4 SHEEP EXTENSIFICATION AS A CONSERVATION TOOL

4.1 Introduction

Schemes designed to reduce overgrazing and tackle intensification in the uplands have to date been mainly experimental and location specific. The use of Section 15 management agreements to tackle the overgrazing problem and other symptoms of upland sheep intensification on SSSIs, for instance, has had some success, though as Marsden (1990) comments, this is at best an unwieldy tool, administratively expensive and not well suited to addressing a problem as complex and large scale as overgrazing. The Wildlife Enhancement Scheme is now offering a better instrument in situations where groups of landowners with SSSIs can be brought together to undertake management changes over larger areas (including, in the case of the proposed Buttermere and Newlands Commons scheme, groups of commoners). Meanwhile, upland ESAs in areas like the North Peak are vital mechanisms for maintaining extensive farming systems that already exist. However, all such schemes are limited in coverage and cannot engineer the broader extensification of upland sheep farming that is required.

Widespread extensification, if it could be achieved, could prevent further degradation of the conservation resource, and could improve it in many areas. However, many of the changes reported in table 3.4 are reversible only at a high cost (such as the reclamation of moorland or the reseeding of acid grassland). Indeed, it would be a mistake to view extensification purely as de-intensification - we cannot push on a string just because it can be pulled. Ball *et al* (1982) point out that, even in successional terms, reversion may prove a much slower and more uneven process than improvement and there is an argument that simply reducing stock numbers or even keeping grazing rates within ecological limits will not do all that is needed (see below). Nevertheless, upland sheep extensification offers at least the potential to address a number of key problems underlying environmental damage and loss in the uplands. To summarise, there is a need for a dual strategy in which "narrow and deep measures" such as ESAs and the Wildlife Enhancement Scheme approach are combined with "wide but shallower" extensification measures which reduce stock numbers, limit stocking rates, modify grazing regimes and improve vegetation management. The latter are discussed in detail in the following section and summarised in Table 4.1.

4.2 The conservation requirements of sheep extensification prescriptions

A number of requirements need to be met if extensification schemes are to be effective in securing long term conservation benefits. In farming system terms it is vital that measures should support sheep farming systems that utilize heather for winter nutrition (its traditional "role" in the hill and upland sheep farms) and maintain moorland vegetation in good condition (Felton & Marsden, 1990). Winter grazing is considered potentially most harmful to Ericaceous moorland and off-wintering is commonly advocated.

Thus, short-term prescriptions should include reduction in winter stocking rates for an initial period based on the current mix of plant communities (grassland-heath- bog) and their condition (good-poor-suppressed (Felton & Marsden, 1990)). Off-wintering could then be employed to assist restoration of suppressed dwarf shrubs. Away-wintering may be employed where inbye land is scarce to prevent undue pressure for improvement displacing onto the inbye. On hill farms, where the proportion of moorland (or fell) is high, the winter carrying capacity of the moorland must set the upper limit on stock numbers on the holding. On upland farms where the proportion of moorland is much lower, the summer carrying capacity of the intake (or allotment) is critical and overgrazing here would need to be addressed. A code of practice for winter feeding would be required, and preparation and implementation of a burning programme with guidance notes.

The prescription may include action for specific habitats, eg woodlands, hay meadows, limestone grasslands, montane heaths, but these would always have to be based firmly upon the whole farm system. The prescriptions may include targets relating to individual species, for example to improve conditions for upland birds. Generally, habitat heterogeneity in the form of variations in vegetation height, mixtures of heath and grassland vegetation types, the presence of flush and bog areas, and the presence of crags and scattered trees increases upland bird diversity and breeding success. However, the precise mix and proportions of different habitats cannot yet be defined (MacDonald *et al* 1990).

