

4. SOCIOECONOMIC CONSIDERATIONS AFFECTING WOODLAND EXPANSION IN THE NATIONAL PARKS/AONB

In this section we discuss socioeconomic issues relating to woodland expansion within each of the following areas: Northumberland National Park, Lake District National Park, Peak District National Park, Dartmoor National Park and Shropshire Area of Outstanding Natural Beauty (AONB). There are five sub-sections. First, we describe the policies and grant schemes within each of these areas. Secondly, we describe the main types of land use in each of these areas. Thirdly, we discuss how ESA designation has affected these areas in terms of woodland expansion and management. Fourthly, we discuss the different types of ownership within these areas and how this may affect incentives for woodland expansion. Finally, we discuss some of the constraints private landholders face in making a decision about whether to plant trees.

4.1 POLICIES AND GRANT SCHEMES WITHIN AREAS

In 1993, the National Parks and Forest Authority signed a national accord to promote and encourage the management and extension of native woods in National Parks. All of the National Parks have been involved in preparing local accords with the Forestry Authority in the spirit of this national agreement. They all have local schemes (in addition to those available nationally) which are consistent with this objective, although many of them were in place prior to the national accord. Apart from providing assistance for woodland management and expansion (financially or otherwise), there are other ways National Park Authorities may attract funds for this purpose. For example, several National parks are collaborating to bid for Millennium Funding which includes promoting the creation of new native woodlands. Individually, National Park Authorities may apply for Objective 5b funding (a European programme), for this purpose. We will give a brief summary of the main grant schemes available within these areas. Information about grant schemes was obtained from phone conversations with a representative from each National Park.

All the National Parks have local schemes which aim to complement national schemes in some way. This assistance may be in terms of financial (or in-kind) payments or by providing information and advice. Financial assistance is usually provided in two types of circumstance. First, in certain cases, NPAs provide grant-aid for specific tasks that are not funded under the national schemes. For example, there was a case in the Lake District where the NPA grant-aided the top wires and repairs for the boundary while the grant for tree planting was obtained under the WGS. Secondly, the NPA may provide grant aid (75-80 per cent of the costs) for suitable areas that do not qualify for the national schemes. This latter case might arise if the area proposed for tree planting is too small (the WGS requires a minimum planting area of 0.25 ha and at least 15 m wide). These types of assistance are provided in the Peak District, the Lake District and Northumberland National Parks. The officer in Northumberland National Park also mentioned that for existing woodlands, it may be possible for landholders to enter into section 39 Management Agreements. In those cases, the NPA pay 100 per cent of the planting costs and are involved in the management of the forest.

In Dartmoor National Park, while grant-aid may be provided for operations that don't qualify for the WGS, the NPA does not provide any supplementary financial assistance for landholders participating in the WGS. Instead, the NPA provides in-kind assistance through the provision of trees and materials to the landholder. The reason given for this is the need

to avoid double-funding. Where the NPA does commit to investing time or financial resources in a particular location, it occasionally seeks Management Agreements with the owner. These are legally binding agreements to protect the area from subsequent alteration by the owner.

In the Shropshire Hills AONB, these schemes are not available since the area is not in a National Park. However, the area has been successful in obtaining Objective 5b funding. This funding is for landscape conservation more generally, though it includes tree planting. The grants, which have only become available this year, are designed to cover the costs of carrying out work. Another programme within this area is called Rural Action. This is funded by several national bodies but it has a local orientation. Some of this funding, especially in South Shropshire, is used for environmental purposes and again, is designed to cover costs.

All the NPAs have acquired areas in the past - either to protect established woodland or for woodland creation. This will be discussed further in section 1.4.

4.2 LAND USE WITHIN THESE AREAS

To examine land use within these areas, parishes with over 30 per cent of their area within the National Park/AONB were considered and aggregate data was produced from the June Agricultural Census.¹ Because some of the parishes have most of their area outside the National Park/AONB, the sample considered here does not fully represent farming in these areas.

Table 4.1 shows the area of each of the main enterprises as a proportion of the total agricultural area within each National Park/AONB. Table 4.2 shows the number of holdings for each enterprise as a proportion of the total number of holdings. The most obvious things to note are that agricultural businesses are mainly livestock and most of the holdings within these areas have Less Favoured Area (LFA) status.

Northumberland National Park: over 70 per cent of the area is classified as either specialist sheep or mixed cattle and sheep. These enterprises also account for a significant proportion of holdings in the region.

Peak District National Park: over 70 per cent of the area is classified as either specialist sheep (27%), mixed cattle and sheep (11%), dairy LFA (26%) or specialised beef (10%). 23% of holdings in the area are classified as dairy LFA and whereas specialist beef, mixed cattle and sheep and specialised grass and forage each account for 11-15 per cent of holdings.

Dartmoor National Park: the three most significant businesses in terms of area are mixed cattle and sheep (31%), cattle and sheep lowland (11%) and specialised beef (18%). Over sixty per cent of holdings can be classified as either specialised grass and forage (16%), specialised beef (15%), mixed cattle and sheep (15%) or cattle and sheep lowland (16%).

Lake District National Park: about 75 per cent of the agricultural area consists of specialised sheep (35%), mixed cattle and sheep (21%) and cattle and sheep lowland (19%). Collectively, these form a lower proportion of holdings in the area, each accounting for 12-20 per cent.

¹ We are very grateful to Charlie Pickering in MAFF for his help.

Shropshire AONB: most of the area consists of enterprises classified as dairy lowland (10%), mixed cattle and sheep (16%), cattle and sheep lowland (21%) and crops, cattle and sheep (17%). However the proportion of holdings accounted for by different enterprises is more diverse than any of the other areas, although cattle and sheep lowland account for about 28% of holdings.

