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Scotland's Nature Agency
Buidheann Nàdair na h-Alba

GLEN COE SPECIAL AREA OF CONSERVATION (SAC)

CONSERVATION ADVICE PACKAGE

Site Details

Site name:	Glen Coe
Map:	https://sitelink.nature.scot/site/8264
Location:	Highlands and Islands
Site code:	UK0012959
Area (ha):	2,967.37
Date designated:	17 March 2005

Qualifying features

Qualifying feature	Assessed condition	SCM visit date	UK overall Conservation Status
Clear-water lakes or lochs with aquatic vegetation and poor to moderate nutrient levels	Favourable Maintained	6 September 2009	Unfavourable - Bad
Dry heaths	Unfavourable Declining	30 April 2014	Unfavourable - Bad
Alpine and subalpine heaths	Unfavourable Recovering	1 September 2016	Unfavourable - Bad
Mountain willow scrub	Unfavourable Recovering	15 September 2016	Unfavourable - Bad
Montane acid grasslands	Unfavourable Recovering	31 October 2003	Unfavourable - Bad
Alpine and subalpine calcareous grasslands	Unfavourable No change	25 October 2009	Unfavourable - Bad
Species-rich grassland with mat-grass in upland areas*	Unfavourable No change	3 August 2012	Unfavourable - Bad
Tall herb communities	Favourable Maintained	19 September 2014	Unfavourable - Bad
Base-rich fens	Favourable Maintained	25 June 2015	Unfavourable - Bad
High-altitude plant communities associated with areas of water seepage*	Unfavourable No change	25 October 2009	Unfavourable - Bad
Acidic scree	Unfavourable No change	21 August 2015	Unfavourable - Inadequate
Plants in crevices on acid rocks	Favourable Maintained	25 October 2009	Unfavourable - Bad

Plants in crevices on base-rich rocks	Favourable Maintained	25 October 2009	Unfavourable - Inadequate

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:

Glen Coe SAC overlaps with most of Glen Coe Site of Special Scientific Interest (SSSI). Glen Coe SSSI exhibits a variety of upland habitats and supports plant communities of a wide altitudinal range on a variety of rock types from near sea level to the summit of Bidean nam Bian at 1141m. It includes one of the richest Arctic-Alpine floras in Scotland and patches of woodland support a rich assemblage of bryophytes.

Glen Coe SAC also overlaps with part of Glen Etive and Glen Fyne Special Protection Area (SPA), a large, predominantly upland site notified for golden eagle *Aquila chrysaetos*.

Key factors affecting the qualifying features

Clear-water lakes or lochs with aquatic vegetation and poor to moderate nutrient levels
This feature includes Loch Achtriochtan, representing oligotrophic lochs in the mountainous western Highlands of Scotland. The loch contains high-quality oligotrophic habitat with vegetation typical of nutrient-poor conditions on a substrate dominated by stones. The clear soft water, which characterises this habitat type, contains low to moderate levels of plant nutrients and supports characteristic assemblages of plant species. The vegetation community is characterised by amphibious short perennial vegetation the marginal components of which can be exposed on the loch shores during summer.

Key management issues include changes to hydrology, invasive non-native species, surface water pollution and air pollution.

This feature was assessed through NatureScot's Site Condition Monitoring (SCM) programme as being in favourable condition in 2009.

European dry heaths
European dry heaths are widely distributed in Scotland although most extensively in the central and northwestern Highlands. On this site they typically occur on freely-draining, acidic to almost neutral soils with generally low nutrient content over a wide range in altitude. The feature is almost completely absent from Gleann Fhaolain, but is common on cliff ledges and very steep slopes around the Three Sisters and on the southern slopes of Aonach Eagach. Ericaceous dwarf-shrubs dominate the vegetation but all heaths vary in their flora and fauna according to climate, altitude, aspect, soil conditions (especially base-status and drainage), maritime influence, and grazing and burning intensity.

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 (sheep, cattle and deer). Additional contemporary influences are tracks and paths that can cause fragmentation, degradation and erosion. Other key management issues include forestry, problematic native and non-native species

This feature was assessed as unfavourable declining in 2014. It was found that where dry heath is accessible to large herbivores the levels of browsing are high (compared to the low levels of grazing required by this habitat) and it appears that most of this is happening in winter, outside the growing season of the dwarf-shrubs. Impacts were from deer (found throughout the site) and in some areas from livestock (Meall Mòr and Gleann Leac na Muidhe). Feral goats are occasionally seen on the north side of Glen Coe. Winter ingress of red deer from Rannoch Moor in times of poor weather were significant. Work is ongoing with the two relevant Deer Management Groups and the livestock graziers to reduce impacts. On areas inaccessible to deer (crags and fenced areas) the survey found scattered trees. Bracken encroachment at lower altitude was also noted.

Alpine and subalpine heaths

Alpine and subalpine heaths occur on acid rocks on mountains, both on exposed lower summits and ridges and on sheltered slopes. Exposure or snow-lie, which suppress the growth of dwarf-shrubs, also favour the growth of characteristic lichens and bryophytes. Alpine heaths develop above the natural altitudinal tree-line. Boreal heaths develop below the tree-line in gaps among scrubby high-altitude woods or as replacements for those subalpine woods lost due to grazing and burning. On lower slopes, Boreal heaths may grade into floristically-similar European dry heaths.

Alpine and Boreal heaths that are rich in bryophytes and also juniper-rich heaths are particularly susceptible to disturbance, especially by fire. Similarly, lichen-rich heaths are susceptible to damage by fire or trampling. Rocky ground can be important in protecting heaths from fire.

This feature was assessed as Unfavourable recovering in 2016 as the vegetation composition has still to fully recover to what would be expected for this habitat type. All samples passed browsing and grazing targets and there was little or no disturbed bare ground, indicating a very low level of herbivore impacts, and there were clear indications that grazing pressure had reduced over recent years. No burning or non-native species were seen on or near this feature.

Mountain willow scrub

Mountain willow scrub is the UK's highest-altitude shrubby vegetation, occurring on moist, relatively base-rich soils in rocky situations on mountains. It is predominantly a natural habitat, with succession prevented by the harsh climate at the high altitudes at which it is found. It tends to be associated with the more sheltered areas of the upper subalpine and low alpine zones of mountains, and there may be a positive association with moderately late snow-lie.

On this site the most important stands are on Meall Mòr. Stands of willow scrub survive on ungrazed ledges and, more rarely, on lightly grazed, steep rocky slopes or boulder fields, occurring only as small, discrete stands or more scattered bushes. The largest continuous stand of this habitat type is about 0.5ha in extent and most stands are much smaller.

The key management issue for this habitat is grazing pressure, with low levels required; inappropriately high grazing pressure is believed to have reduced and restricted the habitats occurrence in the past. This feature was last assessed as unfavourable recovering (2016) because there was a net gain in extent of the feature within the exclosure on Meall Mòr, conditions outside the exclosure were improving, and a new crag was discovered with at least 200 plants forming dense scrub. The overall cover of willow at some sites is still too low to class the habitat as favourable.

Montane acid grasslands

Montane acid grassland are the most extensive type of vegetation in the high mountain zone, i.e. above an altitude of about 750 m. It characteristically forms large continuous tracts, covering summit plateaux and the tops of the higher summits and ridges. The habitat comprises a range of grassland types whose composition is influenced by contrasting extremes of exposure and snow-lie. Within Glen Coe SAC these plant communities occur at high altitude on ridges and in the upper parts of corries.

This feature was assessed as being in unfavourable recovering condition in 2003 as reduction of sheep stocks were predicted to allow recovery of the vegetation structure and composition. More recent results from Sitecheck and monitoring of other features shows generally good and improving condition on this site, primarily due to better herbivore management.

The habitat is vulnerable to nutrient inputs and physical damage such as occur due to dunging and urination by grazing animals, acid deposition, human and animal trampling and use of all-terrain vehicles. Other key management issues currently (or potentially) are the nature and extent of grazing/browsing by sheep and red deer (grazing above low levels being inappropriate), burning, use of vehicles, non-native species, recreation and habitat loss for development. Nitrate pollution from the air can be concentrated in parts of this habitat where there are long-lying snow beds, since the snow captures the nitrogen which is then released into the ground below when the snow melts.

Alpine and subalpine calcareous grasslands

The habitat occurs on lime-rich soils and consists of short, often grazed, species-rich mixtures of arctic-alpine cushion herbs, grasses and sedges across a broad range of altitudes. The habitat is widespread and frequent within Glen Coe, typically at low to mid altitudes, where it often occurs in mosaic with heaths, rock outcrops and flushes. There are stands on the northeast slopes of Meall Mòr, the northern corries of Bidean nam Bian and the south facing slopes of Stob Coire Sgreamhach. This is one of the most important upland habitats in the UK for rare arctic-alpine plants and other rare montane or northern plants. Meall Mòr supports calcicolous vegetation types (e.g. mountain avens heath) not found elsewhere in the site.

At low altitude, colonisation of the grasslands by trees and shrubs is prevented by a combination of exposure and grazing. At high altitude the grasslands are maintained by the harsh climate, though grazing may also alter species composition.

The condition of the Alpine and subalpine calcareous grassland has been assessed as unfavourable during the second and third cycles of SCM because of failures indicating under-grazing. This is a habitat that is often maintained by a moderate level of grazing by sheep and deer which prevents the sward becoming dominated by rank grasses. It is known that the sheep on Meall Mòr tend to avoid the steep north to northeasterly slopes on which the habitats occur.

Species-rich grasslands with mat-grass in upland areas

Species-rich grassland with mat-grass in upland areas tend to develop where there is flushing through base-rich strata on siliceous bedrock. These may include moderately base-rich metamorphic and igneous rocks. The soils have an acidic pH (<7.0 and mainly <6.0) and are derived from bedrocks with at least some silica.

The altitudinal range varies from near sea level to an upper limit of between 800 and 900 m.

On this site, species-rich *Nardus* grassland occurs on base-rich igneous rocks, calcareous-schists and base-enriched alluvial soils, and is found from moderately high to high altitudes.

