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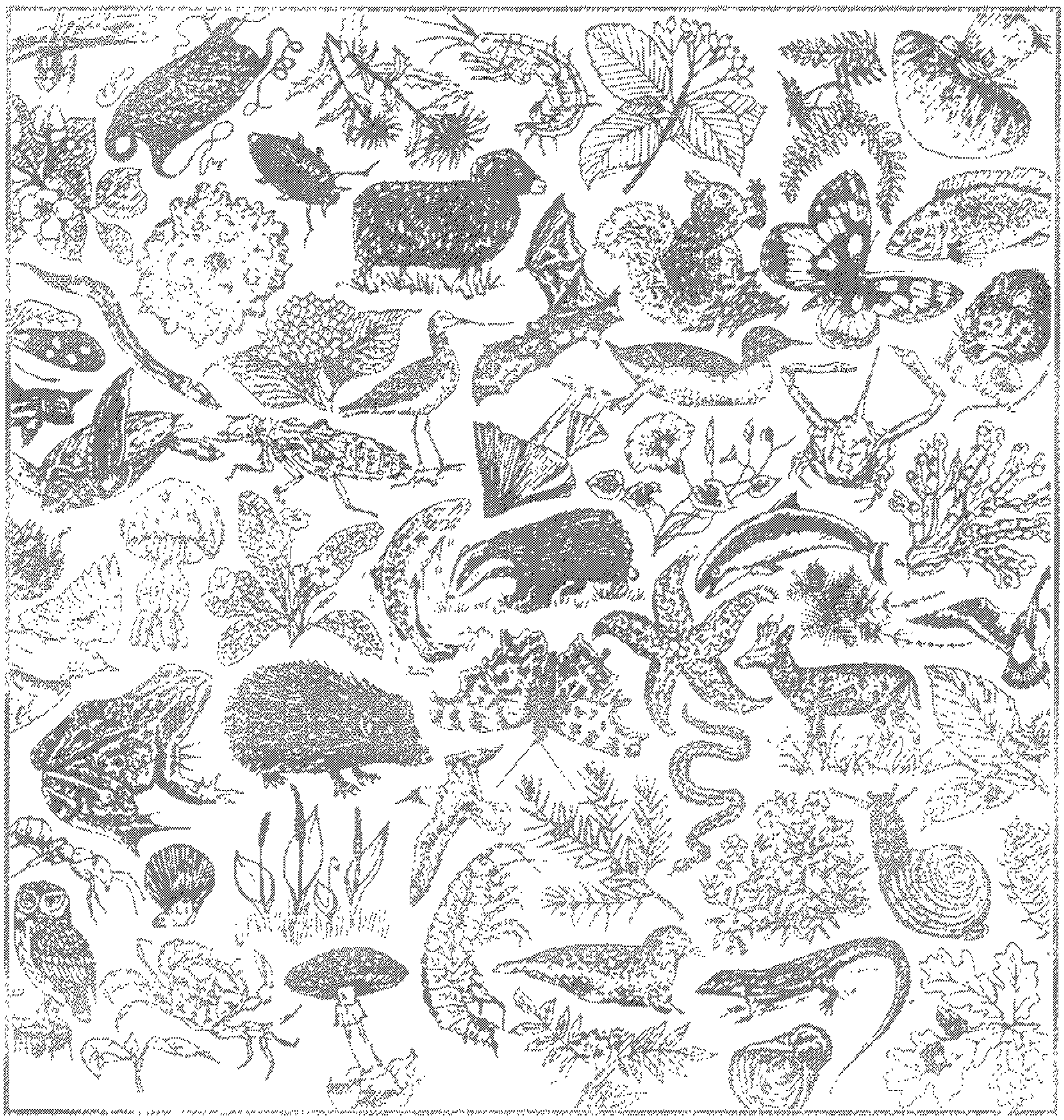

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Prepared for English Nature by

CEAS Consultants (Wye) Ltd
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REVIEW OF THE IMPACT OF EXTENSIVE LIVESTOCK SYSTEMS ON NATURE CONSERVATION AND THE ENVIRONMENT

PHASE 1 FINAL REPORT

Prepared for

English Nature

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1 BACKGROUND AND RATIONALE

Extensification first entered the vocabulary of policy makers in the late 1980s with the agreement in Brussels of EC Regulation 1760 which required member states' agriculture departments to implement schemes to "encourage the conversion and extensification of production" on farms. At that time, extensification was viewed largely as a supply control tool and it was interpreted in strictly quantitative terms. Community rules further defined extensification as a reduction in a farm's output of a surplus product by 20 per cent or more compared with a base period. Somewhat confusingly, this was to be achieved by removing land from production (in the case of cereal farmers) as well as by reducing the number of head of livestock or by adopting other unspecified measures (CEC, 1987). With the emphasis firmly on reducing production, this was an interpretation of extensification far removed from what most conservationists understood by the term - that is, a qualitative de-intensification of production to be achieved through reductions in the application of fertilisers and farm chemicals applied to land and through reductions in stocking rates.

