iii. Spread of introduced species

Non-intervention allows naturalised trees and shrubs to spread, notably sycamore and rhododendron. Except in the few minimum intervention reserves where the target composition is agreed to be future-natural (section 3.3), naturalised species will be unwelcome. The most straightforward and best response is to exterminate unwanted species as part of set-up management (Section 5.1) and control any re-colonisation as part of permitted interventions.

Non-native ground flora and bryophytes may also spread into unmanaged woodland, eg *Impatiens glandulifera, Vinca minor, Gaultheria procumbens*, though there is no reason to believe such invasions are any commoner in minimum intervention reserves than in managed woodland. In practice, there is little one can do about well-established populations, though one can select sites which are free of introductions, and react quickly to eliminate any that arrive.

Non-native fauna may also be an issue. Deer have already been discussed (above). Domestic and semi-domestic stock may be used in minimum intervention reserves treated as wood-pasture (section 3.4). Otherwise, the responses match those for plant species: eliminate the big ones, like mink, and accept that little can be done about the small ones. Interesting issues will arise if wild boar colonise: these can legitimately be regarded as part of the original-natural forest ecosystem, but like deer their numbers might need eventually to be controlled. Likewise, if beaver are re-introduced, it would be appropriate to have them within an minimum intervention floodplain forest reserve.

iv. Source of disease or costs in management

Fears that an abundance of dead wood can generate insect or fungal infections in adjacent commercial woodland are real enough in some climates, but do not seem justified in Britain, except in the Highland pinewoods (Winter 1993). There is some evidence of large fires starting naturally in Glen Tanar native pinewood during the 19th century, but that seems to be the exception, not the rule.

A more realistic concern may be that a mature stand will attract rookeries or excessive numbers of pigeons, which then descend on nearby fields. However, there is no reason to think minimum intervention reserves would be worse than mature managed stands.

v. Loss of historical meaning

Tree forms provide clues from which the history of a stand can be deduced (Rackham 1986). These will vanish eventually, though several centuries may have to elapse before the last standard oaks or pollard beeches die in a minimum intervention reserve. This is undoubtedly a loss, but in most circumstances it is inevitable, and would happen just as surely in managed woodland. The principal exception is the survival of pollards, which can be regularly pollarded and kept free of competing trees, and thus survive much longer than they would in a minimum intervention reserve. The only recourse would be to select the wood as a wood-pasture minimum intervention reserve, but even there the failure to pollard would result in the break-up of the tree within 200-300 years.

Other features, such as boundary banks and pits, will waste away slowly where they have been formed from sandy soils, but will otherwise survive indefinitely. They would be damaged when trees growing on them are tipped over by a storm, but that is unlikely to obscure the feature completely. Archaeologists take the view that trees damage ancient monuments, particularly large trees that would disrupt buried strata and the form of the monument if they blew down. The best recourse is evasion: avoid selecting a wood on a major monument, such as a wooded hill fort, as a minimum intervention reserve.

9.2.3 Damaging perceptions

Some people see minimum intervention reserves that have attained a near-natural structure as untidy or dangerous. There should be no surprise at this: disorientation has been one of the standard responses to wild woodland, and this will frighten some visitors These antagonistic attitudes are shared by very few ecologists, but they are real enough. In fact, they may well be frequent in the general public (who mostly come from towns), farmers (who generally seem devoted to control and rectilinearity in the countryside), and timber growers (who may see minimum intervention reserves as a negation of their profession).

Three kinds of response come to mind:

- Post an explanation and warning at the entrance. Explain the purpose of the reserve and advise against entry or walking off the path.

- Point out that the minimum intervention reserve is a demonstration of wild conditions, which allows people to appreciate the advantages of the safe, controlled, usually urban or sub-urban environment where they live. Natural woodlands are far less dangerous and disorienting than some parts of the urban jungle.

- Allow no paths through the minimum intervention reserve, or decide to keep paths clear and well signposted.

10. Recommendations

1. Establish a core set of 50-60 minimum intervention woodland reserves in GB. These would broadly conform to type IIa, ie inherited naturalness, high forest model (section 3.5). At a mean area of 50ha, these would cover up to 3000ha.

2. The principal objectives for these reserves should be (i) to increase understanding of natural woodlands; (ii) to provide guidance for near-to-nature forestry; (iii) to provide reference points for measuring human impacts on woodland and other land, (iv) to maintain locations for monitoring widescale environmental change free from direct influence, and (v) to demonstrate these points to ecologists, foresters, and others. The benefits of minimum intervention reserves for nature conservation and cultural activities should be regarded as secondary, because they can be provided by suitable treatments in managed woods.

3. Selection of minimum intervention reserves should aim to represent the range of native woodland types and to generate a reasonably even geographical spread (section 4.1).