Table 4.3 shows the proportion of holdings in each ESU (Economic Size Unit) category. One could loosely define small farms as less than 40 ESUs; medium-large farms as 40-100 ESUs and large farms as over 100 ESUs. In all the regions well over half the holdings are less than 40 ESUs. In the Shropshire Hills, the Peak District and Dartmoor, over 70 per cent of the holdings are less than 40 ESUs.

4.3 ESA DESIGNATION

Apart from Northumberland National Park, all of the other areas contain a significant proportion of land that has been designated as an ESA. A standard provision of ESA agreements is that landholders must retain existing broadleaved woodland and retain individual and small groups of trees. Agreement holders are also obliged to obtain advice on the management of existing woodland and on any proposals to plant new woodland within two years of the start of the agreement.

Farmers cannot claim grants under both the WGS and the ESA for the same area of land. In most regions, ESA status was not identified as a barrier to woodland expansion. However it has been noted as a barrier in the Lake District National Park. There was one case where a landholder who had formerly been in an ESA had to be compensated for foregone payments by a combinations of LEAP payments (available under the WGS) and payments from the NPA.

4.4 TYPE OF OWNERSHIP

The type of ownership within these areas is important because it is likely to effect incentives to engage in tree planting. For example, conservation organisations that are not primarily concerned with maximising agricultural profit may be more inclined to plant trees even in the absence of a large financial return.

In all of the regions there is significant ownership by at least one of the following organisations: Forest Enterprise, the National Trust, water companies and other conservation organisations. There are many examples of where such organisations have been very active in expanding woodland on their holdings. For example, in Northumberland National Park, there was one large scheme funded in 1995 on the College Valley Estate. This estate is owned by a trust with conservation objectives (though it is not the main purpose of the trust). The scheme was for new planting on 73 hectares. While this was brought about through a combination of favourable circumstances at the time (for example sheep grazing had become less profitable), it would not be surprising to find that organisations with multiple objectives are more often associated with large-scale planting.

In each of these regions, there are several traditional estates. While such estates have several objectives, timber production is usually a significant goal (Nicholls et al., 1996). This was mentioned in an interview with an NPA representative in the Lake District. It was noted that

traditional large estates would have an interest in commercial timber production whereas private owners tend to be involved in smaller-scale planting of broadleaves.

Finally, in all of the National Parks, some land is owned by the NPA. The Peak District NPA is notable for its policy of acquiring land and then disposing of it when the sale can be linked to an agreement to manage the woodland in a way consistent with the NPA's policy. Dartmoor NPA owns 132.2 ha and the Lake District NPA owns about 1,000 ha. In both cases, most of this land was acquired in the 1970s and '80s. Since then constraints have been imposed on the capital spending of local authorities. In Northumberland, there is very little land owned by the NPA.

In the context of ESAs, comparisons between (SSSI type) Management Agreements, ESA payments and land purchase have found the last option to be most cost-effective (for example, see Colman et al. 1992). Selling land with a covenant (as practised by the Peak District NPA) is also regarded as a potentially efficient type of policy mechanism (for a discussion, see Dwyer and Hodge, 1996).

4.5 CONSTRAINTS ON PRIVATE LANDHOLDERS

It has been noted above that incentives facing landholders for woodland creation and management will differ according to the type of ownership. Even among private landholders, one might expect people to be motivated by different concerns. Foregone agricultural income will not be a big issue with every landholder.

In Dartmoor NPA, Management Agreements (as discussed in 1.1) have been conducted recently with four different types of owner. One was described as a "true hill farmer", another was a landholder on a traditional estate, a third was a wood sculpturer and a fourth was an accountant who didn't live in the National Park. One would not expect agricultural opportunity cost to play an equally important role in each of these cases. In the Lake District National Park, several applicants for the WGS scheme have been from landholders who earn their main source of income off the farm.

However, for many landholders, agricultural opportunity costs will be an important consideration and may prevent woodland creation in the absence of compensatory payments in addition to assistance towards financial costs. For example, in a letter an NFU representative from the Shropshire Hills AONB stated that there is limited scope for an increase in woodland expansion because of the high cost of establishment and the long period before any sensible return could be anticipated. Grant aid was viewed as insufficient to persuade land occupiers to switch production from existing crops into woodland.

On the basis of the nature of land use and holdings described in section 1.2, one might also be able to say something about agricultural opportunity costs. Although it would be possible to do a more detailed financial analysis, this would take a lot more time than allowed for in this study. It was noted in 1.2 that many holdings are less than 40 ESUs. If such holdings represent small farmers highly dependent on agricultural income, one might speculate that they would be less inclined to participate in schemes because of the potential loss of agricultural income. In the overview of economic aspects of woodland expansion (section?), Crabtree et al. (1996) were cited as finding that this was the type of farmer not entering schemes. On the other hand, marginal land with less potential for other uses may be attracted

into such schemes. It may be expected that such land would be found on parts of less intensive farms. For example, one might expect more of such land to be on farms classified as mixed cattle and sheep than farms classified as intensive grass and forage. In all of these areas, woodland creation could cause loss of agricultural subsidies (such as HCLA payments) if planting causes the stocking rate on remaining land to exceed current stocking rate limits or if livestock numbers must be reduced. Insufficient compensation for foregone income would be one of the biggest constraints preventing woodland creation on a more significant scale. This is reflected in the take-up of the WGS.

The take-up of the WGS is summarised in table 4. The Lake District and Northumberland National Parks have about 5-6 per cent of their area enrolled in this scheme. The Shropshire Hills AONB and Peak District National Park each have about 3 per cent of their land area in the scheme. Northumberland National Park has only 1 per cent of its area covered by the scheme.

