European Site Conservation Objectives: supplementary advice on conserving and restoring site features

Simonside Hills Special Area of Conservation (SAC)
Site code: UK0030336

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About this document

This document provides Natural England's supplementary advice about the European Site Conservation Objectives relating to Simonside Hills 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	Simonside Hills Special Area of Conservation (SAC)
Location	Northumberland
Site maps	The designated boundary of this site can be viewed here on the MAGiC website
Designation Date	1 April 2005
Qualifying Features	See section below
Designation Area	2082.60 hectares
Designation Changes	Not applicable
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)	Simonside Hills SSSI
Relationship with other European or International Site designations	None
Other information	Natura 2000 Standard Data Form for Simonside Hills SAC

Site background and geography

Simonside Hills SAC is located on a commanding sandstone ridge within Northumberland National Park, 3 miles south of the village of Rothbury. These heathery hills are a well-known landscape feature. They are punctuated by a number of impressive sandstone crags. The blocky high-point of Simonside is visible from nearly all of Northumberland. The Simonside Hills are one of a number of similar craggy hills that form the Northumberland Sandstone Hills National Character Area (NCA).

The complex geology of Simonside has provided a variety of aspects, slopes and soils; a wonderfully diverse site with a complex mosaic of habitats. Upland heath has formed on the free draining thin acid soils which weather from fell sandstone. A range of heath types are represented from species-poor ling heather-dominated to heaths containing bilberry *Vaccinium myrtillus*, crowberry *Empetrum nigrum*, cowberry *Vaccinium vitis-idaea* and luxuriant understoreys of mosses. Cloudberry, *Rubus chamaemorus* is found here at unusually low altitudes. The arctic-alpine dwarf cornel *Cornus suecica*, which is rare in Northumberland, occurs in a small colony on the steep north-western edge of Simonside crag. Usually present in a complex mosaic with other heathland habitats, wet heath, characterised by the presence of purple moor-grass, develops where water moves through poorly draining soils on shallow slopes.

Blanket mire, usually identified by the presence of hare's-tail cotton grass, is found on plateaux and basins. On the high plateau there is blanket bog with heather and cotton grasses in which cloudberry

Rubus chamaemorus occurs sparingly. Caudhole Moss and Boddle Moss are the largest of a number of lens mires basin or valley landforms where often very deep peat has formed.

Spring-fed soligenous mires are smaller but botanically diverse habitats. These tend to be located on the lower slopes of the SAC. Base-rich types are usually colonised by sharp-flowered rush *Juncus acutiflorus*. Typical herbs include marsh valerian *Valeriana dioica*, marsh pennywort *Hydrocotyle vulgaris*, fairy flax *Linum catharticum*, common butterwort *Pinguicula vulgaris* and, more rarely, grass-of-Parnassus *Parnassia palustris*. One flush system has black bog-rush *Schoenus nigricans* and there are several with bog-myrtle *Myrica gale*. Both these species have a western distribution in Britain and are unusual in the eastern counties. More acidic flushes support either soft rush *Juncus effusus* with the bog-moss *Sphagnum recurvum* or star sedge *Carex echinata*, bog asphodel *Narthecium ossifragum*, round-leaved sundew *Drosera rotundifolia* and cross-leaved heath.

The Simonside Hills have a relatively high cover of native woodland and these contribute to overall diversity and landscape character. Woodland is located along the northern edges and in gills such as the Forest Burn, Grain Syke, Whitefield Burn and Darden Burn. Eared willow creates valuable scrubby areas on the fringes of the moorland. Conditions for succession to birch woodland are ideal towards the western end of the site. The SAC has long boundaries adjoining commercial forestry, which is not included within the site area. This contains much mature Scots pine with a very diverse heathy understorey and this contributes to the value of the site as a whole.

As well as the small upland streams there are two small lakes, Darden Lough and Little Lough, on the eastern edge of the east section of the SAC. All bar one of the streams flow into the River Coquet which is designated as SSSI and is important for its excellent habitat for salmonids. The exception is the Landshot Burn which is a tributary of the Rede. This is an important river for the threatened Pearl Mussel which requires excellent water quality for their survival.

The road B6342 borders the furthest northeast of the site and the B6341 is a field's width away from the northwest of the site. A named trail-St Oswalds Way- cuts through the site from the car park on the B6342 to the north through to Coquet Cairn at the southeast of the site. In addition there are some smaller footpaths cutting through the site including the popular route from Humble Law to Darden Pike and the honey pot of the Simonside Ridgewalk. This has been significantly improved by diverting the path from damaged areas and surfacing with flags and stone pitching to reduce erosion and path creep.

