

INFORMATION NOTE

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SUMMARY

Two new native woodland demonstrations were established within the National Forest using some of the principles described in Forestry Commission Bulletin 112. Lowland mixed broadleaved woodland with dog's mercury (W8) was planted at Desford, and at Barton-under-Needwood lowland mixed broadleaved woodland with bluebell (W10). Two areas were established at each site: in one an innovative design with spacing varying between 1.25 m and 5 m was used and the position of each species was mapped in advance; in the other the design was uniform with trees at 2 m x 2 m and species located at random during planting. Estimates suggested that there was little difference in the time required to establish each design although this will obviously vary with site conditions and complexity of the designs chosen. Planting trees and establishing tree cover represents the first phase in the creation of a new native woodland, which may take many years to develop successfully by invasion or introduction of other species.

INTRODUCTION

1. Recent years have seen a trend towards use of native species in new woodland plantings and Forestry Commission Bulletin 112 *Creating new native woodlands* by Rodwell and Patterson (1994) gives good guidance on how these species should be used.
2. Creating new native woodlands does not simply mean planting random mixtures of native species, it requires a more careful approach with thought being given to a wide variety of topics which are described in Bulletin 112.

These include:

- woodland design - the location and design at the landscape scale, species choice and use of natural colonisation, planting patterns;
- management practices - ground preparation, fertilisers, herbicides, grazing, modifying canopy structure;
- disturbed sites - farmland, reclaimed land, plantations;
- introduction of a field layer.

The practical difficulties that these topics present will be site specific and may arise at any stage. For example, in order to match the species with site characteristics, careful mapping may be necessary on

sites where topography, soils and moisture availability vary; in contrast, at some sites establishment may be adversely effected by the problems of locating random or widely spaced trees amongst vigorous weed growth.

3. To gain first hand experience in using some of the methods suggested in Bulletin 112, Forest Research established two trial areas within a series of demonstration woodlands in the National Forest. These are at Desford colliery near Leicester and Barton-under-Needwood, near Burton-on-Trent.
4. These trials were established to:
 - demonstrate some of the principles in Bulletin 112;
 - make comparisons of the times taken for initial establishment of two innovative and uniform designs both using the same mix of species;
 - provide two experimental sites where changes in ground flora and other components of the wildlife present can be monitored;
 - observe, in the longer term, whether novel planting patterns produce woodlands which differ substantially in structure from more traditional patterns.
5. The difficulties anticipated at these sites were: the design of woodlands which gave structural diversity on small, reasonably uniform areas of land; the transfer of these designs to the field; and the establishment of trees amongst the vigorous weeds at Desford.

WOODLAND TYPES

6. The sites demonstrate two of the woodland types found in lowland Britain and were chosen on the basis of soils present and the climate of the area.
7. At Desford the site is beside a colliery spoil tip and is a neglected agricultural field with a heavy, moisture-retaining soil which supports a luxuriant growth of rank grasses: NVC W8 ash–field maple–dog’s mercury woodland was judged appropriate for this site.
8. At Barton-under-Needwood the site was, until recently, rough grazing beside a canal and has a well-drained brown soil overlaying sands and gravel, and an oak–bracken–bramble, NVC W10 woodland was selected.

SPECIES

9. The original species lists for these woodland types given by Rodwell (1991) contain more than 20 species of broadleaved trees and shrubs. However, most of the species chosen for Desford and Barton were from the more restricted lists of major and minor trees and shrubs found in Bulletin 112. No attempt was made to use all species.
10. The principle adopted was to plant large numbers of the major recommended species and small numbers of the minor recommended species (Table 1).
11. In order to maintain variety, the mixtures and proportions of species should vary between sites.

Table 1 Species planted at each site

Desford		Barton	
Lowland mixed broadleaved with dog’s mercury (NVC W8)		Lowland mixed broadleaved with bluebell (NVC W10)	
Major species	%	Major species	%
Trees		Trees	
Ash	47	Oak	42
Oak	32	Birch	31
Field maple	11		
Shrubs		Shrubs	
Hazel	2	Hazel	5
Hawthorn	2	Hawthorn	5
Minor species		Minor species	
Shrubs		Trees	
Elder	2	Rowan	3
Sloe	2	Holly	3
Privet	2	Hornbeam	3
		Aspen	1
		Ash	2
		Field maple	1
		Shrubs	
		Gorse	3
		Elder	1

12. Although these species will form the woody component of a new native woodland it may take many years before the site approaches a natural state with other herbaceous plants, insect, mammal and bird species typical of native woodlands. This may be accelerated by introducing species (e.g. planting appropriate flowers) or by siting new native woodlands alongside existing native woodlands. Further information about these aspects of woodland creation can be found in *The ecology of woodland creation* (Ferris-Kaan, 1995).