While MAFF debated how best to implement the Regulation, opinion about the environmental pros and cons of extensification began to crystallise. Interest focused on the scope for making more ambitious use of the Regulation to promote less intensive farming practices on a broad front (Bell & Bunce, 1987). The RSPB, for instance, proposed a package of measures which would require farmers to reduce their use of fertilisers and pesticides but also switch into more extensive farming systems which would "produce" environmental products like wet grassland and scrub (Woods *et al*, 1988).

In the event, MAFF decided that cereal farming should be "extensified" by setting aside land and it put in place the five year voluntary set aside scheme. It was not until 1990 that pilot schemes for the extensification of beef and sheep production were offered to farmers in selected English counties (MAFF, 1990). These too were expressly designed with production control in mind. Beef farmers were paid to reduce their total sales of beef animals by at least 20 per cent within a reference period, while sheep producers were required to reduce the size of their breeding flocks by a similar proportion. Compensation was paid on each eligible animal removed. Following doubts about their effectiveness, the schemes were wound up after two years. Subsequent evaluation studies showed that participating sheep farmers were often being paid to carry out de-stocking that they would have undertaken anyway, while many beef animals were merely being displaced from participating farms onto farms outside the scheme (Young and Williams, 1992).

Despite this, the policy commitment to using extensification for supply control purposes remain undimmed - though under the now agreed MacSharry reforms it will be extensification driven by price cuts and quotas on production premiums rather than a process directly subsidised under labelled extensification schemes (CEC, 1991). Such schemes are now more likely to be used to encourage the production of environmental goods in the countryside. The agri-environmental package of measures agreed as one of the "Accompanying Measures" under MacSharry contains a series of proposals for both arable and livestock extensification, though it is still unclear how this more conservation-directed extensification is to be brought about. Article 2 of the Regulation envisages schemes which will encourage arable producers to reduce their use of various inputs with the aim of ameliorating the pollution effects of agriculture as well as reducing production and to adopt what are described as "more extensive methods of production". Other schemes will be set up to bring about "a reduction in sheep and cattle numbers" on livestock farms.

As Baldock and Beaufoy (1992) point out in their review of these proposals, such highly skeletal definitions follow a weakness of earlier EC proposals in not being precise enough to ensure that environmental benefits are forthcoming. Encouraging broad-brush reductions in applications of fertilisers, for example, may not necessarily produce significant environmental benefits and may simply mean subsidising changes in fertiliser use that farmers will be driven to make anyway because of cuts in cereal prices. Similarly, the rather bald injunction to "reduce sheep and cattle numbers" is meaningless in environmental terms.

With MAFF due to publish its consultation paper on these measures, there is now a clear need both to re-examine the concept of extensification, its value and likely effectiveness as a policy tool, and to devise workable schemes that will maximise environmental value for money. English Nature has commissioned CEAS Consultants Ltd and Wye College to focus on the extensification of the upland sheep sector with these questions in mind. The aims of the present study are as follows:

1. to consider different definitions of extensification and to identify the problems that a sheep extensification scheme would need to address;
2. to systematise thinking about the nature conservation benefits associated with different types and degrees of sheep extensification by drawing up an "impact table";
3. to define, on this basis, a number of possible extensification schemes, some narrow but deep, others wide but shallow and to consider the relationship of these to existing systems of farm support in the uplands;
4. to undertake a partial budgeting exercise to estimate the likely farm income effects of the different schemes and thus the probable budgetary costs.

The current report addresses (1) and (2). It will be followed by the phase 2 report on (3) and (4).

2 EXTENSIFICATION AND ITS ROLE IN PROMOTING CONSERVATION BENEFITS

Extensification is potentially capable of producing, in policy terms, at least two end results: one is the reduction in output and the second is the improvement in the quality of the nature conservation resource. Policymakers have in the past been almost exclusively interested in the former, and this has led to the classification of set-aside as an extensification measure, when it clearly has no effect on farming intensity on those areas still farmed. Conservationists, by contrast, are more interested in how the conservation resource is affected, and the reduction in output is but the means to the end. In fact, the ideal changes from a conservation point of view could be a reduction in material inputs combined with an intensification of the labour input in order to manage the conservation resource. Any change in physical output would be immaterial if the conservation objective were attained.

The proposed accompanying measures in the CAP reform programme have the merit of recognising that the objectives of both agricultural administrators and conservationist can be met to some degree through extensification. The mere reduction in output has at last been recognised as being an insufficient policy objective on its own. However, despite the fact that extensification can provide conservation benefits, there is still no consensus concerning the form extensification should take.

