

# Sheephouse Wood – variations in vegetation across the wood and over time.

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This report summarizes studies carried out between 1981 and 2012 while the author was employed by the Nature Conservancy Council and its successors (English Nature and Natural England) but the views are solely those of the author. A paper based on this work was published as:

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<http://forestry.oxfordjournals.org/content/63/3/241.full.pdf+html>

**Kirby, K.J.** (2015) Changes in the vegetation of clear-fells and closed canopy stands in an English oak wood over a 30-year period. *New Journal of Botany*, **5**, 1-12.  
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## Summary

Vegetation changes in Sheephouse Wood, Buckinghamshire are described, based on a mixture of temporary and permanent 10x10m plots recorded at various times between 1981 and 2012.

The bulk of the woodland consists of mature oak high forest. During the period considered the canopy cover has increased; the ground flora richness has declined. The key influence appears to be increased shading, but deer may also be having an effect particularly on ground flora cover, particularly of bramble, the dominant species.

The more mixed woodland in the north of the site, with more ash in the canopy, is also richer in its ground flora. Although the tree layer was also found to have increased, there was not the same species richness decline, possibly because ash is a much less heavy-shade caster.

Changes in two areas felled in 1984 and 1988 respectively showed similar patterns. Initially ground flora richness and cover increased and the areas became dominated by various grass species. Richness then dropped probably as a result of competition effects from the dominant grasses. The shrub and tree cover took longer than expected to establish and is now likely to have an increasing effect on the flora, which is expected to decline in richness and cover as the shade increases. Similar effects were seen in smaller areas cut as group-fells or rideside scallops.

An experimental coppice area was cut in 1984, but because the tree layer was not thinned it did not really function as a proper coppice cut. Increases in richness and cover of the vegetation occurred but not as great as in the clear-fell areas.

Overall the results show a strong correlation between the openness of the canopy and the species richness of the vegetation below. Hence where most of the wood has been left undisturbed the flora has tended to thin out. This suggests that from a ground flora conservation perspective more 'disturbance' for example by further small scale felling or ride widening would be desirable.

Concerns that the dominance of grasses and other competitive species might lead to subsequent losses of more specialist woodland flora are not supported in this study, at least if the open phase is less than ten years. While such species may form a smaller part of the total flora, in absolute terms they remain as common as in the undisturbed woodland. Further analysis of the changes in individual species is however needed.

The future management of the woodland needs however to take account of other interests, not all of which may be favoured by increased disturbance.

## **Background**

In 1981 the Nature Conservancy Council (NCC) was reviewing the coverage of woodland within Sites of Scientific Interest (SSSI) in Buckinghamshire. The cluster of woods that form the Claydon Estate was surveyed as part of this review and Sheephouse Wood was selected as the site with highest nature conservation value amongst these.

Annex 1 gives a brief account of the survey; Annex 2 contains the SSSI description; Annex 3 has notes on the past management of Sheephouse Wood provided at the time by Sir Ralph Verney.

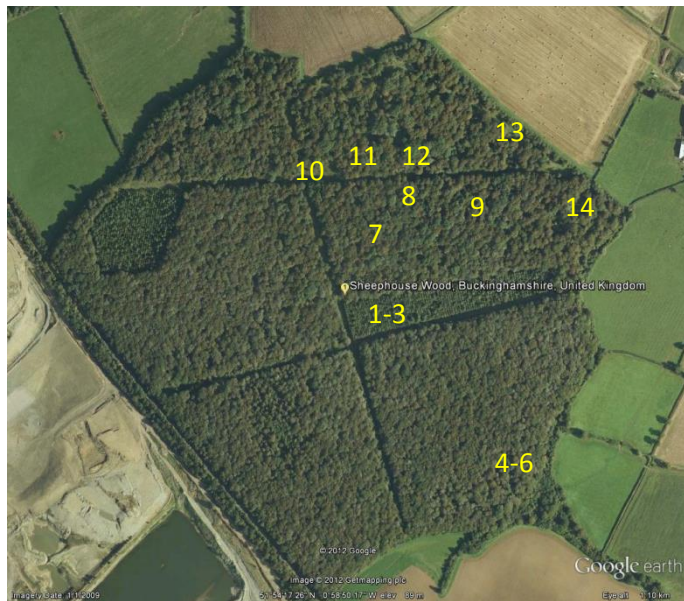
Sir Ralph Verney encouraged NCC to set up a monitoring programme within the wood.

Unfortunately we did not have any separate funds for this so no formal programme was ever really established. However in 1984 Dr Rob Fuller of the British Trust for Ornithology started a long-running study of the bird populations and has also made periodic surveys of the structural changes in the wood (analysed and reported on separately eg Fuller 1988). A survey of the butterflies along the rides was carried out in 1986 (Steel 1986, Annex 4); more recently the bats have been studied (Hilary Phillips pers. com.).

My work has concerned variations in the ground flora across the wood and over time based on a mixture of permanent and temporary plots. Recording has been intermittent because of other work priorities. An initial account looked at changes up to 1988 (Kirby 1990). Sufficient additional data have now been collected (Table 1) to contrast the changes in the main, oak-dominated part of the woodland where no management has taken place, the two clear-fells established in 1984 and 1988, and to a more limited extent with other small scale interventions.

**Table 1.** Number of plots recorded in different parts of the wood in different years.

		Plot no	1981	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1996	1999	2000	2006	2008	2012
Undisturbed oak	Permanent	7,9		2	2	2	2	2	2				2		2				2	2
	Temporary		6					3							6	6	8	7	6	6
84 clear fell	Permanent	1-3		3	3	3	3	3	3		3	3							2	3
	temporary		(1)					3	3						4	6	6	6	6	3
84 copp	Permanent	4-6		3	3	3	3	3	3			3			3				3	3
	temporary							3	3									3		
88 clear fell	temporary							6	6	6		6		6	6	6	6	6	6	6
86 rideside plots	Permanent	8,10		(2)	(2)	2	2	2	2			2			2				2	2
86 group fell plots	Permanent	13,14				2	2	2	2			2			2					2
Undisturbed ash	temporary		1					3									1	1		1
	permanent	11,12		2	2	2	2	2	2				2		2				2	2



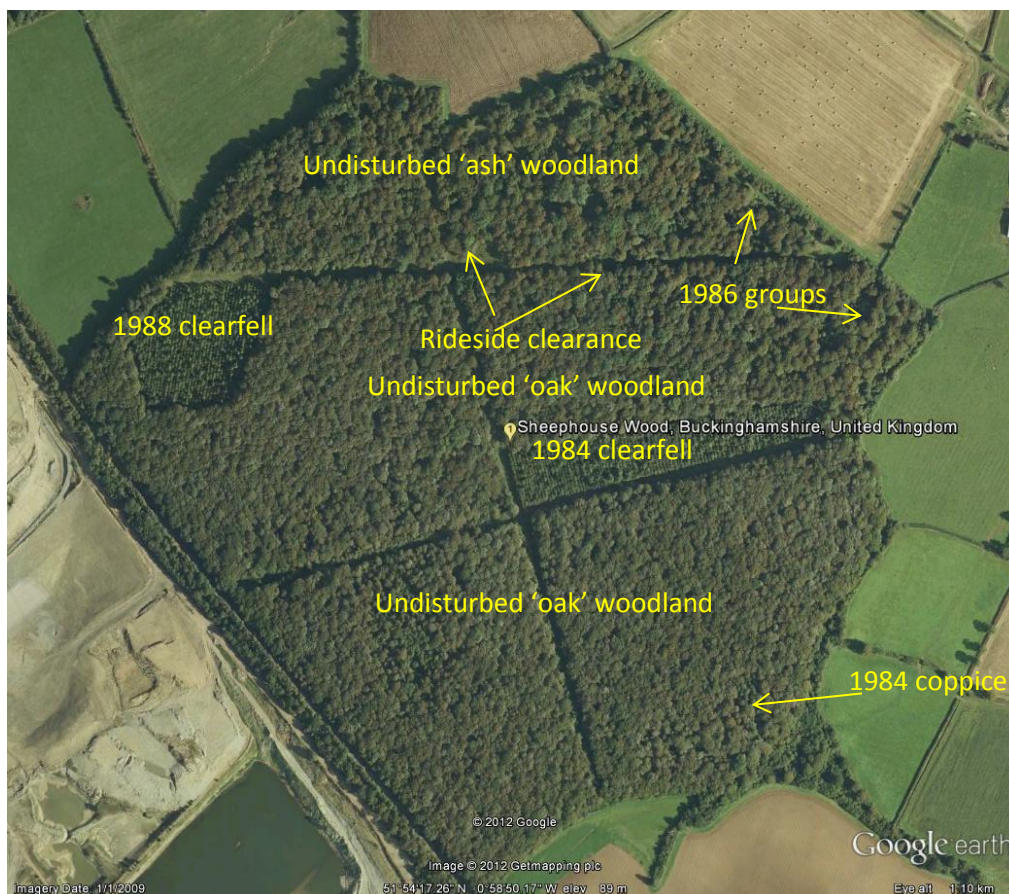
Approximate location of permanent plots referred to in Table 1.

