

B. Biodiversity

- B1. Ancient woodland**
- B2. Native woodland area**
- B3. Native woodland condition**
- B4. Abundance of fauna**
- B5. Richness of flora**
- B6. Diversity of woodland within a stand**
- B7. Natural regeneration of woodland**

Biodiversity – Summary

Biodiversity (short for biological diversity) means the total variety of life. It includes the variety of habitats, species and genes. As a signatory to the Convention on Biological Diversity, the UK is committed to conserving and enhancing biodiversity and has set out objectives, priorities and targets in the UK Biodiversity Action Plan (BAP - See the UK Biodiversity website). Forestry aims to contribute towards the aims and targets of the UK BAP:

- To conserve and where practical enhance overall populations and natural ranges of native species and the quality and range of wildlife habitats and ecosystems within woodlands.
- To help conserve and enhance internationally and nationally important and threatened species, habitats and ecosystems and of natural and managed habitats which are characteristic of local areas.
- To increase public awareness and involvement with woodland biodiversity conservation.

In general the most important woodland types for biodiversity are ancient semi-natural woodlands (ASNW), closely followed by other forms of native or ancient woodlands (B1 - B3), which have native tree and shrub species and/or a long continuous history as woodland. Eight types of native woodland habitats are priority habitats in the UK BAP.

Abundance of animal species (B4) and diversity of plant species (B5) that depend wholly or partly on woodland are important components of biodiversity.

Biodiversity value in woodlands of all types depends upon structural diversity at both stand level (B6) and woodland or landscape scales. Generally, enhancing natural processes in woodlands enhances their biodiversity value. An example is natural regeneration of trees and shrubs (B7), which assists conservation of genetic diversity and natural structures and species patterns.

B1. Ancient woodland

Relevance Maintaining the area of ancient woodland is a key target of the UK Biodiversity Action Plan (BAP). Ancient semi-natural woodlands (ASNW) tend to be richer in plants and animals than other woodland areas, and also have a role in preserving locally native genotypes; they are also important as part of the historic visual and cultural landscape. The area of ASNW has declined over the centuries and the woodlands have become increasingly fragmented.

Key Points The area of ancient woodland in the UK is now estimated to be 508,000 hectares, of which 288,000 hectares is ASNW. ASNW accounts for around 10% of the total UK woodland area and around 1.2% of the total land area.

Area of ancient woodland

thousand hectares

	England	Scotland	Wales	N Ireland	UK
Total woodland 1995-1999 ¹	1,097	1,281	287	81	2,746
Total ancient woodland ²	334	119	52	3+?	508
ASNW (ancient semi-natural woodland) ²	193	65	27	3 ³	288
PAWS (plantation on an ancient woodland site) ²	140	55	25	?	220

¹Source: NIWT 1995-1999

²Source: Pryor and Smith (2002)

³Source: Forest Service database

Note: This is an updated estimate of ancient woodland based on overlaying the NIWT 1995-1999 digital map with ancient woodland inventories. However there remain discrepancies between these new estimates for ASNW and total ancient woodland, and those made previously. These are being investigated further by Forest Research.

Background As there are no reliable records older than 1600 in England and Wales, 1750 in Scotland and 1830 in Northern Ireland, ancient woodlands are defined as areas that have been continuously wooded since those dates. It is therefore impossible for the area to increase, except through reclassification. Ancient woodland can be ancient semi-natural (ASNW) or plantations on ancient woodland sites (PAWS), which may retain some of the native trees, shrubs and ground flora. Of the ASNW present in the 1930s, about 38% was converted to plantations and a further 7% cleared for other land uses. Depletion has now largely ended with the implementation of policies for their conservation.

The removal of trees that are not native to the ancient woodland sites, and restoration of native woodland on some of these ancient sites, is a target under the UK BAP. Areas of ASNW are now highly fragmented; the greatest concentrations are in south-east England, the southern Welsh borders and the central Scottish Highlands. Only about a quarter of ASNW is in designated nature conservation areas.

The area of ASNW in GB is indicator S11 in the Quality of Life Counts indicators of sustainable development. ASNW also forms part of the semi-natural category in the indicator for native woodland (indicator B2). No monitoring system currently exists for the loss of ancient woodland (indicator A3).

Future English Nature and the Forestry Commission are currently looking at ways of updating the Ancient Woodland Inventory in England.

