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Scotland's Nature Agency
Buidheann Nàdair na h-Alba

LOCH MAREE COMPLEX SPECIAL AREA OF CONSERVATION (SAC)

CONSERVATION ADVICE PACKAGE

Site Details

Site name: Loch Maree Complex

Map: https://sitelink.nature.scot/site/8299

Location: Highlands and Islands

Site code: UK0013597

Area (ha): 15,753.97

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	15 July 2010	Unfavourable - Bad
Wet heathland with cross-leaved heath	Unfavourable No change	16 June 2017	Unfavourable - Bad
Dry heaths	Unfavourable Recovering	16 June 2017	Unfavourable - Bad
Alpine and subalpine heaths	Favourable Maintained	22 November 2006	Unfavourable - Bad
Montane acid grasslands	Favourable Maintained	22 November 2006	Unfavourable - Bad
Tall herb communities	Favourable Maintained	26 August 2014	Unfavourable - Bad
Blanket bog*	Favourable Maintained	13 September 2014	Unfavourable - Bad
Depressions on peat substrates	Favourable Maintained	30 August 2014	Unfavourable - Bad
Acidic scree	Favourable Maintained	29 August 2014	Unfavourable - Inadequate
Plants in crevices on acid rocks	Unfavourable Declining	30 August 2014	Unfavourable - Bad
Plants in crevices on base-rich rocks	Favourable Maintained	30 August 2014	Unfavourable - Inadequate
Western acidic oak woodland	Unfavourable No change	24 April 2008	Unfavourable - Bad
Caledonian forest*	Unfavourable No change	27 September 2010	Unfavourable - Bad

Bog woodland*	Favourable Maintained	20 August 2008	Unfavourable - Inadequate
Alder woodland on floodplains*	Unfavourable No change	3 July 2004	Unfavourable - Bad
Otter (Lutra lutra)	Favourable Maintained	30 July 2012	Favourable

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.
*Indicates Habitats Directive priority habitat

Overlapping Protected Areas

Loch Maree Complex SAC includes Loch Maree itself, as well as Beinn Eighe, Liathach, Beinn Alligan, and part of Letterewe Forest. It also includes land to the south of Glen Torridon at Coulin Pinewood and Sgurr Dubh, Talladale Gorge, and two discrete areas at Doire Damh and Shieldaig Woods. There are a number of underpinning SSSIs:

- Torridon Forest SSSI
- Beinn Eighe SSSI
- Loch Maree SSSI
- Doire Damh SSSI
- Shieldaig Woods SSSI
- Talladale Gorge SSSI
- Coille Dhubh SSSI
- Coulin Pinewood SSSI
- Ardlair - Letterewe SSSI

Loch Maree SPA covers the loch and its shoreline, and includes Loch Maree Islands.

Beinn Eighe and Loch Maree Islands National Nature Reserve is within the SAC.

Further information on these protected areas can be found on SiteLink.

Key factors affecting the qualifying features

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

Loch Maree is an excellent example of a large oligotrophic waterbody. The dominant substrates of oligotrophic waters are silt, sand, gravel, stones and boulders. 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 lake shores during summer.

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

Wet heathland with cross-leaved heath

Wet heath is the commonest habitat on the site and usually occurs on acidic, nutrient-poor substrates, such as shallow peats or sandy soils with impeded drainage. It is extensive and predominant on the lower gentler slopes of both Beinn Eighe and Torridong Forest SSSIs. Wet heaths occur in several types of ecological gradient. At this site they occur most frequently in gradients between dry heath or other dry, acid habitats and blanket bogs.

At high altitude in the Scottish Highlands wet heaths occur in mosaics with Alpine and Boreal heaths; in these situations lichens and northern or montane species may be well-represented. Flushed wet heaths are especially frequent in areas of high rainfall, and occur as topogenous fens, usually in channels within heath or grassland vegetation.

The key management issue responsible for this site being assessed as unfavourable is the nature and extent of deer pressure. There is evidence that grazing pressure has reduced within the site, however the impacts of historic high grazing levels is continuing to affect the condition of the habitat. Whilst not responsible for the feature being unfavourable the presence of non-native species is also a management issue.

European dry heaths

European dry heaths typically occur on freely-draining, acidic to almost neutral soils with generally low nutrient content. 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 (sheep, cattle and deer).

Beinn Eighe and Torridon Forest, in particular Beinn Alligin, have extensive and highly representative examples of dry heaths. These include the most extensive and best-developed areas of moist Atlantic (oceanic) bryophyte-rich heaths in the UK, supporting bryophyte species of restricted world distribution, for example *Mastigophora woodsii* and *Herbertus borealis* (endemic to Britain and only found on Beinn Eighe).

The key management issues leading to the feature being unfavourable are the nature and extent of deer pressure and undesirable bracken cover in some localised areas. There is evidence that grazing pressure has reduced within the site.

Alpine and subalpine heaths

Alpine and subalpine (Boreal) 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.

Loch Maree Complex SAC has the largest area of H15 *Calluna vulgaris – Juniperus communis* ssp. *nana* heath in the UK.

Alpine and subalpine 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 habitat has been assessed to be in favourable condition at Loch Maree Complex SAC, although the effects of grazing combined with Nitrogen deposition have been noted, leading to some increase in undesirable grass species in the habitat.

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.

This is the dominant vegetation on the broad, exposed shoulders and summits of the site, e.g., Tom na Gruagaich, Mullach an Rathain and Spidean a' Choire Leith. Snow-bed grasslands are often dominant on shallower slopes in the montane zone.

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.

Tall herb communities

Tall herb communities are typically found on ungrazed upland cliff ledges, occasionally extending on to open ground, and is restricted to base-rich substrates and somewhat sheltered situations. On this site it is mainly found on the north side of Liathach. It provides a refuge for rare, grazing-sensitive, montane plants.

Key management issues include ensuring only low/no grazing from domestic stock and deer and invasion by other species

Blanket bogs

Blanket bogs are found in areas of moderate to high rainfall and a low level of evapotranspiration, allowing peat to develop over large expanses of undulating ground. Blanket bogs are considered active when they are supporting a significant area of vegetation that is peat-forming. This is a Habitats Directive Priority habitat.

Key management issues include over-grazing, aspects of red deer pressure, burning, energy use, changes in the hydrology, non-native species, abiotic natural changes, air pollution, infrastructural development and outdoor recreation.

Depressions on peat substrates

Depressions on peat substrates occur in complex mosaics with lowland wet heath and valley mire vegetation, in transition mires, and on the margins of bog pools and hollows in both raised and blanket bogs. The vegetation is typically very open, usually characterised by an abundance of white beak-sedge *Rhynchospora alba*.

This habitat is found in complex mosaics, particularly in wetter areas of blanket and raised bogs, and heaths, on the edge of bog pools and so can be of a transitional nature depending on hydrological changes, direct and indirect.

Key factors affecting this habitat are changes to hydrology that may alter the height of the water table, inappropriate grazing pressure and, disturbance e.g., through trampling or burning.

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.

Plants in crevices on acid rocks

The chasmophytic (grows in the crevices of rocks) vegetation that colonises siliceous (silica based, acidic) rock faces and is widespread in upland areas. 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 and trampling although many sites are protected by inaccessibility

Key management issues for this site include over grazing and encroachment from bracken, both of which are causing this feature to be considered in unfavourable condition.

