TA/532420	Single water vole sighted	L. Mander, IECS
2002	Far Ings			L. Grooby
2002	Waters Edge, South Bank of Humber Estuary.			R. Waters, EN

What seems to emerge from the records held is that due to the size of the area and the efforts of field workers often being restricted to the naturalists' 'home ranges' or favourite 'territories', the monitoring generally appears uneven and inconsistent (Howes 2001).

## Seasonality

In general, water voles live for two to three years and breed from late March until early October. During this time they may have up to five litters, each containing up to six young. Weaning occurs around 14 days after birth and the young subsequently leave the nest when the mother has her next litter, approximately 10 days later. Sexual maturity is rapidly reached, although in Britain, it is unusual for the juveniles to reproduce in the summer of their birth (Boyce 1996).

During the winter months they become less active and stay close to their burrows. However, they do not hibernate.

## Historical changes and trends

The British water vole population declined throughout the 20<sup>th</sup> Century due to habitat destruction and change with intensification of agriculture. This decline has accelerated in recent years due to predation by feral American mink (Marshall 2002).

Two national surveys carried out by the Vincent Wildlife Trust in 1989-90 and 1996-1998 have shown that this decline has developed into a serious population 'crash' with a further loss of 67.5% of the occupied sites and 88% of the remaining population in only 7 years. This population loss has been most severe in the north and south-west of England, reaching over 97% of the population in Yorkshire (Marshall 2002).

However, in Lincolnshire, populations appear to be stabilising and may possibly be on the increase (Farrow & Wright 2000). These populations are significant to the sustainability of the water vole nationally as, despite the national trend, they are widespread throughout the county. This status may however be relatively fragile as a decline was seen approximately 10 years ago (Farrow & Wright 2000). From surveys conducted in other areas of the country, it has been found that water vole colonies can be lost very quickly (Farrow & Wright 2000).

Changes in both land-use and riparian habitat management have resulted in habitat loss and degradation, causing fragmentation and isolation of water vole populations. This has increased their vulnerability, especially to predation by American mink *Mustela vison* (Strachan 1998).

