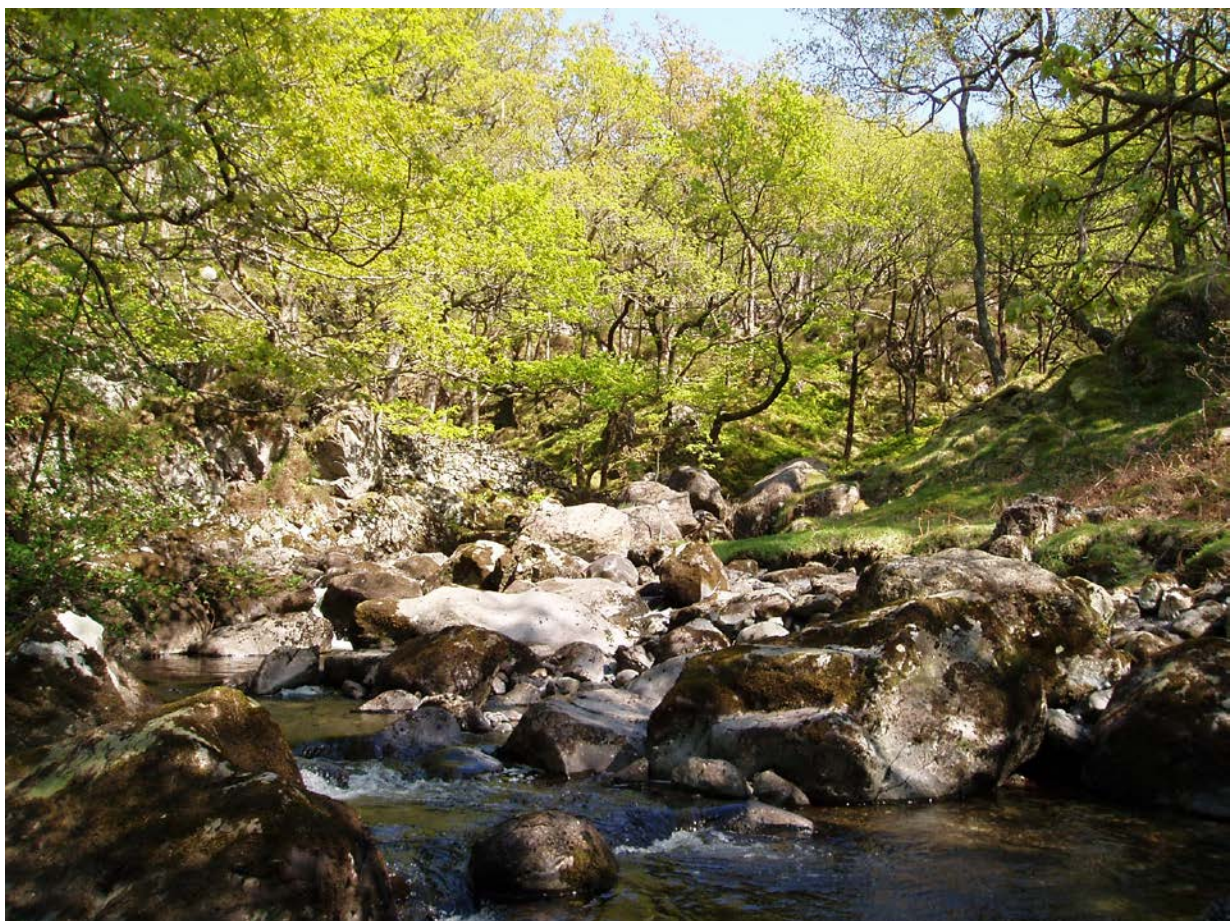




European Site Conservation Objectives: Supplementary Advice on Conserving and Restoring Site Features

**Borrowdale Woodland Complex Special Area of Conservation (SAC)
Site code: UK0012745**



Photograph by Susan MacKirdy

Date of Publication: 17 January 2017

About this document

This document provides Natural England's supplementary advice about the European Site Conservation Objectives relating to Borrowdale Woodland Complex SAC. This advice should therefore be read together with the SAC Conservation Objectives available [here](#).

You should use the Conservation Objectives, this Supplementary Advice and any case-specific advice given by Natural England, when developing, proposing or assessing an activity, plan or project that may affect this site.

This Supplementary Advice to the Conservation Objectives presents attributes which are ecological characteristics of the designated species and habitats within a site. The listed attributes are considered to be those that best describe the site's ecological integrity and which, if safeguarded, will enable achievement of the Conservation Objectives. Each attribute has a target which is either quantified or qualitative depending on the available evidence. The target identifies as far as possible the desired state to be achieved for the attribute.

The tables provided below bring together the findings of the best available scientific evidence relating to the site's qualifying features, which may be updated or supplemented in further publications from Natural England and other sources. The local evidence used in preparing this supplementary advice has been cited. The references to the national evidence used are available on request. Where evidence and references have not been indicated, Natural England has applied ecological knowledge and expert judgement. You may decide to use other additional sources of information.

In many cases, the attribute targets shown in the tables indicate whether the current objective is to 'maintain' or 'restore' the attribute. This is based on the best available information, including that gathered during monitoring of the feature's current condition. As new information on feature condition becomes available, this will be added so that the advice remains up to date.

The targets given for each attribute do not represent thresholds to assess the significance of any given impact in Habitats Regulations Assessments. You will need to assess this on a case-by-case basis using the most current information available.

Some, but not all, of these attributes can also be used for regular monitoring of the actual condition of the designated features. The attributes selected for monitoring the features, and the standards used to assess their condition, are listed in separate monitoring documents, which will be available from Natural England.

These tables do not give advice about SSSI features or other legally protected species which may also be present within the European Site.

If you have any comments or queries about this Supplementary Advice document please contact your local Natural England adviser or email HDIRConservationObjectivesNE@naturalengland.org.uk

About this site

European Site information

Name of European Site	Borrowdale Woodland Complex Special Area of Conservation (SAC)
Location	Cumbria
Site maps	The designated boundary of this site can be viewed here on the MAGIC website
Designation Date	01 April 2005
Qualifying Features	H91A0. Old sessile oak woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles ('Western acidic oak woodland') H91D0. Bog woodland (<i>*Priority feature</i>) H8220. Siliceous rocky slopes with chasmophytic vegetation ('Plants in crevices on acid rocks')
Designation Area	667.83 hectares
Designation Changes	None
Feature Condition Status	Details of the feature condition assessments made at this site can be found using Natural England's Designated Sites System
Names of component Sites of Special Scientific Interest (SSSIs)	Great Wood SSSI, Johnny Wood SSSI, Lodore - Troutdale Woods SSSI, Scales Wood SSSI, Seatoller Wood, Sourmilk Gill and Seathwaite Graphite Mine SSSI, Stonethwaite Woods SSSI
Relationship with other European or International Site designations	None
Other information	Natura 2000 Standard Data Form for Borrowdale Woodland Complex SAC

Site background and geography

Lying within the dramatic upland landscape of the Cumbria High Fells National Character Area, which covers the north and central Lake District and is largely within the Lake District National Park, Borrowdale contains a greater extent of native woodland than any other of the Lakeland valleys.

Most of the woodlands are of the hanging type on steep slopes between around 80 m and 380 m above sea level. The parent rock is almost entirely the Borrowdale Volcanic Series, which generally gives rise to acidic soils, but contains calcite beds in many places. The slopes within most woods are variably covered with block scree, and many have outcrops of varying size from small faces to high cliffs. The woods lie within a sharp rainfall gradient varying from around 180 cm at Great Wood to about 320 cm at Seathwaite. There are fine stands of high forest sessile oak woods in a number of locations, such as, Great Wood, Johnny's Wood and Seatoller Wood and smaller coppice in Troutdale.

