Biodiversity in the New Forest

Edited by Adrian C. Newton

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Dedicated to the memory of
Muriel Eliza Newton (1929–2009),
who loved the New Forest,
especially the donkeys.

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Back cover: Wood Crates (Adrian Newton)

The maps in this book are for illustrative purposes only, and do not represent the legal definition of National Park boundaries or any other feature

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20 Synthesis: status and trends of biodiversity in the New Forest

Adrian C. Newton

Introduction

The preceding chapters provide an overview of biodiversity in the New Forest, focusing on the current status and trends in species of conservation concern, and the habitats with which they are associated. A brief overview is also provided of current management approaches and future challenges. The aim of this chapter is to integrate some of the information presented by previous authors, and thereby to identify any cross-cutting issues that emerge, with the aim of informing future management decisions. The chapter does not claim to provide a comprehensive, integrated analysis of biodiversity in the New Forest, but rather offers a personal perspective on some of the issues raised by other authors. Similarly, no attempt is made to provide a detailed, critical evaluation of current management approaches. Rather, some suggestions are made regarding how such approaches might develop in future, based on an exploration of available evidence.

The chapter first assesses the importance of the New Forest for biodiversity, and then considers current trends in the status of particularly notable species and habitats, with the aim of identifying any common issues or themes. Information needs are then highlighted. The implications of current biodiversity trends for management of the New Forest are also considered, with reference to some of the management approaches that are currently being employed. It should be emphasised that no attempt is made here to identify a consensus of opinion among the contributors to this volume. As became clear during the conference on which this book is based, the New Forest provides a rich topic for debate, and is the subject of a wide variety of opinions, some of which are strongly held! The comments provided here represent an individual perspective, which is offered in the hope of encouraging further dialogue. Such debate has perhaps been something of a tradition in the Forest.

Importance of the New Forest for biodiversity

Many authors have suggested that the New Forest is of exceptional importance for biodiversity. Chatters and Read (2006), for example, describe the Open Forest as being '*one of the richest places for wildlife in Europe and one of the best wetlands in the world*'. Ratcliffe (in Tubbs 2001) describes the New Forest as '*the most important single wildlife area in southern Britain*'. In the light of evidence presented in the chapters of this volume, can these claims be sustained? The answer is a resounding 'yes'.

The most comprehensive assessment of the conservation importance of the New Forest is provided by the SAC Management Plan (Wright and Westerhoff 2001), which provides the following description: '*The New Forest candidate SAC is one of the most important sites for wildlife in the United Kingdom, and is widely recognised as being of exceptional importance for*

Table 55
Comparative evaluation of New Forest habitats of nature conservation importance. This highlights the comparative status of some of the features for which the New Forest has been designated in terms of their international and national context.

Vegetation type	Internationally important	Nationally important	Significance of the New Forest for site feature
Pasture woodland	Yes *	Yes	Outstanding
Riverine woodland	Yes	Yes	Outstanding
Bog woodland	Yes *	Yes	Outstanding
Inclosure woodland	No	Yes	
Dry heath	Yes	Yes	Outstanding
Wet heath	Yes	Yes	Outstanding
Mire	Yes *	Yes	Outstanding
Dry grassland	No	Yes	Outstanding
Wet grassland	Yes *	Yes	Outstanding
Temporary ponds	Yes *	Yes	Outstanding
Permanent ponds	Yes *	Yes	Outstanding
Streams	No	Yes	Outstanding

Internationally important refers to SAC/SPA/Ramsar designations. **Nationally important** refers to the SSSI designation. The national significance of the habitats given in the final column summarises the national evaluations for key habitat groups undertaken by English Nature.
* Does not include all plant communities within this vegetation type. Adapted from Wright and Westerhoff (2001).

Table 56
Importance of the New Forest for different groups of species.