Both CG10 *Festuca ovina – Agrostis capillaris – Thymus praecox* grassland and CG11 *Festuca ovina – Agrostis capillaris – Alchemilla alpina* grassland are well represented. This habitat is particularly susceptible to changed nutrient status eg agricultural improvement, burning over and under-grazing, forestry, air pollution and damage from recreational pressure

The condition of the species-rich grassland has been assessed as unfavourable during the second and third cycles of Site Condition Monitoring (SCM) because of failures indicating under-grazing (with the habitat favouring anywhere from low to high grazing levels, most frequently moderate levels being appropriate), including cover of forbs, and bracken encroachment. Most of the failures were on Meall Mòr, despite it being grazed by sheep and also cattle on the lower slopes. In other areas (eg Bidean nam Bian, Sgorr nam Fiannaidh) there were fewer failures, despite these grasslands being grazed by deer only. They are preferentially grazed over surrounding habitats, and it was concluded that climate may be suppressing the height of the vegetation in these areas where plots tended to be located at higher altitude.

Tall herb communities

Tall herb communities habitat is typically found on ungrazed upland cliff ledges, occasionally extending on to open ground, and is restricted to base-rich substrates and somewhat sheltered situations. It provides a refuge for rare, grazing-sensitive, montane plants.

Variation within the habitat type is related chiefly to geographical position, altitude, and soil conditions and rock type.

Glen Coe contains tall herb communities at a range of altitudes in an oceanic climate on igneous rocks, including calcareous andesites and limestone, which support the richest flora. This habitat type shows well-developed structure and high species diversity. The habitat is widely distributed across the site in on ledges and gullies inaccessible to sheep and deer.

The condition of the Tall herb communities has been assessed as favourable during all cycles of Site Condition Monitoring (SCM). Key management issues include ensuring only low/no grazing from domestic stock and deer and invasion by other species.

Base-rich fens

Base-rich fen consists of a complex assemblage of vegetation types characteristic of sites where there is tufa and/or peat formation with a high water table and a calcareous base-rich water supply.

There is considerable variation between sites in the associated communities and the transitions that may occur. Such variation can be broadly classified by the geomorphological situation in which the fen occurs, namely: flood plain mire, valley mire, basin mire, hydroseral fen (i.e., as zones around open waterbodies) and spring fen. Another important source of ecological variation is altitude, with significant differences between lowland fens, which are rich in southern and continental species, and upland fens, which are rich in northern species.

On this site the habitat is quite limited with most of the habitat on Meall Mòr, scattered patches up Fionn Ghlean and some base-rich areas on the south facing slopes of Sgorr nam Fiannaidh to the east of Allt an t-Sidhein.

In 2003 the feature was assessed as unfavourable due to cattle trampling on a few plots. Cattle stocking level were not excessive and relatively minor adjustments of management were required. Subsequent monitoring performed in 2009 assessed the site as unfavourable recovering and in 2015 the base-rich fen was considered to be favourable, with all the

targets easily met at all the sample points. Grazing levels were low and the surveyor estimated that trampling levels were probably optimal for this habitat, which benefits from some disturbance but not too much.

Key factors affecting this habitat type are land use changes/development, pollution to ground or surface water and, grazing and trampling impacts (75% of sample locations should have impacts in the range from low to moderate-to-low. Up to 25% of samples may have impacts in the moderate range).

High altitude plant communities associated with water seepage

High-altitude plant communities associated with areas of water seepage is a type of flush mire that occurs only at high altitude. The characteristic plant communities colonise open substrates that are constantly flushed by surface seepage of cold, base-rich water. They are amongst the few remaining natural plant communities in the UK and are maintained by harsh climatic and soil conditions. On Glen Coe SAC the bulk of this habitat is found around the summit and upper slopes of Meall Mòr.

The vegetation consists of mixtures of small sedges, rushes, small herbs and bryophytes, and includes many arctic-alpine species.

In 2009 the feature was assessed as unfavourable due to the amount of disturbed ground due to trampling by herbivores (sheep and deer). The area of many of the flushes is enclosed by a stock fence, partly to encourage regeneration of mountain willows. Increasing the height of the fence to reduce grazing further may have a negative long term impact on the flushes, by creating undergrazing. There is a need to review management because of the management requirements of the different features.

Key factors affecting this habitat include inappropriate levels of grazing, above low levels, by deer and livestock and, atmospheric pollution adding nitrogen.

Acidic scree

Scree habitats consist of rock fragments covering the frost-shattered summits of mountains or accumulating on slopes below cliffs. Scree is intrinsically unstable and rocks will frequently move meaning that this habitat is vulnerable to disturbance naturally. Acidic screes are made up of siliceous rocks such as quartzite, granite and sandstone. They may occur at any altitude, but screes in the lowlands are excluded from the Annex I definition. On Glen Coe SAC acidic scree is derived from igneous rocks at a range of altitudes.

In 2015 this feature was found to be in unfavourable condition, predominantly due to bracken cover. There is no simple management change which can be prescribed for the high cover of bracken, or the occasional winter interest by deer. Maintaining relatively low numbers of deer and livestock on the site and keeping the sheep on the Gleann Leac na Muidhe heft, as per current management, is the only simple mechanism for trying to prevent future failures.

Siliceous rocky slopes with chasmophytic vegetation

Chasmophytic (grows in the crevices of rocks) vegetation consists of plant communities that colonise the cracks and fissures of rock faces and is widespread in upland areas but is localised and fragmentary in its occurrence. The type of plant community that develops is largely determined by the base-status of the rock face. Siliceous communities develop on acid rocks. At Glen Coe the habitat type is developed on massive outcrops of siliceous igneous rocks with crags up to very high altitude.

The plants in crevices are found in harsh and sometimes extreme conditions with limited soil development, but where there is some shelter and moisture, and so plants are sparse and scattered. Chasmophytic plant species are adapted to the stresses of drought and low nutrient availability. They can be sensitive to overgrazing (above low levels) and trampling although many sites are protected by inaccessibility.

In 2009 this feature was found to be in favourable condition.

Calcareous rocky slopes with chasmophytic vegetation
Chasmophytic (grows in the crevices of rocks) vegetation consists of plant communities that colonise the cracks and fissures of rock faces and is widespread in upland areas but is localised and fragmentary in its occurrence. The type of plant community that develops is largely determined by the base-status of the rock face. Calcareous sub-types develop on lime-rich rocks such as limestone and calcareous schists. At Glen Coe base-rich outcrops occur from moderate to high altitude including limestone and calcareous schists on Meall Mòr and lime-rich bands in igneous rocks on Bidean nam Bian.

The plants in crevices are found in harsh and sometimes extreme conditions with limited soil development, but where there is some shelter and moisture, and so plants are sparse and scattered. Chasmophytic plant species are adapted to the stresses of drought but can be sensitive to overgrazing and trampling although many sites are protected by inaccessibility. The base-richness of calcareous rocks may encourage competition from more vigorous native species, or non-native invasives such as New Zealand willowherb.

In 2009 this feature was found to be in favourable condition.

Further information on the protected habitats of this site can be found on the JNCC website.

Conservation Priorities

Higher priority features
These are the higher priority features, chosen because Glen Coe is a key site for these habitats having scored an A or a B on the site data form for its overall importance to the conservation of that vegetation community. This list also includes Habitats Directive priority habitats (marked in bold) which are of particular conservation importance across their range:

Clear-water lakes or lochs with aquatic vegetation and poor to moderate nutrient levels
Species-rich grassland with mat-grass in upland areas
Tall herb communities
Acidic scree
Plants in crevices on base-rich rocks
Plants in crevices on acid rocks
High-altitude plant communities associated with areas of water seepage (note this habitat scored ‘C’)

In general, precedence should be given to priority habitats and features that are in unfavourable condition, should any conflict between management of different habitats or species arise.

At Glen Coe, the following habitats from the lists above are in unfavourable condition:
Species-rich grassland with mat-grass in upland areas
Acidic scree

High-altitude plant communities associated with areas of water seepage

Current management across Glen Coe SAC is focussed on lowering the levels of grazing and browsing from red deer, whilst sheep at the west end of the site are being managed via stock reduction and extra shepherding. This management has led to recovering condition for Alpine and boreal heaths, acid grassland, base rich fens and willow scrub. High-altitude plant communities associated with areas of water seepage were in unfavourable condition in 2009 due to trampling, but the current management should also be helping to improve their condition. Dry heaths were found to be in unfavourable declining condition in 2014. The management focus on lowering herbivore impacts should also be benefitting this feature, though high impacts caused by winter incursions from red deer are likely to need to be resolved in order to bring this feature into favourable condition.

The key issue for Species rich grassland with mat grass and Alpine and subalpine calcareous grasslands is under grazing (with low levels, with limited moderate levels, desired). Most of the failure sample points have been found on Meall Mòr, despite it being grazed by sheep and also cattle on the lower slopes. In other areas, these habitats are preferentially grazed over surrounding habitats, and at high altitude the grasslands are maintained by the harsh climate. Livestock on Meall Mòr are being managed to benefit the suite of calcicolous vegetation types that are found on the Dalradian limestone of this hill, and management should continue to find a balance between this suite of habitats, many of which require lower grazing than the grasslands. Some under grazing of Species rich grassland with mat grass and Alpine calcareous grassland should be accepted in favour of the other habitats more sensitive to over grazing as Species rich grassland with mat grass will tolerate being under grazed for a significant amount of time without loss in species richness. Habitats that would benefit include the priority High-altitude plant communities associated with areas of water seepage, and others such as base-rich fens, montane willow scrub and tall herb ledge – the latter two have the potential to expand with lower grazing pressure.

Increasing extent of bracken looks to be a long-term challenge on this site, and is leading to unfavourable condition of acidic scree, and is a threat to dry heath. Why this is happening and how it can be resolved is not clear. There may not be a practical remedy due to, for example, difficult access and sensitivity of the other fern species to chemical bracken control.

<u>Glen Etive and Glen Fyne SPA</u>

Any plans or projects also need to consider the requirements of golden eagles in the overlapping Glen Etive and Glen Fyne SPA. Golden eagles require open ground or widely spaced trees to hunt. They nest on cliffs or in tall trees. None of the management measures proposed for Glen Coe are likely to have any significant negative impact on golden eagles. The ongoing low grazing pressure, leading to recovery of dwarf shrubs, may have a small positive effect for eagles, by providing cover for prey species and increasing prey availability.

Conservation Objectives

Overarching Conservation Objectives for all features of Glen Coe SAC

1. To ensure that the qualifying features of Glen Coe 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 Glen Coe SAC is maintained by meeting objectives 2a, 2b and 2c for each qualifying feature.
The aim at this SAC is to maintain, or where appropriate restore, the protected habitats in a favourable condition as a contribution to their wider conservation status. Therefore any impacts on the objectives shown in 2a, 2b, or 2c below must not persist so that they prevent the achievement of this overall aim. When carrying out appraisals of plans or projects the focus should be on restoring site integrity, specifically by meeting the objectives outlined in 2a, 2b and 2c. If these are met then site integrity will be restored. Note that not all of these 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 a feature to recover and there is certainty that the features will be able to quickly recover. This objective recognises that the qualifying habitats are 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 habitats' 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 exception to this is when the favourable condition of a habitat is dependent on halting or managing natural succession. 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.