Plants in crevices on base-rich rocks

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.

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.

Western acidic oak woods

This habitat type comprises a range of woodland types dominated by mixtures of oak and birch. It is characteristic of base-poor soils in areas of at least moderately high rainfall. A key feature of importance within this habitat type is the well-developed Atlantic bryophyte communities it can support.

A key management issue that is causing this feature to be assessed as unfavourable is over grazing. The habitat requires low but not zero grazing. High levels of grazing can distort the natural structure of the woodlands (especially within the oak populations) leading to woodland dominated by older trees and lacking normal representation of intermediate life classes. The presence of non-native species such as Rhododendron is also contributing towards the assessment of unfavourable condition, impacting the habitat and preventing natural regeneration. In the future new stresses to the feature, particularly from climate change and novel pests and pathogens, are anticipated.

Caledonian forest

Caledonian forest comprises relict, indigenous pine forests of Scots pine *Pinus sylvestris* var. *scotica*, and associated birch *Betula* spp. and juniper *Juniperus communis* woodlands of northern character. Self-sown stands naturally regenerated from stock of genuinely native local origin recorded in the Caledonian Pinewood Inventory (Forestry Commission 1998) are included in the Annex I type. It is usually found on strongly-leached, acidic podzols, and these soil conditions are reflected in the ground flora.

A key management issue that is causing this feature to be assessed as unfavourable is over grazing. The habitat requires low, but not zero, levels of grazing to sustain it. High levels of grazing can distort the natural structure and variation within the woodlands, producing a habitat that lacks a natural representation of intermediate life classes; abundance of old trees with very few younger ones. Insufficient grazing impacts can include excessive regrowth leading to changes in microclimates such as light and humidity levels. The presence of non-native species, notable rhododendron, is also contributing to this site being assessed as unfavourable.

Other management issues include impacts from forestry and woodland management, burning and recreational impacts. Further pressures on the habitat are also anticipated, particularly from the effects of climate change (drought, waterlogging, windblow etc.), and of novel pests and pathogens (such as Dothistroma needle blight).

Bog woodland

Bog woodland exists under specific physical conditions, where scattered trees (principally Scots pine) co-exist across a rain-fed (ombrotrophic) bog without the loss of the bog species.

This feature requires a combination of suitable hydrological conditions within bogs, tree-seed sources, and low grazing levels from herbivores. These conditions allow

tree-seeds to germinate and establish during relatively drier periods on the bog, while the low level of grazing impacts and the high water table in the bog also help to prevent excessive tree growth. Such a balance of conditions can be either very stable or transitory depending on numerous factors.

Key management issues include grazing levels, forestry activity, problematic native and non-native species, burning and changes to local and catchment hydrology.

Alder woodland on floodplains

This habitat of riverine woods are often just narrow strips or lines of trees due to clearance of woodland along rivers that has removed most of the true alluvial forests, leaving just fragments, many of which are relatively recent in origin. As such these residual alder woods on floodplains frequently occur in association with other woodland types or with other wetland habitats such as fens.

Alder woodland on floodplains comprises woods dominated by alder *Alnus glutinosa* and willow *Salix* spp.. At this site they are predominantly found onlow-lying wetlands alongside river channels. The habitat typically occurs on moderately base-rich, eutrophic soils subject to periodic inundation.

At Loch Maree Complex SAC the most significant area of this habitat is found on the south-east end of Loch Maree at Taagan. Alder woodland also occurs in areas with flushed soils on the lower areas of Beinn Eighe.

As this woodland habitat is dynamic in nature the structure and function are best maintained within a larger unit that includes the open communities, mainly fen and swamp, of earlier successional stages

A key management issue that is causing this feature to be assessed as unfavourable is over grazing. Other management issues can include invasive non-native species and changes in local and catchment hydrology.

Otter

Otter require continued proximity to unpolluted open water either freshwater or coastal. There should be a plentiful food supply and features for providing shelter for both resting and breeding. They are wide ranging and normally occur at low densities.

Previous population declines in otters were primarily due to pollution and persecution.

Further information about this SAC's protected habitats and species can be found on the JNCC website.

Conservation Priorities

Caledonian forest is an Annex I priority qualifying habitat of the Loch Maree Complex SAC. Caledonian forest is only found in Scotland which means the UK has sole responsibility for its conservation. At present the UK and biogeographical conservation status is reported to be 'unfavourable - bad'.

Western acidic oak woodland is a non-priority qualifying habitat. The majority of this woodland habitat is found in the UK, with the best developed examples found in western Scotland. These include communities of bryophytes and lichens occurring nowhere else in the world. The existing woodland resource is fragmented so adjacent blocks of woodland are generally clustered in the process of site selection (as they have been at Loch Maree Complex SAC) to take account of the formerly more extensive and more continuous cover of this habitat type. At a biogeographical level this habitat is reported as being 'unfavourable – bad'.

Caledonian forest and Western acidic oak woodlands need to expand their extent and be regenerating naturally if their condition and their UK and biogeographical conservation status are to become favourable. This will also help to create a more natural, sustainable and resilient ecosystem. At Loch Maree Complex SAC this expansion can only occur by favouring these habitats over dry heath and wet heath; allowing for a reduction in their extent. Any reduction in extent of heath to favour Caledonian forest and Western acidic oak woodlands will need to ensure that there is no change in the Scottish contribution to the UK and biogeographical conservation status of these habitats.

For the expansion of Caledonian forest it is also recognised that there may be a small reduction in blanket bog, also a priority habitat, where this habitat occurs as a non-distinct small proportion of an open habitat mosaic. This would constitute a change from blanket bog to bog woodland which is also a 'Priority feature' and a qualifying feature of the SAC. To safeguard significant areas of blanket bog, the management priorities at Loch Maree Complex SAC must ensure no further loss in extent of larger distinct areas blanket bog habitat (open habitat mosaics where the blanket bog component is more than 33%).

In addition conservation management measures to enhance the structure and function of blanket bog, wet heath and dry heath are also required as a management priority to improve the conservation status of this habitat (See Conservation Measures section below). Part of this will be achieved through the Beinn Eighe NNR Management Plan. It is also noted that a degree of structural diversity through the restoration of scrub does not negatively affect the condition of dry heath or wet heath. This includes creeping/dwarf willow, bog myrtle, holly, rowan, birch and juniper (but not Scots pine).

Natural regeneration of Caledonian Forest should not be restricted, and nor would land managers be obliged to allow trees to spread over heaths if they decided it was not appropriate. The extent of possible natural woodland regeneration over the next 20 years at Loch Maree Complex SAC is restricted by natural (e.g. available seed source) and physical constraints (e.g. altitude, exposure). Natural regeneration should not be encouraged on areas of blanket bog or within open habitat mosaics where the blanket bog component is more than 33%. The wet conditions of blanket bog are also largely unsuitable for regeneration.

Dry heath, wet heath and blanket bog habitats will remain extensive throughout the SAC and all discrete and contiguous areas of blanket bog (excluding bog woodland)

will be maintained with <10% tree cover. These controls and limits will maintain the conservation interest at the national and biogeographical level.

Conservation Objectives

Overarching Conservation Objectives for all habitat features

1. To ensure that the qualifying features of Loch Maree Complex 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 Loch Maree Complex SAC is restored 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 2678 ha.

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.

