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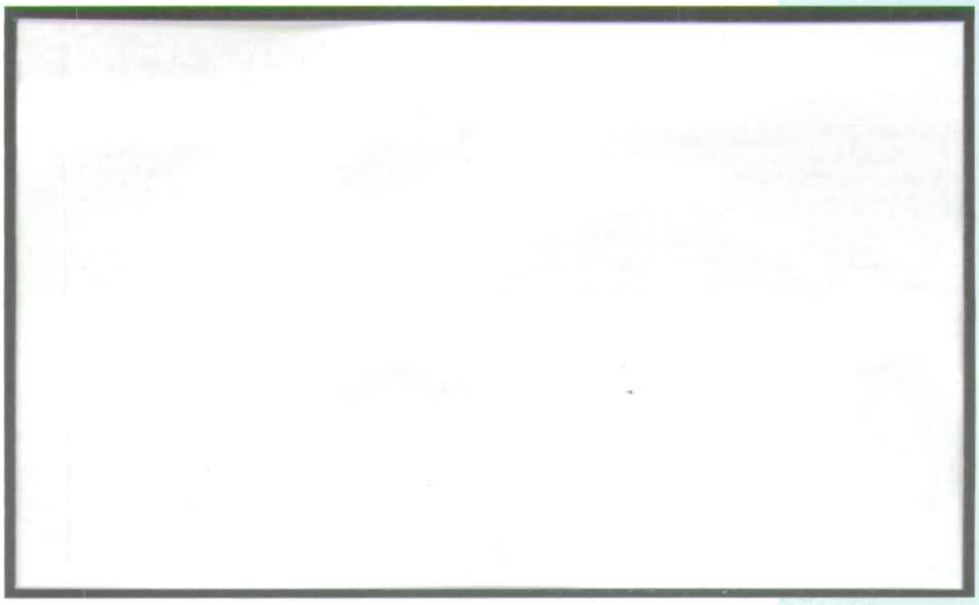

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Formerly the Institutes of Hydrology, Terrestrial Ecology, Freshwater Ecology, and Virology and Environmental Microbiology

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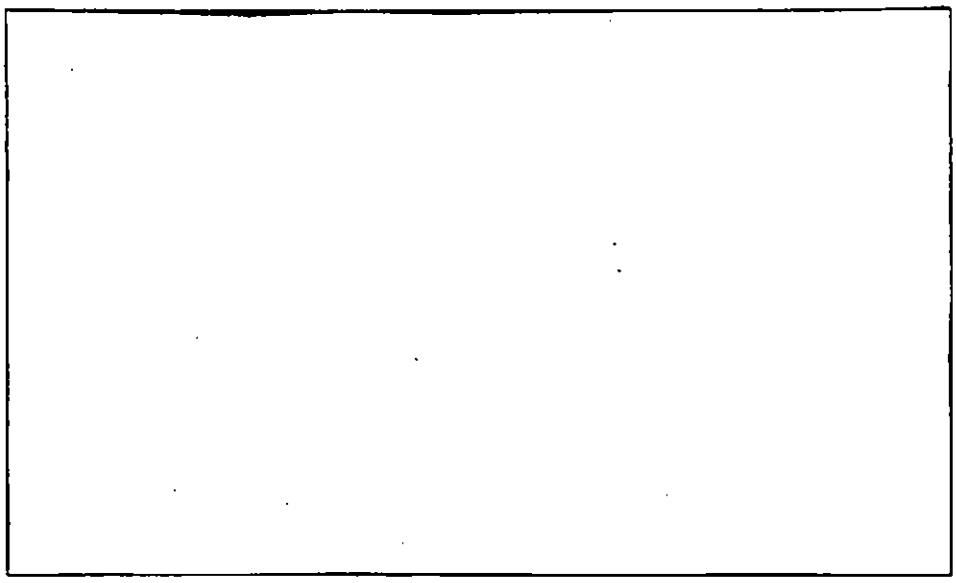

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- To advance the sciences of ecology, environmental microbiology (including virology) and hydrology through high-quality and internationally recognised research leading to a better understanding and quantification of the physical, chemical and biological processes relating to land and freshwater and living organisms within these environments.

- To investigate, through monitoring and modelling, natural changes in the ecological, microbiological and hydrological environments, to assess both past and future changes and to predict man's impact on these environments.

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Countryside Survey 2000

Module 17 - FINDING OUT CAUSES AND UNDERSTANDING SIGNIFICANCE (CS2000 FOCUS)

First Progress Report

C J Barr, D C Howard, L C Maskell, S Petit, S M Smart, R C Stuart & J W Watkins

Centre for Ecology & Hydrology
Merlewood Research Station
Grange over Sands
Cumbria LA11 6JU

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Countryside Council for Wales
Department for Environment, Food & Rural Affairs (Science Directorate)
English Nature
Forestry Commission
Joint Nature Conservation Committee
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MODULE 17:
FINDING OUT CAUSES AND UNDERSTANDING SIGNIFICANCE (FOCUS)

1 BACKGROUND

Objectives

1.1 The objectives of the work programme (as defined in the project specification) are:

1. to undertake further critical analysis of the data arising from CS2000 to answer a series of specific questions concerning interpretation and understanding of the results in terms of ecological processes and land management effects;
2. to acquire and use other contextual data to assist in the analysis, interpretation and assessment;
3. to recommend improvements to survey protocols;
4. to establish and consult a steering group and organise workshops as necessary to ensure that user requirements are defined, clearly understood and addressed;
5. to publish the results in technical reports and concise non-technical summaries and to present the results at a seminar; and
6. to maintain the CS2000 website following completion of the current Module 16 and to facilitate internet publication of the results of ongoing CS2000 projects.

Task, Topics & Questions

1.2 The Module 17 objectives are being met through three main areas of work (**tasks**):

1. Answering specific research **questions** arising from published results.
2. Recommending improvements to survey protocols.
3. Maintaining the CS2000 Website.

1.3 Other stated objectives are being met as part of carrying out and completing these three areas of work.

1.4 It has been agreed that the specific research questions should be aggregated under seven distinct **topics**. Each topic relates to one of the Broad Habitat groups (Chapters) in the CS2000 main report (Accounting for nature), with the exception of one which is of a more over-arching nature. **It should be noted that funding is not currently available for work in Topic 6.**

1.5 The aggregation of FOCUS questions as shown in Table 1.

Table 1. Aggregation of 17 specific research questions under 7 topic headings.

Topic no.	Topic heading	Qu. no.*	Question
T1	Enclosed farmland	1 (1)	Decline in semi-natural grasslands?
		2 (2)	Newly cultivated land in CS2000?
		3	Conservation value of weed species?
T2	Boundary & linear features	4 (10)	Change in hedges 1990, 1993 and 1998?
		5 (8)	Plant diversity, hedge characteristics, land use?
		6 (9)	Value of hedges for birds?
		7 (7)	Hedges that are being gained/lost?
		8	Condition of ancient and/or species-rich hedgerows?
T3	Woodlands	9 (13)	Differences in estimates of woodland cover? Correspondence with AWI sites? Woodland changes - where and how?
T4	Mountain, moor, heath & down	10 (6)	Changes in dwarf shrub heath?
		11 (4)	Increases in fen, marsh & swamp?
		12 (5)	Bracken invasion?
T5	Rivers, streams & standing waters	13 (3)	Causes of overgrown streamside veg'n?
		14 (11)	What and where are the new ponds?
T6	Developed land in rural areas	15 (15)	Habitat creation on developed land?
		16 (16)	Countryside around towns?
T7	Agri-environment schemes	17 (12)	Agri-environment schemes?

