**Report 308 The nature conservation value of scrub in Britain**

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This report represents a synthesis of the existing knowledge of scrub ecology and conservation, and identifies priorities for future conservation and research. This information has been accessed through published and unpublished literature, questionnaires, an expert workshop, and through consultation with national and international experts.

For more detailed information beyond this summary report see **http://jncc.defra.gov.uk/page-2445**

**Executive Summary**

**Rationale and approach**

1. Scrub has received little attention from nature conservationists, resulting in insufficient knowledge of the distribution, ecology, management and conservation status of scrub in Britain. This information is needed to identify, conserve and enhance valuable scrub.
2. This report represents a synthesis of the existing knowledge of scrub ecology and conservation, and identifies priorities for future conservation and research. This information has been accessed through published and unpublished literature, questionnaires, an expert workshop, and through consultation with national and international experts.

**Definition and classification**

1. For the purposes of this report, scrub includes all stages from scattered bushes to closed canopy vegetation, dominated by locally native or non-native shrubs and tree saplings, usually less than 5m tall, occasionally with a few scattered trees. This includes carr, scrub in the uplands and lowlands (including wood edge habitats), montane scrub and coastal scrub. The definition excludes dwarf shrub heaths, planted stands of young trees and coppice stump regrowth less than 5m high.
2. Most scrub in Britain is seral, forming a stage in the transition from open herbaceous vegetation to woodland. In certain situations, scrub can be considered a climax vegetation type, for example where altitude, exposure or edaphic factors limit tree growth. Such communities can be found in the alpine and sub-alpine zones, on exposed coasts and on skeletal soils.
3. For seral scrub, problems of definition occur when separating scrub from herbaceous and woodland vegetation. For species which have ranges above the scale of an individual scrub stand, the intimate mix of scrub with woodland or herbaceous communities is an important habitat requirement.
4. Widely used classifications of scrub types depend on floristics, the identity of dominant woody species and soil characteristics. However, for describing the conservation value of scrub types for associated organisms, especially birds and invertebrates, classifications which take account of both horizontal and vertical structural complexity are needed.
5. The National Vegetation Classification describes five scrub types, although scrubby vegetation forms an important component of many other grassland, heath, mire woodland and coastal NVC communities.
6. In Britain, scrub vegetation comprises a significant component of six priority habitats types in the EU Habitats Directive, namely dune juniper thickets (*Juniperus* spp.), semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (important orchid sites), limestone pavements, Caledonian forest, bog woodland and residual alluvial forests (Alnion glutinosae-incanae).
7. Scrub vegetation comprises an important component of 11 Priority Habitats in the UK Biodiversity Action Plan, and a minor component of several others.

**Distribution and conservation value**

1. The available information on the distribution and abundance of scrub communities in Britain is inadequate.
2. Best estimates (from the ITE [CEH] Countryside Survey 1990) are that there is 900 ±200 km2 ( 90,000 ±20,000 ha) of scrub in Britain. On a country basis this breaks down into: England 600 ±100 km2; Scotland 200 ±50 km2; Wales 100 ±50 km2.
3. Scrub occurs widely within SSSIs but has rarely been taken into account when designating them. Hence it is not known to what extent the distribution and abundance of particular scrub types within SSSIs is representative.
4. Scrub is generally valued by managers of designated sites for its contribution to biodiversity.
5. In England and Wales scrub is generally (with the exception of juniper) valued primarily for the species it supports rather than in its own right. In Scotland scrub (mainly upland and montane) is more often valued for its own intrinsic value.
6. Scrub is known to be an important habitat for a wide range of higher plants, herbivorous insects and birds, including Red Data Book and BAP1 species.
7. Little is known about the value of scrub for lower plants, non-herbivorous invertebrates, reptiles and amphibians, and mammals although scrub is likely to be equally important for these groups.
8. Most British scrub communities are well represented elsewhere in Europe. However, hawthorn scrub is particularly characteristic of the English lowlands and of marginal uplands in England and Wales, while Scottish montane dwarf willow communities differ in detail from their Scandinavian counterparts, perhaps reflecting climatic differences.