Conservation Objectives for Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea [H3130] (Clear-water lakes or lochs with aquatic vegetation and poor to moderate nutrient levels)

2a. Maintain the extent and distribution of the habitat within the site
The extent of Clear-water lakes or lochs with aquatic vegetation and poor to moderate nutrient levels habitat feature has been estimated at 14.84ha, which constitutes Loch Achtriochtan The area figure has been taken from the Standard Data Form. Fundamentally there should be no measurable net reduction the extent of the habitat and, most importantly, its distribution throughout the site and the number of sites should be maintained. This should include the total surface area, depth of water and type and distribution of loch substrate sediments. This conservation objective is considered to be met if the conditions to ensure the habitats' long-term existence are in place.

2b. Maintain the structure, function and supporting processes of the habitat
The structure and function of lochs are strongly influenced by activities within their catchment. Changes in land management or development can affect the integrity of the feature which will manifest itself in changes to the loch. Physical Attributes -Surface Area Changes to surface area can indicate pressures on the structure and function of lochs. The surface area of a loch may fluctuate slightly naturally. However changes to surface area and the associated change to depth can adversely affect the character of the loch, particularly the edge vegetation. Artificial fluctuations to depth found in controlled water bodies such as reservoirs can adversely affect the vegetation. Changes to the surface area may also indicate a number of pressures such as abstraction, regulation, construction, excessive sediment deposition and natural succession which may occur in the catchment. -Hydrological regime The hydrology of the loch affects both water level fluctuations and annual and within year flushing patterns. Flushing is important as it is strongly related to dilution and removal of nutrients and plankton. Changes to the flushing pattern can be caused by factors similar to those affecting area; abstraction, regulation, construction, excessive sediment deposition and natural succession which may occur in the catchment. -Loch substrate character The type and distribution of sediment particles within a loch will affect the biology of the loch and the availability of habitats. Changes to the substrate character may also be indicative of changes to the area and hydrological regime. Reduction in area or flushing may affect the substrate character as finer sediments become trapped and there is increased input of leaf-litter from scrub encroachment. -Natural sediment load Accumulation of nutrient-rich sediment may have a strong effect on the water quality and biology of the loch. Increases in sediment loading may result from both changes in land

management practice in the catchment or on the shoreline and short term events such as construction. The turbidity of this loch varies greatly as a result of natural process taking place elsewhere in the catchment such as snow thaw and landslips. Evidence is growing that an increase in storm events associated with climate change may increase the amount of sediment deposited in lochs.

-Connectivity between the loch and the surrounding area
While a loch is often perceived as a discrete entity the connections between it and the surrounding area are vital to its functioning as part of a natural system. These natural connections can be reduced or changed by, for example, hard engineering works on the shoreline or loch bed and anything that impedes the exchange of water either on the surface or with the underlying water table.

Water Quality
-Dissolved Oxygen
Oxygen is vital to respiration. An artificially high biomass caused by increased loadings of organic matter or algal blooms can create a heavy demand which causes low levels of dissolved oxygen. Dissolved oxygen is likely to be lowest in July and August. The target is dissolved oxygen >7.0mg/l for lochs classified as at Good Ecological Status (GES) under the Water framework Directive (WFD) or >9.0 Mg/l for lochs classified as High Ecological Status (HES) during July and August.

-pH
This influences many of the chemical processes in lochs such as the binding of phosphorus. Artificial changes through eutrophication or acidification can therefore have a significant effect. Oligotrophic lochs such as Loch Achtriochtan should have pH of 5.5 to 7.

-Chlorophyll a
Chlorophyll a is a good measure for phytoplankton abundance. Phytoplankton is an important part of the processes of a loch ecosystem affecting light penetration and oxygen demand. A high biomass is usually associated with nutrient enrichment and sedimentation of organic matter. Target Chlorophyll a can be calculated for each loch based on site specific targets related to alkalinity and depth. Where a site is in favourable condition current Chlorophyll a can be used to set a baseline.

Nutrients
There should be no unnatural nutrient inputs to lochs, for example from sources such as litter or human waste. Excessive dunging by animals should be prevented by avoiding management that encourages them from congregating near lochs.

Phosphorus is one of the main nutrients required for plant growth and there is strong correlation between TP concentration and phytoplankton biomass. The target for TP is based on an annual mean; for deeper lochs (mean depth >3m) 15ugP/l maximum annual mean TP, very shallow (Mean depth <3m) 20ugP/l. Site specific targets may also be set where there are good records.

Nitrogen is the other main nutrient important in loch ecosystems. It is generally less likely to be limiting than phosphorus because of the ability of some organisms to fix Nitrogen from the atmosphere. The target for all lochs is that Annual Mean Total Nitrogen should not exceed 1.5mg/l. with no deterioration from baseline. For N limited lochs consideration may be given to setting site based targets.

2c. Maintain the distribution and viability of typical species of the habitat
Typical species of oligotrophic lochs;

Juncus bulbosus	bulbous rush
Litorella uniflora	shoreweed
Lobeliia dortmanna	water lobelia
Subularia aquatica	awlwort
Isoetes lacustris	lake quillwort
Nitella flexis	smooth stonewort
Potamogeton polygonifolius	bog pondweed
Phalaris arundinacea	reed canary-grass

The viability of the characteristic species is determined by water quality and other conditions that support the plant community such as water clarity. Loss or reduction in frequency of species may therefore be an indicator of deteriorating or changing water quality or some other adverse impact.

Alien species can have direct effects upon the natural plant communities through competition. They may also have more subtle effects as the niche they fill is different and this may directly or indirectly affect the rest of the ecosystem. A list of high impact species has been agreed as part of the Water Framework Directive. Other species that may also affect the integrity of the site include Elodea nutallii, E.canadensis and Crassula helmsii. Filamentous algae are indicative of high nutrient levels. This can create dense blankets reducing light and which can cause problems when they die and decay.

No unfavourable or invasive species have been recorded at Loch Achtriochtan.

Conservation Objectives for European dry heaths [H4030]

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

Restore to approximately **281.9**ha. The area figure has been taken from the Standard Data Form, and is an estimate based on the fact that European dry heaths can form complex mosaics with habitats such as grasslands, wet heaths and bogs. However the measurable habitat extent and its distribution throughout the site should be restored.

The habitat is found on freely-drained, nutrient-poor, acidic soils. This can determine the extent and distribution of the habitat throughout the SAC, although it is also dependant on heathland management to maintain its extent including:

- Appropriate low level of grazing – previous and on-going high levels of grazing, particularly by red deer entering the site in periods of adverse weather, has resulted in the loss (which is still continuing) of this habitat type as it is transformed into grassland/overtaken by bracken

- avoidance of any loss of habitat through increased extent of successional or adjacent natural habitats, afforestation or invasion by alien species.

- avoidance of negative effects of access and recreation

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

European dry heaths are closely associated with scrub and woodland habitats, which would form the climax habitat without heathland management. Therefore maintaining dry heath is a fine balance between degrading to grasslands as a result of intensive management (as has happened in areas of this site causing the site to be assessed as unfavourable), and succession to scrub or woodland from too low a level of browsing, grazing or burning. Red

deer and sheep are the main herbivores on Glen Coe SAC, and appropriate management of their numbers and distribution across the site is important to restore dry heath habitat whilst preventing habitat degradation from under/overgrazing or trampling. Scattered native trees are compatible with dry heath habitat but a complete lack of grazing or burning can lead to dry heath being colonised by species that are not typical of this habitat (such as dense areas of trees) if this management is continued over many years.

Further targets to achieve suitable habitat structure include:

Grazing/browsing
- less than 33% of the last complete growing season's shoots of dwarf-shrub species (collectively but excluding dwarf birch *Betula nana* and bog myrtle *Myrica gale*) should show signs of browsing.

Trampling/disturbance
- less than 10% of the ground cover should be made up from disturbed bare ground (ie where a substrate of bare humus, bare peat, bare mineral soil, bare gravel, or soil covered only by an algal mat, has its surface broken and imprinted by hoof marks, wallows, human foot prints, or vehicle and machinery tracks. The emphasis is on 'disturbed' rather than 'bare')

Invasive native and non-native species
– non-native species should be absent from the habitat, with less than 1% of vegetation cover should be made up of non-native species.
- bracken coverage should be minimised, making up less than 10% of the vegetation cover.
- less than 20% of the vegetation cover should be made up of scattered native trees and scrub (exclude *Betula nana* and *Myrica gale*).

Note that interaction of burning and grazing is an important cause of loss of dwarf shrub cover.

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

The dry heath at Glen Coe SAC includes NVC types H10, H12, H18, H21 and H22 which are dominated by heather (*Calluna vulgaris*), bell heather (*Erica cinerea),* blaeberry (*Vaccinium myrtillus*) and crowberry (*Empetrum nigrum*). There is usually a deep carpet of pluerocarpus mosses.

In summary the indicator species for European dry heath are:
Arctostaphylos uva-ursi - bearberry
Calluna vulgaris - heather
Erica cinerea – bell heather
Empetrum nigrum - crowberry
Racomitrium lanuginosum - woolly fringe-moss
Vaccinium myrtillus – blaeberry
Vaccinium vitis-idaea – cowberry

Typical, associated vertebrates of upland heaths are red deer (*Cervus elaphus*) and mountain hares (*Lepus timidus*), red grouse (*Lagopus l. scotica)* and golden eagle (*Aquila chrysaetos)*.

Historic, and locally continuing, high grazing pressure (above the low levels required) from red deer and livestock are resulting in the loss of indicator species from areas of this habitat and causing it to be assessed as unfavourable.

Conservation Objectives for Alpine and Boreal heaths [H4060] (Alpine and subalpine heaths)

2a. Maintain the extent and distribution of Alpine and Boreal heaths within the site

Maintain to approximately **979.23**ha. The area figure for this SAC has been taken from the Standard Data Form, and is an estimate based on the fact that both Alpine and Boreal heaths can grade into other heath types, especially the latter into floristically-similar European dry heaths. However there should be no measurable net reduction in the extent of the habitat and its distribution throughout the site.