* (#) = number in original project specification

1.6 A number of general points apply to the way this suite of questions is being addressed:

1. Where possible, work is making use of external (ie to CS2000) research and survey results, including information and expertise held by the funding consortium.
2. Although this programme of work has been initiated to clarify or expand on some of the results from CS2000, it will still be necessary to include an assessment of uncertainty of these further, second-stage results. Statistical significance is being handled in the same way as in the earlier analyses but, in addition, discussion will be held with interested sponsors and other experts about the policy significance and relevance of any results and conclusions.
3. The work will adopt a flexible approach to the use of geographical frameworks according to customer requirements; ie Environmental Zones, countries, including separate reporting of England and Wales and will investigate the

appropriateness of using other possible geographical breakdowns – regions, catchments and natural areas.

4. Given the timescales involved, some of the vegetation analysis is relatively simple (compared with earlier EcoFact work, for example). It is sufficient to undertake simple analyses, look at changes in individual squares and then apply expert judgement to the interpretation of the results. We will use expertise within the sponsoring organisations. An iterative approach of data exploration, consultation with experts and further analysis may be productive.
5. Where there is uncertainty about the feasibility of undertaking an analysis and generating useful results then the work programme for the topic will include a review stage. This should allow for unpromising lines of enquiry to be halted and new lines of enquiry instigated within the overall scope and timing of the project.

Timetable, Milestones & Reports

1.7 The proposed programme of work (Table 2) has been devised with two guiding principles in mind: (a) the priority attached to the different tasks as indicated by DEFRA and (b) ensuring optimal use of staff and other resources throughout the course of the contract period.

1.8 Table 2 shows a work programme that meets these requirements.

1.9 Progress reports summarising work in individual research topics will be produced at intervals according to the schedule proposed in Table 3. The dates of delivery of interim and final reports are based on discussions of priorities held with DEFRA.

Table 3. Due dates of interim and final reports for each work task.

Task		Progress report	Final report
M	Overall management and liaison	n/a	n/a
T1	Enclosed farmland	15th Mar 2002 & 31st Jul 2002	15th Dec 2002
T2	Boundary & linear features	15th Mar 2002 & 31st Jul 2002	15th Dec 2002
T3	Woodlands	15th Mar 2002 & 31st Jul 2002	15th Dec 2002
T4	Mountain, moor, heath & down	15th Mar 2002 & 31st Jul 2002	15th Dec 2002
T5	Rivers, streams & standing waters	31st Jul 2002	15th Dec 2002
T6	Developed land in rural areas	n/a	n/a
T7	Agri-environment schemes	15th Mar 2002	31st Jul 2002
P	Survey protocols	n/a	15th Dec 2002
W	Maintaining web site	n/a	n/a

Table 2 Detailed work programme (and milestones)

	Priority	2002 Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2003 Jan	Feb	Mar	
Topic 1 Enclosed farmland																	
Q1 Decline in semi-natural grasslands.	H			IR				FR									
Q2 Newly cultivated land in CS2000.	H			IR				FR									
Q3 Conservation value of weed species.	L							IR					FR				
Topic 2 Boundary & linear features																	
Q4 Change in hedges 1990, 1993 and 1998.	H			IR				FR									
Q5 Plant diversity, hedge characteristics, land use.	M							IR					FR				
Q6 Value of hedges for birds.	M							IR					FR				
Q7 Hedges that are being gained/lost.	M												FR				
Q8 Ancient and/or species-rich hedgerows.	L												FR				
T3 Woodlands																	
Q9 Differences in estimates. Changes - where and how.	M/H			IR				IR					FR				
Topic 4 Mountain, moor, heath & down																	
Q10 Changes in dwarf shrub heath.	H			IR				FR									
Q11 Increases in fen, marsh & swamp.	M/H			IR				IR					FR				
Q12 Bracken invasion.	M/H							IR					FR				
Topic 5 Rivers, streams & standing waters																	
Q 13 Causes of overgrown streamside veg'n.	L							IR					FR				
Q 14 What and where are the new ponds.	L										IR		FR				
Topic 6 Developed land in rural areas																	
Q15 Habitat creation on developed land.	L																
Q16 Countryside around towns.	L																
Topic 7 Agri-environment schemes																	
Q17 Agri-environment schemes.	H			IR				FR									
Module 17 report														R			FR

IR = Interim report / FR = Final report

1.10 No delivery dates are given for Topic 6 given the absence of funding for work at this stage. If further funding becomes available, then appropriate reporting dates will be agreed.

1.11 A **Final report** will be produced in draft by 15.12.2002 and in final draft by 15.03.2003, and results will be prepared for inclusion in an **internet website.**

1.12 Depending on the outcome of individual research initiatives, opportunities will be sought to publish results in refereed science journals.

Project team

1.13 The project is led by Colin Barr who has overall responsibility of the completion of research, to time and to budget

1.14 Each work task is led by a member of the Land Use Section at CEH Merlewood, as indicated in Table 4.

Table 4 Work Task Leaders

	Work Task	Leader
M	Overall management and liaison	Colin Barr
T1	Enclosed farmland	Dr Sandrine Petit
T2	Boundary & linear features	Colin Barr
T3	Woodlands	Dr David Howard
T4	Mountain, moor, heath & down	Simon Smart
T5	Rivers, streams & standing waters	John Watkins
T6	Developed land in rural areas	n/a
T7	Agri-environment schemes	Lindsay Maskell
P	Survey protocols	John Watkins
W	Website	Dr Andrew Sier

1.15 As well as Topic Leaders identified above (all of whom are based at CEH Merlewood) a number of other CEH staff are involved in the work, including:

Dr Les Firbank (CEH Merlewood)
Rick Stuart (CEH Merlewood)
Geoff Smith (CEH Monks Wood)
Dr Mike Furse (CEH Dorset)
Dr Lisa Norton (CEH Merlewood)

2 PROGRESS

Management

2.1 The Merlewood-based members of the project team meet formally at fortnightly intervals and minutes are produced; there have been four such meetings so far. Other members of the team are kept in touch through meeting minutes, e-mails and personal visits.

2.2 It is planned to hold a FOCUS workshop back-to-back with the next (and final) Countryside Survey Advisory Group meeting. The date and venue is not confirmed at the time of writing but the joint meeting is expected to be held in April. The workshop will review progress so far and discuss remaining work.

Task 1: Answering specific questions

GENERIC WORK

2.3 Some generic work has taken place to revisit the results of automated allocation procedures used in the analysis of CS2000 data to further investigate particular data records and rules used to allocate change. This has resulted in some generic work that will inform categorisation of changes under several different FOCUS topics. The findings of this study will be reported more fully in the next interim report.

RESEARCH APPROACH

2.4 The research approach used to address each question is included in the original tender document.

INDIVIDUAL QUESTIONS

2.5 There follow reports on progress made on each of the seven questions which were due to be started in the 2001/2 Financial Year.

TOPIC 1 - ENCLOSED FARMLAND

Question 1: What are the likely causes of the decline in extent and condition of semi-natural grasslands (acid, neutral and calcareous)? Why was there a high turnover with improved grassland types? To what extent do gains compensate for losses? What are the implications for conservation of biodiversity and agri-environment management prescriptions?

Policy context

2.6 The following policy context statement has been drafted but has not been circulated for comment:

Permanent grasslands in Britain are largely managed for livestock production so that changes in their extent and condition have been associated with shifts in the economic viability and intensity of agricultural management over time (Hopkins &

Hopkins 1994). Unimproved grasslands, particularly in lowland Britain and including in-bye on upland farms, have declined in extent at least since the plough-up campaign of WWII (Hopkins et al 2000) during which about 35% of permanent grassland was converted to sown ley or crops (North 2000). Since then there has been a gradual decline in extent and condition of the remaining unimproved grasslands with loss rates of unimproved lowland grasslands that were still estimated at between 2-10% pa in parts of England in the 80s and 90s (Jefferson & Robertson 1996).