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

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. 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 should have pH of 5.5 to 7 and Mesotrophic 6.5 to 8

-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.

-Total Phosphorus
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.

-Total Nitrogen
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

Loch Maree is an excellent example of a large oligotrophic waterbody and has the largest surface area of any loch in the north-west Highlands. Typical species of Loch Maree are:

Litorella uniflora	shoreweed
Isoetes lacustris	lake quillwort
Lobeliia dortmanna	water lobelia
Sparganium angustifolium	floating bur-reed
Subularia aquatica	awlwort
Potamogeton spp	pondweeds
Utricualria sp (each species)	bladderworts

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.

Non-native 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.

Black-throated divers are associated with this open water feature on Loch Maree. Loch Maree holds populations of Atlantic salmon, freshwater brown trout Arctic charr and was famous for its sea trout, until the population collapse in the late 1980's.

Conservation Objectives for Northern Atlantic wet heaths with *Erica tetralix* [H4010] (Wet heathland with cross-leaved heath)

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

Maintain to approximately 4900ha.

The baseline is 5356ha (estimated from the Standard Data Form) but prioritising expansion of Annex 1 priority qualifying habitat Caledonian forest and non-priority qualifying habitat Western acidic oak woodland will result in a reduction in extent of wet heathlands with cross-leaved heath to no less than 4911ha (8% reduction). Important sub-communities of wet heath will should be maintained free from trees.

Wet heath typically covers large areas, forming complex mosaics with areas of blanket bog, and in dryer areas dry heaths and grassland. Baseline surveys will include smaller areas of other habitats. The vegetation is very variable in composition. Dwarf shrub cover and structure is variable, similar to dry heath in some areas, and to blanket bog in other, usually wetter areas, particularly on degraded bog. At high altitudes wet heath can be found in mosaics with Alpine and Boreal Heath, usually in areas with some topographic shelter.

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

Wet heathland with cross-leaved heath is sensitive to inappropriate grazing or burning that may affect the habitat structure and function in two main ways. A combination of overgrazing and frequent burning can lead to creation of a grass sward if this is continued over many years. Overgrazing can also result in high levels of nutrient input and trampling. Under grazing or complete lack of burning can lead to the habitat type being colonised by species that are not typical of this habitat (such as trees) if this management is continued over many years. An appropriate level of grazing is therefore needed to maintain this habitat. Most of the grazing/browsing at Loch Maree Complex SAC is by red deer which should be at low levels.

Wet heath at Loch Maree Complex SAC should be restored from the legacy of damage from past trampling, overgrazing and burning, as well as man-made drainage. The objectives of this are to:

- restore the height structure of the vegetation by reducing grazing/browsing by red deer so that less than 1/3rd of the last complete growing season's shoots of dwarf-shrub species (collectively but excluding dwarf birch *Betula nana* and bog myrtle *Myrica gale*) show signs of browsing.
- restore the ground cover structure of the heath by reducing trampling by red deer so that less than 10% of ground cover is disturbed bare ground (with an emphasis on 'disturbed' rather than 'bare') and less than 10% of the *Sphagnum* moss is crushed or pulled up.

Additional objectives for the structure of the habitat are:

- The area of disturbed bare ground should not be increased. Activities that might cause this to increase include excessive use of vehicles or increasing use of the habitat by red deer.
- Cover by species that are not typical of this habitat should not increase. Examples of inappropriate species are bracken, trees and non-native species such as Rhododendron.
- Active drainage should be minimised. No new drains should be dug and existing ones should be blocked.

Any burning on Loch Maree Complex SAC should follow the Muirburn Code to avoid damage to the structure, function and supporting processes of wet heath.

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

Wet heath is an important habitat for a range of vascular plant and bryophyte species. Generally the vegetation is dominated by mixtures of cross-leaved heath, heather, grasses, sedges and *Sphagnum* bog-mosses. The distribution of typical plant species should be restored throughout the habitat by appropriate red deer management and avoiding frequent burning (see Objective 2b).

At Loch Maree Complex the typical species for Northern Atlantic wet heaths with *Erica tetralix* are :

Arctostaphylos spp	
Betula nana	dwarf birch
Calluna vulgaris	common heather
Carex spp.	sedges
Drosera spp.	sundews
Empetrum nigrum	crowberry
Erica spp.	heaths
Eriophorum angustifolium	common cottongrass
Myrica gale	sweet gale
Narthecium ossifragum	bog asphodel
Non-crustose lichens	(lichens)
Pleurocarpous spp.	(mosses)
Racomitrium lanuginosum	wooly hair moss
Rhynchospora alba	white beak-sedge
Rubus chamaemorus	cloudberry
Salix repens	creeping willow
Sphagnum spp.	(mosses)
Trichophorum cespitosum	deer grass
Vaccinium spp	(heaths)

Whilst this habitat is important for maintaining the population of red deer on this site, high levels of herbivore use have damaged this habitat in the past and led to a reduction in the distribution of typical species. A low level of grazing and browsing is necessary to allow this habitat to recover and be maintained in future.

Typically associated birds are red grouse (*Lagopus l. scotica)*, golden plover (*Pluvialis apricaria*), greenshank (*Tringa nebularia*) and golden eagle (*Aquilla chrysaetos*).

Conservation Objectives for European dry heaths [H4030]

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

Maintain to approximately 1062 ha. The baseline is 1103ha (estimated from the Standard Data Form) but prioritising expansion of Annex 1 priority qualifying habitat Caledonian forest and non-priority qualifying habitat Western acidic oak woodland will result in a reduction in extent of dry heath to no less than 1062 ha (4% reduction).

The best-developed areas of moist Atlantic (oceanic) bryophyte-rich dry heaths (especially where they support *Herbertus borealis* and *Mastigophora woodsii*) should be kept free from trees.

European dry heaths can form complex mosaics with habitats such as grasslands, wet heaths and bogs. 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 and muirburn.
- 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

Maintaining dry heath is a fine balance between degrading to grasslands as a result of intensive management, and succession to scrub or woodland from too low a level of browsing, grazing or burning. At Loch Maree Complex SAC red deer are the main herbivores on dry heath. Appropriate management of their numbers and distribution across the site is important to maintain dry heath habitat whilst preventing habitat degradation from under/overgrazing or trampling. Currently, burning is not used as a management tool, although the site has been burnt historically, and more recently from accidental wildfires.

The objectives for restoring dry heath on this site are to:

- restore the height structure of the vegetation by reducing grazing/browsing by red deer and sheep so that less than1/3 of the last complete growing season's shoots of dwarf-shrub species show signs of browsing.
- restore the ground cover structure of the heath by reducing trampling by red deer and sheep so that less than 10% of ground cover is disturbed bare ground (with an emphasis on 'disturbed' rather than 'bare').

Additional objectives for the structure of the habitat are:

- 25-90% of vegetation should be dwarf shrub heath species. Heather *Calluna vulgaris* should remain the dominant species and should be present in all phases of growth (pioneer, building, mature and degenerative) to provide a wide range of ecological variety and conservation benefit to a variety of species.
- Current levels of disturbed bare ground should not be increased. Activities that might cause an increase include excessive use of vehicles, introducing heavier livestock such as cattle or increasing use of the habitat by red deer and sheep.
- Cover by species that are not typical of this habitat should not increase. Examples of inappropriate species are bracken, trees and non-native species.
- Any burning on Loch Maree Complex SAC should follow the Muirburn Code to avoid damage to the structure, function and supporting processes of dry heath.