In its simplest, "weakest" form, extensification is wide in application but shallow in the reductions in the amounts of inorganic fertilisers, pesticides and other farm chemicals applied to a given area of land together with reductions in the rate at which the land is stocked. Restricting nitrogen input to a rate at which it can be absorbed by the soil and crops, for instance, will presumably ease problems of eutrophication in water courses, while a lowering of stocking densities on over-grazed moorland will improve conservation value. In general though, we are surprisingly ignorant about how a given reduction in some of the inputs going into the "black box" of modern agriculture will affect the eventual output of environmental goods (Traill, 1989). In the case of nitrates in groundwater for example, the complexity of the nitrogen cycle and the still incomplete state of knowledge about the impact of the timing and rate of fertiliser applications means it is difficult to predict exactly how effective a reduction in nitrogen applications will be in reducing contamination. Moreover, induced extensification on one part of a holding could rebound by encouraging intensification elsewhere as farmers strive to maintain margins. Experience from the dairy sector, following the imposition of milk quotas when many dairy farmers cut back on their use of concentrates by feeding more home-grown grass to their herds, suggests that the result was more re-seeding of old pasture and upland grassland and a general intensification in grassland management (Potter *et al*, 1991).

Extensification in its stronger form is less problematic. Concerned with encouraging the adoption or continuation of low input farming systems, this is a narrower but deeper process which may be restricted to groups of farms in target locations. There is now widespread agreement that certain farming systems - Scottish crofts, traditional hill sheep farms, some mixed farms - are inherently more sensitive to the environment than others (Potter, Houghton and Robey, 1991). Such farms may have a conservation interest that is "core" rather than "peripheral" to the way the land is actually farmed and managed (NCC 1990). Small scale, low input crofting effectively produces and sustains the rich mosaic of flower and bird rich machairs of the Hebrides for instance, while hill sheep farms are the units in which vast stretches of upland semi-natural vegetation are grazed and burned to maintain their diversity and conservation interest. Conservationists are increasingly convinced of the need to devise measures which will keep such systems in place - this is extensification in its "strong" form.

On the basis of this brief discussion, it is possible to envisage an extensification policy for nature conservation with two main elements, each related to the "conservation principles" promulgated by English Nature. As a first priority, and in order to maintain, protect and enhance the existing nature conservation resource, there is a need for highly targeted measures designed to keep already extensive farming in place and forestall any further intensification on such farms. Schemes of this type could be modelled on the ESA approach and involve offering payments to farmers who agree to retain traditional practices and abide by benchmark limits on input use and stocking rates. Essentially, scheme administrators define a green box of environmentally friendly farming practices and pay farmers to stay within it. Second, and in order to enhance and restore the resource on a broader front, there is a need for wider but shallower schemes (ie extensification proper), which encourage greater numbers of farmers to extensify their existing farming practices, in the case of livestock farmers by stocking fewer cattle and sheep and by adopting more appropriate grazing regimes. This type of scheme would pay by results - or at least by the degree of extensification achieved, for instance, rewarding farmers for the number of stock removed. A modification of the English Nature grazing index could be used to reveal overgrazing and undergrazing. It would then be feasible to introduce a system of "payment by results" with penalty clauses if objectives were not met, eg, if overgrazing continued. By definition, it might mean channelling money into the hands of farmers who have intensified in the past and thus (potentially) made the biggest contribution towards a loss of environmental capital. It may prove more controversial than the politically attractive ESA approach, which rewards existing good practice and sets up disincentives for departing from that. Clearly, if extensification is to be politically acceptable as well as technically workable, it must be achieved through schemes that have a clear environmental rationale and are designed in ways which maximise on conservation value for money. These are guiding principles in the discussion which follows.

3 THE UPLAND SHEEP SECTOR AND ITS CONSERVATION IMPORTANCE

3.1 Vegetation types of the uplands

The uplands of Britain may be considered to embrace all land lying above the upper limits of enclosed farmland and include the hills, moors and mountains. By this definition the area of uplands comprises 30 per cent of the land area of Britain (Thompson & Ratcliffe, 1988). Many upland plant communities in Britain are of international importance, the range and variation they demonstrate is large and Britain is the biogeographic centre of many of these communities (Table 3.1). However, in the agricultural landscape the uplands must also be taken to encompass farm land below the limits of enclosure; the enclosed inbye land and the semi-improved or allotment.