The north facing slopes of Simonside hill are of significant archaeological interest with over 70 Neolithic burial sites recorded. These include the Schedule Ancient Monument, Cairn 320 southwest of Stell Crag; a Bronze Age funery monument.

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:

- **H4030. European dry heath**

  European dry heaths typically occur on freely-draining, acidic to circumneutral soils with generally low nutrient content. Ericaceous dwarf-shrubs dominate the vegetation. The most common is heather *Calluna vulgaris*, which often occurs in combination with gorse *Ulex spp*., bilberry *Vaccinium spp*. or bell heather *Erica cinerea*, though other dwarf-shrubs are important locally. Dry heath occur generally on low nutrient soils with a peat depth <0.4m. Nearly all dry heath is semi-natural, being derived from woodland through a long history of grazing and burning. Most dry heaths are managed as extensive grazing for livestock or, in upland areas, as grouse moors.

  Dry heaths generally vary in their flora and fauna according to climate, and are also influenced by altitude, aspect, soil conditions (especially base-status and drainage), maritime influence, and grazing and burning intensity. There is a gradation from southerly to northerly kinds of dry heath, and there are also both western (oceanic) and eastern (more continental) forms.

  In upland regions further north, there are sub-montane *Calluna*-dominated heaths with abundant bilberry *Vaccinium myrtillus* and crowberry *Empetrum nigrum* ssp. *nigrum* (H12 *Calluna – Vaccinium*). The *Calluna – Vaccinium* heaths occur throughout the British uplands, but are best-developed in the North Pennines and north-eastern Scotland. They often hold important populations of moorland birds. Red grouse *Lagopus lagopus scoticus*, hen harrier *Circus cyaneus*, merlin *Falco columbarius*, twite *Carduelis flavirostris*, short-eared owl *Asio flammeus* and golden plover *Pluvialis apricaria* occur widely. Vaccinium-dominated heaths also occur in more southerly upland areas where Calluna heaths have been subjected to heavy grazing and/or inappropriate burning.

  The dry heath vegetation on this SAC predominately corresponds to the UK NVC type H12 *Calluna vulgaris – Vaccinium myrtillus* heath.

- **H7130. Blanket bogs (* where active)**

  These extensive peatlands have formed in areas where there is a climate of high rainfall and a low level of evapotranspiration, allowing peat to develop not only in wet hollows but over large expanses of undulating ground. Peat depth varies, with an average between 0.4 and 3 metres but depths of up to 8 metres are not uncommon.

  The blanketing of the ground with a variable depth of peat gives the habitat type its name and results in the various morphological types according to their topographical position, e.g. saddle mires, watershed mires, valleyside mires. Other morphological types are less obviously defined.

  Blanket bogs show a complex pattern of variation related to climatic factors, particularly illustrated by the variety of patterning of the bog surface in different parts of the UK. Such climatic factors also influence the floristic composition of bog vegetation.

  'Active' is defined as supporting a significant area of vegetation that is normally peat-forming. Typical species include the important peat-forming species, such as bog-mosses Sphagnum spp. and cotton-grasses *Eriophorum spp*., or purple moor-grass *Molinia caerulea* in certain circumstances, together with heather *Calluna vulgaris* and other ericaceous species. Thus sites may still be classed as 'active' if they otherwise support extensive areas of typical bog vegetation, and especially if erosion gullies show signs of re-colonisation.

This SAC supports ‘Active’ blanket bog which is defined as supporting a significant area of vegetation that is normally peat-forming. Typical species include the important peat-forming species, such as bog-mosses Sphagnum spp. and cotton-grasses *Eriophorum spp*., or purple moor-grass *Molinia caerulea* in certain circumstances, together with heather *Calluna vulgaris* and other ericaceous species. Thus sites, particularly those at higher altitude, characterised by extensive erosion features, may still be classed as ‘active’ if they otherwise support extensive areas of typical bog vegetation, and especially if the erosion gullies show signs of re-colonisation.

The blanket bog vegetation on this SAC predominately corresponds to the UK NVC type M18 *Erica tetralix – Sphagnum papillosum* raised and blanket mire and M19 *Calluna vulgaris – Eriophorum vaginatum* blanket mire.