Correspondence and discussion with representatives of various organisations within these areas has been a useful source of information about such schemes. In the Peak District National Park, the WGS has been important for managing and regeneration of existing woodlands. In the experience of officers within the NPA, it is not difficult to persuade a lot of farmers to enter schemes that will involve managing existing woodlands. On many such farms, the existing woodland consists of broadleaved species, not generating any significant income for the farmer. There may be opportunities for woodland creation adjacent to such woods in situations where this land would have a very small (or zero) opportunity cost. The farmer might see an advantage of this through provision of shelter. Both Gasson and Hill (1990) and Appleton and Crabtree (1991) observed that those farmers who were already managing their woodlands were more likely to plant trees than those not engaged in woodland management. However in this interview, it was also noted that the new woodland creation would be on a very small scale in the absence of compensation payments for foregone agricultural production.

In Northumberland there has been a lot of interest in the Livestock Exclusion Annual Premium Scheme (LEAP - which is a component of the WGS), whereas in Dartmoor, there has hardly been any interest in this scheme. In the latter case, the fact that HCLA payments are £86 per acre and can be claimed over woodland area was identified as a disincentive for landholders to participate in LEAP. In both Dartmoor and Northumberland National Parks, the fact that there isn't a direct payment for fencing was identified as a very significant short-coming of this scheme. In Dartmoor, the NPA representative also noted the marked reduction in the number of applications for the WGS because of the dramatic reduction in the area payment for restocking in the last review of the WGS - from £1,525 per ha to £525 per ha.

It is very likely that the uptake of such schemes would improve if payments improved to more fully cover costs and to compensate landholders for foregone profit. It has also been suggested that the benefits of woodland creation in terms of shelter need to be emphasised as well as persuading landholders that woodland creation is not an onerous task.

Table 4.1 Area in each enterprise as a proportion of total agricultural area in the National Park/AONB (for main agricultural enterprises)*

Figures in bold indicate where at least 10 per cent of the agricultural area is in a particular enterprise

	North- umberland	Peak District	Dartmoor	Lake District	Shropshire
Cereals	0.013	0	0.03	0	0.08
Dairy LFA	0.004	0.26	0.06	0.08	0.02
Dairy Lowland	0.003	0.06	0.07	0.07	0.10
Specialised Sheep SDA	0.43	0.27	0.034	0.35	0.05
Specialised Beef SDA	0.02	0.10	0.18	0.02	0.01
Mixed Cattle and Sheep SDA	0.32	0.11	0.31	0.21	0.16
Cattle and Sheep DA	0.03	0.04	0.06	0.03	0.04
Cattle and Sheep Lowland	0.09	0.09	0.11	0.19	0.21
Cropping, cattle and sheep	0.08	0	0.04	0.004	0.17
Specialised grass and forage	0.01	0.04	0.06	0.03	0.03
Specialised horses	0	0.004	0.028	0.004	0.01
Total	0.99	0.99	0.98	0.99	0.87
Hectares (100%)	106221	64705	65409	124477	98958

Table 4.2 The number of holdings in each enterprise as a proportion of the total number of holdings in the National Park/AONB (for main agricultural enterprises)*

	Northumber-land	Peak District	Dartmoor	Lake District	Shropshire
Cereals	0.02	0	0.012	0	0.05
Dairy LFA	0.02	0.23	0.04	0.09	0.02
Dairy lowland	0	0.05	0.05	0.09	0.09
Specialised Sheep SDA	0.26	0.09	0.05	0.20	0.05
Specialised Beef SDA	0.08	0.15	0.15	0.04	0.023
Mixed Cattle and Sheep - SDA	0.38	0.11	0.15	0.16	0.09
Cattle and Sheep DA	0.03	0.06	0.05	0.05	0.06
Cattle and Sheep Lowland	0.07	0.12	0.16	0.20	0.28
Cropping, cattle and sheep	0.04	0	0.02	0.008	0.08
Specialised grass and forage	0.05	0.13	0.16	0.12	0.11
Specialised horses	0	0.03	0.09	0.02	0.04
Total	0.95	0.96	0.94	0.97	0.90
Number of holdings	398	1167	1429	1379	1554

* The following codes are used to classify farms according to their Less Favoured Area (LFA) status:

SDA: Severely Disadvantaged Area; DA: Disadvantaged Area;

Table 4.3 The proportion of holdings in each National Park/AONB in each ESU (Economic Size Unit) Category

ESUs	Northumber-land	Peak District	Dartmoor	Lake District	Shropshire
0<8	0.23	0.49	0.55	0.36	0.41
8<40	0.34	0.28	0.27	0.31	0.29
40<100	0.33	0.19	0.14	0.28	0.21
100<200	0.08	0.03	0.03	0.05	0.07
200+	0.015	0	0.003	0.004	0.016

Table 4.4 The number of WGS cases and areas covered in each National Park/AONB

	No. of cases	No. of ha
Dartmoor	138	3554.61
Peak District	92	2049.36
Lake District	235	6875.74
Northumberland	51	978.72
Shropshire	91	978.72

5. DISCUSSION AND CONCLUSIONS

The purpose of this study was to investigate the potential for developing new native woodlands in the uplands. Opportunities for woodland expansion were to be identified and potential conflicts (wildlife, landscape, silvicultural, economic) explored. The opinions of a wide range of consultees were to be sought on this matter but there was also to be a focused study in five contrasting upland areas of England to identify generic issues and local variations so as to inform the debate.

The consultation exercise revealed general support from the conservation organisations (EN, Countryside Commission, National Parks, National Trust, County Wildlife Trusts, Council for the Protection of Rural England), the forestry industry (Forestry Authority and Forest Enterprise, private forestry advisers) and to a lesser extent the farming industry (National Farmer's Union) for woodland expansion in the uplands, but concern in the most part about where and how it might be achieved. The conservation organisations' chief concerns relate to the potentially damaging impacts of new woodland (change in landscape character, loss of open ground habitats, harbouring of foxes and corvids which would predate favoured species on adjacent ground). The farming community in general, as represented by the National Farmers Union and Country Landowners Association remains unconvinced that the current grants and other incentives for planting and/or managing woodland (highlighted in the economic analyses in Sections 1.4 and 4 of this report and referred to where appropriate in the accounts of the study areas) are adequate to compensate for the long lead-in time before a crop is produced and accompanying reduction of income, and loss of flexibility which is seen as being very important in enabling a rapid response to changes in EU support mechanisms and prices.