PLANTING DESIGN

13. A range of new planting designs is suggested in Bulletin 112. This includes variation in: the species composition of clumps; size and location of clumps; spacing in adjacent clumps; spacing within clumps; size of gaps between clumps; and size and location of larger open areas. Demonstration of some of these designs, such as size and location of both clumps and larger open areas, requires a large amount of space and was incompatible with the areas available at Desford and Barton. In addition some of the designs are difficult to achieve within the open space and stocking requirements of the Woodland Grant Scheme (Anon., 1994). In each of these demonstration woodlands the option to plant trees in patches with different stocking densities was selected.
14. At both Desford and Barton the sites were split into two parts; one was planted with trees at a uniform 2 m x 2 m spacing, the other using the novel design with trees planted at three different spacings.

DISTRIBUTION OF SPECIES

15. The innovative designs were planted with the trees in single species plots 5 m x 5 m square at 1.25, 2.5 and 5 m spacing, giving 25, 9 and 4 trees per plot. The woodlands were designed to give two areas of dense planting grading out to the areas of wide spacing, with mixtures of species within each area. Shrubs were planted in patches throughout. The position of each plot of each species was drawn on a planting plan which was transferred to the field using three planting lines that were moved systematically across the site as planting progressed. Two lines were laid parallel 25 m apart, the third was laid across these. The planting lines were marked at 1.25 m intervals and the

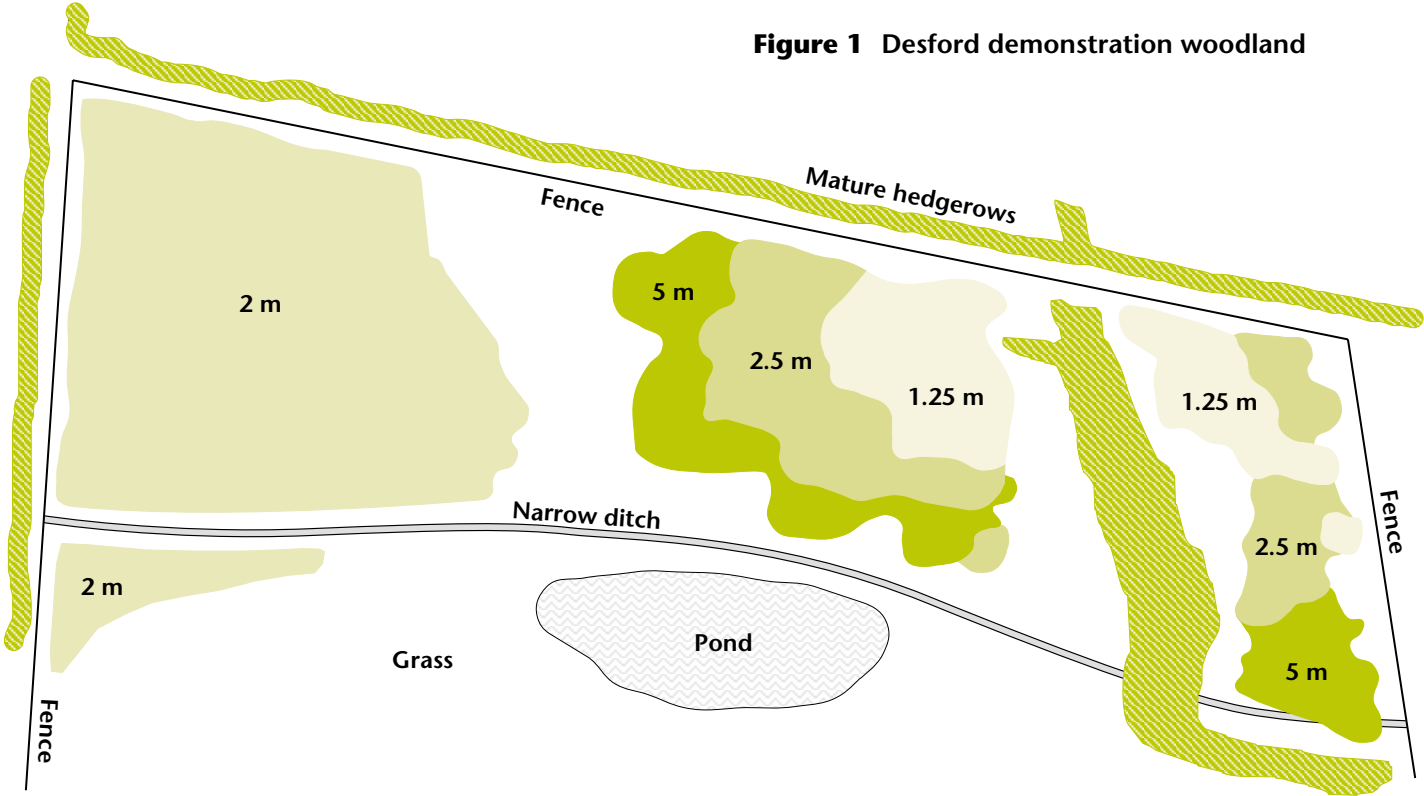
different spacings within each species plot were achieved by planting along the cross line which was moved to the appropriate position on the parallel lines. Minor canopy and understorey trees were planted in patches throughout.