Alpine and subalpine heaths are generally found on acid rocks on mountains, both on exposed lower summits and ridges and on sheltered slopes where the dominant plants can cope with harsh climatic conditions such as high winds and prolonged snow cover. These conditions will largely determine the extent and distribution of the habitats throughout the SAC, although the habitats' long-term existence will also be affected by:

- grazing and muirburn
- habitat loss through increased extent of adjacent natural habitats
- The effects of access and recreation

2b. Restore the structure, function and supporting processes of the Alpine and Boreal heath

Alpine and Boreal heaths are climax vegetation in exposed and extreme conditions which result in slow growth; they are therefore very sensitive to disturbance and are slow to recover.

As with many other Scottish upland habitats, restoring Alpine and Boreal heaths is a fine balance between degrading to grasslands with intensive management and succession to scrub/woodland with too low a level of browsing, grazing or burning. This is especially the case with the Boreal (sub-alpine) heaths where there may be only subtle differences between them and some adjacent habitats. Historic grazing, above the low levels required for this habitat, is responsible for its unfavourable condition. Whilst grazing levels have improved the structure has not yet fully recovered to conditions as outlined below.

The structure of the habitat is based around:

- the presence of at least 25% cover of dwarf shrub heath species, but can be up 90%.
- less than 10% of live leaves should show signs of grazing (of any of *Carex bigelowii*, *Deschampsia flexuosa*, *Festuca ovina*, *Festuca vivipara*, *Juncus trifidus*)
- less than 33% of the last complete growing season's shoots of dwarf-shrub species (collectively) should show signs of browsing
- no signs of burning inside the feature boundaries
- less than 10% of the ground cover should be disturbed bare ground (ie where a substrate of bare humus, bare peat, bare mineral soil, bare gravel, or soil covered only by an algal mat, has its surface broken and imprinted by hoof marks, wallows, human foot prints, or vehicle and machinery tracks. The emphasis is on 'disturbed' rather than 'bare'.)

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

This habitat comprises a wide range of heath types, with variation related to climate, local exposure and snow-lie.

On less-exposed, more sheltered ground at the lower altitudinal range of the habitat, *Calluna*

generally dominates. *Calluna* is usually accompanied by other dwarf-shrubs, such as *V.myrtillus*, bell heather *Erica cinerea*, bearberry *Arctostaphylos uva-ursi* and crowberry *E.nigrum* ssp. *nigrum*. On more exposed and windswept ground, a range of dwarf-shrubs may dominate, forming an altitudinal progression. The first in the progression, and often the most extensive, are heaths dominated by *Calluna* growing in a prostrate form. At higher altitudes, where conditions are too extreme for heather, short or prostrate *Vaccinium* spp. and *E.nigrum* ssp dominate. On sheltered slopes where snow lingers, the dominant shrub is *V.myrtillus*, which is either the sole dominant or grows with *E.nigrum*, dwarf cornel *Cornus suecica* and cloudberry *Rubus chamaemorus*.

Woolly fringe-moss *Racomitrium lanuginosum*, bell heather *Erica cinerea* and Atlantic liverworts and mosses may be abundant as well as mountain bearberry *Arctostaphylos alpinus* and trailing azalea *Loiseleuria procumbens* Different structural forms of heath can also occur, owing to differences in exposure, giving rise to closed or open heaths with crescentic waves (wave-form).

In some stands of Alpine and subalpine heaths the action of solifluction creates unstable soils, which provide more plant nutrients and maintain open conditions. These conditions favours the growth of plants such as mountain everlasting *Antennaria dioica*, carnation sedge *Carex panicea*, pill sedge *C. pilulifera*, sea plantain *Plantago maritima*, fir clubmoss *Huperzia selago* and viviparous sheep's-fescue *Festuca vivipara*, enriching the flora of the heaths.

The uncommon species bog whortleberry *Vaccinium uliginosum* is found in some parts of this habitat.

This habitat is used by populations of red deer *Cervus elaphus* and mountain hares *Lepus timidus* on this site. High levels of herbivore use can damage heaths, but a low level of grazing and browsing is necessary to maintain this habitat. Previous high levels of grazing are responsible for this feature being assessed as unfavourable with the proportion of plant species that are 'non-typical' present still too high in some areas.

Ptarmigan *Lagopus muta*, golden eagle *Aquila chrysaetos* and snow bunting *Plectrophenax nivalis* also use this habitat.

Conservation Objectives for Sub-Arctic *Salix* spp. Scrub [H4080] (Mountain willow scrub)

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

Maintain the extent of existing mountain willow scrub at approximately **1**ha. The area figure has been taken from the Standard Data Form, and is an estimate.

This habitat is found on the Dalradian limestone crags of Meall Mòr. It is a localised habitat type found usually on ledges and steep rocky slopes less accessible to herbivores. Baseline estimates may not be very precise and any changes in extent estimates as a result of new survey may not represent real change but greater precision. The fenced exclosure does, however, give this habitat the opportunity to expand.

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

This habitat is the UK's highest-altitude shrubby vegetation, occurring on moist, relatively base-rich soils in rocky situations on mountains. The willow scrub survives on ungrazed ledges and, more rarely, on lightly grazed, steep rocky slopes or boulder fields.

However, over-grazing/browsing is believed to have reduced and restricted the occurrence

of this habitat. At many sites its continued future is precarious, since it is confined to often unstable rock ledges and reproducing populations are very small, isolated, and of uncertain long-term viability. Excessive trampling can damage the habitat. The condition of the habitat is improving and effforts to restore the structure, function and supporting processes of the habitat should continue by managing herbivore impacts on Meall Mòr.

Where grazing/browsing occurs it should be of a level where distinct browse lines or shaping of the canopy (topiary-like effects) does not occur.

This habitat is very sensitive to muirburn and should be avoided in these areas.

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

This habitat consists of a mixture of willow species which have arctic-alpine and arctic-subarctic distributions in Europe. On Glen Coe SAC the indicator sub-arctic species present are:

whortle-leaved willow *S. myrsinites*
tea-leaved willow *S. phylicifolia*.

As willows are dioecious to maintain a viable population it is important that there is a suitably large population size with both male and female plants present.

The willows grow among a rich mixture of dwarf shrubs, grasses, rushes and broad-leaved herbs, such as:
blaeberry *Vaccinium myrtillus*
tufted hair-grass *Deschampsia cespitosa*
great wood-rush *Luzula sylvatica*
Alpine lady's-mantle *Alchemilla alpina*,

Overgrazing of this habitat has led to it being assessed as unfavourable with the proportion of the area covered by indicator species, as listed above, being too low in some areas identified as being this habitat type.

Since this habitat is small and fragmented and generally occurs within a wider landscape-scale, maintenance of the typical species will need to be managed as part of the wider site management.

Conservation Objectives for Siliceous alpine and boreal grasslands [H6150] (Montane acid grasslands)

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

Maintain approximately **163**ha The area figure has been taken from the Standard Data Form, and is an estimate based on the amount and complex, yet often limited, mosaic of several different high altitude communities. Fundamentally however there should be no measurable net reduction the extent of the habitat and its distribution throughout the site.

Factors at the global/national level that may affect Montane acid grasslands' extent over the site may be linked to climate change, reduced snow cover and, atmospheric acid deposition.

This conservation objective is considered to be met if the conditions to ensure the habitats' long-term existence are in place.

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

Whilst these grasslands are some of the very few predominantly near-natural habitats

remaining in the UK, they are very sensitive to changes in current pressures, especially grazing and nutrient input. Excessive grazing, and the associated manuring, may favour grasses over bryophytes.

Montane acid grassland at Glen Coe should continue to be restored to favourable condition by maintaining reduced grazing levels across the site (deer and sheep). Where appropriate levels of grazing/browsing are in place to allow survival of component species of the habitat the structure, throughout the site, should meet the following conditions:

- Less than 10% of grass and sedge tillers uprooted;
- Less than 10% of live leaves and/or flowers of any of the following showing evidence of grazing *Alchemilla alpina*, *Carex bigelowii*, *Deschampsia flexuosa*, *Festuca ovina*, *Festuca vivipara*, *Juncus trifidus*, *Nardus stricta*, *Sibbaldia procumbens*, *Thymus polytrichus*;
- Less than 50% of live leaves of any of the following showing evidence of grazing *Agrostis capillaris*, *Agrostis vinealis*, *Anthoxanthum odoratum*, *Poa* spp.

Where appropriate levels of disturbance are in place, that allow for survival of component species of the habitat throughout the site, then the following conditions should be met:

- Montane acid grasslands should not be burnt to avoid damage to the structure, function and supporting processes of this habitat.
- Less than 10% of the ground cover should be disturbed bare ground
  a) distinct and clearly defined paths and tracks (exclude constructed tracks) across the feature or,
  b) diffuse/scattered disturbance of the ground, not on clearly defined paths or tracks.

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

There are multiple NVC communities that can be form Montane acid grassland habitat. These vary geographically with the relevant types for this site listed below:

Within Glencoe SAC, the vegetation consists of U7 *Nardus stricta Carex bigelowii* heath, U8 *Carex bigelowii Polytrichum alpinum* heath, U10 *Carex bigelowii Racomitrium lanuginosum* moss heath, U11 *Polytrichum sexangulare Kiaeria starkei* snow-bed, U12 *Salix herbacea Racomitrium heterostichum* snow-bed and U14 *Alchemilla alpina Sibbaldia procumbens* snow-bed.

The number of sub-types in the habitat results in a spectrum of specialised plants, the actual species in any one dependent upon the specific topography where the community occurs.

Carex – Racomitrium moss-heath occurs on windswept ground blown clear of snow during winter, and is the most extensive sub-type of the habitat across most of the UK. Where snow-lie builds up, such moss-heath gives way initially to *Nardus – Carex* grass-heath, and then to *Carex – Polytrichum* sedge-heath where snow-lie is more prolonged. The longest lying snow-beds (*Polytrichum – Kiaeria* snow-bed, *Salix – Racomitrium* snow-bed and *Alchemilla – Sibbaldia* dwarf-herb community) are dominated by mosses and hardy herbs. These communities occur around the edges of high plateaux on steep slopes where a snow cornice develops in high corries or in gullies where deep snow accumulates. They can also occur in snow hollows on the highest summits. The *Alchemilla – Sibbaldia* dwarf-herb community requires a certain amount of base-rich flushing to develop its distinctive flora of small herbs. *Carex – Racomitrium* moss-heath grades into *Juncus – Racomitrium*

rush-heath where exposure is more severe or the substrate unstable, and the latter community represents the habitat type at its highest altitude.