In these oak woods a shrub layer is generally absent, with scattered individuals of birch, hazel and rowan. Ash-hazel wood occurs in many locations, its juxtaposition with sessile oak reflecting soil-based lines of separation. These ash woods contain wych elm, and usually an understorey of hazel and a generally wider variety of shrubs. Birch woods are evident on upper slopes, with juniper and yew in

places, there are small patches of bog woodland dominated by birch on peat soils, and a fringe of alder wood, willow, reed and sedge is found along the shore of Derwent Water, which completes the ecological zonation.

The woods were undoubtedly exploited for timber in the 18th and 19th centuries, and many, if not all, locations have been replanted with native trees, and in recent decades with exotic conifers for more commercial objectives. The field layer varies according to depth of soil and rockiness of the ground and is invariably calcifuge or indifferent. On stable ground where grazing has been present there is a tendency for a grassy sward to develop with bracken locally dominant. Bilberry is often abundant and would most likely dominate the oak stands where grazing is absent.

Fern communities are well developed especially on the block scree. There is a widespread carpet of bryophytes composed of the general species associated with oak and ash-hazel woods, and a notably strong representation of the Atlantic element. Lodore Falls is the most important location in England for Atlantic bryophytes. Borrowdale appears to be especially rich in moisture-loving species, not only because of its western position and high rainfall, but also because of the apparent historical continuity of woodland cover in places.

The Borrowdale woods are equally important for oceanic lichens, some of which are very rare in Britain, and benefits from some of the best locations in England for arboreal species, including some of the large foliose ones. Red squirrel, northern wood ant, netted carpet moth, pied flycatcher and wood warbler are among the notable associated species.

About the qualifying features of the SAC

The following section gives you additional, site-specific information about this SAC's qualifying features. These are the natural habitats and/or species for which this SAC has been designated.

Qualifying habitats:

- **H91A0. Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles; Western acidic oak woodland**

This habitat type comprises a range of woodland types dominated by mixtures of oak (*Quercus robur* and/or *Q. petraea*) and birch (*Betula pendula* and/or *B. pubescens*). It is characteristic of base-poor soils in areas of at least moderately high rainfall in northern and western parts of the UK. The woodland vegetation communities which comprise this SAC habitat most closely resemble the NVC types W11 *Quercus petraea* – *Betula pubescens* – *Oxalis acetocella* and W17 *Quercus petraea* – *Betula pubescens* – *Dicranum majus*.

The habitat shows considerable variation across its range in Borrowdale, in terms of the associated ground flora and the richness of bryophyte communities. There is a continuous spectrum of variation between oak-dominated and birch-dominated stands. Often these local variations reflect factors such as rainfall, slope, aspect, soil depth, and past and present woodland management (e.g. coppicing, planting, grazing).

The most distinctive forms of the habitat have a ground flora dominated by bryophytes. Other variants include stands in which the ground flora is characterised by the prominence of dwarf shrubs, such as bilberry *Vaccinium myrtillus*; grasses, such as wavy hair-grass *Deschampsia flexuosa*, common bent *Agrostis capillaris* and sweet vernal-grass *Anthoxanthum odoratum*; and plants indicative of more mesophytic conditions, including bluebell *Hyacinthoides non-scripta*, bramble *Rubus fruticosus*, scaly male-fern *Dryopteris affinis*.

Birch-dominated woodlands which contain at least some oak, and which either (a) occur as part of an intimate mosaic with oak-dominated stands, or (b) are clearly successional stages which are reverting to oak woodland, are included in this Annex I habitat definition.

A key feature of European importance is the rich Atlantic bryophyte communities that are often well-developed within this Annex I type. These include numerous rare species, such as *Campylopus setifolius*, *Sematophyllum demissum*, *Adelanthus decipiens*, *Leptoscyphus cuneifolius* and *Plagiochila atlantica*. Fourteen different bryophyte zones have been identified in the UK (Ratcliffe 1968), with distinct differences in the bryophyte assemblages within them. The richest zones are in the western Scottish Highlands. Stands of old sessile oak woods in eastern Britain tend to be much smaller and less distinctive in their species composition, particularly their bryophyte assemblages.

The woodlands comprising the SAC contain bryophyte assemblages that are relatively high compared to other woods in the British Isles, reflecting the presence of good bryophyte habitat including stream sides, ravines and rock outcrops incorporating a wide range of substrates from wet to dry and from acidic to basic. The high total number and the rich oceanic bryophyte flora are important at local, national and international levels. Several species are uncommon in the British Isles and are typically found in small quantity including *Plagiochila exigua*, *Harpalegeunea molleri*, *Drepanolejeunea hamatifolia*, *Aphanolejeunea microscopica*, *Jubula hutchinsiae*, *Radula aquilegia*, *Radula volute* and *Herbertus aduncus*, whereas the more common species are found in good quantity including *Scapania gracilis*, *Saccogyna viticulosa* and *Plagiochila spinulosa*.

The presence of a number of species is reflective of long-term canopy cover and low levels of disturbance and includes the moss *Sematophyllum micans* and the liverworts *Adelanthus decipiens*, *Plagiochila atlantica* and *Jamesoniella autumnalis* together with good populations of the scarce liverworts *Harpalejeunea molleri*, *Plagiochila exigua* and *Radula volute* (Averis, 2002).

In addition to the bryophyte zones, there are distinct differences in higher plant and animal assemblages in the south compared with the north. Some woodland in the complex, particularly Great Wood, hold a rich lichen flora, especially epiphytic assemblages such as macrolichens of the *Lobaria pulmonariae* community (Averis, 2002).

- **H91D0. Bog woodland (*Priority feature)**

Under certain combinations of physical circumstances in the UK, scattered trees can occur across the surface of a bog in a relatively stable ecological relationship as open woodland, without the loss of bog species. This true bog woodland is much rarer than the progressive invasion of bogs by trees, through natural colonisation or afforestation following changes in the drainage pattern which leads eventually to the loss of the bog community. The habitat type has not previously been well described in the UK, and consequently knowledge of its ecological characteristics is limited.

This woodland stand is found in small areas amongst the oak dominated stands, over peat soils, and conforms to the NVC type W4b *Betula pubescens* – *Molinia caerulea* woodland, *Juncus effusus* sub-community.

- **H8220. Siliceous rocky slopes with chasmophytic vegetation; Plants in crevices on acid rocks**

In the UK, 'chasmophytic' vegetation comprises plant communities that colonise the cracks and fissures of rock faces. These chasmophytic plants which grow on rock crevices are able to thrive in an extremely inhospitable environment with full exposure to sun and wind and minimal levels of soil and nutrients. They have developed special adaptations, such as strong roots, in order to survive. The type of plant community that develops is largely determined by the base-status of the rock face. Siliceous communities develop on acid rocks whereas calcareous sub-types develop on lime-rich rocks such as limestone and calcareous schists.

Siliceous rock crevice vegetation is poorly covered by the UK NVC, although some forms can be referred to U21 *Cryptogramma crispa* – *Deschampsia flexuosa* community. The habitat type typically is distinguished by parsley fern *Cryptogramma crispa* and mixtures of bryophytes, such as *Amphidium mougeotii* and *Racomitrium* spp., and vascular plants, such as wavy hair-grass *Deschampsia flexuosa* and fir clubmoss *Huperzia selago*.

Altitude and geographical location account for a large part of the ecological variation exhibited by this habitat type. In western localities, especially close to the coast, the habitat type is enriched by oceanic species as well as rich assemblages of Atlantic bryophytes. In the southern uplands of Wales and England, northern floristic elements are reduced, and some species, such as dwarf willow *Salix herbacea*, have their most southerly occurrence in this habitat type.