4.2.1 Shepherding practices

Regulation of stock numbers alone will not address other important nature conservation issues (and indeed may exacerbate some of them). Loss of conservation interest of enclosed upland grassland, loss of moorland through afforestation and loss of botanical diversity of swards whose species composition is regulated by grazing are examples. Moreover, in circumstances of sub-optimal sheep management (eg, lapse of moor-burning programmes, and demise of active shepherding) technical improvements, which often focus on increasing the productivity of inbye land, may have an effect on moorland grazing (increasing the carrying capacity of improved land can facilitate higher stocking rates on two-pasture farming systems, for example) (Evans & Felton, 1987). On the other hand, changing seasonal stocking by facilitating removal of sheep to improved marginal land at lambing and tupping may achieve more for moorland conservation than a small reduction in total numbers. Indeed, just as in voluntary agreements on SSSIs which often "require the provision of alternatives more tempting than a simple reduction of stock" (Mowforth and Sydes, 1989) so within any extensification scheme which incorporates the voluntary principle, whole farm plans become an essential part of any farming systems approach.

Inappropriate management, extending to the lapse of active shepherding, has been identified as a complementary cause of moorland deterioration (Evans & Felton, 1987). For moorland conservation depends not just on restricting overall stocking but also by

preventing localised overgrazing which results from inadequate shepherding and winter supplement feeding (Topham, 1985). Hill flocks tend to congregate in winter at foddering sites, this results in trampling damage to vegetation, soil enrichment and erosion, and to localised overgrazing of heather (which offers some, albeit meagre, grazing in winter). The problem is exacerbated on moorland where hefting is commonly found (eg, North Pennines) but where raking of flocks has become a low priority (Topham, 1985). With localised degradation of habitats now commonplace given the widespread practice of winter-feeding **codes of practice on the use and siting of supplements and feedblock** are called for (for example, selecting young heather rather than older stands and choosing grassy areas where heather is particularly scarce or vulnerable (SAC/MLURI, 1988)). Prescriptions of this sort have widespread relevance: they are included both in the Tir Cymen schemes and in the North Peak ESA Tier 1 prescription, for example. In its Consultation Document for 'the North Peak ESA Review' MAFF concluded that in seeking to support low intensity sheep grazing of heather and encourage improvement in moorland vegetation, this scheme "has met the main purposes for which it was designed" (MAFF, 1992).

Offering encouragement and advice to farmers to reduce wider stocking levels by away-wintering part of the hill flock may be appropriate for farming systems where summer stocking rate prescriptions do not adequately take account of winter management constraints on shepherding or supplement feeding. Conditions of this kind are featured in English Nature's management plan agreements in the Lake District and could usefully be applied to most other farming systems in northern England. They would be of less relevance to farming systems on Exmoor where off-wintering from the moor is already common.

Advice and encouragement to adopt more active shepherding would address the problem of localised overgrazing, especially of areas of high conservation value but low grazing resistance such as deciduous woodland and scrub and bogs. In particular, the conservation interest of farming systems in the Pennines and Yorkshire Dales where the decline in the level of shepherding (although not the skill) has contributed to the problems outlined, would be enhanced by more intensive shepherding.

4.2.2 Stocking rates

While it has been stated that the EC sheepmeat regime has encouraged 'significant' overgrazing in many areas (NCC, 1988), it is more accurate to recognise that it is the combination of grazing and burning regimes which has eradicated Ericaceous substrates in many areas to create uniform, species-poor acidic grassland accompanied often, by soil erosion (Ratcliffe, 1990). Thus, the conservation of the wildlife interest in the uplands (both unenclosed and enclosed land) depends upon the numbers and management of livestock (especially sheep) and management of the vegetation resource on which the livestock depend (NCC, 1990).

Overgrazing pressures on dwarf shrub communities, leading to wider expanses of grasses and bracken have been seen as the major land use related conservation issue in the uplands (Thompson, Whyle and Oswald, 1988): this is because "the wildlife typically associated with heather moorland is more abundant and more highly prized than that associated with the grass or bracken which replaces it" (Evans & Felton, 1987). Heather, however, is nutritionally inadequate for sheep, which ideally require a 50% grass component in their diet (SAC/MLURI, 1988). Because sheep have distinct grazing preferences when ranging over mixed vegetation communities, grazing pressure on heather is dependent on the nature and proportion of grassland. The effects of sheep grazing are thus highly differentiated geographically. Where grass is relatively scarce, lower stocking is necessary to protect heather: where grass is more abundant the higher stocking rates which may result may lead to over-exploitation of heather. The age of heather is also an important factor in determining the extent of ecological overgrazing: young heather is more tolerant of grazing, being able to sustain 40% removal of current year's growth: at all stages of growth, greatest damage will occur from grazing in autumn, least in winter, with intermediate levels in summer (SAC/MLURI, 1988).