The uplands of England extend over some 41,500 km^2 with moorland area encompassing about 14,550 km^2 (Felton & Marsden, 1990). The three major types of vegetation in the uplands today (originally derived from woodland) are acid grassland, moorland and bog and all three are linked in complex zonations and successional relationships which may be related to topography, soils, moisture and agricultural management (Ball *et al* (1982), Miles (1985), Rodwell (1992 and unpublished)). Information on the areal extent of upland vegetation types is limited, fragmentary and often contradictory. Using the ITE Land Classification, Bunce (1987) has estimated the proportions of the three main types for the UK as 37 per cent heath, 32 per cent bog and 31 per cent grassland. However, these proportions will undoubtedly be different for England. In a survey of upland vegetation change in England and Wales Ball *et al* (1982) estimated the following proportions for four major types: mesotrophic grasslands 22 per cent, acid grasslands 13 per cent, Ericaceous-dominated moorland 39 per cent and mires and bog 26 per cent. Proportions will also vary considerably from site to site. For example, from National Park surveys the proportion of Ericaceous moorland in Cumbria was regarded as about 5 per cent (Kelly & Perry, 1990) while for North York Moors it was 24 per cent (Matheson *et al*, 1990). The corresponding values for acid grassland were 16 per cent and 2 per cent respectively. Clearly the extent of the moorland resource will vary from location to location and the component mix of vegetation types will also vary in relation to topography, soils and management.

The following list includes the major vegetation types found in the uplands of England and are based on NCC Phase 1 classification for relative simplicity. A complete listing is provided in Appendices 1 and 2.

1. ERICACEOUS MOORLAND
   Includes the widespread dwarf shrub heath and grass heath on podzolised soils as well as the more restricted montane moss heaths; very rich associated fauna.

2. BOG AND OTHER PEATLANDS
Important vegetation types in the uplands of England. Vegetation development is over peat and characteristic species are heather, bog mosses and cotton grasses; associated fauna is of great value.

3. MARSHY GRASSLAND
Covering a range of communities from rush invaded pastures to characteristic upland mires with abundant purple moor grass.

4. BRACKEN
This is a plant which thrives on a wide range of better drained soils throughout the uplands. It may occur as scattered fronds or dense mono-stands of very little conservation value; increased invasion of bracken in recent years related to shifts in grazing/burning patterns.

5. ACID GRASSLAND
Derived from dwarf shrub heath by overgrazing/burning, may be species rich and of conservation interest, likely to revert to dwarf shrub heath through relaxation of grazing, but depends on precise shift in grazing and proximity of invasive species like, bracken, mat grass (drier sites), rushes and purple moor grass (wetter sites).

6. CALCAREOUS GRASSLAND
This is a very valuable habitat, principally on carboniferous limestone of the Pennines, Peak District, Teesdale, Lake District. Often species rich habitat resulting from centuries of grazing. Can tolerate moderate grazing and are of high conservation value; undergrazing leads to scrub encroachment.

7. UNIMPROVED NEUTRAL GRASSLAND
Meadows (mown and grazed) and pastures (grazed) can be species rich and of high conservation value if unimproved long periods, eg, hay meadows of Yorkshire Dales; semi-improved examples may revert slowly if inputs removed. Risk of losses occur due to switch from hay to silage and associated shifts in inputs and cutting times, these changes may also affect associated bird species.

8. IMPROVED GRASSLAND
Generally little conservation value but may have potential for reversion, however fringes and flushes may harbour interesting species in which case reduction in inputs and grazing could lead to improved conservation value.

9. SCRUB

Higher altitude scrub is of major conservation value (eg, juniper scrub). Lower altitude scrub (eg, hawthorn, willow, gorse) is also of considerable value as part of the habitat mosaic. Removal of grazing or very light grazing is required for maintenance and regeneration.

10 WOODLAND

An important upland resource often on the fringes of moorland, frequently suffers from overgrazing and poor regeneration.

11. MISCELLANEOUS

Tall herb ledge vegetation, limestone pavement, cliff and scree, some of great conservation importance. Tall herb vegetation is threatened by grazing and probably suffered greatest recent losses of all upland habitat. Limestone pavement is, however, more tolerant.

Table 3.1: International importance of heather moorland communities

NVC code[1,4]	Community name	International importance[2]	No of plant species[3]		
			Rare	Mean (range)	Total
H12	*Calluna vulgaris - Vaccinium myrtillus* heath	I	0	17 (4-42)	69
M19	*C. vulgaris - Eriophorum vaginatum* blanket mire	I	4	19 (7-33)	84
H10	*C. vulgaris - Erica cinerea* heath	I	1	20 (5-58)	70
H9	*C. vulgaris - Deschampsia flexuosa* heath	I	0	8 (2-15)	41
H8	*C. vulgaris - Ulex gallii* heath	GB	0	13 (4-32)	60
H21	*C. vulgaris - V. myrtillus - Sphagnum capillifolium* heath	GB	9	29 (10-46)	83
M18	*Erica tetralix - Sphagnum papillosum* raised/blanket mire	I	2	17 (8-30)	54
M17	*Scirpus cespitosus - E. vaginatum* blanket mire	GB	5	20 (8-38)	79
M15	*S. cespitosus - E. tetralix* wet heath	I	2	18 (6-57)	97
M20	*E. vaginatum* blanket/raised mire	I	0	11 (5-20)	44
U4	*Festuca ovina - Agrostis capillaris Galium saxatile* grassland	II	0	22 (7-62)	83
U5	*Nardus stricta - Galium saxatile* grassland	II	0	21 (6-42)	79
U6	*Juncus squarrosus - F. ovina* grassland	GB	1	15 (7-36)	52