It is interesting to note, however, that recent studies of uptake under the various woodland grant schemes indicate that expectations of a net increase in income as a result of tree planting are of secondary importance to most farmers who have taken advantage of the various woodland grant schemes. Most gave enhancement of landscape, conservation and amenity as their primary motives while describing sporting, shelter, timber production and income as of secondary importance. However, the farmers interviewed tended to have larger holdings than the average and had few financial constraints. Gasson & Hill (1990) identified three kinds of farm owner to whom the schemes particularly appealed: landowners who were managing an integrated agricultural and forestry estate and were likely to have done some planting before (College Valley Estates in our Northumberland National Park study area would fit into this category); commercial farmers who took advantage of the scheme to take relatively unproductive land out of food production, but would not have been motivated to do so without the scheme; farmers who are sympathetic to tree planting but would not have considered themselves able to afford to do so in the absence of the scheme. In many cases the grants and subsidies prompted farmers to increase the areas that they were planning to plant in any case, rather than to initiate planting, and the more commercially aware might adjust the area planted to take maximum advantage of grant levels within different size bands. Many participating farmers were already actively managing their existing woodlands, indicating that knowledge and experience of woodland ownership and management leads to a wish to expand these activities.

This highlights the problem that in England (unlike the rest of the UK) planting funded by the woodland grant scheme has mostly taken place on arable land; there has been little response from livestock farmers generally, let alone hill farmers. However, the picture varies from region to region. Thus about 5% of area has been entered into the schemes in the Lake District and Dartmoor National Parks but only 1% in Northumberland. Possible reasons for these differences are discussed in Section 4. These issues are addressed in the National Parks/Forestry Authority national and draft local accords on native woodland which state the need for improved financial incentives and/or simplification and consolidation of the various schemes and payments. The need for provision of advice on all aspects of grant application procedures, planting, management and harvesting of farm woodlands, to reduce consultancy fees and show how the woodland operation could be fitted most profitably into the overall farm economy would improve the prospects of woodland expansion in the uplands. Increasing the provision of on-farm demonstrations for landholders would help to carry this forward. It should be appreciated, however, that not all, or perhaps even most farmers who decide to extend or establish woodlands on their land will necessarily wish to become involved in routine woodland management or harvesting. If a substantial increase in woodland occurred in an area increased availability of employment in contract farm woodland management would almost certainly follow.

Assuming that progress can be made on the economic and advice/training fronts so necessary to make forestry more attractive to upland landholders, the question of where to put new woodland becomes more pressing. There is no avoiding this assessment in any case if a serious start is to be made on implementing the all-party policy on woodland expansion set out in the Government's 1995 White Paper, *Rural England*, which seeks a doubling of woodland area in the next 50 years. Particularly relevant to the uplands is the national target under the Biodiversity Action Plan for a 10% expansion of upland oakwood by 2005. Our studies in the Northumberland, Lake District, Dartmoor and Peak District National Parks and the Shropshire Hills AONB have shown that there is no shortage of land which could support semi-natural woodland appropriate to the area, which in many cases would be upland oakwood. In most cases there is sufficient for at least a five-fold increase, in some (Northumberland, Shropshire Hills AONB) much more. This is a conservative estimation because the method used to assess potential woodland areas only includes unwooded areas with similar characteristics (elevation, slope, aspect, soil types, vegetation cover) to land already wooded. It excludes all land above 600 m and below 200 m (except where special cases have been made), all areas with significant heather cover and, more subtly, types of land which for one reason or another do not have any wooded counterparts but may be very suitable for tree growth (notably the best arable land on the lower ground in areas like the Shropshire Hills).

It is important to note that this objective method shows the most significant potential woodland areas are mainly adjacent to existing woodland, often joining fragments to form much larger woods as in the Teignbridge 10 x 10 km study area on Dartmoor (Figure 3.3.5) and the Clun Forest study area in the Shropshire Hills (Figure 3.5.8). At higher elevations in the Lake District, Northumberland and the Dark Peak the suggested areas often involve extending woodland upland from the valley bottoms along watercourses and ultimately out into the moorland along the deeper ghylls. Since all those consulted, including the Countryside Commission, Forestry Commission, National Park Authorities (see joint 1996 FC/CC statement and FA/NPA 1995 Accord), National Trust (pers. comm.), RSPB (RSPB 1996 and pers. comm.), Wildlife Trusts and English Nature (Kirby 1996; Kirby and Rush 1993) favour extension of existing woodland rather than planting in isolated situations, these

maps can be seen to provide appropriate guidance. Woods planted adjacent to existing woodland, particularly on sites which retain some woodland flora and fauna, as is often the case on semi-natural grassland sites in uplands, have the best chance of successful establishment of both appropriate trees (suitable soils, seed trees available or stock of local origin) and characteristic plant and animal communities (Peterken 1996; Rodwell & Patterson 1994). They also have the greatest likelihood of being allowed to remain to maturity (important because some less mobile plants and animals take a long time to colonise, e.g. those associated with old trees and dead wood) (Elton 1958), and the best chance of being accepted in landscape terms (trees and woodlands are generally most acceptable where woodland cover is part of the landscape character) (FC/CC 1996 and several Local Authority and NPA correspondents).

Whether woodlands established on sites adjacent to existing woodland will also provide the best net wildlife conservation value depends on what is displaced as well as the quality of the woodland that is created. Thus a woodland established on a re-seeded upland pasture of little nature conservation value, or on grassland heavily dominated by bracken, or purple moor grass on wetter sites, may not establish as easily or develop ecologically as fast as one established on herb-rich, unimproved pasture or heath in a similar situation, but it may give a higher net nature conservation benefit because the habitat it displaces is less valuable. Difficult decisions are often required to decide whether to sacrifice high quality existing habitats for the sake of the potential attraction of the eventual woodland flora and fauna. These decisions can only be taken at the local level, although seeking advice from outside where necessary is sensible, and should ideally involve all those with an interest in the future (and in the case of archaeology the past) of the site. Because upland sites suitable for woodland expansion more often have a high or moderate existing wildlife value than lowland sites, which are generally on ex-arable or otherwise disturbed land, such consultations are likely to be more difficult and the decisions reached involve more compromises.