* denotes a priority natural habitat or species

Qualifying Species:

Not applicable

Table 1: Supplementary Advice for Qualifying Features: H4030. European dry heaths

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 H4030 feature at 1500 hectares.	There should be no measurable 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. Approximately 1500 ha of the site consists of H4030 dry heath. The rest of the site comprises approximately 279.4 ha of H7130 blanket bog. While the remainder of the site is composed of 59.3 ha of broadleaved, mixed and yew woodland; 22.6 ha of fen, marsh and swamp. The latter being broken down into 11.1 ha of acidic flush 11.5 ha of basic flush.	Aerial photograph, 2013, held by Natural England. This attribute will be periodically monitored as part of Natural England's site condition assessments.
	Spatial distribution of the feature within the site	Maintain the distribution and configuration of the H4030 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	This attribute will be periodically monitored as part of Natural England's site condition assessments.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			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. This site has pressures of fragmentation from burning; bracken encroachment; succession; erosion through walkers and estates vehicles and grazing (to a lesser extent).	
Structure and function (including its typical species)	Vegetation community composition	Ensure the component vegetation communities of the H4030 feature are referable to and characterised by the following National Vegetation Classification type: H12 *Calluna vulgaris – Vaccinium myrtillus* heath	This H4030 habitat 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 these characteristic and distinctive vegetation types will be important to sustaining the overall H4030 dry heath habitat. This will also help to conserve their typical plant species (i.e. the constant and preferential species of a H12 community), and therefore that of the SAC feature, at appropriate levels (recognising natural fluctuations).	This attribute will be periodically monitored as part of Natural England's site condition assessments.
	Vegetation community transitions	Maintain any areas of transition between the H4030 feature and other heathland-associated habitats, such as blanket bog, acid grasslands, scrub and woodland.	Transitions and zonations between adjacent but different vegetation communities are usually related to naturally-occurring changes in soil, aspect or slope. Such 'ecotones' often combine the characteristics of each bordering community and can add value in often containing species not found in the adjacent communities. Retaining such transitions can provide further diversity to the habitat feature, and support additional flora and fauna. This is an important attribute as many characteristic heathland species utilise the transitions between vegetation types or use different vegetation types during different stages of their life cycle.	
	Vegetation structure: cover of dwarf shrubs	Maintain an overall cover of dwarf shrub species across the H4030 feature which is typically between 25-75%	A variation in the structure of the heathland vegetation (vegetation height, amount of canopy closure, and patch structure) is needed to maintain high niche diversity and hence high species richness of characteristic heathland plants and animals. Many species also utilise the transitions between vegetation types or use different vegetation types during different stages of	This attribute will be periodically monitored as part of Natural England's site condition

