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JOINT NATURE CONSERVATION COMMITTEE

THE 2010 BIODIVERSITY TARGETS - DEFINITION, MEASURING PROGRESS AND IDENTIFYING SUCCESSOR TARGETS

Paper by Tasha Chick, Paul Rose and James Williams

1. Background

1.1 In June 2001, the EU Heads of State adopted the European 2010 biodiversity target at the Gothenburg Earth Summit; they agreed that '*biodiversity decline should be halted with the aim of reaching this objective by 2010*'.

1.2 In April 2002, at The Hague, the 188 Parties of the Convention on Biological Diversity made the 2010 biodiversity target a key mission to achieve their three objectives:

i. the conservation of biodiversity;

ii. the sustainable use of its components; and

iii. the fair and equitable sharing of benefits arising from genetic resources.

1.3 To this end the Parties agreed '*to achieve by 2010 a significant reduction of the current rate of biodiversity loss at the global, regional and national level as a contribution to poverty alleviation and to the benefit of all life on Earth*'.

1.4 Five months later the UN World Summit on Sustainable Development, held in Johannesburg, South Africa, identified the critical role of biodiversity and endorsed the 2010 target as agreed by the Convention on Biological Diversity.

1.5 In 2003, the Environment Ministers from 51 countries in the UNECE region (i.e. including the UK) adopted the Kiev Resolution on Biodiversity at the 'Environment for Europe' conference: Ministers agreed to '*reinforce our objective to halt the loss of biological diversity at all levels by the year 2010*'.

1.6 The European Commission in 2006 again reinforced the commitment, in the Biodiversity Communication 'Halting the loss of biodiversity by the year 2010 - and beyond', reconfirming '*to deliver the 2010 biodiversity target and put biodiversity on course to recovery*'.

1.7 The commitments are ambitious, more so for Europe than globally since the EU target is to halt the decline in biodiversity by 2010 while the CBD target is to achieve a significant reduction in the rate of decline by 2010. None of the targets are legally binding, but the UK Government has agreed to work to achieve them (in relation to both the UK and elsewhere) and they represent highly-significant policy drivers.

2. Interpretation of the targets

2.1 The Convention on Biological Diversity has defined biodiversity as '*the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems*'.

2.2 Given the complexity of the CBD definition, biodiversity is most commonly measured at three levels: ecosystems, species and genes. At each of these levels measures may represent one or more of the following:

i. variety (reflecting the number of different types);

ii. quantity (how much of one type);

iii. distribution (reflecting where that attribute is located);

iv. ecosystem services (the human benefits derived from ecosystem processes and products).

2.3 The concept of ecosystems creates difficulties for practical interpretation because of the lack of spatial or typological precision in the concept. The CBD work programmes are based at the biome level (e.g. agricultural biodiversity, forest biodiversity, coastal and marine biodiversity, montane biodiversity etc) but recognises that natural systems often comprise a combination of biological communities. For practical purposes, the ecosystem level of biodiversity may best be considered in terms of the different habitat types. If this solution is followed the issue then is which level of definition should be used e.g. i) biome, ii) broad habitat, iii) more narrowly-defined habitat?

2.4 Ecosystem services are not necessarily a separate component from either habitats or species but rather represent their utility to humans. However, some ecosystem services result from ecosystem processes (e.g. broadleaved woodland can maintain the fertility of porous or acid soils; erosion of soft coastal cliffs helps to maintain dune systems and salt marshes), and ecosystem processes can be said to represent an important separate element of biodiversity. However, there is currently no typology for ecosystem processes, nor is there, as yet, any system of

measures for gauging their status, though work is underway to try to address these gaps. Ecosystem processes, therefore, currently remain a potential component of biodiversity, but one of limited utility at the moment in terms of assessing progress towards the 2010 targets.

2.5 Definition of species provides fewer problems, although the concept can be difficult to apply to micro-organisms.

2.6 Identifying biodiversity at the genetic level creates many problems and could be considered to include sub-species, races, varieties, populations, and so on down to individual organisms. In practice, the concept has, to date, best been elaborated for sub-species and races of some wild animals and plants, and for varieties of some cultivated plants and livestock breeds.

2.7 'Loss of biodiversity' is not defined in the text of the Convention on Biological Diversity, and there has been some discussion about this term. Globally, it is agreed it is a concept that reaches beyond extinction, with spatial and temporal dimensions, covering:

i. decline in extents, condition or sustainable productivity of ecosystems;

ii. decline in abundance, distribution or sustainable use of populations, and species extinctions;

iii. genetic erosion.

2.8 In a general sense; 'loss of biodiversity' has been defined as '*the long-term reduction of abundance and distribution of species, ecosystems and genes, and the goods and services they provide*' (UNEP/CBD/SBSTTA/9/INF/9).

2.9 Taking account of the foregoing, a practical conclusion would be that, for the purpose of the 2010 targets, biodiversity should be considered at three (or four) levels:

i. the habitat level (the UK Broad Habitat or European Union Nature Information System (EUNIS) equivalent is suggested);

ii. [ecosystem processes - when/if sufficiently elaborated];

iii. the species level;

iv. the genetic level (initially at the level of sub-species, races and varieties);

and that each of these levels should be considered in terms of the key parameters:

i. extent/quantity;

ii. distribution;

iii. quality (for habitats);

iv. [functionality - for ecosystem processes when/if sufficiently elaborated].

2.10 The status of biodiversity is then equated to the status of each level against the relevant parameters at an agreed point in time. Loss of, or decline in, biodiversity is then seen as a reduction in one or more of these components between two time periods. Since the EU target is to halt the decline in biodiversity by 2010 (that is to slow the rate of decline from the time of the Gothenburg declaration in June 2001 to zero in 2010), it would be logical to assume that 2010 will come to represent a benchmark against which (the objective is that) there will be no further decline. A further point is that the benchmark level assumes that the habitat/species etc is viable as well as stable at the benchmark point (bearing in mind its need to survive normal environmental fluctuations and events). If this is not the case then halting the loss of biodiversity for that feature will involve restoration to a viable level.

3. Measuring progress towards the 2010 target

3.1 JNCC 07 N03 (updated version attached at Appendix 1) set out what the UK is currently capable of reporting in terms of the levels and parameters referred to in paragraph 2.9 above:

i. for Habitats, we are capable of reporting on extent of the Broad Habitats, we can give a fairly good indication of their distribution, and we can give some indication of their quality (in particular those more specific habitats listed on Annex 1 of the Habitats Directive);

ii. for ecosystem processes, we have little if any current reporting capability, though consideration is being given actively to this; e.g. the development of a Marine Trophic Index as a measure of a stable and diverse marine ecosystem, and also an indicator on habitat connectivity. Research in the area of ecological processes is beginning to deliver some results through programmes such as the Rural Economy and Land-Use Research Programme (RELU);

iii. as regards Species, only for the birds, some of the mammals, and some of the scarcer other species of plants and animals can we provide an assessment against the parameters of quantity and distribution listed in paragraph 2.9 above. We are not able to provide any assessment in relation to micro-organisms;

iv. at the Genetic level, we can provide some information in relation to a number of sub-species and some races of a relatively small number of wild animals and plants, and we expect to have the potential to report on the number of varieties and breeds of cultivated plants and livestock breeds using the UK biodiversity indicator for this which is currently under development.

3.2 The 5th meeting of the Convention on Biological Diversity's Subsidiary Body on Science Technical and Technological Advice considered that biodiversity indicators would serve as a tool for adequate measurement of biological diversity at local and national levels, for regional and global overviews of the status and trends of components of biodiversity, in the context of the ecosystem approach and the three objectives of the Convention.

3.3 The UK has developed a suite of 18 indicators to enable the UK to meet reporting commitments under the Convention on Biological Diversity. *Biodiversity Indicators in Your Pocke*t was published in June 2007. A list of the indicators is provided at Appendix 2. The 18 indicators set out in this publication select some key issues but do not attempt to cover, or integrate, all aspects of biodiversity into a single index. Not all the indicators selected are state indicators, some are response indicators (e.g. extent of protected areas, area of agri-environmental land, expenditure on conservation, amount of time spent by conservation volunteers), some are sustainability indicators (e.g. sustainable woodland management, sustainable fisheries), some are impact indicators (e.g. Spring index, ecological impacts of air pollution, river quality, invasive species) and some of the indicators are still under development. Of the indicators which have been developed, 4 are state indicators (one in two parts); also, the two sustainability indicators can be considered as proxy state indicators.

3.4 The marine environment is a particularly large gap in the current indicator framework. The paucity of marine surveillance information resulted in a relatively high level of the marine conservation status assessments under the Habitats Directive being reported as unknown. The Government is currently developing its UK Marine and Monitoring Strategy to address this problem.

3.5 Indicators are likely to provide an important tool for reporting progress against the European and CBD targets, not just for the UK but also for the Crown Dependencies and Overseas Territories, and for the other countries around the world.

3.6 The UK suite of indicators will be published again in 2008 and 2010 as a major contribution to assessing UK progress towards the 2010 target. However, the scope of the state indicators in the UK suite is quite limited (trends in wild birds, trends in butterflies, plant biodiversity, and UK BAP priority habitats and species). It is unknown to what extent these indicators are measures of biodiversity other than that which is actually being measured. While, therefore,

the UK's Biodiversity Indicators are a key reporting tool to achieve a better understanding of the UK's progress towards meeting the 2010 targets, a more comprehensive assessment is required at national level of the type set out in JNCC 07 N03. For many countries, however, such a more comprehensive assessment will not be a practical proposition.

3.7 An aspect which requires further attention is the need to understand the implications of observed trends better so that they can be interpreted properly. For example, an indicator could, by combining the data for a number of species, indicate that the group of species as a whole is stable, but this could hide the fact that some of the component species populations are increasing and some decreasing. Even in a stable environment we would expect some such dynamic among the species, but, at present, we do not have a stable environment benchmark to help us draw conclusions. In lieu of this, it will be necessary to look also at what is happening to the main components of an indicator, in order to interpret it reasonably accurately, as well as the indicator as a whole.