This may be considered difficult enough, but it is also necessary to consider the larger picture; it is not only the loss of habitats which are immediately displaced which is important, but also the importance of that loss in relation to what will be left. In deciding the precise size and location of new woodlands it is therefore necessary to consider the character of the landscape of the whole locality and the distribution of existing tracts of woodland and other semi-natural vegetation, also the pattern of topography and soils (Rodwell & Patterson 1994). Unfortunately our knowledge of the effects of habitat size and fragmentation on plants and animals remains imprecise (Dempster 1991) although studies on birds (Fuller 1982; Lynch & Whigham 1984) suggest that larger woods generally contain more species, Fuller (1982) adding that there may be regional variations. It is probable that big woods generally hold more bird species than small ones because extra species which are largely restricted to bigger woods (e.g. tawny owl, tree pipit) are added to the community but no species avoids large woods. The same rules are likely to apply to other taxonomic groups so it is probably safe to assume that larger woods will eventually contain viable populations of more species of more types of plants and animals than smaller ones. It is certainly best to avoid if possible creating very small stands, especially narrow belts with a high proportion of well-lit woodland edge, because these are unlikely to develop a complete woodland flora or fauna. An exception might be made, however, where the potential gains outweigh the disadvantages, for example where corridor planting to link patches of habitat is the objective and land is hard to come

by; many species will move through such corridors to acceptable habitat beyond which would not stay and breed there.

Economic considerations also come into play when considering questions of scale. Larger woodlands are proportionately cheaper to establish than small ones, especially if fencing is required because bigger woods involve smaller perimeter to area ratios. It is also cheaper to buy planting stock in large numbers and to carry out the management (weed control, thinning brashing) required if the woodland is to become productive of quality timber. Marketing small quantities of hardwood timber is likely to remain problematical and in any case the returns will inevitably be smaller because the harvesting cost per tree felled is greater. This is less important if the landholder manages and harvests his/her own woods, but realistically this is probably unlikely to happen in most cases. The question of scale is also important in terms of the mechanisms that might be needed to achieve more woodland. On a small scale farmers, sustained by grants and subsidies may be able to provide some woodland gain without significant loss of income. If the financial incentives become more attractive, however, while it is unlikely that many farmers will wish to become foresters on a large scale the costs of land for forestry will rise, perhaps impacting adversely on the forestry industry and hence on rural employment (National Trust pers. comm.).

With regard to the placement of new woodlands our study revealed very different attitudes in different National Parks. It is perhaps not surprising that Dartmoor, being the largest area of moorland in the south of England, and one rich in archaeology and folk lore associated with the use of the moor by man since prehistoric times, is particularly valued both scenically and in wildlife conservation terms for its wild open character in which trees are seen as playing little part. Though our analysis (Section 3.3) shows that much of the Moor could support woodland there is a strong presumption against any significant woodland expansion. The places where woodland is acceptable are on the moorland edge, often as in our Widecombe smaller study area, where woodland cover is high already. While the rightness of the high valuation placed on the open character of the Moor may be considered appropriate is there not perhaps potential for some development of open woodland and perhaps even for the creation of something which might one day come to resemble the highly valued, high altitude Wistman's Wood or Black Tor Copse with their unique Dartmoor character.

Similar sensitivities exist in the Lake District, the Dark Peak and to a lesser extent the Shropshire Hills, although there is more positive activity, particularly on the part of the LDNPA and the PDNPA to develop new woodlands across the full altitudinal range. In Northumberland, where woodland cover is very sparse and the upland area is part of a much bigger moorland area stretching to north and south, there is more acceptance of the desirability of increasing woodland cover substantially and a willingness at least in principle to consider planting in most areas. Nevertheless, in practice is still often difficult to get agreement for potential native woodland expansion schemes of the sort of size (100's rather than 10's of hectares) appropriate to the large Northumbrian landscape, so powerful is the lobby (agricultural, because of subsidy arrangements; conservation, for retention of open ground habitats and species) in favour of the *status quo*.

The opposition here and elsewhere might be less on the part of landholders, but perhaps correspondingly greater among conservationists, if non-native species which may be more desirable from a forestry point of view are permitted to be included in the planting. Among

broadleaves sycamore and beech are likely to be favoured by foresters and the wood processing industry while nurse conifers (Scots pine, larch) might also find a place. In some places (e.g. the Shropshire Hills AONB) it is difficult to get extra woodland without accepting mixtures (AONB, pers. comm.). It is not at all clear that having a component of exotic species is necessarily damaging to the wildlife value of a wood. The danger in introducing them is that they may get out of hand on sites which favour them (e.g. sycamore on relatively fertile upland oak woodland sites at low to intermediate elevations) over the native species. Also, if planted in new woodlands adjacent to existing native woodland they may invade that too. One only has to see the ability of sycamore or Sitka spruce to self-seed on favourable sites in many upland situations to appreciate the potential problems posed by exotics.