## Methods

### *Whole wood lists*

The standard survey method to produce a basic description and vascular plant list for a woodland is based on a walk through the site – the surveyor aims to cover as much of the site as possible within 2-6 hrs (depending on the size of the site) and makes notes of the composition and structure of the woodland as they go. A species list and vegetation description for Sheephouse Wood produced in this way was available from the 1981 surveys; a similar survey walk was done in 2008 to see whether there was any indication of overall loss of species at the wood level.

The main variations in vegetation across the wood and the main management interventions that have taken place since are indicated on Figure 1. The recording within these areas is summarised in Table 1.



**Figure 1.** (a) The main variations in composition and management in the wood 1981-2012; (b) below, views of the wood in the 1980s. Source Google Earth, ©Getmapping plc.



## **Table 2.** 10x10 m quadrat /plot recording

Field layer – all vascular plants listed and given a cover score on the Domin scale (1-10). Wood species eg ash seedlings have been excluded from the analyses.

Cover across the plot estimated on a percentage basis for:

- Bare ground, Litter (and dead wood);
- Moss cover (generally very low);
- Field layer;
- Shrub/understorey 1-5m (excluding bramble and tall herbs);
- Tree/canopy cover (>5m high)
- Open sky, ie the light available to the ground flora.

The cover scores, except for the 1981 records, were all made by the same recorder. While they are highly subjective they can provide an indication of gross changes.

### *‘Undisturbed oak woodland’*

In 1981 the walk survey was supplemented by eight quadrats (Table 2) randomly distributed across the wood. Six of these fell within the main oak-dominated area of the woodland and repeat surveys based on randomly placed quadrats but covering the spread across the wood have been carried out six times since. The 1981 quadrats were 14.1x14.1 m (200m<sup>2</sup>) but only data from the central 10x10 m (100m<sup>2</sup>) is used in the analyses below to be comparable with subsequent recordings that have used the smaller (10x10m) plot size.

Four permanent plots (7,9,11,12) were set up in the undisturbed woodland in 1984 and have been recorded nine times since. However two of the plot positions (11,12) proved to be in vegetation that was closer to the more species-rich ash-maple woodland in the north of the wood and have therefore been analysed with those data below.

### *Undisturbed ash-maple woodland*

This is the least studied part of the woodland, although it has the richest flora, because originally little management was expected to take place in it. Apart from the two permanent plots established in 1984, one of the 1981 quadrats fell in this woodland type; three temporary plots were recorded in 1988 and single plots in 2006 and 2012. The two group fells (13,14) fall within this woodland type.

### *1984 Clear-fell*

In 1984 a block of oak 2.x ha was clear-felled and replanted with mixed broadleaves at three metre spacing. One of the 1981 quadrats fell in this block and so provides evidence that this area was indeed similar to the surrounding undisturbed oak woodland. Three permanent plots (1-3) were established in 1984 and have been recorded ten times since. Temporary plots were also recorded on eight occasions up to 2012.

### *1988 Clear-fell*

A second clear-fell was created in the autumn of 1988, again being planted with mixed broadleaves at three-metre spacing. This has been recorded using six temporary randomly placed plots on ten occasions from 1989 to 2012.

### *1984 'Coppice'*

The intention in 1984 had been to create a coppice cycle so that changes under this could be contrasted with those under the clear-fell regime. The understorey in a block in the south-east of the wood was cut, but none of the canopy oaks were removed. So while the initial response was similar to that of a coppice cut, the retained canopy created too much shade for the understorey regrowth to be maintained. No further coppice cuts were made. Three permanent plots (4-6) were set out in 1984, which have been recorded on ten occasions and temporary plots on three.

### *Group-fells and ride scallops*

Smaller clearings were also made in the wood from time to time, either as group fells within which trees were planted at wide spacing or as scallops to extend the rides. Two permanent plots (8,10) had their canopies partly cleared in 1986 and have effectively become rideside scallops; while two other permanent plots were established in group-fells (13,14) at the same time. These have been recorded on ten and seven occasions respectively.

## **Results**

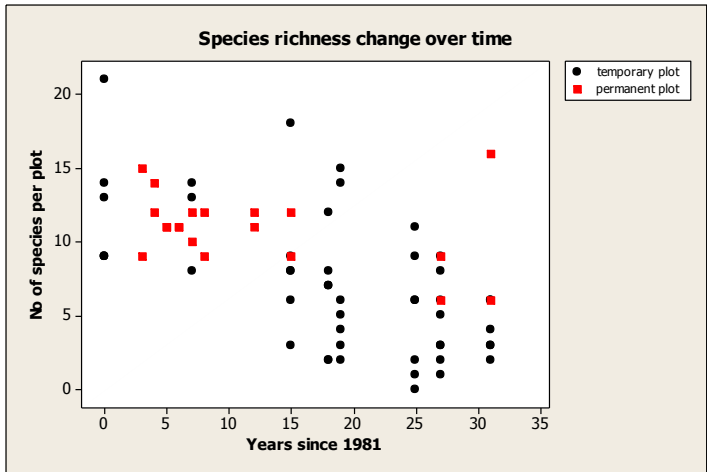
### *Whole wood lists*

Walks of about 2-3 hours round the wood produced a list of about 88 and 80 vascular plants species in 1981 and 2008 respectively. As neither was a complete list there were, as expected, species recorded in 1981 but not in 2008. Of the 31 species from 1981 not picked up in 2008 27 were given a score of 'rare' in the wood in 1981 (most species recorded only in 2008 were similarly rated 'rare'); at least 20 of the 'missing' species from the 1981 walk survey have however been seen recently. There is thus no indication that the richness of the wood – in terms of the overall species list - has changed substantially in the last three decades.

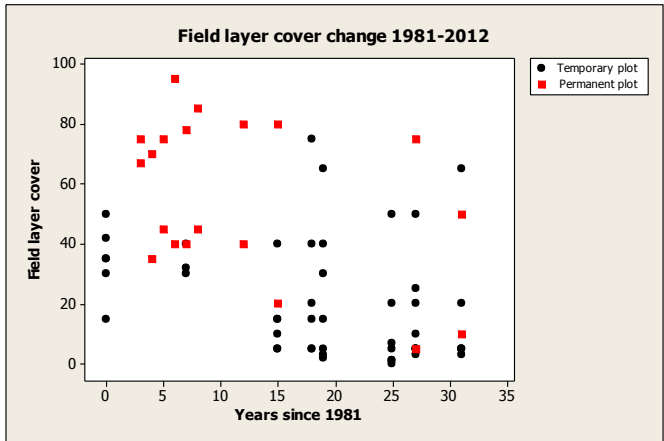
### *Changes in the undisturbed oak woodland 1981-2012*

Overall species richness and field layer cover both declined (Figures 2,3), although there was more variation in change in field layer cover than richness. Species richness in particular was inversely correlated with the estimate of 'open sky' and inversely related to cover in the tree layer; there was little change in the estimate of shrub layer cover over this period (Figures 4,5,6, 7). The photographs below show plot 7 in August 1984, May 1988 and August 2012.