4. The target beyond 2010

4.1 JNCC 07 N03 indicated that many components of biodiversity were beginning to stabilise after the dramatic declines that had taken place between 1940 and 1990. For the UK at least, the CBD target of achieving a significant reduction in the current rate of biodiversity loss is likely to be achieved. Much more problematic is whether, in the little over three years remaining, the UK can halt the decline in biodiversity as required by the Gothenburg and Kiev targets. At the moment, the most likely result is that the UK will have gone a considerable way towards achieving this target but will not have achieved it fully. It is possible that a small number of European countries may be able to achieve the target, but it is to be expected that the majority will not. The issue then, for both Europe and globally, will be what should the successor target be?

4.2 The 2010 targets should be replaced by new, equally high profile and resonant, targets which should reflect, and not detract from, the efforts made by countries to achieve the present targets. The European Commission Communication *Halting the loss of Biodiversity by 2010 - and beyond* does not consider the post 2010 scenario in any detail. It does state that the objective should be to halt the loss of biodiversity by 2010 and achieve substantial recovery by 2013, but does not explain what it means by substantial recovery (to what, from what?). In fact, as regards the Gothenburg and Kiev targets, there is no particular reason to change the benchmark set by the 2010 target. Rather, the new target could be, by a defined future date (e.g. 2015), to maintain, or restore, biodiversity at, or to, its 2010 level, or to the level of permanent viability, whichever is the greater. Possibly, the milestone of substantially achieving this by 2013 could be included also, in recognition of the European Commission's Communication.

4.3 As regards the CBD target there is no similar (2010) benchmark since the CBD/WSSD targets refer to an unspecified reduction in the rate of decline. The main problem in setting a successor target will be to persuade many developing countries that they should stabilise biodiversity at much higher relative levels than that which *de facto* would be being applied to developed countries. A developing country might well be willing to stabilise habitat loss at the level of the 10-15% national coverage typical in many developed countries, but that would represent a huge loss in global biodiversity. Requiring a developing country to stabilise habitat coverage at, say, 50% of its national area would represent a very high biodiversity premium being accepted by that country.

4.4 However, a successor global target that was expressed simply in terms of further reducing the rate of decline, while it might be easy to negotiate, would simply accept that massive further losses to biodiversity would occur. A much better target would be one formulated along the lines of the Gothenburg and Kiev targets but with a more realistic timeframe, e.g. 'Halt the decline in biodiversity by 2020'. To stand a chance of being agreed by developing countries, such a revised target would need to be accompanied by effective incentive measures which recognised the value of the ecosystem services provided by natural habitats to the global human community but which could not be paid for through normal market measures.

4.5 Given that surveillance programmes in the UK are likely to have improved somewhat within the next 5-10 years, with better terrestrial habitat surveillance and improved marine surveillance, the UK's future ability to report against the levels and parameters set out in paragraph 2.7 is likely to be more comprehensive than is currently the case. However, for many countries, reporting may need to be confined to the more limited, original, set of national indicators defined through the CBD process.

APPENDIX 1 **JNCC 07 N03 (updated)**
June 2007

JOINT NATURE CONSERVATION COMMITTEE

ENVIRONMENTAL CHANGE REFLECTED IN THE STATE OF NATURE

Paper by Paul Rose

1. Introduction

1.1 In June 2005 Committee received a paper that attempted to report on the state of UK nature as a whole, by pooling the results of the many excellent reports that had hitherto been produced on the state of particular components of biodiversity. The paper endeavoured to provide an assessment of overall trends in some of the main components of UK biodiversity and to draw conclusions.

1.2 The June 2005 State of Nature paper to Committee was very much a work in progress, that was followed up in June 2006 by an event in London to jointly launch the idea of a UK Nature Barometer, its associated website, and the results of the first 6 year cycle of statutory site monitoring (Common Standards Monitoring). At this event JNCC showed updated information on the state of UK nature which was summarised for Committee in a presentation to their June 2006 meeting in Oxfordshire.

1.3 This paper is a further update to the state of UK nature that draws on new reports from surveillance and monitoring schemes and additional content within the wildlife statistics website. In addition, information has been taken from the substantial work, over the last twelve months, in association with one of the main drivers for this work mentioned in the June 2005 paper. This was the need to track progress against the Gothenburg target to halt the decline of biodiversity by 2010 through the production of UK biodiversity framework indicators. There has also been an enormous amount of useful work to collate information for the purpose of reporting on the favourable conservation status of species and habitats mentioned in the EU Habitats Directive but unfortunately this is not quite available yet.

1.4 Given one of the main purposes of this paper is to remind Committee of the state and changes to UK Nature, much of the text from the 2005 paper remains largely unchanged. Key changes to the status of species and habitats and new advances in knowledge have been clearly identified in each section and the conclusions and discussion have been re-emphasised accordingly.

2. Components of UK wildlife

2.1 The Convention on Biological Diversity recognises the following components of biodiversity:

i. Genes
ii. Species
iii. Habitats
iv. Ecosystem services

2.2 For the purpose of assessing the state of nature in the UK, it is useful to add protected areas to the list of biodiversity components, since they support a significant quota of the UK's biodiversity in terrestrial, freshwater and coastal areas.

2.3 In order to collate summary information on the state of nature, JNCC has drawn on the principal biodiversity surveillance schemes to which we have access, including Government schemes, schemes to which JNCC and/or the country agencies contribute, and schemes which are operated by JNCC or the agencies directly. This information base includes the Biological Records Centre and the data made available through the National Biodiversity Network. While there is enough data and information to make a reasonable interpretation of the state of species, habitats and protected areas in the UK, it is more difficult to make assessments of genes and ecosystem services. It is also much harder to estimate status and trends in the marine environment than in terrestrial, freshwater and coastal systems.

3. Genes

3.1 The Convention on Biological Diversity (CBD) has focussed mainly on genes in relation to crop strains and livestock breeds, but in the UK and elsewhere the role of genes within wild species and habitats, and as a conservation tool, is attracting increasing interest. In June 2005, it wasn't possible to report on the state of nature at the genetic level and this is still the case. It is however now possible to report on the high priority research needed due to a recent report from the Biodiversity Research Advisory Group (BRAG).

3.2 BRAG generally agreed that there are three main areas in which conservation has underlying genetic concerns:

i. the maintenance of the adaptive potential of species in the face of environmental change;

ii. avoiding the loss of genetic diversity;

iii. avoiding inbreeding and outbreeding depression.

3.3 In practice conservationists are currently concerned with:

i. identifying situations where genetic constraints limit population viability;

ii. learning whether species can be grouped meaningfully according to the level of genetic risk, in order to identify generic conservation policies;

iii. conserving habitats and processes to facilitate evolutionary responses to changing environmental conditions;

iv. potential conflicts between species and genetic conservation.

3.4 The report then identified a number of high priority research needs around the following themes:

i. managing genetic diversity *in situ* - to provide assessments of when genetic problems are likely to occur, and to obtain the necessary information to guide management for mitigation;

ii. translocations - to establish the best strategies for active movement of organisms;

iii. units to conserve - to establish the diversity of species/divergent lineages.

4. Ecosystem Services

4.1 Ecosystem services are often suggested as an ideal focus for the assessment of biodiversity status because they reflect ecosystem health, are easily related to environmental pressures faced by biodiversity, and attract attention by focussing on the benefits mankind receives from biodiversity. The difficulties in assessing ecosystem services stem from them being poorly defined, hard to measure, hard to quantify and because they have poorly established relationships to the other components of biodiversity.

4.2 A proposed working definition for the purpose of this report is that ecosystem services are the benefits to humans that accrue from ecosystem functions such as photosynthesis, nutrient cycles, water cycles, trophic webs, pollination etc. The ecosystem services that these functions deliver may or may not be possible to express in monetary terms and include things like flood prevention, carbon sequestration, food, atmospheric regulation etc.

4.3 In the UK there is no comprehensive valuation of ecosystem services, but BRAG has produced a summary report with an overall aim to highlight knowledge gaps and identify research to improve understanding of the mechanisms and processes that underpin ecosystem function, in order to more fully comprehend the role that biodiversity may play in maintaining such processes. Following an initial review

by sub-group members, the following broad themes are suggested as priorities for research coordination and action:

i. linking biodiversity with ecosystem function;

ii. linking biodiversity, ecosystem function and the provision of services;

iii. evaluating changes in ecosystem function in response to environmental change;

iv. the impact of changing ecosystem function on human well being ;

v. development of adaptive management strategies ;

vi. issues of scale ;

4.4 Taking this work forward will be a real challenge, certainly requiring interdisciplinary partnerships between economic, social and ecological sciences and probably requiring new interdisciplinary paradigms to be developed such as economic models developed around non monetary values.

5. Survey and Monitoring Data

5.1 Current UK biodiversity surveillance and data recording schemes have been in operation over different timescales and have used different methodologies and analytical techniques. Virtually all schemes detect changes over the last decade but only for birds and some mammals do we have systematic data for 20 years or more. Biological recording, moth survey and vascular plant atlases do additionally allow some sort of comparison to be made between the current state and that 20 years or more ago which can be useful. Also schemes can measure different things, for example changes in distribution (atlas data), compared to changes in population levels (e.g. the wetland bird data). It is not surprising that their results can differ and that their interpretation is not always easy. This problem tends to be compounded when data are summarised. However, it is when data are considered as a whole that it becomes possible to see the bigger picture.