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			their life cycle. The structural character of the heathland feature is strongly influenced by the growing habits of its dominant species which in most cases will be ericoids (i.e. plants that look like heathers, including members of the Ericaceae and Empetraceae families). The most common characteristic dwarf-shrubs in this H4030 habitat are heather or ling *Calluna vulgaris* and bilberry or blaeberry *Vaccinium myrtillus.* Localised areas of heath with, *E.cinerea* and *Vaccinium vitis-idaea* occur on the steep, craggy slopes e.g. around Tosson Hill, Whitfield Shank, Darden Burn Crammonds Crag and Selby's Cove. Bog myrtle, *Myrica gale* and bracken occur on lower slopes in the far north-east of the site. The impact of burning on site should be monitored, including Beacon Hill where there are patches of bare peat and little recolonization of dwarf shrubs.	assessments.
Structure and function (including its typical species)	Vegetation composition: bracken cover	Restore a low cover of dense bracken (typically at <5%) across the H4030 feature	The spread of bracken *Pteridium aquilinum* is a problem on many lowland heathlands. 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 heathland vegetation. Usually active management of bracken is required to reduce or contain its cover across this habitat feature. But this fern has also some nature conservation value, for example on sites where fritillary butterflies occur and utilise bracken litter habitat. Bracken control over this SAC is an ongoing concern and should be continually monitored and actively managed. On Lordenshaws, bracken is controlled by spraying. This should be continued in any dry heath areas whilst it is legal to do so. Blueburn currently has organic status which means that bracken cannot be controlled by spraying. Rolling or cutting can be carried out where safe to do so. Spraying would only be allowed if it was possible to take the hill parcel out of organic status.	NATURAL ENGLAND, 2013. Simonside Hills SSSI Northumberland Estates Moorland Management Plan 2013-2019, held by Natural England This attribute will be periodically monitored as part of Natural England's site condition assessments.
	Vegetation structure: cover of gorse	Maintain the cover of common gorse *Ulex europaeus* at <50%	Gorse as a component of heathland is a very valuable wildlife habitat, and often a marker of relict heath and common. Both dense and spiny, it provides good, protected cover for many wildlife species: birds, mammals and reptiles; breeding habitat for rare or declining bird species, and	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			excellent winter roosting. The flowers, borne at a time of year when other sources of pollen or nectar are in short supply, are particularly good for insects and other invertebrate pollinators. However gorse may cause problems if unchecked by dominating an area, eliminating other typical heathland species. Mature stands en masse may also be serious fire hazards. There has been no gorse recorded on site and as such is currently not considered a concern.	
Structure and function (including its typical species)	Vegetation structure: tree cover	Maintain the open character of the H4030 feature, with a typically scattered and low cover of trees and scrub (<20% cover)	Scrub (mainly trees or tree saplings above 1 m in height) and isolated trees are usually very important in providing warmth, shelter, cover, food-plants, perches, territorial markers and sources of prey for typical heathland invertebrates and vertebrates. But overall cover of scrub and trees across this habitat feature should be maintained or restored to a fairly sparse level, with a structurally complex edge and with characteristic heathland vegetation as ground cover. If scrub is locally important for any associated species with their own specific conservation objectives, then a higher level of cover will be acceptable. The area of scrub/tree cover should be stable or not increasing as a whole. There is a scrubby area in the wet heath mosaic near to Lordenshaws next to the fenced planting area which should be monitored to prevent scrub encroachment onto the dry heath. There are a few small Sitka Spruce *Picea sitchensison* on site which should be removed before they begin to set seed.	This attribute will be periodically monitored as part of Natural England's site condition assessments.
	Vegetation structure: heather age structure	Maintain a diverse age structure amongst the ericaceous species typically found on the site	Each phase of growth associated with the characteristic heathers which dominate this feature also represents different microclimatic conditions and microhabitats which may provide shelter or food to other organisms. Therefore, it is important to maintain a mosaic of heather in different phases of growth. Typically this age structure will consist of between 10-40% cover of (pseudo) pioneer heathers; 20-80% cover of building/mature heathers; <30% cover of	This attribute will be periodically monitored as part of Natural England's site condition assessments.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			degenerate heathers and less than <10% cover of dead heathers. Heather regeneration throughout the site is fairly extensive. There is a high proportion of late mature heather stands present in the far southwest of the site. However, there are still patches of bare ground with little to no pioneer heather from previous burns and erosion from walkers and estate vehicles. These require future monitoring. Heather seed or brash scattering may help address this problem.	
Structure and function (including its typical species)	Vegetation: undesirable species	Maintain the frequency/cover of undesirable species at within acceptable levels of <1% and prevent changes in surface condition, soils, nutrient levels or hydrology which may encourage their spread. Undesirable species include: *Cirsium arvense;* *Cirsium vulgare;* *Rumex acetosa;* *Ranunculus repens;* or *Urtica dioica* All invasive non-native species are included as undesirable species	Undesirable non-woody and woody vascular plants species may require active management to avert an unwanted succession to a different and less desirable state. Often they may be indicative of a negative trend relating to another aspect of a site's structure and function. These species will vary depending on the nature of the particular feature, and in some cases these species may be natural/acceptable components or even dominants. Overall, the occurrence of undesirable species is minimal and below <1%. However, monitoring should continue on site, especially on bare ground areas which are more susceptible to the growth of undesirable species. Shallon *Gaultheria shallon*, a species which is sometimes planted for pheasant cover and sometimes becomes invasive, was treated with herbicide prior to 2007. There are currently none known to remain on the SAC but it has been recorded nearby and could colonise again. One small rhododendron was recorded outside the site boundary and was removed to ensure this species does not spread into the site. In addition, the invasive non-native Pirri-pirri burr, *Acaena novae-zelandiae* has been noted along footpaths and a management plan needs to be instigated before it spreads.	NATURAL ENGLAND, 2013. Simonside Hills SSSI Northumberland Estates Moorland Management Plan 2013-2019, held by Natural England This attribute will be periodically monitored as part of Natural England's site condition assessments.
	Key structural, influential and distinctive species	Maintain the abundance of the species listed below to enable each of them to be a viable component of this H4030 Annex 1 habitat; *Calluna vulgaris, Erica tetralix,*	Some plant or animal species (or related groups of such species) make a particularly important contribution to the necessary 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 Annex I habitat's structure or help to define that habitat on a particular SAC (see also the attribute for	NATURAL ENGLAND, 2013. Simonside Hills SSSI Northumberland Estates Moorland