In summary indicator species for Montane acid grassland are:

Alchemilla alpina	alpine lady's mantle
Carex bigelowii	stiff sedge
Cetraria islandica	Iceland moss (lichen)
Cladonia arbuscula	(lichen)
Cladonia uncialis	thorn lichen
Dicranum fuscescens	dusky fork-moss
Empetrum nigrum ssp. hermaphroditum	mountain crowberry
Gnaphalium supinum	dwarf cudweed
Juncus trifidus	three-leaved rush
Kiaeria starkei	Starke's fork-moss
Nardus stricta	mat-grass
Polytrichum alpinum	alpine haircap
Ptilidium ciliare	ciliated fringewort
Racomitrium lanuginosum	wooly hair moss
Rhytidiadelphus loreus	little shaggy-moss
Salix herbacea	dwarf willow

This feature is currently assessed as unfavourable recovering. In 2003 this habitat was found to have too high a proportion of non-typical plant species, probably due to a combination of historically higher herbivore usage (and the inclusion, in the monitoring sample, of vegetation transitional to U5 (sub-alpine) grassland). The current composition of the vegetation may be an intermediate (but possibly quite long lasting stage) in the process of developing more favourable condition.

Red deer and mountain hare use this habitat for grazing and birds such as ptarmigan and snow bunting can be found here.

Conservation Objectives for Alpine and subalpine calcareous grasslands [H6170]

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

Alpine and subalpine calcareous grasslands occur on lime-rich soils. The habitat is widespread and frequent within Glen Coe, typically at low to mid altitudes, where it often occurs in mosaic with heaths, rock outcrops and flushes. There are stands on the northeast slopes of Meall Mor, the northen Corries of Bidean nam Bian and the south facing slopes of Stob Coire Sgreamhach.

The objective is to maintain the extent of the habitat to approximately **0.9**ha. The area figure has been taken from the Standard Data Form, and is an estimate based on the amount and complex, yet often limited, mosaic of several different high altitude communities.

Alpine and subalpine calcareous grasslands form intimate mosaics with other upland Annex I habitats, and there are complex transitions to a range of montane communities. They are often associated with montane willow scrub and tall herb communities. They can also give way to species-rich grasslands with mat-grass on more siliceous substrates. Where snow lies late they give way to late snow-bed communities, and on the more

windswept and leached summits they are
replaced by moss-heaths. Where there is strong base-rich flushing they grade into high-altitude plant communities associated with areas of water seepage and on rocky ground to plants in crevices on base-rich rocks or plants in crevices on acid rocks.

Fundamentally however there should be no measurable net reduction in the extent of the habitat and its distribution throughout the site.

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

Whilst these grasslands, especially the *Dryas octopetala* – *Silene acaulis* ledge community, are amongst the most near-natural habitats remaining in the UK, they are very sensitive to certain pressures. The main elements that affect the habitat are under-grazing, over–grazing, trampling damage and encroachment of trees and scrub. Inappropriate grazing may facilitate creation of a grass sward. At this site there are signs of both over and under-grazing of this habitat however under-grazing dominates – due to the unfavourable location of the habitat for grazing livestock – and is responsible for the habitat being assessed as unfavourable with the structure not being as described below.

A distinctive characteristic of this habitat is the high proportion of dwarf forbs to grasses accompanied by a relatively high proportion of mosses in the sward. Appropriate (low) levels of grazing should allow the typical plants listed in section 2c to grow, flower and set seed. Where appropriate levels of grazing occur habitat structure should meet the below criteria:

- At least 50% of live leaves and/or flowering shoots of vascular plants should be more than 20 cm above the ground.
- Less than 10% of vegetation cover should be made up of bracken and/or scattered native trees and scrub.
- Less than 10% of ground cover should be disturbed bare ground

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

Alpine and subalpine calcareous grasslands can comprise of three NVC types as given below:

CG12 *Festuca ovina* – *Alchemilla alpina* – *Silene acaulis* dwarf-herb community

CG13 *Dryas octopetala* – *Carex flacca* heath

CG14 *Dryas octopetala* – *Silene acaulis* ledge community

The alpine and subalpine calcareous grassland habitat in Glen Coe is primarily CG12. Both CG13 and CG14 are present on Meall Mor, with CG13a in grasslands accessible to herbivores and CG14 on steeper and more precipitous terrain.

Variation within the habitat type is due to differences in altitude, climate and the intensity of grazing.

The low-altitude *Dryas* – *Carex* grasslands are dominated by mountain avens *Dryas octopetala*. This community occurs in the north and west of Scotland from near sea level up to an altitude of 500m, mainly on Durness limestone and wind-blown shell-sand. Within *Dryas* – *Carex* heath, mountain avens occurs mixed with lowland species and a relatively small complement of other arctic-alpine species. In some forms of the community the calcifuge (lime-hating) arctic-alpines crowberry *Empetrum nigrum* ssp. *nigrum*, hermaphrodite crowberry *E. nigrum* ssp. *hermaphroditum* and bearberry *Arctostaphylos uva-ursi*, occur mixed with calciphile (lime-loving) species such as mountain avens.

At high altitudes the habitat type occurs in two forms with a much larger assemblage of arctic-alpine species. Dominance of mountain avens is maintained on steep rocky ground,

on rock ledges, and among boulders out of reach of grazing animals, forming *Dryas – Silene* ledge community. Within this sub-type, mountain avens occurs mixed with a wide range of arctic-alpine species. On open slopes, montane cushion herbs, especially moss campion *Silene acaulis*, and other small herbs replace mountain avens to form *Festuca – Alchemilla – Silene* dwarf-herb community. Arctic-alpines also dominate here, usually moss campion and alpine lady's-mantle, sometimes with cyphel.

On most upland sites, Alpine and subalpine calcareous grasslands form intimate mosaics with other upland Annex I habitats, and there are complex transitions to a range of montane communities. They are often associated with Sub-Arctic *Salix* spp. scrub and Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels on inaccessible rocky ground. On more siliceous soils, they give way to Species-rich *Nardus* grasslands, on siliceous substrates in mountain areas (and submountain areas in continental Europe) or more species-poor forms of *Nardus* grassland. Where snow lies late they give way to late snow-bed communities, and on the more windswept and leached summits they are replaced by moss-heaths, both habitats belonging to Siliceous alpine and boreal grasslands. Where there is strong base-rich flushing they grade into Alpine pioneer formations of the *Caricion bicoloris-atrofuscae* and on rocky ground to Calcareous rocky slopes with chasmophytic vegetation or Siliceous rocky slopes with chasmophytic vegetation.

In summary indicator species for Alpine and subalpine calcareous grasslands are:

Alchemilla alpina	alpine lady's mantle
Carex capillaris	hair sedge
Carex flacca	glaucous sedge
Carex pulicaris	flea sedge
Dryas octopetala	mountain avens
Linum catharticum	fairy/purging flax
Lotus corniculatus	common bird's-foot-trefoil
Luzula spicata	spiked wood-rush
Plantago maritima	sea plantain
Persicaria vivipara	alpine bistort
Salix reticulata	net-leaved willow
Saxifraga aizoides	yellow mountain saxifrage
Saxifraga oppositifolia	purple saxifrage
Selaginella selaginoides	lesser clubmoss
Sibbaldia procumbens	least cinquefoil
Silene acaulis	moss campion
Thalictrum alpinum	alpine meadow-rue
Thymus polytrichus	wild thyme

Uncommon species such as Scottish aspodel *Tofieldia pusilla* and whortle-leaved willow *Salix myrsinites* can also be found here as well as red deer and birds such as ptarmigan.

Conservation Objectives for Species-rich *Nardus* grassland, on siliceous substrates in mountain areas [H6230] (Species-rich grasslands with mat-grass in upland areas)

2a. Maintain the extent and distribution of the habitat within the site
The area of this habitat should be maintained at at least **148**ha.

The area figure has been taken from the Standard Data Form, and is an estimate based on the fact that Species-rich *Nardus* grasslands can grade into sub-maritime, Alpine and subalpine calcareous grasslands or, next to limestone areas, form transitions to Semi-natural dry grasslands and scrubland on calcareous substrates. Habitat mapping (HabMos) in fact shows the area of species-rich *Nardus* grasslands as 113ha on this site, so the 148ha on the data form may be an over-estimate. There should be no measurable net reduction in the extent of the habitat and its distribution throughout the site.

These grasslands occur on base-rich igneous rocks, calcareous-schists and base-enriched alluvial soils, and are found from moderately high to high altitudes in localised areas within the site for example on Meal Mòr, Bidean nam Bian and Sgorr nam Fiannaidh.

This conservation objective is considered to be met if the conditions to ensure the habitats' long-term existence are in place.

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

As with many upland habitats maintaining Species-rich grasslands with mat-grass in upland areas is mainly reliant on appropriate levels of grazing. This tends to be moderate levels though can range from low to high. Reduction in grazing may cause a change towards tall herb communities or, at higher altitudes, towards *Dryas octopetala* vegetation. Overgrazing or burning/muirburn may cause increase in unpalatable species i.e. *Prunella vulgaris, Cirsium* spp and mosses and local trampling to communities with *Lolium, Plantago* and *Poa*.

On this site the feature is currently failing to meet the measures outlined below due to undergrazing – both within and outwith exclosures for mountain willow scrub. Whilst the objective remains 'restore' the resilient nature of this habitat means it can withstand undergrazing for some time without losing its biodiversity and this must be taken into consideration as per the conservation priorities section at the beginning of this document that outlined the overall strategy for this site.

The key factors affecting the habitat type and measures to assess whether or not they are causing damage are given below;

- For overgrazing/browsing
  - At least 25% of the tips of live leaves and/or flowering shoots of vascular plants should be more than 5 cm above the ground surface.
  - at least 25% of the tips of live leaves and/or flowering shoots of vascular plants should be less than 5 cm above the ground surface.

- For colonisation by other species
  - Less than 10% of vegetation cover should be made up of bracken and/or scattered native trees and scrub.

- For trampling
  - Less than 10% of ground cover should be disturbed bare ground.

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

Species present in the grassland tend to be mesophilic. Swards are closely grazed and consist of a complex mosaic of grasses, small herbs and bryophytes.

The species composition of this habitat type will be affected by factors such as altitude and soil moisture levels. Undergrazing, as at this site, can also affect the composition and is currently contributing towards the negative assessment of the feature due to the proportion of non-typical species being higher than tolerated at some points monitored (though not

responsible for it being assessed as unfavourable) .

At high altitude there is a greater representation of arctic-alpine plants, and the habitat can be transitional floristically to and grade into Alpine and subalpine calcareous grasslands. Floristically richer areas develop where there is a concentration of base-rich or calcareous strata, giving suitable conditions for the rarer base- or calcium-loving species. In such situations, especially where outcrops of limestone occur, transitions to Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) may develop.