Under appropriate conditions of soil and climate, however, heather is the ecologically dominant species and, in the absence of tree seed sources, dwarf shrub communities may be said to be the climax vegetation type of the uplands. If conditions of management are very favourable, heather can competitively exclude less vigorous plant species, as can be seen on the heather moors in northern England which are managed for grouse (Mowforth and Sydes, 1989). Conversely, disappearance of heather has led to abandonment of grouse moors with resulting declines in numbers of merlin, golden plover and stonechat (Ratcliffe, 1990).

The heterogenous nature of the moorland resource and biogeographical variation of upland plant communities mean that conservation objectives are not easily or best served by introduction of blanket stocking-rate prescriptions (although it has been stated that the current general year-round stocking rate, though "wide in terms of differing effects on vegetation ... is a fairly narrow range to influence using the blunt instrument of blanket policy measure" (Evans & Felton, 1987)). Moreover, research into the effects of grazing on moorland plant communities has been slow to establish how to determine the minimum density of sheep that will maintain habitat mosaics on a particular moorland (Mowforth and Sydes, 1989). This would seem to be as crucial a figure to know as is the maximum density compatible with moorland maintenance (or regeneration as appropriate). It is important to acknowledge, also, that adequate information on the response to grazing of species other than heather is often not available, thus making the setting of appropriate grazing levels an extremely inexact science. This is true in particular of peatland and bog communities (Rowell, 1990). Significant problems for wholesale stocking rate prescriptions are also presented by the existence on many moorland commons of unexercised grazing rights: nature conservation interests were not considered in the registration of rights procedures of

the Common Land Registration Act (1965) (Topham, 1985) and unless stocking, prescriptions take account of such local political considerations, in addition to ecological ones, delivery of conservation goods resulting from reduced stocking will be very uncertain.

However, even though it may be accepted that a national stocking rate is inappropriate because of differential ecological and agricultural overgrazing, sheep grazing remains essential to the maintenance of the conservation interest of the uplands (NCC, 1988). Maximum stocking rates compatible with nature conservation lie, very generally, in the range of 0.37-2.0 ewes/ha (Evans & Felton, 1987) but some habitats such as blanket bog have been shown to suffer degradation at stocking rates of 0.01-0.3 ewes/ha (Mowforth and Sydes, 1989). High stocking rates do confer benefits to carrion feeding birds such as raven, buzzard, golden eagle and red kite. Although improved veterinary care may have offset some of the increase in supplies of carrion (Ratcliffe, 1990), the recolonisation of England by golden eagle and red kite may be compromised by further declines in supply. With localised exceptions (eg, North York Moors) reductions in sheep numbers will slow the degradation of structure and species composition of grazing-sensitive dwarf shrub communities, and will reverse the loss of mosaics of vegetation communities. The stocking-rate figures appropriate for specific farming systems will, as stressed, depend on the composition and extent of different vegetation types, their condition and age and the desired end product mix of vegetation. More detailed attention to regionally optimal stocking rates is given in Section 5.

4.2.3 Semi-natural vegetation management

Management of livestock is one facet of an extensification programme that would confer nature conservation benefits. Management of the vegetation that supports the livestock is another, and is central to maintenance or enhancement of the environmental value of the uplands.