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		E.cinerea, Vaccinium myrtillus, Empetrum nigrum and *V.vitis-idaea,* .	'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 SAC. 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. It is particularly important to ensure that distinctive species growing on the low lying accessible areas of the site are not over grazed or trampled by sheep and walkers. In areas of high visitor use, footpath improvements may need to be carried out. Heather seed scattering and brash spreading may need to be carried out along footpaths on a case by case basis.	Management Plan 2013-2019, held by Natural England This attribute will be periodically monitored as part of Natural England's site condition assessments
	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 the connectivity of the site to its wider landscape in order to meet the conservation objectives. These connections include habitat patches, watercourses and sandstone ridge habitats 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 H4030 dry heath habitat. These features may also be important to the operation of the supporting ecological processes on which the designated site and its features 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.	Aerial photograph, 2013, held by Natural England.

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			This site is divided by an area of 1km wide commercial forestry which may prevent connectivity between sections of dry heath and the wider landscape.	
Structure and function (including its typical species)	Adaptation and resilience	Maintain the H4030 feature's ability, and that of its supporting processes, to adapt or evolve to wider environmental change, either within or external to the site	This recognises the increasing likelihood of natural habitat features 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. The vulnerability and response of features to such changes will vary. The overall vulnerability of this SAC to climate change has been assessed by Natural England as being *moderate*, taking into account the sensitivity, fragmentation, topography and management of its habitats. These sites are considered to be vulnerable overall but moderately so. This means that some adaptation action for specific issues may be required, such as reducing habitat fragmentation, creating more habitat to buffer the site or expand the habitat into more varied landscapes and addressing particular management and condition issues. Individual species may be more or less vulnerable than their 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.	NATURAL ENGLAND, 2015a. Climate Change Theme Plan and supporting NBCCV Assessments for SACs and SPAs [both available at http://publications.naturalengland.org.uk/publication/4954594591375360]. .
	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 this H4030 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 H4030 habitat.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
Supporting processes (on which the feature relies)	Conservation measures	Maintain the management measures (within the site boundary which are necessary to maintain the structure, functions and supporting processes associated with the H4030 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. Maintain low nutrient levels to maintain high numbers of species through the management activities of grazing and burning. Bracken control is important for the management of H4030 on this site. Specific on-site erosion through walkers and estate vehicles is a further concern for reducing connectivity across the site especially along Grain Sike where an extensive area of bare ground is visible. There is an ongoing investigation as to how to reduce erosion on site. However, it must also be noted that a range of invertebrates and plants require bare ground/peat where it is not too frequently disturbed by vehicles or feet. This site has previously had light grazing but to ensure this is maintained stocking rates are constantly reviewed. Where burning is proposed, it should only be undertaken during the winter and should follow an appropriate burning rotation in order to create a mosaic of habitats with vegetation of different ages, composition and structure, which in turn supports a wide diversity of species. Areas with particularly sensitive species or habitats should be identified and avoided. Burning should not be carried out unless a suitable grazing regime is in place because heavy grazing of land that has recently been burnt (especially in winter) can prevent regeneration of the dwarf shrubs and lead to a rapid conversion of the site to grassland.	NATURAL ENGLAND, 2014. Site Improvement Plan: Simonside Hills (SIP217) ENGLISH NATURE, 2005. Views about the management of Simonside Hills SSSI. NATURAL ENGLAND, 2013. Simonside Hills SSSI Northumberland Estates Moorland Management Plan 2013-2019, held by Natural England
Supporting processes (on which the feature relies)	Air quality	Maintain as necessary the concentrations and deposition of air pollutants at or below the site-relevant Critical Load or Level values given for this feature of the site on the Air Pollution	This habitat type is considered sensitive to changes in air quality. Exceedance of these critical values for air pollutants may modify the chemical status of the habitat's substrate, accelerating or damaging plant growth, altering its vegetation structure and composition and causing the loss of sensitive typical species associated with it.	More information about site-relevant Critical Loads and Levels for this SAC is available by using the 'search by site'

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		Information System (APIS).	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 (NOx) 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. Control, reduce and ameliorate atmospheric nitrogen impacts. 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. 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. The level of air pollutants on this site has not yet been determined.	tool on APIS.
Version Control N/A				
Variations from national feature-framework of integrity-guidance: N/A				