The post war period of intensification was driven by a strategic desire for self-sufficiency (eg. HMSO 1975) and assisted by the increasing mechanisation of agriculture and the availability of cheap mineral fertiliser (Hopkins et al 2000). It was only from the 80s onwards that the threat that agriculture posed to the countryside at large was realised via the Wildlife & Countryside Act (1981) and the Agriculture Act (1986). The latter imposed a statutory duty to balance the needs of crop and livestock production with conservation and also led to the establishment of the first tranche of ESA in 1987.

The three BH considered in this FOCUS question incorporate five Priority Habitats – Lowland meadows, Upland hay meadows, lowland calcareous grassland, Upland calcareous grassland and Lowland dry acid grassland. Unenclosed upland grazings are excluded from the five, so that the increases in area of upland acid grassland that may have resulted from overgrazing of Bog and Dwarf Shrub Heath will not offset any loss or degradation across the constituent PH.

NEUTRAL GRASSLAND

CS2000 results showed statistically significant reductions in area in Northern Ireland and in the marginal upland and north western lowland zone 5 in Scotland. Relatively large gains were seen in zones 1 and 2 in lowland England & Wales although these were not significant. High turnover probably contributed to lack of statistical significance in places.

An increase in mean Ellenberg fertility score across the GB plot sample was seen for Y plots only indicating the vulnerability of smaller fragments of Neutral Grassland to elevated fertility. However, a significantly decreasing light score in the same sample suggests that lack of disturbance also affected the population of less improved grassland fragments. This process can amplify the effects of increased fertility on terrestrial vegetation hence, small grassland fragments seem doubly susceptible to processes that can reduce the density richness of characteristics species. Not surprisingly, the proportion of competitive plants went up and the proportion of stress-tolerators decreased in the same GB-wide, Y plot sample (CS2000 web-tables; Haines-Young et al 2000). Where Neutral Grassland was sampled by the X plots in fields and usually larger parcels, no change in light score was observed while Ellenberg fertility score only increased in the England & Wales sample suggesting relative stability may characterise larger Scottish stands of the BH (McGowan et al 2001).

ACID GRASSLAND

The total area of Acid Grassland was estimated to have declined throughout GB and NI between 1990 and 1998, however the only statistically significant changes were a 17% decline in England & Wales, which was largely a function of a statistically significant decline in upland zone 3, and a 15% decline in the lowland zone 4 in Scotland.

Analyses of change in vegetation condition measures saw GB-wide reductions in proportion of stress-tolerators and increased average proportions of weedier and more competitive species (CS2000 web-tables). Increases in Ellenberg fertility score also imply changes in species composition towards vegetation more typical of heightened fertility. Interestingly though, these changes accompany an increase in mean species richness at the GB-level.

CALCAREOUS GRASSLAND

Between 1990 and 1998 significant reductions in extent of calcareous grassland were seen in England & Wales and in Scotland. These losses were estimated as 9,000ha (95% CI 200ha – 21,800ha) and 5,000ha (95% CI >0 – 14,400ha) respectively (CS2000 web tables). Gains to calcareous grassland were relatively small over the eight year period as would be expected given the long time scales needed for development and species packing in the best examples (eg. Rodwell 1992; Gibson & Brown 1991). A gain amounting to 5% of the 1990 stock was seen at the expense of Arable & Horticultural implying restoration management and re-seeding, while 23% of the 1990 stock of Calcareous Grassland was lost mainly to Improved and Neutral Grassland (agricultural improvement?) and to Arable & Horticultural (ploughing up?).

The number of CS vegetation plots that fell in Calcareous Grassland in either 1990 or 1998 was too small for meaningful analyses of change in vegetation condition. However, movement between the plant community types of the Countryside Vegetation System (Bunce et al 1999) showed local losses to more improved grassland and to less disturbed scrub. Hence, the signals in this very small dataset are consistent with lack of appropriate management and eutrophication.

In summary, Question 1 of Topic 1 concerns changes in area and condition of three semi-natural grassland BH. Together, they cover five priority habitats each of which has published area targets for maintenance and restoration by 2010. If the change in extent of these grasslands is to be properly evaluated in terms of action plan objectives the representation of the five Priority Habitats across the Countryside Survey sample must be assessed. Hence further work is required to :

a) calibrate the vegetation condition and therefore assess the conservation value of stock gained and lost over time,

b) assess the representation of the five constituent Priority Habitats by matching with NVC plant community data,

c) disaggregate the patterns of turnover and net increase by geographic region and by donor or recipient broad habitat,

d) *to analyses vegetation response in terms of drivers such as N deposition and sheep density (extension of activities currently underway as part of a GANE funded project).*

e) *based on outcomes from previous steps, to make an assessment of the importance to biodiversity of both lost and newly recruited areas of each of the grassland BH and to estimate the importance of different causes of change.*

Progress

2.7 A thorough policy literature review has been undertaken and the main findings have been written up in a draft report (which includes some of the material above). Reference data from the ESA archive is underway.

2.8 A detailed research plan has been drawn up which builds on the approach outlined in the contract tender document.

2.9 The GANE analysis is underway.

Question 2: What was the amount and character, in term of Broad Habitat, parcel size and location of land that was recorded as newly cultivated in CS2000?

Policy context

2.10 The following policy context statement has been drafted and sent to DEFRA (WCFM) for comment.

The 1990s have been characterised by important modifications in the policy context of agriculture, notably the implementation of the MacSharry reforms (1992) and the development of Agenda 2000 (for a review see Winter and Smith, 2001). Market trends have fluctuated widely, with an increase in farming income in the early 1990s followed by a fall in the economic returns to agriculture from 1996 onwards. In response to this context, Haines-Young and MacNally (2001) suggest in their review on drivers of countryside change that the British agriculture in the 1990s experienced three different processes: consolidation, specialisation and diversification. One trend of specialisation is for example the increase in cereals farm numbers observed in some areas of Britain (Kiddle, 2001) suggesting that, although the overall area agricultural land decreased, farmers have not halted expansion of arable area. The loss of permanent grasslands to cereals and other crops is a trend noted in several other studies (see Haines-Young and MacNally, 2001, p29).

In parallel, governments have recently had to implement the Environmental Impact Assessment[1] for projects involving the conversion of uncultivated land and semi-natural areas into intensive agricultural production (part of Directive 85/337/EEC as amended by Directive 97/11/EC, or 'uncultivated land provisions' in the UK).

[1] *Regulations 2001 (England) – Statutory Instrument 2001 – No 3966.coming into force 1 February 2002 - http://www.hmso.gov.uk/si/si2001/20013966.htm#n*

Consultation exercises were carried out in 2001[2] and highlighted a number of questions related to i) the identification of projects where EIA will be required and the need for "a short list of illustrative projects updated in the light of experience" or "a comprehensive list of probable projects" and also ii) a definition of what might constitute "significant environmental effects".

Uncultivated lands identified in the consultation exercises were:

1. *Permanent grassland, defined as grassland which has been in grassland since at least 1991 and has not been reseeded or improved to an extent that plant characteristic of unimproved grassland constitute less than 20% of the sward by area. This definition corresponds to the Broad Habitats types "neutral grassland", "acid grassland" and "calcareous grassland" of the Biodiversity Action Plan.*
2. *Heathland and moorlands: this category corresponds to the Broad Habitats types "Dwarf shrub heath", "Bracken", "Fen, marsh and swamp" and "Bog".*

Estimates of the amount of newly cultivated land in the UK, and in countries within the UK, have been derived from successive Countryside Surveys and related projects since 1984 (see http://www.cs2000.org.uk/). However, there is a lack of information as to the characteristics of parcels that were converted into cultivated land in term of use and ecological condition.