Species group	Internationally important*	Nationally important*	Significance of the New Forest at national scale**	Number species of conservation concern	Estimated total number of species recorded in the New Forest	New Forest species richness expressed as a % of total number of species in Britain	Comments made by Tubbs (2001)
Birds	Yes	Yes	Outstanding; particularly important for breeding waders, raptors, heathland and woodland communities	37*	Approx. 100‡	17%	Generally rich; exceptionally rich in woodland birds
Mammals other than bats	No	Yes	Species present of conservation importance include dormouse, otter and water vole	3*	19*	35%	Small mammals generally scarce
Bats	No	Yes	High species richness; may contain significant populations of Bechstein's and barbastelle bat, two of the rarest bats in Europe	13	13	81%	Outstandingly rich; possibly the most important area in Britain
Reptiles and amphibians	Yes	Yes	One of the most important areas in the UK. High species richness; particularly notable species include smooth snake, sand lizard and great crested newt	12	12/13	92%	All but one of native British species present
Fish	No	Yes (probably)	Fairly high species richness, possibly of national importance	>2*	22	88%	–
Invertebrates	Yes	Yes	Nationally significant	544*	5,000–10,000†	17–33%†	>50% of all British insects present
Dragonflies and damselflies			A national hotspot for diversity	9	31	69%	73% of British species present (breeding)
Saproxylic beetles			One of the richest parts of Britain, and of European significance	53	326#	55%#	Exceptionally rich
Butterflies and moths			Outstanding national importance	72 RDB and 192 NN	1,488 (of which 33 are butterflies)	66%	55% of British species recorded
Other invertebrates			Exceptionally rich invertebrate fauna, at least in woodlands	403* including Coleoptera, Hymenoptera, Diptera, Orthoptera, Hemiptera, Crustacea	1,539 Coleoptera†, 22 Orthoptera†, 296 taxa of macro-invertebrate recorded from Forest streams		47.5% of British Coleoptera recorded and >67% of British Orthoptera. Largest British assemblage of Diptera known
Vascular plants	Yes	Yes	Nationally and internationally important, but perhaps not of exceptional importance at the international scale	72 RDB, 43 nationally rare or scarce	Approx. 540*	36%	At least 46 internationally or nationally rare species present
Lichens	Yes	Yes	Outstanding international importance	64 RDB, plus 78 other species of conservation interest	421	18%	Outstanding
Fungi	Yes	Yes	Of the highest importance nationally, and of high international importance, at least for some fungal groups (e.g. beechwood saprotrophs)	89*	2600	22%	Outstanding
Bryophytes	Yes	Yes	One of the best areas in lowland England for bryophytes	33*	326*	32%	Outstanding

Internationally important refers to SAC/SPA/Ramsar designations. **Nationally important** refers to the SSSI designation.
** Based on information in preceding chapters, and the national evaluations for selected groups undertaken by English Nature reported by Wright and Westerhoff (2001). *Based on information provided by Wright and Westerhoff (2001). † Data from Tubbs (2001). ‡ Data from http://www.newforestexplorersguide.co.uk/. # SQI species only (see Chapter 5). RDB, Red Data Book; NN, Nationally Notable.

nature conservation throughout the European Union. It supports a complex mosaic of wildlife habitats, formerly common in lowland western Europe but now rare and fragmented. The major components are the extensive wet and dry heaths with their rich valley mires and associated wet and dry grasslands, the ancient pasture and enclosed woodlands, the network of clean rivers and streams and frequent permanent and temporary ponds. Outstanding examples of thirteen habitats of European interest are represented together with two priority habitat types, namely bog woodland and riverine woodland.'

The reasons for designation of the New Forest SAC include a range of both habitats and species (Appendix), many of which are considered in preceding chapters. As described in Chapter 1, part of the New Forest is also designated as a Special Protection Area (SPA) on account of its bird populations. The New Forest is also designated as a Ramsar site, because it possesses the largest concentration of intact valley mires of their type in Britain. The justifications for such designations provide powerful evidence of the importance of the biodiversity of the New Forest, at both national and international scales (Table 55). However, as is made clear by Tubbs (2001) and by Wright and Westerhoff (2001), it is not just the presence of such habitats that is important, but their occurrence in an intimate mosaic.

With respect to individual groups of species, the preceding chapters again repeatedly emphasise the conservation importance of the New Forest. For all of the species groups considered, the New Forest is of national importance, and for many, it is also of international importance (Table 56). The species richness of many groups is high, sometimes exceptionally so. For example, more than two thirds of the British species of reptiles and amphibians, butterflies and moths, fish, bats, dragonflies and damselflies are found in the New Forest (Table 56). Even for those groups that are less well represented, at least one sixth of all British species have been recorded in the area. In every group considered, the New Forest is home to species of national conservation concern, and in some groups, the numbers of such species is very substantial; for example 155 vascular plants, 264 butterflies and moths, and 142 lichens (Table 56).

Status and trends in the biodiversity of the New Forest

One of the observations that stimulated the production of this book was the comment made by Colin Tubbs in his classic account of the area, that 'the biodiversity of the New Forest is now diminishing rapidly' (Tubbs 2001, p.365). Is this suggestion supported by the evidence presented in the preceding chapters? This question is considered below with respect to both habitats and species. Reference is also made to the threats (or threatening processes; Balmford *et al*. 1998) responsible for causing the decline and loss of species and habitats. Effective biodiversity conservation depends on a thorough understanding of such threats. Here, the principal threats to biodiversity in the New Forest are briefly considered, based on the evidence presented in previous chapters.

Trends in habitat condition

Chapter 12 presents an overview of the current condition of habitats in the New Forest, based on the Common Standards Monitoring (CSM) approach conducted by Natural England. As is made clear in current management plans for the New Forest (Forestry Commission 2008, Wright and Westerhoff 2001), the CSM forms the basis of habitat monitoring in the Forest. Formal monitoring using this approach has only been undertaken in recent years (principally the last decade), and therefore the data have limited value for assessing recent trends in habitat condition. However, the results do provide an indication of the current status of habitats in the New Forest.