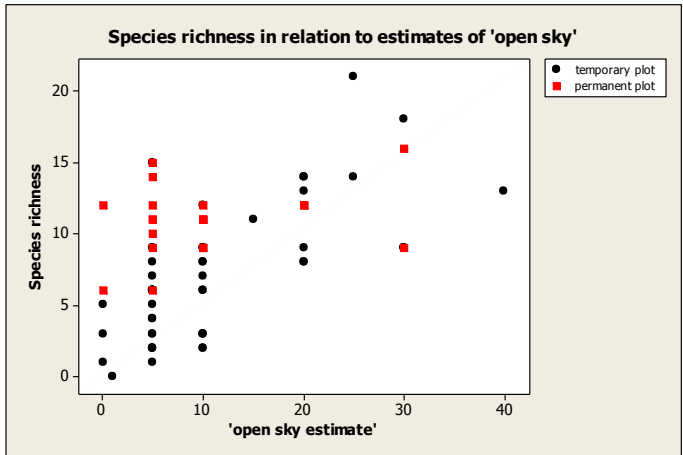




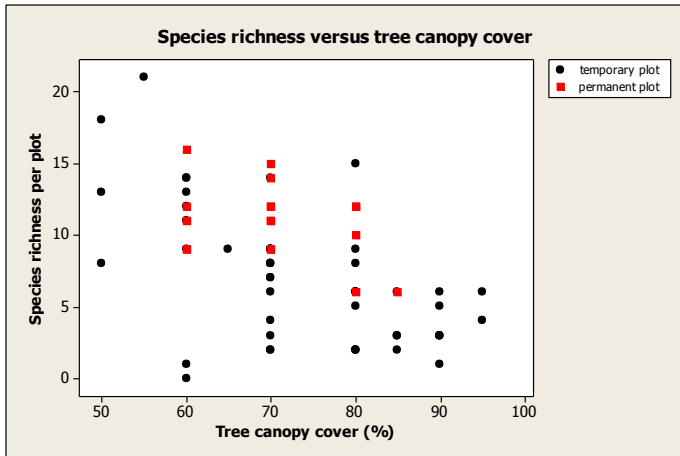
**Figure 2.** Species number per plot 1981 and 2012 in undisturbed oak woodland. Linear regression significant ( $p < 0.001$ ,  $r^2 = 35\%$ )



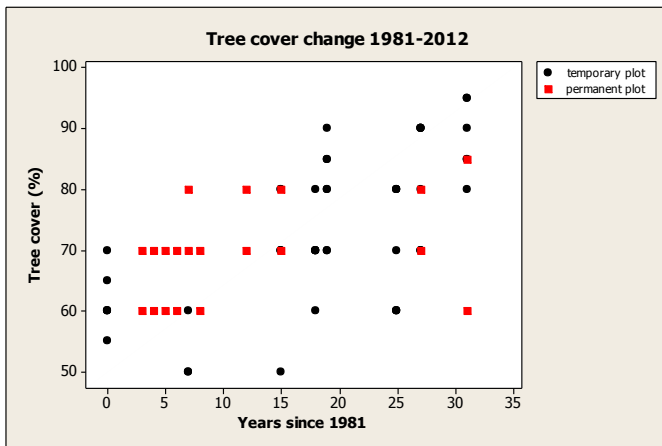
**Figure 3.** Field layer cover per plot 1981-2012 in undisturbed oak woodland. Linear regression significant ( $p < 0.001$ ;  $r^2 = 22\%$ )



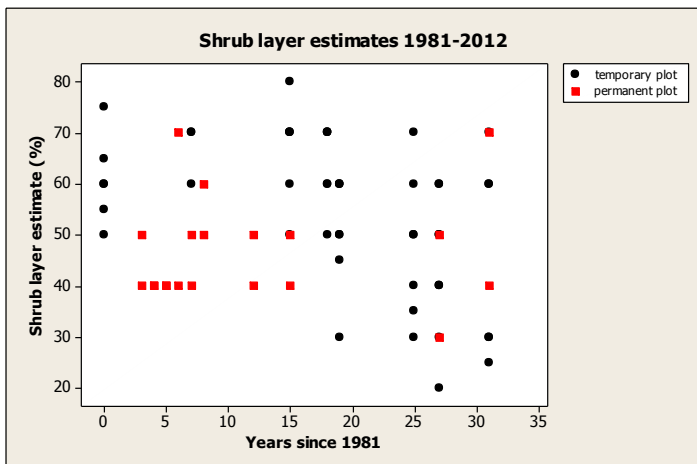
**Figure 4.** Species richness and 'open sky'. Linear regression significant ( $p < 0.001$ ;  $R^2 = 29\%$ )



**Figure 5.** Relationship between estimates of tree canopy cover and species richness per plot. Linear regression significant ( $p < 0.001$ ;  $r^2 = 31\%$ )



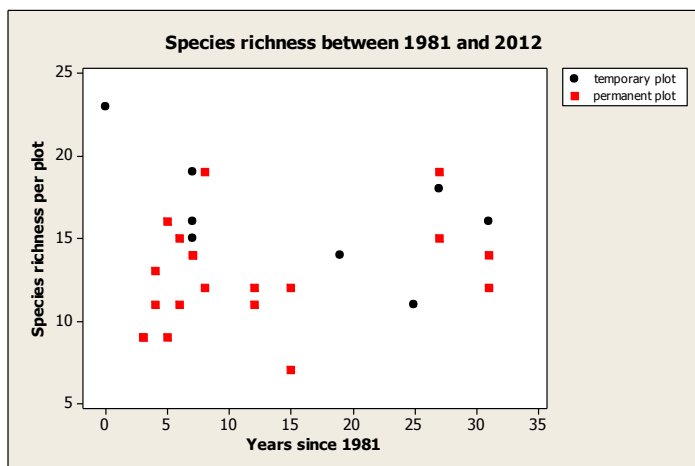
**Figure 6.** Changes in estimates of tree canopy cover 1981-2012. Linear regression significant ( $p < 0.001$ ;  $r^2 = 35\%$ )



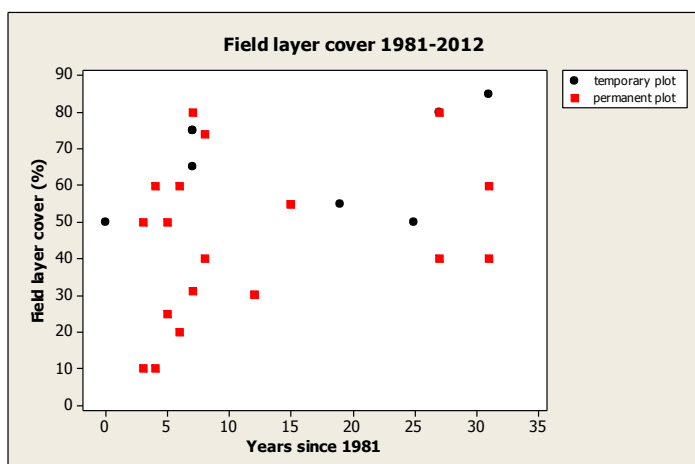
**Figure 7.** Shrub layer cover estimates 1981-2012 – no trend

### Undisturbed ash woodland

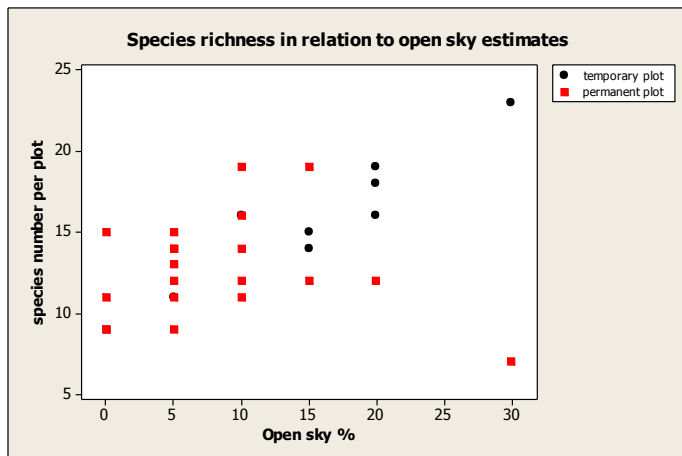
There are fewer plot records from this area and more species tended to be present in plots, often only as single plants. The results are more variable even from year to year in permanent plots. No trend was found in species richness over time, in field layer richness (Figures 8,9), or (as in the oak area) in shrub layer cover. Species richness was still correlated with 'open sky' estimates, but these showed no trend over the period, despite a rise in estimated tree cover (Figures 10,11). This may reflect the greater abundance of ash in the canopy in the northern part of the wood which is less of a shade caster than oak, or a greater role for the shrub layer in determining light to the field layer. The photographs show plot 11 in August 1984, May 1988 and August 2012



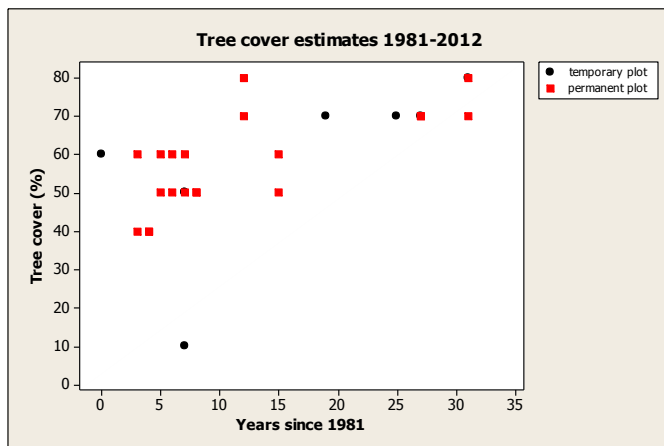
**Figure 8.** Species richness per plot in the undisturbed ash woodland 1981-2012. No trend.



