5. **Sites selected for open ground species e.g. butterflies**

Target 1	-	Open habitat is maintained as Z% of the wood
Monitoring	-	Define what counts as open ground. Use aerial photographs to assess extent, if % has not been confirmed by field visits in last 5 years.
Action required if target not met	-	Institute field survey. Alter management to increase open ground.
Frequency of recording	-	20% of sites in this category to be checked each year.
Target 2	-	Right sort of open phase habitats/structures are present in the wood (wide rides etc.).
Monitoring	-	Define types of structure. ½ day walk round wood. Visual check and photographs.
Action if target not met.	-	Identify why structure wrong. Institute more detailed survey. Alter management if necessary.
Frequency of recording	-	20% of sites in this category to be checked on a 5-year rolling programme.

Notes

Photographs of rides and glades (whether from fixed points or not) can be very effective in assessing both the structure and limited information on the composition of the rideside vegetation.

Target 3	-	Main open phase species present on site.
Monitoring	-	Botanical survey for specific species or entomological survey. List species expected to be found in the survey period ± error.
Action required if target not met	-	Identify why species absent. May be cyclical event. If irreversible change, consider de-notifying site.
Frequency of recording	-	10% of sites in this category to be checked on a 10-year rolling programme.

Notes

Transects 1-2m wide across rides and extending into adjacent wood at critical points can provide a way of describing the vegetation changes both in composition and structure that take place across ride edges (or equivalent glades). Other ideas are contained in:

ENGLAND FIELD UNIT 1982. *A survey of Orlestone Forest, Kent.* Peterborough, Nature Conservancy Council (unpublished report).

Target 4	-	Populations of species maintained
	-	Rare species
	-	All species
Monitoring	-	Detailed recording. Check colonies and size. Butterfly walks etc. Check changes against national trends.
Action required if target not met	(i)	Identify changes and likely cause.
	(ii)	Alter management if appropriate.
	(iii)	Accept change.
Frequency of recording	-	At least one site per county annually as a reference site. Shorter runs elsewhere where previous monitoring systems indicate a need for more information to guide management.

Notes

The Butterfly Transect method of monitoring is described in the following reference. Although new sites are unlikely to be added to the national scheme the method can still be adopted elsewhere and results compared with the national averages.

POLLARD, E. 1977. A method for assessing changes in the abundance of butterflies. *Biological Conservation* 12, 115-134.

POLLARD, E., HALL, M.L. & BIBBY, T.J. 1986. *Monitoring the abundance of butterflies.* Peterborough, Nature Conservancy Council (Research and survey in nature conservation 2).

6. Sites selected for dead wood or veteran timber habitat

Target 1	-	Maintain level of dead wood/veteran timber resource in woodland generally
Monitoring	(i)	Assess frequency of veteran trees, level of fallen dead wood, or amount of dead wood in canopy using standard sample survey methods. Repeat surveys. If greater than (say) 10% decrease then target not being met.
	(ii)	Do complete inventory map of all veteran trees with photographs of all/selected ones. Repeat survey. Define maximum decline in number of trees that is acceptable in a given period.
Action required if targets not met	(i)	Institute more detailed survey if reason for decline unclear.
	(ii)	Alter management if necessary.
	(iii)	Consider de-notifying site.
Frequency of recording	(i)	All sites in this category to be checked every 10 years on a rolling programme using (a) above. (Can be linked to vegetation monitoring).
	(ii)	Complete inventory is only likely to apply to parkland. All sites in this category to be checked every 10 years.
	(iii)	Either type of re-survey may be brought forward after extreme events such as drought or storms.

Notes

Surveys of dead wood are very rare in Britain. One of the few until recently was Wilson's survey of dead wood in the New Forest, although dead and fallen trees are noted in the permanent transect studies of minimum intervention areas (see later, Section 10). More recently a transect system for fallen dead wood and standing dead trees has been trialled.

KIRBY, K.J. 1992. Accumulation of dead wood: a missing ingredient in coppicing? In *Ecology and management of coppicewoods* edited by BUCKLEY, G.P. pp 99-112, London, Chapman & Hall.

KIRBY, K.J., WEBSTER, S.D. & ANCTZAK, A. 1991. Effects of forest management on stand structure and the quantity of fallen dead wood: some British and Polish examples. *Forest Ecology and Management* 43, 167-174.

The value of repeated surveys of parkland is illustrated by results in:

HARDING, P. 1990. *Damage to ecologically important trees in selected pasture-woodlands resulting from winter storms and summer drought in 1990.* Peterborough, Nature Conservancy Council (Commissioned Research Report).