Boulder-strewn woodland floors and open block scree cover a significant area of this SAC on steep slopes mainly with acidic geology. Pockets of U21 *Cryptogramma crispa* – *Deschampsia flexuosa* and fern-rich communities are found widely, however, this rocky habitat, especially beneath a closed woodland canopy, is more dominated by bryophytes, often reflecting micro-variations in conditions across individual boulders in all but the most dry and unstable locations. This community also extends on to cliff ledges and rock faces away from grazing animals where it merges with a community with U16 *Luzula sylvatica* – *Vaccinium myrtillus* characteristics. Southern species, such as forked spleenwort *Asplenium septentrionale*, tutsan *Hypericum androsaemum*, columbine *Aquilegia vulgaris* and wood bitter vetch *Vicia orobus*, also occur.

Qualifying Species:

Not applicable at this SAC.

References

- AVERIS, A.B.G., 2002. Bryophyte survey of Lodore Woods, Borrowdale, Cumbria - October 2001. Unpublished report.
- RATCLIFFE, D. A. 1968. An ecological account of the Atlantic bryophytes of the British Isles. *New Phytologist*, 67, 365-439.
- RODWELL, J.S. (ed.) 1991. *British Plant Communities. Volume 1 - Woodlands and scrub*. Cambridge University Press.

Table 1: Supplementary Advice for Qualifying Features: H91A0. Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles (Western acidic oak woodland)

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Extent and distribution of the feature	Extent of the feature within the site	Restore the total extent of the H91A0 feature to 540 hectares.	There should be no measurable net reduction (excluding any trivial loss) in the extent and area of this feature, and in some cases, the full extent of the feature may need to be restored. The baseline-value of extent given has been generated using data gathered from the listed site-based surveys. Area measurements given may be approximate depending on the methods, age and accuracy of data collection, and as a result this value may be updated in future to reflect more accurate information. The extent of an Annex I habitat feature covers the sum extent of all of the component vegetation communities present and may include transitions and mosaics with other closely-associated habitat features. Where a feature is susceptible to natural dynamic processes, there may be acceptable variations in its extent through natural fluctuations. Where a reduction in the extent of a feature is considered necessary to meet the Conservation Objective for another Annex I feature, Natural England will advise on this on a case-by-case basis. For this feature tree roots (particularly of veteran trees) can extend a considerable distance beyond the boundary of the site - they can be impacted by soil compaction (such as caused by vehicles or construction works); agricultural operations or other soil disturbance (like trenches); and agro chemicals or other chemicals which get into the soil. Any loss of woodland area - whether at the edge or in the middle of a site will reduce the core woodland area where woodland conditions are found - these support significant assemblages of species dependent on woodland conditions (e.g. lichens and bryophytes - being one example). Loss of any woodland area which fragments a site into different parts will clearly disturb the movement of species between the remaining parts of the woodland.	STEWART, A & TIDSWELL, R. 1995. Survey of Woodland Communities in Borrowdale using the National Vegetation Classification with recommendations for woodland management. A report for English Nature and the National Trust. NATURE CONSERVANCY COUNCIL, 1982; 1984. Phase II SSSI habitat maps NATURAL ENGLAND. SSSI Definitions of Favourable Condition and Maps compiled by Natural England for individual SSSIs.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			The component sites within this complex have individual extent areas however a number of sites have large areas of open ground formerly under grazing regimes that have now ceased. Given the closed nature of the canopy over large parts of the habitat extent, it is expected that regeneration will best occur in the more open locations where natural processes are being encouraged in the site objectives.	
Extent and distribution of the feature	Spatial distribution of the feature within the site	Restore the distribution and configuration of the H91A0 feature, including where applicable its component vegetation types, across the site	A contraction in the range, or geographic spread, of the feature (and its component vegetation and typical species, plus transitional communities) across the site will reduce its overall area, the local diversity and variations in its structure and composition, and may undermine its resilience to adapt to future environmental changes. This may also reduce and break up the continuity of a habitat within a site and how well its typical species are able to move around the site to occupy and use habitat. Such fragmentation can impact on their viability and the wider ecological composition of the Annex I habitat. Smaller fragments of habitat can typically support smaller and more isolated populations which are more vulnerable to extinction. These fragments also have a greater amount of open edge habitat which will differ in the amount of light, temperature, wind, and even noise that it receives compared to its interior. These conditions may not be suitable for some of the typical and more specialist species associated with the Annex I habitat feature. The long-term continuity of many bryophyte and lichen species on the site, and their ability to colonise new locations is dependent upon the continuity and quality of high forest cover. In locations such as Lodore, there has been a history of enclosed grazing, including the woodlands and heathland habitat higher up slope in some units. The objective is to enable natural processes to determine woodland distribution.	STEWART, A & TIDSWELL, R. 1995. NCC, 1982, 1984.
Structure and function (including its typical)	Vegetation community composition	Ensure the component vegetation communities of the H91A0 feature are referable to and characterised by the	This habitat feature will comprise a number of associated semi-natural vegetation types and their transitional zones, reflecting the geographical location of the site, altitude, aspect, soil conditions (especially base-status and drainage) and vegetation management.	STEWART, A & TIDSWELL, R. 1995.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
species)		following National Vegetation Classification types: NVC W11 <i>Quercus petraea</i> – <i>Betula pubescens</i> – <i>Oxalis acetocella</i> NVC W17 <i>Quercus petraea</i> – <i>Betula pubescens</i> – <i>Dycranum majus</i> NVC W9 <i>Fraxinus excelsior</i> – <i>Sorbus aucuparia</i> – <i>Mercurialis perennis</i> woodland NVC W7 <i>Alnus glutinosa</i> – <i>Fraxinus excelsior</i> – <i>Lysimachia nemorum</i> woodland NVC W5 <i>Alnus glutinosa</i> – <i>Carex paniculata</i> woodland Maintain a natural transition between these NVC types and the more open heathland communities.	In the UK these have been categorised by the National Vegetation Classification (NVC). Maintaining or restoring these characteristic and distinctive vegetation types, and the range of types as appropriate, will be important to sustaining the overall habitat feature. This will also help to conserve their typical plant species (i.e. the constant and preferential species of a community), and therefore that of the SAC feature, at appropriate levels (recognising natural fluctuations).	
Structure and function (including its typical species)	Vegetation structure - canopy cover	Maintain a tree canopy cover of between 70-90% within woodland stands.	Canopy cover is the overall proportion of vegetative cover consisting of any woody layer ranging from established regeneration to mature and veteran stages. Woodland canopy density and structure is important because it affects ecosystem function and in particular microclimate, litterfall, soil moisture, nutrient turnover and shading; this in turn influences the composition of plants and animals in lower vegetation layers and soil. Open canopies with just scattered trees will have less of a woodland character and reduced diversity of woodland-dependent species (although they may be still important as a form of woodland-pasture). Completely closed canopies across the whole woodland are not ideal either however, as they cast heavier shade and support fewer species associated with edges, glades and open grown trees, and have little space where tree regeneration could occur.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			In general, the woodland canopy of this feature should provide a core of woodland interior conditions with some open and edge habitat as well. Local targets for canopy cover vary across different component SSSIs within the range stated, and are derived from the Definitions of Favourable Condition for individual SSSIs within the complex.	
Structure and function (including its typical species)	Vegetation structure - open space	Maintain areas of permanent and temporary open space within the H91A0 woodland feature, typically to cover approximately 10% of the woodland stand areas.	Woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning. Having some open, sunlit and largely tree-less areas as part of the woodland community is often important to facilitate natural tree and shrub regeneration and also to provide supporting habitat for specialist woodland invertebrates, birds, vascular and lower plants. Such open space can be permanent or temporary and may consist of managed grazed areas, linear rides and glades, or naturally-produced gaps caused by disturbance events such as windthrow/fire/tree falling over/snow damage. Areas within Lodore – Troutdale Woods and Seathwaite Wood are more reflective of a wood pasture feel and can expect to retain this more open landscape, especially on lower ground, whilst other areas of the same sites are expected to exhibit expansion and transition under natural processes on to higher slopes.	STEWART, A & TIDSWELL, R. 1995
	Vegetation structure - old growth	Maintain the extent and continuity of undisturbed, mature/old growth stands (typically comprising at least 20% of the H91A0 feature at any one time) and their assemblages of veteran and ancient trees (typically >10 trees per hectare).	Good woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning. For this habitat type, old or over-mature elements of the woodland are particularly characteristic and important features, and their continuity should be a priority. Old trees and continuous stands of old growth are noted to be of particular value as hosts for bryophytes and corticolous lichens in this complex.	AVERIS, A.B.G., 2001. Bryophyte survey of Seatoller Wood and Johnny Wood, April 2000. Report to the National Trust AVERIS, A.B.G., Bryophyte surveys of