**Figure 9.** Field layer cover in the undisturbed ash woodland 1981-2012. No trend.



**Figure 10.** Species richness versus 'open sky' estimates. Linear trend significant ( $p < 0.05$ ;  $r^2 = 17\%$ )

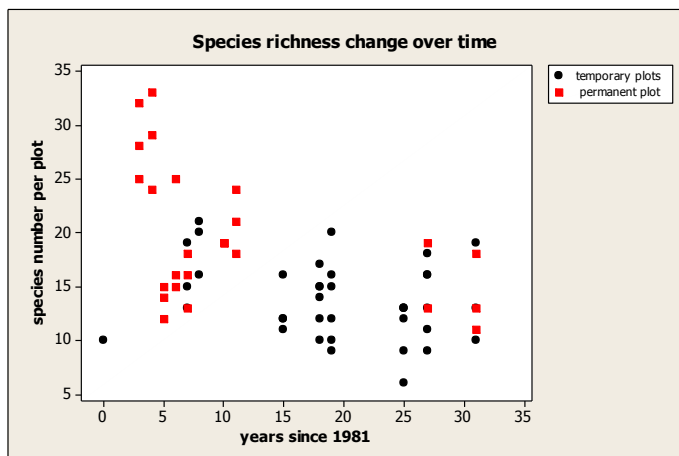


**Figure 11.** Increase in tree layer cover (%) in the undisturbed ash woodland 1981-2012 . Linear trend significant ( $p < 0.001$ ;  $r^2 = 43\%$ ).

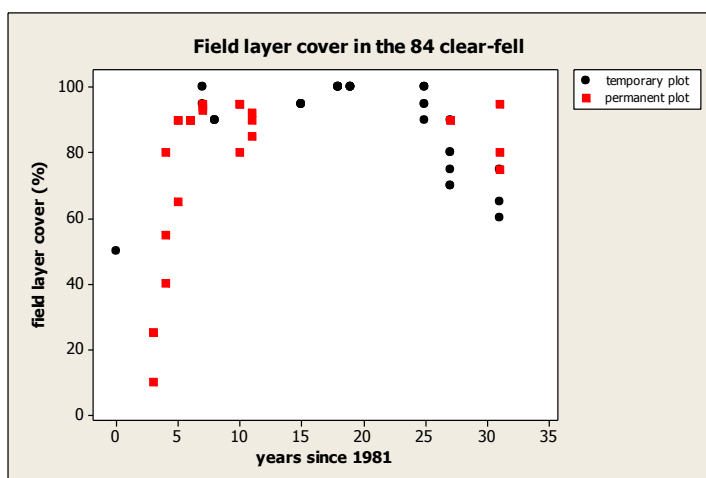
### 84 clear-fell

Following the clear-fell there was a rapid rise in species numbers and cover, followed by a decline over the next 5-10 yrs. Thereafter the species richness stayed more-or-less constant at about 15 species per plot (Figures 12,13). The trees took longer than expected to establish (not helped by a grass fire which killed some of the planted saplings). Mowing between the rows also limited the amount of natural regeneration that had been expected to supplement the wide-spaced planted trees. However their increasing contribution to the 'shrub layer' and then to the tree layer cover is apparent. (Figures 14,15). Now that the canopy is re-establishing a further decline in species richness is expected (through shading), as is already starting to happen with field layer cover.

The photographs below show plot 3 in August 1984, July 1992 and August 2012.



**Figure 12.** Change in species richness per plot in the 1984 clear-fell, 1981-2012.



**Figure 13.** Change in field layer cover in the 1984 clear-fell, 1981-2012.

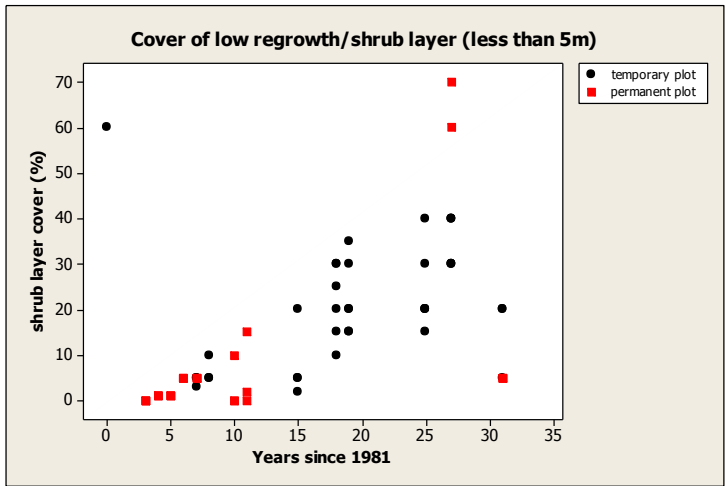


Figure 14. Re-establishment of low shrubby cover (<5m high) as trees grew.

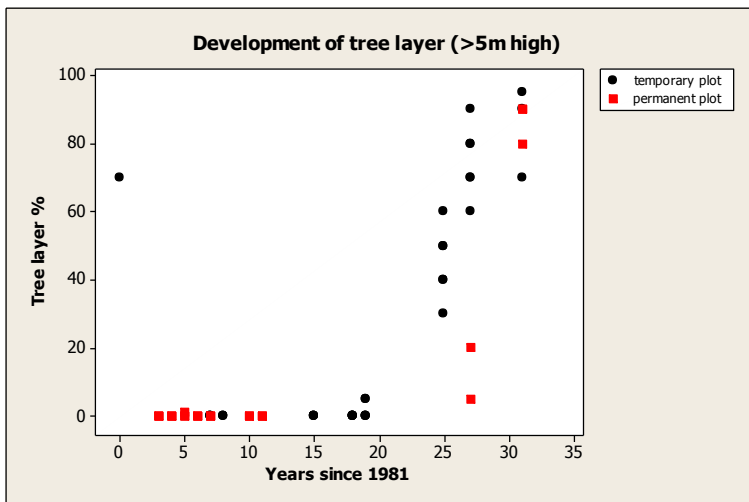


Figure 15. Re-establishment of tree layer (>5m high).

### 1988 clear-fell

Species richness increased following felling, as in the 1984 clearfell, but there has not been much of a subsequent decline (Figures 15,16). Similarly field layer cover increased after felling and has not yet started to decline. Although the trees established and grew better than in the 1984 clear-fell and so reformed first the shrub and then a tree layer quicker it is only in the last few years that the stands have approached full canopy (Figures 17,18), suggesting that, to date, light limitation by the woody species has not influenced species richness.

The photographs below illustrate the state of the clear-fell in May 1989 following felling in autumn 1988, in 1994 and in 2012 (not the same plots).

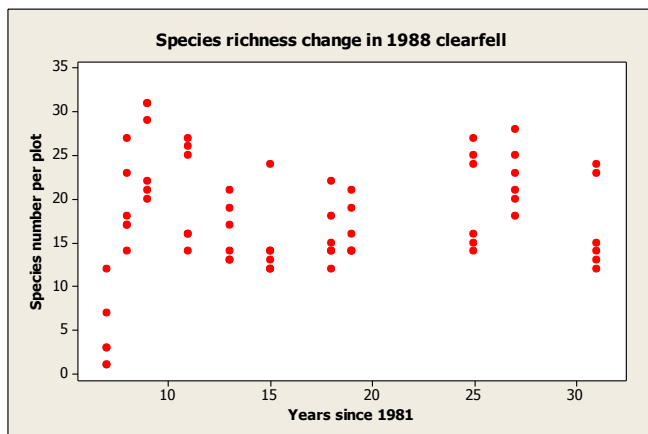


Figure 15 Change in species richness in the 1988 clear-fell (all temporary plots).