## Conservation status

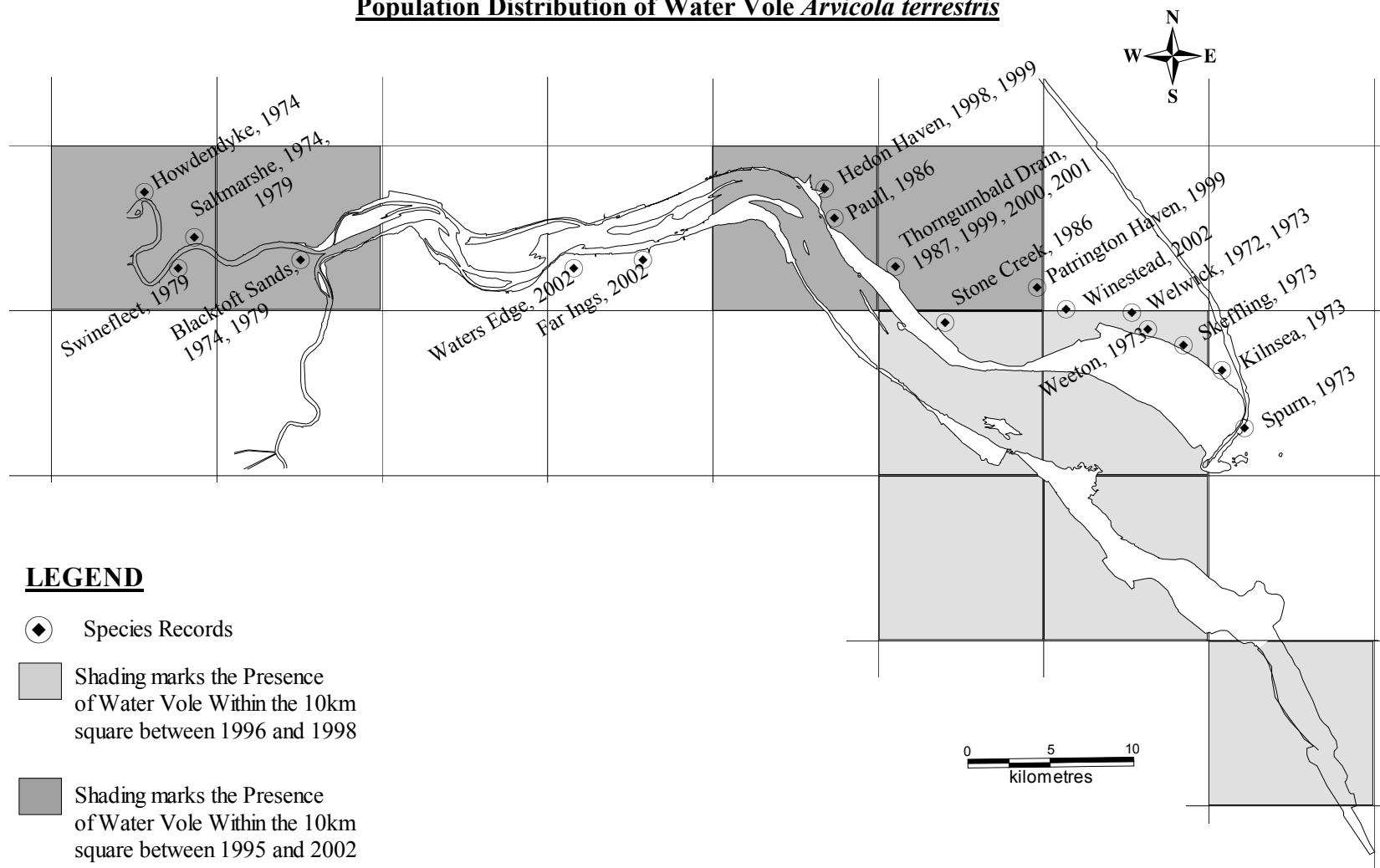
Since the waters and low wetlands associated with the Ouse/Trent/Humber and Rhineland river systems were contiguous during the Holocene when the North Sea was some 20 metres below its current level, it is likely that water voles colonised the Yorkshire and Humber region from the Rhineland before the land bridge between the east coast of the UK and the 'low countries' of the continent finally became inundated. This could suggest a genetic affinity with northern European and Scandinavian populations rather than populations which may have moved up mainland Britain from the South (Howes 2001). Although this has not yet been confirmed, work currently being undertaken on the mitochondrial DNA of water vole populations around the British Isles and the adjacent continent may in the future be able



to validate this theory (Howes 2001). If the theory is proved, the value of the Humber water voles will certainly increase with respect to their conservation.

The sudden decline in numbers of the water vole has resulted in protection of the species under Schedule 5, of the Wildlife and Countryside Act 1981 (as amended). This legislation prevents intentional activities that damage, destroy, or obstruct access to any structure or place which they use for shelter or protection. It also prevents the intentional disturbance of water voles whilst in occupation of these places. However, this legislation does not protect the water voles themselves. Planning Policy Guidance on Nature Conservation (PPG 9) covers water voles and other protected species. The planning authorities should take appropriate action to check for the presence of such species and ensure they are protected through the planning process (Marshall 2002).

**Population Distribution of Water Vole *Arvicola terrestris***



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## Common seal *Phoca vitulina*

**Key Sites:** Donna Nook (TA430010).

### Summary Status:

- Wildlife and Countryside Act: not listed.
- Habitats Directive: Annex II.
- Berne Convention: not listed.
- Red Data Book: not listed.
- Breeding Status in the Humber: Possibly breeds at Donna Nook.
- Conservation of Seals (England) Order 1999 No. 3052.

### Description

The common seal *Phoca vitulina* (also known as the harbour seal) is the smaller of the two resident species of seal in the UK, with males weighing up to 130kg and measuring up to approximately 1.85m in length. Females tend to be shorter in length (up to 1.75m) and lighter (up to 106kg). The colour of the common seal is generally grey to sandy-brown with small and numerous spots, sometimes forming a network composed of small rings. Their heads are small in relation to their body size and their nostrils are closely adjacent and v-shaped (Bonner & Thompson 1996).