4. The selection of individual woods for inclusion in the core set should be made in accordance with criteria that (i) maximise immediate and long-term value as minimum intervention reserves and (ii) minimise the disadvantages of minimum intervention woods. In the interests of ensuring that minimum intervention reserves are immediately useful for their main objectives, preference should be given to sites that already approximate to old-growth, near-natural characteristics, and have a history of recording (section 4.2).

5. This core set should have a distinctive designation, such as 'strict nature reserve' or 'research natural area' (section 8.2).

6. Supplement the core set with (section 4.3):

   - Restoration reserves, ie type Ia. These would be in woodland types that do not have examples in the core set that approximate to original-natural composition.

   - Future-natural reserves, ie type IIIa. These would be a limited number of old-growth stands with well-established naturalised tree populations.

   - Conifer old-growth reserves. A limited number of reserves in planted, non-native conifer stands.

7. Establish wood-pasture equivalents of inherited-natural reserves, ie type IIb. Many of these will be existing wood-pastures under conservation management.

8. Decision rules relating to stand composition should be agreed for each reserve by reference to the concepts of original-, inherited- and future-natural (section 3.2). This will decide which tree and shrub species can be retained, evicted, re-introduced and/or allowed to colonise. Most reserves should be assigned to the inherited-natural composition category.

9. Management of minimum intervention reserves (chapter 5) should be in accordance with a 'code of practice', which should include reference to decisions on which type of naturalness is sought. Managers of individual reserves should interpret the code of practice in their particular circumstances.

10. Baseline monitoring on long-term change should be started and maintained in each reserve (section 7.5). This would provide a check on the state of the reserve, collect data on natural processes and states, and provide background information for the interpretation of research within the reserve.

11. Mature habitats should be developed and maintained in the generality of GB woodland, including large trees, complex stand structures, and high deadwood volumes. These should generally be achieved within managed stands, but small minimum intervention inclusions should be included if practicable (chapter 6).

12. The concept of very large minimum intervention reserves should be developed in respect of (a) already well-wooded countryside, and (b) reconstructing natural floodplain forests (section 4.4).

13. Consideration should be given to compiling an inventory of old-growth stands (section 4.5)

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Annex. Current opinion

In an effort to sound out current opinion about the value, selection, management etc. of minimum intervention reserves, a standard letter was sent to 40 people (listed below) who were known or believed to have some interest in and responsibility for this matter. The standard letter ran as follows:

> Invitation to comment: MINIMUM INTERVENTION RESERVES IN WOODS
>
> English Nature is considering establishing a series of minimum intervention sites across a range of woodland types, partly because of commitments in various Habitat Action Plans. As part of this initiative, I have been asked to prepare a review of the concept, the benefits and drawbacks, links with long-term surveillance and research, and other issues, taking into account the views of many organisations and individuals. Accordingly, this circular is being sent to 30-40 individuals as an invitation to comment.
>
> Briefly, minimum intervention sites are woods which are left to develop as naturally as possible. They are commonly described as 'non-intervention', but complete exclusion of human influence is impossible, and usually undesirable. Minimum intervention reserves come in two forms (i) substantial woods of, say, 20ha or more, and (ii) small stands within woods which are otherwise actively managed.
>
> Minimum intervention reserves have several possible benefits:
>
> - for research on natural woodland characteristics and processes;
> - as reference points or controls for comparison with managed land;
> - for monitoring some aspects of environmental change, free of direct human influence;
> - as guidance for foresters who are attempting to manage woods as naturally as possible;
> - for nature conservation, particularly the species of mature timber and old-growth forest;
> - as cultural reference points, exemplifying wilderness;
> - as demonstrations of ecosystem recovery (eg Broadbalk wilderness).
>
> On the other hand, minimum intervention reserves have drawbacks. For example, they may exclude the open space habitats associated with managed woodland, and extinguish historic features, such as tree forms developed within traditional management.
>
> We would welcome any comments on any aspect, but particularly on your specialist interests and responsibilities. The concept itself may be questioned. Your views on the benefits and drawbacks would be particularly useful. Any observations or experience of the practicalities would help. A response by the end of October would be most useful, as I plan to complete the report in November 1999.
>
> Yours sincerely
>
> G.F.Peterken

Recipients (* response received):

*Keith Alexander, NT
Peter Buckley, Wye College
*David Bullock, NT
*Dave Burton, EN Langley Wood
*Nigel Cooper,

*Fred Currie, FA
Richard Ferris, Forest Research
*Vikki Forbes, National Trust
*Rob Fuller, BTO
*Chris Gardiner, EN Monks Wood

*Ted Green
Barrie Goldsmith, UCL
*John Good, ITE Bangor
*Paul Hackman, EN LPW
Kate Holl, SNH