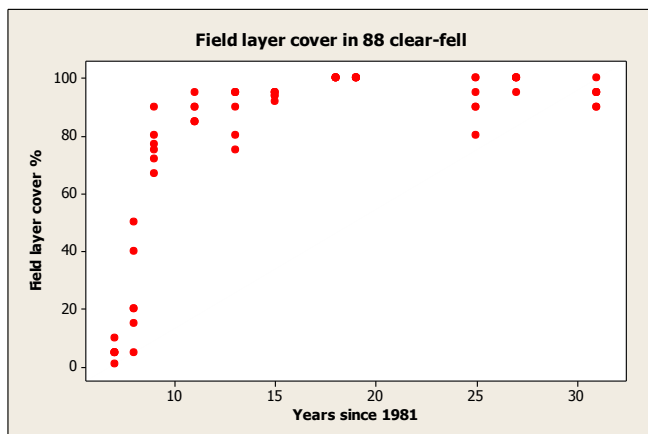
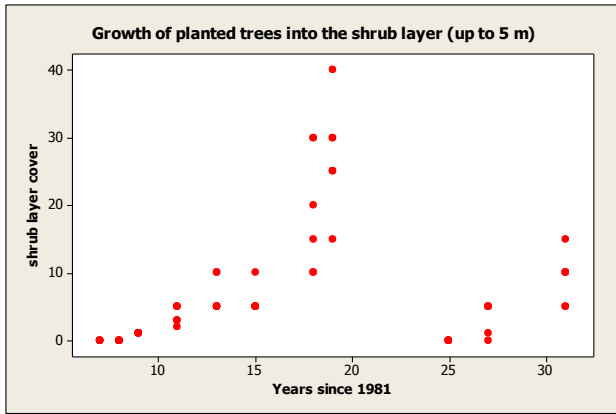
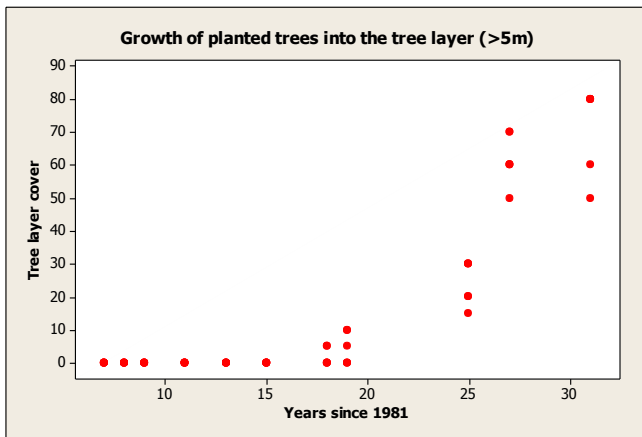


Figure 16 Change in the field layer cover in the 1988 clear-fell (all temporary plots)



**Figure 17** Shrub layer cover in 1988 clear-fell (all temporary plots).

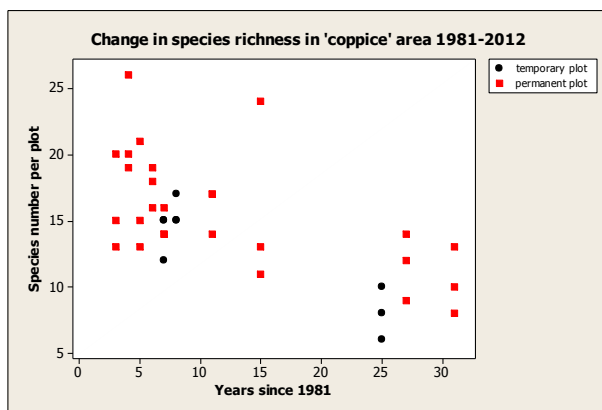


**Figure 18** Growth of planted trees into a distinct tree layer (>5m) (all temporary plots).

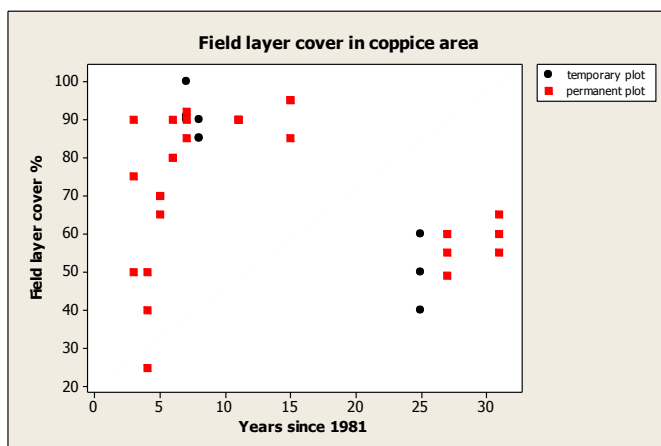
### 1984 'coppice' area

Clearance of the understorey led to an increase in species richness compared to the undisturbed oak woodland surrounding it but thereafter species richness declined. Field layer cover initially increased but subsequently dropped back down although it is still somewhat higher than in the undisturbed oak woodland (Figures 19,20). The shrub layer was eliminated through the coppice cut, but has since re-established. The tree layer was not cut in 1984 but has, as in the undisturbed woodland, tended to increase in cover (Figure 21, 22). The changes in species richness are correlated with changes in the estimate of 'open sky', as in the undisturbed woodland, but more strongly with the estimate of regrowth of the shrub layer (Figures 23, 24).

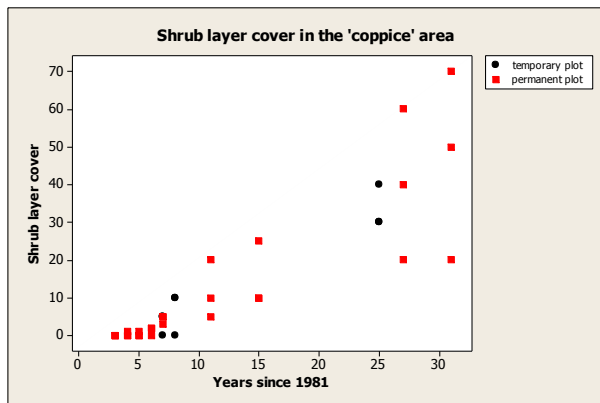
The photographs show plot 4 in August 1984, May 1989 and August 2012.



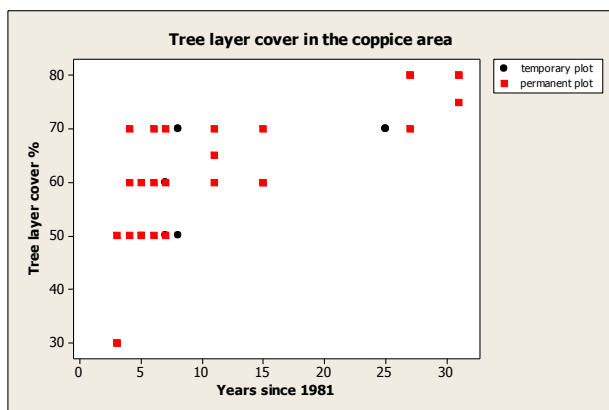
**Figure 19.** Changes in species richness in the 'coppice' area 1981-2012. Linear trend significant ( $p < 0.001$ ;  $r^2 = 41\%$ )



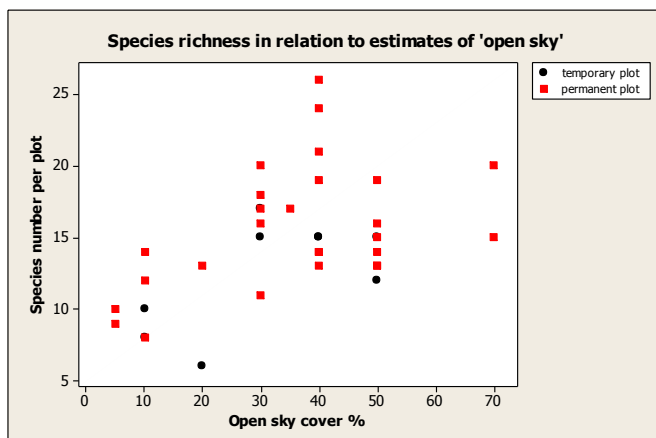
**Figure 20.** Field layer cover in the 'coppice area'.



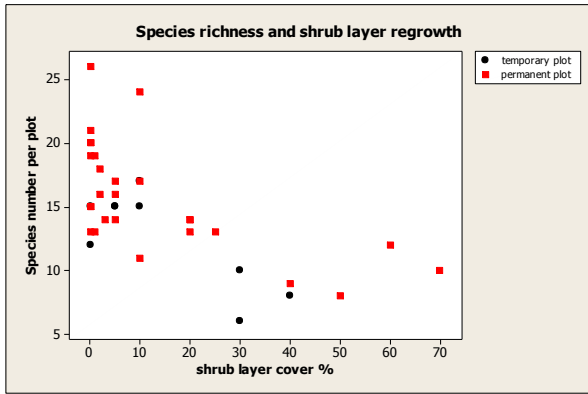
**Figure 21** Shrub layer cover in the 'coppice' area



**Figure 22.** Changes in tree layer cover in the coppice area 1981-2012. Linear trend significant ( $p < 0.001$ ;  $r^2 = 51\%$ )



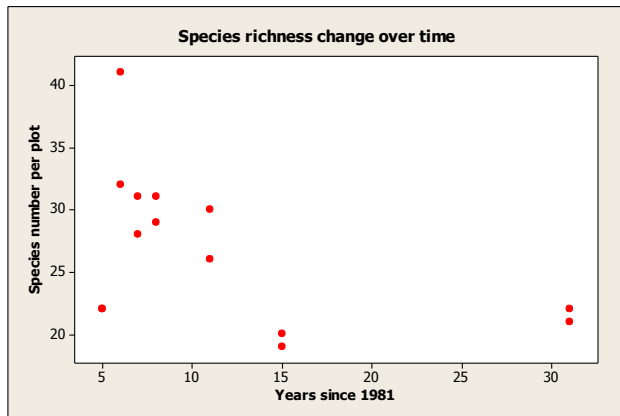
**Figure 23.** Species richness versus open sky in the 'coppice area'. Linear trend significant ( $p < 0.01$ ;  $r^2 = 25\%$ )



**Figure 24** Species richness change in relation to shrub layer cover in the 'coppice area'. Linear trend significant ( $p < 0.001$ ;  $r^2 = 40\%$ )

### 1986 Group fells

These were felled areas about 30m across in which a few individual trees were planted. They have remained largely open throughout the period. The field layer remains more or less complete cover. After an initial rise in species richness in the first decade there was then a decline (Figure 25), although remaining at much higher levels than under shade.