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			These sites have been known for their lichen and bryophyte interest and well recorded for a long time	Stonethwaite Woods, 2000 and 2007. Report to the National Trust AVERIS, A.B.G., 2002. Bryophyte survey of Lodore Woods, Borrowdale Cumbria, October 2001. Report to the National Trust AVERIS, A.B.G., 2008. Bryophyte survey of Lodore Falls, December 2007. Report to the Environment Agency DAY, I. 1996. Lichen survey of Borrowdale Woodlands. Report to the National Trust. NEWTON, M. E. 2005. Scales Wood: Bryophyte Monitoring
Structure and function (including its typical species)	Vegetation structure - dead wood	Maintain the continuity and abundance of standing or fallen dead and decaying wood, typically 6 fallen trees >30cm per hectare, and 5 standing dead trees per hectare	Woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning. Dead and actively decaying wood, either as part of a standing tree or as a fallen tree on the woodland floor, is an important component of woodland ecosystems, and supports a range of specialist invertebrates, fungi, lichens and bryophytes, and associated hole-nesting birds and roosting bats, all of which may be very typical of the feature.	SSSI condition assessments and FCTs 2015-16

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Structure and function (including its typical species)	Vegetation structure - age class distribution	Restore at least 3 age classes (pole stage/ medium/ mature) spread across the average life expectancy of the commonest trees.	A distribution of size and age classes of the major site-native tree and shrub species that indicate the woodland will continue in perpetuity, and will provide a variety of the woodland habitats and niches expected for this type of woodland at the site in question. Ensuring the regenerative process within the open areas and at the edges of existing woodland will secure the development of improvements in the age structure. Improving the provision of mature trees where these are currently lacking will take many years.	SSSI condition assessments and FCTs 2015-16
	Vegetation structure - shrub layer	Maintain an understorey shrub layer covering 10% of the stand area within oak stands and 25% in alder and ash woodlands	Woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning.	
	Vegetation structure - woodland edge	Restore a graduated woodland edge into adjacent semi-natural open habitats, other woodland/wood-pasture types or scrub.	Woodland edge is defined as being the transitional zone between the forest feature and adjacent but different habitat types - the best woodland edges will have a varied structure in terms of height and cover. Many typical forest species make regular use of the edge habitats for feeding due to higher herb layer productivity and larger invertebrate populations. Lodore – Troutdale Woods and Seathwaite Wood have areas where transition zones and development of a more typical woodland edge habitat can readily occur, but all sites within the complex could benefit from the restoration of woodland edge.	
	Adaptation and resilience	Maintain the resilience of the H91A0 feature by ensuring a diversity (at least 12 species) of site-native trees and shrubs (eg sessile oak, birch, holly, ash, wych elm, yew, juniper, alder, rowan, bird cherry, willow, hazel and hawthorn) across the site.	This recognises the increasing likelihood of natural habitat features needing to absorb or adapt to wider environmental changes. Resilience may be described as the ability of an ecological system to cope with, and adapt to environmental stress and change whilst retaining the same basic structure and ways of functioning. Such environmental changes may include changes in sea levels, precipitation and temperature for example, which are likely to affect the extent, distribution, composition and functioning of a feature within a site.	NATURAL ENGLAND, 2015. Climate Change Theme Plan and supporting NBCCV Assessments for SACs and SPAs [both available at http://publications.naturalengland.org.uk/publication/4954594591375360]

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			The vulnerability and response of features to such changes will vary. The overall vulnerability of this particular SAC to climate change has been assessed by Natural England as being low, taking into account the sensitivity, fragmentation, topography and management of its habitats. This means that this site is considered to be vulnerable overall but is a lower priority for further assessment and action. Individual species may be more or less vulnerable than their supporting habitat itself. In many cases, change will be inevitable so appropriate monitoring would be required. Using best available information, any necessary or likely adaptation or adjustment by the feature and its management in response to actual or expected climatic change should be allowed for, as far as practicable, in order to ensure the feature's long-term viability.	
Structure and function (including its typical species)	Browsing and grazing by herbivores	Restore browsing to a (low) level that maintains a well-developed understorey with no obvious browse line, lush ground vegetation with some grazing sensitive species evident (e.g. bramble, ivy), and tree seedlings and sapling common in gaps.	Herbivores, especially deer, are an integral part of woodland ecosystems. They are important in influencing woodland regeneration, composition and structure and therefore in shaping woodland wildlife communities. In general, light grazing and browsing is desirable to promote both a diverse woodland structure and continuous seedling establishment. Short periods with no grazing at all can allow fresh natural regeneration of trees, but a long-term absence of herbivores can result in excessively dense thickets of young trees which shade out ground flora and lower plant species. However, heavy grazing by deer or sheep prevents woodland regeneration, and can cause excessive trampling and/or poaching damage, canopy fragmentation, heavy browsing, bark stripping and a heavily grazed sward. Monitoring of individual sites during 2015/16 is showing that browsing by deer is having a widespread impact on the potential for regeneration of tree and shrub species throughout the complex. The Site Improvement Plan for Borrowdale Woodland Complex SAC identifies the need for deer management and control of grazing by livestock on a landscape scale. HLS agreements secured on a number of tenanted farms are having beneficial effects on the impacts from livestock, however, deer numbers appear to be currently rising and their impact continues to be widespread,	NATURAL ENGLAND, 2014. Site Improvement Plan for Borrowdale Woodland Complex SAC (SIP021). Available at http://publications.naturalengland.org.uk/publication/5108578910208000