6. Terrestrial Habitats

Countryside survey

6.1 The principal surveillance scheme for habitats is Countryside Survey 2000 (CS2000) which provides information on the changes in extent of broad habitats between 1984 and 1990, 1990 and 1998 and between 1984 and 1998. Summary information derived from the individual surveys, in terms of the extent of the broad habitats is provided at Annex 1. Seven broad habitats have shown significant increases in extent between 1984 and 1998. These are Broad-leaved

mixed and Yew woodland; Fen, Marsh and Swamp; Built up areas and Gardens; Neutral Grassland; Inland Rock; Montane; and Unclassified. The last three of these are habitats with rather small total areas and are consequently most prone to analytical biases. Improved Grass and Bogs have decreased significantly in extent in recent years. These conclusions relate to habitat extent and no conclusions can be drawn in relation to habitat quality.

6.2 While there is no comprehensive, readily available, measure of habitat quality outside of protected areas and, to some extent, Biodiversity Action Plan (BAP) priority habitats, CS2000 was able to draw some conclusions:

i. the declines in extent of semi-natural habitats that occurred in the 1980s appear to have halted or reversed in the 1990s but there is some evidence that declines in habitat quality continue;

ii. the loss of features such as hedges, walls and ponds, prevalent in the 1980s, appeared to have halted in the 1990s; (see Annex 2a);

iii. the loss of arable plant species has halted (see Annex 2b);

iv. plant species continued to decrease in some of the more natural habitat types, especially unimproved grassland (see Annex 2c);

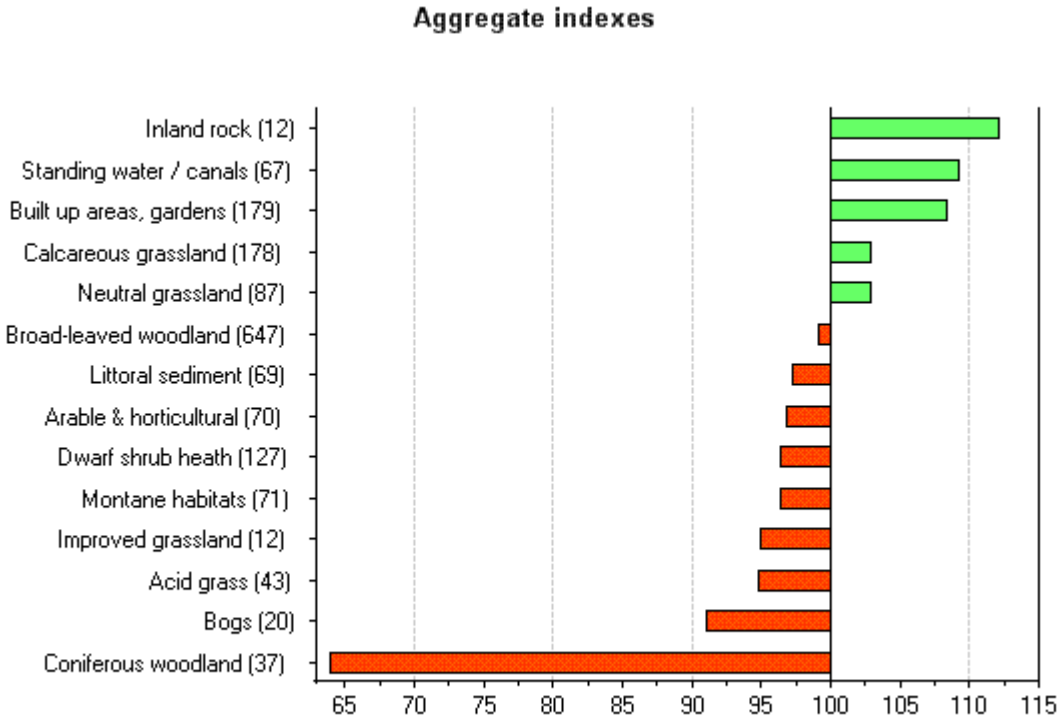
v. streams and rivers improved in biological quality (see Annex 2d);

vi. there were indications of adverse eutrophication effects in many vegetation communities.

Nature Barometer

6.3 It is possible to assess trends in habitats by looking at the species associated with each habitat type. Biological recording data can be used in conjunction with ITE land cover maps to identify the species most likely to occur in each broad habitat type. Aggregate trends for these species can then be used to assess broad habitat trends but it is difficult to identify whether these trends relate to extent or quality. The results of such an exercise are presented in figure 1. This shows that the species associated with inland rock, built up areas and gardens, standing water, neutral grasslands and calcareous grasslands are generally increasing while those associated with other broad habitats, most noticeably native coniferous woodlands and bogs are decreasing.

Figure 1. Aggregate indexes for broad habitats based on trends in characteristic species as identified and calculated from biological recording data. (Numbers in brackets denote the number of species associated with each habitat type. Index values below 100 represent a decline and those greater than 100, an increase).



BAP Habitats

6.4 In the UK Biodiversity Action Plan Report of 2002, trend information was reported for 29 of the 45 priority habitats. In 2005 this increased to 34. It was left to the habitat specialists to interpret status and the comments made suggested that they generally included quality in their assessment at least as much, if not more, than extent. In 2002, 26 priority habitats were showing signs of recovery or stability and 3 continued to decline with no sign of the decline slowing. In 2005, 28 were stable or recovering, 3 were listed as fluctuating probably declining and 3 declining without sign of slowing. The three habitats that reported a continuing or accelerating decline were all coastal or marine (saltmarsh, sheltered muddy gravels and Horse Mussel beds) reflecting the pressures on the coast including from coastal squeeze. The fourteen priority habitats for which decline was slowing, support the CS2000 conclusion that the losses of the 1980's are being reduced in the 1990s.

6.5 The UK 2010 biodiversity indicator used 16 habitats reported in both 2002 and 2005 to assess progress. This indicator shows one habitat has improved in status over the three years (lowland beech and yew woodland) and another has declined (lowland calcareous grassland). The rest remain unchanged.

Habitat inventories

6.6 Countryside Survey 2000 provides a useful overview of broad land use cover in the UK, and some measures of ecological quality, but its value for conservation purposes has significant limitations. Considerable other information is potentially available, at the broad habitat level contained in a range of habitat inventories. At the moment this information is not readily accessible, but work within JNCC/country agencies should enable access to this via the National Biodiversity Network (NBN) some time in the future.

7. Plants

7.1 The most recent measure of vascular plant trends (*Change in the British Flora 1987-2004*, Botanical Society of the British Isles (BSBI) includes analysis of 726 species among which 16% show a significant decline in area occupied and 18% a significant increase in area occupied. The Red List published in 2005 analysed trend information for the earlier period 1958-1998, using a comparison between the two vascular plant atlases. The analysis indicated that 25% of vascular plants (542 out of 2176) are threatened according to IUCN World Conservation Union criteria (which include both trend and rarity data). Earlier trends in area occupied (1958 versus 1998) can be calculated for 1591 taxa. The comparison suggests that 9% have declined by 30% or more. It is more difficult to derive increasing trends from these data, as there are significant problems regarding earlier under-recording, which tends to inflate the number with apparent increases; however the calculated estimate is that 26% of taxa have increased by 30% or more.

7.2 Table 1: Trend information from the Vascular Plant Red List (1958 compared to 1998)

Taxa assessed	**Taxa declined by 30% or more**		**Taxa increased by 30% or more**	
	Number	**%**	**Number**	**%**
1591	147	9%	410	26%

7.3 The main messages from the vascular plant trends are:

i. upland plants are declining due to overgrazing;

ii. arable plants have almost disappeared in large parts of the country but the long-term declines have slowed recently;

iii. plants of unimproved grassland are disappearing, many are only hanging on in small fragments such as roadsides, and these are under severe pressure;

iv. woodland ground flora is changing, and tending towards more shade-tolerant species;

v. as a nation, we have been very successful at looking after our rarest species, but very unsuccessful at preventing widespread species suffering severe declines;

vi. readily dispersed southern species are moving north in response to climate change;

vii. eutrophication is a major pressure so species of low nutrient habitats such as heathland, acid grassland and calcareous grassland have fared relatively badly.

8. Mammals

8.1 The Tracking Mammals Partnership (TMP) provides trend data for 35 of our 66 species (and subspecies) of terrestrial mammals. The statistics from the various schemes operating in the TMP have been reanalysed and standardised in early 2007.

8.2 Updated summary information on recent and historic trends is given in Table 2.

Table 2. Trends in British Mammals

Historic Trend	Total terrestrial (Number)	%	Non Native (Number)	Recent Trend (post 1995)	Total terrestrial (Number)	%	Non Native (Number)
Unknown	14	21	8	Unknown	25	38	11
Increase	14	21	9	Increase	20	30	7
Stable	3	5	1	Stable	13	20	3
Decline	35	53	5	Decline	8	12	2
TOTAL	**66**		**23**		**66**		**23**

8.3 Table 2. The main schemes providing data for the analysis include the National Bat Monitoring Programme, the National Gamebag Census, the Breeding Bird Survey and Waterways Breeding Bird Survey, and the National Dormouse Monitoring Programme. The majority of schemes provide data post 1995, but the National Gamebag Census has recently analysed data going back to 1961 and so for 17 species there are analysed trends prior to 1995. The quality of historic information for the majority of species is more variable and less reliable than current trend information. For some of the remaining 31 species not currently covered by national schemes, trends can sometimes be estimated or inferred from other sources.

8.4 In total, more than half (35 or 53%) of the mammal species show estimated long-term declines. For 17 species these trends have stabilised (8) or reversed (9), since 1995. However, 6 species (Hedgehog, Water Vole, Hazel Dormouse, Wild Cat, Harvest Mouse and Red Squirrel) have continued to decline since 1995. The remaining 12 species showing long-term declines have insufficient information to calculate recent trends. Remarkably, all 17 species of bat are thought to have

suffered historic declines, but of the 11 species for which post 1995 trends can be calculated, 6 are stable and 5 are increasing.