Burning of moorland vegetation (and heather in particular) benefits grazing animals by stimulating vegetative regeneration (MAFF/WOAD, 1986). However, maintaining heather in a productive condition for sheep and grouse may not always be compatible with wildlife management objectives as it promotes a trend towards uniformity and lack of associated species. Moors that are well managed for production may certainly offer suitable habitats for species requiring extensive open country such as certain birds of prey, curlew, golden plover and other animals such as mountain hares but overall diversity is not high (Gimingham, 1985). Heather will die if burnt too frequently but deteriorates if burnt too infrequently: lapse of burning management results in stands of degenerate phases of heather which, provide a more open canopy structure facilitating growth of other species and providing taller 'leggy' heather which is favoured for nesting and shelter by species such as hen-harrier and merlin. Overall, as with stocking densities, burning regimes must be regionally differentiated to take account of biogeographic variation and differences in grazing intensity and vegetation mix (Mowforth and Sydes, 1989). Certainly, burning grassland every year benefits

neither agriculture nor conservation (MAFF/WOAD, 1986), and even burning on a 3-4 year rotation of *Calluna-Molinia* communities will lead to dominance by *molinia* (Gimingham, 1985). Over-zealous burning can, in contrast, promote the development of heathland communities in place of peatland communities (Rowell, 1990).

A code of practice on moor burning which takes full account of nature conservation objectives alongside sheep-raising or grouse-rearing requirements is therefore appropriate. Such a code would clearly relate burning practice to grazing management and in this area models such as that devised by MLURI should be useful in determining prescriptions appropriate to a given farming system. A caveat that needs to be issued with such models, however, is that their assumptions with regard to burning rotations should not be based on the desirability of maintaining heather is its most productive phase, as this does not confer maximum nature conservation benefit (Mowforth and Sydes, 1989).

Enclosure of 'bottom land' in upland farming systems has been cited as a major cause for concern amongst conservationists (Thompson, Whyle, and Oswald, 1988). Increases in soil fertility and modification to vegetation attendant on land improvement schemes (which include drainage, re-seeding, cultivating and the application of lime, artificial fertilisers and pesticides) has resulted, for example, in the decline of botanical diversity in meadows and pastures in the Yorkshire Dales and the loss of wet flushes and unimproved grassland, which are essential to the breeding success of many species of wader (eg, snipe, redshank, curlew, golden plover). The enhanced productivity of inbye land resulting from improvement has an important effect on moorland management, given that "the ratio of improved and/or inbye land to heather moorland and the nutritional status of both, determines the technical limit to stocking rates" (Mowforth and Sydes, 1989). **Restrictions on improvements to inbye land** are therefore an essential feature of extensification measures in their own right and would reinforce measures aimed at stocking rates and shepherding practices. Positive management of inbye land also needs to be addressed. Perhaps the most important component of any **Code of Practice for management of meadows** would be the seasonal restriction on use of meadows for grazing as fodder production: excluding grazing from late spring until after cutting for hay is practised in most traditional upland farming systems and is a feature, for example, of the North Peak ESA Tier 1 prescriptions. Besides addressing the issue of botanical diversity and wader breeding and feeding sites, extensive meadow management would limit loss of and damage to invertebrate populations. Given that, in general, botanical diversity is greatest on soils of intermediate fertility, the loss of species richness in grasslands can be attributed mostly to use of artificial fertilisers together with drainage and liming. These three aspects of agricultural improvement should thus be most closely targeted. Targeting of measures to maintain and restore meadows will certainly be necessary anyway in these areas where lack of grazing of unimproved grassland would lead to reversion to scrub or rough grassland: indeed cutting sheep numbers "if not done in the right manner could further extend this neglect" (Hopkins, 1990). Related to hay meadow management prescriptions would

be measures to regulate use of pastures for silage production and encourage reversion to management of meadows for hay production in preference to silage. Floristic richness of traditionally managed hay meadows results from the ability of plants to flower and set seed before mowing: indeed the action of haymaking serves to scatter seeds. Mowing for silage earlier in the growing season interferes with this dispersal while the greater use made in silage production of fertilisers and herbicides favours fast growing nutrient demanding species such as docks, thistles and nettles. This process is exacerbated by the repeated, and more frequent mowing associated with silage production (Kelly & Parry, 1990).

These silage management practices have a deleterious effect on ground nesting waders. The denser and more lush vegetation resulting from high fertiliser inputs makes silage fields useless as nesting and chick-feeding grounds for species such as lapwing, for example: moreover, the decline of the corncrake has been attributed to the change in timing of mowing associated with silage production (O'Connor & Shrubb, 1986). This prescription would have greatest impact on those upland farming systems (such as those of the Lake District) where improvements to inbye land has substantially reduced the number and extent of hay meadows.