Current results indicate that 463 units (out of 576) are in unfavourable condition (including 366 unfavourable recovering, 75 declining, 20 no change, and 1 partially and 1 totally destroyed). This represents 80% of units, or 68% expressed as a percentage of the total area (see Chapter 12). For 114 of the 463 units in unfavourable condition, no information was provided on the reasons for the condition being unfavourable. For those units for which data are available, the reasons for the condition being unfavourable provide an insight into the main threats currently affecting New Forest habitats. Results indicate that the threats differ between habitat types. In dry heathland and grassland habitats, the principal threat is overgrazing, although inappropriate scrub control is also a significant factor (Table 57). In wet heathland, wet grassland and mire habitats, the principal threat is drainage. In woodland habitats, inappropriate forestry or woodland management practices are the principal threat, although drainage is also a significant factor accounting for unfavourable condition. In none of the habitats is public access or disturbance cited as a significant factor (Table 57).

Trends in species

One of the issues repeatedly raised by the authors of preceding chapters is the lack of systematic survey and monitoring data. As a result, it is difficult to ascertain the trends in abundance of individual species or species groups with any precision. However, the available evidence indicates that at least 170 species have been lost from the New Forest in recent decades. This estimate is necessarily uncertain; many species are difficult either to locate or to identify, and might be rediscovered by future survey work (see, for example, Chapter 9). On the other hand, this estimate might be conservative, as information on many species groups (particularly the most speciose) is lacking. The number of species that have been extirpated varies between different groups; losses of butterflies and moths are particularly high, but significant losses also appear to have occurred in lichens, saproxylic beetles and fungi (Table 58). A number of other species appear to be

Table 57
Assessment of threats to habitats in the New Forest, based on results of Common Standards Monitoring (CSM) assessments (see text), accessed in August 2008. The threat data represent the reasons cited for unfavourable condition given in the CSM assessments. Values presented are percentages of the total area classified as in 'unfavourable condition' (including unfavourable recovering, unfavourable declining, unfavourable no change, and partially or totally destroyed). The values are based on the assumption that the adverse conditions listed affect the whole unit area, but excluding the 114 units for which no information was provided. Only the main threats are included (i.e. affecting 20% of one or more habitats), although 'Public access/ disturbance' is also included for comparison.

	Habitat type			
Threat	**Dry heathland and dry grassland**	**Wet heath, wet grassland and mire**	**Pasture, riverine and bog woodland**	**Inclosure woodland**
Forestry and woodland management	3.17	0.73	35.3	45.4
Overgrazing	39.7	0.02	1.79	–
Inappropriate scrub control	34.2	11.5	10.5	–
Drainage	0.19	43.6	17.3	30.2
Public access/disturbance	0.72	–	–	0.42

Table 58
Declines and losses of different species groups in the New Forest, and associated causes (threats). Based on information presented in preceding chapters, except where indicated by asterisk, which indicates that the information was sourced from Wright and Westerhoff (2001).

Species group	Trends	Threats
Birds	At least three species lost during the last century. While some species (such as nightjar and woodlark) are stable or increasing, others (such as Dartford warbler, snipe, curlew and redshank) are declining.	Species losses attributable to habitat loss and possibly climate change. Causes for declines in species often unclear, but may include inappropriate habitat management (e.g. Dartford warbler, sparrowhawk), disturbance from human recreation (e.g. ground-nesting birds), climate change, nest predation (e.g. Montagu's harrier).
Bats	No evidence of species losses. Insufficient data to determine trends.	Some forest management interventions may be negative (e.g. tree felling and holly pollarding). Possible disturbance from recreation.
Reptiles and amphibians	One extinction of a native species (natterjack toad). Sand lizard lost but reintroduced.	Common toad declines may be caused by fungal disease. Inappropriate heathland management (burning) responsible for loss of sand lizard. Main threat to reptiles is inappropriate heathland management.
Fish	No evidence of losses. Insufficient data to determine trends.	History of catchment modification and drainage likely to have had negative impacts on fish populations, but evidence limited. Current management interventions including woody debris accumulation in streams and physical modifications to stream channels can have both positive and negative effects. Tree clearances in some reaches have caused elevated water temperatures and invasion of instream plants where none existed previously.
Invertebrates		
Dragonflies and damselflies	One extinction. Some evidence of historic declines in some species; others appear stable.	Drainage actions and scrub development responsible for species loss.
Saproxylic beetles	At least five species believed to be extinct; 27 further species not reported in past 25 years. Insufficient data to determine trends, although some species appear to have declined.	Extinctions caused by scrub clearance, and forestry / commoning activities involving the felling of large, old trees.
Butterflies and moths	General decline of many species in recent decades; 124 species believed to have been lost.	Increased levels of herbivore grazing and browsing, particularly in the Inclosures, leading to a loss of structural diversity and food sources. Greater intensity of management for grazing (burning, reseeding, scrub clearance). Direct destruction of habitat caused by forestry operations (e.g. conifer planting, surfacing of rides in Inclosures). Economic pressures driving land use at the Forest margins (e.g. urban development, pony paddocks, lack of support for traditional woodland management).