1. Codes according to the National Vegetation Classification (NVC), Rodwell (1992).
2. I = Plant communities of international importance especially well developed in Britain but very local elsewhere in the world.
   II = Found elsewhere globally.
   GB = Virtually confined to Britain with close equivalents, rare or absent elsewhere in the world (also internationally important).
3. Number of plant species taken from Rodwell (1992). The mean (range) is the number counted in each 1 m sq quadrat. The rare species are those occurring in <100 10 km grid squares in Britain.
4. Details are given above for 13 heather moor communities. Another 2 communities are locally extensive on Carboniferous limestone in the uplands. (CG9, *Sesleria albicans - Galium sterneri* grassland and CG10, *Festuca ovina - Agrostis capillaris - Thymus praecox* grassland).

Source: Thompson *et al* (in press)

3.2 The role of sheep farming in maintaining the conservation resource

Sheep farming is the major farming activity in the hills and uplands of the UK and a vital factor in the conservation of the vegetation and landscape that are found there. Grazing by sheep has a critical impact on the composition of semi-natural vegetation, preventing tree and scrub regeneration and, together with an appropriate burning regime, maintaining the diverse mosaic of Ericaceous moorland, grassy heaths and acid and neutral grassland that make up the core conservation resource. As NCC concluded in a recent report "this usage has a long history and contributes to some of the outstanding conservation value of the uplands. Continuation of grazing and burning regimes is essential if the characteristic wildlife communities are to be maintained" (NCC, 1990, p14). In any event, as Sydes (1988) points out, almost all upland vegetation results from the interaction between the native flora and the many centuries of man's exploitation of grazing animals. It is therefore only appropriate and pragmatic to continue (or bring about changes in) the management which has helped form the ecosystem we wish to protect.

Constrained by poor soils, a harsh climate and an uncompromising terrain, the traditional hill sheep farm has evolved as a low input system almost exclusively geared to the production and rearing of breeding stock. In the early days of hill sheep farming in Britain, particularly in the Scottish Highlands, the sale of mutton and wool from flocks of wethers (castrated rams) was the main source of income. These wether flocks disappeared during the 19th century following increased competition from refrigerated mutton from overseas and because of a switch in consumer taste in favour of lamb. Hill sheep farming focused instead on supplying cast ewes and lambs for crossing and draft lambs for fattening to their lowland counterparts - and the "stratified" sheep farming industry was born.

Clearly, some hill farms are more marginal than others. An important distinction is that between true hill farms, which occupy the highest land and which make extensive use of upland pasture and unenclosed moor and fell, and upland farms, occupying land over a wider range of altitudes, and farms containing larger areas of improved and enclosed pasture and meadowland, the latter in the valley floor. From a conservation point of view, the hill sheep farm (at least in its traditional form) is probably one of the most important "core" farming systems in England in that the grazing and management of areas of semi-natural vegetation earns the farmer his living. Containing large expanses of bog, Ericaceous moorland and more grassy heaths together with *Festuca/Agrostis* grassland, such farms typically carry breeding flocks of purebreed ewes which are "set stocked". This means that they are simply left to graze the moor throughout the year (excluding tupping and lambing time, when they are brought off the hill), the ewes being sold as drafts for crossing and the lambs as stores for fattening, with stock ewe lambs (followers) perhaps being "off-wintered" on the lower slopes or in sheds or "away wintered" on lowland farms. The breeding flock thus spends most of its time on the hill, which is unfenced except in the main valleys, with the land (which may be commonland) being divided into hefts (usually following natural boundaries). Little supplementary feed would be provided, except in the most severe weather conditions. Taken together with the shepherding that used to be considered necessary to ensure the sheep utilised the available grazing and the associated regime of small burns to maintain heather in a nutritious state, this is an environmentally sensitive system of farming which not only results in sustainable management of the vegetation but also has its own in-built constraint to prevent overgrazing (because the number of summer stock that can be carried is limited by the capacity of the moor to provide winter feeding).

An upland farm, with more improved or improvable land, faces rather fewer natural constraints. The most important feature of such farms is the operation of a two-pasture system in which sheep are grazed on the inbye during the autumn and winter and in spring and summer are moved up the hill (and perhaps onto the moor), while the lower fields may be "shut up" for hay which will later provide winter fodder. These inbye meadows are often of high botanical importance and may provide breeding ground for birds such as curlew, snipe and redshank. Together with the higher pastures and moor, this is an agro-ecosystem of considerable landscape as well as wildlife importance.