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

The dry heath at Loch Maree Complex is dominated by heather *Calluna vulgaris*, blaeberry *Vaccinium myrtillus*, crowberry *Empetrum nigrum* and bearberry *Arctostaphylos uva-ursi*.

Typical, associated vertebrates of upland heaths are red deer (*Cervus elaphus*) and red grouse (*Lagopus l. scotica)*, black grouse (*Tetrao tetrix*), golden plover (*Pluvialis apricaria*), merlin (*Falco columbarius*) and golden eagle (*Aquila chrysaetos)*.

This habitat is important for maintaining populations of red deer *Cervus elaphus* on this site, although the deer themselves are not a feature of the site. High levels of herbivore use can damage dry heath, but a low level of grazing and browsing is necessary to maintain this habitat.

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 866 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 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:

- an appropriate low level of grazing
- habitat loss through increased extent of adjacent natural habitats, afforestation or invasion by alien species
- The effects of access and recreation

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

Alpine and subalpine 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 several other habitats at Loch Maree Complex, maintaining Alpine and subalpine heaths is a fine balance between degrading to grasslands (which tends to happen if grazing/browsing and burning levels are too high) and succession to scrub/ woodland/ dense juniper thicket (which can happen if browsing/grazing is too low).

On Loch Maree Complex SAC red deer are the main herbivores on alpine and subalpine heaths. The predominant requirement for maintaining alpine and subalpine heaths is managing appropriate low levels of browsing and trampling by deer. This in turn allows typical plants (listed in 2c) to grow and set seed.

In popular walking areas bare ground can be disturbed by human trampling. Recreation management might be necessary if excessive trampling is affecting the structure and function of the habitat.

Additional objectives for the structure of the habitat are:

- Bracken *Pteridium aquilinum* should be kept to less than 10% of the ground cover.
- Less than 10% of the ground cover should be disturbed bare ground (the emphasis is on 'disturbed' rather than 'bare'.)

- Alpine and subalpine heath should not be burnt to avoid damage to the structure, function and supporting processes of this habitat

2c. Maintain 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. At Loch Maree Complex SAC it is formed mainly of alpine heath NVC types:

- *Calluna vulgaris – Racomitrium lanuginosum* heath
- *Calluna vulgaris – Juniperus communis* ssp. *nana* heath
- *Vaccinium myrtillus – Racomitrium lanuginosum* heath

and boreal heath NVC types:

- *Calluna vulgaris – Erica cinerea* heath
- *Calluna vulgaris – Vaccinium myrtillus – Sphagnum capillifolium* heath

The dominant plants in UK examples of Alpine and Boreal heaths are usually dwarf-shrubs of heather *Calluna vulgaris*, blaeberry *Vaccinium myrtillus* or juniper *Juniperus communis*, which are low-growing or prostrate owing to exposure to high winds or prolonged snow cover at moderately high altitudes.

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* (NVC communities *Calluna – Erica*; *Calluna – Vaccinium – Sphagnum* heaths). 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 (NVC communities *Calluna – Racomitrium* heaths). Heather may also be combined with dwarf

juniper *Juniperus communis* ssp. *nana* (NVC community *Calluna – Juniperus* heath) or with *Arctostaphylos alpinus* and *Loiseleuria procumbens* (NVC community *Calluna – Arctostaphylos alpinus* heath). At higher altitudes, where conditions are too extreme for heather, short or prostrate *Vaccinium* spp. and *E. nigrum* ssp. *hermaphroditum* dominate (NVC communities *Vaccinium – Racomitrium* heaths).

In addition to this altitudinal zonation, there are other lines of floristic variation within the habitat type. In the more oceanic climate of the north-west and north, woolly fringe-moss *Racomitrium lanuginosum*, bell heather *Erica cinerea* and Atlantic liverworts and mosses (especially the species of the northern Atlantic hepatic mat) may be abundant in *Calluna – Racomitrium*, *Calluna – Juniperus*, *Calluna – Arctostaphylos alpinus* and *Vaccinium – Racomitrium* heaths.

Typical associated vertebrates of these high habitats are the mammals red deer (*Cervus elaphus*) and mountain hares (*Lepus timidus*) and the birds ptarmigan (*Lagopus muta)*, dotterel (*Charadrius morinellus*), golden eagle (*Aquila chrysaetos*).

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 to approximately 1575 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.

2b. Maintain 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.

Appropriate low levels of grazing/browsing are needed to allow survival of component species of the habitat and to maintain its structure, throughout the site. This should be achieved by continuing a low level of grazing by sheep and red deer that allows typical plants (listed in 2c) to grow and set seed.

Less than 10% of the ground cover should be disturbed bare ground (the emphasis is on 'disturbed' rather than 'bare'.)

Montane acid grasslands should not be burnt to avoid damage to the structure, function and supporting processes of this habitat.

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

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 the SAC. 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. 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. *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 on this site are:

Alchemilla alpina	alpine lady's mantle
Carex bigelowii	stiff sedge
Cladonia arbuscula	(lichen)
Cladonia uncialis	thorn lichen
Empetrum nigrum ssp. hermaphroditum	crowberry
Juncus trifidus	three-leaved rush
Nardus stricta	mat-grass
Polytrichum alpinum	alpine haircap
Racomitrium lanuginosum	wooly hair moss
Rhytidiadelphus loreus	little shaggy-moss

Non-plant typical species such as red deer *Cervus elaphus* and mountain hare *Lepus timidus* use this habitat.

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 to approximately 1.58 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 possible opportunity should be taken to restore and/or extend this habitat.

This habitat is restricted to inaccessible ledges, with examples present on Beinn Alligin.

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 to low levels has the ability to restore or extend this scarce habitat.

The following conditions should be met when grazing/browsing is low enough to allow survival of component species of the habitat and to maintain the habitat's structure:

- 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.
- Less than 50% of live flowering shoots of indicator tall herbs (see below in section 2c for list) should show evidence of grazing.

The structure of this habitat can also be impacted by succession from tall-herb communities to woodland, which can be controlled by additional grazing.

The following conditions should be met when appropriate levels of disturbance are in place, to allow for survival of component species of the habitat throughout the site:

- Less than 25% of the ground cover, of each patch or stand, should be disturbed bare ground*.
- Over the whole feature scanned from sample locations, less than 10% of the ground cover should be disturbed bare ground*.

* The emphasis is on 'disturbed' rather than 'bare'. Exclude distinct and clearly defined paths or tracks.

Tall herb communities should not be burnt to avoid damage to the structure, function and supporting processes of this habitat.

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. Agile herbivores, such as goats, should not be introduced to this site as they would be likely to damage this habitat.

Species typically found in tall-herb communities at Loch Maree Complex SAC are:

Alchemilla spp.	lady's-mantles
Angelica sylvestris	wild angelica
Cirsium heterophyllum	melancholy thistle
Crepis paludosa	marsh hawk's-beard
Filipendula ulmaria	meadowsweet
Geranium sylvaticum	wood crane's-bill
Geum rivale	water avens
Hieracium spp.	hawkweeds
Hypericum spp.	St. John's-worts
Luzula sylvatica	great wood-rush
Oxyria digyna	mountain sorrel
Primula vulgaris	primrose
Ranunculus acris	meadow buttercup
Rubus saxatilis	stone bramble
Rumex acetosa	common sorrel
Saussurea alpina	alpine saw-wort
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 Blanket bog [7130]

2a. Maintain the extent and distribution of blanket bog within the site

The area of blanket bog is to be maintained to approximately 2048 ha.