Jonathan Humphries, Forest Research
Richard Johnston, RSPB Edinburgh
Roger Key, EN
*Jim Latham CCW
*Rod Leslie, FE

Maurice Massey, EN
*Mike Moorcroft, ITE Wytham
*Doug Oliver, CCW
*Phil Page, EN Yarner
*Terry Parr, ITE Merlewood

Gordon Patterson, FA
Robert Petley-Jones, EN Gaitbarrows
Simon Pryor, Oxford Forestry
Oliver Rackham
*Alan Rayner, Bath University

*David Russell, NT
*Neil Sanderson, British Lichen Society
*Ken Smith, RSPB Sandy
*Richard Smithers, Woodland Trust
Martin Speight, Oxford University (or Clive Hambler)

*Jonathan Spencer, FE, New Forest
*Tom Wall, EN
Martin Warren, Butterfly Conservation
Tony Whitbread, Sussex Trust
Ray Woods, CCW

Responses

There was a good deal of support for minimum intervention reserves and some explicit support for the formal recognition of a series of such reserves, but tempered by substantial doubts about their value in a landscape where human influences cannot be excluded and the reserves cannot be complete natural ecosystems. Those who saw value in the concept supported the benefits for research into natural processes and environmental monitoring. The nature conservation benefits perceived related to particular groups of species, especially those associated with dead wood, and the value of minimum intervention stands as a form of diversity within individual woods and larger landscapes.

Many useful points were made in relation to monitoring, research, management and the selection of minimum intervention reserves, most of which are incorporated within the main body of the report. Some helpful confirmations of the value of such reserves were expressed. In addition, some important general points were made, and these are summarised below:

1. The need to define concepts of Minimum Intervention and Natural Woodland

Several respondents implied through comments or questions about the role of large herbivores, the absence of large predators, the treatment of exotic species, and the effects of fencing round woods in a pastoral matrix, that the concepts needed to be clarified. Many expressed scepticism about the value of minimum intervention reserves, due to uncontrollable influences from outside, or the absence of important components of natural woodland. Two respondents emphasised that minimum intervention must be seen as a process, not a particular state.

Comment: Defining the concepts is one objective of this report. Several respondents seemed to be assuming that minimum intervention should equal natural woodland, which is hardly likely to be the case in modern circumstances. Minimum intervention reserves are useful if we can get reasonably close to natural.

2. Determining the role of grazing and browsing in natural woodland

Several respondents said that grazing and browsing by large herbivores should be regarded as part of natural woodland. This has direct implications for the character of natural woodland, and in particular its stand structure and amount of open space habitats. On the basis that natural woodland would have included a good deal of 'wood-pasture', minimum intervention reserves should be retained as or developed into this form of woodland.

Comment: This is becoming a key debating point in forest ecology and conservation. The report aims to accommodate the diversity of views and the uncertainty about the impact of large herbivores in natural woodlands. The evidence on this point needs to be thoroughly reviewed.

3. The need for large scale reserves

The most frequent comment related to the desirability of establishing really large scale minimum intervention reserves, accepting that space could be found for very few. The Whitbread-Jenman paper of 1995 seems to have made quite an impression! This point was related to further comments on the value of buffer zones, the need to link existing smaller sites, the role of minimum intervention reserves in the wider landscape, accommodating large herbivores, and the selection of a variety of existing conditions as minimum intervention reserves.

Conversely, views of the value of small minimum intervention patches within managed woodland varied from those who thought they were pointless to others who saw them as useful factors in habitat diversity.

Comment: The strong sentiment towards fewer, larger minimum intervention reserves, and the disagreements about the value of very small minimum intervention stands, were both couched in vague terms. There is a need to quantify, and to define what is meant. Nevertheless, an interestingly new picture emerged of a set of, say, five minimum intervention reserves of several 100s or 1000s of hectares each, rather than a set of 50 reserves of perhaps 30-100ha each.

4. Minimum intervention as part of a spectrum of conservation treatments

It was stated or implied many times that minimum intervention reserves would/should only form part of a range of treatments, if only because management is necessary to minimise damaging trends (such as invasion by exotics) and maintain some conservation values (open space habitats). Jim Latham came up with the interesting idea of a range of different degrees of intervention.

Comment: I think this has long been generally accepted, though there are people who react as if we are proposing that every wood be treated as a minimum intervention reserve.

General comment

The exercise has usefully demonstrated widespread support for minimum intervention reserves, but many points for debate on their character, size and purpose. Opinion amongst specialist conservationists was well covered, but I have my doubts that scientific and wilderness values were properly covered, or that sufficient thought has been given to the value of minimum intervention reserves as reference points for timber growing.