3.3 The conservation costs of intensification

Unfortunately for nature (and landscape) conservation, post war developments in hill farming research, backed up by farm policies encouraging expansion of output, have offered even the most marginal hill farmer some scope for intensification, often changing the enterprise structure of farms as well as increasing the intensity of production. To take the simplest example, hill farmers, in order to be able to carry increased numbers of stock on the moor, have steadily made more use of supplementary feed during the winter period. This, together with a long term changes in shepherding has meant localised overgrazing, often very severe. As Hudson (1984) explains, the resulting trampling of vegetation around feed blocks and hay drops can have a devastating effect on Ericaceous moorland and more grassy heaths. Hill farmers with inbye land have also been encouraged to enclose and fertilise rough grazing and so move towards a two-pasture system. This greatly increases the summer carrying capacity of their farms, improving ewes' milk yields and allows the production of sturdier, heavier lambs. Increases in output of up to 200 per cent have been recorded following such improvements. An intensifying hill sheep farmer may also be able to increase value added by changing breeds or producing more crossbreed ewes or even by fattening lambs on the farm himself - for Sinclair (1987) the dividing line between an extensive and an intensive system.

The environmental effect of all this is two-fold. First, there is the direct loss of semi-natural vegetation as land is enclosed, fertilised or even ploughed, drained and reseeded. Secondly, during the critical autumn period, many more sheep are now decanted onto the moors creating generalised over-grazing but also, in one of the many vicious circles that accompanies upland sheep intensification, problems of acute localised over-grazing as farmers resort to intensive supplementary feeding to support their now much larger flocks. According to recent figures, the number of breeding ewes in the UK increased by 35 per cent between the early 1970s and late 1980s, this average figure disguising much greater increases of 100 per cent or more in parts of England (MAFF, 1990). Felton and Marsden (1990) suggested that 71 per cent of Ericaceous moorland in England was being grazed at levels damaging to vegetation. Only 29 per cent of moorland in England and Wales was thought to be stocked at levels compatible with maintaining the vegetation in good condition. This result was even more striking in that the area of optimally grazed heather in 1977 was 71 per cent of the total. It has been estimated that two-thirds of the net 20 per cent loss of Ericaceous moorland in England and Wales between 1947 and 1980, can be attributed to over-grazing. Moreover, over-grazing is recognised as one of the main causes of landscape change in the National Parks (see Table 3.2).

Table 3.2: Number of NVC communities susceptible to overgrazing in National Parks

National Park	Number
Dartmoor	6
Exmoor	8
Brecon Beacons	5
Snowdonia	11
Peak District	6
Yorkshire Dale	10
North York Moor	6
Lake District	13
Northumberland	7

Source: Edwards (1991)

Overgrazing means different things to different people; to the farmer overgrazing is allied to decreasing productivity of stock, to the conservationist it is directly related to change in wildlife value of the habitat.

Ecological overgrazing results in shifts in vegetation composition and as such is relatively easy to identify (Evans & Felton, 1987). However, overgrazing is the result of year long management practices and cannot be defined using snapshot stocking rates such as January livestock returns on June agricultural census figures (MacDonald (1990), MacDonald & Armstrong (1989)). Further, sheep graze selectively, preferring grass to heather, and local overgrazing can still occur even if the grazing unit as a whole seems sufficient to support the flock.

In addition, the problem is not simply one of over-grazing, damaging though that is. Over-stocking on hill farms is typically accompanied by other changes in the grazing regime which reinforce the problem. With a change in the proportion of inbye land, and the use of supplementary feed, the management of moorland vegetation becomes less important to the economy of the farm, with the result that burning declines in frequency but increases in extent, simplifying the habitat mosaic and further exacerbating the effects of high grazing intensity. Thompson (1987) demonstrates how declining management leads to the replacement of heather by purple moor grass and cottongrass on moist peaty soils and by fescues and bracken on mineral soils. The system of hill farm support, by rewarding output and further marginalising the smallest hill farms least able to intensify, encourages amalgamation of farms and an increase in average farm size, developments which researchers such as Sinclair (1987) believe further encourage under-management. Clearly, the causes of intensification and decline in the hills are deeply rooted in the system of farm support and in longer term trends in the nature and structure of hill farming.

The opportunities for intensification and land improvement are generally greater on upland and marginal upland farms. Increasing summer stocking rates have a similarly detrimental effect on the vegetation intake and moor and will also increase the likelihood that the woodland typically found on such farms will be over-grazed (Mitchell and Kirby, 1990). The reseeding and fertilising of meadowland in the valley bottoms and the replacement of hay making by silage production has also significantly reduced the conservation interest of many upland farms.

The problem, then, is not simply one of overstocking but is a complex mixture of local, seasonal and general over-grazing combined with land improvement and passive neglect and decline. Moreover, the processes of change are systematically different on hill and upland farms, an important point and one often not made in analyses of upland landscape change. Table 3.3 summarises some of these observations.