Prioritising expansion of Annex 1 priority qualifying habitat Caledonian forest may result in a small reduction in extent of blanket bog, where this habitat occurs as a non-distinct small proportion of an open habitat mosaic. Natural regeneration will not be encouraged on areas of blanket bog or within open habitat mosaic's where the blanket bog component is more than 33%. Areas of contiguous blanket bog within open habitat mosaics are maintained with less than 10% of tree cover.

Blanket bog typically covers very large areas, forming complex mosaics with other wetland habitats as well as heath and grass habitats in drier areas. At Loch Maree Complex it is mainly found in the flatter, lower areas of Glen Torridon, as well as on the slopes of Liatach and Ben Alligan and in Coire Mhic Nobuil, although patches of blanket bog are found throughout the site.

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

The predominant requirement for blanket bog is to be actively forming peat, a process that relies on peat-forming species having suitable conditions to maintain growth. Blanket bog that is degraded through damage or drying is likely to resume active peat-forming function following suitable restoration. A covering of 'active' peat-forming vegetation will protect the peat surface and will be more resilient to climate change.

Blanket bog habitat requires a high water table, and so maintaining appropriate hydrology for blanket bog is critical. This will depend on management to prevent or reduce detrimental effects of drainage, including in the wider surrounding area and potentially at a distance from the habitat.

The objectives for maintaining blanket bog at Loch Maree Complex SAC are to:

- maintain the height structure of the vegetation by setting grazing/browsing by red deer and livestock at low levels so that less than 1/3 of the last complete growing season's shoots of dwarf-shrub species (collectively but excluding dwarf birch *Betula nana* and bog myrtle *Myrica gale*) show signs of browsing.
- maintain the ground cover structure of the bog by reducing trampling by red deer and sheep so that less than 10% of ground cover is disturbed bare ground (with an emphasis on 'disturbed' rather than 'bare') or where more than 10% of the *Sphagnum* moss is crushed or pulled up.

Additional objectives for the structure of the habitat are:

- Current levels of disturbed bare ground should not be increased. Activities that might cause an increase include excessive use of vehicles (including ATVs),

introducing heavier livestock such as cattle or increasing use of the habitat by red deer.
- Cover by species that are not typical of this habitat should not increase. Examples of inappropriate species are bracken, trees and non-native species.
- Active drainage should be minimised. No new drains should be dug and existing ones should be blocked.

Blanket bog should not be burnt as fire damages the structure, function and supporting processes of this habitat and is contrary to the Muirburn Code

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

Typical species include the important peat-forming species, such as bog-mosses Sphagnum species and cotton grasses *Eriophorum spp*., or purple moor-grass *Molinia caerulea* in certain circumstances, together with heather *Calluna vulgaris* and other ericaceous species and forbs such as bog asphodel *Narthecium ossifragu* and the carnivorous sundews *Drosera spp*.

Other typical species include:

Arctostaphylos spp	
Betula nana	dwarf birch
Carex bigelowii	stiff sedge
Cornus suecica	dwarf cornel
Erica spp.	heaths
Empetrum nigrum	crowberry
Menyanthes trifoliate	bogbean
Myrica gale	sweet gale
Non-crustose lichens	(lichens)
Pleurocarpous mosses	(mosses)
Racomitrium lanuginosum	wooly hair moss
Rubus chamaemorus	cloudberry
Rhynchospora alba	white beak-sedge
Trichophorum cespitosum	deer grass
Vaccinium spp	

Conservation measures should aim to maintain or restore conditions suitable for these species. All characteristic bog species rely on a high water table, and are likely to benefit from measures to improve the bog's hydrological integrity, principally by damming of artificial drainage.

Typical species of this habitat include, golden plover (*Pluvialis apricaria*), greenshank (*Tringa nebularia*) and red deer (*Cervus elaphus*). Whilst active blanket bog does not require grazing to be maintained, drier areas can benefit from low level grazing by typical species such as red deer to prevent growth of non-typical plant species.

Conservation Objectives for [H7150] Depressions on peat substrates

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

Maintain the extent of existing depressions on peat substrates at 1.58 ha.

This habitat is found in complex mosaics in wetter areas of bogs and heaths. It is generally fragmented (<1ha) therefore current baseline estimates may not be very precise.

Any changes in extent estimates as a result of new survey may not represent real change but greater precision.

On Loch Maree Complex SAC this habitat is mostly found in Beinn Eighe SSSI and Torridon Forest SSSI and is associated with bog pools.

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

This habitat is found in complex mosaics in wetter areas of bog and heaths. It is often found on the edge of bog pools and so can be of a transitional nature depending on hydrological changes.

The maintenance of appropriate hydrology for this habitat is important to retain the structure and functions. A high water table is required and this will depend on management to prevent or reduce detrimental effects of drainage, including in the wider surrounding area, potentially at a distance from the habitat.

Heavy trampling and/or tracking by deer, and potentially ATVs, 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. Heavy trampling can also cause ground disturbance, which can lead to erosion and inhibit vegetation growth.

This habitat is very sensitive to burning and it should not be carried out in these areas.

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

This habitat occurs in hollows and depressions in complex mosaics in wetter areas of bog and heaths and is mainly characterised by an abundance of white beak-sedge *Rhynchosporion alba* which is the key species.

Typical species for this habitat are those found in NVC types M1, M2, M17 and M18 such as the bog moss *Sphagnum denticulatum*, round-leaved sundew *Drosera rotundifolia* and, in relatively base-rich sites, brown mosses such as *Drepanocladus revolvens* and *Scorpidium scorpioides*. The Nationally scarce species brown beak-sedge *Rhynchospora fusca* and marsh clubmoss *Lycopodiella inundata.*

Typical species of this habitat include, golden plover (*Pluvialis apricaria*), greenshank (*Tringa nebularia*) and red deer (*Cervus elaphus*). 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 at low levels 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 866ha. 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.

On Loch Maree Complex SAC this habitat is mostly found on Liathach, Beinn Alligin and Sgurr Dubh and is also closely associated with plants in crevices on acidic rock where the same rock type is also found forming the scree.

2b. Maintain 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.

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 such as parsley fern *Cryptogramma crispa*, species requiring a humid microclimate such as Wilson's filmy-fern *Hymenophyllum wilsonii*, and species sensitive to grazing such as stone bramble *Rubus saxatilis*. It is important for its rich fern flora and act as refugia for a number of rare species. Northern rock-cress *Arabis petraea* is frequently found and alpine lady-fern *Athyrium distentifolium* occurs in high-altitude areas where snow lingers. Other ferns occur frequently in the screes, including mountain male-fern *Dryopteris oreades*, beech fern *Phegopteris connectilis*, and lemon-scented fern *Oreopteris limbosperma*. The most outstanding feature of the vegetation on these sites is the abundance of northern Atlantic mosses and liverworts, which include *Plagiochila spinulosa*, *Anastrophyllum donnianum* and *Scapania nimbosa*, which are chiefly developed on steep, shady and humid slopes.

Excessive grazing/browsing/trampling by red deer *Cervus elaphus* 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 burning.

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.

