NatureScot
Scotland's Nature Agency
Buidheann Nàdair na h-Alba

SOLWAY MOSSES NORTH SPECIAL AREA OF CONSERVATION (SAC)

CONSERVATION ADVICE PACKAGE

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Site Details

Site name:	Solway Mosses North
Map:	https://sitelink.nature.scot/site/8378
Location:	South Western Scotland
Site code:	UK0012907
Area (ha):	648.78
Date designated:	17 March 2005

Qualifying features

Qualifying feature	SCM assessed condition	SCM visit date	UK overall Conservation Status
Active raised bog [H7110]*	Unfavourable Recovering	7 August 2009	Unfavourable-Bad
Degraded raised bog [H7120]	Unfavourable Recovering	7 August 2009	Unfavourable-Bad

Notes:
Assessed condition refers to the condition of the SAC feature assessed at a site level as part of NatureScot's Site Condition Monitoring (SCM) programme.
Conservation status is the overall condition of the feature throughout its range within the UK as reported to the European Commission under Article 17 of the Habitats Directive in 2019.
***** Habitats Directive priority habitat

Overlapping Protected Areas

Solway Mosses North SAC comprises two separate Sites of Special Scientific Interest: Longbridge Muir SSSI and Kirkconnell Flow SSSI.

Key factors affecting the qualifying features

Active raised bog
Raised bogs are slow-growing, entirely rain-fed, nutrient-poor ecosystems, raised above the surrounding mineral soil to create a low dome that is isolated from ground water and where the vegetation depends entirely on rainfall.

These bogs survive because water losses are matched or exceeded by regular precipitation inputs. In good conditions they remain waterlogged despite sometimes being several metres above the surrounding land. The bog grows over time as vegetation dies off and the remains partially decompose and accumulate.

Sphagnum mosses and cotton grasses are the main bog-forming plant species on most bogs, and are unable to survive unless they lie close to the water table. This means the living growing surface of the bog is closely tied to the shape of the water table within the bog, and the low levels of nutrients that exist.

These bogs can be very sensitive to any changes in their hydrological conditions. Such changes can include changes to water levels through alterations to drainage and climatic changes; alterations to the acidic conditions (typically a weakening of the acidity) that the vegetation communities need to persist; and physical damage to their structure (especially to their surface layers).

The feature has been assessed through NatureScot's site condition monitoring programme as being in unfavourable condition at this SAC because past management activities (planting of commercial conifers and ditch creation) are still having a negative impact on the feature. Positive management is taking place, including the removal of conifer blocks from the two constituent SSSIs (Longbridge Muir SSSI and Kirkconnell Flow SSSI), ongoing scrub removal, grazing, and ditch blocking to improve the condition of the site. The overall assessment is therefore unfavourable recovering.

Degraded raised bogs

Degraded raised bogs are entirely rain-fed, nutrient-poor ecosystems, raised above the surrounding mineral soil, and formed by waterlogging of an area. They differ from active raised bogs as they are not currently forming peat. They will have also been subject to changes that have caused deterioration to their hydrology, structure and / or vegetation, usually through land management, either on the bog or nearby. Degraded raised bogs selected for designation are those that are capable of regeneration, for example with appropriate rehabilitation management.

Degraded raised bogs are important in the SAC series, mainly due to the habitat's potential to be restored to active raised bog, and thus contribute to attaining favourable conservation status for raised bogs as a whole. The feature has been assessed through NatureScot's site condition monitoring programme as being in unfavourable condition at this SAC because past management activities (planting of commercial conifers and ditch creation) are still having a negative impact on the feature. As noted above positive management is taking place to improve the condition of the site. The overall condition assessment is therefore unfavourable recovering.

Further information on these habitats can be found on the JNCC website.

Conservation Priorities

The overall objectives for this SAC are to maintain the healthy condition of areas of active raised bog and to restore areas of degraded raised bog to active raised bog.

Conservation Objectives

Active and degraded raised bogs are considered separate habitat types for the purposes of designating SACs. However as the aim is to restore degraded raised bog to active raised bog, and both are hydrologically linked, they have been considered together within the conservation objectives.

Conservation Objectives for active raised bog and degraded raised bogs

1. To ensure that the qualifying features of Solway Mosses North SAC are in favourable condition and make an appropriate contribution to achieving favourable conservation status
Favourable Conservation Status (FCS) is considered at a European biogeographic level. When determining whether management measures may be required to ensure that the conservation objectives for this site are achieved, the focus should be on maintaining or restoring the contribution that this site makes to FCS. When carrying out appraisals of plans and projects against these conservation objectives, it is not necessary to understand the status of the feature in other SACs in this biogeographic region. The purpose of the appraisal should be to understand whether the integrity of the site (see objective 2) would be maintained. If this is the case then its contribution to FCS across the Atlantic Biogeographic Region will continue to be met. Further details on how these appraisals should be carried out in relation to maintaining site integrity is provided by objective 2 (including parts a, b and c). If broader information on the feature is available then it should be used to provide context to the site-based appraisal. Note that "appropriate" within this part of the conservation objectives is included to indicate that the contribution to FCS varies from site to site and feature to feature.