In reality of course, even the hill/upland distinction is a simplification of reality. Hill and upland farming is far from homogenous and there are many regional and even local variations within this broad framework which have important implications for conservation policy. Table 3.4 illustrates this by summarising the major farming systems likely to be encountered in five upland English regions. As can be seen, the hill/upland categorisation is generally, but not always, a useful one; on Dartmoor for instance local variations mean that any simple classification is misleading.

Table 3.3: The relationship between hill and upland farming systems and the conservation resource

Farm type	Topography, main vegetation types and conservation interest	Farming system	Direct impact of intensification	Indirect effects
Hill	High altitude, strong or moderate relief and steep slopes. Mainly rough grazing and unenclosed moorland, which may be held in common. Little or no enclosed or improved inbye land. Large tracts of Ericaceous moorland and bog plus more grassy heath on lower slopes provides conservation interest.	Traditionally concerned exclusively with sheep breeding with surplus lambs and cross ewes "drafted" to lowland farms for fattening/crossing. Sheep may be "set stocked" on moor all year round (apart from tupping) or partially "off wintered" on lower land and/or housed.	Increasing use of supplementary feeding allows more stock to be carried on moor, resulting in local overgrazing. Enclosure and controlled grazing of rough grazing on lower slopes creates a 2-pasture system, with more sheep being decanted on to the moor over critical autumn (and winter) period.	Long-term decline in shepherding and less frequent burning of heather associated with reduced nutritional importance of heather. This exacerbates overgrazing and degrades habitat mosaic. Ranching encouraged by amalgamation and increasing size of hill farm units.
Upland	Moderate altitude but may still contain land of strong relief with steep slopes. Greater areas of improved or improvable land than hill farms, with wider range of vegetation types. Acid grassland, grassy heaths on steep slopes, upland moorland and meadowland in valley floors and woodland provides main conservation interest.	Traditionally also mainly concerned with production of draft ewes and lambs (plus cattle) crossing draft ewes with long wool rams and passing on breeding ewes and store lambs but now increasingly involved in rearing and farming.	Considerable potential for enclosure, fertilising and re-seeding of inbye land on these farms means increased summer stocking and overgrazing of upland pasture and rough grazing together with associated woodland plus draining, fertilising and reseeding of meadowland (which may grow silage instead of hay).	Moorland and rough-grazing likely to become increasingly marginal to the overall grazing regime. Pollution of water courses and ground water. Neglect of landscape features such as stone walls and barns.
Marginal upland	Low altitude, moderate relief but some steep slopes. Almost entirely enclosed, improved pasture with some arable land for fodder crops and fragments of rough grazing on steepest land. Unimproved grassland, woodland and meadowland main conservation assets.	Traditionally concerned with rearing of dairy heifers, store cattle and store of breeding ewes but now given over to rearing of finished animals. Usual destination of cast ewes from hill farms of crossing. May also provide winter grazing for ewe hoggets from hill farms.	Continued improvement of pastureland and widespread move from hay to silage production. Potential for overgrazing of pasture and associated woodland.	Pollution of water courses and ground water. Neglect of landscape features.

Table 3.4: Model farming systems in the English uplands (source: ADAS flock performance studies)