Table 58 ... continued

Species group	Trends	Threats
Other invertebrates	Insufficient data to determine trends. Some extinctions are likely to have occurred as many rare species have not been recorded for a long time, e.g. New Forest cicada may now be extinct. Groups such as Orthoptera appear to have undergone significant declines.	Changes to the grazing regime and management of the heaths and woodlands are likely to have had a detrimental affect on many insect species and their habitats. Increase in grazing intensity since the 1960s is a particular issue, especially in Inclosures. The intensification of farmsteads within the Forest and the loss of small rotationally managed fields must also have been negative in the Forest, as throughout the wider countryside. "Improvement" of sandy footpaths and tracks for access to bicycles and horses by resurfacing them with compacted gravel and clay reduces nesting sites. Removal of large carrion reduces habitat availability. Inappropriate ride management and widespread scrub clearance likely to have negative impacts.
Vascular plants	One species known to have gone extinct in the middle of the 20th century: summer lady's-tresses *Spiranthes aestivalis*, which was exterminated by over-collecting and drainage damage*. Little evidence of declines in species, although few monitoring data available and impacts of human activity largely uncertain.	Invasion by exotic water plants (e.g. New Zealand pygmyweed *Crassula helmsii*) is probably a major threat to flora associated with ponds. Other invasive species such as *Rhododendron* similarly pose a threat to terrestrial vegetation. In the 20th century, forestry practices involving creation of new plantations and planting up of ancient woodland undoubtedly caused enormous damage. Management practices and laissez-faire attitudes to grazing within the Inclosures during the second half of the 20th century led to negative impacts on flowering plants.
Lichens	Few monitoring data available. Most uncommon species appear to be stable. However, some are clearly declining and some extinctions appear to have occurred. A total of 13 species were recorded from New Forest woods in the 19th century and have not yet been refound, and may therefore be extinct. In addition, four leafy species recorded since 1967 appear to have been lost and a further four are declining and rare.	The spread of holly, and hence increased shade, in the past 150 years is the most significant issue. Pollution is another significant factor, especially of sulphur and nitrogen. This may be responsible for difficulties in colonising rather than direct poisoning of the mature thalli. Death of trees has also caused loss of colonies.
Fungi	Few monitoring data available. Little evidence of declines. Extinctions hard to evaluate although 18 species of conservation concern have not been seen in the past 50 years* and may be extinct.	Substantial losses of semi-natural woodland through felling and establishment of exotic conifers in the 20th century must have had a major deleterious impact on fungi. Other threats include deadwood removal, and possibly also commercial collecting and climate change.
Bryophytes	Four species of liverwort have apparently become extinct.* Most species generally stable.	Some species threatened by scrub invasion.*

declining, although again, the lack of robust monitoring data limits the conclusions that can be drawn.

The preceding chapters identified a range of different causes of the decline or loss of species, which vary among different groups (Table 58). The widespread damage to ancient woodland habitats caused by forestry operations in the 20th century appears to have had a significant negative impact on groups such as vascular plants, fungi and some invertebrates. Another key issue has been the increase in grazing and browsing pressure in recent decades, particularly in the Inclosures, which accounts for the losses of many invertebrates, especially the Lepidoptera. As for the assessment of habitat condition (see above), inappropriate habitat management interventions are widely cited, including scrub control, tree felling and heathland burning (Table 58). The loss or decline of some species may be the result of processes occurring in the wider countryside, including agricultural intensification and land use change in areas adjacent to the New Forest (Table 58).

Information needs

As noted above, there is an urgent need for improved information regarding the status and trends of biodiversity in the New Forest. There is some evidence that Tubbs (2001) was right to suggest the biodiversity of the New Forest is diminishing. However, this suggestion is difficult to evaluate without improved survey and monitoring data. The current distribution of most species in the New Forest is inadequately known, and even less information is available regarding trends in abundance of individual species, even for those of international conservation concern for which the area was designated. It is widely

recognised that effective conservation management depends on adequate monitoring, so that management interventions can be amended and adapted in response to available evidence (Sutherland 2000). Although the CSM approach provides a valuable source of information, it does not capture trends in individual species, and as indicated in Chapter 13, it appears to provide results that are poorly related to more quantitative and repeatable monitoring approaches.

Much of our current knowledge of species in the New Forest depends on the dedication and hard work of naturalists, many of whom collect information in an entirely voluntary capacity. These efforts deserve much greater support from those agencies and organisations responsible for managing the New Forest. There is scope to improve the coordination and targeting of survey effort. There is also a need to improve the management of biodiversity information. Although the Biodiversity Information Centres in Hampshire and Wiltshire have an important role in compiling and managing biodiversity data (often submitted from volunteers), the information is typically incomplete and out of date. There is arguably a case for a biodiversity information system to be developed explicitly for the New Forest. There is also a need to ensure that existing information can be readily accessed by those responsible for management decisions on the ground, so that such decisions can be informed by current knowledge. It is hoped that this book will encourage greater coordination and collaboration among those with an interest in the New Forest, to improve the collection, management and dissemination of biodiversity information.