Common seals are predominantly opportunistic fish feeders taking a variety of species that are locally abundant including sand eels *Anguilla anguilla*, whiting *Merlangius merlangus*, herring *Clupea harengus* and sprat *Sprattus sprattus*, and flatfish (order Pleuronectiformes), together with invertebrates such as cephalopods (including octopus and squid), gastropods and crustaceans (Davies 2001).

### Distribution within the Humber

The main haul out site, which is used throughout the year is Donna Nook on the Lincolnshire coast. At Donna Nook on the 4<sup>th</sup> August 2000 (during moult), 435 common seals were counted by fixed-wing aerial counts conducted by the Sea Mammal Research Unit (SMRU) (Duck & Thompson 2001).

Although in general, movements are considered 'local' compared with grey seals (Davies 2001), they are strongly influenced by local food availability, and so may move regularly from these inshore areas to more open waters, travelling up to 50km between haul-out and feeding areas (Bonner & Thompson 1996).

### Seasonality

Common seals have been known to be present in the Yorkshire and Lincolnshire coastal waters and the Humber Estuary all year round although they follow a pattern of occurrence which seems closely linked with the annual breeding cycle. Delany (1985) noted that the numbers of adults, which appear to reach a maximum in January, slowly decline until almost absent during May and June, an absence corresponding with peak numbers at the breeding

sites in the Wash. There is no recent distribution data available for this species throughout these waters but it is expected that Delany's (1985) description is still valid. Delany (1985) also noted a sudden but brief increase in numbers during August which corresponds closely with pup dispersal from colonies in the Wash.

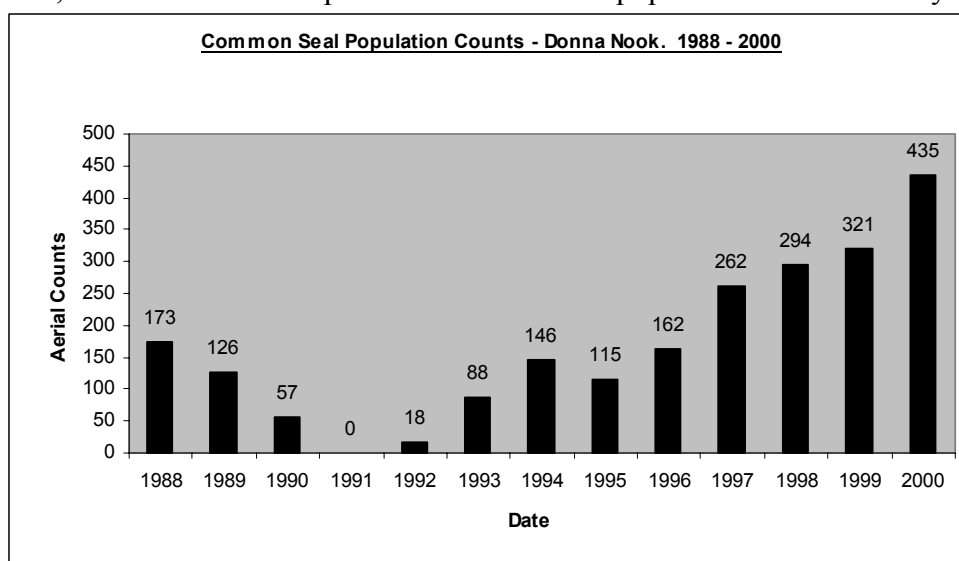
Adult females bear a single pup in June or early July. Pups are born with their adult coat and can swim from birth. They are weaned after approximately four to five weeks and normally leave the beach by late July at most colonies (Davies 2001), after which the mothers are available for mating.

Although it is generally thought that all Lincolnshire common seals breed in the Wash, it is also possible that a small number of common seals may breed at Donna Nook (Lidstone-Scott pers. comm. 2002).