This piece of work will examine aspects of the CS databases where uncultivated land and semi-natural areas has been converted into intensive agricultural production between 1990 and 1998. It will quantify for each Broad Habitat type the amount of land that was converted into cultivated land and describe the condition of habitats that have been converted and for arable land, the characteristics of the new parcels. Finally, this project will document the spatial characteristics of parcels of land converted in term of adjacency and overall composition of the 1km square.

References

Haines-Young and MacNally (2001)
http://www.cs2000.org.uk/Final_reports/M14_final_report.pdf

Kiddle (2001) http://www.cs2000.org.uk/Final_reports/M14_final_report_App6.pdf

Winter and Smith (2001)
http://www.cs2000.org.uk/Final_reports/M14_final_report_App4.pdf

2.11 While broadly accepting the statement, DEFRA will be consulting more widely. It has become clear that this question has been interpreted in a different way by the user community. One important point is that users are not just concerned about conversion to arable but, rather, about loss of uncultivated land due to agricultural

[2] *The Ministry of Agriculture, Fisheries and Food and The Scottish Executive Rural Affairs Department have issued a consultation paper on implementing the uncultivated land and semi-natural areas provisions of the Environment Impact Assessment directive - closed on 31/08/01 - http://www.scotland.gov.uk/consultations/agriculture/eia/eia.pdf.*

improvements generally and this can include conversion to improved grassland. A detailed examination of the field codes will be needed to determine which of these can be interpreted in terms of different types of agricultural improvement, not simply changes between Broad Habitat types.

Progress to date

Conversion to Arable (BH4)

2.12 Analysis of the CS databases showed that newly arable parcels came from the conversion of a diverse array of Broad Habitat types. As expected, a large amount of parcels came from the conversion of semi-natural grasslands parcels (BH6,7 and 8) i.e. 'permanent grassland' of the EIA and a very limited amount of parcels of the 'heathland-moorland' category of the EIA (mainly BH9 and 11). More surprisingly, we also found some cases of conversion from woodlands (BH1 and 2), boundaries (BH3) and built-up areas (BH17).

2.13 The recorded changes were validated manually in a systematic way.

- Conversions from semi-natural grasslands (BH6,7 and 8) were confirmed with very few exceptions.
- In a majority of cases, conversions from woodlands (BH1 and 2) did not correspond to real changes; it appeared that, for a number of different reasons, some parcels were allocated to woodland in 1990 while they should have been allocated to arable. The results of the validation exercise were fed back to the central allocation table.
- In the case of boundaries (BH3), changes often corresponded to the conversion of tracks to arable land as a result of the disappearance of a linear feature between 1990 and 1998. This is related to the definition of tracks, which were allocated track if bordered by two linear features and allocated to the adjacent Broad Habitat type if not bordered by a linear feature on at least one side.
- The validation of conversions from built up areas (BH17) is not seen as a priority and therefore will be carried out at a later stage, providing time resources are available. Those conversions will not be included in the following analyses.

2.14 The validated dataset is now ready to be used to i) provide national and regional estimates of change between Broad Habitat types ii) examine the primary codes of the new arable parcels iii) analyse the Broad Habitat composition of squares where change occurred and iv) analyse change in term of vegetation.

2.15 Information on the condition of semi-natural grasslands in 1990 that were converted to arable land in 1998 was extracted from the CS databases. We examined attributes such as primary codes (fertile grassland, calcareous grassland, acid grassland, tall herb vegetation, ley) and other available information on the general condition and use (neglected, abandoned, unmanaged, grazed, mown, silage, hay, no apparent use). This information is ready to be converted to national and regional estimates

Conversion to Improved grassland (BH5)

2.16 This work was initiated after feedback from DEFRA on the policy context statement (see 2.8) but is additional to work costed in the original CEH tender (and has involved some duplication of field record searches).

2.17 As with new arable, new improved grasslands came from a broad array of Broad Habitat types.

- A large number of converted parcels came from the 'permanent grassland' category, mainly neutral and acid grasslands (BH6 and 8). The extraction of attribute information is under way. Because manual validation is very time-consuming, it will be targeted to parcels were attribute information is missing/insufficient.
- It also appears that a substantial number of parcels allocated to 'Fen, Marsh, Swamps' (BH11) and 'Bracken' (BH9) were converted to improved grasslands. These changes will be examined thoroughly as they correspond to the 'heathland-moorland' category of the EIA.
- The results of the validation exercise performed in 3.1 can help focusing our effort for the remaining Broad Habitat types that were converted. It is likely that a sub-sample of conversions from woodland (BH1 and 2) will be validated. Conversions from boundaries and built-up areas will not be examined for the reasons given in 3.1.

2.18 This validation work is continuing.

TOPIC 2 – BOUNDARY AND LINEAR FEATURES

Question 4: What evidence is there that length of hedges declined between 1990 and 1993 and increased between 1993 and 1998 in England and Wales?

Policy context

2.19 The following policy context statement has been drafted and forwarded to DEFRA Science Directorate for comment where it was seen as broadly acceptable:

Estimates of the length of hedgerow in the UK, and in countries within the UK, have been derived from successive Countryside Surveys and related projects since 1984. Results are given in a number of papers and reports (and, most recently, web sites).

The most recent report was 'Accounting for nature: assessing habitats in the UK countryside' (Haines-Young et al. 2000) which presents results from Countryside Survey 2000. In this report it is stated that, in contrast with the period 1984 to 1990, there is no statistically significant change in the length of hedgerows in England and Wales or in Scotland, between the two most recent Countryside Surveys in 1990 and 1998. There was a reported loss in N Ireland.

However, the report also includes reference to a partial survey in England and Wales in 1993 which visited a sub-sample of survey sites and recorded hedgerow

length. The results of this survey showed a continuing reduction in hedgerow loss. The 'Accounting for nature' report says "Although there was no net change for hedges in England and Wales over the full period from 1990 to 1998, there is some evidence from the interim survey of hedges in 1993 that net losses, recorded in the first part of this period, 1990-93, were reversed in the latter part. The apparent increase in hedges between 1993 and 1998 needs to be confirmed by a more detailed analysis of the data from 1993, and comparison with other sources of information on hedgerow planting within agri-environments schemes.".

Given the introduction of policy measures in the early 1990s [which?] designed to halt the decline of hedgerows, in both quantitative and qualitative terms, it is important to know from a policy perspective whether there has been a real increase in the length of hedgerows in England and Wales between 1993 and 1998, or whether the results from the 1993 survey are unreliable and are giving a false picture of trends.

This piece of work will therefore re-examine aspects of the databases from the 1990, 1993 and 1998 surveys (including case studies of individual sites) and will also re-assess the statistical reliability and robustness of the results, taking into account the construction of the sampling frame and the adequacy of feature definitions, used in the three surveys. The outputs will give a definitive statement on trends in hedgerow change in the 1990s in England and Wales.

Progress to date

2.20 Here, we have reviewed progress under the headings used to describe the scientific approach, as specified in the original tender.

All relevant analyses from CS2000 Module 1 will be re-visited and re-validated, especially in relation to the 'allocation procedure' used to categorise each hedge.

2.21 Spatial data held in the GIS for linear boundary features from the 1993 Hedgerow survey had been previously combined with the 1990 and 1998 data set. This combined data set was checked against the original 1993 data set for consistency of length and attribute data per line.