Management responses

Given the importance of the New Forest for biodiversity, as indicated at the beginning of this chapter, the current status and trends of both habitats and species should be the focus of significant concern. There is a clear need for management action to address this situation.

A striking conclusion from the evidence presented above is that inappropriate management currently represents the principal threat to biodiversity in the New Forest. This provides a marked contrast to the National Park perspective (see Chapter 18, and New Forest National Park Authority 2008a), which currently focuses on the potential threats of climate change and increasing recreation pressure, despite the fact that there is currently little evidence that either of these factors are negatively affecting New Forest biodiversity to any great extent (although they clearly have the potential do so in future). To a large degree, the declines and losses of species that have occurred, and the currently unfavourable condition of much habitat, is the legacy of decades of mismanagement that occurred during the 20th century, as chronicled in detail by Tubbs (2001). Substantial progress has been made in amending and improving management approaches, including the restoration of degraded habitats undertaken during the LIFE projects (see Chapters 17 and 19), and as reflected in current management plans (Forestry Commission 2008, Wright and Westerhoff 2001). Such efforts undoubtedly merit recognition and support. However, the evidence presented in this book highlights some of the challenges that remain, if further losses of biodiversity are to be avoided.

A detailed evaluation of current management approaches is beyond the scope of this chapter. Instead, some cross-cutting issues that have emerged from the preceding chapters are briefly considered here.

Grazing pressure

Is the New Forest overgrazed? This issue has long been the subject of debate. As noted in Chapter 7, for example, many entomologists believe that grazing pressure is too high. Many forest ecologists might say the same thing (Chapter 13). On the other hand, it is widely recognised that many of the distinctive characteristics of the New Forest, and the survival of many of its species, depends directly on the maintenance of large herbivore populations. It is for this reason that recent management plans (Wright and Westerhoff 2001, New Forest National Park Authority 2008a) have placed the maintenance of the pastoral economy, and the tradition of commoning, as a principal objective.

Despite the importance of grazing to the maintenance of many species, overgrazing has clearly contributed to biodiversity loss. The high losses of invertebrate species, especially Lepidoptera, have largely been attributed to an increase in grazing pressure in recent decades, particularly within the Inclosures (Chapters 6 and 7). Such losses should not be dismissed as a minor concern, reflecting the advocacy of an individual species group by enthusiasts. Rather, they are an indicator of a decline in the condition of the New Forest as an ecological system. Declines in the invertebrate fauna must have had a negative impact on the other species that depend on them, such as insectivorous birds and bats. What Putman (Chapter 14) refers to as the 'unique' characteristic of the New Forest, namely the lack of small mammals and the birds and mammals that predate them, is the result of an impoverished insect fauna caused by high grazing pressure (Putman 1986). Declining availability of invertebrate food resources could also be a factor in the recent declines in wading birds (Chapter 1), although this has not been examined to date.

What, then, is the optimum grazing pressure in the New Forest? The most detailed analysis of this question is that provided by Putman (1986), based on almost a decade of research into the behaviour and impacts of large herbivores. Estimates of forage offtake per day per individual cow or pony were related to measurements of forage productivity, to determine the potential stocking density of the Forest for livestock. This approach was used to estimate the total carrying capacity for ponies across the New Forest. Values were

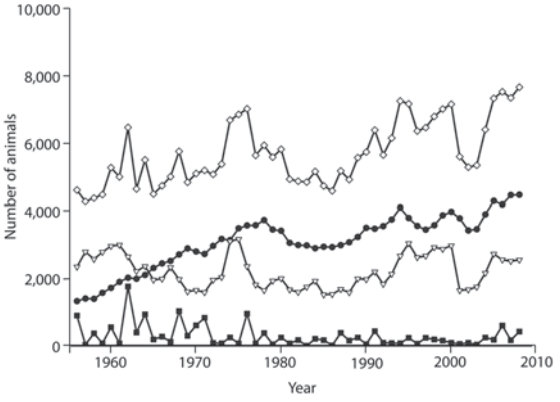

Figure 74
Numbers of stock depastured in the New Forest. Data from the New Forest Verderers (http://www.verderers.org.uk/stock_depastured.pdf). Symbols: pigs, filled squares; cattle, open triangles; ponies, filled circles; total, open diamonds.

found to vary with season, reaching a maximum of 2,840 in July. As Putman (1986) emphasises, the values provided by this analysis should be viewed with a great deal of caution, because of the uncertainties associated with estimating the amount of forage available to animals, the influence of range use and behaviour on animal densities, and the productivity of different vegetation types. In addition, this estimate is based on an agricultural approach, focusing on the capacity of New Forest vegetation to support stock, rather than defining the stocking density that would be desirable for maintaining biodiversity.