2. To ensure that the integrity of Solway Mosses North SAC is restored by meeting objectives 2a, 2b and 2c
The aim at this SAC is to restore the areas of degraded raised bog habitat to active raised bog, and to restore the active raised bog habitat to favourable condition, as a contribution to wider raised bog conservation status. Therefore any impacts to the objectives shown in 2a, 2b, or 2c below must not persist and prevent the achievement of this overall aim. When carrying out appraisals of plans or projects the focus should be on restoring site integrity, and ensuring that they do not prevent restoration of the raised bog habitat, specifically by meeting the objectives outlined in 2a, 2b and 2c. If these objectives are met then site integrity will be restored. Note that not all of these objectives will be relevant for every activity being considered. Any impacts on the objectives shown in 2a, 2b or 2c below must not persist so that they prevent the restoration of site integrity. Temporary impacts on these objectives resulting from plans or projects can only be permitted where they do not prevent the ability of the feature to recover and there is certainty that the features will be able to quickly recover. This objective recognises that the qualifying habitat is exposed to a wide range of drivers of change. Some of these are natural and are not a direct result of human influences. Such changes in the habitat's extent, distribution or condition within the site which are brought about by natural processes, directly or indirectly, are normally considered compatible with the site's conservation objectives. An assessment of whether a change is natural or

anthropogenic, or a combination of both, will need to be looked at on a case by case basis.

2a. Maintain the extent and distribution of the habitat within the site

There should be no reduction in the overall extent and distribution of raised bog habitat within the site. The aim is to increase the extent and distribution of active raised bog across the site as a result of current and ongoing restoration work on the degraded areas of bog. This will mean areas defined as degraded raised bog will decline in extent over time as active raised bog areas increase. The aim is to increase the extent of existing active raised bog on the site to at least 648.78ha.

2b. Restore the structure, function and supporting processes of the habitat

The slow formation of raised bogs and their typical domed shape mean they rely heavily on specific hydrological conditions. Degraded raised bogs will likely have been subject to some deterioration of these conditions. The natural hydrology of this site should be maintained with no modifications, both within and outwith the site, that may negatively change the hydrology of the site (e.g. by the digging or deepening of ditches, or by excessive vehicle usage).

Artificial drains should be blocked, or natural vegetation growth be allowed to block the drains. No new drains should be installed. This will help the bog to function naturally and actively grow. Ditch digging has been carried out in the past, but such operations have not been active on the site in recent times and would not be permitted.

Self-sown commercial conifer, native conifer and native deciduous tree species should be removed with no tree planting on site. Rhododendron should be controlled.

Active raised bogs typically display a distinctive micro-topography, with patterns of hummocks and hollows rich in Sphagnum mosses and other peat forming species. This habitat structure should not be damaged. Any increases in drainage can cause deterioration to the structure of this mosaic of habitats through drying out and shrinkage of the peat. Burning and compaction by vehicles can also impair the topography, natural functions and processes of the raised bog habitat. Excessive trampling and inappropriate grazing regimes can also contribute to deterioration in the habitat structure.

Overgrazing can cause poaching, damaging and dislodging the surface vegetation of Sphagnum mosses and other bog species, resulting in areas of bare peat and erosion. Light grazing with appropriate numbers and types of stock can help to supress the encroachment of young trees and scrub, and can help to lessen the dominance of *Calluna vulgaris*. This is particularly the case on sites where the hydrology has been modified and water levels are not sufficiently high to supress tree establishment. Grazing levels should be set with reference to the condition at this site and other land management measures, to ensure the maintenance of the vegetation communities and bog structure and function across the whole of the site. Where possible it is preferable to graze the bog in association with adjacent drier land and, where this is the case, stocking rates should be set to reflect the areas and types of habitats being grazed (bog, lagg fen and adjacent land). Grazing regimes should be sufficiently flexible to take into account variations in water levels and ground conditions within and between years.

Burning can destroy areas of habitat leading to drying out, a loss of Sphagnum, a loss of

diversity of dwarf-shrubs with increasing dominance by *Calluna vulgaris* (heather), exposed peat, possibly encouraging grass species atypical of active raised bogs, and altering the chemistry in its vicinity. Burning at this site should be avoided.

Tree and shrub cover should not increase on the site. Trees and scrub can cause the habitat to dry out through transpiration and should be no more than occasional on the bog, although they can be slightly more frequent on the rand (the sloping bog margin) and lagg (an area of wetland at the edge of the bog). The likelihood of the establishment of scrub or non-native invasive species on the bog surface is increased where the hydrology has already been compromised by drainage, commercial conifer planting or peat cutting.