**Ecology**

1. Scrub in Britain is almost entirely a product of man's activities. In primeval landscapes, scrub would have occurred in at least five situations and local examples can still be found. These situations are: in primary successions such as dunes, on exposed coasts, as high altitude montane scrub, as ecotones between woodland and open habitats, as natural regeneration within treefall gaps.
2. The majority of scrub results from secondary successions. In the lowlands, the breakdown of traditional grazing and cutting regimes on marginal land has been a major stimulant for scrub development. Large-scale expansion of scrub may occur in the uplands as a result of abandonment of hill farms and reduction of deer numbers.
3. The mechanisms driving the successional development of scrub are poorly understood. A range of mechanisms may operate simultaneously. Seed dispersal may be a critical factor in the rate of scrub development and in the structural mosaics that develop. Most scrub species are dispersed by birds and factors such as proximity to seed sources, availability of perches and quality of the receptor site for dispersers may be important.
4. Successional development of scrub involves increases in soil nutrients, organic matter, shifts in the composition of the ground flora and ultimately reduction in the seed bank. These changes are accompanied by continuous development in the structure of the scrub as a result of canopy-closure and increasing height of the woody vegetation. Structural development of much upland birch and pine scrub appears to be less complex than in much lowland scrub.
5. For many taxa, shrub species composition is less important than microclimate, microhabitat structure or macrohabitat structure. However, examples of apparent dependencies on particular species are to be found among the lower plants and among phytophagous insects. The majority of phytophagous insects are specific to plant family and a substantial number are specific to plant genus.
6. Many invertebrates and birds are associated with specific vegetation structures. This results in large ongoing changes in insect and bird communities as a result of the massive structural changes that accompany scrub development in succession.
7. Scrub often exists as a mosaic with grassland and other open vegetation. Spatial patchiness is an extremely important habitat feature for many plants and animals. In the case of invertebrates, fine-scale mosaics of structure and plant composition provide a diversity of niches and a variety of food and shelter. Edges are particularly important and intimate mixtures of grass, scrub and woodland may be advantageous to many insects. Similar structural patchiness can result in very rich bird communities. The maintenance of such mosaics is a difficult management challenge.

 **Management**

1. There is often insufficient clarity in setting objectives for scrub management due to imprecise definitions of its role.
2. Scrub is often felt to be both beneficial and a nuisance on the same site, especially in the English lowlands where invasion of species-rich grassland is a very common problem. However, the proportion of scrub which is considered to be a nuisance is generally small (<25%). Juniper and hazel scrub are always welcome.
3. Much management of scrub in lowland England aims to develop and maintain mosaics of scrub and grassland, which are believed to favour the widest range of flora and fauna. Scrub is generally less welcome on wet habitats in the lowlands where it may adversely affect site hydrology. It is also often unwelcome in coastal areas where it invades maritime grasslands and dwarf shrub heath of international importance. Sea buckthorn, although having appreciable conservation value in its own right, is generally regarded as a pest species in sand dune systems.
4. Scrub is generally reviled by archaeologists and geologists who consider it a nuisance where it damages or obscures features of interest.
5. Scrub is rarely considered to be a nuisance in the uplands and in Scotland there is a major programme for the protection and enhancement of montane scrub communities.
6. A very wide range of techniques is used for scrub management and control, with very varying success. These techniques are mostly based on cutting with or without stump treatment followed by grazing or mowing. Practitioners urgently seek improved information on which techniques are appropriate where and when and how they should be carried out.
7. *Rhododendron ponticum is* by far the most serious invading exotic scrub species throughout Britain accounting for 44% of all cases mentioned by survey correspondents. Very large amounts of money are spent annually on Rhododendron control and eradication programmes.
8. Clearance of scrub is widely funded in lowland England, where scrub is widespread and frequently encroaches onto habitats perceived to be more valuable. In upland England and Wales, scrub is less common, and grants are available for both conservation management and clearance. Scotland contains a low proportion of the British scrub resource, but many of the uncommon habitat types of high conservation value. As a consequence, only management to conserve and enhance scrub is funded.
9. None of the schemes reviewed differentiate between scrub of high conservation value and other types of less valuable scrub when funding clearance.
10. Neither Countryside Stewardship nor Environmentally Sensitive Area schemes in England fund annual management to conserve or enhance scrub.
11. Land management grants to promote conservation and enhancement of wet scrub (willow and alder carr) are available in only a few regions of Britain.