16. There was no detailed planting plan for the area of uniform planting: all tree and shrub species were planted in irregular groups randomised on site using the bead method described by Helliwell (1993). The species planted were represented by coloured beads. At each site the number of beads of each colour was equivalent to the number of groups of each species being planted. The beads were mixed within a secure carrier and withdrawn one at a time to determine the order in which groups of each species were planted across the site. Major species were planted in groups of 20 and minor species in groups of 7.
17. The same proportions of each species were planted in the two designs.
18. The trees were planted in single species groups to allow for mortality during establishment and enhance the probability of any species surviving until the woodland matures and natural successional changes are initiated.

DESFORD

19. About 1 ha was planted at Desford, half of which was at variable spacing (Figure 1). The ground slopes gently towards a ditch at the south and is bounded on the west and north by a hedge. The area planted at uniform spacing was at the west of the site. The design with variable spacing was divided by a mature hedge of hawthorn, blackthorn, elder and wild rose. Between the two designs a very wet area of grass was left unplanted. In addition, small groups of aspen, willow and alder were planted to the north of the pond.
20. The site was very difficult to plant as a dense mat of vegetation had accumulated during the years of neglect and most planting spots required screefing. Weed growth was very vigorous and wide spaced plants in the innovative design were often difficult to find. Weed control was carried out on four occasions during the first year. The entire site was rabbit fenced and trees were protected with vole guards.