Common seals moult between the beginning of August and the middle of September and haul out on land regularly throughout the year.

### Historical changes and trends

From the fixed-wing aerial surveys conducted by the Sea Mammal Research Unit (SMRU), the common seal population at Donna Nook appears to be steadily increasing since its recovery from the outbreak of phocine distemper in the late 1980's. It should be noted that this count is less accurate than that of the grey seals where ground counts of pups are conducted during the pupping season. This is because they are more widely dispersed, and do not form distinct breeding aggregations as do grey seals. In addition, pups are precocious, frequently swimming with their mothers within a few hours of birth. It is therefore too difficult to monitor pup numbers, so instead the population is surveyed during their annual moult, in the last few days of July and the first three weeks of August. It is thought that during this time the greatest and most consistent numbers of seals are hauled out. Strict conditions are applied to the timing of surveys, taking into account the state of the tide, time of day and climatic conditions (Duck *et al* 2002). Figure 3 shows the common seal population counts at Donna Nook, 1988-2000. This represents the minimum population size for each year.



**Figure 3** Common seal population counts at Donna Nook, 1988-2000 (Duck & Thompson 2001). It is important to note that there was no data for 1991 rather than a nil count (Duck & Thompson 2001).

Animals in the Humber catchment suffered high mortality in the 1988 phocine distemper virus epizootic and populations throughout the east coast are thought to have reduced by about 50% (Davies 2001). Similarly, in August 2002, there was another outbreak of the virus although the full extent of this has yet to be determined.

### **Conservation status**

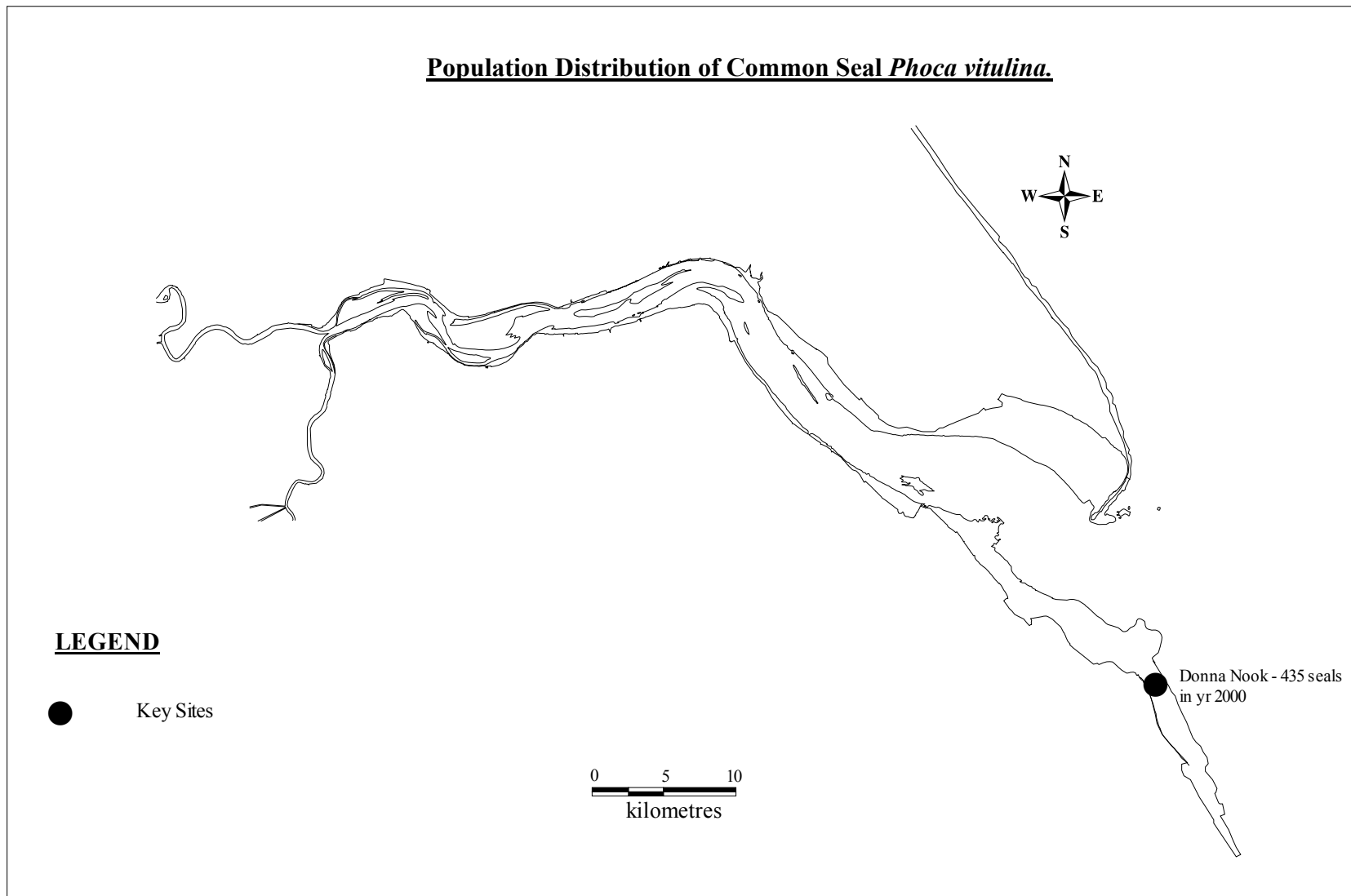
The UK holds approximately 5% of the world population of common seals, and approximately 50% of the EC population (Davies 2001).