8.5 14 species (21%) show significant (11), non significant (2) or estimated (1) long-term increases that, with the exception of Rabbit and Mink, have levelled out or continued since 1995. The Rabbit has been in decline since 1995 and Mink appears to be in decline, although trends from schemes are contradictory. In total 20 species (30%) have shown increases since 1995, 16 significantly so.

8.6 For non native species, the breakdown of trends is very similar to that overall, with 10 species having increasing (9) or stable (1) trends historically, which remained similar (7 and 3 respectively) since 1995. Declines have been detected for two species since 1995 compared with 5 long-term, and the number of non natives with unknown trends has increased from 8 long-term to 11 post 1995.

8.7 Data are insufficient to make any kind of trend estimate, long-term or short-term, for 12 species. Small mammals (voles, shrews and mice) are the most important gap, given the functional niche they fill and their potential to indicate important environmental changes. Pilot surveillance is underway in an attempt to provide information on this group of species.

8.8 Many of the causes of historic declines in mammals have now been dealt with quite effectively. Some mammals suffered heavily from persecution, particularly the carnivores and some game species, but legislation and the regulation of hunting have had positive effects on most of these species' populations. The specific threats of water pollution to otters and timber treatments to bats have also been effectively addressed with noticeable improvements to the status of the species concerned.

8.9 Habitat loss and alien invasive species are the most obvious continuing pressures on UK mammals. Habitat loss and fragmentation are thought to be major contributors to the continuing decline or probable decline of hazel dormouse, water vole, hedgehog, harvest mouse and water shrew and could be a problem for other small mammal species. Red squirrel and water vole declines are in large part attributable to invasive alien mammals (grey squirrel and mink). The threat posed by a number of invasive alien mammals (grey squirrel, mink, feral cat, sika deer, muntjac) to other components of UK biodiversity is a serious problem to habitats and species alike.

8.10 At present the current or future impacts of climate change on the status of UK mammal populations is not possible to estimate but it has the potential to be high (both positive and negative) for some species in the near future.

9. Birds

Widespread Terrestrial Breeding Birds

9.1 The former British Trust for Ornithology (BTO) Common Birds Census was replaced by the BTO/JNCC/Royal Society for the Protection of Birds (RSPB) Breeding Bird Survey (BBS) in 1994, but continued to collect data until 2000. As a result of the overlap between the schemes we are now able to produce combined trends for a large number of widespread and commoner breeding terrestrial bird species over a period of 25-37 years.

9.2 Declines in some groups of commoner birds, such as those of farmland and woodland, have been well documented, including in the previous report to Committee, and are significant drivers of agri-environment policy. Many continue to decline, but review of trends over the last 10 years can reveal whether recovery policies might be working (Table 3).

9.3 Table 3. **Ten year trends for species that have shown significant long-term declines**[1]

Species	Period (yrs)	Change (%)	Period (yrs)	Change (%)	Source
Willow Tit	10	-59	37	-81	CBC/BBS UK
Lesser Redpoll	10	-50	37	-90	CBC/BBS England
Turtle Dove	10	-48	37	-79	CBC/BBS UK
Cuckoo	10	-47	37	-57	CBC/BBS England
Tree Pipit	10	-43	37	-82	CBC/BBS England
Starling	10	-43	37	-82	CBC/BBS England
Grey Partridge	10	-39	37	-87	CBC/BBS UK
Corn Bunting	10	-34	37	-86	CBC/BBS UK
Willow Warbler	10	-30	37	-61	CBC/BBS England
Spotted Flycatcher	10	-30	37	-85	CBC/BBS UK
Yellow Wagtail	10	-28	37	-67	CBC/BBS UK
Yellowhammer	10	-20	37	-55	CBC/BBS UK
Lesser Whitethroat	10	-19	37	-26	CBC/BBS UK
Skylark	10	-17	37	-59	CBC/BBS England
Meadow Pipit	10	-12	37	-41	CBC/BBS England
House Sparrow	10	-12	27	-68	CBC/BBS England
Linnet	10	-11	37	-69	CBC/BBS England

[1] Sourced from the BTO/JNCC Breeding Birds in the Wider Countryside 2006 report: www.bto.org/birdtrends

Species	Period (yrs)	Change (%)	Period (yrs)	Change (%)	Source
Lapwing	10	-8	25	-44	CBC/BBS UK
Mistle Thrush	10	-5	37	-44	CBC/BBS UK
Bullfinch	10	-3	37	-46	CBC/BBS UK
Marsh Tit	10	-2	37	-61	CBC/BBS UK
Kestrel	10	0	25	-25	CBC/BBS England
House Martin	10	5	37	-53	CBC/BBS England
Reed Bunting	10	8	37	-27	CBC/BBS UK
Dunnock	10	19	37	-39	CBC/BBS UK
Song Thrush	10	22	37	-51	CBC/BBS UK
Tree Sparrow	10	25	37	-97	CBC/BBS England
Whitethroat	10	30	37	-64	CBC/BBS UK

9.4 Most of these species continue to decline rapidly, although the rate of decline for most has reduced and for a few has actually reversed. Population sizes are however still much depleted compared with 25-37 years ago.

9.5 The recent declines in some woodland species, like the Willow Tit and the Wood Warbler (both have declined by more than 50% (-65% each)) is most likely due to general deterioration of woodland habitat, also implicated in the decline of Tree Pipit, leading to increased predation, increased competition and less food availability. Six of the recently declining species (Wood Warbler, Pied Flycatcher, Cuckoo, Tree Pipit, Lesser Whitethroat and Spotted Flycatcher) plus the Turtle Dove and Yellow Wagtail are trans Saharan migrants for which declines might to be in response to factors operating mainly outside of the UK, including desertification of the Sahel and in the case of Turtle Dove might be related to hunting during migration. The Whinchat, which has declined by 36% over the last 11 years (BBS), is also a trans Saharan migrant with very apparent declines across the whole of Europe that have been linked to increasingly early first silage cuts.

9.6 Not all species are declining. 17 species have more than doubled their population size (>100% increase) in the 37 years of census. Four groups stand out: crows - Jackdaw, Carrion Crow and Magpie; doves - Woodpigeon, Stock Dove and Collared Dove; insectivores; and some waterbirds. Crows appear to have benefited from a decline in gamekeeping in recent years, and the increased use of *Brassica* crops (particularly oilseed rape) has probably been beneficial to the doves (Baillie *et al*. 2007). It is currently unclear why several insectivorous species of woodlands and gardens are increasing so rapidly.

Seabirds

9.7 Currently, 25 seabird species breed in the UK. Censuses are carried out at approximately 15 year intervals, the last of which was Seabird 2000. These censuses are supplemented by a monitoring programme based on samples; the Seabird Monitoring Programme. Populations of the various species have varied considerably over the last 30 years, and, of the 20 species for which there is data for this period, 10 species (50%) are increasing by more than 25% and 2 decreasing by more than 25%. The trend over the last 15 years is less encouraging, with 8 species (40%) increasing by more than 10% and 7 (35%) decreasing by more than 10%. The Herring Gull is the only species to be declining to this extent over both 30 years and 15 years and the Arctic Skua shows the most serious decline (-47%) over the last 15 years. The main factors driving some of the declines are thought to include the reduction in number and quality of prey fish through the combined impacts of fisheries and rising sea temperatures; reductions in food supply from fisheries discards and offal discharge; and predation by invasive alien mammals and native birds. More work is needed to confirm and quantify the main factors driving decline. A summary of these data is given in Annex 3.

Wintering Waterbirds

9.8 The latest Wetland Bird Survey (WeBS) reported data for the 2004/05 winter and Great Britain trends (in the form of alerts) were calculated for 38 species covering 39 biogeographic populations. These are listed in Annex 4 which also contains data from the 2001/02 winter as last reported to Committee in June 2005. The great majority of species have shown stable or increasing populations long-term (35 of 38) . Three species have shown a decline in excess of 25% over a 25 year period or more which is an improvement in the 5 species last reported in 2005. Recent data show improvements to the long-term declining status for Ringed Plover, Dunlin and Pochard while European White-fronted Goose and Mallard continue to decline. Purple sandpiper is the other long-term declining species for which trends were not available in 2005.

9.9 Trends calculated for the last ten years (1995-2004) tell a similar story but worryingly there are 5 species declining by more than 25%, 2 more than longer term. These are European White-fronted Goose, Dark Bellied Brent Goose, Red Breasted Merganser, Purple Sandpiper and Turnstone.

9.10 For each of the declining species (long and short-term), the reason for the decline is believed to be different but like seabirds, climate change is thought to be one strong reason for declining trends. In the case of European White Fronted Goose, improvements in winter feeding conditions elsewhere in Europe are thought to be reducing wintering numbers in the UK and Mallard declines are complicated by the vast number of captive bred birds released for hunting purposes all over Europe. The other declining species are all either extreme high arctic breeding

species or in the case of the Red-breasted Merganser, an extreme northerly wintering species. Given that the fastest increasing species (Black tailed Godwit and Avocet) are some of the most southerly breeding of the UK wintering waterbirds provokes speculation that climate change induced shift of range is likely and worth further investigation.

10. Butterflies

10.1 There are two principal sources for butterfly trends; first, the Butterfly Monitoring Scheme (BMS) which started in 1976 and is based on over 100 weekly transects counts for 33 species, and second, the published butterfly distribution atlases which started in the 1970s. The most recent results from these surveys are summarised in a 2007 update report on the State of Britain's butterflies produced by Butterfly Conservation.

10.2 Over the last 10 years (1995-2004) trends (annual rates of population change) have been calculated for 49 species. Of these, 24 (49%) have declined by >25%. This is more than in any other taxonomic group for which data is available. The largest declines have been for High Brown Fritillary, Duke of Burgundy and Silver Studded Blue, despite the conservation attention they receive through being BAP priority species. Over the same time period 11 (22%) species have increased by the same amount.