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			requiring a co-ordinated approach to monitoring and management by numerous landowners. All sites in the complex could benefit from a thorough deer impact assessment.	
Structure and function (including its typical species)	Regeneration potential	Restore the potential for sufficient natural regeneration of desirable trees and shrubs; typically tree seedlings of desirable species (measured by seedlings and <1.3m saplings - above grazing and browsing height) should be visible in sufficient numbers in gaps, at the wood edge and/or as regrowth as appropriate.	The regeneration potential of the woodland feature must be maintained if the wood is to be sustained and survive, both in terms of quantity of regeneration and in terms of appropriate species. This will include regeneration of the trees and shrubs from saplings or suckers, regrowth from coppice stools or pollards, and where appropriate planting. Browsing and grazing levels must permit regeneration at least in intervals of 5 years every 20. The density of regeneration considered sufficient is less in parkland sites than in high forest. Regeneration from pollarding of veteran trees should be included where this is happening. Many of the woodland stands are high canopy woodland with near full canopy cover. However, regeneration of desirable tree and shrub species will contribute to the objectives to enable transition of woodland up slope, improve the density of cover of the shrub layer and regeneration at woodland edges.	
	Tree and shrub species composition	Maintain a canopy and under-storey of which 95% is composed of site native trees and shrubs.	Native trees and shrubs in general support a greater diversity of associated species than non-native species, especially amongst groups of invertebrates which depend directly on trees for food and shelter. There are many plants and animals which use or co-exist with non-native trees, but many rare and threatened woodland species are specialists adapted to one or a few native trees or shrub species (birches, willows and oaks, are examples of trees that host many specialist insect species). Some work is required to review the contribution of sycamore on sites in the context of ash die-back.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Structure and function (including its typical species)	Key structural, influential and/or distinctive species	Maintain the abundance of the species listed below to enable each of them to be a viable component of the H91A0 habitat; - Tree and shrub species as listed in the adaptation and resilience section above. - Constant and preferential species of site's NVC community types listed above. - Assemblage of bryophyte and lichen communities associated with western acidic woodland - Assemblage of ferns characteristic of western acidic woodland. - Northern wood ant <i>Formica lugubris</i> - Red squirrel <i>Sciurus vulgaris</i>	Some plant or animal species (or related groups of such species) make a particularly important contribution to the structure, function and/or quality of an Annex I habitat feature at a particular site. These species will include; - Structural species which form a key part of the habitat's structure or help to define an Annex I habitat on a site (see also the attribute for 'vegetation community composition'). - Influential species which are likely to have a key role affecting the structure and function of the habitat (such as bioturbators (mixers of soil/sediment), grazers, surface borers, predators or other species with a significant functional role linked to the habitat). - Site-distinctive species which are considered to be a particularly special and distinguishing component of an Annex I habitat on a particular site. There may be natural fluctuations in the frequency and cover of each of these species. The relative contribution made by them to the overall ecological integrity of a site may vary, and Natural England will provide bespoke advice on this as necessary. The list of species given here for this Annex I habitat feature at this SAC is not necessarily exhaustive. The list may evolve, and species may be added or deleted, as new information about this site becomes available.	AVERIS, A.B.G., 2000, 2001, 2002, 2007, 2008. DAY, I. 1996. NEWTON, M. E. 2005. Natural England monitoring surveys looking at target note locations from the above reports. SSSI citation and Natural England survey data.
	Invasive, non-native and/or introduced species	Ensure invasive and introduced non-native species are either rare or absent, but if present are causing minimal damage to the H91A0 feature	Invasive or introduced non-native species are a serious potential threat to the biodiversity of native and ancient woods, because they are able to exclude, damage or suppress the growth of native tree, shrub and ground species (and their associated typical species), reduce structural diversity and prevent the natural regeneration of characteristic site-native species. Once established, the measures to control such species may also impact negatively on the features of interest (eg use of broad spectrum pesticides). Such species can include Rhododendrons, snowberry,	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			Japanese knotweed, giant hogweed and Himalayan balsam, for example. Similarly, this would include pheasants, rabbits and non-native invertebrate 'pest' species.	
Structure and function (including its typical species)	Soils, substrate and nutrient cycling	Maintain the properties of the underlying soil types, including structure, bulk density, total carbon, pH, soil nutrient status and fungal:bacterial ratio, to within typical values for the H91A0 habitat.	Soil is the foundation of basic ecosystem function and a vital part of the natural environment. Its properties strongly influence the colonisation, growth and distribution of those plant species which together form vegetation types, and therefore provides a habitat used by a wide range of organisms. Soil biodiversity has a vital role to recycle organic matter. Changes to natural soil properties may therefore affect the ecological structure, function and processes associated with this Annex I feature.	
	Root zones of ancient trees	Maintain the soil structure within and around the root zones of the mature and ancient tree cohort in an un-compacted condition	The management of land within and around forest habitats which are characterised by ancient trees can be crucial to their individual welfare and long-term continuity, and the landscape they are part of can be just as or even more important. The condition of the soil surrounding such trees will affect their roots, associated mycorrhizal fungi and growth. Plants have difficulty in compacted soil because the mineral grains are pressed together, leaving little space for air and water which are essential for root growth. Unless carefully managed, activities such as construction, forestry management and trampling by grazing livestock and human feet during recreational activity may all contribute to excessive soil compaction around ancient trees. A number of the comprising sites to the complex have long boundaries with a busy road and path network. The impact of this compaction has yet to be assessed.	
Supporting processes (on which the	Air quality	Restore as necessary, the concentrations and deposition of air pollutants to at or below the	This habitat type is considered sensitive to changes in air quality. Exceedance of critical values for air pollutants may modify the chemical status of its substrate, accelerating or damaging plant growth, altering its	More information about site-relevant Critical Loads and

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
feature relies)		site-relevant Critical Load or Level values given for the H91A0 feature of the site on the Air Pollution Information System (www.apis.ac.uk).	vegetation structure and composition and causing the loss of sensitive typical species associated with it. Critical Loads and Levels are recognised thresholds below which such harmful effects on sensitive UK habitats will not occur to a significant level, according to current levels of scientific understanding. There are critical levels for ammonia (NH₃), oxides of nitrogen (NO_x) and sulphur dioxide (SO₂), and critical loads for nutrient nitrogen deposition and acid deposition. There are currently no critical loads or levels for other pollutants such as Halogens, Heavy Metals, POPs, VOCs or Dusts. These should be considered as appropriate on a case-by-case basis. Ground level ozone is regionally important as a toxic air pollutant but flux-based critical levels for the protection of semi-natural habitats are still under development. The Site Improvement Plan for Borrowdale Woodland Complex SAC (Natural England 2014) identified that atmospheric nitrogen deposition currently constitutes a threat to all three SAC interest features. A number of the comprising sites to the complex have long boundaries with a busy road network. The impact of winter salt applications on qualifying features, especially the lichen component, has yet to be assessed. It is recognised that achieving this target may be subject to the development, availability and effectiveness of abatement technology and measures to tackle diffuse air pollution, within realistic timescales.	Levels for this SAC is available by using the 'search by site' tool on APIS. Site Improvement Plan for Borrowdale Woodland Complex SAC (Natural England 2014)
Supporting processes (on which the feature relies)	Hydrology	At a site, unit and/or catchment level, maintain natural hydrological processes to provide the conditions necessary to sustain the H91A0 feature within the site	Defining and maintaining the appropriate hydrological regime is a key step in moving towards achieving the conservation objectives for this site and sustaining this feature. Changes in the source, depth, duration, frequency, magnitude and timing of water supply can have significant implications for the assemblage of characteristic plants and animals present. This can include changes some distance from the site boundary. This target is generic and further site-specific investigations may be required to fully inform conservation measures and/or the likelihood of impacts. A number of small scale hydro-electric power schemes have been installed in becks within the SAC. The long-term impacts of these,	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			especially on the important bryological interests in the ravines, are yet to be assessed.	
Supporting processes (on which the feature relies)	Illumination	Ensure artificial light is maintained at a level which is unlikely to affect natural phenological cycles and processes to the detriment of the H91A0 feature and its typical species at this site.	Woodland biodiversity has naturally evolved with natural patterns of light and darkness, so disturbance or modification of those patterns can influence numerous aspects of plant and animal behaviour. For example, light pollution (from direct glare, chronically increased illumination and/or temporary, unexpected fluctuations in lighting) can affect animal navigation, competitive interactions, predator-prey relations, and animal physiology. Flowering and development of trees and plants can also be modified by un-natural illumination which can disrupt natural seasonal responses.	
Version Control Advice last updated: not applicable				
Variations from national feature-framework of integrity-guidance: None				