No Ancient Woodland Inventory for Northern Ireland has been undertaken until now, but the Woodland Trust have commenced this inventory in 2002, and areas continuously wooded since 1830 will be included. Results should be available in 2005.

In future, the area of PAWS that is restored to native woodland on ancient woodland sites may be recorded in the Woodland Grant Scheme database and in Forest Enterprise systems. An alternative would be to use NIWT to estimate the proportions of PAWS that are native and non-native.

B2. Native woodland area

Relevance Native woodland is valuable for biodiversity and can have a high concentration of rare and threatened species. It also provides many other environmental and social benefits including amenity, landscape and soil and water protection.

Key Points In the past native woodland had decreased to cover only 2% of the UK land area. Grants are available from the Woodland Grant Scheme (WGS) for creation of new native woodland (including native pinewood). An average of around 1,500 ha of 'new native woodland' has been planted each year since 1997 and has received a first instalment of grant.

Area of native woodland: semi-natural and planted

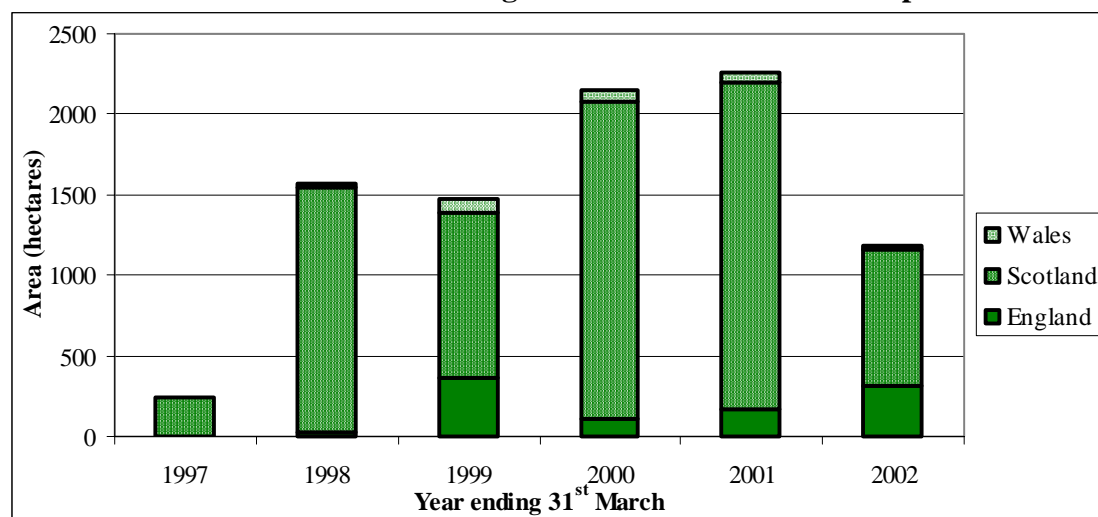
	thousand hectares				
	England	Scotland	Wales	N Ireland	UK
Total woodland 1995-1999 ¹	1,097	1,281	287	81	2,746
Total native woodland		321 ²			
Semi-natural woodland ⁴	416	133	83	~18	~650
Planted native woodland					

¹Source NIWT 1995-1999; ²Source: MacKenzie (1999). Includes areas of local and non-local seed origin.

⁴Source: Pryor and Peterkin (2001). These estimates are based on reports from the early 1990s. This includes ASNW (from indicator B1) plus other semi-natural woodland.

Note: Native Woodland figures for NI are currently being produced

New native woodland where a WGS grant 1st instalment has been paid¹ in GB



Source: WGS database

¹Area only includes new planting of 'new native woodland' in non-FC woodlands in GB where the first instalment is paid. It does not include restocking of an area which was previously not native (conversion) or restoration. The second instalment of a grant for 'new native woodland' was first paid in 2001/2.

Background Native woodland is woodland where at least 50% of the canopy cover is site-native species. Semi-natural woodland is native woodland which is not obviously planted (e.g. it appears to have arisen mainly through natural regeneration). The total native woodland resource includes both semi-natural native woodland and planted native woodland.

The native woodland Habitat Action Plans (HAPs) aim to increase the area of native woodland, through new planting, restoration of plantations on ancient woodland sites (PAWS) to ancient semi-natural woodland (ASNW) and conversion of other woodland to native species. 'New native woodland' is being created using communities of locally native tree and shrub species matched to the site (FC, 1998). It is intended that new native woodlands will increase the area of woodlands with semi-natural characteristics. Nature conservation and protection and enhancement of cultural landscapes are strategic objectives of management of these woodlands. Native woodland can also be created by conversion of existing non-native woodland. Ongoing work is assessing the extent to which native woodland HAP targets are being met (MacKenzie and Worrell, in press).