Figure 1 Desford demonstration woodland

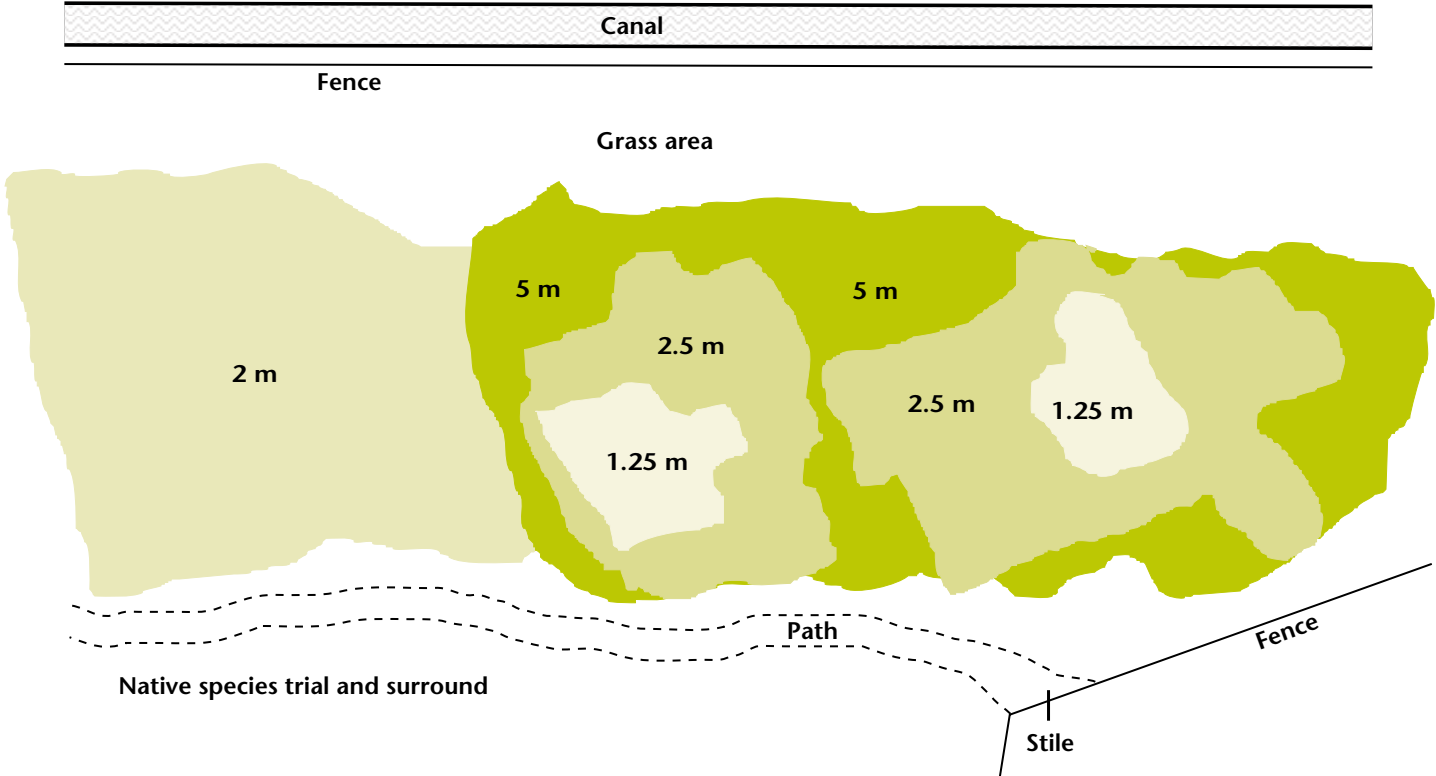


BARTON

- 21. The site is bounded by the Trent and Mersey canal and other experimental areas (Figure 2).
- 22. The flat site and grazed sward made Barton much simpler to plant than Desford but, despite fencing and active control, rabbits from a warren on the woodland

boundary have been a problem. Three applications of herbicide were made in the first season and trees were protected by vole guards.

Figure 2 Barton-under-Needwood demonstration woodland



DISCUSSION

23. Bulletin 112 contains information on a variety of features which should be considered when creating new native woodlands, giving guidance rather than explicit methods which can be used routinely. This requires the user to be imaginative, think carefully about each woodland, and consider a wide range of features including: appropriate woodland type; the proportions of suitable species and their distribution across the site; planting densities and patterns; and the practicalities of establishment.
24. For this study the sites were small, fairly uniform and selection of the appropriate woodland types and species to use was not difficult. However, this may not be true of other sites which have a lot of small scale variation in environmental characteristics.
25. The innovative design aimed to create structural diversity across the site and early observations suggest that it will be successful as the dense areas of birch are already prominent features of the young woodland.
26. The anticipated problems in transferring the innovative design to the field were unfounded and although it was harder at Desford than Barton, locating the plots was not too difficult. The coloured bead technique to randomise groups was simple to use. Weeds did give the problems expected at Desford and maintenance has been costly.
27. Estimates suggest that although the time taken to plant and establish a tree at Desford was twice that at Barton, which was caused by the need to screef and for repeated applications of herbicides, there was little difference between the innovative and uniform designs at each site.
28. The amount of time required for design and management is difficult to quantify as it will depend on factors such as existing knowledge, practical experience, and complexity of the site and design chosen. It is likely to decline as experience is gained.
29. Whether these complex designs have long-term advantages over simple mixtures planted using traditional designs will only become clear as more are established and their growth and development monitored.

ACKNOWLEDGEMENTS

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