Low-altitude variants of species-rich *Nardus* grasslands are extensive in the Western Isles and the extreme western Highlands but also occur locally in the eastern Highlands. In the west, where oceanic influences predominate, communities are characterised by the presence of Atlantic or sub-Atlantic species, including both vascular plants and bryophytes. Some examples contain maritime species, and may show transitions to sub-maritime grasslands.

On this site there is an unusual wet flushed grassland with an abundance of sedges, such as carnation sedge *Carex panicea* and flea sedge *C. pulicaris*, purging flax *Linum catharticum*, grass-of-Parnassus *Parnassia palustris*, fragrant orchid *Gymnadenia conopsea*, lousewort *Pedicularis sylvatica* and sea plantain *Plantago maritima*. The grasslands are enriched locally with the arctic-alpines yellow saxifrage *Saxifraga aizoides*, purple saxifrage *S. oppositifolia*, alpine meadow-rue *Thalictrum alpinum* and hair-sedge *C. capillaris*. Other northern species occurring more generally are viviparous sheep's-fescue *Festuca vivipara*, northern bedstraw *Galium boreale*, lady's-mantle *Alchemilla glabra* and mountain everlasting *Antennaria dioica*. There are transitions to western herb-rich bilberry *Vaccinium myrtillus* heath.

Indicator species for species-rich grassland with mat grass in upland areas are:

Alchemilla alpina	alpine lady's mantle
Alchemilla glabra	smooth lady's mantle
Angelica sylvestris	wild angelica
Briza media	quaking grass
Campanula rotundifolia	harebell
Carex caryophyllea	spring sedge
Carex panicea	carnation sedge
Cerastium fontanum	common mouse-ear
Danthonia decumbens	heath-grass
Filipendula ulmaria	meadowsweet
Galium verum	lady's bedstraw
Geum rivale	water avens
Lathyrus linifolius	bitter-vetch
Lotus corniculatus	common bird's-foot-trefoil
Pinguicula vulgaris	common butterwort
Persicaria vivipara	alpine bistort
Stachys officinalis (S. betonica)	common hedgenettle
Succisa pratensis	devil's bit scabious
Thymus polytrichus	wild thyme
Veronica officinalis	heath speedwell

This habitat is used by red deer and birds such as ptarmigan.

Conservation Objectives for Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels [H6430] (Tall herb communities)

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

Maintain at approximately **5.5**ha.

The area figure has been taken from the Standard Data Form, and is an estimate based on the amount and complex, yet often limited, mosaic of several different high altitude communities. Fundamentally however there should be no measurable net reduction in the extent of the habitat and its distribution throughout the site. Where there are possibilities to improve and/or extend this habitat they should be taken.

This conservation objective is considered to be met if the conditions to ensure the habitats' long-term existence are in place.

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

The extreme sensitivity of this habitat to grazing pressure is responsible for its scarcity. Whilst this habitat would have once been more abundant it is now largely confined to areas inaccessible to grazers. Introduction of additional grazing pressure, especially from highly agile species such as goats, has the ability to cause major losses. Direct management of grazing pressure has the ability to restore or extend this scarce habitat.

Where appropriate levels of grazing/browsing are in place to allow survival of component species of the habitat the structure, throughout the site, should meet the following conditions:

- At least 50% of tall herb stems should be more than 20 cm tall, or there should be few observable signs of grazing on tall herbs or ferns, and most tall herb species should be flowering or showing signs of being able to flower. (Qualifier: include flowering stems, other than those of *Luzula sylvatica* which can be hard to see clearly from a distance and do not tend to form a distinct stratum) assessed against visual estimate at individual stand scale.
- Less than 50% of live flowering shoots of indicator tall herbs (see below in 3 for list) should show evidence of grazing.

The structure of this habitat can also be impacted by succession from tall-herb communities to woodland.

Where appropriate levels of disturbance are in place, that allow for survival of component species of the habitat, throughout the site, then the following conditions should be met:

- Less than 25% of the ground cover, of each patch or stand, should be disturbed bare ground. The emphasis is on 'disturbed' rather than 'bare'. Exclude distinct and clearly defined paths or tracks.
- Over the whole feature scanned from sample locations, less than 10% of the ground cover should be disturbed bare ground*. Assessed against the aggregate of visual estimates for as much of the feature as is visible while standing at all sample locations.

Furthermore, muirburn negatively impacts upon this habitat type and should not take place.

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

The Tall herb communities habitat is a species-rich habitat corresponding to NVC type *Luzula sylvatica – Geum rivale* tall-herb community.

It is characterised by the abundance of a species-rich mix of tall, broad-leaved herbs, most of which are otherwise rare in the uplands owing to their sensitivity to grazing.

Characteristic species on this site include roseroot *Sedum rosea*, wild angelica *Angelica sylvestris*, common valerian *Valeriana officinalis*, hogweed *Heracleum sphondylium*, mountain melick *Melica nutans*, lesser meadow-rue *Thalictrum minus* and melancholy thistle *Cirsium heterophyllum*. The habitat type is similar to that on Ben Lui, with a good representation of ferns, including brittle bladder-fern *Cystopteris fragilis*, polypody *Polypodium vulgare*, beech fern *Phegopteris connectilis* and holly-fern *Polystichum lonchitis*. Some crags have running water with an unusual abundance of common scurvygrass *Cochlearia officinalis*, and other species of wet crags are well represented, including opposite-leaved golden-saxifrage *Chrysosplenium oppositifolium*, grass-of-Parnassus *Parnassia palustris* and marsh hawk's-beard *Crepis paludosa*. On Meall Mòr there are transitions to Montane willow scrub with whortle-leaved willow *Salix myrsinites*.

In summary indicator species for Tall-herb communities on this site are:

Alchemilla spp.	lady's-mantles
Angelica sylvestris	wild angelica
Cirsium heterophyllum	melancholy thistle
Crepis paludosa	marsh hawk's-beard
Filipendula ulmaria	meadowsweet
Galium boreale	northern bedstraw
Geranium sylvaticum	wood crane's-bill
Geum rivale	water avens
Heracleum sphondylium	hogweed
Hieracium spp.	hawkweeds
Hypericum spp.	St. John's-worts
Luzula sylvatica	great wood-rush
Meconopsis cambrica	welsh poppy
Mercurialis perennis	dog's mercury
Oxyria digyna	mountain sorrel
Potentilla crantzii	alpine cinquefoil
Primula vulgaris	primrose
Ranunculus acris	meadow buttercup
Rubus saxatilis	stone bramble
Rumex acetosa	common sorrel
Saussurea alpina	alpine saw-wort
Sedum rosea	roseroot
Silene dioica	red campion
Solidago virgaurea	goldenrod
Succisa pratensis	devil's-bit scabious
Trollius europaeus	globe-flower
Valeriana officinalis	common valerian
Calluna vulgaris	common heather
Empetrum nigrum	crowberry
Erica spp.	heaths
Ferns (excluding bracken)	
Vaccinium spp.	

Conservation Objectives for Alkaline fens [H7230] (Base-rich fens)

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

Maintain (or where appropriate restore) the extent of existing base-rich fen at 0**.89**ha (Note: the HabMos estimated area for this habitat in Glen Coe SAC is 1.92ha).

The area figure has been taken from the Standard Data Form but due to the small and fragmentary nature of this habitat current baseline estimates may not be very precise and any changes in extent estimates as a result of new survey may not represent real change but greater precision.

On Glen Coe SAC this habitat is found on Meall Mòr, scattered patches up Fionn Ghlean and on richer ground on the south facing slopes of Sgorr nam Fiannaidh to the east of Allt an t-Sidhein. HabMos mapping also shows areas of this habitat in Coire Gabhail, on Stob Coire nam Beith, and on the south bank of the river near Achtriochtan.

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

This habitat is found where there are springs or seepages, fed by base-enriched waters on both peat and mineral soils. It can be found up to moderate altitudes, but generally below 600 m. Tufa deposition may sometimes occur.

Grazing at appropriate levels can be beneficial in helping to maintain species-richness and in preventing succession. However, over-grazing and excessive poaching is detrimental which can result in damage to the fragile tufa formations and/or result in disturbed bare ground. This is where a substrate of bare humus, bare peat, bare mineral soil, bare gravel, or soil covered only by an algal mat, has its surface broken and imprinted by hoof marks, wallows, human foot prints, or vehicle and machinery tracks. The emphasis is on ‘disturbed’ rather than ‘bare’.

Appropriate grazing levels will vary between and within sites, and should be considered at an individual site level to ensure the maintenance of the base-rich fen structure and function across the whole of the site.

Heavy trampling and/or tracking by deer or livestock can result in active drainage of the habitat. Drainage should be considered active if it has altered, or is likely to alter, or remove, the original vegetation, and facilitate the removal of water from the site.

Colonisation of this habitat by vigorous native species (common reed *Phragmites australis* and/or soft rush *Juncus effuses*), tree or scrub growth or invasive non-native species could led to irreversible habitat loss in the longer term, through conversion to other open-ground habitats or woodland.

This habitat is very sensitive to muirburn and should be avoided in these areas.

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

The core vegetation of this habitat is short sedge mire (mire with low-growing sedge vegetation) with the following NVC type found at Glen Coe:

M10

Brown mosses; quaking grass *Briza media;* dioecious sedge *Carex dioica;* glaucous sedge *Carex flacca;* tawny sedge *Carex hostiana;* yellow sedge *Carex viridula;* carnation sedge *Carex panacea;* flea sedge *Carex pulicaris;* jointed rush *Juncus articulates;* fairy flax *Linum catharticum;* common butterwort *Pinguicula vulgaris;* birdseye primrose *Primula farinose;* lesser clubmoss *Selaginella selaginoides;* marsh arrow-grass *Triglochin palustris.*

Excessive grazing/browsing/trampling by deer and/or livestock can contribute to a deterioration in the habitat structure, leading to a reduction or loss in the typical/indicator species for this habitat and should be only be done in a controlled, appropriate manner that helps maintain the habitat.

Conservation Objectives for Alpine pioneer formations of the *Caricion bicoloris-atrofuscae* [H7240] (High altitude plant communities associated with water seepage)

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

Maintain (or where appropriate restore) the extent of existing High-altitude plant communities associated with areas of water seepage at **0.89**ha.

The bulk of this habitat is found around the summit and upper slopes of Meall Mòr. Several sample points identified in upper Coire nan Lochain were discarded as they supported only M31 and M32 type springs.