'New native woodland' is a subset of 'new woodland creation' in indicator A2. No monitoring system currently exists for loss of native woodland (see indicator A3). The semi-natural category in this indicator includes ASNW (see indicator B1). Recorded 'new native woodland' is likely to be an underestimate of the total amount of native woodland that is planted or regenerates naturally.

Future Estimates of native woodland area are uncertain and work is ongoing to increase the accuracy of these estimates. Estimates of the native woodland area in Northern Ireland will be developed from the NI Countryside Survey.

As more 2nd instalment grants for 'new native woodland' are paid this information will also be shown. It is desirable to include new native woodland that does not receive the 'New Native Woodland' grant.

In future it may be possible to show the expansion of native woodland in total, including conversion and restoration in addition to new woodland creation.

B3. Native woodland condition

Relevance The condition of native woodland contributes to the conservation and enhancement of biodiversity in the UK.

Key Points Although there are measures of the area of native woodland, there are currently no systematic surveys of the condition of all such habitats, but they are being developed. The condition of woodland on Sites of Special Scientific Interest (SSSI) is assessed every six years. Over half of woodland on SSSIs in England is in favourable condition.

Condition of woodland on SSSIs in England, 1997-2002

hectares	
Condition	England
Favourable	57,028
Unfavourable recovering	16,395
Unfavourable no change	14,789
Unfavourable declining	4,495
Part destroyed	145
Destroyed	13
Total	92,865

Source: English Nature

Note: No similar information is yet available for Scotland, Wales or Northern Ireland

B. Biodiversity

Background There will eventually be a Habitat Action Plan (HAP) for each of the native woodland types in the UK. The HAP sets out specific targets for the conservation of the habitat and lists key actions that are necessary to achieve these objectives. Progress will need to be monitored at the strategic level (i.e. HAP type as a whole) as well as at the individual site level. A HAP working group is developing sets of measures of condition which could be used at national and UK level.

Some native woodland is part of a SSSI. The condition of each SSSI in the UK is assessed every 6 years. The table shows the results for woodland in England that was assessed between April 1997 and August 2002.

The information about woodland diversity in indicator B6 may also give an indication of the condition of woodland.

Future Information regarding the condition of woodland in SSSIs will be available for Scotland by the end of 2002. Similar data are also collected in Wales and Northern Ireland.

Condition measures to be used for all native woodland are being developed by the HAP working group. They are likely to be focused on extending existing measures in the National Inventory of Woodland and Trees.

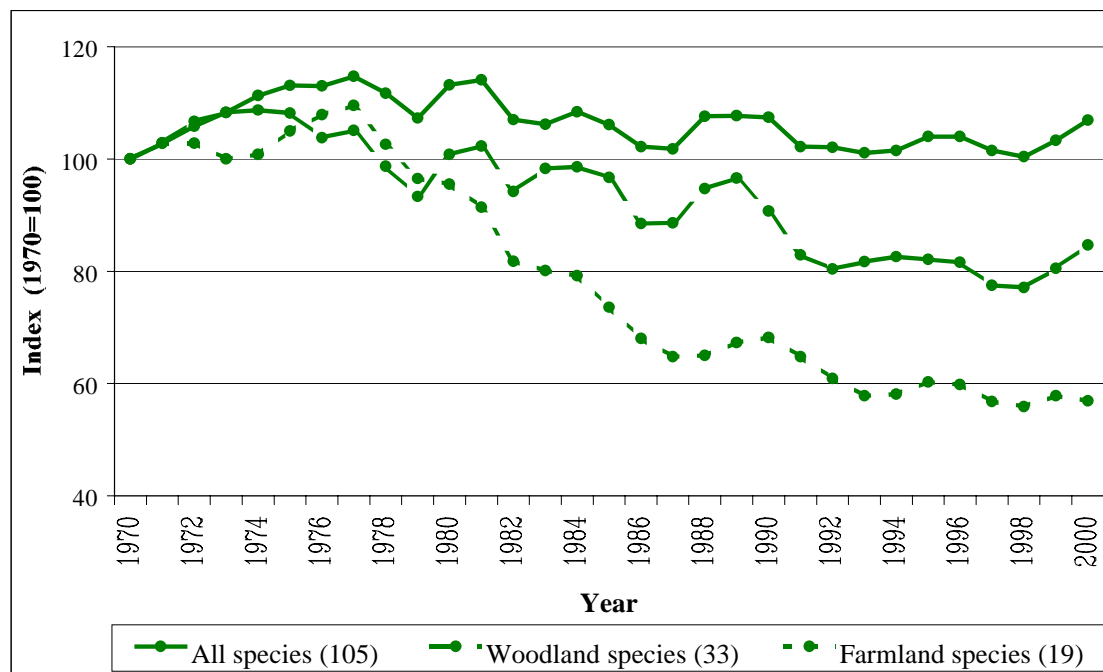
A possible additional measure of condition of native woodland could be the area of native woodland coming into the Woodland Grant Scheme in recent years, both new native woodland and that which receives a management grant.