It is normally assumed that natural regeneration is preferable to planting as a means of woodland establishment. While this is generally true, ensuring appropriate species and genotypes (assuming that the donor woods are of native stock origin, which is by no means a safe assumption in every case) it is not invariably so. Some species (birches, willows, and rowan) colonise more readily and over greater distances than others (notably oak) and it is not unusual to get a closely spaced forest of seedlings of these species. This may be satisfactory if the objective is to produce a semi-natural woodland of high wildlife conservation value and time is of no concern, as the oaks will arrive in their own good time and displace the early colonisers. There is certainly a case for having some such woodlands in all regions of the country, if only to provide an outdoor laboratory for ecologists studying woodland succession. This approach will not do, however, if the aim is to produce a multi-use forest as soon as possible with sufficient trees of the eventual timber crop to make it economically viable. In this case nature will often need to be restrained, perhaps by controlling the aggressive pioneer species while encouraging the main crop trees or where necessary planting them. It is vital, therefore, to have clearly focused objectives when deciding whether natural regeneration is appropriate and if so whether to control it. This is especially important when giving advice to landholders who may have little knowledge of what they may be letting themselves in for. It only takes a few examples of misunderstandings, or worse, misinformation of this kind to give broadleaved woodlands in general, and natural regeneration in particular a very bad name in an area.

There are other situations where natural regeneration can sometimes be considered a curse rather than a blessing. In the White Peak in Derbyshire, development of woodland and scrub on highly valued remnant limestone heath and grassland habitats is seen as a major problem. There is an interesting generic conservation issue here in that woodland and scrub are clearly the natural vegetation cover types in such areas, the open habitats here as elsewhere being mainly an artefact resulting from grazing by sheep and/or cattle. To what extent should nature conservation be geared to the preservation of such habitats when woodland cover is so heavily depleted compared with what it would be if left to nature?

If it is decided to establish woodland by planting, which will often be appropriate, particularly in areas such as much of the Northumberland National Park, the Lake District and the Dark Peak where existing tree cover is low, care should be taken over species selection, genetic integrity, site preparation and management during establishment and beyond. All these issues are covered in the excellent Forestry Commission Bulletin 112, *Creating New Native Woodlands* (Rodwell & Patterson 1994), to which we are indebted for much of what is written here. In short: choose species appropriate to the region and the type of land to be

planted; use stock of local origin if possible; plant simple mixtures of species which will grow together happily (lists are given in the Bulletin); only plant rare native species after seeking advice from the local EN office, use local stock and record planting and monitor subsequent performance and reproduction; plant in open patterns if a semi-natural woodland is the objective, not at close regular spacing in rows, to allow space for the development of glades and also for later colonisers; undertake ploughing and/or draining only if absolutely necessary as they can be very damaging to both the planted and nearby sites; use fertilisers with caution as they favour aggressive weeds; herbicides should not be regarded as anathema to creation of semi-natural woodland, carefully used they may aid tree development and eliminate the need for more damaging site preparation.

In many parts of England woodland establishment will not be possible without fencing out grazing animals. There are some encouraging indications coming through (several cases in the Lake District National Park are noted in Section 3.2) that this may not so often be necessary in future as the reduced grazing levels achieved through ESA schemes are beginning to have a beneficial effect on woodland regeneration. The effectiveness of the ESA prescriptions will vary from place to place, depending as much or more on the balance of different vegetation types on the holding and how the sheep are managed as on the simple livestock unit per hectare relationship. Nevertheless, it is encouraging to see another positive return in addition to the undoubted recovery of heather moorland being recorded in some areas as a result of the operation of the scheme.

In many parts of the country, including most of the study areas in this project, deer are a growing problem in forestry generally but especially where broadleaves are concerned. The extra cost of deer fencing may tip the balance against woodland expansion in areas with high deer populations such as parts of Dartmoor, Northumberland and the Lake District. The approach developed by the Forestry Authority in the Lake District which involves coordinated deer control and promotion of venison seems an appropriate development which might be tried elsewhere. English Nature is part of the England-wide 'Deer Initiative' which is also looking at best practice for deer management on NNR's and is generally keen to reduce deer numbers.

Finally, the cry coming from all directions is for sustainable multi-use forestry. What should be the nature conservation objectives for such forests and how might English Nature contribute to their achievement? (Kirby 1996). These are deceptively simple questions for the answers are by no means apparent. Sustainability implies stability and natural forests are nothing if not variable. They vary in both space and time, going through cycles in which different tree species may predominate affecting in turn the balance of the flora and fauna dependent upon them (Peterken 1996). The economic value of the woodland is thereby affected which may reduce or enhance its sustainability from the point of view of the forester or landholder who owns or manages it. Clearly then, if nature conservationists wish to become involved in sustainable multi-use forestry, in which wildlife conservation is one of several goods, they will have to trim their ambitions somewhat to the needs of the other beneficiaries. This need not be an unacceptable requirement, however, if the alternative is to take whatever morsels fall from the table of unbridled commercial forestry. Those with even short memories will remember the resentments and antagonisms that resulted from that unhappy relationship and will be grateful for the very considerable movement that has taken place in the direction of establishing more natural forests which are much better able to

sustain woodland wildlife. Rather than concentrating too much effort on trying to achieve woodlands which resemble ASNW as nearly as possible (although that is a laudable aim), the cause of woodland wildlife conservation may be better served by trying to influence silvicultural methods and MAFF upland farming support policy.

Moving away from clearfelling towards some sort of continuous cover forestry (Helliwell 1982), hopefully with broadleaved woodland as a major component, might reap great rewards, not least because the opportunity would be created routinely to retain old trees with their unique assemblages of plants and animals. Similarly, if (not as) conifers are required to ensure an adequate economic return from sustainable forests how are they best used? Is it better in a given area to have some pure semi-natural woodland and some pure conifer plantations or might mixtures with variable components of the different species in different areas serve wildlife better, restricting 'pure' native woodland to SSSI's and NNR's? These and similar questions need to be addressed if the most is to be made of opportunities within sustainable multi-use forestry.

In relation to MAFF policy it is clear that the resources are there to stimulate a considerable increase in upland farm woodlands but not as yet the will. Current ESA payments, while helpful in protecting existing woodland and allowing it to develop in a haphazard way in some places are not intended to encourage farmers to plant. What is needed is a move away from livestock headage payments into support for production of desired 'goods', including woodland, so that efficient farmers are not penalised for taking land out of agriculture and into woodland by loss of payments. A move in this direction would probably provide a greater stimulus to the expansion of semi-natural woodland in the uplands than all the other current promotional activities combined.