The common seal is protected in Great Britain for a close season from 1<sup>st</sup> June to 31<sup>st</sup> August by the Conservation of Seals Act 1970, during which period seals can be killed only under licence or in the vicinity of fishing nets to protect catch (Bonner & Thompson 1996). The Act also allows seals to be fully protected when required and following the 1988 seal plague, common seals in England, Wales and Scotland were given year-round protection.

Currently, the 'Conservation of Seals (England) Order 1999 No. 3052' is in effect which provides further protection. This Order prohibits the killing, injuring or taking of common seals in the counties of England bordering the North Sea set out in article 3(a) of the Order and the adjacent territorial waters. The Humber Estuary area is included in this together with several of the surrounding stretches of coastline.

Common seals are less abundant in this region than grey seals but their British population is important in international terms. The common seal is listed in Annex II of the Habitats Directive.

**Population Distribution of Common Seal *Phoca vitulina*.**



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## **Grey seal *Halichoerus grypus***

**Key Sites:** Donna Nook NNR to Saltfleet Haven area.

### **Summary Status:**

- Wildlife and Countryside Act: not listed.
- Habitats Directive: Appendix II and V.
- Berne Convention: Appendix III.
- Red Data Book: not listed.
- Breeding Status in the Humber: Breeds at Donna Nook.
- Conservation of Seals (England) Order 1999 No. 3052.
- Donna Nook is the most southerly regular breeding site on the east coast.

### **Description**

The grey seal is the larger, more abundant of the two species found in British waters, with males reaching a length of up to 2.45m and weighing up to 310kg (Anderson 1996). Females are noticeably smaller and weigh up to 186kg and may grow to 2.2m in length. They have a variable coat colour, with spots which, when distinguishable are larger and less numerous than in the common seal. Both sexes have a distinctive elongated muzzle, although the 'Roman nose' is more characteristic of the males (Anderson 1996).

Grey seals are predominantly fish feeders and take a variety of species including sandeels *Anguilla anguilla*, gadoids, salmonids, and flatfish (order Pleuronectiformes), although cephalopod and crustacean invertebrates are occasionally consumed. Dietary composition varies seasonally and is linked to the availability of prey species (Davies 2001).