B4. Abundance of fauna

Relevance Wildlife is valued for its own sake and because it is an integral part of our surroundings and our quality of life. The abundance of fauna is an indicator of the quality of woodland habitats for wildlife. Habitat quality is influenced by woodland management practices. Birds are regarded as good indicators of the broad state of wildlife and the countryside, because they are wide-ranging in habitat distribution and tend to be at or near the top of the food chain. Butterflies and bats are good indicators of diversity in young and mature woodland respectively. Present policies seek to promote management which leads to a more diverse forest.

Key Points Woodland birds are less abundant than they were in 1970. Although populations of the more common woodland and farmland birds have been declining, populations of other birds, such as open water birds and many rare birds, have been stable or rising.

Abundance of woodland birds in GB since 1970, compared with all birds and farmland birds.



Source: Royal Society for the Protection of Birds, the British Trust for Ornithology and DEFRA

Background Many factors affect populations of birds and other wildlife species. These include short-term influences such as the weather and a range of longer-term influences such as changes in farming practices, loss of habitat diversity, urban development, road building, climate change, loss of habitats, changes to food supplies and pollution.

The bird index forms one of the headline Quality Of Life Counts indicators of sustainable development. DEFRA have also published regional bird indices for England. These are available from the UK sustainable development website. More information about individual bird species trends can be found on the RSPB website.

Future The Royal Society for the Protection of Birds, British Trust for Ornithology, DEFRA and the FC plan to examine ways in which bird indices for Scotland and Wales can be developed.

Other information which may be developed includes:

1. Butterfly abundances (all species) at woodland and non-woodland sites are available from the Butterfly Monitoring Scheme and Butterfly Conservation. These will require some work to form a woodland butterfly index. Woodland Species Action Plan (SAP) butterflies are not numerous enough to form a GB index of their abundance.
2. The 130 (fauna and flora) woodland SAP species should be monitored individually by lead partner organisations as part of the UK BAP. Formation of an index of their abundance is theoretically attractive but would require considerable work and time. It may be possible to form an index of the abundance of the smaller group of 'woodland specialists', excluding species that are partially dependent upon woodland.
3. Bat box schemes are managed by Forest Enterprise districts. Basic annual information, including the number of boxes and number of species present, is collated by Forest Research for the Eurobat project.
4. Mammonet, a monitoring network for mammals, is being developed for GB and it may be possible to use information about woodland mammals from this monitoring network.

B5. Richness of flora

Relevance This indicator shows the overall condition and richness of flora in woodland. It tells us about the state of and trends in ecological conditions, and hence whether management is delivering a stable mosaic of woodland types, even though there are natural changes and successions between types. Present policy seeks to promote management which leads to a more diverse forest structure in plantations.

Key Points Between 1990 and 1998 there was a decrease in the species richness of broadleaved, mixed and yew woodlands in England and Wales.

Vegetation richness and condition scores in 1998 and their change since 1990 in GB

Broadleaved, mixed and yew woodland ¹	1998			Change 1990-1998		
	England & Wales	Scotland	GB	England & Wales	Scotland	GB
Species richness score	14.13	19.87	15.27	-2.40	n.s.	-2.06
Light score	5.96	6.29	6.02	-0.10	n.s.	-0.07
Fertility score	5.21	4.08	4.98	+0.14	n.s.	+0.09
Conifer woodland ²	1998			Change 1990-1998		
	England & Wales	Scotland	GB	England & Wales	Scotland	GB
Species richness score	8.56	10.79	10.00	n.s.	n.s.	n.s.
Light score	5.96	6.46	6.28	n.s.	n.s.	n.s.
Fertility score	3.95	3.13	3.43	n.s.	n.s.	n.s.