**Figure 25.** Change in species richness in two group fells (based on two permanent plots).



The photographs show plot 13 in May 1986, 1995 and August 2012.

### 86 Ride widening plots

Two plots close to rides, but originally under full closed canopy were partially opened out in 1986 as part of scalloping of ride edges and have remained half closed woodland, have ride since. Their species richness increased substantially in the first few years, then dropped back (Figure 26). As with most other areas the species richness changes tend to be correlated with change in tree layer cover (Figure 27). The photographs show plot 10 in 1986 when it had been felled, in 1989 showing growth back into the ride scallop, and in August 2012 inside the developed scrub edge (the portion of the plot that remains open can be seen in the top left corner).

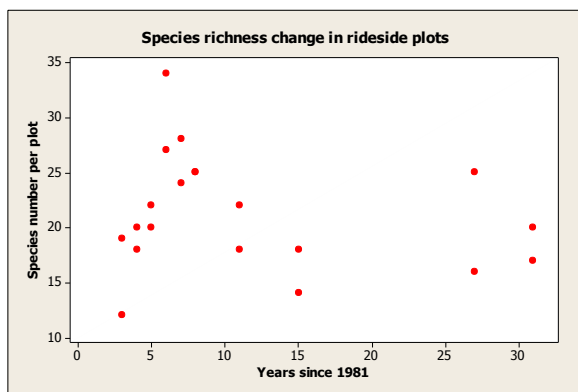


Figure 26. Change in species richness in rideside plots (based on 2 permanent plots)

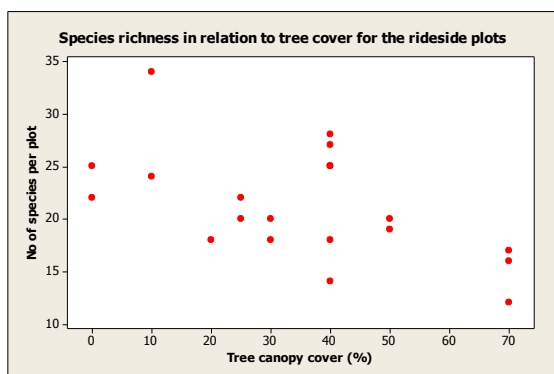
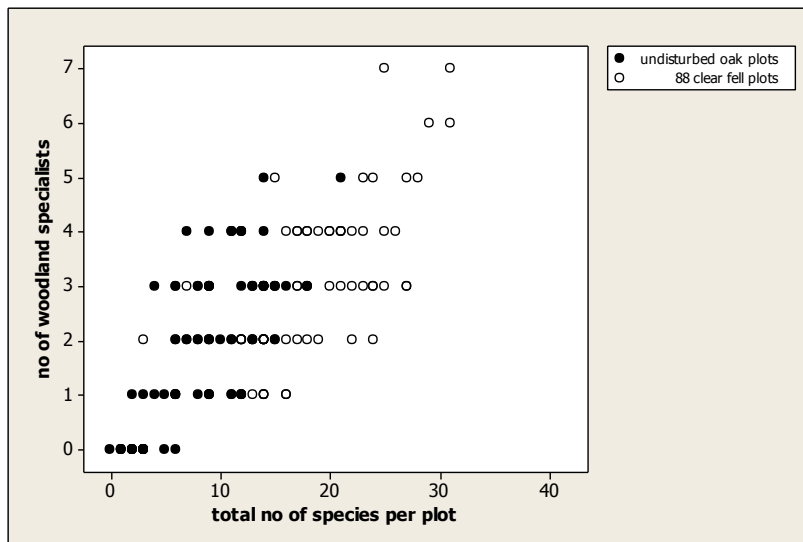


Figure 27 Species richness versus tree cover for rideside plots (linear trend significant  $p < 0.05$ ;  $r^2 = 29\%$ )

*Differences in species composition of different areas and over time [Further analysis needed]*

The main part of the wood – the undisturbed oak woodland – has a relatively species-poor flora with bramble and honeysuckle the most frequent species. To the north a wider range of species occur on the more base-rich soils.

Where the canopy was cleared the increase in species richness is still very largely of generalist woodland species, particularly grasses (*Calamagrostis*, *Holcus spp*, *Deschampsia cespitosa*, *Agrostis stolonifera*, *Dactylis glomerata*). Non-woodland (grassland/disturbed ground species) increase some of these then disappear in the face of competition from grasses in particular. Woodland specialists can still be found amongst dense vegetation, not least because they include grasses such as *Anthoxanthum odoratum*, *Holcus mollis* and *Calamagrostis*. Nevertheless even some of the woodland herbs (*Primula vulgaris*, *Hyacinthoides non-scripta*) could still be found in plots several years after clearance. Woodland specialists may form a slightly smaller proportion of the total flora in clearings than in the closed canopy woodland in absolute terms they occur as frequently.



**Figure 28.** No of woodland specialists versus total species richness for undisturbed oak woodland and 88 clear fell plots across all times.

## Discussion

The method of recording – with low numbers of plots and combining permanent and temporary samples – is messy and will have introduced some biases. It was however a consequence of making the most of visits to the wood, sometimes for other purposes such as staff training. Nonetheless some general patterns emerge which are similar across both temporary and permanent plot records.

In the undisturbed woodland the canopy cover (>5m high) has tended to become denser and the ground more shaded, particularly in the oak dominated areas of the wood, although locally small gaps have started to occur recently as trees have died. The ground flora in the oak woodland, poor to start with, has become less rich and the cover of the ground flora has declined. Both cover and richness have however remained stable in the northern ash-dominant woodland. The correlation between species-richness and estimates of tree cover/open sky suggest that shading is a major driver of change, although an increase in deer pressure from the late 1980s onward may be contributing particularly to the decline of the bramble cover in the oak woodland.

Felling led to increases in both ground flora richness and cover. After an initial peak of species richness (in some cases over 30 species per plot) there is a decline, even before the canopy re-establishes - in some cases the felled areas have remained fairly open for twenty years. This reflects competition within the ground flora. The plots remain however richer than the closed canopy areas.

While some of the increase in species richness is from invasion by non-woodland species such as *Cirsium arvense* most of it is from woodland generalist species including various grasses such as *Agrostis stolonifera*, *Dactylis glomerata*, *Deschampsia cespitosa*. Woodland specialists also benefit, not surprisingly because some of these are also grasses of woodland clearings such as *Calamagrostis epigeos*. However typical woodland herbs can still be found 5-10 years after felling amongst the grasses. As the canopy re-establishes so these species should assume more prominence.

A major re-survey of woods in 2001 of 103 woods spread across Britain that had previously been looked at in 2001 found a decline in plant species richness which appeared to be linked to increases in shading (Kirby *et al* 2005). This study of one site but with a more continuous record over a similar time scale supports this finding.

There has been concern that clear-felling and the subsequent dominance of grasses may swamp more specialist woodland plants. The results from Sheephouse suggest this risk may be over-stated; while this element of the woodland flora may not increase as much as more generalist species they may still benefit from some opening up of the canopy.

### *Implications for management – a ground flora perspective*

The ground flora would benefit from localised opening up of the canopy in the currently undisturbed oak areas. An 'active' and 'passive' approach to this are suggested below.

The Estate might, if it wished to realise some of the current timber potential from the wood, create small group fells. Grasses and bramble are still likely to rapidly form the bulk of the vegetation but if the gaps are kept reasonably small and dense regeneration is encouraged any competitive effect on woodland specialists should be minimised. Good regeneration will depend on deer numbers being kept low; even so some planting of oak is likely to be needed. Learning from past experience groups

of close spaced trees, and not mowing the areas between the groups, should lead to better establishment and quicker canopy closure.