10.3 Longer term trends are very similar to the 10 year trends with 20% of species declining at a rate >25% in 25 years and 22% of species increasing by the same amount or more. Between the 1970s and 2004, the large blue has gone extinct and 76% of the remaining 54 resident species have suffered decreases in distribution. Six species have lost more than 50% of their distribution and a further 15 have lost more than 30% of range. In terms of depletion of population size, 54% of species have suffered declines which have been most pronounced for Marsh Fritillary and Heath Fritillary.

10.4 Despite the generally negative picture for butterflies, there have been a few very noteworthy conservation successes including the reintroduction of the large blue, increases in Adonis Blue and a spectacular 1500% increase in Silver Spotted Skipper. Most other increases are thought to be a result of climate change induced expansions North. The Essex Skipper has expanded its range 46% since the 1970s and has recently colonised Wales. Some other wider countryside species have also benefited including Comma, Brown Argus, Orange-tip and Peacock.

10.5 The most prevalent cause of decline for butterflies is thought to be habitat loss and deterioration. Loss of post-industrial ‘brownfield’ sites and bogs in addition to a departure from traditional land management practices for grasslands and woodlands have all been associated with particular butterfly declines. Habitat fragmentation is a specific form of habitat loss causing problems for butterfly species such as Marsh Fritillary, Heath Fritillary, High Brown Fritillary, Pearl

Bordered Fritillary and Small Pearl Bordered Fritillary. The latest butterfly atlas showed that the recent distributions (up to 1999) of most habitat specialist butterflies have declined, while the distributions of most wider countryside species have expanded (largely due to climate changes) or remained stable.

11. Moths

11.1 New data has been obtained from the report by Butterfly Conservation and Rothamsted Research in 2006, entitled 'The State of Britain's Larger Moths' and supplemented by more detail behind the report as published by the authors in Biological Conservation.

11.2 Longer term, over the 35 years from 1968 to 2002, 226 of 337 species (approximately two thirds) are declining. Of these 192 species have declined by more than 25% and 132 by more than 50%. Very worryingly 8 species have declined by 95 % or more between 1968 and 2002. These are Dusky Thorn (-8%), Hedge Rustic (-97%), V-moth (-97%), Double Dart (-97%), Garden Dart (-97%), Grass Rivulet (-96%), Dark Spinach (-96%), Spinach (-96%), and Figure of Eight (-95%). Some of these, such as the Figure of Eight were very numerous widespread species towards the beginning of their decline. In the twentieth century 62 moth species went extinct in the UK and declines of this extent suggest that extinctions are likely to continue into the 21st century. Declines across so many species of such an abundant widespread group of species as the larger moths must start to raise concerns about secondary impacts on the ecosystem functions and habitats of which these moths are a part. As yet these secondary effects have not been quantified.

11.3 There is however some good news in that 46 species have more than doubled their population size since 1968 and a further 23 species have increased by more than 50%.

11.4 The declines are more pronounced in the south and especially the south-east and thought to be due mainly to habitat loss and possibly climate change. Habitat loss is hard to link explicitly to declines but loss of hedgerows, destruction of field margins and improvements to pasture land are thought to be particularly important factors of decline. The evidence is growing. For example, there is reasonably strong evidence that a flexible life cycle benefits moths as only those species that overwinter as adults or emerge during winter have been able to increase on average and those that overwinter in the egg stage (the least flexible stage of the life cycle) have done particularly badly on average. There are also many North South and East West changes that suggest climatic influence.

11.5 The reasons for increase are perhaps even more difficult to determine. Climate change is again likely to be important and it is noticeable that those species that feed on lichen, algae and conifers have done particularly well.

12. Biological Recording

12.1 Biological recording data is relatively comprehensive at the simplest level in that it exists for many thousands of species in most taxonomic groups such as lower plants, beetles, spiders etc, and has almost blanket coverage. The uses to which it can be put are however more limited than the more systematic surveys but improved through the development of novel analytical techniques, including modelling.

12.2 One of the new techniques developed recently within JNCC, involves fitting environmental niche models to the biological recording data. For 137 species including dragonflies, hover flies, ground beetles and spiders, these models fitted well enough to give meaningful results. For the 137 species modelled it is then possible to estimate the main environmental variables that account for the predicted distribution. The results show that climate variables account for 55% of distribution, land use 25% and a combination of climate and land use 20%. This leads to a general conclusion that change in climatic variables would lead to changes in the distribution of between 55% and 75% of UK species if these 137 are representative of biodiversity as a whole. This is an alarming statistic when taken in conjunction with climate change statistics and given that climate change will also have knock on effects to land use which could then increase the impacts on species further.

12.3 Long-term 16% of 4822 species assessed are declining. 20% of 1288 species assessed have declined over the last 10 years. This suggests that declines have not yet been halted or reversed. In terms of the 2010 targets, this means that for species we are some way from meeting the EU target to halt biodiversity loss and unable to report how close we are to meeting the global target of significantly reducing the rate of biodiversity loss by 2010. For those species, such as birds and mammals for which we have some data there are indications that historic declines have started to stabilise and in some cases reverse but this might not be the case for all taxonomic groups. Some species are however doing well as 20% have increased long-term.

13. BAP species

13.1 For BAP priority species, 27% continue to decline, but for 10% the decline appears to be slowing. This still leaves 17% of species for which more than 10 years of BAP priority action has been insufficient to slow the decline. This result indicates the enormity of the threat faced by UK's most endangered species. Some well known and widespread species are included in this list, such as the bullfinch, skylark, red squirrel, common skate, juniper and several types of bumblebee. There have however been some improvements since the 2002 reporting round. The number of increasing species has risen from 26 to 42 and the decline has slowed for a few more species than in 2002 indicating slow but steady improvement in the status of the species on which conservation action is focussed.

Also significant is the large reduction in unknown species suggesting we are addressing the knowledge gap which has so often been reported as a major obstacle to action and the achievement of targets.

13.2 For 136 species it is possible to make a direct comparison of trends from 2005 and 2002 reporting rounds. These were the species used to compile the UK 2010 biodiversity indicator on priority species that is currently in press. This comparison shows that in 2005, 27 species (20%) were assessed as increasing up from 20 species in 2002. Declining species were down from 68 in 2002 to 61 (45%) in 2005. While this shows a steady overall improvement 45% of species continue to decline and there are many individual species whose status has worsened since 2002.

13.3 Table 4. Trends in BAP Priority Species

2005 Trend in BAP priority species													
Increasing		Stable		Decline (slowing)		Decline cont/ accelerating		Extinct		No trend		unknown	
2002	2005	2002	2005	2002	2005	2002	2005	2002	2005	2002	2005	2002	2005
6.4%	11%	19.4%	36%	7.7%	10%	17.1%	17%	4.1%	3%	10.2%	10%	35.0%	13%

13.4 An important finding of BAP priority species reporting in 1999 was that widespread priority species are more likely to be in decline, while more restricted range priority species are more likely to be stable or increasing. This pattern persisted in 2002 but was not analysed in 2005. As shown by the 1999 and 2002 analyses it is likely that targeted site protection and habitat management action, for those species restricted to a few sites, can sometimes achieve relatively rapid results. In 1999, only two widespread priority species were increasing (the otter and lesser horseshoe bat); by 2002 these were joined by the song thrush, nightjar, tree sparrow and Shepherd's needle, bringing the total to six.

14. Marine Nature

14.1 The reports '*Charting Progress: an Integrated Assessment of the State of UK Seas*' and *Review of Marine Nature Conservation -Working Group report to Government* summarise what is known about the state of the UK marine biodiversity. Additionally, the Marine Climate Change Impacts Partnership (MCCIP) has produced an Annual Report Card for 2006 which has been incorporated into the following text.

Plankton

14.2 The Continuous Plankton Recorder survey has been operating in UK waters for over 70 years. Results from the survey, run by Sir Alister Hardy Foundation for Ocean Science (SAHFOS), indicate that major biological changes have taken place in the plankton around the British Isles in recent decades with a pronounced regime shift occurring after the mid-1980s that is reflected in the plankton, nutrients and current fluxes. A northerly movement of warmer water plankton by 10º latitude (1000km) over the last 40 years has been recorded, and a similar retreat of colder water plankton to the north. There has been an increase in the flow of warmer oceanic water into the North Sea. Marine ecosystems around the UK appear to have moved into a warmer dynamic regime that may be leading to a greater transport of dead planktonic material to the benthos and faster carbon turnover. The change in plankton composition is likely to adversely affect cod breeding and stocks in UK waters.

Marine habitats [this section was revised in September 2007]

14.3 Marine habitats have been classified in broad terms by *UKSeaMap*. The marine seabed area under UK jurisdiction extends to *ca* 871,900 km². *UKSeaMap* identified seabed habitat types in three main categories: i) coastal features, ii) continental slope and deep sea topographic and bed-form features, iii) substrate features.

14.4 Coastal features make up a small proportion of the total. Bays comprise 0.6% of the UK marine area, estuaries 0.3%, and sealochs 0.3%. The remaining coastal features each make up 0.1% or less of the total.

14.5 As a proportion of the total, continental slope and deep sea topograhic and bed-form features are more extensive. Deep ocean rises (typically rock) comprise 10.1% of the UK total, the continental slope (mainly sediment) 4.2%, and shelf troughs (mainly sediment) 0.7%. No other feature in this category exceeds 0.2% of the UK area

14.6 Substrate features comprise the largest component of the UK marine area. Sand plains make up 31.6% of the total area, coarse (gravel) sediment plains 17.3%, mud plains 15.1% and mixed sediment plains 2.6%. Rock substrates comprise 2.1% of the total. The list of UK broad marine habitats is given at Annex 5.

14.7 Trends in the biological status of these habitats are uncertain, but repeated bottom trawling, as occurs in the parts of the North Sea and the Irish Sea, is likely to have altered the characteristic benthic communities. At the moment, there are no national surveillance programmes capable of reporting on the status and trends of UK marine habitats.