Area and location	Model farming systems	Main farming characteristics	Overgrazing problem
Exmoor	Exmoor hill farm	Main sheep enterprises with small number of suckler cows. Ewes lamb in April, suitable ewe lambs being retained for replacements, the rest sold as stores. Ewes and lambs graze the moor from April to allow a June silage cut on inbye. Ewes return to the inbye for tupping and are then put back onto the moor until start of winter feeding at Christmas.	Sheep numbers limited by the area of inbye on the farms. Away wintering of part of flock permits higher summer stocking of the moor. Overgrazing by sheep on the open common is likely to be less important than grazing by deer. Increasing local overgrazing due to feeding of big bale silage to suckler cows.
	Exmoor upland farm	Sheep with a suckler cow enterprise. Ewes lamb in April to produce replacements and lambs which are sold as half-breed ewes to lowland producers. Ewes will be moved up the hill in summer to allow sufficient winter fodder to be produced in inbye (principally to feed suckler cows). But overwintering or housing of sheep in winter means that the moor may actually be destocked during winter.	Summer overgrazing of upland pasture and low moorland. Destocking of moor in winter.
Dartmoor	Dartmoor farm	Hill ewes, crossbred ewes or mule type ewes and hill cows and/or a suckler herd. The moor is used for summer and part winter grazing of dry stock. Lambing is in April and ewes and singles go back to the moor to be brought back for shearing late July and ewes returned to the moor for the winter months bringing them back to inbye prior to lambing. Half the herd of cattle are turned out on to the hill with the autumn calves from May to end of October. Note there is no pattern of true draft ewe sales or production of half bred lambs. Most hill flocks sell cull ewes and only produce sufficient ewe lambs for own requirements. There is not a distinct system of allotments, intakes etc. Although there is some enclosed common owned by individuals the general picture is of a sudden transition from enclosed improved or low input grassland to open moor	Both breeding ewes and suckler cows graze the moor and in local situations the use of feed on the moor has enabled high stocking levels. There are varying pressures from pony grazing on the moor which may confound assessment of overstocking. Unlimited Venville rights (rights to graze forest) may exist in holdings adjacent to the forest which also confounds assessment of stocking rate. Many fringe farms have concentrated on dairying or cross bred ewes and do not use traditional grazing rights. Other occupiers have extended their use and this can locally create problems if others try to reassert their rights.
Yorkshire Dales	High dale farm	Sheep flock and suckler herd. Ewes graze the fells together with a suckler herd on inbye land. Traditional flocks tupped with hill rams to produce draft ewes and store lambs. Ewes spend most of the year on the fell but are gathered into better pastures during tupping and again in spring for scanning and lambing. Ewes with twins remain on better pasture while hill lambs are put back onto the fell.	Peak stocking occurs during Jan and Feb, and June-August when yearlings and dry ewes will be on the fell. But stocking rates are usually self-limited by the area of inbye available for tupping and lambing. Supplementary feeding Jan-March/April.
	Low Dale farm	Sheep flock with suckler herd. Ewes may be cross-bred to produce mules. Draft ewes may also be carried if inbye is sufficient. Ewes are gathered from the fell for tupping and again for lambing. Supplementary feeding on fell commences in January. Hill wethers and surplus gimmers sent to lowland pasture in September and are finished there.	There is a greater proportion of inbye and enclosed fell to accommodate a higher level of stocking. There is rather little seasonal variation in stocking rates.

Area and location	Model farming systems	Main farming characteristics	Overgrazing problem
Cumbria	Cumbrian Pennine Moor farm	Swaledale ewes kept for store or breeding lamb production. Shearlings mated pure, draft ewes retained on inbye and crossed to produce lambs for lowland breeding flocks or wethers for finishing and sale in autumn. Twin-bearing ewes wintered indoors or inbye. Other hill ewes returned to moor in January and fed supplements and hay from February to March. Usually a small dairy or beef herd which uses the moor in summer.	Year-round grazing has led to deterioration in extent and quality of heather. Feeding of supplements at fixed points leads to localised trampling, soil-erosion, enrichment. High proportion of inbye permits higher summer stocking and obviates need for away-wintering. Inbye tends to be heavily improved.
	Lake District Upland Farm	Swaledale ewes maintained for store and breeding lambs. Ewes tupped on inbye in October and retained there till January; draft ewes retained on inbye after crossing, but hill ewes returned to fell where supplements are fed. After lambing on inbye, ewes with single lambs put back on fell.	Current stocking levels result in ecological overgrazing of commons, the effects of which are compounded by lapse of burning management. Absence of active shepherding leads to winter congregation around fothering sites.
Northumberland	Hill farm	A hill flock with a suckler herd (not grazing the high fell). Ewes tupped with hill rams to produce draft ewes and store lambs. Shearlings are selected for the hill flock each autumn whilst the remainder are transferred to the draft flock. Hill ewes gathered immediately before tupping in mid-November, tupped on inbye and moved to allotment at Christmas and fell during January. Hay and other supplements are fed from late January-early February. The ewes are allowed to rake in and out of the allotment until April when the fields are closed from grazing to allow fresh growth for lambing mid-April. Ewes with twins and those suckling wether lambs remain on inbye and allotment unit, weaning in early August. All ewes then return to the fell, draft ewes retained for sale early September. During Summer the ewes on the fell are raked each day.	Peak stocking rate occurs during September/October when all ewes return to the fell joining the new intake of shearling ewes. The size of the flock is limited by the area of inbye used for tupping/lambing and not occupied by drafts.
	Upland farm	A large hill flock with ewe hoggs and a suckler herd. Ewes are cross bred to produce mule lambs. The ewes selected for crossing are gathered into the inbye in mid November and return to the fell by Christmas. The remaining ewes are tupped in the fell. Supplementary feeding is carried out as required. Most ewes lamb on the fell. Ewes with twins are placed on inbye and remain there till weaning. Blocks and hay are fed on inbye during lambing and after depending on grass growth. Wether lambs and surplus ewes sold during October. Those retained for flock replacement are home wintered on inbye from November to April. Daily raking is practised throughout the year, except for busy periods.	Peak stocking occurs during September when ewes that have summered on inbye return to the fell to join the new intake of shearlings. After the sale of draft ewes the stocking rate declines. Heavy stocking also in late summer as yearlings mature. Summer grazing of heather fell by cattle may occur.