2.22 This combined data set now enables a time series analysis per line. Automated linear boundary feature allocation programmes specifically for 1990, 1993 and 1998 years were reviewed and re-run. Where 1990 and 1998 automatic allocation had not changed, but 1993 allocation differed, the recorded field codes were checked in the original field records. A manual allocation override was applied where the 1998 surveyor had recorded codes that were interpreted as there having been a change from the 1993 allocation. This was the case in 979 out of 13772 records (7%). Validation is continuing.

Exploration of the relationship between differences in stock, change and change using different sample sizes.

2.23 Comparison will be made between the following stock and change estimates:

- At the time of the 1993 Hedgerow Survey the sub-sample of 108 squares were allocated to amalgamated land classes. National estimates will be now be

produced from this population for 1990, 1993 and 1998.

- The 1990 and 1998 full sample size of surveyed squares are to be allocated to these same amalgamated land classes and national estimates will be produced. These will be compared to the published Module 1 results to assess the effects of amalgamating land classes.
- The mean change per amalgamated land class for 1990-93 and 1993-98 derived from the 1993 sub-sample of 108 squares will be applied to the further squares in England & Wales to create a boosted sample size from which national estimates will be produced.

A number of 'case studies' (a sub-sample of the overall population) will be examined in terms of the codes used to describe the same hedge at each of the three survey dates, and how these codes have subsequently been used in data analysis.

2.24 A complete dataset has been created with allocations per feature in a time series for 1990, 1993 and 1998.

2.25 Two datasets of a sub-sample of the overall population are being created of codes used to describe the same hedge at each of the three survey dates. The first has been created manually from the actual surveyors records in the Field Assessment Booklet. The second is being created from Database queries and will be cross-checked to the manually created dataset for validation. From these data changes in codes used and /or changes in allocation will be identified.

TOPIC 3 – WOODLANDS

Question 9: Why are there differences in estimates of stock of woodland cover and changes in woodland cover obtained from Forestry Commission surveys and CS2000 (including LCM2000)? How are Ancient Woodland Inventory sites represented in the CS2000 field survey sample and LCM2000? What evidence is there in CS2000 for the location and reasons for changes in woodland cover?

Policy context

2.26 The following policy context statement has been drafted but has not yet been circulated for comment:

It can be argued that woodland is the most important Broad Habitat as it represents what would be the climax vegetation covering most of Britain if man were not present. In principle, it may therefore reflect the extent of remaining unmodified natural habitat and consequently be of especial interest to conservationists. However, little, if any, woodland is native, natural or undisturbed; large areas are used for the production of timber, wood pulp, and energy coppice, etc on the one hand and recreation (e.g. hunting, walking and cycling) on the other. Moreover, woodlands are important biodiversity resources, and perform environmental functions such as carbon sequestration, local climate modification and conservation of soil. They are receptors for a range of atmospheric pollutants and may buffer,

trap or modify the passage of pollutants on to surrounding habitats as well as reflecting the adverse consequences themselves.

The Government has recognised the importance of woodlands and targeted policies at increasing the area under trees with a statement "the most significant alternative land use in the next twenty years is likely to be forestry"[3]. The initial aim of increasing woodland area in Great Britain was set at 33,000 ha per year. The twentieth century hierarchy of use of rural land being the most productive for agriculture, less productive for forestry and un-productive for nature and recreation is breaking down. There is encouragement to plant trees on more productive land and just over a third of the target for new planting (12,000 ha per year) would be under the Farm Woodland Scheme.

Statistics describing woodland are essential to monitor the amount of this resource for its wide array of uses. Monitoring is also needed to assess progress and success in the achievement of the aims of these policies. However, changes seen in woodland area can be misleading without reference to turnover and condition. An increase in area of woodland may mask deleterious effects such as a loss of native woodland flora and a shift in soil quality. It is also important to ask what land cover and use has been lost to woodland. If the gain is predominantly from intensive agriculture, it may be of no ecologically negative consequence, but other threatened habitats may also be lost. Examination of the pattern, structure and history of the parcels in the landscape should indicate the shifts in land use and demonstrate the success of policy to steer changes in management.

A variety of organisations produce statistics describing woodlands:

- *The Forestry Commission produces the standard definitive statistics describing woodland in Britain. Annual reports are produced describing the state of woodland and a national database is maintained (the National Inventory of Woodland Trees - NIWT) and resurveyed approximately every 15 years.*
- *Other organisations such as the nature conservation agencies may present figures on ancient woodlands and special interest groups (e.g. the Council for the Preservation of Rural England) may occasionally produce estimates.*
- *Countryside Survey records all types of land cover in rural Britain including woodland and publishes statistics that are apparently equivalent to Forestry Commission figures once every six to eight years. The Survey records all elements of the landscape, allowing interpretations to be made about the fluxes between different land uses. Moreover, it includes valuable information about the environmental condition from vegetation and soil samples which again is set in context of the wider landscape.*

The figures do not agree. It would be surprising if the estimates were exactly the same, as contrasting methods and definitions are used. For example, research is needed to identify how well the Countryside Surveys can provide data according to definitions of Ancient Woodland, both in terms of extent and quality.

[3] House of Commons 1990 Agricultural Committee second report Land Use and Forestry volume 1 (Session 1989-90) HMSO London

And yet national data are required on forests. It is therefore important to identify the differences in these methods of estimation, partition the causes of difference and identify their significance in the use of the statistics.

Progress to date

2.27 When answering the question, the different users and values discussed in the policy relevance need to be taken into account. The question in Topic 3 can be divided into three distinct parts each of which has its own associated issues. Dealing with the parts separately:

a) Why are there differences in estimates of stock of woodland cover and changes in woodland cover obtained from Forestry Commission surveys and CS2000 (including LCM2000)?

2.28 To answer the question in a way that is meaningful and valuable for different users of information, a number of distinct questions need to be addressed. What is the size and importance of the difference? Are the values statistically different? Where in GB are the differences greatest? At what resolutions are the estimates made and are they appropriate for the policy uses? Who is using the information? What are the potential causes for differences in statistics? Unless all these questions are addressed, the differences between the two datasets will prevent them being used together.

2.29 The potential causes for differences are worth investigating even if the differences are not statistically different as they may aid the information to be appreciated. There are several potential causes for difference:

- Insufficient or inappropriate sample (specifically with Module 1 field survey)
- Inappropriate spatial resolution (mainly with LCM2000)
- Datasets that are not contemporary
- Incompatible categories or contradictory use of terms
- Errors in data collection, processing or analysis
- Lack of co-registration of maps

2.30 Each of these questions will be answered. Comparisons will be made with the Forestry Commission's current National Inventory of Woodland Trees (NIWT). Direct comparison. The simplest approach would be to create a three-class map (LCM2000 only, external dataset only and both) at the 'LCM2000 Target and Subclass level' if possible (dependent on the thematic detail of the other datasets). A map will be created for each of the comparisons to be made. Using the three-class map, a set of analyses will be undertaken:

- Summary statistics of each class,
- Regionalised summary statistics,
- Patch size and shape for each class,
- Adjacency of different classes,

strengthen the interpretation. The Drivers of Countryside Change[4] report identifies the different schemes and the signals coming through from the shifts observed between 1990 and 1998. One of the important points recognised was the breaking of the traditional concept that aforestation will only take place on unimproved land of low agricultural value. By identifying the underlying soil type associated with each parcel that has become afforested, a crude agricultural value can be assigned.

2.35 The report also comments on the subtle changes in size and shape of woodland parcels reflecting general shifts in management; pattern measures can be applied to demonstrate the effects. An analysis of changes in ownership can also be carried out.