14.8 The status of the estimated 7,300 species of marine invertebrates and macro-algae has not been comprehensively documented, and for most species is insufficiently known to assist in reporting on marine habitats.

14.9 Non-native marine species might be an increasing threat to marine habitats primarily due to rising sea temperature. Cambridge University and SAHFOS note that new marine life is arriving into our waters both by migration and by human introduction. The number of different non-native species is increasing in marine habitats and some are causing major ecological changes. Distributions of non-native species are currently limited by water temperature so warmer UK waters over the last three decades are facilitating the establishment of some of these species. This climate change effect also applies to native species of rocky shores and probably other habitat types as well if these had been investigated. Marine Biological Association (MBA) and Marine Environmental Change Network (MECN) report that warm-water species on rocky shores in the UK have increased in abundance and range with rising temperatures (e.g. purple acorn barnacle has extended its range by 170 km since the mid 1980s), whilst northern, cold-water species (e.g. common tortoiseshell limpet) have decreased in abundance.

Marine mammals

14.10 Twenty-eight species of cetaceans have been recorded from UK waters in the latter part of the 20th century and 11 of these are recorded frequently, the remainder intermittently or rarer. The large whales include some of the most globally threatened species and for some of these species their population status is unknown. For the smaller cetaceans, the latest large scale cetacean survey (SCANS II) provided the first comprehensive estimates of abundance in the whole west European Atlantic continental shelf region. For most species, no significant changes were observed between the current abundance estimates and the previous ones from the SCANS 1994 survey (encompassing part of the SCANS II area). There are ongoing plans to establish a Joint Cetacean Protocol and update the cetacean Atlas (Reid et al 2003). In addition, a UK surveillance strategy for cetaceans is being developed. Both of these projects aim to use the best available data collected by different organisations to enable the detection of trends in cetacean populations and the assessment of their status in UK and adjacent waters. Many cetacean species, particularly common dolphins and porpoises, are subject to incidental captures in fisheries in UK waters. A conservation strategy is being implemented and government is working with fisherman to try and eliminate this problem. Two species of seals are resident in the UK. They were both affected by outbreaks of Phocine Distemper Virus (PDV) and while the grey seal population has been increasing in the last few years, the trends in common seal populations around the UK have varied, with those in the North Sea having apparently declined in the last 6 years. A conservation order has been put in place in the Northern Isles and the east coast of Scotland to provide

further protection while the causes for this apparent decline are being investigated.

Marine fish

14.7 The status of most fish species in UK marine waters is very poorly known. Of over 330 fish species recorded in the UK's continental shelf waters, only 30 commercially important species are regularly assessed by International Council for the Exploration of the Seas (ICES). The remainder are mostly species of low commercial value and there are generally insufficient data available to assess their status.

14.8 Over the past decade there has been a small improvement in status of some commercial fish stocks. Of those stocks assessed by ICES, 38% were considered in 2005 to be harvested within safe biological limits (full reproductive capacity and harvested sustainably), compared with 21-27% between 1998 and 2000. However, the status of some species, most notably cod, continued to decline during this period and 30% of the demersal fish stocks in UK waters that have been assessed by ICES remain outside safe biological limits (suffering, or at risk of, reduced reproductive capacity).

14.9 Because of their low reproductive rates, sharks, rays and a number of deep-water fish species are considered to be at particular risk from fishing. Scarcity of data on most of these species makes it impossible to quantitively assess their status, however in 2006 the IUCN's Shark Specialist Group carried out semi-quantitative Red-List assessments for 111 chondrichthyan species in the North East Atlantic. The preliminary findings of the workshop were that 32% of assessed species were threatened (Critically Endangered, Endangered or Vulnerable) with a further 24% assessed as Data Deficient.

14.10 In addition to the effects of fishing pressure, fish distribution and abundance have changed in response to changes in the ocean climate. A Centre for Environment, Fisheries and Aquaculture Science (CEFAS) study of the distribution of demersal fish in the North Sea over a 25 year period found latitudinal shifts in distribution in response to rising sea temperatures for 15 of the 36 species studied. Distances moved ranged from 48 to 403 km and, in all but two cases, the direction of movement was northwards. For some species, the effects of climate change may compound the effects of fishing. For example, modelling has shown that higher water temperatures can be expected to lead to slower recovery rates for depleted cod stocks. For some other species, higher water temperatures may lead to faster growth and increased productivity.

15. Protected areas

15.1 Common Standards Monitoring of designated sites reported the UK results of its first six year cycle in June 2006. The sites covered by the monitoring exercise cover 10% of the land area of the UK (2.4 million hectares) and consequently support a very significant share of UK's most important biodiversity. For each site there are 1 or more features of biodiversity for which the site is protected and each of these are assessed independently. Of the 10,560 biological features assessed 68% are either in favourable condition (49%) or recovering towards favourable (19%). 1% have unfortunately been irretrievably lost from the site.

15.2 For habitat features, results indicate that some 42% are in favourable condition, with a further 24% showing signs of recovery from an unfavourable state. Only some 13% of habitat features have been assessed as declining although this may be an underestimate. Comparing types of habitat features, Acid Grassland, Calcareous Grassland, Dwarf Shrub Heath and Rivers/Streams seem to be faring relatively badly, while Inshore sublittoral sediments, Littoral Sediment, Littoral Rock, Supralittoral Rock and Mosaics seem to be doing better.

15.3 For species features, considerably fewer have been assessed than for habitat features, but, of these, 68% are in favourable condition. Looking at the species groupings making up these assessments, only for Vascular Plants and Lower Plants is the number of features which are favourable less than in the unfavourable category. Only 11% of species features are listed as declining.

16. Conclusions

16.1 Some conclusions are now given within each of the previous sections but it is still important to draw out some of the overarching reasons for changes to UK nature.

16.2 In 2005 it was reported that long-term (last 30-40 years) about 30% of habitats and species have declined mainly between 1960 and the mid 1980s. These declines were shown to have largely levelled out or reversed in the 1990s but not without notable exceptions. The declines between 1960 and the 1980s are largely attributable to habitat loss caused by agricultural intensification practices (including the use of fertilisers and pesticides), increased land drainage, the channelisation of water courses and eutrophication of waterbodies, the reduction in extent of hedgerows and loss of farm ponds, and the coniferisation of broadleaf woodlands; particularly in eastern and southern Britain.

16.3 In the uplands, the principal changes were increased grazing levels as a consequence of incentive payments (often leading to the loss of heather moorland), major afforestation schemes, and, in some areas, the effects of acidification. While afforestation and acidification have been addressed to some extent since the mid 1980s, grazing remains a problem.

16.4 The improvements seen since the mid 1980's were attributed to reduction in lowland habitat loss and measures to improve both water and air quality. A range of conservation-related measures introduced in the 1990s also helped, cumulatively, to stabilise, and in some areas increase, the biodiversity carrying-capacity of lowland Britain and to assist recovery for many of the most threatened habitats and species.

16.5 Declines in biodiversity tended to have been more pronounced in widespread habitats and species, than for scarce ones, probably reflecting the intensity of conservation effort and the greater difficulty of achieving recovery, but this is not universally true for all analyses, some mammals proving to be exceptions. We need to halt the decline of biodiversity quickly. The next task will be to enhance and accelerate restoration where necessary and the longer biodiversity decline continues, the more this will be needed.

16.6 At this high level the conclusions of 2005 are just as valid in 2007. We do, however, now have a slightly more detailed picture of the main reasons for the changes to UK nature and can consequently identify the impacts caused by some additional environmental pressures. The bird data is also sufficiently robust to identify major events over the last two years and some of the new analyses of data confirm, that as predicted in 2002, climate change is likely to be the single most important driver of changes to the state of UK nature in the future. At present however, habitat transformation is still the factor most implicated in the decline of bird species.

16.7 Climate change effects are thought to account for the majority of changes to wintering waterbird populations and are implicated as one of the major drivers of change for vascular plants, mammals, moths and butterflies. Modelling of biological recording data also predicts that climate effects could account for more than 50% of future changes to the distribution of species. The evidence is becoming overwhelming that climate change is a major consideration for nature conservation now and in the future.

16.8 In terms of adapting to and living with climate change there has also been more attention given to ecological connectivity and associated issues such as gene flow and features of the landscape that improve connectivity. This area of work has been further emphasised by the negative effects of habitat fragmentation on biodiversity particularly through the moth data coming on line and new reports on butterfly status.

16.9 The Biodiversity Research Advisory Group (BRAG) has identified high priority research needs for genetic aspects of conservation which are likely to become much more central to conservation work as we grapple with range changes and adaptation needed for biodiversity to respond to climate change. Getting this research started and applying the results that ensue needs to happen quickly.

16.10 Other pressures on the biodiversity that have emerged since 2005 include overshading and eutrophication. While eutrophication has always been recognised as a problem, substantiated by CS2000, additional evidence from the monitoring of protected areas, from analysis of plant trends and from the status of nutrient poor BAP habitats and species associated with nutrient poor habitats, further confirms the problem. Overshading has been recognised as a major negative factor for woodland protected areas and woodland plants and is thought to be due to a decrease in traditional woodland management practices.

16.11 The bird species are one group that appears to be doing relatively well. Improved bird protection laws brought in during the 1950s and 60s helped populations of some exploited and persecuted bird species to recover from previously depressed levels and they have also benefited from targeted conservation efforts. 2004 and 2005 also helped to improve the status of many bird species and while no other monitoring schemes are sufficiently rigorous to confirm this trend there is equally no reason to doubt its more universal nature. Between 2004 and 2005 alone, the Grey Wagtail increased 52% and a further 8 species showed significant increases. Only Chiffchaff and Tree Pipit showed significant declines between 2004 and 2005 adding further evidence to the number of migratory bird species where the decline is thought to be due to factors operating outside of the UK.