Despite such caveats, this figure of 2,840 provides a rough indication of how many ponies the New Forest might support. Interestingly, this number has been exceeded every year since 1972 (Figure 74). The number of ponies depastured on the Forest has increased steadily since the early 1950s, reaching values of more than 4,200 in each of the years 2005–2007. Such numbers are higher than at any time in the past (Tubbs 2001). Pony numbers are particularly significant in terms of overall grazing pressure on the Forest, because ponies consume more vegetation than ruminants such as cattle and deer (Tubbs 2001). For example, Tubbs (1991, 2001) suggested that one pony may be the equivalent of at least two cattle or three deer in terms of forage intake. In the early 1980s, when livestock numbers were substantially lower than at present, Putman (1986) concluded from his analyses of the New Forest that 'it is apparent that, at least in some habitats and in some areas, grazing really is excessive – by *whatever* criteria' [original emphasis]. This suggestion is borne out by the data on habitat condition presented above.

The SAC Management Plan avoids defining either upper or lower limits for grazing animals in the New Forest, rightly pointing out that there is 'no ecologically derived justification for the upper and lower stocking levels seen in the past' (Wright and Westerhoff 2001). Instead, the Plan suggests that 'all that can be usefully stated is that within the historical upper and lower stocking levels, experience shows that as far as grazing goes, the individual habitats are maintained in favourable condition' (Wright and Westerhoff 2001). This avoids the fact that some habitats are not currently in favourable condition (as noted above), and fails to address the fact that livestock numbers are currently higher than ever before and are continuing to increase. However the Plan does accept that overstocking can occur, and is an issue that has to be addressed and managed.

Overall limits to numbers of livestock can be set by the Verderers. Currently (2003–2013) there is a Countryside Stewardship Scheme in place, which is a 10 year agreement between Defra and the Verderers, under which Defra makes available payments totalling some £460,000 each year. In return for depasturing their animals for laid down minimum periods, Commoners receive an annual headage payment, which in 2007 was £56.00 each for cattle, ponies and donkeys. The Scheme defines limits on the numbers of livestock that Commoners are allowed to enter. The grazing plan developed in conjunction with this Scheme states that the number of animals (ponies, donkeys and cattle) is not to fall below 3,500 or exceed 7,000 (Verderers of the New Forest 2005). Yet, as indicated on Figure 74, numbers have exceeded this total for each of the years 2005–2007. In 2007, for example, the total was 7,363. Although such totals do not necessarily provide an accurate indication of the livestock actually depastured on the Forest, this does highlight a potential difficulty in regulating livestock numbers.

Based on the analysis presented by Tubbs (2001, p.161), it would appear that grazing and browsing pressure in the New Forest is currently at a very high level, with livestock numbers among the highest on record. In the past, deer densities would have been much higher than at present; for example, around 8000 fallow and red deer were recorded in the Crown lands in 1670 (Putman 1986). Deer densities within the Crown lands are currently maintained at around 2000 animals through a programme of culling (Forestry Commission 2007). Over the past two centuries, there has therefore been a shift from deer to livestock (ponies and cattle) in terms of the main contribution to grazing and browsing pressure. Taking account of the higher forage requirement of ponies than of either cattle or deer, grazing and browsing pressure in the New Forest may currently be higher than at any time in the past. If history is to be used to guide current management, as suggested by the SAC Management Plan (Wright and Westerhoff 2001), then there may now be a need to consider reducing livestock numbers. However, what is actually required is an identification of an appropriate stocking density, adjustable in response to monitoring information, beyond which any financial support (such as headage payments) would cease (Tubbs 2001, p.374). Identification of this stocking density should be based on a thorough ecological understanding of the New Forest ecosystem, and the role that large herbivores play within that system. Further research is required to provide this understanding.

Scrub clearance

As noted in Table 58, scrub clearance has been implicated as a cause of species loss in the New Forest, particularly for invertebrate groups such as saproxylic invertebrates and Lepidoptera (although it should be noted that some species, for example some bryophytes and dragonflies, have also been threatened by development of scrub). As noted by Putman (1986), the Commoners have repeatedly pressed for management aimed at increasing the available grazing in the New Forest, which includes clearance of scrub from grasslands. According to Putman (1986), this '*runs counter to conservation interests within the Forest, threatening structural diversity [and]… the integrity of whole communities*'. As noted in Chapter 13, scrub plays an important role in the dynamics of woodland colonisation, and if the New Forest is to be managed according to the 'Vera model' (as suggested in the SAC Management Plan), then such colonisation should be allowed to occur, at least in some areas.