Recommendations

***Classification***

1. The nature conservation value of scrub is generally related to its structure, including elements of both vertical canopy structure and horizontal spatial structure in relation to other habitats. The National Vegetation Classification, being based on floristic inventory of homogenous stands, is therefore inadequate for ascribing conservation value to scrub stands.
2. There is a need for a structural classification of scrub that is ecologically meaningful in terms of the requirements of scrub-associated organisms, especially invertebrates and birds. This classification must take account of spatial structure (mosaics / patchiness), scrub height and foliage profiles.
***Distribution***
3. In order to assess the absolute and relative importance of scrub to nature conservation, whether regionally, nationally or within Europe, there is a need for better information on the distribution and extent of the major scrub types.
4. Treatment of scrub within land cover surveys adopted by various agencies varies considerably. Much information on national distributions is potentially available within the ITE Countryside Survey 1990 and Countryside Survey 2000 datasets but it is currently in aggregated form under the main category 'Shrub'. Dis-aggregation of these data would provide information at the required level of detail.

 ***Conservation status***

1. Certain rare scrub types (e.g. juniper scrub) or scrub composed of rare shrub species (e.g. *Salix lanata*) have Habitat or Species Action Plans within the UK Biodiversity Action Plan. No changes to the definitions of broad or priority habitats are considered necessary. However, the conservation value of scrub as a structural component of many priority habitats needs to be fully acknowledged in relevant Habitat Action Plans.
2. An assessment is needed of the extent to which scrub within SACs and SSSIs is representative of the wider resource and to decide whether further designations are required to cover under-represented scrub communities.
3. Better information is needed on the status and management of scrub within existing SSSIs, including occurrence of scrub types, structural characteristics, associated species, conservation importance within the SSSI and management objectives.
4. An assessment is needed of the ecological contexts in which scrub should form a criterion for SSSI designation. In addition, citations for existing SSSIs and definitions of 'favourable condition' may need to be changed to take account of the nature conservation value of scrub.
5. Research is needed to determine for which species and under what circumstances scrub is a primary (or sole) habitat and when and where it is of secondary importance.
6. Characterisation of the unique attributes of British scrub types in relation to those of mainland Europe is essential in order to set conservation priorities within the UK. A meeting of key European specialists could provide a starting point for a European network on managing scrub vegetation for nature conservation.

 ***Ecology***

1. This review has identified the importance of mosaics of vegetation, of which scrub is an integral part, for several taxa. There is a need for research that identifies the optimum mosaic structures for ground flora, invertebrates and birds. This work needs to take account of the different scale requirements of these taxa and should take account of the importance of edges and glades within scrub.
2. The processes of scrub establishment and the development of patchiness within scrub are poorly understood. In particular, there is a need to examine more closely the role of birds in seed dispersal and how their behaviour influences the distribution and spatial structure of scrub.
3. A landscape approach to the importance of scrub for conservation needs to be developed. This could have two main components. First, an assessment of how the proximity of other habitats, especially woodland and grassland, affects the plant and animal communities found within scrub. Second, there is a need to determine the contribution that scrub makes to biodiversity within different landscape types relative to other habitats. The latter work would help to identify the extent to which species are dependent on scrub compared with other habitats and, therefore, clarify the complementarity of scrub and other habitats.
4. Research is needed on the successional dynamics of animal communities (especially invertebrates, birds and small mammals) within developing scrub. Such research should seek to identify which are the richest stages of successional development, both in terms of species richness and the presence of species of particular conservation interest. These data would be valuable in helping to underpin management policies that sought to maintain rich communities of animals within scrub habitats.
5. Carr has been remarkably little researched, especially concerning its animal communities and how these are influenced by factors such as successional stage and wetness. Further research in this area seems highly desirable in view of the current conservation interest in riparian woodland.
6. Very little is known about the mycorrhizal associations of scrub species and indeed, how these might benefit the rare communities. Manipulation may enhance the success of establishment or restoration of these communities, especially when soil conditions are not optimal.