Table 2: Supplementary Advice for Qualifying Features: H7130. Blanket bogs*

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 H7130 blanket bog habitat feature at 279.4 ha	There should be no measurable reduction (excluding any trivial loss) in the current extent and area of this feature, and in some cases, the full extent of this habitat feature may need to be restored. The baseline-value of extent given has been generated using data gathered from the listed site-based surveys and so may be approximate depending on the methods, age and accuracy of data collection. As a result this value may be updated in light of more accurate information. The extent of an Annex I habitat feature covers the sum extent of the likely range of component vegetation communities present and can include any 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. Approximately 279.4 ha of the site support the SAC feature, H7130 blanket bog. The additional 1500 ha is the SAC feature, H4030 dry heath. While the remainder of the site is composed of 59.3 ha of broadleaved, mixed and yew woodland; 22.6 ha of fen, marsh and swamp. The latter being broken down into 11.1 ha of acidic flush 11.5 ha of basic flush.	Aerial photograph, 2013, held by Natural England. This attribute will be periodically monitored as part of Natural England's site condition assessments
	Spatial distribution of the feature within the site	Maintain the distribution and configuration of the H7130 feature, including where applicable its component vegetation types, across the site	A contraction in the range, or geographic spread, of the feature (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	NATURAL ENGLAND, 2013. Simonside Hills SSSI Northumberland Estates Moorland Management Plan 2013-2019, held by Natural England

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			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. Fragmentation of blanket bog is common with areas drying out through drainage, and past burning encouraging a more species-poor community dominated typically by *Calluna vulgaris* or *Molinia caerulea*. True bog species become fragmented or are lost. Hydrological fragmentation of the bog system can also occur. On this SAC Caudhole Moss has a peat depth exceeding 15m in places, which can easily be damaged by burning and as such careful management on this area needs to be in place.	
Structure and function (including its typical species)	Vegetation community composition	Ensure the component vegetation communities of the H7130 feature are referable to and characterised by the following National Vegetation Classification type(s): M18 *Erica tetralix – Sphagnum papillosum* raised and blanket mire M19 *Calluna vulgaris – Eriophorum vaginatum* blanket mire	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 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). As blanket bog 'blankets' extensive areas it is not surprising that the habitat supports a range of different vegetation communities. Transitions can occur between bog pools, wetter Sphagnum lawns, through to more mixed terrestrial bog communities associated with both hummocks and hollows. At its margins (normally on the steeper slopes), blanket bog communities will gradually be lost and replaced by wet heath and dry heath communities. Blanket bog communities can be heavily influenced by land management, notably drainage, managed rotational burning and grazing. In these situations typical blanket bog communities are replaced by a variety of degraded mire (M15, M16, M25), dry heath (H8, H12) or acid grassland (U6) vegetation types. Where these vegetation types occur on deeper peats, they should be assessed as part of the blanket bog feature and be restored to bog vegetation	This attribute will be periodically monitored as part of Natural England's site condition assessments

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			types. Note: Blanket bog vegetation can sometimes become established on peats shallower than 0.4m deep. On this SAC on Caudhole Moss there are large areas that are currently dominated by Heather with little species diversity. However, there are pockets within this of more diversity, and it is expected that with time the older heather will open out and allow other species to increase.	
Structure and function (including its typical species)	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 H7130 feature	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 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 herbicides). A low number of self-seeded Birches *Betula sp*. has been recorded growing on the bog adjacent to Harwood Forest. These should be removed to prevent further drying out of the bog. Further self-seeded Sitka Spruce, *Picea sitchensis* and are scattered over the entire bog areas on site at low numbers and should be removed. There are no other issues with invasive species on blanket bog areas.	This attribute will be periodically monitored as part of Natural England's site condition assessments
	Presence/ cover of woody species	Maintain a low cover (<10% of the area) of scrub or trees within stands of H7130.	Native trees and shrubs which can tolerate permanently waterlogged conditions can occur naturally on bog and fen surfaces. An abundance of scrub and trees on bogs and fens is sometimes regarded as detrimental because water is lost by evapotranspiration from the trees and, as the tree canopies develop and close, water is further prevented from reaching the bog surface by interception. This can reduce the amount of water reaching the bog surface. Birch, pine, willow and rhododendron (an invasive non-native species) are the main species of concern. The seeds of most invasive woody species are wind dispersed, so trees are able to establish on raised bog and fen surfaces. This excludes dwarf birch *Betula nana* (currently not recorded) and bog myrtle *Myrica gale* which has been recorded on site. There are a few small Sitka Spruce *Picea sitchensison* across the site and a low number of Birches, *Betula sp* on Caudhole Moss. These should be	This attribute will be periodically monitored as part of Natural England's site condition assessments