Tubbs (2001) considers this issue in some detail, noting that Section 11 of the New Forest Act 1949 requires that the Forestry Commission shall ensure that 'the grazings shall be kept sufficiently clear of coarse herbage, scrub and self-sown trees', reflecting a perception that the unenclosed Forest should be managed primarily for the benefit of Commoners and their stock. As noted by Tubbs (2001), this is potentially in conflict with nature conservation, to which the Commission is committed under the New Forest Act of 1964, through the Wildlife and Countryside Acts of 1981 and 1985, and through international designations. Tubbs (2001) strongly deplores the 'quite irrational flailing of old gorse thickets' and removal of blackthorn thickets, leading to an erosion in the 'character and naturalness of the Forest in the name of management, most of it of little measurable benefit'. Most importantly, Tubbs (2001) points out that no assessment of the ecological costs and benefits of such management is carried out, and neither does the Forestry Commission monitor its impacts. As a result, 'habitats are often damaged or destroyed without benefit to the Commoners from increased forage'; in fact, such interventions can even reduce the availability of food plants to stock (Tubbs 2001, p.355).

Tubbs' emphasis on the importance of monitoring the effects of management is entirely consistent with recent calls for an evidence-based approach to conservation management (Pullin and Knight 2001, Sutherland 2000, Sutherland *et al.* 2004). Such calls reflect growing concern that much conservation management is not currently based on any rigorous evidence regarding its effectiveness, as can be provided by a robust monitoring programme. The concerns raised by Tubbs (2001), and the undoubted habitat value of scrub (for example as a food source for nectar-feeding insects), highlight the need for such monitoring, supported by research into the ecological costs and benefits of such management.

How do current management plans address the issue of scrub clearance? The SAC Management Plan highlights the habitat value of scrub, and identifies the need '*to maintain a good quality scrub component on Open Forest habitats within the limits set by Condition Assessment, and to maintain woodland edge / Open Forest transitions such that sharp boundaries between pasture woodland and open habitats are minimised*' (Wright and Westerhoff 2001). The current Management Plan for the Crown lands similarly recognises the potential habitat value of scrub, and its importance in the ecological dynamics of natural woodland expansion, stating that '*it would be unwise and impractical to remove more birch and scrub than is necessary from the Open Forest*' (Forestry Commission 2008). The Plan identifies as a key action implementation of scrub clearance according to the generic prescriptions identified in the SAC Management Plan. As noted above, this should be supported by appropriate monitoring and research, to ensure that such interventions are targeted on appropriate areas, and deliver clear benefits. Given that evidence for such benefits is currently lacking, there is arguably a need for a much more sensitive approach to scrub clearance than has occurred in the past. In particular, there is a need to address the concern raised by Tubbs (2001, p.355), that 'too much has been done simply to demonstrate activity'.

Recreation

Tubbs (2001) similarly gives detailed consideration to growing pressure for recreation in the Forest, noting the recent growth in adjacent urban populations and the associated increase in the number of visitors. Specific issues that Tubbs (2001) identifies include the erosion 'fans' around car parks, the management and expansion of camp sites, damage caused by horse riding, and disturbance to wildlife caused by walkers, dogs, horse riders and cyclists. As noted by Tubbs (2001), much of the evidence of such disturbance is circumstantial, reflecting the difficulties of identifying disturbance as a cause in the decline or loss of a species. The possible role of disturbance as a cause of declines in breeding waders has attracted particular concern (Chapter 1).

Recreation in the New Forest was recently examined by the PROGRESS project, which was an EU-funded initiative that ran from 2003 to 2007 and undertook a range of visitor surveys and other studies to identify appropriate actions for managing recreation (Gallagher *et al.* 2007). The project commissioned a survey (undertaken by Tourism South East), which estimated that the New Forest National Park receives some 13.5 million day visitors per year (Tourism South East 2005). This suggests that visitor numbers have increased enormously in recent decades; in 1969, the number of day visits was estimated at 3.25 million (Tubbs 2001).

It is clear that demands for recreation on this scale represent a significant management challenge, and the issue is given detailed consideration in current management plans. For example key actions

identified in the plan for the Crown lands (Forestry Commission 2008), which were informed by the PROGRESS project, include:

- Maintenance of a permanent Ranger and Keeper team supplemented by seasonal staff and volunteers to provide a visible presence on the Crown lands, to actively manage access and recreation.
- Seasonal closure of four car parks to monitor change in visitor movements and impact on ground-nesting birds.
- Improvement of access to and the aesthetics of certain Inclosures to encourage more people to use the generally more robust Inclosures for informal recreation.
- Installation of temporary information points and interpretation boards at carefully selected locations.
- Closure of certain laybys to reduce ease of access to sensitive habitats on the Open Forest.
- Installation and maintenance of 'dragons teeth', roadside ditches and banks to try to minimise damage to road site verges and prevent inappropriate roadside parking.

The New Forest National Park Authority has recently developed a draft Recreation Management Strategy, which is designed to set out the strategic direction for the management of outdoor recreation over the next 20 years (New Forest National Park Authority 2008b). At time of writing (2009), the Strategy is undergoing further consultation and revision; once finalised, the next step will be to develop an action plan for its implementation. The draft Strategy is in many ways a visionary document, with some radical proposals that have inevitably generated substantial controversy, including the possibility of dog-free car parks, seasonal closure of minor roads, traffic management and zoning, road user pricing, car-free zones and landscaping for noise and visual screening. Proposed criteria for regulating equestrian development have proved particularly controversial. The National Park Authority should be commended for stimulating debate, regardless of the eventual outcome of this planning process. A visionary, strategic approach to management is surely something that the New Forest requires (Tubbs 2001). The Strategy's commitment to research and monitoring, to strengthen the evidence base for future management, should also be strongly commended.