A more 'passive' approach would be to rely on an increase in gap creation as trees die to provide the increase in light to the ground flora. Deer control would still be desirable to allow for regeneration within the gaps, though as the gaps would probably be smaller than group fells the frequency of oak regeneration would be less. If this approach is taken it would be desirable to link it to some further opening up of rides through the wood which would locally increase the side light in to the stands.

This study has just been of the ground flora. There does need to be consideration of the other interests in the wood; for example while the key butterflies would probably benefit from active intervention there would probably be less dead wood in the longer term and this might impact on the bat populations (eg Murphy *et al* 2012). Leaving at least a quarter of the woodland undisturbed even if the more active approach to management is taken might therefore be advisable.

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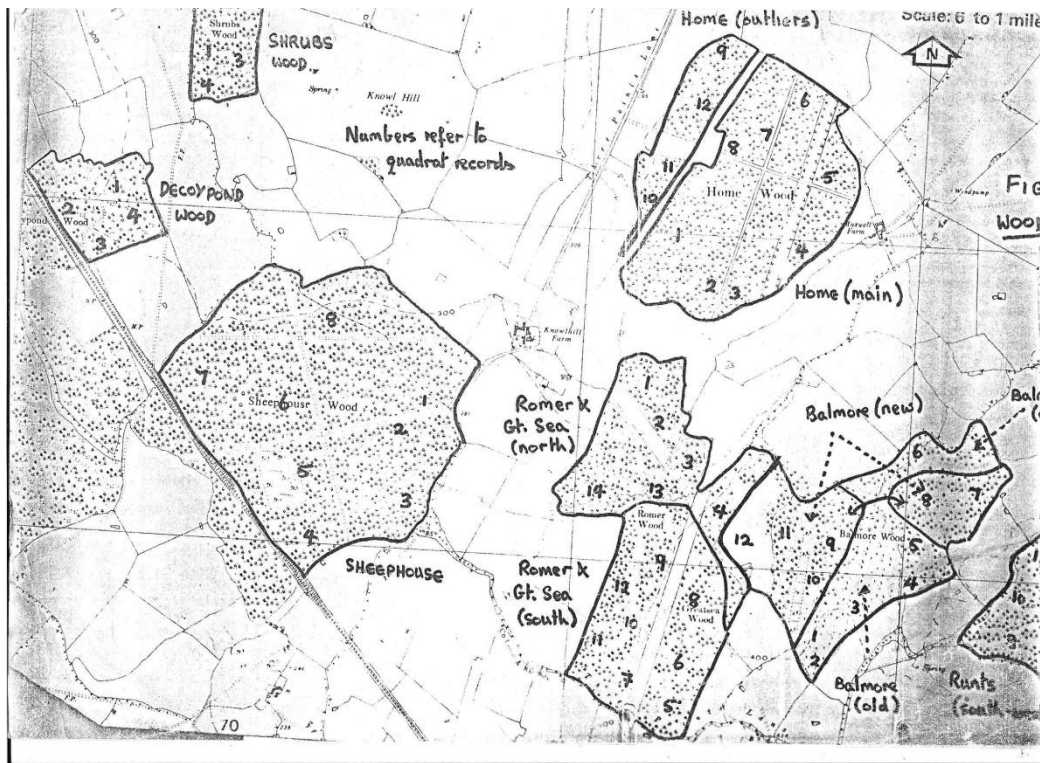
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### Annex 1. Summary of survey work carried out on the Claydon Estate in 1981 (unpublished)

A survey was carried out in 1981 of the woods on the Claydon Estate:

- To record the species, communities and structure of the different woods;
- To identify those features/species within the semi-natural areas that are of particular importance for nature conservation;
- To determine the extent to which these species/features survive in the woods which have been partially or completely converted to plantations.

A mixture of structured walk and quadrat records were made and records from previous surveys for some of the woods were also available. Summaries of the results for each wood were prepared. That for Sheephouse is included below. The woods were then compared using the framework of the Nature Conservation Review criteria in the table below. It was clear that Sheephouse and Home Woods stood out as of significantly higher value than the others and this led to Sheephouse subsequently being notified as a Site of Special Scientific Interest.



SHEEPHOUSE WOOD

<u>Area</u> (ha)	Total 50	Broadleaved : 50	Conifer +	Semi-natural : 50	plantation +		
<u>Species</u> <u>No.</u>	Woodland Species (excluding intro ductions) 104			"Indicators" 21			
<u>Common</u> <u>species</u>	Ajuga reptans Carex sylvatica Circaea lutetiana Deschampsia caespitosa Dryopteris austriaca Endymion non-scriptus Glechoma hederacea Lonicera periclymenum Luzula pilosa Rubus fruticosus	Rumex spp (dock) Viola riviniana Corylus avellana Crataegus spp. Quercus robur					
<u>Canopy</u>	Mostly oak-hazel (6Dc) Small areas of ash-maple (2A) Fragments of wych-elm ash (1B) and suckering elm wood (10A)						
<u>Ground</u> <u>Flora</u>	Plot Types:	5	7	10	11	20	21
	No of quadrats:	1	1	1	3	1	1 semi-natural
	Mean ground flora cover (from plots); 42%						
<u>Structure</u>	Score from "walk" record: 16 Mean shrub cover (from plots): 55% " tree cover ( " " ): 62%						
<u>Comments</u>	The largest and (marginally) most species-rich wood, still almost entirely semi-natural with a high structure score. Distinguished from the other semi-natural woods by the greater abundance of the oak-hazel coppice type compared to the ash-maple type, by reduced importance of types 5 and 7 in the ground flora. Apart from the species already listed, <u>Milium effusum</u> , <u>Mercurialis perennis</u> and <u>Geum urbanum</u> occur in the ash-maple areas, while <u>Holcus mollis</u> , <u>Anthoxanthum odoratum</u> and <u>Anemone nemorosa</u> occur in the oak-hazel areas. <u>Melampyrum pratense</u> also occurs. Although there are plans under discussion at present the wood has not received any major forestry treatment recently.						

TABLE 16. RELATIVE NATURE CONSERVATION VALUE OF THE CLAYDON WOODS

SIZE	Feature	Relative Position						
		Sheephouse	Home	Romer & Gt Sea	Baltimore	Runts	Shrubs	Decoy
		(50)	(40)	(39)	(28)	(27)	(8)	(8)
DIVERSITY								
(a)	Woodland species	Sheephouse (104) Home (104)	Baltimore (99)	Romer & Gt Sea (92)	Runts (81)	Decoypond (64)	Shrubs (63)	
(b)	Indicator species	Sheephouse Baltimore (23)	Home (22)	Runts Romer & Gt Sea (20)	Decoypond (14)	Shrubs (13)		
(c)	No & size of stand types	Sheephouse	Home	Decoypond	Baltimore Shrubs	Romer & Gt Sea	Runts	
(d)	Number of plot types	Decoypond (4/4)	Sheephouse (6/8)	Baltimore (6/12)	Runts (5/12)	Romer & Gt Sea (5/14)	Home (4/12)	
	Number of plots		Shrubs (3/4)					
(e)	Structural index (highest value per sub-unit)	Sheephouse Home (16)	Romer & Gt Sea Shrubs Decoypond (15)	Runts (13)	Baltimore (12)			
(f)	Shrub cover (from plots)	Shrubs (57)	Sheephouse (55)	Home (59)	Decoypond (45)	Romer & Gt Sea (24)	Runts (18)	Baltimore (10)
(g)	Structural variation from stand to stand*	Baltimore Romer & Gt Sea	Runts	Home Sheephouse	Shrubs Decoypond			
(h)	Presence of ponds or streams	Sheephouse Baltimore Decoypond Romer & Gt Sea Home						

TABLE 16 continued

(i) Openess and extent of ride system*	Home Balmore Romer & Gt Sea	Sheephonse Runts	Shrubs	Decoypond			
NATURALNESS							
Extent of semi-natural stands	Sheephonse (50)	Home (33)	Decoypond (8)	Shrubs (8)	Balmore (7)	Runts (5)	Romer (4)
RARITY							
<u>Sorbus torminalis</u> present	Sheephonse Romer & Gt Sea Balmore						
FRAGILITY							
Semi-natural more fragile than plantations	Sheephonse Home Decoypond Shrubs	Romer & Gt Sea Runts Balmore					

\* subjective impression



Annex 3. Notes from Sir Ralph Verney on past management in Sheephouse Wood - 1981

Notes from Sir Ralph Verney  
1981

CLAYDON WOODS

In our heavy Oxford Clay oak trees grow rather slowly, and the optimum rotation is probably something like 200 years. But it has always been a struggle to get it right because of the fluctuation of demand and the ups and downs of firewood prices, the coppice market and the furniture and ship-building industries. There are two ancient oaks in the Park which Charles I was said to have looked at when he was searching for oak trees to build his navy - Edmund Verney was his Knight Marshal - No, Your Majesty, said his forester: they are past their prime. Though <sup>used</sup> ~~Bermuda~~ Forest was primarily reserved for hunting there was a thriving if sporadic demand for hazel coppice for hurdles and baskets, oak for firewood, building timber and furniture making and, of course, for charcoal. When Ralph Verney's estates were sequestrated by Parliament in 1649 and he had to go into exile in France his letters to his Steward at Claydon were full of concern that the trees in Maxwell Wood should be saved from the sequestrator's axe and the bucks from the sequestrator's hounds. And when he returned home in 1658 he brought with him walnuts from the Loire to adorn his policies, as his son John later brought cedars from Lebanon for the same purpose. Both are still evident for our enjoyment.