Typical associated vertebrates of these high habitats are red deer (*Cervus elaphus*) and mountain hare (*Lepus timidus*) and ptarmigan (*Lagopus muta).*

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 394ha. 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.

On Loch Maree Complex SAC this habitat is found on extensive crags of Torridonian sandstone and quartzite on Liathach, Beinn Alligin and some areas north of Loch Maree. It 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. Restore 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. Bracken encroachment has been recorded in recent surveys in some areas which has affected the condition of the feature.

Inappropriate grazing regimes, above low levels, have the potential to harm this feature through over-grazing and trampling damage and this has been noted in some areas of this site contributing to the unfavourable condition during the 2014 assessment. 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 site contains a characteristic north-western flora, with many of the commoner montane vascular plants, including Wilson's filmy-fern *Hymenophyllum wilsonii*, sea spleenwort *Asplenium marinum*, three-leaved rush *Juncus trifidus*, dwarf willow *Salix herbacea* and spiked wood-rush *Luzula spicata*. Rarer species include the characteristic black spleenwort *A. adiantum-nigrum*. Oceanic influence is shown by the widespread development of oceanic ferns. Of particular importance is the outstanding flora of Atlantic mosses and liverworts in the crevices of the more shady crags.

Excessive grazing/browsing/trampling by red deer *Cervus elaphus* and/or livestock can contribute to a deterioration in the habitat composition, 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 burning 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.

Typical associated vertebrates of these high habitats are red deer (*Cervus elaphus*) and mountain hare (*Lepus timidus*) and ptarmigan (*Lagopus muta).*

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 16ha (area stated on the Standard Data Form). 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.

On Loch Maree Complex SAC this habitat is uncommon, and is restricted to very occasional limestone outcrops.

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 New Zealand 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, above low levels, 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, are: Alpine lady's mantle *Alchemilla alpine* green spleenwort *Asplenium viride;* hair sedge *Carex capillaris;* brittle bladder-fern *Cystopteris fragilis;* fairy flax *Linum catharticum; y*ellow saxifrage *Saxifraga aizoides;* wild thyme *Thymus polytrichus.*

Excessive grazing/browsing/trampling by red deer *Cervus elaphus* can contribute to a deterioration in the habitat structure, having harmful effects on the typical species, and should be only be done in an 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 burning and which should not occur in these areas.

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

Typical associated vertebrates of these high habitats are red deer (*Cervus elaphus*) and mountain hare (*Lepus timidus*) and ptarmigan (*Lagopus muta).*

Conservation Objectives for Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles [91A0] (Western acidic oak woods)

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

The extent of the western acidic oak woodland feature, taken from the Standard Data Form, has been estimated at 236ha.

This should be maintained or allowed to increase through natural regeneration; there should be no measurable net reduction in the extent of the habitat and its distribution throughout the site. An objective of this site is to expand the range of western acidic oak woodland (see Conservation Priorities section).

This will include the avoidance of effects that could lead to a permanent reduction in the extent or distribution of the habitat such as further upland agricultural reclamation and minimising the risk of fire.

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

This habitat type comprises a range of woodland types dominated by mixtures of oak. It is found in areas of base-poor soils with at least moderately high rainfall, and is characterised by tree cover that:

- Has a high forest structure including young, mature, dying and dead trees in dense thickets and open glades with a range of shade cast on the woodland floor. Some western oceanic locations may be of smaller and scrub-dimensions.
- Is dominated by variable proportions of species with the characteristics (shade, leaf decay, structure, bark pH and obligate/associated dependent species) of oak and birch, with holly and in some places hazel as a lower shrub. The high forest types include long lived trees growing to large dimensions with a variety of niches including furrowed bark, rot-holes, large slow-decaying snags and deadwood.

The field layer is generally species-poor, characterised by ericoid shrubs, bracken and grasses. In the more oceanic and wetter parts of the range the diversity of ferns and particularly lichens and bryophytes dominates the species interest.

To achieve these characteristics, and to restore the habitat, there needs to be a low level of grazing and browsing pressure. The habitat requires low but not zero grazing. High levels of grazing can distort the natural structure of the woodlands (especially within the oak populations) leading to woodland dominated by older trees and lacking normal representation of intermediate life classes. The presence of non-native species such as Rhododendron can also impact the habitat and prevent natural regeneration, so the extent of non-native species should be reduced.

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

The habitat corresponds broadly to the western oakwoods described in previous accounts of UK woodlands, particularly NVC types:

- W11 Quercus petraea – Betula pubescens – Oxalis acetosella woodland
- W17 Quercus petraea – Betula pubescens – Dicranum majus woodland

The key tree species found in this habitat are oak (*Quercus. petraea*) and birch (*Betula pubescens*). There is significant variation between individual stands of the habitat in

domination by either oak or birch. Holly (*Ilex* aquifolium) and hazel (*Corylus* avellana) are also important components of the habitat.

Western acidic oak woodland supports an important component of Britain's oceanic bryophyte flora and lichen mycota. The distribution and viability of these assemblages should be maintained with particular focus on nationally rare, scarce and/or threatened species and on assemblages that indicate a long period of ecological continuity.

Species commonly found in the ground flora at this site include:

Lonicera periclymenum	common honeysuckle
Pteridium aquilinum	bracken
Rubus fruticosus aggr.	Blackberry spp.
Galium saxatile	heath bedstraw
Vaccinium myrtillus	blaeberry
Oxalis acetosella	wood-sorrel
Potentilla erecta	common tormentil
Viola riviniana	dog-violet
Agrostis capillaris	common bent
Anthoxanthum odoratum	sweet vernal grass
Deschampsia flexuosa	wavy hair-grass

Non-plant typical species of this habitat include mammals such as red deer *Cervus elaphus* and pine marten *Martes martes* as well as birds such as wood warbler *Phylloscopus sibilatrix* and redstart *Phoenicurus phoenicurus*.

Conservation Objectives for Caledonian forests [91C0]

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

Maintain to approximately 394 ha. An objective of this site is to expand the range of Caledonian Forests (see Conservation Priorities section).

The area figure of the extent of the Caledonian forest feature has been taken from the Standard Data Form. This should be maintained or allowed to increase through natural regeneration. Fundamentally however there should be no measurable net reduction in the extent of the habitat and its distribution throughout the site.

This will include the avoidance of effects that could lead to a permanent reduction in the extent or distribution of the habitat such as medium or high levels of grazing or the risk of fire.

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

Caledonian pinewoods are found on soils dominated by low nutrient status, strongly-leached acidic podzols, ranging from well drained to very wet and boggy often over short distances.

The habitat is characterised by vegetation that

- has a diverse structure including young, mature, dying and dead trees in dense thickets and open glades with a range of shade cast on the woodland floor
- is mostly evergreen and coniferous, long lived (to >250 years) and grows to large dimensions with a variety of niches including furrowed bark, rot-holes, large slow-decaying snags and deadwood

- has small proportions of diverse broadleaved trees and shrubs (and juniper), especially on pockets of richer soils
- has ground flora dominated by dwarf ericaceous shrubs, grasses, bryophytes and in places rare pinewood specialist species

This can be achieved through the presence of key tree species at all ages up to senescence and death, particularly Scots pine, juniper, birch, and aspen providing continuous cover of young, mature and old trees, dead and dying trees throughout the site; absence of invasive species which compromise the critical characteristics; and grazing levels that allow trees, shrubs and ground flora to develop naturally and flower, fruit and seed.