On farms where areas of moorland are often enclosed as unimproved allotments it may be appropriate to restrict further enclosures of moorland: although the withdrawal of agricultural improvement grants may have made such works unviable, measures to destock moors in winter may encourage farms to enclose freehold moorland. In the past moorland 'take' for agriculture has been outweighed by losses to afforestation but has nevertheless been responsible for loss of breeding habitat for grouse, golden plover, hen harrier, shorteared owl with only marginal benefit to lapwing. Improvement of allotments, particularly in the form of drainage, has adversely affected lapwing and other wader species (Ratcliffe, 1990).

Table 4.1: The nature conservation issues associated with sheep extensification at the whole farm level

Prescription	Conservation problem addressed	Conservation problem not addressed	Accompanying measures required	Farming system affected (see table Table 3.4)
Shepherding practices				
1) Encouragement and support for 'off-wintering' (from moorland) of higher proportion of hill flock	1) Ecological overgrazing of *Calluna* 2) Incidence of localised vegetation trampling, overgrazing, soil erosion and nutrient enrichment	1) Summer overgrazing of moorland 2) Grazing pressure on inbye land and the associated trend to 'improve' enclosed land to support breeding and store flocks over winter	1) Advice and encouragement to 'away-winter' stock 2) Restrictions on improving inbye or allotment	Lake District Upland Farm Cumbrian Pennine Moor Farm Yorkshire Dales high dale Farm Yorkshire Dales low dale Farm Northumberland Hill Farm Dartmoor Farm
2) Advice and encouragement to adopt more active shepherding	3) Incidence of localised overgrazing (especially in winter at foddering sites) 4) Grazing pressure on areas of high conservation value such as woodland and bog	As 1) and 2) above		Cumbrian Pennine Moor Farm Yorkshire Dales high dale Farm Yorkshire Dales low dale Farm
3) Code of practice on use and siting of supplementary feed for hill flocks in winter	As 2) above	As 1) and 2) above	3) Advice and encouragement for in wintering of cattle	Lake District Upland Farm Cumbrian Pennine Moor Farm Yorkshire Dales high dale Farm Yorkshire Dales low dale Farm Northumberland Hill Farm Northumberland Upland Farm Exmoor Hill Farm Exmoor Upland Farm Dartmoor Farm

Prescription	Conservation problem addressed	Conservation problem not addressed	Accompanying measures required	Farming system affected (see table Table 3.4)
Stocking rates				
1) Reduction of summer grazing densities on moorland/fell	1) Loss of *Calluna* heath 2) Degradation of structure and species composition of dwarf shrub 3) Loss of mosaic of habitat types - on which many moorland birds are dependant for breeding success 4) Loss of grazing-sensitive communities such as wet heaths and blanket bog	1) Bracken encroachment 2) Possibility of overgrazing in future as a result of commoners taking up grazing rights which are not currently exercised 3) Loss of conservation interest of meadows and pastures 4) Loss of moorland through afforestation 5) Decreased availability of carrion - important food source for birds such as raven, buzzard, golden eagle, red kite 6) Possibility of loss of diversity in herb-rich *Agrostis-Festuca* grasslands when grazing stress is relaxed 7) Scrubbing-over of under-grazed grassland and heath	1) Advice and encouragement to ensure grazing is at a level sufficient to maintain diverse vegetation communities in a mosaic of habitats. 2) Restrictions on intensified usage of enclosed grazings: achievable through 'whole farm' extensification. 3) Introduction of appropriate moor-burning regimes, even though the strict agricultural necessity for doing so may not exist at lower stocking densities. 4) To ensure that other livestock are not substituted for sheep on moorland.	Lake District Upland Farm Cumbrian Pennine Moor Farm Northumberland Hill Farm Northumberland Upland Farm Yorkshire Dales high dale Farm Yorkshire Dales low dale Farm Dartmoor Farm Exmoor Hill Farm Exmoor Upland Farm