Progress

2.36 An arranged meeting with the Forestry Commission (20th March) should help formalise a hypothesis about the consequences of change in management on woodland structure and form.

TOPIC 4 - MOUNTAIN, MOOR, HEATH AND DOWN

Question 10: What are the possible causes for change in extent and condition of dwarf shrub heath habitats? Are there geographical variations between environmental zones? Is there any evidence for positive effects of conservation measures?

Policy context

2.37 The following policy context statement has been drafted but has not yet been circulated for comment:

British obligations for conservation objectives relating to Dwarf Shrub Heath vary in their applicability to designated areas or the wider countryside as well as their emphasis on site safeguard, enhancement or maintenance. Management agreements drafted under the provisions of the Wildlife and Countryside Act (1981), CROW (2000) and legislation that implements the EEC Habitats Directive all focus activity onto designated SSSI and NNR designed to afford protection as well as positive management to the best examples of habitat types across Britain. In 1999 about 16% of upland heath was designated as SSSI (includes NNR) in England and Wales and 15% in Scotland (UHAP, 1999). Outside these designated sites, obligations for habitat and species conservation fall under the UK Biodiversity Action Plan that sets out a strategy for conservation of specific habitats and species. Under the UK BAP Dwarf Shrub Heath is divided into two priority habitats, upland and lowland heath, each covered by their own Habitat Action Plans[5]. The total expenditure envisaged in implementing objectives under both plans is around 250K for the period up to 2010 (UHAP 1999; LHAP 1995).

[4] Haines-Young, R. and McNally, S. (2001) *Drivers of Countryside Change Final Report* CEH contract Report to DEFRA

[5] See action plan texts at http://www.ukbap.org.uk/Library/library_1.htm#P3

- Sliver patch detection.

Progress

- NIWT has been acquired to analyse with the Countryside Survey field survey (Module 1) and Land Cover Map 2000.
- A meeting with the Forestry Commission is planned for 20th March 2002.
- Preliminary analysis has been carried out to sample NIWT using the same stratification and sampling intensity as in CS2000 module 1.
- Initial high level comparisons have been made between NIWT statistics and CS2000 Module 1

b) How are Ancient Woodland Inventory sites represented in CS2000 field survey sample and LCM2000?

2.31 Unlike the previous question relating to the extent of woodland Broad Habitats, the second part asks more about the potential of Countryside Survey (CS) information to provide context and offer a way of monitoring change. The Ancient Woodland Inventory is a census description of Great Britain (broken down and managed by different national agencies) mapping all sites; by definition new sites cannot be added, but sites can be lost or their quality may decline.

2.32 The first investigation will be the matching of the AWI with both field survey maps and the Land Cover Map 2000 (LCM2000); it may be possible to also compare with the AWI with the NIWT. From both CS datasets, the matching parcels will be used to compare characteristics with other woodland parcels to identify potential indicators. The efficiency of the indicators and confidence in there application will be assessed.

2.33 CS information will also be used to identify the landscapes in which ancient woodland sites are found, relating surrounding land cover, landscape features (such as hedgerows) and spatial patterns. The vegetation plots recorded in ancient woodlands will also be compared to those in other woodland types.

Progress

- The Ancient Woodland Inventory digital map has been acquired from Scottish Natural Heritage and English Nature; the dataset has been requested from the Countryside Council for Wales.
- Discussions within the research group have taken place over the methods of analysis.

c) What evidence is there in CS2000 for the location and reasons for changes in woodland cover?

2.34 The repeated field visits to the same locations is the best method of identifying where change has occurred. Some inferences about the causes of change may be made from the information collected in the field, but ancillary information may

Since entry into the EU over 30 years ago, livestock (largely sheep) production in the British uplands has been assisted by a variety of price support mechanisms implemented as part of the Common Agriculture Policy. The most important of these measures in terms of impacts on upland heath are the Hill Livestock Compensatory Allowance Scheme (HLCA), Sheep Annual Premium (SAP), Suckler Cow Premium (SCP) and the Beef Special Premium (BSP). Given the predominance of sheep grazing in the British uplands, the HLCA scheme has been probably the most important policy driver. This has operated since 1975 in the Less-Favoured Areas that contain the majority of upland heath in Britain (UMHB, 2002).

Until the MacSharry reforms of the CAP in 1992 neither the HLCA or SAP schemes carried any sanction against the ecological effects of over-grazing (UMHB, 2002; Winter & Smith 2000). Since support was available on a per animal basis, the scheme acted as an incentive to increase flock size (Fuller & Gough, 1999). There is now considerable evidence that, since 1975, the impact of this policy driver has been to increase the extent of moorland and grass/heath. Certainly, evidence from analyses of change in plant species composition between 1978 and 1998 are partly consistent with these effects although difficulties still remain in teasing apart the role of additional potential drivers such as deer grazing and pollutant deposition (see below). Also the HLCA driven rate of increase in sheep numbers tailed off in the late-80s to be replaced by either a lower rate of increase or regional stability through the 90s (Fuller & Gough 1999; Kiddle 2000).

In response to on-going concerns about subsidised over-grazing, the headage-based HLCA scheme was replaced with the area-based Hill Farm Allowance scheme in 2001 (UMHB, 2002). It is hoped that this change should also help alleviate the particular issue of over-grazing on upland commons (UHAP, 1999).

The conservation and agri-environment schemes relevant to conservation of the Dwarf Shrub Heath Broad Habitats include (a) the Environmentally Sensitive Area Scheme (b) Countryside Stewardship, Countryside Premium and Tir Cymen; and (c) Life Enhancement Schemes

CS2000 estimated that Dwarf Shrub Heath made up 6.4% of the land cover of GB in 1998 (Haines-Young et.al. 2000). Proportional cover was highest in Scotland (12.5%) where it was the third most abundant category behind Improved Grassland (13%) and Bog (25%). Between 1990 and 1998 the total British extent of Dwarf Shrub Heath did not show a statistically significant change. However, a significant 8.3% decline in extent was estimated for zone 5[6] in Scotland. This decline amounts to an estimated loss of 21,000ha (SE +/-14,000) out of a total of 220,000ha in the zone. Net losses were also estimated for zone 6 and zone 2 while increases were estimated for zones 1, 3 and 4. Although none of these net changes were statistically significant this may well reflect high turnover between Broad Habitats leading to low statistical power. Because high turnover implies major habitat change, lack of statistical significance may well conceal important differences in condition between transferred stock (see below).

6 ..marginal land at sea level and intermediate altitudes, mostly in the west and including the Scottish islands

The starting point for the FOCUS follow-up work on vegetation condition is the existing analyses of changes in vegetation condition indicators between 1990 and 1998. These results allow an initial assessment of floristic change in the Dwarf Shrub Broad Habitat in terms of movement along gradients of disturbance and fertility as well as changes in species richness. At the GB level the balance of plant community types within the broad habitat saw grass-dominated moorland increase at the expense of the cover of heath/bog continuing a trend seen between 1978 and 1990 (Bunce et al 1999; Firbank et al. 2000). Mean Ellenberg fertility score also increased in Dwarf Shrub Heath between 1990 and 1998 but only in the England with Wales sample (Haines-Young et al 2000). However, in Scottish Dwarf Shrub Heath there was a significant reduction in mean species richness while the index conveying the proportion of Grime's stress-tolerators decreased (McGowan et al 2001; Haines-Young et al 2000).

In summary, the Dwarf Shrub Heath broad habitat is made up of two priority habitats, both of which have published area targets for maintenance and restoration by 2010. The losses and turnover reported in CS2000 must be evaluated in term of these objectives. This requires further work to :

a) calibrate the vegetation condition and therefore assess the conservation value of stock gained and lost over time,

b) to disaggregate the patterns of turnover and net change by geographic region, by donor or recipient broad habitat and, where possible, by areas under management agreement versus undesignated land,

c) to analyses vegetation response in terms of drivers such as N deposition and sheep density (extension of activities currently underway as part of a GANE funded project).

d) based on outcomes from previous steps, to make an assessment of the importance and causes of change.