The habitat requires low, but not zero, levels of grazing to sustain it. High levels of grazing can distort the natural structure and variation within the woodlands, producing a habitat that lacks a natural representation of intermediate life classes; abundance of old trees with very few younger ones. Insufficient grazing impacts can include excessive regrowth leading to changes in microclimates such as light and humidity levels.

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

Caledonian forest comprises relict, indigenous pine forests of Scots pine *Pinus sylvestris* var. *scotica*, and associated birch *Betula* spp. and juniper *Juniperus communis* woodlands of northern character. It is usually found on strongly-leached, acidic podzols, and these soil conditions are reflected in the ground flora, which typically includes the dwarf shrubs heather *Calluna vulgaris*, blaeberry *Vaccinium myrtillus* and cowberry *V. vitis-idaea*, wavy hair-grass *Deschampsia flexuosa*, and the bryophytes *Dicranum scoparium*, *Hylocomium splendens*, *Pleurozium schreberi* and *Rhytidiadelphus loreus*.

Non-plant typical species of this habitat include mammals such as red deer *Cervus elaphus* and pine marten *Martes martes* as well as birds such as Scottish crossbill *Loxia scotica*.

The relict Caledonian Forest sites have Scots pine populations with a local genetic distinctiveness, this is especially true in Loch Maree SAC. We value this distinctiveness in its own right, as well as in terms of adaptation to current local conditions, and current practice protects it. We do not know how the anticipated long term changes and potential threats will interact with this genetic distinctiveness and the variation within it. Further work should help us better understand these interactions, but for now we recommend that any planting or replanting of Scots pine should originate from the appropriate region.

Conservation Objectives for Bog woodland [91D0]

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

The extent of the Bog woodland feature has been estimated at 3ha. This should be maintained or allowed to increase through natural and managed hydrologically-related changes. Fundamentally however there should be no measurable net reduction in the extent of the habitat and its distribution throughout the site. On Loch Maree Complex SAC this habitat is mostly found on Loch Maree islands.

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

Bog woodlands are extremely complex ecosystems, and in order to maintain the structure, function and processes supporting the habitat, some of the key elements that should be in place should include:

- Ombrotrophic (rain fed) conditions with a water table at or near the surface, and some degree of surface-drying during summer periods to permit tree root growth within the upper peat layers.

- An appropriate hydrological regime i.e. maintain both existing drainage and water ingress processes

- The presence on the bog of Scots pine trees and other suitable trees with the characteristics of the existing tree species, (bark chemistry and structure, shade, needle-litter, fruiting, senescence and deadwood development). There should be relative ecological stability between the open woodland and bog species combination.

- The continued presence of mature trees suitable for bog woodland trees on nearby drier ground to supply tree seed to the bog. Such trees need to have the characteristics of existing bog woodland species (especially Scots pine and downy birch). Maximum distance is likely to be 50-100m.

- Low levels of grazing that allows natural regeneration of trees and structural variation of trees. The grazing should also allow trees to grow, herbs, bryophytes and lichens to flourish, and avoid undue ground disturbance or trampling.

- Absence of invasive non-native species.

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

Where Bog woodland occurs there is a balance that exists between various hydrological criteria that allows both trees and bog plants to grow over the long-term.

The typical pine dominated subtype often gives way to mire habitats but the constant species are:

Scots pine *(Pinus sylvestris),*
cross-leaved heath *(Erica tetralix)*,
common heather *(Calluna vulgaris)*,
purple moor-grass *(Molinea caerulea)*,
wavy hair-grass *(Deschampsia flexuosa)*,
Sphagnum spp.

Bog woodlands at Loch Maree complex are important sites for dragonfly and damselfly assemblages.

Conservation Objectives for Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*) [91E0] (Alder woodland on floodplains)

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

The extent of the Alder woodland on floodplains feature, taken from the Standard Data Form, has been estimated at 15.75ha and represents the amount of often complex, yet limited, mosaic of several individual stands of habitat. This should be maintained or allowed to increase through natural regeneration; there should be no measurable net reduction in the extent of the habitat and its distribution throughout the site.

This will include the avoidance of effects that could lead to a permanent reduction in the extent or distribution of the habitat such as further agricultural reclamation and minimising the risk of fire.

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

This habitat depends on hydrological conditions that lead to a high water table, wet conditions and sufficient variation to allow channel dynamics and vegetation succession to occur. This should allow for an abundance of key tree species that:

- Can colonise the floodplain substrate (wet, unstable) and thrive (tolerance of high water table) pioneer species recolonising riparian habitats after disturbances
- Can create important habitat structure for freshwater invertebrates and fish
- Can support a wide variety of terrestrial invertebrates, whilst overhanging the water surface (providing food for fish and other aquatic predators)
- Can provide leaf litter with a rapid decomposition rate, high levels of nitrogen, moderate levels of phosphorous and low levels of refractory carbon
- Provide moderate shade, especially over the water surface

These conditions are achieved through maintaining hydrological conditions within their long term range, an absence of invasive species which compromise the critical characteristics, and grazing at low levels that allow trees, shrubs and ground flora to develop naturally to flower and fruit (particularly important on drier margins).

The habitat requires low levels of grazing to sustain it. High levels of grazing can distort the natural structure and variation within the woodlands, producing a habitat that lacks a natural representation of intermediate life classes; abundance of old trees with very few younger ones. Current grazing levels by red deer, and feral goats, is preventing the natural structure and processes of this feature.

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

Alder woods on floodplains are dynamic, being part of a successional series of habitats. In the UK this Annex I habitat falls mainly within the following NVC types:
W5 *Alnus glutinosa – Carex paniculata* woodland
W6 *Alnus glutinosa – Urtica dioica* woodland
W7 *Alnus glutinosa – Fraxinus excelsior – Lysimachia nemorum* woodland

The key tree species found in this habitat are alder (*Alnus glutinosa*), ash (*Fraxinus excelsior*) and willow (*Salix* spp). On the drier margins of these areas other tree species, notably elm *Ulmus* spp., may become abundant. In other situations the alder woods occur as a stable component within transitions to surrounding dry-ground forest.

These transitions from wet to drier woodland and from open to more closed communities provide important ecological variation. The ground flora is correspondingly varied. Some stands are dominated by tall herbs, reeds and sedges, for example common nettle *Urtica dioica*, common reed *Phragmites australis*, greater tussock-sedge *Carex paniculata*, and meadowsweet *Filipendula ulmaria* while others have lower-growing communities with creeping buttercup *Ranunculus repens*, common marsh bedstraw *Galium palustre*, alternate-leaved golden-saxifrage *Chrysosplenium oppositifolium* and marsh-marigold *Caltha palustris*.

Currently at this site there are inadequate levels of tree regeneration, due to overgrazing primarily by red deer, meaning the viability of such species is compromised.

Conservation Objectives for Otter [S1355]

1. To ensure that the qualifying features of Loch Maree Complex 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 Loch Maree Complex SAC is restored by meeting objectives 2a, 2b and 2c for each qualifying feature

The aim at this SAC is to maintain the species in a favourable condition as a contribution to its 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 continue to 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 species are exposed to a wide range of drivers of change. Some of these are natural (e.g. population fluctuations/ shifts or habitat changes resulting from natural processes) and are not a direct result of human influences. Such changes in the qualifying species' distribution and use of the site, which are brought about by natural processes, directly or indirectly, are normally considered compatible with the site's conservation objectives. An assessment of whether a change is natural or anthropogenic.