Table 2: Supplementary Advice for Qualifying Features: H91D0. Bog woodland *(priority feature)

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Extent and distribution of the feature	Extent of the feature within the site	Maintain the total extent of the H91D0 feature at 1.85 ha.	See the explanatory notes for this attribute in Table 1 above. The area of bog woodland is amalgamated from numerous small patches of this stand type, but has not been separately quantified. Locations of typical stands are indicated on objective maps to aid checking condition during monitoring.	STEWART, A & TIDSWELL, R. 1995 NCC, 1982, 1984. NATURAL ENGLAND. SSSI Definitions of Favourable Condition and Maps compiled by Natural England for individual sites.
	Spatial distribution of the feature within the site	Maintain the distribution and configuration of the H91D0 feature, including where applicable its component vegetation types, across the site	A contraction in the range, or geographic spread, of the feature (and its component vegetation and typical species, plus transitional communities) across the site will reduce its overall area, the local diversity and variations in its structure and composition, and may undermine its resilience to adapt to future environmental changes. This may also reduce and break up the continuity of a habitat within a site and how well its typical species are able to move around the site to occupy and use habitat. Such fragmentation can impact on their viability and the wider ecological composition of the Annex I habitat. Smaller fragments of habitat can typically support smaller and more isolated populations which are more vulnerable to extinction. These fragments also have a greater amount of open edge habitat which will differ in the amount of light, temperature, wind, and even noise that it receives compared to its interior. These conditions may not be suitable for some of the typical and more specialist species associated with the Annex I habitat feature.	
Structure and function (including its typical species)	Vegetation community composition	Ensure the component vegetation communities of the H91D0 feature are referable to and characterised by the following National Vegetation Classification type; NVC W4 <i>Betula pubescens</i> –	This habitat feature will comprise a number of associated semi-natural vegetation types and their transitional zones, reflecting the geographical location of the site, altitude, aspect, soil conditions (especially base-status and drainage) and vegetation management. In the UK these have been categorised by the National Vegetation Classification (NVC). Maintaining or restoring these characteristic and distinctive vegetation types, and the range of types as appropriate, will be	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		<i>Molinia caerulea</i> woodland	important to sustaining the overall habitat feature. This will also help to conserve their typical plant species (i.e. the constant and preferential species of a community), and therefore that of the SAC feature, at appropriate levels (recognising natural fluctuations).	
Structure and function (including its typical species)	Vegetation structure - canopy cover	Maintain an appropriate tree canopy cover across the H91D0 feature, which will typically be between 70-90% of the site	Canopy cover is the overall proportion of vegetative cover consisting of any woody layer ranging from established regeneration to mature and veteran stages. Woodland canopy density and structure is important because it affects ecosystem function and in particular microclimate, litterfall, soil moisture, nutrient turnover and shading; this in turn influences the composition of plants and animals in lower vegetation layers and soil. Open canopies with just scattered trees will have less of a woodland character and reduced diversity of woodland-dependent species (although they may be still be important as a form of woodland-pasture). Completely closed canopies across the whole woodland are not ideal either however, as they cast heavier shade and support fewer species associated with edges, glades and open grown trees, and have little space where tree regeneration could occur. In general, the woodland canopy of this feature should provide a core of woodland interior conditions with some open and edge habitat as well. Targets for canopy cover vary across different sites within the range stated, and are derived from the FCT tables for individual sites within the complex	NATURAL ENGLAND. SSSI Definitions of Favourable Condition and Maps compiled by Natural England for individual SSSIs.
	Vegetation structure - open space	Maintain areas of permanent and temporary open space within the H91D0 woodland feature, typically to cover approximately 10% of area due to permanently wet soils and slow tree growth	Woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning. Having some open, sunlit and largely tree-less areas as part of the woodland community is often important to facilitate natural tree and shrub regeneration and also to provide supporting habitat for specialist woodland invertebrates, birds, vascular and lower plants. Such open space can be permanent or temporary and may consist of managed grazed areas, linear rides and glades, or naturally-produced gaps caused by disturbance events such as windthrow/fire/tree falling over/snow	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			damage.	
Structure and function (including its typical species)	Vegetation structure - old growth	Maintain the extent and continuity of undisturbed, mature/old growth stands (typically comprising at least 10% of the H91D0 feature at any one time) and the assemblages of veteran and ancient trees (typically 5-10 trees per hectare).	Good woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning. For this habitat type, old or over-mature elements of the woodland are particularly characteristic and important features, and their continuity should be a priority. Old trees and continuous stands of old growth are noted to be of particular value to bryophytes and corticolous lichens in this complex.	
	Vegetation structure - dead wood	Maintain the continuity and abundance of standing or fallen dead and decaying wood, typically 6 fallen trees >20cm per hectare, and 5 standing dead trees per hectare	Dead and actively decaying wood, either as part of a standing tree or as a fallen tree on the woodland floor, is an important component of woodland ecosystems, and supports a range of specialist invertebrates, fungi, lichens and bryophytes, and associated hole-nesting birds and roosting bats, all of which may be very typical of the feature.	
	Vegetation structure - age class distribution	Restore at least 3 age classes (pole stage/ medium/ mature) spread across the average life expectancy of the commonest trees.	A distribution of size and age classes of the major site-native tree and shrub species that indicate the woodland will continue in perpetuity, and will provide a variety of the woodland habitats and niches expected for this type of woodland at the site in question. Ensuring the regenerative process within the open areas and at the edges of existing woodland will secure the development of improvements in the age structure. Improving the provision of mature trees where these are currently lacking will take many years.	
	Vegetation structure - shrub layer	Maintain an understorey of shrubs covering 5- 25% of the stand area (this will vary with light levels and site objectives)	Woodland structure includes variations in age, tree form, layering, the distribution and abundance of open space and dead wood. It plays a critical role in woodland ecosystem functioning. Understorey cover for this stand type is typically low.	
	Vegetation structure - woodland edge	Restore a graduated woodland edge into adjacent semi-natural open habitats, other woodland/wood-pasture types or scrub.	Woodland edge is defined as being the transitional zone between the forest feature and adjacent but different habitat types - the best woodland edges will have a varied structure in terms of height and cover. Many typical forest species make regular use of the edge habitats for feeding due to higher herb layer productivity and larger invertebrate populations.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			Grasslands / arable fields managed with high doses of agro-chemicals could potentially not allow this gradation of woodland edge and could have other impacts on the integrity of the site (pollution/ nutrient enrichment).	