John Evelyn emphasized in his advice to the Royal Society what a pity it was that it was only when men got old that they began to realise the importance and satisfaction of planting trees: so that they never had the pleasure of seeing them in their maturity. There was little woodland planting at Claydon, like most other English estates, in the 18th century: the emphasis was on parkland and avenues and vistas: but the threat of Napoleon's invasion, like that of the Kaiser and Hitler, stimulated interest afresh in timber as a resource. In the mid-nineteenth century my Great Grandfather planted a lot of trees using Irish labour brought over by the great famine, and Paddy's land is still their memorial. My Father planted with acorns 6 acres of Runts Wood in 1915 as a gesture to the submarine menace: at the time he was Parliamentary Secretary in the Department of Agriculture in Asquith's Government. Those oaks are now having their second thinning after receiving an award from the RASE in the 1960s. And in 1942, in the midst of the second submarine menace, the sequestrators were again at Claydon, this time under the label of the Ministry of Supply, to requisition 100,000 cubic feet of oak to build Hurricanes for the RAF. We saved most of the Home Wood, but the whole

of Romer and Great Sea Woods were felled, and at the end of the War the tops still lay there a harbour for rabbits and impenetrable for anything else. The two quarters of the Home Wood which were felled were replanted with pure oak by prisoner of war labour, but there was no-one to weed them, and parts only have been successful.

Claydon Woods extend to about 600 acres, the largest block of privately owned woodland in North Buckinghamshire with the benefit, or drawback, of continuous management by one family for 500 years. When the Forestry Commissioner's Dedication Scheme was launched in the 1950s we entered into a covenant with them to dedicate to the primary use of silviculture 500 acres of our woodland heritage. This imposed on us land use constructions which we voluntarily and willingly accepted, and in return, under Basis II, we received grants for planting and maintenance and exemption from planning control so long as we managed our woods in accordance with the Plan of Operations agreed between ourselves and the Forestry Commission and revised every 5 years. Under the dedication scheme we received free and copious advice some of which we followed, but the difficulty about such advice, freely and generously and honestly given, is that Conservators and District Officers keep changing and each new officer has his own sincerely held ideas on how to deal with our wet, deep, cold clay with its enormous weed problem, perhaps silviculturally the most difficult soil in Britain on which to establish plantations, especially if the economists are allowed to contribute to decisions. I have always stuck to the view that oak was the proper indigenous tree for Claydon - hearts of oak in what Henry James described as midmost unmitigated England - and looking back over 40 years I am pretty well convinced that when I was over-persuaded to the contrary I was usually wrong. But I did accept in most cases that for economic reasons oak must have a nurse. I'm not sure now that even that was right, except that I instinctively reject monoculture in any form, and what a fool I should look if oak wilt ever attacked the English Oak, or Tony Benn became Prime Minister of England.

So I have tried to concentrate on the growing of oak trees on the majority of our 500 dedicated acres, some pure, some with conifer nurses of Scots or Corsican Pine or Spruce, and interspersed with larch or poplar where the ground seemed suitable; and in each wood I have left a small area of the old oak standards and hazel coppice as a reminder of what it used to be and a reservoir for the primroses and bluebells

and other beautiful things which will spread back to the rest of the wood as the nurses are removed and the canopy opened. Oak, once established, is wonderfully persistent and will fight its way through any amount of weed so long as its head is in the sun. The main enemies, apart from birch scrub which will outgrow it if allowed to, are honeysuckle, rabbits and grey squirrels. We have had partial failures from all four causes. The most difficult decision, as with most forms of forestry, is when and how heavily to thin: I think in almost every case I have left it too long because it is an expensive exercise with little if any return, and if you leave them alone nature in time will do the thinning for you. But this is a false economy because you lose so much important increment at a crucial stage of the tree's life.

It is exciting that there is a lot stirring just now in the field of the cultivation of oak, largely neglected by foresters for the last two generations because of the lure of the comparatively quick return on growing conifers, the foolish economist's myth that the theories of net discounted revenue are a proper guide to the growing of trees, and the assumption that quantity is more important than quality in a market where all wood will be pulped anyhow and then transformed by technology to look like plastic. The Hardwood Project, inspired by the late Lord Bradford, the experiments at Alice Holt in pot grown oak and weed control, the demise of the English Elm and the growing demand for firewood for wood-burning stoves, the hardwood supplement in the <sup>new</sup> great structure for private forestry and the growth of interest in our urban society in the conservation of nature are all producing a climate favourable to our greatest national tree so that those terrible years in the mid-sixties when the Forestry Commission, ruled by its benighted Forest economists, instructed its conservators to eliminate oak from its young plantations in the Midlands of England by spraying with 245T will be remembered as a hideous nightmare, and Hazelborough and ~~Bernwood~~ and ~~Salcey~~ and Rockingham will become deciduous again, teeming with bluebells and wildlife. I don't know whether Claydon can help in this return to sanity. Your survey will perhaps point a way.

RBV  
12 September 1981

#### Annex 4. Summary of 1986 butterfly survey.

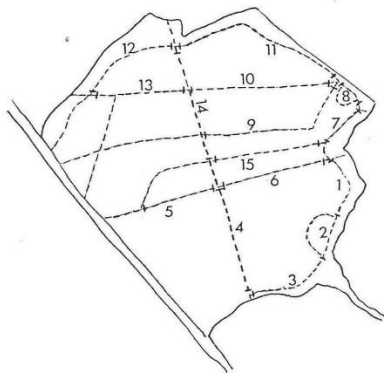
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#### CONCLUSIONS

22. The butterfly fauna of Sheephouse Wood was monitored by using the standard transect recording method.
23. 18 species were recorded in total, compared to 25 species recorded in the 1970's and 1981.
24. Poor weather and a limited period of recording may account for the lower number of species in 1986.
25. 7 species were recorded in over 50% of the rides. 6 species were only recorded as single individuals.
26. The recent management has affected the butterflies in the following ways:-
  - (i) The recently widened rides had more individuals than the untreated rides. The wider rides in general have a greater range of nectar plants which tend to attract the more mobile species.
  - (ii) The widened rides where standards have been left had fewer individuals than the widened rides without standards. The former rides may prove to be better habitats for some of the woodland species, e.g. white admiral, whilst the latter rides are predominantly grassy and provide a breeding habitat for some of the grassland species.
  - (iii) Group fellings along rides IO and II have produced sheltered bays although those along ride IO which are south-facing will probably be more favoured by butterflies than the north-facing bays in ride II. These bays have not had sufficient time to develop a diverse flora and therefore may be more valuable in a few years time.
  - (iv) Ride I5 at the edge of the clear-felled area had the highest number of species and individuals on the transect. 2 common grassland species, the meadow brown and small skipper accounted for 65% of the total number of individuals.
  - (v) The area of coppice-with-standards proved to be disappointing for butterflies. A high density of standards, Rubus dominated ground flora, and poor (shaded) access to the rest of the wood, are possibly factors accounting for the low number of butterflies.

- (vi) The glade alongside ride 8 provides a warm, sheltered habitat and should prove valuable in a few years time after further recolonisation.
- (vii) Ride cutting in early September is seriously reducing the number of nectar sources for the autumn butterflies. A later cut (late autumn) is recommended. It is also preferable to cut one side of the ride only, alternating the side from year to year.

FIG. I THE TRANSECT ROUTE IN SHEEPHOUSE WOOD



The photographs show the widening of section 5 in March 1985; flower-rich section 4 in July 2012; a shaded narrow ride, the westward extension of section 9 (taken in 1990)