At birth, the pups are between 90 and 105cm in length and have a thick white natal coat, which is shed in the few weeks after birth and replaced by a second coat which nearly matches the adult coat (Bonner 1981). Once their natal coat is fully moulted they leave the beach to feed. A female gives birth to a single pup which is weaned after 16-21 days. Females come into oestrus towards the end of lactation when mating occurs. Females subsequently leave the breeding site soon after mating, and so there is no parental care for the pups post-weaning. Males usually stay on the beach for the entire breeding season in order to mate with as many females as possible (Davies 2001).

### **Distribution within the Humber**

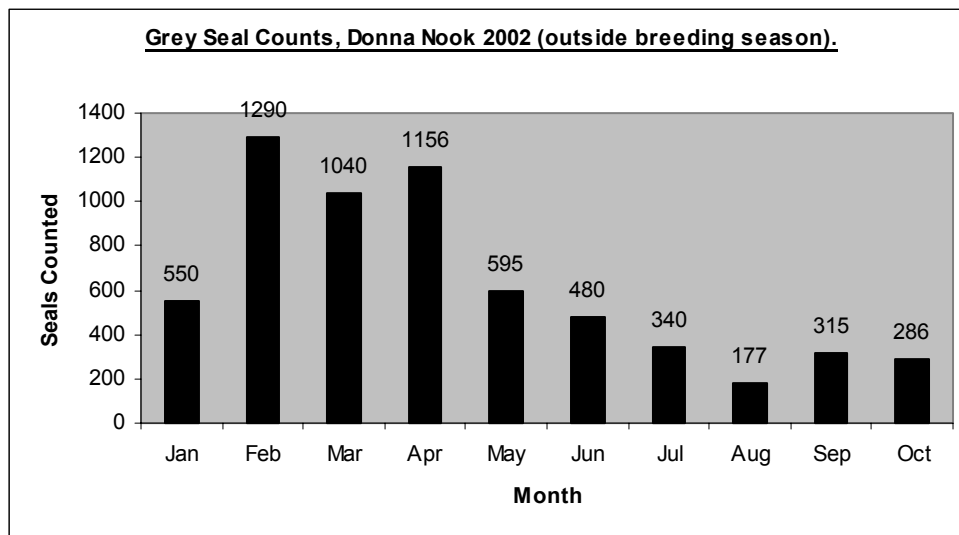
In general, grey seals have a coastal distribution, however, they are known to travel considerably long distances whilst feeding. Tagged studies have demonstrated that seals born locally have distributed throughout the North Sea although most feeding activity has been found to be within 50km of the haul out site (Davies 2001). Typical foraging trips last from 2 to 5 days. However, satellite telemetry studies show distinct aggregations of animals at offshore locations in the North Sea, often where the seabed comprises coarse sand and gravel (Davies 2001).

The main haul out site, which is used throughout the year by this species, is Donna Nook on the Lincolnshire coast. The Donna Nook population is thought to have originally been an overspill from the Farne Island breeding colonies, and small breeding groups began to establish at Donna Nook in the late 1960's when 10-15 pups were produced annually (Delany 1985). Here the seals are generally protected as the beach is owned privately by the MoD who have the authority to manage activities during the breeding season. The site is jointly managed by the Lincolnshire Wildlife Trust who employ a seasonal warden to help prevent disturbance of the seals.

### Seasonality

Grey seals remain off the surrounding coast throughout the year, where there is a distinct seasonal pattern of occurrence closely linked with the annual breeding cycle. The breeding season for this species varies considerably depending on the location of the haul out. In the Humber area there is only one haul out at Donna Nook which is consistently used for breeding which occurs once a year between October and December. A few seals have now started breeding on Skidbrooke ridge, south of Donna Nook (G. Weaver pers. comm. 2002; Lidstone-Scott pers. comm. 2002).

Grey seals disperse away from breeding sites once the season is over, presumably to feeding areas, but stay in the vicinity of the haul out site if rich resources are available nearby. In general, little is known about the behaviour of the grey seal outside the breeding season (Anderson 1996). A proportion of the grey seal population hauls out throughout the year across the Donna Nook to Saltfleet Haven area and can be seen on the beach particularly at low tide (Figure 4).