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APPENDIX 1:

Distribution of land in each 10 x 10 km study area by ITE land cover types, and area and proportion which would be lost if potential areas for woodland expansion were realised

Northumberland National Park

ITE Land Cover Type		Total Area (ha)	Area Lost (ha)	Percent Lost
Wooler				
Unclassified	0	1152	18	2
Sea/Estuary	1	0	0	0
Inland Water	2	1	0	0
Grass Heath	5	424	160	38
Mown/Grazed Turf	6	368	94	26
Meadow/Semi Natural	7	2718	778	29
Rough/Marsh Grass	8	59	20	34
Moorland Grass	9	1807	198	11
Open Shrub Moor	10	646	3	1
Dense Shrub Heath	11	582	6	1
Bracken	12	1018	353	35
Dense Shrub Heath	13	29	1	5
Scrub/Orchard	14	0	0	0
Deciduous/Mixed Woodland	15	179	16	9
Coniferous Woodland	16	572	11	2
Upland Bog	17	230	0	0
Tilled Land	18	1010	349	35
Suburban	20	97	16	16
Urban	21	2	0	4
Inland Bare Ground	22	0	0	0
Felled Forest	23	0	0	0
Lowland Bog	24	82	6	7
Open Shrub Heath	25	156	6	4
Total		11129	2017	18
Coquet				
Unclassified	0	616	4	1
Sea/Estuary	1	0	0	0
Inland Water	2	0	0	0
Grass Heath	5	550	16	3
Mown/Grazed Turf	6	115	2	2
Meadow/Semi Natural	7	2598	89	3
Rough/Marsh Grass	8	17	1	6
Moorland Grass	9	2899	38	1
Open Shrub Moor	10	110	0	0
Dense Shrub Heath	11	71	1	1
Bracken	12	798	90	11
Dense Shrub Heath	13	7	0	3
Scrub/Orchard	14	0	0	0
Deciduous/Mixed Woodland	15	39	4	9
Coniferous Woodland	16	403	1	0
Upland Bog	17	128	0	0
Tilled Land	18	552	89	16
Suburban	20	81	11	14
Urban	21	1	0	0
Inland Bare Ground	22	0	0	0
Felled Forest	23	0	0	0
Lowland Bog	24	44	1	3
Open Shrub Heath	25	42	1	1
Total		9072	347	4

Lake District National Park

ITE Land Cover Type		Total Area (ha)	Area Lost (ha)	Percent Lost
Helvellyn				
Unclassified	0	163	18	11
Sea/Estuary	1	0	0	0
Inland Water	2	27	0	0
Grass Heath	5	47	17	36
Mown/Grazed Turf	6	21	5	25
Meadow/Semi Natural	7	894	320	36
Rough/Marsh Grass	8	45	2	4
Moorland Grass	9	4756	492	10
Open Shrub Moor	10	301	9	3
Dense Shrub Heath	11	56	1	2
Bracken	12	2880	354	12
Dense Shrub Heath	13	0	0	0
Scrub/Orchard	14	0	0	0
Deciduous/Mixed Woodland	15	241	13	5
Coniferous Woodland	16	77	2	2
Upland Bog	17	12	0	3
Tilled Land	18	111	34	30
Suburban	20	39	1	1
Urban	21	47	0	1
Inland Bare Ground	22	61	2	3
Felled Forest	23	11	1	11
Lowland Bog	24	1	0	0
Open Shrub Heath	25	0	0	0
Total		9790	1253	0
Scafell				
Unclassified	0	56	2	4
Sea/Estuary	1	0	0	0
Inland Water	2	293	3	1
Grass Heath	5	0	0	0
Mown/Grazed Turf	6	7	2	31
Meadow/Semi Natural	7	196	66	34
Rough/Marsh Grass	8	39	0	1
Moorland Grass	9	3370	136	4
Open Shrub Moor	10	253	4	1
Dense Shrub Heath	11	25	0	1
Bracken	12	1999	291	15
Dense Shrub Heath	13	0	0	0
Scrub/Orchard	14	0	0	0
Deciduous/Mixed Woodland	15	129	7	5
Coniferous Woodland	16	27	1	4
Upland Bog	17	6	0	1
Tilled Land	18	46	6	14
Suburban	20	45	1	2
Urban	21	58	1	1
Inland Bare Ground	22	182	1	0
Felled Forest	23	34	0	1
Lowland Bog	24	0	0	0
Open Shrub Heath	25	0	0	0
Total		6765	521	0

Dartmoor National Park

ITE Land Cover Type		Total Area (ha)	Area Lost (ha)	Percent Lost
Teignbridge				
Unclassified	0	243	18	7
Sea/Estuary	1	0	0	0
Inland Water	2	1	0	0
Grass Heath	5	953	226	24
Mown/Grazed Turf	6	1658	713	43
Meadow/Semi Natural	7	1757	555	32
Rough/Marsh Grass	8	321	38	12
Moorland Grass	9	342	11	3
Open Shrub Moor	10	23	0	0
Dense Shrub Heath	11	5	0	0
Bracken	12	331	60	18
Dense Shrub Heath	13	49	1	2
Scrub/Orchard	14	48	3	5
Deciduous/Mixed Woodland	15	1241	49	4
Coniferous Woodland	16	209	7	4
Upland Bog	17	6	0	7
Tilled Land	18	749	212	28
Suburban	20	242	8	3
Urban	21	17	0	0
Inland Bare Ground	22	25	0	1
Felled Forest	23	19	2	13
Lowland Bog	24	0	0	0
Open Shrub Heath	25	103	5	5
Total		8344	1891	23
Believer				
Unclassified	0	86	10	12
Sea/Estuary	1	0	0	0
Inland Water	2	0	0	0
Grass Heath	5	845	331	39
Mown/Grazed Turf	6	505	258	51
Meadow/Semi Natural	7	1390	551	40
Rough/Marsh Grass	8	164	30	18
Moorland Grass	9	1209	496	41
Open Shrub Moor	10	140	9	6
Dense Shrub Heath	11	13	1	4
Bracken	12	164	61	37
Dense Shrub Heath	13	31	1	2
Scrub/Orchard	14	26	3	13
Deciduous/Mixed Woodland	15	284	31	11
Coniferous Woodland	16	456	7	2
Upland Bog	17	14	2	11
Tilled Land	18	348	166	48
Suburban	20	81	5	6
Urban	21	0	0	0
Inland Bare Ground	22	0	0	0
Felled Forest	23	10	2	20
Lowland Bog	24	0	0	0
Open Shrub Heath	25	113	12	10
Total		5879	1974	34