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			removed before they begin to set seed. However, the number of tree species is well below 10% across the H7130 habitat feature. Stands of bog myrtle, *Myrica gale* are found on site, especially towards the base of slopes and should be maintained as the plants themselves and their deep leaf litter provide cover for bird and small mammal species.	
Structure and function (including its typical species)	Vegetation composition: undesirable species	Ensure the following undesirable competitive species are either absent or rare (individually and collectively less than 1% of vegetation cover); common bent-grass *Agrostis capillaris*, Yorkshire fog *Holcus lanatus*, common reed *Phragmites australis,* bracken *Pteridium aquilinum,* creeping buttercup *Ranunculus repens*.	These are species not considered to be a desirable part of the blanket bog vegetation community as they may spread and out-compete more sensitive typical species. In the southern section of the bog habitat adjacent to Harwood Forest there is an increase in grass species as a consequence of overgrazing. Stocking rates need to be monitored to ensure that a high proportion of ericaceous species remain. Bracken is currently not a concern on blanket bog but is a concern on the lower dryer areas of this SAC is a concern and should be monitored across the site as a whole. Grips at Whiskershiel have been revegetated by common rush, *Juncus effusus* and should be monitored. There are no other concerns with undesirable species on this site.	This attribute will be periodically monitored as part of Natural England's site condition assessments
	Structural diversity	Maintain the full range of typical structural features associated with the H7130 feature at this site, e.g. vegetation cover, surface patterning and hydrological zonations	Bogs in particular show varying degrees of structural variation and surface patterning reflecting hydrological gradations (which may be natural or the result of previous damage). These can occur at different macro and micro scales across the habitat and include alternative aquatic and terrestrial surface features, such as pools and hummocks, and terrestrial features such as ridges and hollows. These features will support distinctive patterns of bog vegetation, and so will be sensitive to changes in topography and hydrology. These can be modified or disrupted by activities such as drainage, burning, grazing, vehicular access and peat digging. These are likely to be missing or poorly represented in degraded blanket bog systems. These components may include areas with noticeably uneven structure, at a spatial scale of around 1 m2 or less. The unevenness should be the result of Sphagnum hummocks, lawns and hollows, or mixtures of well-developed cotton-grass tussocks and spreading bushes of dwarf-shrubs.	This attribute will be periodically monitored as part of Natural England's site condition assessments

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			On this SAC structural diversity varies locally within the interest feature, H7130 blanket bog with between 3 and 6 notable species recorded constantly. However, towards the western boundary grass dominated with few ericaceous species. Further on Caudhole Moss there are large areas that are dominated by Heather with little species diversity. However, there are pockets within this of more diversity, and it is expected that with time the older heather will open out and allow other species to increase. Erosion, fire damage, overgrazing and vehicle access are the main concerns on this site.	
Structure and function (including its typical species)	Physical structure: ground disturbance (and peat erosion)	Restrict and restore significant areas of disturbed and eroding bare ground. Where present, any affected areas should typically not exceed 1% of the total feature, and be considered only as a temporary stage.	Bare ground and eroding peat not only affects the hydrology of bog systems and its associated biodiversity but can also have wider environmental impacts on e.g. water quality. There will also be a carbon loss from the system. Deep gullies in Boddle Moss show some signs of erosion. This area has been densely gripped with varying success. Some grip sections remain uncolonised, particularly to the north and east among mature *Calluna*, where water flow rates are higher. However, some of this work has only recently been completed, and further monitoring is recommended.	This attribute will be periodically monitored as part of Natural England's site condition assessments
	Soils, substrate and nutrient cycling	Maintain the properties of the underlying soil types, including structure, bulk density, total carbon, pH, soil nutrient status and fungi:bacteria ratio, to within typical values for the H7130 habitat. For this feature the peat substrate should consist of both acrotelm and catotelm layers.	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. Peat is a soil distinguished from other soil types by its high content of organic matter (30%-100%). The organic matter content results form a combination of plant growth and waterlogging, the latter reducing oxygen diffusion to levels which are so slow that decomposition of the dead plant matter uses up this oxygen faster than it can be supplied. Consequently conditions rapidly become anaerobic, which reduces decomposition rates and the semi-decomposed plant material builds up over time to form peat.	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			An active blanket bog should be made up of two layers; an acrotelm and a catotelm. The thin (5-75cm) upper layer or acrotelm consists of living plant material and is a zone of fluctuating water table, where relatively rapid plant decomposition occurs. Below this is the catotelm, a much thicker layer of peat (up to 10m), consisting of broken down plant material, and which is always below the water table. Degraded (through e.g. drainage and rotational burning) blanket bogs may have lost the acrotelm layer, and now has layer of damaged catotelm ('haplotelm') at the surface. This is currently no specific information on soil properties for this SAC.	
Structure and function (including its typical species)	Adaptation and resilience	Maintain the H7130 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 explanatory notes for this attribute in table 1 above. The interest feature of H7130 Blanket bog on this SAC is situated in three designated areas; each area is approximately 500m across and there is approximately 2km between areas. The surrounding habitat is predominately dry heath. The correct hydrological conditions need to be continually met in each of these three areas to prevent the habitat drying out.	
	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 Annex 1 habitat; *Calluna vulgaris, Erica tetralix, E.cinerea, Vaccinium myrtillus, Empetrum nigrum, V.vitis-idaea, Drosera spp., Eriophorum angustifolium,* E. vaginatum Assemblage of *Sphagnum* mosses.	See explanatory notes for this attribute in table 1 above. The majority of the mires are characterised by carpets of bog-mosses *Sphagnum papillosum, S. magellanicum, S. capillifolium* and *S. pulchrum* with species such as cross-leaved heath *Erica tetralix*, bog rosemary *Andromeda polifolia* and cranberry *Vaccinium oxycoccus* occurring occasionally. In addition, on site *Rubus chamaemorus* occurs sparingly in the Simonside summit and rare *Sphagnum pulchrum* was reported on Boddle Moss. Both should be monitored and protected.	This attribute will be periodically monitored as part of Natural England's site condition assessments
Supporting processes (on which the feature relies)	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 this feature of the site on the Air	See explanatory notes for this attribute in table 1 above. This habitat type is considered sensitive to changes in air quality. Exceedance of critical values for air pollutants may modify the chemical status of a habitat's substrate, accelerating or damaging plant growth, altering its	More information about site-relevant Critical Loads and Levels for this SAC is available by using the 'search