Nutrient enrichment via aerial deposition of nitrogen may negatively affect the condition of typical bog species. The critical load for nitrogen for this habitat is 5kg/ha/yr. The characteristic bog species, such as Sphagnum, are dependent on low nutrient conditions and, in the long term, nutrient enrichment would favour the growth of dwarf shrub species and grasses over the bog-building Sphagnum mosses. There should therefore be no alteration to the acidic conditions needed for the bog species to be maintained, or where necessary restored.

The Air Pollution Information System (www.apis.ac.uk/srcl) identified a three year average Nitrogen deposition rate for Solway Mosses North SAC of 17.9kg N/ha/yr between 2015-17. The SAC is likely, therefore, to experience some level of eutrophication. Increases in Nitrogen inputs to the site should therefore be avoided. Bogs that have been hydrologically compromised are more sensitive to the effects of Nitrogen deposition and therefore the natural hydrology of this site should be maintained or where appropriate restored.

The remaining lagg fen is a component of the raised bog. It supports the raised bog, and acts in part as a buffer, and therefore the maintenance of the lagg fen is important in maintaining the structure and function of the raised bog.

2c. Maintain the distribution and viability of typical species of the habitat

The distribution and viability of typical plant species found on raised bogs relies heavily on the varied structure of the bog surface, its functional hydrology and the natural processes that support this.

Typical species for raised bogs are those that have a main role in forming peat. These are primarily Sphagnum species, particularly red bog-moss *(Sphagnum capillifolium),* papillose bog-moss (*S. papillosum),* magellanic bog-moss *(S. magellanicum),* feathery bog-moss *(S. cuspidatum)*, and cotton grasses (*Eriophorum* species). Heather (*Calluna vulgaris* and *Erica* species) other ericaceous plants, and the carnivorous sundews (*Drosera* species) should also be considered typical species, although heather is a less desirable component.

Excessive trampling, and inappropriate grazing regimes can contribute to deterioration in the habitat structure, having harmful effects on the typical species, and grazing should only be done in a controlled, appropriate manner that does not prevent restoration of the habitat or its continued maintenance.

Alterations to the acidic conditions through nutrient enrichment should also be avoided in order to protect the typical species of the site.

Conservation Measures

Solway Mosses North SAC consists of two SSSIs. Management changes described on the list of Operations Requiring Consent for each SSSI must have prior consent from SNH (NatureScot).

Current and recommended management for both active raised bogs and degraded raised bogs

Issue	Measure	Responsible party
Herbivore impacts	Ensure that herbivore impacts on the feature are appropriate to check the growth of trees and scrub without causing damage to the surface structure of the bog.	Private landowners and managers, Forest and Land Scotland (FLS), NatureScot, Deer Management Groups, Lowland Deer Network
Hydrology	At the Longbridge Muir SSSI component of the SAC some drainage ditches require blocking. At Kirkconnell Flow cell bunding has been installed along sections of the bog edge to slow down the flow of water from the site and raise the water level across the bog.	Land managers, NatureScot
Tree and scrub management	Commercial conifer plantations on the Longbridge Muir SSSI component of the SAC have been felled in recent years, although self-seeded Lodgepole Pine require ongoing control. Tree growth on the Kirkconnell Flow SSSI component is a result of self-sown commercial native and non-native species, mainly Scots Pine, coming from surrounding woodland. Many of these self-seeded trees have been removed over the past 20 years, with the aim of reducing tree cover across the site.	FLS and NatureScot carry out this work on an ongoing basis as required.
Invasive species	Rhododendron is a problem, particularly on Kirkconnell Flow, and requires regular control.	NatureScot, FLS, private landowners and managers.
Habitat Management including: water management through ditch blocking and re-profiling; management of tree and scrub growth; rhododendron	Kirkconnell Flow SSSI is wholly owned by NatureScot and is managed for conservation through the Kirkconnell Flow Nature Reserve Management Plan. Longbridge Muir SSSI is part-owned by FLS and is managed through the Lochar Mosses Land Management Plan – the main focus is restoration of lowland raised bog habitat.	NatureScot, FLS, private landowners and managers.

control; management of grazing by domestic stock to reduce scrub and conifer regeneration.		
Peatland management through 'Peatland Action' funding, or through its successor funding mechanisms	The primary means of supporting peatland restoration is through agri-environment funding if this is available. Alternatively, Peatland Action funding may be available in the absence of any current agri-environment schemes at the time an application is being considered	Land owners Land managers
Nutrient enrichment from aerial deposition of nitrogen	Bogs that have been hydrologically compromised are more sensitive to the effects of Nitrogen deposition and therefore the natural hydrology of this site should be maintained or where appropriate restored. Increases in Nitrogen inputs to the site should be avoided.	NatureScot, land managers, SEPA

Contact details: NatureScot
Greystone Park
55/57 Moffat Road
Dumfries
DG1 1NP

Tel: 01738 458678

Approved on 06 March 2020 by:

Greg Mudge
Principal Advisor
International Designations

Denise Reed
Area Manager
Tayside and Grampian