16.12 Another important change since the 2005 report to Committee is the availability of trends for 337 species of larger moths. Some of the moth species are very widespread and common often making up quite significant proportions of the animal biomass of some ecosystems in their larval stages. This makes them important components of ecosystem function delivery through their role as herbivores, both selective and non selective, their place in the food chain and their role in various nutrient cycling processes. As well as having important functional roles moths have also suffered quite serious declines when compared to other taxonomic groups. The potential for moths to act as sensitive environmental indicators and to help shed light on the increasing interest in ecosystem functions are consequently things to be investigated more thoroughly in the near future.

16.13 Taking work forward around ecosystem services delivered by ecosystem functions has recently become very topical. BRAG has identified priority research themes to assist this work but it will require true interdisciplinary research to be successful. The first results from the interdisciplinary Rural Economy and Land Use programme (RELU) are just starting to appear and plans are in place to summarise and apply the results. We will need to learn lessons from RELU when taking forward the new research programme 'Living with Environmental Change' being developed on behalf of the three research councils and other major environmental research funders. This programme offers the potential to achieve many of the research goals needed to improve our knowledge of and responses to changes in the state of nature, especially those relating to ecosystem services.

Marine Conclusions

16.14 In the marine environment, the main changes appear to have been brought about by the warming of the UK's seas, which became apparent in the mid-1980s, and the effects of over-fishing which intensified from the 1970s onwards, and for which the measures which have been taken have not yet led to recovery. The recent 2006 report from Marine Climate Change Impacts Partnership (MCCIP) concluded that 'The variety and distribution of marine species are being altered by climate change, although it is not the only actor. Cold-water species of plankton, fish and intertidal invertebrates are retreating northwards around the UK and the ranges of southern species are expanding. Fishing pressure remains the principal cause of changes in the abundance of most fish species, but climate has probably also played a role in some cases.' Non native species and pollution (including eutrophication) are other important factors of change in the marine environment both exacerbated by climate change effects.

16.15 The 'State of UK Seas' report concluded:

i. the status of commercial fish stocks is unacceptable with many stocks being fished outside safe limits;

ii. there have been unacceptable negative changes to plankton communities attributable to climate change;

iii. status and trends for cetaceans are unknown but bycatch figures are still worrying;

iv. after mixed fortunes seal populations have stabilised.

16.16 For cetaceans and seals a little more information is now available. Many of the small cetacean species in UK waters seem to be in favourable conservation status while the status of species occurring mostly in offshore waters is unknown. Bycatch is still the major cause for concern with regards to the conservation status of small cetaceans. Grey seal populations have been increasing in the last few years while common seals in the North Sea have some evidence of a decline.

16.17 Quite clearly, the knowledge about status and trends of marine species and habitats is insufficient to inform marine conservation action and policy adequately. This tends to lead to ambiguous messages. Establishing a simple estimate of the marine wildlife resource from which to start appears to be a logical first step hence the JNCC emphasis on mapping seabed habitats through the Mapping European Seabeds Habitat (MESH) project and other related activities. Seabed maps are a critical first step to monitoring. The development of an integrated UK marine monitoring and assessment strategy (UKMMAS) is also underway and needs to be finalised and implemented as a matter or urgency.

Protected Areas Conclusions

16.18 Designated features within protected areas appear to have declined much less than in the wider environment. The figure for the proportion of designated features within protected areas below target (favourable condition) status is the best indicator of feature condition on protected areas that we have at the moment (as opposed to trends). Current indications are that 58% of habitats and 32% of species features in designated areas are below target condition.

17. Discussion and future work

17.1 The UK is particularly lacking on status information for habitats and for the marine environment more generally. Work is underway to improve the data for habitats and marine but progress is understandably slow. Establishing an initial estimation of the total habitat/marine wildlife resource is a common first step being taken forward through the MESH and habitat inventory projects and through development of the UK Marine Monitoring and Assessment Strategy (UKMMAS) Both the marine and terrestrial work is also looking at remote sensing techniques for future monitoring and, terrestrially, how the next Countryside Survey can better serve the nature conservation community needs.

17.2 For many species, biological recording is the only information available to give an indication of trends but not at a high level of confidence. More confidence can be obtained by using the excellent expert knowledge available in the UK but this is time consuming to tap into. The recent work on the Vascular Plant Red Data Book, Status and Trends of UK Mammals and Species Status Assessment are all excellent examples of how expertise can improve the interpretation of, and confidence in, biological recording data. There has been a noticeable improvement in the relevance of source material needed to produce this paper since 2005.

17.3 In 2005 some of the main purposes of recording and collating information on the UK State of Nature were identified including:

i. the identification of current conservation priorities for the purposes of directing effort, financial resource and policy action where it is most needed;

ii. the development of strategic approaches to nature conservation in order to maintain the scale and range of biodiversity in an effective way;

iii. to serve as early warning mechanisms to identify emerging and potentially important pressures on biodiversity before they become major problems;

iv. to underpin national and international obligations to report on UK biodiversity.

17.4 It was also recognised that few of these purposes were understood well enough for evidence on the state of nature to be fed in effectively. Since 2005 evidence on the state of nature has been used to help review BAP priority lists, has supported the Committee's vision working group activities and has been used to underpin several international reporting obligations such as the reporting of Conservation Status under the Habitats Directive and UK BAP reporting. Some analyses have also been undertaken to predict future pressures such as climate change impacts. Despite these encouraging developments more is still needed especially around embedding biodiversity in the work of other sectors and hence achieving UK objectives for mainstreaming biodiversity.

17.5 To meet requirements to support nature conservation, support policy and report, it is essential that information can be shared and brought together easily and flexibly to illustrate and give a variety of messages. This is a challenge that JNCC and others are trying to meet through long-term initiatives such as NBN and newer initiatives such as the nature barometer and biodiversity indicators. All of this work helps to collate and present information in differing formats. Several recent committee papers have addressed this issue and point to the need for a final concerted effort to achieve the necessary access we all require.

17.6 In order to make information on the status of biodiversity policy-relevant, requires that status can be interpreted in terms of threats, actions or policies. Undertaking research and expert consultation to create ecological profiles for species enables the further use of data in this way. This is paramount to making policy-relevant interpretations and to improving understanding of the factors driving the changes in state of UK nature. It also increases the benefits of our survey and monitoring activities and makes maximum use of the volunteer contribution to our work. Indicators have made some progress in this area but the link between the wildlife status and the driver of change is rarely made explicit enough to lead directly into a mitigating response. For example, in the headline sustainability indicators, it is clear that farmland birds have declined, and hence we have not achieved sustainable development yet, but there is no suggestion as to how farmland bird trends might be associated with any of the other headline indicators such as population growth, trends in gross domestic product (GDP) and social well being. This is the type of modelling analysis that the research community is starting to develop and the wildlife statistics project would dearly like to apply. Further progress needs to be made.

17.7 Resources for recording and collating biodiversity information, information on the impacts effecting biodiversity, and information on policy and practical measures to sustain biodiversity, are always likely to be limited. It may be necessary to make difficult, and possibly contentious, decisions to redirect resources to balance the information recording and collation effort more effectively. Also we need to consider further the degree to which we should re-use data for one element of biodiversity as a proxy for others for which we do not have information. There

may often be a conflict here between evidence-based decisions, and the employment of the precautionary principle. All these issues require further considerations.

17.8 In the 2005 paper JNCC undertook to do a number of strands of work. Of these:

i. the 2005 report has been updated;

ii. a strategy for surveillance and research incorporating assessment of policy needs is being consulted on;

iii. human impacts and response measures have been investigated and a tool developed to assist the work of the vision working group;

iv. BRAG has undertaken some work on genes and ecosystem services;

these strands of work need to continue.

17.9 While some work has been undertaken, other work identified in 2005 has made no significant progress. Consequently, JNCC still needs to:

i. make the wealth of biodiversity information available to the UK more policy-relevant by linking changes in wildlife status to threats, actions policies and indicators;

ii. make more use of information on the status of UK wildlife in setting and implementing policy, in taking decisions and in reporting at all geographic scales and across all sectors;

iii. emphasise trends occurring in the short-term and start to develop a coherent suite of medium and longer-term biodiversity targets (taking account of BAP targets, Favourable Conservation Status, etc) and use data to measure progress towards achieving these;

iv. consider further the respective roles of 'evidence-based' and 'precautionary' approaches in the development of policy advice.

ANNEX 1

Extent and Change in extent of Broad Habitats from Countryside Survey 2000

Broad Habitat	Extent (ha)			Change		
	1984	1990	1998	1984-1990	1990-1998	1984-1998
Improved grass	5902.7	5503.1	5481.6	-410.4	-103.1	-477.1
Arable and horticultural	5282.5	5242.6	5248.9	-70.8	86.9	-11.1
Neutral grass	467.4	566.1	612.6	151.1	8.8	152.7
Broadleaf, mixed and yew woodland	1316.6	1369.8	1470.8	64.5	67.5	142.5
Conifer woodland	1243.0	1365.3	1373.8	65.1	-9.1	85.9
Bog	2302.8	2317.9	2218.3	-102.7	-18.8	-120.5
Dwarf shrub heath	1387.7	1557.3	1487.0	12.4	-57.3	-57.3
Acid grass	1476.2	1451.0	1295.5	81.2	-154.4	-103.9
Fen, marsh and swamp	427.7	454.6	547.2	27.8	98.5	127.1
Bracken	439.0	451.8	438.9	-25.7	28.2	3.2
Calcareous grass	75.1	81.2	64.7	5.9	-14.6	-10.7
Inland rock	37.6	52.2	55.5	12.9	6.6	17.9
Montane	40.6	49.8	49.1	18.5	0.0	18.6
Standing open water and canals	284.4	206.2	190.3	0.9	1.4	1.1
Rivers and streams	69.8	65.8	64.2	-2.0	-1.0	-3.0
Littoral rock	0.1	0.1	0.1	0.0	0.0	0.0
Littoral sediment	149.1	142.0	138.1	1.8	-1.5	0.1
Supralittoral rock	83.1	78.8	77.0	-2.2	-2.0	-4.4
Supralittoral sediment	54.2	53.2	53.0	-8.6	2.7	-5.2
Built up and gardens	1267.8	1212.6	1330.8	66.3	60.5	133.4
Boundary and linear features	490.6	497.5	497.9	17.0	-3.2	9.0
Unclassified	0.4	73.5	94.8	94.7	4.7	100.5
Sea	304.4	298.5	302.9	2.1	-0.7	1.3