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
		Pollution Information System (APIS)	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. The critical values for atmospheric nitrogen and acidity are currently being exceeded with regard to this feature.	by site' tool on APIS.
	Hydrology	At a site, unit and/or catchment level (as necessary), maintain and where site specific restore the natural hydrological processes to provide consistently near-surface water levels necessary to sustain the H7130 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 source, depth, duration, frequency, magnitude and timing of water supply can have significant implications for the assemblage of characteristic plants and animals present. This target is generic and further site-specific investigations may be required to fully inform conservation measures and/or the likelihood of impacts. For this feature, various land management activities may impact on and interrupt natural hydrological processes and water levels, including artificial drainage, managed burning, wildfires; track construction; afforestation; and compaction by trampling and vehicular use. The loss of the acrotelm layer normally reflects significant changes to the hydrology of the bog. An increase in the cover of heather on the bog surface will also indicate a drying out of the bog, and can lead to further drying out through an increase in sub-surface peat pipes. Fire influences the near-surface hydrological functioning of peatland. This leads to enhanced overland flow and higher streamflow peaks and, in combination with a removed vegetation cover, can exacerbate surface erosion. There have been several historic hot wildfires which have impacted negatively on the site. Recovery from fire needs to be continually monitored and appropriate management practices put in place. Most of the grips across the site have been blocked which has resulted in some disturbance where the peat plugs have been taken, but these are re-colonising well as are the grips. However, on Boddle moss occasionally	

Attributes		Targets	Supporting and Explanatory Notes	Sources of site-based evidence (where available)
			plastic dams at the very edge of the bog are being undermined due to gully side collapse. This will require monitoring and the strengthening or modifying the plastic dams as required.	
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 the structure, functions and supporting processes associated with the H7130 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. The principal management measures on this site are: • Ensure burning does not take place on sensitive areas. This includes no burning on Caudhole Moss, Boddle Moss and the mire around Little Lough. • Control bracken spread on site. • Continually monitor the hydrology of the site including monitoring the re-vegetation and success of grips and plastic dams and where necessary repair or replace. • Maintain appropriate stocking densities to prevent overgrazing. • Maintain public access to the site through maintaining designated walking routes. • Monitor vehicle access on site and prevent vehicle use on sensitive areas of the site.	NATURAL ENGLAND, 2014. Site Improvement Plan: Simonside Hills (SIP217) ENGLISH NATURE, 2005. Views about the management of Simonside Hills SSSI. Northumberland Estates Moorland Management Plan 2013-2019, held by Natural England
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