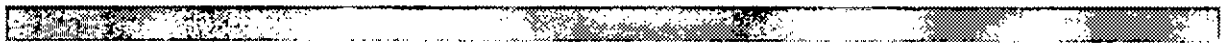
Progress

2.38 A thorough policy literature review has been undertaken and the main findings have been written up in a draft report (which includes some of the material above). Reference data from the ESA archive is underway.

2.39 A detailed research plan has been drawn up which builds on the approach outlined in the contract tender document.

2.40 The GANE analysis is underway.

2.41 Contacts have made with relevant experts including Dr Angus MacDonald (SNH) and Professor John Milne (MLURI) (who have also provided useful advice for the context statement, above).



mapped as Improved, Neutral or Acid Grassland, Bog or Conifer in 1990. These types of shift imply the involvement of increased seasonal flooding, clear-felling and possibly rush expansion in wetter grasslands. Of the 18% of GB stock that was lost from Fen, Marsh & Swamp, most was gained by Improved, Neutral or Acid Grassland and Bog (Haines-Young et al 2000). Further exploration of the robustness and causes of parcel-based change in Fen, Marsh & Swamp area forms a core component of this topic question.

Existing analyses of change in vegetation condition between 1990-'98 were carried out on three subsets of repeat plots and each type of analysis can help address a different type of question about change. 'Stay-same' analyses examined change in vegetation condition in plots that remained in the same Broad Habitat over the eight year period ie. stock carried over. 'Stay-same' results for Fen, Marsh & Swamp showed that there had been a statistically significant reduction in light score in Scottish X plots implying reduced disturbance and greater shade in larger stands. In addition, increases in substrate fertility were implied by Ellenberg fertility score increases in Scottish Y plots (ie. small fragments of Fen, Marsh & Swamp) and in Y plots in the western, lowland zone 2 in England & Wales. No significant changes in wetness score were detected, suggesting an absence of change in patterns of seasonal inundation in Fen, Marsh & Swamp stock carried over despite possible change in fertility and disturbance regime (CS2000 web-tables).

'90-based' analyses focussed on change from a common Broad Habitat starting point but plots could have changed Broad Habitat over time. Results for Fen, Marsh & Swamp tended to show the same pattern as the 'stay-same' analyses. Most statistically significant changes were seen in smaller habitat fragments (Y plots) and these shifts suggested reduced disturbance and increased fertility. As would be expected if some stock had been lost to typically drier Broad Habitat, wetness score significantly declined across the GB population but again, only in Y plots (CS2000 web-tables).

The 'turnover' analyses contrasted the condition of new stock in 1998 with stock present in 1990 but absent in 1998. For Fen, Marsh & Swamp the only significant difference in Ellenberg scores was for higher fertility scores in Y and X plots in 1998 based on the total GB population (CS2000 web-tables).

In summary, the Fen, Marsh & Swamp broad habitat is made up of three quite different priority habitats, each of which have published area targets for maintenance and restoration by 2010. The mapped extent of the Broad Habitat in 1990 and its increased area in 1998 is also likely to include borderline areas of rush-dominated rough grazing that reflect real difficulties in discriminating Fen, Marsh & Swamp from grassland broad habitats in the field. If the increase in Fen, Marsh & Swamp is to be properly evaluated in terms of action plan objectives the representation of the three Priority Habitat across the CS sample must be assessed. Hence further work is required to :

f) calibrate the vegetation condition and therefore assess the conservation value of stock gained and lost over time,

g) assess the representation of the three constituent Priority Habitats by matching with NVC plant community data,

Question 11: Where did increases in Fen, Marsh & Swamp occur? What are the possible causes? What are the botanical characteristics of these new areas? What are the wider implications for biodiversity?

Policy context

2.42 The following policy context statement has been drafted but has not yet been circulated for comment:

Most of the largest areas of Fen, Marsh & Swamp in Britain are already designated as SSSI and NNR, Special Protection Areas (SPA) or Wetlands of International Importance under the Ramsar Convention. Together these designations under domestic and European driven legislation can cover sites supporting all three of the Priority Habitats that constitute the Broad Habitat.

Outside designated sites, obligations for habitat and species conservation fall under the UK Biodiversity Action Plan that sets out a strategy for conservation of specific habitats and species. Under the UK BAP Fen, Marsh & Swamp covers three priority habitats, each covered by their own Habitat Action Plans. These are Purple moor grass and rush pastures (also known as Culm Grasslands), Fens and Reed beds. The biological interest features differ to some extent between the Priority Habitat and this is reflected in the action plans for each. For example, reed beds are among the most important habitats for birds in the UK so that variation in importance of reed bed tends to vary with size of site and geographic coincidence with the range of resident or visiting bird species. Fens, are associated with a range of scarce plants and invertebrates that vary greatly in their geographic restriction and ecological preferences. Thus the valley fens of the New Forest have a different character and associated biota than the Norfolk valley fens, which again differ from the topogenous base-poor fens of the Scottish Insh Marshes (Rodwell 1991; Fojt 1994). Purple moor grass and rush pastures also comprise a particular range of plant communities valued for their botanical as well as bird and invertebrate interest. Again, the largest known extents of these tend to have been designated although in many instances this has not guaranteed protection from threats to the condition of the site (UK biodiversity Steering Group 1995)

In 1998 Fen, Marsh & Swamp was estimated to make up 2.3% of GB land cover with 66% of this being in Scotland (CS2000 web-tables). CS2000 reported three statistically significant changes in area of Fen, Marsh & Swamp between 1990-'98 (Haines-Young et al 2000). A 27% increase in England with Wales, an 18.7% increase in Scotland and an 18.6% decrease in Northern Ireland. As a proportion of the 1990 stock by zone, the largest increase was seen in zone 1 in England & Wales (123%) although in area terms the estimate was relatively small (13,000ha with a 95%CI of 1,700ha to 27,400ha). In Scotland the national increase in extent was largely a consequence of increases in the upland zones 5 and 6. The different landscape locations of these changes suggest that the identity and vegetation condition of broad habitats gaining or losing stock to Fen, Marsh & Swamp are likely to differ considerably; so too might the causes of these changes.

Patterns of flow between Broad Habitats at the GB level indicated that the increase in area amounted to 39% of the 1990 stock. This was largely gained from parcels

h) *disaggregate the patterns of turnover and net increase by geographic region and by donor or recipient broad habitat,*

i) *based on outcomes from previous steps, to make an assessment of the importance to biodiversity of new areas of Fen, Marsh & Swamp and to estimate the importance of different causes of change.*

Progress

2.43 A thorough policy literature review has been undertaken and the main findings have been written up in a draft report (which includes some of the material above).

2.44 A detailed research plan has been drawn up which builds on the approach outlined in the contract tender document.

TOPIC 5 - RIVERS, STREAMS AND STANDING WATERS

2.45 Although no work is due to start on this Topic until June 2003, the Topic Leader has already started reviewing the research approach and has noted that some CS2000 Module 1 analyses completed since the launch (in November 2000) might prove useful.

TOPIC 7 – AGRI-ENVIRONMENT SCHEMES

Question 17: How are agri-environment schemes represented in the CS2000 field survey sample? What evidence is there that agri-environment schemes have contributed to the changes in the Broad Habitats and landscape features recorded in CS2000?