It is surely appropriate that recreation management should continue to form a central element of any management plan for the New Forest. However, any restrictions on visitor movements or activities are inevitably going to generate controversy. Any evidence suggesting that recreational pressure is the cause of environmental degradation, or negative impacts on biodiversity, is therefore likely to be scrutinised very closely. Although there are clearly areas of concern in terms of recreation impacts on biodiversity, such as possible disturbance to ground-nesting birds (Chapter 1), there is also a great deal of uncertainty regarding what the precise impacts actually are. Such uncertainty can only be addressed by an increased emphasis on research and monitoring in future.

A vision for future management

A number of the contributors to this book highlighted the need for a landscape-scale approach to conservation management. The future status of biodiversity in the New Forest will be strongly influenced not only by management of the Forest itself, but by patterns of surrounding land use. The importance of a landscape-scale approach to conservation management is now widely recognised, based on developments in landscape ecology and metapopulation ecology. Evidence suggests that the maintenance of many species depends on the spatial characteristics of habitat, such as the size and connectivity of habitat patches, and their influence on ecological processes such as dispersal and colonisation (Lindenmayer and Franklin 2002). In the current era of rapid environmental change, the maintenance of species within a landscape is likely to depend strongly on providing an appropriate landscape pattern to support such processes.

The landscape ecology of the New Forest has received relatively little attention to date, and clearly there is tremendous scope for research in this area. Ideally, management of the New Forest would be informed by a thorough understanding of the spatial dynamics of different vegetation types, and how such dynamics influence populations of the various species associated with them. Understanding the spatial movement and behaviour of large herbivores in relation to vegetation pattern is clearly key to understanding such dynamics, building on the pioneering work of Putman and colleagues (Putman 1986, Chapter 14). The use of landscapes by people is another important area where further knowledge is required, in order for recreation to be managed effectively.

The development of a landscape-based approach to the management of the New Forest was recently considered in a report produced by the Land Management subcommittee of the New Forest Association (Reeves *et al*. 2006), which is an independent, campaigning charity dedicated to protecting the New Forest, and is thought to be one of the oldest conservation organisations in the world. The report was stimulated by the creation of the New Forest National Park, which as noted in Chapter 18, considers the unique New Forest landscape as among its 'special qualities' that merit protection.

As noted in the report, much of the New Forest landscape is now dominated by commercial forestry, specifically through the previous establishment of forest plantations. This report suggests that future management should involve the natural restoration of selected areas through the controlled retreat of commercial forestry where it has come to dominate the landscape, to produce a sustainable pastoral landscape in which forestry continues to play a part, but no

longer dominates. This would be achieved by restoring a number of the Inclosures to the Open Forest, and by stocking retained Inclosures with broadleaved trees, to provide a reservoir from which species less tolerant of heavier grazing could exploit and colonise surrounding areas (Reeves *et al*. 2006). The remaining area would be thrown open to grazing animals, with the conifers in such areas being felled at a commercially viable age, and broadleaved trees being left largely to their own devices. In time, it is suggested, these woodlands would take on the characteristics of the open pasture woodlands, and be colonised by those species associated with them. This would help address the fact that pasture woodlands are currently fragmented, which reduces the potential for dispersal and colonisation of the species associated with them. The result would be a matrix of wooded and unwooded areas, perhaps similar to that recorded in the New Forest in the late 18th century (Reeves *et al*. 2006). Most importantly, the spatial dynamics of such habitats would be allowed to develop naturally, in response to patterns of herbivory, and as influenced by the underlying geology, topography and climate. In other words, natural processes would be allowed to predominate, leading to the restoration of habitat features on a landscape scale, which would be far more sustainable than the current situation (Reeves *et al*. 2006).

Reeves *et al*. (2006) suggest that this approach would benefit the wildlife of the Forest, as well as providing a high quality recreational experience for visitors. It would also benefit the commoning community by opening up a large area of currently unavailable land for grazing. It would provide a unique opportunity for long-term scientific study to understand landscape scale ecological change. Furthermore, it would be economically advantageous, as the felling of the conifer stands would continue to provide financial revenue, while the costs of maintaining fencing and undertaking new planting would be reduced. The requirement for grazing the newly opened areas would be absorbed by the current commoning system, to its benefit.

Does this visionary idea provide a suitable basis for managing the New Forest in future? Would it really help meet the needs of local communities and visitors, as well as helping to maintain the biodiversity of the area? Might it even provide greater resilience to the environmental change that could be just around the corner? As noted by Tubbs (2001, p.374), it is this kind of radical thinking that is needed, to ensure that the special character and value of the New Forest is maintained into the future.

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