However, since this habitat usually forms mosaics and shows complex transitions to other upland habitat types, and due to the small and fragmentary extent of the habitat current baseline estimates may not be very precise and any changes in extent estimates as a result of new survey may not represent real change but greater precision.

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

This habitat usually forms mosaics and shows complex transitions to other upland Annex I habitat types and is maintained by harsh climatic and soil conditions. There is variation in this habitat because of differences in altitude, geographic location, length of snow-lie, nature of the substrate, and the amount of water flushing the communities.

Over-grazing, above low levels, and excessive poaching/trampling can be detrimental to this habitat which can result in disturbed bare ground. This is where a substrate of bare humus, bare peat, bare mineral soil, bare gravel, or soil covered only by an algal mat, has its surface broken and imprinted by hoof marks, wallows, human foot prints, or vehicle and machinery tracks. The emphasis is on 'disturbed' rather than 'bare'. Excessive trampling by sheep and red deer is leading to this feature being assessed as unfavourable due to the high levels of disturbed ground.

Appropriate grazing levels will vary between and within sites, and should be considered at an individual site level to ensure the restoration of the high-altitude plant communities associated with areas of water seepage within the wider habitat structure and function across the whole of the site.

This habitat is very sensitive to muirburn and should be avoided in these areas.

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

This habitat consists of Carex demissa – Saxifraga aizoides mires (NVC type M11), Carex saxatilis mires (NVC type M12), *Carex demissa – Koenigia islandica* flush (M34) and those Carex dioica – Pinguicula vulgaris mires (NVC type M10) with arctic-alpine species. It is characterised by the presence of Scottish asphodel *Tofieldia pusilla*. The habitat is stonier and more sparsely vegetated than similar communities at lower altitude.

This habitat is characterised by the presence of a number of rare species. On this site these are likely to include scorched alpine-sedge *Carex atrofusca*, bristle sedge *C. microglochin*,

alpine rush *Juncus alpinoarticulatus*, chestnut rush *J. castaneus*, two-flowered rush *J. biglumis*, three-flowered rush *J. triglumis*, false sedge *Kobresia simpliciuscula* and Scottish asphodel *Tofieldia pusilla*. Other uncommon species may occur, such as hair sedge *Carex capillaris*, sheathed sedge *C. vaginata* and variegated horsetail *Equisetum variegatum*. There is a range of calcicolous mosses, some of which are rare.
A number of commoner species are also characteristic of the habitat. These include yellow sedge *Carex viridula*, carnation grass *C. panicea*, flea sedge *C. pulicaris*, russet sedge *C. saxatilis*, jointed rush *Juncus articulatus*, common butterwort *Pinguicula vulgaris*, yellow saxifrage *Saxifraga aizoides*, alpine bistort *Persicaria vivipara*, alpine meadow-rue *Thalictrum alpinum* and the moss *Blindia acuta*.

The indicator species for this habitat are:
Brown mosses*;* greasewort *Aneura pinguis;* sharp-leaved Blindia *Blindia acuta;* scorched alpine-sedge *Carex atrofusca;* bristle sedge *Carex microglochin;* carnation sedge *Carex panacea;* sheathed sedge *Carex vaginata;* yellow sedge *Carex viridula;* mountain scurvygrass *Cochlearia micacea;* alpine rush *Juncus alpinoarticulatus;* two-flowered rush *Juncus biglumis;* chestnut rush *Juncus castaneus;* three-flowered rush *Juncus triglumis;* Iceland purslane *Koenigia islandica;* false sedge *Kobresia simpliciuscula;* common butterwort *Pinguicula vulgaris;* alpine meadow-rue *Thalictrum alpinum;* Scottish asphodel *Tofieldia pusilla.*

Excessive grazing/browsing/trampling by deer and/or livestock can contribute to a deterioration in the habitat structure, leading to a reduction or loss in the typical/indicator species for this habitat and should be only be done in a controlled, appropriate manner that helps maintain the habitat within the wider site management..

Conservation Objectives for Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*) [H8110] Acidic scree

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

The extent of the acidic scree feature has been estimated at **326**ha. This should be maintained.

However, due to the fragmentary nature of this habitat current baseline estimates may not be very precise and any changes in extent estimates as a result of new survey may not represent real change but greater precision. Note, the HabMos estimated area for this habitat on Glen Coe SAC is 417ha.

This habitat is widely dispersed across this site, particularly at higher altitude, and is also closely associated with plants in crevices on acidic rock where the same rock type is also found forming the scree.

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

Scree is intrinsically unstable and rocks will frequently move so this habitat is vulnerable to disturbance naturally.

Additional disturbance may be seen through herbivore grazing, trampling and recreation activities. There is also the possibility of colonisation, particularly of more stable scree, by other species, including trees and scrub where there are seed sources. On this site, bracken encroachment in some areas is leading to unfavourable condition of the feature, though this is likely to be due to historical management as current management is appropriate.

Inappropriate grazing regimes, above low levels, have the potential to harm this feature through over-grazing and trampling damage.

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

This habitat may be colonised by a range of pioneer species. It also provides shelter for many species sensitive to frost. The characteristic species parsley fern *Cryptogramma crispa* occurs throughout the site, and tends to be found with alpine lady-fern *Athyrium distentifolium* in snowy corries at high altitude (U18). There is an abundance of ferns on the boulder screes within the site. These include lemon-scented fern *Oreopteris limbosperma*, and a number of oceanic species such as Wilson's filmy-fern *Hymenophyllum wilsonii*. Atlantic mosses and liverworts such as *Anastrophyllum donianum* and *Scapania nimbosa* are also abundant in screes on steep, shady, humid slopes. The rare Highland saxifrage *Saxifraga rivularis* occurs in springs and flushes amongst high-altitude scree.

At the highest altitudes vegetation types include lady's mantle-sibbaldia snowbed communities and Racomitrium moss heaths associated with acidic scree.

A nationally important assemblage of bryophytes has developed on stable scree slopes, and over wet rock surfaces within gorges. Several rare and nationally scarce species, including the liverworts *Scapania parvifolia* and *Marsupella boeckii* and the moss *Molendoa warburgii* are present. Excessive grazing/browsing/trampling by deer and/or livestock can contribute to a deterioration in the habitat structure, having harmful effects on the typical species. This habitat is also very sensitive to muirburn.

Colonisation or shading of this habitat by bracken, tree growth and/or woodland expansion can reduce or eliminate cover of indicator species, including bryophytes.

Trampling from walkers can contribute to a deterioration in the habitat structure, having harmful effects on the typical species.

Conservation Objectives for Siliceous rocky slopes with chasmophytic vegetation [H8220] (Plants in crevices on acid rocks)

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

The extent of the plants in crevices on acid rocks feature has been estimated at **415**ha. This should be maintained.

However, due to the localised and fragmentary nature of this habitat current baseline estimates may not be very precise and any changes in extent estimates as a result of new survey may not represent real change but greater precision. Note, the HabMos estimated area for this habitat on Glen Coe SAC is 898 ha.

This habitat is widely dispersed and frequent across the site and is also closely associated with acidic scree where the same rock type is also found forming the scree, and/or plants in crevices on base-rich rocks where calcareous bands of rock are found within siliceous rock.

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

This habitat is found in harsh and sometimes extreme conditions with limited soil development, but where there is some shelter and moisture, and so plants are sparse and scattered. Chasmophytic plant species are adapted to the stresses of drought.

Colonisation or shading of this habitat by vigorous native species, such as bracken, tree growth or invasive non-native species can reduce or eliminate cover of typical species including bryophytes.

Inappropriate grazing regimes have the potential to harm this feature through over-grazing and trampling damage. However, some examples of this habitat are protected from herbivores by inaccessibility.

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

This habitat typically comprises mixtures of a limited number of species, most of which may also occur in other adjacent habitats, with mosses and ferns often prominent. There are no indicator species for this habitat.

The rock type varies across the site, leading to variation in the plant species. The crags support many of the commoner arctic-alpine species of acidic rocks, which are widespread across the site. The very rare drooping saxifrage *Saxifraga cernua* occurs in small pockets of calcareous material within predominantly acidic rocks, together with such species as brittle bladder-fern *Cystopteris fragilis*, roseroot *Sedum rosea* and mountain sorrel *Oxyria digyna*. The nationally rare hare's-foot sedge *Carex lachenalii* is found on this habitat on Bidean nam Bian. The fern flora of this site is extremely diverse and westerly influences on the site are shown by the extensive development of oceanic bryophytes associated with the crags.

Excessive grazing/browsing/trampling by deer and/or livestock can contribute to a deterioration in the habitat structure, having harmful effects on the typical species, and should be only be done in a controlled, appropriate manner that helps maintain the habitat.

Colonisation or shading of this habitat by bracken, tree growth and/or woodland expansion can reduce or eliminate cover of indicator species, including bryophytes.

This habitat is very sensitive to muirburn and should be avoided in these areas.

Trampling from walkers can contribute to a deterioration in the habitat structure, having harmful effects on the typical species.

Conservation Objectives for Calcareous rocky slopes with chasmophytic vegetation [H8210] (Plants in crevices on base-rich rocks)

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

The extent of the plants in crevices on base-rich rocks feature has been estimated at **0.89**ha. This should be maintained.

However, due to the localised and fragmentary nature of this habitat current baseline estimates may not be very precise and any changes in extent estimates as a result of new survey may not represent real change but greater precision. Note, the HabMos estimated area for this habitat on Glen Coe SAC is 6ha.

This habitat is found mainly on Meal Mòr and northeast facing slopes of Bidean nam Bian and Stob Coire nam Beith, and is also closely associated with base-rich scree where the same rock type is also found forming the scree, and/or plants in crevices on acid rocks where calcareous bands of rock are found within siliceous rock.

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

This habitat is found in harsh and sometimes extreme conditions with limited soil development, but where there is some shelter and moisture, and so plants are sparse and scattered. Chasmophytic plant species are adapted to the stresses of drought.

However, the base-richness of calcareous rocks may encourage competition from more

vigorous native species, such as bracken and/or scattered native trees or scrub; or non-native invasives such as NZ Willowherb. Colonisation or shading of this habitat by vigorous native species, tree growth or invasive non-native species can reduce or eliminate cover of indicator species.

Inappropriate grazing regimes have the potential to harm this feature through over-grazing and trampling damage. However, some examples of this habitat are protected from herbivores by inaccessibility.