Policy context

2.46 The following policy context statement has been drafted but has not yet been circulated for comment:

There have been a number of agri-environment schemes established all designed to maintain and enhance the landscape, wildlife and historical interest of areas of the countryside. These include the Environmentally Sensitive Areas scheme (which was established in 1987 and designated 22 areas in England as ESA's), farmers and landowners receive annual payments for entering into 10-year management agreements which require them to manage their land according to a set of management prescriptions, the Countryside Stewardship scheme operates outside the ESA's and farmers are paid grants to conserve landscapes and features, each county has specific targets for landscape features and types important within their area. Other schemes include the Organic farming scheme, the Farm Woodland premium scheme, the Woodland grant scheme, the Hill farm allowance scheme, the Habitat scheme (pilot scheme now closed), the Moorland scheme, the Energy crops scheme, the Nitrate Sensitive Areas scheme, Arable stewardship. These are all schemes operating in England and Wales, specific to Wales are Tir Cymen and Tir Gofal, arable area payments scheme and in Scotland there is the ESA scheme and the extensification payment scheme.

Some schemes have spatial boundaries others are more generic and associated with farm management at a broader scale. In some areas more than one designation will apply to the same area of land. The policy context of this question is to establish how much of the area sampled in CS2000 is represented by an Agri-environment scheme. There are several reasons for this; CS2000 is the best example of a control dataset that represents the 'wider picture' of the British countryside. The squares were randomly chosen and detailed information for landscape features such as hedges, stone walls, land cover, vegetation collected. The same features and habitats are being studied to assess the effectiveness of Agri-environment schemes, and there is a desire to use the Countryside Survey data as reference data to compare the monitoring of Agri-environment schemes to. Countryside Survey represents the wider countryside and is important as a context for these schemes. Although most monitoring has attempted to compare agreement land with non-agreement land there are problems with this, many of the schemes were set up before the land was designated and it subsequently changed its' status. There may also be fundamental differences between agreement and non-agreement land relating to the choice to enter the scheme. The recent monitoring of the Countryside Stewardship scheme characterised the ecological quality of land within the scheme by using the same methods as CS and comparing subsequent results in terms of Broad and Priority habitats (CEH 2001). When using CS2000 as a control data set it would be useful to know to what extent the squares are already represented by these schemes. Spatial coverages for AE schemes can be compared to the spatial extent of the CS squares to see what overlap there is. If there is sufficient overlap some of the features within the scheme such as walls, hedges, vegetation plot data can be compared, agreement vs. non-agreement within and between CS squares.

Progress to date

Collation of background information to Agri-environment schemes

2.47 Information on agri-environment schemes has been collated. This includes information on what the schemes are, their extent, timing and objectives. Information has been collated on what features of agri-environment schemes have been monitored, this includes landscape features, boundary features and vegetation data. These have been compared to elements surveyed for CS, compatibility assessed and study features identified.

Identification and acquisition of spatial data for Agri-environment schemes

2.48 Spatial data for the English Agri-environment schemes (Environmentally Sensitive Areas, the Organic Farming scheme and the Countryside Stewardship scheme) have been received from DEFRA. These are in the form of 'ArcInfo' Geographical Information System files (coverages) representing holding boundaries, there is also Tier information (which gives information on management prescriptions that have been applied) included with the coverages.

2.49 Contact has been made with the relevant person from SEERAD to obtain access to spatial information on Scottish ESA's there are some issues of confidentiality and justification for use of the data yet to be resolved.

Analysis of spatial data from Countryside Survey and Agri-environment schemes

2.50 The coverages from the English schemes (the ESA's, CSS and Organic farming scheme) have been overlaid with spatial data for Countryside Survey sample 1km squares to:

- identify the number of sample squares that coincide with land under an Agri-environment scheme in order to carry out more detailed overlays.
- identify the number of vegetation plots on land under agreement.

2.51 The resultant data from the overlays are currently being validated for geo-spatial referencing. Individual 1km sample squares will then be selected and more detailed overlays carried out with the resultant data analysed to look at features of interest. The plot data can also be looked at in more detail, with estimates made of the number of Broad Habitats represented and comparisons between agreement and non-agreement plots carried out.

Reference:

CEH (2001) Monitoring and evaluation of the Countryside Stewardship Scheme. Module 2: The ecological characterisation of land under agreement.

Task 2: Recommending improvements to survey protocols.

2.52 As stated in the introductory comments to this tender, we assume that this element applies only to those aspects of the methodology that are related to the science questions that have been posed (above).

2.53 A shared file directory has been established so that issues that need to be addressed can be logged as work on the various questions proceeds.

Task 3: Maintaining the CS2000 Website after Module 16

2.54 As stated in the introductory comments to the tender, we have assumed that Module 16 will be completed in June 2002. Thus, within Module 17, the task of maintaining the website will not start until July 2002.

3 CONCLUDING STATEMENTS

3.1 CEH is pleased to be able to report that work has started on CS2000 Module 17 and stresses that this has been done in the spirit of good faith, given the absence of a signed contract until now.

3.2 Much of the work that has been done is of a preparatory nature and includes reviewing relevant policy literature, making contacts with experts, revisiting analytical procedures and databases.

3.3 Some Topics (particularly 1, 2, 3 & 4) already have extensive reports in draft form but which are not suitable for release as part of this interim contract report.

3.4 CEH looks forward to continuing work on this Module and notes that the next milestone comprises delivery of a series of reports at the end of July 2002.

[ends].

The Centre for Ecology and Hydrology has 600 staff, and well-equipped laboratories and field facilities at nine sites throughout the United Kingdom. The Centre's administrative headquarters is at Monks Wood in Cambridgeshire.

CEH Sites

CEH Directorate
Monks Wood, Abbots Ripton,
Huntingdon,
Cambridgeshire PE28 2LS
Telephone +44 (0) 1487 772400
Main Fax +44 (0) 1487 773590

CEH Oxford
Mansfield Road,
Oxford,
Oxfordshire OX1 3SR
Telephone +44 (0) 1865 281630
Main Fax +44 (0) 1865 281696

CEH Merlewood
Windermere Road,
Grange-over-Sands,
Cumbria LA11 6JU
Telephone +44 (0) 15395 32264
Main Fax +44 (0) 15395 34705

CEH Bangor
University of Wales, Bangor,
Deiniol Road,
Bangor, Gwynedd LL57 2UP
Telephone +44 (0) 1248 370045
Main Fax +44 (0) 1248 355365

CEH Wallingford
Maclean Building, Crowmarsh Gifford,
Wallingford,
Oxfordshire OX10 8BB
Telephone +44 (0) 1491 838800
Main Fax +44 (0) 1491 692424

CEH Dorset
Winfrith Technology Centre,
Winfrith Newburgh, Dorchester,
Dorset DT2 8ZD
Telephone +44 (0) 1305 213500
Main Fax +44 (0) 1305 213600

CEH Edinburgh
Bush Estate,
Penicuik,
Midlothian EH26 0QB
Telephone +44 (0) 131 4454343
Main Fax +44 (0) 131 4453943

CEH Windermere
The Ferry House, Far Sawrey,
Ambleside,
Cumbria LA22 0LP
Telephone +44 (0) 15394 42468
Main Fax +44 (0) 15394 46914

CEH Monks Wood
Abbots Ripton,
Huntingdon,
Cambridgeshire PE28 2LS
Telephone +44 (0) 1487 772400
Main Fax +44 (0) 1487 773467

CEH Banchory
Hill of Brathens,
Banchory,
Aberdeenshire AB31 4BY
Telephone +44 (0) 1330 826300
Main Fax +44 (0) 1330 823303

Further information about CEH is available on the World Wide Web at www.ceh.ac.uk

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