Peak District National Park

ITE Land Cover Type		Total Area (ha)	Area Lost (ha)	Percent Lost
White Peak				
Unclassified	0	62	18	28
Sea/Estuary	1	0	0	0
Inland Water	2	0	0	0
Grass Heath	5	1710	225	13
Mown/Grazed Turf	6	3702	372	10
Meadow/Semi Natural	7	2950	297	10
Rough/Marsh Grass	8	24	2	10
Moorland Grass	9	178	26	14
Open Shrub Moor	10	2	0	12
Dense Shrub Heath	11	2	0	9
Bracken	12	47	6	12
Dense Shrub Heath	13	150	5	3
Scrub/Orchard	14	265	10	4
Deciduous/Mixed Woodland	15	494	27	5
Coniferous Woodland	16	1	0	6
Upland Bog	17	0	0	0
Tilled Land	18	202	18	9
Suburban	20	47	2	4
Urban	21	1	0	8
Inland Bare Ground	22	4	0	0
Felled Forest	23	0	0	0
Lowland Bog	24	0	0	0
Open Shrub Heath	25	52	6	11
Total		9890	996	10
Dark Peak				
Unclassified	0	38	7	17
Sea/Estuary	1	0	0	0
Inland Water	2	117	0	0
Grass Heath	5	199	30	15
Mown/Grazed Turf	6	960	330	34
Meadow/Semi Natural	7	351	74	21
Rough/Marsh Grass	8	0	0	0
Moorland Grass	9	2208	458	21
Open Shrub Moor	10	743	15	2
Dense Shrub Heath	11	2013	26	1
Bracken	12	257	30	12
Dense Shrub Heath	13	30	1	2
Scrub/Orchard	14	49	4	9
Deciduous/Mixed Woodland	15	734	16	2
Coniferous Woodland	16	174	0	0
Upland Bog	17	0	0	0
Tilled Land	18	171	20	12
Suburban	20	44	2	5
Urban	21	53	1	1
Inland Bare Ground	22	75	2	2
Felled Forest	23	0	0	0
Lowland Bog	24	0	0	0
Open Shrub Heath	25	52	1	2
Total		8265	1017	12

Shropshire Hills Area of Outstanding Natural Beauty

FTE Land Cover Type	Total Area (ha)	Area Lost (ha)	Percent Lost
Brown Clee Hill			
Unclassified	0	192	18
Sea/Estuary	1	0	0
Inland Water	2	0	0
Grass Heath	5	528	194
Mown/Grazed Turf	6	2358	761
Meadow/Semi Natural	7	1498	419
Rough/Marsh Grass	8	100	36
Moorland Grass	9	377	49
Open Shrub Moor	10	77	1
Dense Shrub Heath	11	20	1
Bracken	12	129	58
Dense Shrub Heath	13	17	1
Scrub/Orchard	14	31	3
Deciduous/Mixed Woodland	15	362	23
Coniferous Woodland	16	44	3
Upland Bog	17	0	0
Tilled Land	18	1348	279
Suburban	20	245	12
Urban	21	10	0
Inland Bare Ground	22	25	2
Felled Forest	23	48	8
Lowland Bog	24	0	0
Open Shrub Heath	25	60	5
Total		7471	1855
Stiperstones			
Unclassified	0	239	38
Sea/Estuary	1	0	0
Inland Water	2	1	0
Grass Heath	5	351	165
Mown/Grazed Turf	6	1850	1051
Meadow/Semi Natural	7	1844	768
Rough/Marsh Grass	8	21	5
Moorland Grass	9	31	17
Open Shrub Moor	10	137	9
Dense Shrub Heath	11	144	0
Bracken	12	46	21
Dense Shrub Heath	13	61	2
Scrub/Orchard	14	47	5
Deciduous/Mixed Woodland	15	747	62
Coniferous Woodland	16	205	2
Upland Bog	17	3	0
Tilled Land	18	195	83
Suburban	20	53	6
Urban	21	1	0
Inland Bare Ground	22	20	2
Felled Forest	23	0	0
Lowland Bog	24	0	0
Open Shrub Heath	25	354	41
Total		6350	2276
Clun Forest			
Unclassified	0	452	67
Sea/Estuary	1	0	0
Inland Water	2	0	0
Grass Heath	5	33	13
Mown/Grazed Turf	6	1662	861
Meadow/Semi Natural	7	3072	1320
Rough/Marsh Grass	8	36	18
Moorland Grass	9	5	0
Open Shrub Moor	10	28	0
Dense Shrub Heath	11	12	0
Bracken	12	39	13
Dense Shrub Heath	13	25	1
Scrub/Orchard	14	3	0
Deciduous/Mixed Woodland	15	826	103
Coniferous Woodland	16	185	2
Upland Bog	17	2	0
Tilled Land	18	300	155
Suburban	20	45	2
Urban	21	0	0
Inland Bare Ground	22	2	0
Felled Forest	23	0	0
Lowland Bog	24	1	0
Open Shrub Heath	25	592	83
Total		7321	2640