Source: Countryside Survey website. Higher scores indicate more species, and higher levels of light and fertility.

¹ Broadleaved scores are based on 195 sample 'x' plots in CS2000 in GB. Broadleaved change scores are based on the 131 plots that were in the same woodland broad habitat in 1990 and 1998.

² Conifer scores are based on 170 sample 'x' plots in CS2000 in GB.

Note: CS2000 did not contain sufficient monitoring plots for Wales to be analysed separately. No similar samples were taken in the Northern Ireland Countryside Survey. n.s. = not significant.

Background The scores in the table are based on plant species recorded in the Countryside Survey 2000 (CS2000) sample plots. Species richness measures the number of species found on each plot, a simple measure of plant diversity. The light and fertility scores are indirect measures of light availability at ground level and soil fertility, based on the plant species present in each plot. The light score reflects changes in the abundance of plants that either tolerate or cast shade through to plants which grow on open ground. The fertility score reflects changes in the abundance of plants that are known to be associated with different levels of nutrient availability.

Broadleaved, mixed and yew woodland

From 1990 to 1998 in England and Wales, there was an overall decline in species richness, and an increase in the frequency of plant species associated with more nutrient-rich conditions (fertility score). There was also a change from species suited to well-lit conditions to those suited to more shaded conditions (decrease in light score). This change in light score is perhaps expected due to a 'successional' change (the woodlands established in 1990 will have developed, and longer established woodlands would have continued to mature), but it could also be due to changes in the nature and intensity of management. There were no significant changes in Scotland.

Coniferous woodland

There was no significant change in the variety of vegetation types (species richness) or the light and fertility scores between 1990 and 1998.

See Haines-Young *et al.* (2000) or the Countryside Survey website for further information.

Future It would be desirable to provide separate results for England and Wales, but Wales-only results are not available from CS2000.

B6. Diversity of woodland within a stand

Relevance In addition to preserving the quality of ancient semi-natural woodland (ASNW) there is also considerable scope to enhance the biodiversity of other woodlands by encouraging the development of natural processes such as the build-up of deadwood. Deadwood is an important habitat for certain species. High degrees of naturalness and variation in woodland structure support high levels of biodiversity.

Key Points 12% of high forest in GB contains some standing deadwood, and 4% of high forest in GB contains some felled and abandoned timber.

Standing and lying deadwood in high forest¹ in GB

Standing deadwood ²	% of high forest area				
	No. of pieces per hectare	England	Scotland	Wales	GB
0	84.5	88.6	98.2	88.0	
4/8	8.6	5.2	0.7	6.1	
12/16	3.4	3.0	0.2	2.9	
20/24	1.4	1.4	0.1	1.2	
> 24	2.0	1.9	0.8	1.8	
Lying deadwood ³ (felled and abandoned)	% of high forest area				
	No. of pieces per hectare	England	Scotland	Wales	GB
0	94.9	96.5	99.8	96.2	
4/8	2.0	1.0	0.0	1.3	
12/16	1.1	0.7	0.0	0.8	
20/24	0.7	0.7	0.0	0.6	
> 24	1.3	1.2	0.1	1.1	

Source: NIWT 1995-1999

¹High forest excludes open ground and coppice.

²Standing deadwood is the number of standing trees which have deadwood of more than 15 cm diameter.

³Lying deadwood is felled and abandoned timber which is at least 15 cm diameter and 2 m long.

Background Deadwood is an important habitat for small vertebrates, invertebrates, fish (wood in watercourses), cavity nesting birds, lichens and fungi.

NIWT measures standing deadwood, and it measures lying deadwood in two categories: felled and abandoned timber (logs that have been worked by man to some extent and left to decay) and fallen trees (trees or limbs of trees that have fallen naturally); statistics for the latter are not yet available.

Deadwood is recorded in one quarter of each sample square, so the observed counts are multiplied by 4 to show a count per hectare. For both standing and lying deadwood, the counts are more extreme than would be expected if the distribution of deadwood were random, having more counts showing no deadwood and also more counts showing multiple pieces of deadwood.

NIWT does not cover Northern Ireland, and there is no alternative source of similar data.

Future Many other measures could contribute to an indicator of diversity of the woodland itself (within a stand).