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

Plants in crevices on base-rich rocks is characterised by the presence of bryophytes such as *Tortella tortuosa*, *Anoectangium aestivum* and *Ctenidium molluscum*. Associated vascular plants include brittle bladder-fern *Cystopteris fragilis*, green spleenwort *Asplenium viride* and glaucous meadow-grass *Poa glauca*. However, floristic variation within the habitat type is influenced by geographical location, altitude and rock type.The indicator species for this habitat on this site, of which at least four should be present are: Alpine lady's mantle *Alchemilla alpine;* black spleenwort *Asplenium adiantum-nigrum;* wall-rue *Asplenium ruta-muraria;* maidenhair spleenwort *Asplenium trichomanes;* green spleenwort *Asplenium viride;* hair sedge *Carex capillaris;* flea sedge *Carex pulicaris;* brittle bladder-fern *Cystopteris fragilis;* mountain avens *Dryas octopetala;* common rock-rose*;* hawkweed spp *Hieracium spp.;* crested hair-grass*;* alpine bistort *Persicaria vivipara;* hard shield fern *Polystichum aculeatum;* holly fern *P. lonchitis;; y*ellow saxifrage *Saxifraga aizoides;* purple saxifrage *Saxifraga oppositifolia; ;* lesser clubmoss *Selaginella selaginoides ;* moss campion *Silene acaulis;* alpine meadow-rue *Thalictrum alpinum;* wild thyme *Thymus polytrichus*

On Glen Coe SAC the flora also includes the rare saxifrages drooping saxifrage *Saxifraga cernua* and alpine saxifrage *S. nivalis* and other rare montane species include mountain bladder-fern *Cystopteris montana*, glaucous meadow-grass *Poa glauca* and hoary whitlowgrass *Draba norvegica*. Other calcicoles occurring on rock include lesser meadow-rue *Thalictrum minus*.

Excessive grazing/browsing/trampling by deer and/or livestock can contribute to a deterioration in the habitat structure, having harmful effects on the typical species, and should be only be done in a controlled, appropriate manner that helps maintain the habitat.

Colonisation or shading of this habitat by tree growth and/or woodland expansion can reduce or eliminate cover of indicator species, including bryophytes.

This habitat is very sensitive to muirburn and should be avoided in these areas.

Trampling from walkers can contribute to a deterioration in the habitat structure, having harmful effects on the typical species.

Conservation Measures

Glen Coe SAC is notified as a Site of Special Scientific Interest and management changes described on the list of Operations Requiring Consent must have prior consent from SNH (NatureScot).

Conservation Measures for Clear-water lakes or lochs with aquatic vegetation and poor to moderate nutrient levels

Issue	Measure	Responsible party
Afforestation	Ensure that any forestry is not beyond the carrying capacity of the catchment and that design and management strictly follow the guidelines.	Land Managers Scottish Forestry NatureScot
Water quality	Maintain roadside verges to minimise run-off from A82 entering Loch Achtriochtan	Bear Scotland Transport Scotland
	Implement and maintain monitoring of key water quality parameters.	NatureScot/SEPA
	Any development proposals in the catchment should include appropriate measures to minimise sediment run-off and prevent pollutants from entering the lochs e.g. track creation	Land Managers The Highland Council NatureScot
	Ensure no adverse impacts from diffuse or point sources. Any significant artificial inputs of nitrogen and phosphorus are likely to lead to undesirable nutrient enrichment.	Land Managers SEPA NatureScot The Highland Council
Sediment	Activities such as ATV use should be carried out with care so that they do not lead to creation of bare peat that can be washed into lochs or dubh lochans. Any track maintenance, creation or other development proposals should avoid sediment from disturbed ground being washed into lochs.	Land Managers Planning Authority NatureScot SEPA
Grazing/Trampling	Ensure stocking levels by both deer and livestock are sufficiently low to avoid poaching of edges and peat erosion. Avoid activities related to stock management such as supplementary feeding and fencing close to loch.	Land Managers NatureScot SGRPID
Development	Ensure any development proposals do not adversely affect loch.	Land Managers Planning Authority NatureScot
Invasive species	Avoid deliberate introduction of invasive species. Maintain surveillance for invasive species and agree action with regulator. All anglers and other water users (such as wild swimmers or researchers) should follow the Check, Clean, Dry biosecurity procedures to help prevent the spread of invasive species.	SEPA NatureScot Land managers Members of the public North and West District Salmon Fisheries Board

Current and recommended management for heathery/grassy habitats:

- **Dry heaths**
- **Alpine and subalpine heaths**
- **Montane acid grasslands**
- **Alpine and subalpine calcareous grasslands**
- **Species-rich grasslands with mat-grass in upland areas**

Issue	Measure	Responsible party
Herbivore impacts (grazing and trampling)	Manage a low level of grazing and trampling by deer and livestock within these habitats. Grazing/browsing should be at a level that prevents succession to woodland in drier areas, and avoids domination of habitats by more vigorous species, but avoids damage to habitats by preventing growth or seeding of more palatable plants. As a guide to achieving the correct balance the herbivore impact on the features should be 'low' or 'low to moderate' based on the NatureScot Herbivore Impact Assessment Process.	Land managers, NatureScot, Deer Management Groups
Supplementary feeding of deer	Sustainable deer populations should be in balance with their environment so that natural foraging is sufficient to sustain healthy animals and supplementary feeding is not necessary. If any supplementary feeding is proposed within or close to the site, NatureScot advice should be sought on how to avoid localised damage to habitats that could be caused by concentrated trampling or dunging.	Land managers, NatureScot, Deer Management Groups
Nutrient input (dunging)	Livestock and deer management should avoid encouraging large numbers of animals to concentrate in small areas as the dung can cause significant nutrient enrichment and consequent habitat change.	Land managers, NatureScot, Deer Management Groups
Recreation, especially organised hill running, walking, mountain biking and camping.	Work to manage visitor impacts should continue in partnership with Land Managers. Organised recreational events should continue to be carefully managed and ensure no negative effects on SAC habitats. Although few people take mountain bikes onto the site at present, active management to promote responsible access may be needed in future.	Land managers, Developer, Local authority, NatureScot
Alien and invasive species	Alien and invasive species should not be introduced to the site	Land managers, Scottish Invasive Species Initiative (SISI), NatureScot
Habitat damage from vehicle use	Avoid using ATVs or other vehicles in a way that damages habitats. Vehicle use should be entirely avoided in areas where the vegetation is still recovering from past vehicle damage. Any	Land managers, NatureScot

	vehicles driven on these habitats should have low ground pressure tyres and avoid breaking through the vegetation by avoiding soft wet ground or sharp turns.	
Erosion	Activities that might cause erosion (such as vehicle use or deer management that encourages animals to concentrate in small areas) should be avoided. Areas of current erosion should be left undisturbed until the vegetation has recovered.	Land managers, Deer Management Groups, NatureScot
Access tracks and paths	No new access paths/ tracks should be created unless these address desire lines and improve overall condition of habitats. Existing paths/ tracks should be maintained within their existing footprint and without having significant effects on the surrounding hydrology. Use of drainage ditches should be minimised in flatter areas. Culverts should be used to allow streams to pass underneath existing tracks or paths. In steeper areas, water should be diverted from existing paths and tracks at regular intervals. This will prevent substantial amounts of water collecting on paths/tracks that can lead to deep erosion gullies (damaging both the track and the adjacent habitat).	Land managers, NatureScot, Planning Authority

Current and recommended management for habitats found on rocky mountain slopes and ridges:

- Mountain willow scrub
- Tall herb communities
- Acidic scree
- Plants in crevices on acid rocks
- Plants in crevices on base-rich rocks

Issue	**Measure**	**Responsible party**
Grazing and browsing	Red deer are present across the whole site and sheep are the main herbivore on Meall Mòr. These rocky habitats benefit from very low levels of grazing and browsing, so stocking levels by both deer and livestock should be kept very low. Agile herbivores (such as goats) should not be introduced to the site.	Land managers, NatureScot, Deer Management Groups
Nutrient input (dunging)	Build-up of dung in sheltered spots can lead to significant nutrient deposition in these areas and habitat change. Low levels of stocking by deer and sheep are needed to prevent this from happening.	Land managers, Deer Management Groups
Trampling (by people and deer/sheep)	Vegetation in these habitats is very sensitive to trampling (either by hill runners/walkers or deer/sheep). People cause some localised damage, but as they mainly stick to established routes, only a low proportion of the habitat is affected. Low levels of stocking by deer and sheep are needed to prevent damage from	Land managers, NatureScot, Deer Management Groups

	trampling.	
Muirburn	These habitats are very sensitive to burning and should not be burnt. To some extent, they are normally naturally protected from fire as it cannot spread easily on rocky terrain with sparse vegetation.	Land managers
Vehicle use, particularly ATVs	The obvious practical difficulties of using vehicles in steep rocky areas mean that there is currently no vehicle use in these habitats. Vehicles should not be used here as they would cause significant erosion and crush the fragile vegetation.	Land managers
Colonisation or shading by bracken or trees	Ensure colonisation or shading of this habitat by woodland expansion or bracken is minimal to maintain cover of the typical species, including bryophytes.	Land Managers, NatureScot
Colonisation by vigorous native and non-native species	Alien and invasive species should not be introduced to the site.	Land managers, SISI, NatureScot

Current and recommended management for Base-rich fen and High-altitude plant communities associated with areas of water seepage

Issue	Measure	Responsible party
Herbivore impacts (grazing and/or trampling)	Ensure that herbivore impacts (deer) on the feature are 'low' based on the Herbivore Impact Assessment Process to prevent poaching and loss of typical species.	Land managers NatureScot Deer Management Groups
Heavy trampling and/or tracking	Trampling and/or tracking by deer and livestock to be minimal to be prevent active drainage of this habitat.	Land managers NatureScot Deer Management Groups
Colonisation by native and/or non-native species [eg common reed, soft rush, trees – state species]	Ensure colonisation of this habitat by vigorous native species, such as, (common reed *Phragmites australis* and/or soft rush *Juncus effuses*), tree or scrub growth or invasive non-native species is minimal to prevent loss of indicator species and conversion to other open ground habitats or woodland. This is currently not an issue but further monitoring will note any increase in undesirable species.	Land managers NatureScot

All habitats

Habitat Management	Most of Glen Coe SAC is managed by NTS, and they have a management plan in place advised by regular monitoring of the notified habitats.	NTS Land managers NatureScot
Research and monitoring	To identify emerging impacts on the habitat and their causes, in order to understand the long term issues, and to inform future management of the habitat across Scotland.	NTS NatureScot

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Approved on 10 September 2021 by:

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