Structure and function (including its typical species)	Adaptation and resilience	Maintain the resilience of the H91D0 feature by ensuring a diversity (at least 6 species) of site-native trees (eg birch spp, willow spp, alder, hazel, hawthorn, holly) across the site.	See the explanatory notes for this attribute above in Table 1.	
	Browsing and grazing by herbivores	Maintain browsing at a (low) level that allows well developed understorey with no obvious browse line, & lush ground vegetation with some grazing sensitive species evident (e.g. bramble, ivy), and tree seedlings and sapling common in gaps.	See the explanatory notes for this attribute above in Table 1	
	Regeneration potential	Restore the potential for sufficient natural regeneration of desirable trees and shrubs; typically tree seedlings of desirable species (measured by seedlings and <1.3m saplings - above grazing and browsing height) should be visible in sufficient numbers in gaps, at the wood edge and/or as regrowth as appropriate ;	The regeneration potential of the woodland feature must be maintained if the wood is to be sustained and survive, both in terms of quantity of regeneration and in terms of appropriate species. This will include regeneration of the trees and shrubs from saplings or suckers, regrowth from coppice stools or pollards, and where appropriate planting. Browsing and grazing levels must permit regeneration at least in intervals of 5 years every 20. The density of regeneration considered sufficient is less in parkland sites than in high forest. Regeneration from pollarding of veteran trees should be included where this is happening. Many of the woodland stands are high canopy woodland with near full canopy cover. However, this will contribute to the objectives to enable transition of woodland up slope, improve the density of cover of the shrub layer and regeneration at woodland edges.	
	Tree and shrub species composition	Maintain a canopy and understorey of which 95% is composed of site native trees and shrubs.	Native trees and shrubs in general support a greater diversity of associated species than non-native species, especially amongst groups of invertebrates which depend directly on trees for food and shelter. There are many plants and animals which use or co-exist with non-native trees, but many rare and threatened woodland species are specialists	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			adapted to one or a few native trees or shrub species (birches, willows and oaks, are examples of trees that host many specialist insect species).	
Structure and function (including its typical species)	Key structural, influential and/or distinctive species	Maintain the abundance of the species listed below to enable each of them to be a viable component of the H91D0 habitat; Tree and shrub species as listed in the adaptation and resilience section above. Ground flora communities as listed in the typical NVC community types listed in the vegetation community composition section above. Characteristic bryophyte and lichen communities as listed in the site specific survey information.	See the explanatory notes for this attribute in Table 1 above.	
	Invasive, non-native and/or introduced species	Ensure invasive and introduced non-native species are either rare or absent, but if present are causing minimal damage to the H91D0 feature	Invasive or introduced non-native species are a serious potential threat to the biodiversity of native and ancient woods, because they are able to exclude, damage or suppress the growth of native tree, shrub and ground species (and their associated typical species), reduce structural diversity and prevent the natural regeneration of characteristic site-native species. Once established, the measures to control such species may also impact negatively on the features of interest (eg use of broad spectrum pesticides). Such species can include Rhododendrons, snowberry, Japanese knotweed, giant hogweed and Himalayan balsam, for example. Similarly, this would include pheasants, rabbits and non-native invertebrate 'pest' species.	
	Soils, substrate and nutrient cycling	Maintain the properties of the underlying soil types, including structure, bulk density, total carbon, pH, soil nutrient status and fungal:bacterial ratio, to	Soil is the foundation of basic ecosystem function and a vital part of the natural environment. Its properties strongly influence the colonisation, growth and distribution of those plant species which together form vegetation types, and therefore provides a habitat used by a wide range of organisms.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		within typical values for the H91D0habitat.	Soil biodiversity has a vital role to recycle organic matter. Changes to natural soil properties may therefore affect the ecological structure, function and processes associated with this Annex I feature.	
Supporting processes (on which the feature relies)	Functional connectivity with wider landscape	Maintain the overall extent, quality and function of any supporting features within the local landscape which provide a critical functional connection with the site	This recognises the potential need to maintain or restore the connectivity of the site to its wider landscape in order to meet the conservation objectives. These connections may take the form of landscape features, such as habitat patches, hedges, watercourses and verges, outside of the designated site boundary which are either important for the migration, dispersal and genetic exchange of those typical species closely associated with qualifying Annex I habitat features of the site. These features may also be important to the operation of the supporting ecological processes on which the designated site and its features may rely. In most cases increasing actual and functional landscape-scale connectivity would be beneficial. Where there is a lack of detailed knowledge of the connectivity requirements of the qualifying feature, Natural England will advise as to whether these are applicable on a case by case basis.	
	Air quality	Restore as necessary, the concentrations and deposition of air pollutants to at or below the site-relevant Critical Load or Level values given for the H91D0 feature of the site on the Air Pollution Information System (www.apis.ac.uk).	See the explanatory notes for this attribute in Table 1 above. The Site Improvement Plan for Borrowdale Woodland Complex SAC (Natural England 2014) identified that atmospheric nitrogen deposition constitutes a threat to all three SAC interest features. A number of the comprising sites to the complex have long boundaries with a busy road network. The impact of winter salt applications on qualifying features, especially the lichen component, has not been assessed.	More information about site-relevant Critical Loads and Levels for this SAC is available by using the 'search by site' tool on APIS.
	Hydrology	At a site, unit and/or catchment level, maintain natural hydrological processes to provide the conditions necessary to sustain the H91D0 feature within the site	Defining and maintaining the appropriate hydrological regime is a key step in moving towards achieving the conservation objectives for this site and sustaining this feature. This is because changes in source, depth, duration, frequency, magnitude and timing of water supply can have significant implications for the assemblage of characteristic plants and animals present. For bog woodlands, hydrological processes (especially permanent wetness) are critical to their ecological functioning and must not be negatively	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			impacted. A number of small scale hydro-electric power schemes have been installed in becks within the SAC. The long-term impacts of these are yet to be assessed.	
Supporting processes (on which the feature relies)	Illumination	Ensure artificial light is maintained at a level which is unlikely to affect natural phenological cycles and processes to the detriment of the H91D0 feature and its typical species at this site.	Woodland biodiversity has naturally evolved with natural patterns of light and darkness, so disturbance or modification of those patterns can influence numerous aspects of plant and animal behaviour. For example, light pollution (from direct glare, chronically increased illumination and/or temporary, unexpected fluctuations in lighting) can affect animal navigation, competitive interactions, predator-prey relations, and animal physiology. Flowering and development of trees and plants can also be modified by un-natural illumination which can disrupt natural seasonal responses.	
Version Control Advice last updated: not applicable				
Variations from national feature-framework of integrity-guidance: none				