Target 2	-	Maintain level of specialist invertebrates, lichens or birds
Monitoring	-	Organise specialist surveys for all/representative sample of site.
Action required if target not met	(i)	Alter management
	(ii)	Accept change
	(iii)	Denotify the site
Frequency of recording	-	One site per Region to be monitored every 5 years as a reference site. All sites to be checked every 20 years (5% each year on rolling programme).

A permanent quadrat system for epiplytic lichen monitoring has been trialled and simpler photographic techniques developed by north-west England.

7. Sites selected for ground living lower plants

Target		(a)	Maintain habitats where species occur (e.g. extensive carpets, mossy boulders, big trees for epiphytes)
			OR
		(b)	Maintain species abundance, diversity or rarities
Monitoring	For	(a)	Baseline survey to assess initial level of habitats on sample basis. Repeat survey using same method and assess change. More than 10% decline constitutes a significant change.
	For	(b)	Specialist surveys.
Action required if target not met		(a)	Institute more detailed survey.
		(b)	Alter management.
		(c)	Consider de-notifying site.
Frequency of recording		(a)	All sites in this category to be checked using method (a), every 5 years on a rolling programme. (Can be linked with vegetation monitoring).
		(b)	One site per Region to be monitored more closely by specialists every 5 years as a reference site. All sites to be checked every 20 years (5% a year on a rolling programme).

Notes

There seem to be few instances of systematic repeat surveys of any sort for lower plants.

8. Sites good for woodland birds (excluding rarities)

Target	-	To maintain the diversity and abundance of the woodland bird community.
Monitoring	(a)	Assess structural variation within the wood (likely to be linked to bird abundance) and repeat at 5-yearly intervals.
		OR
	(b)	Carry out point counts.
		OR
	(c)	Carry out Common Bird Census.
Action required if target not met	(a)	Identify cause of change.
	(b)	Institute more detailed survey.
	(c)	Alter management.
	(d)	De-notify site.
Frequency of recording	-	Map structural variations on 20% of sites in this category on a 5-year rolling programme.
	-	Carry out point counts on 10% of sites in this category on a 10-year rolling programme.
	-	Carry out CBC annually on a site in each country as a reference point.

Notes

Two papers on changes to bird communities after the 1987 storm illustrate various aspects of bird monitoring studies.

FULLER, R.J. HENDERSON, I.G. & MARCHANT, J.H. 1994. Responses of woodland birds to the storms, with particular reference to the great storm of 1987. In *Ecological responses to the 1987 great storm in the woods of England*, edited by KIRBY, K.J. & BUCKLEY, G.P. ppxx-xx. Peterborough, English Nature.

SMITH, K.W. 1994. The effects of the 1987 and 1990 storms on great spotted woodpecker *Dendrocopus major* numbers and nest site selection in two Hertfordshire woods. In *Ecological responses to the 1987 great storm in the woods of south east England*, edited by K.J. KIRBY & G.P. BUCKLEY, ppxx-xx. Peterborough, English Nature.

9. Sites for a particular rare species, feature or community

Target	-	To maintain rare species etc.
Monitoring	-	Cannot be specified since it depends on the particular species or feature.
Action required if target not met	(a)	Institute more detailed surveys.
	(b)	Alter management.
	(c)	De-notify the site.
Frequency of recording	-	Cannot be generalised but usually every 1-3 years.

Notes

No standard method can be recommended for rare species or features because they need to be tailored to the specific situation. Lynne Farrell's procedures for following the fortunes of the military orchid are described in A Woodland Survey Handbook and contributed to the Biological Flora of the species (*Journal of Ecology* 73, 1041-1053, 1985).

10. Sites selected as minimum intervention areas

Target	(a)	Minimum intervention except if defined actions are needed (e.g. control of grazing/exotic species)
	(b)	Understand natural change on site.
Monitoring	(a)	Visual inspection as to whether grazing limits or exotic content exceeded.
	(b)	Set up long-term transects/plots etc. for specific features or groups.
Action required if target not met	(a)	Institute more detailed survey.
	(b)	Control grazing or exotics.
	(c)	The site is allowed/intended to develop as it does.
Frequency of recording	(a)	Annual visual inspection or monitoring may be required initially.
	(b)	Probably every 5-10 years for transects or after exceptional events (e.g. storms) with at least one site per Region to be included in this programme.