***Management***

1. Carefully controlled experimental research is needed to determine the effectiveness of differing procedures for scrub management, including procedures for maintaining scrub as well as controlling it. This should take account of existing guidelines and the considerable amount of information contained within the responses to the questionnaire carried out as part of the current study.
2. In the context of scrub control, there is a need to identify whether critical thresholds of scrub development exist, beyond which scrub clearance is ineffective as a means of restoring habitats such as lowland calcareous grassland or fen.
3. Research is especially needed on appropriate management techniques for maintaining patchiness and mosaics. Rotational large-scale cutting of scrub is unlikely to be adequate for maintaining complex vegetation mosaics and approaches that adopt grazing or combinations of grazing and selective cutting are likely to be more successful.
4. A scrub management handbook should be developed outlining best practice for managing scrub, especially means of encouraging sustainable mosaics of scrub and other habitats.

***Dissemination and Education***

1. A major constraint on the conservation of scrub and its associated species is the widely-held opinion that scrub is of low conservation value and primarily a threat to other more valuable habitats. Methods of addressing this problem of perception need to be developed.
2. In particular, there is currently insufficient guidance concerning situations where scrub is valuable and in which contexts other conservation priorities take precedence. This problem is exacerbated by the linkages between the conservation value of scrub and its intimate association with other communities in habitat mosaics.
3. It would be highly desirable to establish a network of scrub demonstration sites where different approaches to difficult scrub management issues can be viewed and discussed with site managers.
 ***Agri-Environmental Policy***
4. In most situations, scrub is primarily considered as a threat to other habitats, and capital payments allocated for clearance. Funding for agri-environment schemes needs to take account of both the efficacy of scrub clearance for restoring species-rich herbaceous communities such as chalk grassland, and the intrinsic nature conservation value of scrub or habitat mosaics including scrub.
5. The introduction of annual management payments to conserve and enhance scrub of high conservation value in England (as opposed to one-off capital payments for clearance) would benefit scrub conservation, and bring the English agri-environment schemes into line with those in Wales and Scotland.
6. Little attention is paid to the roles of landscape processes when funding scrub management, despite the likely impact of the surrounding landscape on the value of individual habitat patches. A consideration of the large-scale spatial processes should be taken into account when allocating funding for scrub management. This approach relies on scrub of high conservation value being identified in funding applications, something that is currently not addressed.

 ***Landscape Policy***

1. Conservation of seral scrub can only be achieved on a large spatial scale, allowing management producing mosaics of scrub at different successional stages.
2. Wherever appropriate, scrub should be encouraged as part of natural vegetation dynamics. For example, in the Scottish Highlands there may be increasing opportunities to regenerate natural woodland cover in which scrub is present not just in the initial establishment phase but also in the longer term as a natural component of the forest dynamics following disturbance by windblow or fire.
3. A more positive approach to scrub habitats is required in the uplands of England and Wales to match that adopted in Scotland. For example, it might be interesting to consider how treeline scrub communities might be enhanced in Snowdonia and the Lake District; how scrub communities might play an important role in 'wild-wood' developed on former conifer forest sites; how upland hawthorn scrub might be regenerated and extended under agri-environment schemes; how willow scrub might be used to enhance and link wet woodland habitats.
4. Landscape policies that promote the large-scale expansion of scrub on lowland flood plains would contribute significantly to the conservation of residual alluvial forest (a priority habitat in the Habitats Directive) and delivery of the Habitat Action Plan for wet woodland.
5. Scrub and associated wet woodland communities frequently develop on abandoned mineral extraction sites. Promoting the nature conservation value of such sites amongst mineral planning officers would provide opportunities for expansion of these habitats and their appropriate management.
6. Within the context of agricultural land, abandonment may provide opportunities for the creation of scrub habitats. Issues of negative perceptions of the value of scrub amongst landowners need to be addressed.
7. The use of scrub buffer strips adjacent to new farm woodlands would contribute significantly to the nature conservation value of such plantations.
8. The nature conservation value of scrub, and of mosaics of scrub, woodland and herbaceous communities, needs to be recognised in the planning of new lowland woods and national forests.