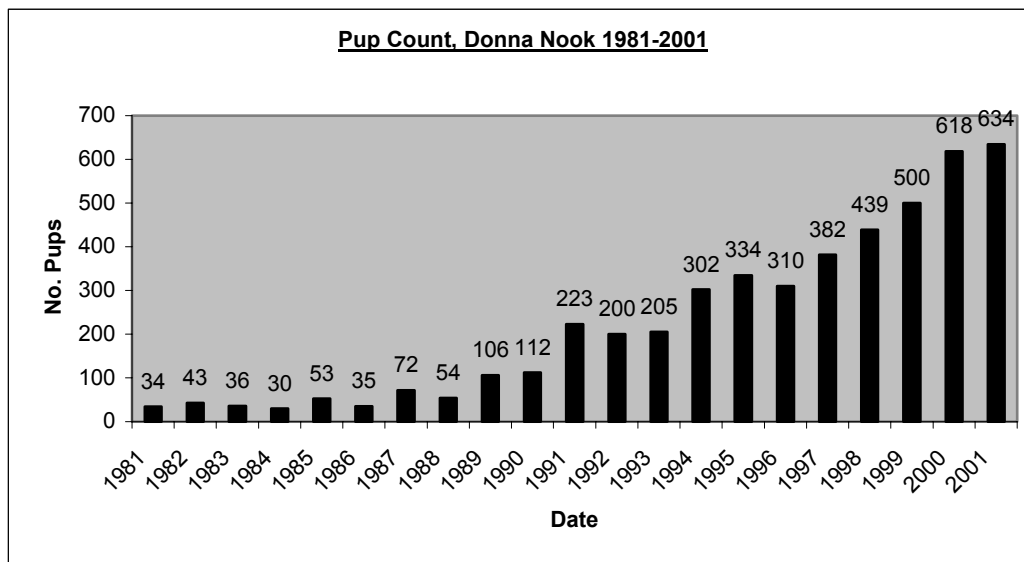


**Figure 4** Grey seal counts January - October, 2002 at Donna Nook (Lidstone-Scott pers. comm. 2002)

### Historical changes and trends

Approximately 1.8% of the British population of grey seal is found at Donna Nook. The British population was estimated as being 124,300 at the beginning of the 2000 pupping season (Duck & Hiby 2001).

The size of a grey seal population is difficult to accurately define as the only time they haul out and can be counted is during the breeding season. However, it is only the sexually mature males and the pregnant females which congregate and as such, a large part of assessing the population is ‘educated guess work’. Estimates of seal population size can be taken by counting the number of new pups each season and multiplying that number by 3.5 - a figure derived from the life table of the species (Lidstone-Scott 1997). The number of pups each year is therefore a good indication of the population size. Figure 5 illustrates the pup counts obtained by ground counts at Donna Nook showing rapid growth of the population.



**Figure 5** Grey seal pup counts at Donna Nook 1981-2001 (Lidstone-Scott 2001)  
 Although the population at Donna Nook continues to rise, the 2.5% increase in pup production in 2001 represents a much smaller increase than in previous years. The 5 year mean for 1996-2000 was a 16% increase (Lidstone-Scott 2001).