ANNEX 2: Selected Other Features Recorded by Countryside Survey 2000

Annex 2a: Length and change in length of linear features

Linear Feature	Length (km/1000)			Change		
	1984	1990	1998	1984-1990	1990-1998	1984-1998
Hedge	562.60	467.51	468.22		0.64	-131.1
Remnant/relict hedge	58.38	69.34	57.64			-14.74
Wall	225.20	195.56	193.08		-4.03	-29.86
Line of trees/shrubs and relict hedge and fence	0	60.03	81.10		17.18	
Line of trees/shrubs and relict hedge	0	73.37	96.56		21.81	
Bank/grass strip	79.93	88.30	82.38		-1.09	16.5
Fence	606.64	611.48	656.94		34.24	55.53
Total boundary features	1532.74	1565.64	1635.93		53.95	

Annex 2b: Average number of species (species richness) found in CS2000 vegetation survey plots on field boundaries associated with arable fields, and which contained the crop and weed vegetation type in 1990 and 1998

	1990	1998
England and Wales (*)	7.96	10.95

Annex 2c: Average number of species (species richness) found in CS2000 survey plots containing infertile grassland vegetation in 1990 and 1998

	1990	1998
England and Wales (**)	18.94	17.38
Scotland	17.68	17.13

Annex 2d: Change in the percentage of CS2000 sites (i.e. rivers and streams) in the two best grades ('a' and 'b') of biological condition between 1990 and 1998, by Environmental Zone

	Percentage of sites in top two grades	
	1990	1998
EZ1	30.4	45.6
EZ2	40.7	55.5
EZ3	42.5	57.4
EZ4	31.6	49.1
EZ5	28.3	48.4
EZ6	45.7	83.0

ANNEX 3

Breeding seabird numbers in Britain and Ireland. Most figures are for 1998-2002 (Mitchell *et al.* 2004) but those for Northern gannet and roseate tern include more recent updates. All counts are of pairs unless otherwise stated.

Species	UK	Republic of Ireland	Total population	% change since previous survey (coastal populations only)	
				Seafarer (1969-70)	SCR (1985-88)
Northern fulmar	505,073	32,918	537,991	+74	0
Manx shearwater [1]	299,722	32,545	332,267		
European storm-petrel [1]	25,710	99,065	124,775		
Leach's storm-petrel [1]	48,047	310	48,357		
Northern gannet [2]	212,835	31,136	243,971	+77	+31
Great cormorant	9,133	4,548	13,681		
coastal component [3]	7,487	4,073	11,560	+44	+7
European shag	28,880	3,426	32,306	-5	-25
Arctic skua	2,136	0	2,136	+106	-37
Great skua	9,634	1	9,635	+213	+26
Mediterranean gull	110	3	113		
Black-headed gull	138,014	3,876	141,890		
coastal component [3]	77,326	2,066	79,392	+6	+2
Common gull	48,720	1,060	49,780		
coastal component [3]	20,889	586	21,475	+65	+39
Lesser black-backed gull	113,808	2,876	116,684		
coastal component [3]	89,261	2,062	91,323	+83	+42
Herring Gull	143,656	5,521	149,177		
coastal component [3]	141,701	5,413	147,114	-57	-17
Great black-backed gull	17,470	2,243	19,713		
coastal component [3]	17,450	2,241	19,691	-12	-6
Black-legged kittiwake	379,895	36,100	415,995	-7	-23
Sandwich tern	12,490	1,762	14,252	+18	-11
Roseate tern [4]	97	715	812	-66	+48
Common tern	12,012	2,485	14,497	-3	-2
Arctic tern	53,388	2,735	56,123	+7	-29
Little tern	1,947	206	2,153	+12	-25
Common guillemot [5]	1,421,376	138,108	1,559,484	+139	+32
Razorbill [5]	188,641	27,446	216,087	+29	+23
Black guillemot [6]	39,316	3,367	42,683		
Atlantic puffin	581,110	19,641	600,751	+33	+19

[1] Not surveyed during Operation Seafarer and SCR.
[2] Northern gannet figures are from the complete survey of north-east Atlantic colonies in 1994-95 (Murray and Wanless 1997) with updates for colonies counted subsequently.
[3] Inland colonies were not surveyed during Operation Seafarer or SCR.
[4] Roseate tern figures are from 2003 (this report).
[5] Counts are of individuals.
[6] Counts of pre-breeding adults were not carried out during Operation Seafarer and were not conducted in the Republic of Ireland during the SCR.

ANNEX 4 Great Britain trends (alerts) for wintering waterbirds

Great Britain	First winter	Last winter	Percentage change to 00/01		Percentage change to 04/05	
			10-year	Max-year	10-year	Max-year
Little Grebe	85/86	04/05	69	544	>33	>100
Great Crested Grebe	82/83	04/05	22	67	Stable	>33
Cormorant	86/87	04/05	13	163	Stable	>33
Mute Swan	74/75	04/05	31	98	No trend	No trend
Bewick's Swan	74/75	04/05	-37	99	Stable	>33
Whooper Swan	74/75	04/05	27	132	>33	>33
European White-fronted Goose	74/75	04/05	-58	-50	<-25	<-50
Dark-bellied Brent Goose	74/75	04/05	-24	90	<-25	Stable
Light-bellied Brent Goose (Svalbard)	?	04/05	No trend	No trend	>33	>100
Shelduck	74/75	04/05	-22	7	Stable	Stable
Wigeon	74/75	04/05	27	73	Stable	>33
Gadwall	74/75	04/05	77	699	>33	>100
Teal	74/75	04/05	11	94	Stable	>33
Mallard	74/75	04/05	-28	-27	Stable	<-25
Pintail	74/75	04/05	-30	-24	Stable	Stable
Shoveler	74/75	04/05	3	60	Stable	Stable
Pochard	74/75	04/05	-8	-28	Stable	Stable
Tufted Duck	74/75	04/05	13	8	Stable	Stable
Scaup	?	04/05	No trend	No trend	Stable	Stable
Eider	?	04/05	No trend	No trend	Stable	Stable
Goldeneye	74/75	04/05	-6	5	Stable	Stable
Red-breasted Merganser	74/75	04/05	7	80	<-25	Stable
Goosander	74/75	04/05	-6	56	Stable	>33
Coot	82/83	04/05	24	31	Stable	Stable
Oystercatcher	74/75	04/05	-12	8	Stable	Stable
Avocet	74/75	04/05	223	>2000	>100	>100
Ringed Plover	74/75	04/05	-25	-28	Stable	Stable
Golden Plover	?	04/05	No trend	No trend	>33	>100
Grey Plover	74/75	04/05	2	196	Stable	>100
Lapwing	?	04/05	No trend	No trend	Stable	>100
Knot	74/75	04/05	-5	15	Stable	Stable
Sanderling	74/75	04/05	18	-6	Stable	Stable
Purple Sandpiper	?	04/05	No trend	No trend	<-25	<-50
Dunlin	74/75	04/05	-26	-39	Stable	Stable
Black-tailed Godwit	74/75	04/05	65	188	>100	>100
Bar-tailed Godwit	74/75	04/05	-22	-13	Stable	Stable
Curlew	74/75	04/05	17	31	Stable	>33
Redshank	74/75	04/05	1	-1	Stable	Stable
Turnstone	74/75	04/05	-25	-10	<-25	Stable

ANNEX 5 UK Marine Habitats (added September 2007)

Broad habitat type	**% UK marine area**
Coastal features	
Lagoon	<0.1
Estuary	0.3
Ria	<0.1
Embayment	0.1
Barrier beach	<0.1
Sound or strait	<0.1
Bay	0.6
Continental slope and deep sea topographic features	
Subtidal sediment bank	0.1
Shelf mound or pinnacle	0.1
Shelf trough	0.7
Pockmark field (overlays other habitats)	(3.4)
Continental slope	4.2
Iceberg plough mark (overlays other habitats)	(3.4)
Canyon	0.2
Deep ocean rise	10.1
Carbonate mound	?
Deep-water mound - sand volcanoes etc	<0.1
Substrates	
Photic rock	0.8
Aphotic rock	1.3
Shallow-water sand plain	5.5
Shelf sand plain	24.7
Deep-water sand plain	1.3
Shallow-water coarse sediment plain	6.7
Shelf coarse sediment plain	10.1
Deep-water coarse sediment plain	0.5
Shallow-water mixed sediment plain	0.7
Shelf-mixed sediment plain	0.7
Deep-water mixed sediment plain	1.2
Shallow-water mud plain	0.8
Shelf mud plain	5.1
Deep-water mud plain	9.2

APPENDIX 2 UK Biodiversity Indicators

1a	Trends in populations of selected species (wild birds)
1b	Trends in populations of selected species (butterflies)
2	Plant diversity
3	UK BAP priority species
4	UK BAP priority habitats
5	Genetic diversity (under development)
6	Protected areas
7	Sustainable woodland management
8	Area of agri-environment land
9	Sustainable fisheries
10	Ecological impacts of air pollution
11	Invasive species (under development)
12	Spring index
13	Marine Trophic Index (under development)
14	Habitat connectivity (under development)
15	River quality
16	Expenditure on UK biodiversity
17	Expenditure on global biodiversity
18	Conservation volunteering

Source: *Biodiversity indicators in your pocket 2007*
Defra on behalf of the UK Biodiversity Partnership
www.jncc.gov.uk/biyp