Prescription	Conservation problem addressed	Conservation problem not addressed	Accompanying measures required	Farming system affected (see table Table 3.4)
Vegetation management				
1) Code of practice on moor burning	1) Loss of heterogeneity of vegetation structure and composition which results from lapse of burning 2) Damage to lower plant and invertebrate communities caused by over-intense burning 3) Incidence of scrub invasion of heath and grassland			Lake District Upland Farm Cumbrian Pennine Moor Farm Yorkshire Dales high dale Farm Yorkshire Dales low dale Farm Northumberland Hill Farm Northumberland Upland Farm Exmoor Hill Farm Exmoor Upland Farm Dartmoor Farm
2) Restriction on improvement to inbye land (eg, drainage, re-seeding, liming, fertilising, use of pesticides, cultivations)	4) Loss of botanical diversity in enclosed meadows and pastures 5) Loss of wet flushes which are essential for breeding success of wader species. 6) Over-stocking within the farm unit (productivity of inbye determines moorland stocking rates in areas where tack is not available)	2) Over-stocking of moorland in summer in areas where tack is available or there is high proportion of inbye to moor within the farm unit	1) Restrictions on 'out-wintering' stock on moorland	Lake District Upland Farm Cumbrian Pennine Moor Farm Yorkshire Dales high dale Farm Yorkshire Dales low dale Farm Northumberland Hill Farm Northumberland Upland Farm Exmoor Hill Farm Exmoor Upland Farm
3) Restriction on reclamation of unenclosed moor	7) Moorland 'take' to create enclosed pasture	3) Threat of continued improvement of enclosed pasture, moor		Lake District Upland Farm Cumbrian Pennine Moor Farm Yorkshire Dales high dale Farm Yorkshire Dales low dale Farm Northumberland Hill Farm Northumberland Upland Farm Exmoor Hill Farm Exmoor Upland Farm

Prescription	Conservation problem addressed	Conservation problem not addressed	Accompanying measures required	Farming system affected (see table Table 3.4)
Vegetation management				
4) Code of practice governing seasonal use of meadows for grazing and hay/silage production	As 4) and 5) above 8) Loss of and damage to invertebrate populations	4) Intense management and use of other enclosed areas and of moorland	2) Restrictions on further improvement to hay meadows inbye and allotment	Yorkshire Dales high dale Farm Yorkshire Dales low dale Farm Northumberland Hill Farm Northumberland Upland Farm Exmoor Hill Farm Exmoor Upland Farm
5) Encouragement to revert from silage production to haymaking	as 4) 9) Disturbance of ground nesting birds 10) Watercourse and groundwater pollution	5) Intensive use of artificial inputs	3) Advice and encouragement to use appropriate fertiliser and liming treatments	Lake District Upland Farm Cumbrian Pennine Moor Farm Yorkshire Dales high dale Farm Yorkshire Dales low dale Farm Northumberland Hill Farm Northumberland Upland Farm Exmoor Hill Farm Exmoor Upland Farm Dartmoor Farm
6) Establishment of 'exclosures' to promote, as appropriate: - *Calluna* regrowth; - woodlands; - blanket bog; - wet flush; - ... etc,	11) Attrition of 'marginal' areas as a result of grazing pressures	6) Attrition of 'marginal' areas resulting from improvement	4) Advice and encouragement to maintain 'marginal' areas and avoid damage by agricultural operations	Lake District Upland Farm Cumbrian Pennine Moor Farm Yorkshire Dales high dale Farm Yorkshire Dales low dale Farm Northumberland Hill Farm Northumberland Upland Farm Exmoor Hill Farm Exmoor Upland Farm Dartmoor Farm
7) Introduction of quotas on Nitrogen applied to grassland	As 4), 8) and 10) above		5) Advice and encouragement to restore botanical diversity through less intensive use of artificial inputs	Lake District Upland Farm Cumbrian Pennine Moor Farm Yorkshire Dales high dale Farm Yorkshire Dales low dale Farm Northumberland Hill Farm Northumberland Upland Farm Exmoor Hill Farm Exmoor Upland Farm Dartmoor Farm