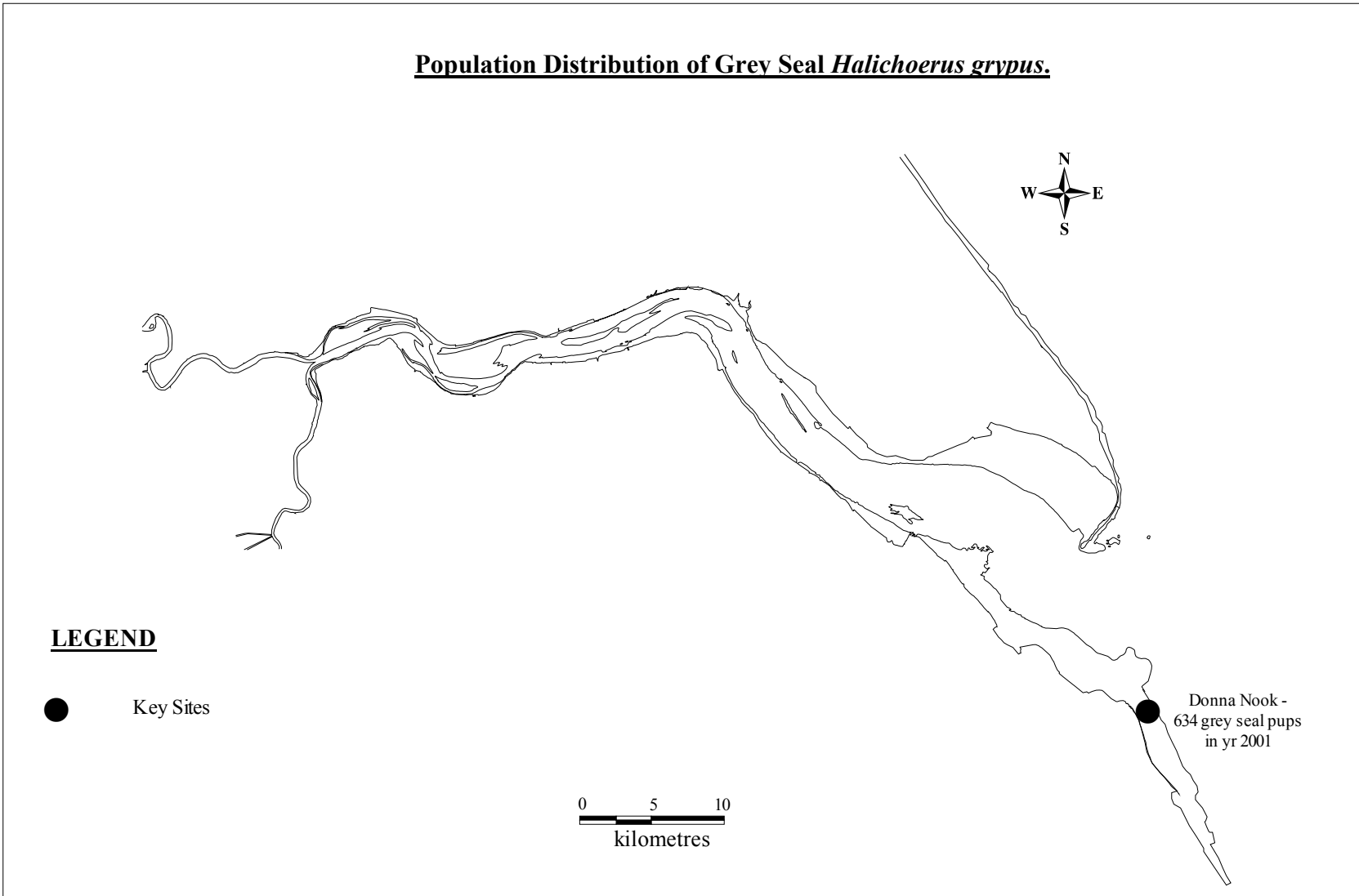
### Conservation status

Approximately 40% of the world population of grey seals breed at UK sites, which represents 95% of the EC population (Davies 2001).

The Conservation of Seals Act (1970) protects grey seals during a closed season from 1st September to 31st December, although seals causing damage at fish nets can still be killed. However, the law also allows complete protection to be given if necessary for example following the outbreak of phocine distemper in 1988. The grey seals in the Humber Estuary are legally protected by this legislation, although the ‘Conservation of Seals (England) Order 1999 No. 3052’ is currently in effect which provides further protection. This Order prohibits the killing, injuring or taking of grey seals in the counties of England bordering the North Sea set out in article 3(a) of the Order and the adjacent territorial waters. The Humber Estuary area is included in this together with several surrounding stretches of coastline.

Grey seals are listed in Annex II and V of the EU Habitats Directive and as an Appendix III species under the Berne Convention.

**Population Distribution of Grey Seal *Halichoerus grypus*.**



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