Table 3: Supplementary Advice for Qualifying Features: H8220. Siliceous rocky slopes with chasmophytic vegetation ('Plants in crevices on acid rocks')

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Extent and distribution of the feature	Extent of the feature within the site	Maintain the total extent of the H8220 feature.	There should be no measurable net reduction (excluding any trivial loss) in the extent and area of this feature, and in some cases, the full extent of the feature may need to be restored. At this SAC, this feature is widespread on block scree and cliffs both of which are extensive, but difficult to precisely map and measure. The extent of an Annex I habitat feature covers the sum extent of all of the component vegetation communities present and may include transitions and mosaics with other closely-associated habitat features. Where a feature is susceptible to natural dynamic processes, there may be acceptable variations in its extent through natural fluctuations. Where a reduction in the extent of a feature is considered necessary to meet the Conservation Objective for another Annex I feature, Natural England will advise on this on a case-by-case basis.	There is no specific data to cover the extent of this feature.
	Spatial distribution of the feature within the site	Maintain the distribution and configuration of the H8220 feature, including where applicable its component vegetation types, across the site	A contraction in the range, or geographic spread, of the feature (and its component vegetation and typical species, plus transitional communities) across the site will reduce its overall area, the local diversity and variations in its structure and composition, and may undermine its resilience to adapt to future environmental changes. This may also reduce and break up the continuity of a habitat within a site and how well its typical species are able to move around the site to occupy and use habitat. Such fragmentation can impact on their viability and the wider ecological composition of the Annex I habitat. Smaller fragments of habitat can typically support smaller and more isolated populations which are more vulnerable to extinction. These fragments also have a greater amount of open-edge habitat which will differ in the amount of light, temperature, wind, and even noise that it receives compared to its interior. These conditions may not be suitable for some of the typical and more specialist species associated with the Annex I habitat feature.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Structure and function (including its typical species)	Vegetation community composition	Ensure the component vegetation communities of the H8220 feature are generally referable to and characterised by the following National Vegetation Classification type; U21 <i>Cryptogramma crispa</i> - <i>Deschampsia flexuosa</i> NVC type (but see supporting comments)	This habitat feature will comprise a number of associated semi-natural vegetation types and their transitional zones, reflecting the geographical location of the site, altitude, aspect, soil conditions (especially base-status and drainage) and vegetation management. In the UK these have been categorised by the National Vegetation Classification (NVC). Maintaining or restoring these characteristic and distinctive vegetation types, and the range of types as appropriate, will be important to sustaining the overall habitat feature. This will also help to conserve their typical plant species (i.e. the constant and preferential species of a community), and therefore that of the SAC feature, at appropriate levels (recognising natural fluctuations). Siliceous rock crevice vegetation is poorly covered by the NVC, although some forms can be referred to U21 <i>Cryptogramma crispa</i> – <i>Deschampsia flexuosa</i> community, which can occur on scree or boulders. This is pioneer vegetation of open, rock ground, usually on steep slopes which comprises mixtures of bryophytes, such as <i>Amphidium mougeotii</i> and <i>Racomitrium</i> spp. and vascular plants, such as wavy hair-grass <i>Deschampsia flexuosa</i> and fir clubmoss <i>Huperzia</i>. Rock faces within this site also support a dry chasmophytic vegetation characterised by columbine <i>Aquilegia vulgaris</i> and orpine <i>Sedum telephium</i>. This is both poorly described and mapped. Until such time as better information is available on community types, vegetation composition and indicator species, the attributes and targets are of necessity brief and aim to ensure that the habitat remains open and is impacted relatively lightly by human activities.	
	Vegetation community transitions	Maintain the pattern of any natural vegetation zonation or transitions.	The presence of calcareous bands within otherwise mainly siliceous rocks often brings the two types together on the same rock outcrop. As a result, calcareous rocky slopes with chasmophytic vegetation (Annex I type H 8210) may occur in close association with Siliceous rocky slopes with chasmophytic vegetation, and some sites are listed for both types.	
	Invasive, non-native and/or introduced species	Ensure invasive and introduced non-native species are either rare or absent, but if present are causing minimal damage to the	Invasive or introduced non-native species can be a serious potential threat to the structure and function of these habitats, because they are able to exclude, damage or suppress the growth of their associated typical species, reduce structural diversity of the habitat and prevent the natural regeneration of	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		H8220 feature	characteristic site-native species. Once established, the measures to control such species may also impact negatively on the features of interest (e.g. use of broad spectrum pesticides).	
Structure and function (including its typical species)	Vegetation composition: trees and scrub	Maintain scrub and tree cover to less than 25% of the ground cover	The unpalatable nature and density of bracken as a tall-herb fern, and its decomposing litter, can smother and shade out smaller and more characteristic grassland vegetation. Usually active management of bracken and scrub is required to reduce or contain its cover. Although bracken and scattered native trees and scrub can naturally occur as part of this community, if they become dominant they can compromise the interest of this feature and key species will disappear.	
	Physical structure: ground disturbance	Ensure that significant areas of disturbed ground are either absent or are less 1% of the total H8220 feature, and be considered a temporary stage.	Whilst this is a habitat where vegetation cover can be sparse, significant disturbance by herbivores or humans (for example rock climbing) can cause damage.	
	Soils, substrate and nutrient cycling	Maintain the properties of the underlying soil types, including structure, bulk density, total carbon, pH, soil nutrient status and fungal:bacterial ratio, to within typical values for the H8220 habitat.	Soil is the foundation of basic ecosystem function and a vital part of the natural environment. Its properties strongly influence the colonisation, growth and distribution of those plant species which together form vegetation types, and therefore provides a habitat used by a wide range of organisms. Changes to natural soil properties may therefore affect the ecological structure, function and processes associated with this Annex I feature. For this feature the soil is rarely more than discontinuous, raw humus derived from the decaying fern fronds. <i>Cryptogramma crispera</i> seems unable to colonise very fine or loose scree, but can be very common on more stable slopes.	
	Adaptation and resilience	Maintain the H8220 feature's ability, and that of its supporting processes, to adapt or evolve to wider environmental change, either within or external to the site	See the explanatory notes for this attribute in Table 1 above	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Structure and function (including its typical species)	Key structural, influential and/or site distinctive species	Maintain the abundance of the species listed below to enable each of them to be a viable component of the H8220 habitat; - Parsley fern <i>Cryptogramma crispa</i> - Characteristic fern, lichen and bryophyte assemblages as listed in relevant surveys.	See the explanatory notes for this attribute in Table 1 above	
Supporting processes (on which the feature relies)	Air quality	Maintain the concentrations and deposition of air pollutants at or below the site-relevant Critical Load or Level values given for the H8220 feature of the site on the Air Pollution Information System (www.apis.ac.uk).	See the explanatory notes for this feature in Table1 above. The Site Improvement Plan for Borrowdale Woodland Complex SAC (Natural England 2014) identified that atmospheric nitrogen deposition constitutes a threat to all three SAC interest features. A number of the comprising sites to the complex have long boundaries with a busy road network. The impact of winter salt applications on qualifying features, especially the lichen component, has not been assessed. It is recognised that achieving this target may be subject to the development, availability and effectiveness of abatement technology and measures to tackle diffuse air pollution, within realistic timescales.	More information about site-relevant Critical Loads and Levels for this SAC is available by using the 'search by site' tool on APIS
	Functional connectivity with wider landscape	Maintain the overall extent, quality and function of any supporting features within the local landscape which provide a critical functional connection with the site	This recognises the potential need at this site to maintain or restore the connectivity of the site to its wider landscape in order to meet the conservation objectives. These connections may take the form of landscape features, such as habitat patches, hedges, watercourses and verges, outside of the designated site boundary which are either important for the migration, dispersal and genetic exchange of those typical species closely associated with qualifying Annex I habitat features of the site. These features may also be important to the operation of the supporting ecological processes on which the designated site and its features may rely. In most cases increasing actual and functional landscape-scale connectivity would be beneficial. Where there is a lack of detailed knowledge of the connectivity requirements of the qualifying feature, Natural England will advise as to whether these are	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			applicable on a case by case basis. Siliceous rocky slopes normally occur as a distinct and important part of the wider uplands landscape alongside siliceous scree, woodlands, and variety of grassland communities. This mosaic can be very important and the rocky slopes can act as refugia for those plants that require increased humidity and shade, and those that are intolerant of heavy grazing pressure. Site survey work for 2015/16 has noted the impacts on this habitat from browsing by deer in some locations.	
Supporting processes (on which the feature relies)	Conservation measures	Maintain the management measures (either within and/or outside the site boundary as appropriate) which are necessary to maintain or restore the structure, functions and supporting processes associated with the H8220 feature	Active and ongoing conservation management is needed to protect, maintain or restore this feature at this site. Further details about the necessary conservation measures for this site can be provided by contacting Natural England. This information will typically be found within, where applicable, supporting documents such as Natura 2000 Site Improvement Plan, Site Management Strategies or Plans, the Views about Management Statement for the underpinning SSSI and/or management agreements. Although rock based this is a fragile habitat and susceptible to human activity. Threats to the habitats include heavy grazing and trampling, nitrogen deposition, recreation (rock climbing).	NATURAL ENGLAND, 2014. Site Improvement Plan for Borrowdale Woodland Complex SAC (SIP021). Available at http://publications.naturalengland.org.uk/publication/5108578910208000 ENGLISH NATURE, 2005. Views about Management for Great Wood SSSI, Johnny Wood SSSI, Lodore - Troutdale Woods SSSI,

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
				Scales Wood SSSI, Seatoller Wood, Sourmilk Gill and Seathwaite Graphite Mine SSSI, Stonethwaite Woods SSSI. Available from NE Designated Sites System
Version Control Advice last updated: none applicable				
Variations from national feature-framework of integrity-guidance: none applicable				

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