Notes

1. Virtually all the methods previously referred to could be applied in minimum intervention areas. However most interest has been in the composition and structure of the tree and shrub layer. Descriptions of the requirements for and references to permanent monitoring transects are contained in:

   PETERKEN, G.F. & BACKMEROFF, C. 1988. *Long term monitoring in unmanaged nature reserves.* Peterborough, Nature Conservancy Council (Research and survey in nature conservation 9).

2. Apart from regular periodic monitoring extra records may be needed after extreme events such as the 1987 storms. Examples of such recordings are included in:

   KIRBY, K.J. & BUCKLEY, G.P. 1994. *Ecological responses to the 1987 great storm in the woods of south-east England.* Peterborough, English Nature, (English Nature Science No. X).

APPENDIX

Woodland SSSIs in Shropshire based on renotified sites for which schedules were readily available in GBHQ; a few sites may have been missed. I have included some mere sites for completeness.

Site			Woodland monitoring
1.	Betton Dingle & Gulley Green	Example of undisturbed woodland. Good for vascular plants.	2, 3, 4.
2.	Bourmere, Shomere & Betton Pools	Woodland not prime interest so no regular monitoring proposed.	2
3.	Brown Moss	Woodland not prime interest so no regular monitoring proposed.	2
4.	Brownheath Moss	Example of alder-willow carr. Rare plants.	2, 3, 9.
5.	Bush Wood & High Wood	Example of woodland type. Good for vascular plants ornithological interest.	2, 3, 4, 8.
6.	Chorley Covert & Deserts Wood	Example of woodland type. Good for vascular plants. Good for butterflies.	2, 3, 4, 5.
7.	Clarpool Moss	Woodland not prime interest so no regular monitoring.	2
8.	Clunton Coppice	Example of woodland type and for vascular plants, western mosses.	2, 3, 4, 7.
9.	Craig Sychtyn	Example of woodland type and for vascular plants (also for grassland).	2, 3, 4.
10.	Cuckoopen coppice	Example of woodland type and for vascular plants.	2, 3, 4.
11.	Earl's Hill & Habberley Valley	Example of woodland type, for vascular plants, rare species, lower plants.	2, 3, 4, 7, 9.
12.	Flat Coppice	Example of woodland type, for vascular plants and birds.	2, 3, 4, 8.
13.	Hencott Pool	Example of carr and for vascular plants.	2, 3, 4.
14.	Hodnet Heath	Woodland not prime interest.	2
15.	Llaumynech Hills & Llynclys Hills	For vascular plants. Lower plants and rare species.	2, 3, 7, 9.
16.	Lydebrook Dingle	Example of woodland type for vascular plants, lower plants.	2, 3, 4, 7.
17.	Muxton Marsh	Small areas of carr.	2
18.	Oss Mere	Example of carr, uncommon species.	2, 3, 4.
19.	Shelve Pool	Sallow carr.	2
20.	Shrawardine Pool	Example of carr.	2, 3, 4.

21.	Sweat Mere & Cross Mere	Example of carr.	2, 3, 4, 9.
22.	Thatchers Wood and Covert	Example of woodland type and for vascular plants.	2, 3, 4.
23.	The Stiperstones	Example of woodland type and The Hollies, birds.	2, 3, 6, 8.
24.	The Wrekin and the Ercall	Example of woodland type, for vascular plants and birds.	2, 3, 4, 8.
25.	Tick Wood & Benthall Edge	Example of woodland type for vascular plants and rare species.	2, 3, 4, 9.
26.	Wentock Edge	Example of woodland type, for vascular plants, rare species.	2, 3, 4, 9.
27.	Whitwell Coppice	Example of woodland type, vascular plants, rare species.	2, 3, 4, 9.
28.	Wolverton Wood	Example of woodland type and for vascular plants.	2, 3, 4.
29.	Wyre Forest	Example of woodland type for vascular plants, birds and invertebrates.	2, 3, 4, 5, 6, 8.

Nothing has been included for monitoring of minimum intervention areas.

Types of monitoring

Code		No. of Sites	Frequency % sites each year	Resource need (No. of days
2	Site still there	29	20%	6
3	Sites as examples of types	23	10%	2
4	Sites for vascular plants	20	10%	2
5	Sites for open ground invertebrates	2	20%	1
6	Sites for over-mature timber	2	10%	1
7	Sites for lower plants	4	20%	1
8	Sites for birds	5	20%	1
9	Sites for rare species	7	30-100%	2-3

Assume one day, per site, for most monitoring operations. The above then comes down to about 17 days' work per year.