Other measures of diversity will be available from NIWT. They will include the following:

- fallen trees (number per sample square),
- old forest growth (measure still to be defined),
- within-stand species diversity (no of patches per sample square and/ or number of species (trees, shrubs and bushes) in each sample square),
- within-stand vertical structure (area of forest with given number of layers).

Other measures of diversity may be available from follow-up analysis of CS2000 data (see Countryside Survey website).

B7. Natural regeneration of woodland

Relevance Natural regeneration contributes to the UK's biodiversity objectives by maintaining the diversity of genotype, species composition and structure.

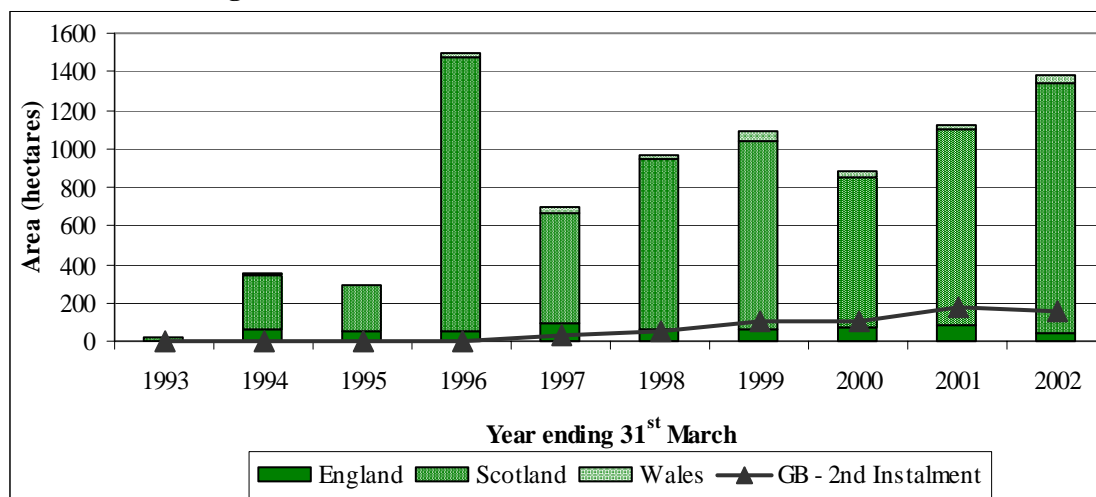
Key Points The amount of woodland, especially ancient semi-natural woodland (ASNW) regenerating naturally has been increasing in recent years. Grants are available for natural regeneration under the Woodland Grant Scheme (WGS). Around 1,500 hectares per year (of which 150 hectares is ASNW) receive WGS 2nd instalment grants for natural regeneration.

Natural regeneration in GB where a second instalment WGS grant is paid (non-FC)

Year ending 31 st March	Natural regeneration of all woodland	Natural regeneration of ASNW
1995	27	0
1996	206	3
1997	343	36
1998	707	55
1999	1,688	101
2000	1,418	104
2001	1,712	172
2002	1,526	155

Source: WGS database

Area of natural regeneration on ASNW sites in GB (non-FC)



Source: WGS database

Note: WGS 1st instalment is shown in bars and WGS 2nd instalment is shown as a line. 1st instalment grant is paid for ground preparation work. 2nd instalment grant is paid once sufficient trees have successfully established. Includes new woodland creation and restocking.

Background Planting has been the favoured method of creating new woodland, but now natural regeneration is becoming increasingly favoured, especially for restoring ASNW or extending woodland to nearby open land, as it preserves the genetic diversity of the ancient and natural forest. The WGS grant for natural regeneration was introduced in 1988, both for new woodland and restocking of woodland. The second instalment of the grant, or a fixed payment, is payable once the trees are established. The success of natural regeneration of woodland is, among other things, dependent upon minimal attack by browsing deer, squirrels and other mammals.

The figures from WGS are likely to be an underestimate of the actual amount of natural regeneration occurring, since they do not include regeneration occurring without grant aid, e.g. in woodland glades or along forest rides.

Natural regeneration is also recorded in Forest Enterprise systems for FC woodland. Cumulative totals for all years up to 2001 are England 62 hectares, Scotland 1391 hectares and Wales 0 hectares. This is also likely to underestimate the actual amount of natural regeneration.

Creation of new woodland by natural regeneration also contributes to total new woodland creation (A2).