2a. Maintain the population of the species as a viable component of the site

An estimate of the number of otters occupying the site is not available and therefore there is no numerical baseline that can be given for the site. When considering the impacts of a plan or project this conservation objective is considered to be met if the conditions for the species' long-term existence are in place. This includes:

- Avoiding effects that could lead to a permanent reduction in the otter population through mortality, injury, or impacts caused by disturbance or displacement. This includes for example the effects caused by development, river engineering, water

pollution, roads without adequate crossing provision for otters or suitable culverts, or entanglement in fishing gear.
- Maintaining the species' ability to use all areas of importance within the site (to be considered under conservation objective 2b)
- Maintaining access to, and availability of, undisturbed resting places
- Maintaining access to, and availability of, supporting habitats and prey (to be considered under conservation objective 2c).

Otters are wide-ranging and highly mobile. The population at Loch Maree Complex SAC is reliant on suitable habitat in the surrounding wider countryside and is unlikely be viable (capable of functioning) in isolation. The home range of an otter will vary depending on their sex, habitat quality and food availability. Males living in rivers and streams can have a mean linear range size of around 40km and females living in the same habitat can have a mean linear range of around 20km. Males have been known to range as far as 80km. When assessing the effects of any plan or project consideration should be given to whether impacts outwith the SAC could affect achievement of this conservation objective.

Temporary short-term changes to otter due to anthropogenic influences may be considered not to compromise the conservation objectives within the site provided it can be demonstrated beyond reasonable scientific doubt that the population can fully recover. Recovery will need to be considered in the context of the species life history traits and the scale and duration of the impact being assessed.

Otters are a European protected species (EPS) and it is an offence to deliberately or recklessly capture, injure, kill, harass or disturb them in certain circumstances, or to damage or destroy their breeding or resting places anywhere in Scotland unless a licence has been issued to do so. A licence can only be issued for particular purposes which the law allows. Further, there must be no satisfactory alternative and no detrimental impact on the contribution to the maintenance of otter at a favourable conservation status for a licence to be issued. This assessment considers impacts on the otter population at a local and regional level. The licensing requirement is in addition to considering whether a plan or project will result in any impacts (including incidental impacts) to the otter population within the SAC.

2b. Maintain the distribution of the species throughout the site

Distribution of otters within the site can be affected by disturbance originating both within and outwith the site. Plans and projects that cause displacement and barrier effects to the species can also affect species distribution. Examples include use of night-time floodlighting of watercourses, road and bridge construction works and general disturbance from human activity (and dogs) by watercourses especially at dusk/night-time.

2c. Maintain the habitats supporting the species within the site and availability of food

Otters require suitable habitat for foraging, breeding and resting. In freshwater environments abundant boulders, crevices and/or peat, or other cavity-forming features such as tree root systems are needed to provide secure holt sites above high water. Dense scrub is also valuable for providing lie-ups and couches. Suitable areas supporting a healthy fish population within a nearby watercourse or still water body are required within each otter's home range, to enable foraging for key prey species such as salmonids and eels. Access to ponds, ditches, reedbeds and wetlands where amphibians may breed is also important.

Changes to water flow and water quality can adversely affect otter habitat and prey on which they depend. Otters' food supply is normally associated with good water quality

and therefore the water quality standards set out under the Water Framework Directive (2000/60/EC) should be met.

Conservation Measures

Loch Maree Complex 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 NatureScot (SNH).

Current and recommended management for Clear-water lakes or lochs with aquatic vegetation and poor to moderate nutrient levels

Issue	Measure	Responsible party
Hydrological flushing regime	Maintain current regime. The main regulatory mechanism is the Controlled Activities Regulations, CAR.	SEPA NatureScot
Water-based recreation	Current levels of recreation (e.g. canoeing, paddling etc) don't appear to be affecting feature condition. Fishing also takes place on the loch and care should be taken to avoid inadvertent introduction of alien species.	Landowner

Current and recommended management for

- **Wet heathland with cross-leaved heath**
- **Dry heath**
- **Alpine and Boreal heaths**
- **Montane acid grasslands**
- **Blanket bog**
- **Depressions on peat substrates**

Issue	Measure	Responsible party
Grazing & trampling by deer and feral goats	Red and roe deer (and small numbers of Sika deer) range over most of the SAC including the islands. Feral goats are also present in some areas. Deer are managed under deer management plans. These habitats require low grazing and trampling levels to maintain a varied habitat structure. High levels of grazing can weaken sensitive plants making them more vulnerable to competition, and reduce their reproductive productivity. Excessive trampling can increase bare soil and exacerbate erosion. Plants such as Sphagnum moss in soft wet habitats such as blanket bog or wet heath are particularly susceptible to damage from trampling where concentrations of animals can break the moss into fragments or create bare ground. As a guide to achieving the	Land manager Deer Management Groups

	correct balance the herbivore impact on the features should be mostly 'low' based on Habitat Impact Assessments. Parts of the SAC are within the Beinn Eighe National Nature Reserve (NNR). These areas are managed in accordance with an approved NNR management plan.	
Muirburn	Any burning would need to be carried out in accordance with the Muirburn Code. No burning should occur on wet heath, blanket bog, alpine and subalpine heaths or montane acid grasslands.	Land manager
Drainage	These habitats should not be actively drained and natural hydrology should be restored by blocking existing drains where feasible.	Land manager
Woodland expansion	Woodland expansion of Caledonian forest and Western acid oak woodland should be driven by natural processes or focused in suitable areas. Important sub-communities of heaths (e.g. Atlantic (oceanic) bryophyte-rich dry heaths, juniper heath and bearberry heath), flushes and alpine and subalpine heaths should be maintained with less than 20% tree cover. Areas of contiguous blanket bog within open habitat mosaics are maintained with less than 10% tree cover. In wetter areas natural regeneration is likely to be restricted by ground conditions.	"
Non-native and invasive species	Non-native and invasive species should not be introduced to the site. Removal of non-native species should be prioritised.	Land manager
Habitat damage from vehicle tracks	Avoid vehicle use that damage habitats. Any vehicles used on these habitats should be low ground pressure ATVs and should avoid areas recovering from past damage.	Land Manager
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 manager
Access tracks and paths	Existing 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.	Land manager (Recreation interests)

Recreation	There are significant numbers of walkers who access the mountains within the SAC. Although hillwalkers cause some trampling and erosion, this is generally localised, affects only a small proportion of these habitats, and most of the Munros have well developed access routes.	Land manager, Local authority, NatureScot

Current and recommended management for Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels

Issue	Measure	Responsible party
Grazing	The extreme sensitivity of this habitat to grazing pressure means this habitat requires very low grazing and trampling impacts. Grazing by red deer is possible although this is limited through inaccessibility. Deer are managed on the SAC to maintain sustainable levels. Targeted culls near to sensitive habitats could be beneficial.	Land manager
Introduction of goats	Introduction of agile herbivores such as goats should be avoided as they would be a threat to this habitat as they may be able to access the otherwise inaccessible ledges.	Land manager
Muirburn	This habitat is very sensitive to burning and should not be burnt.	Land manager

Current and recommended management for

- **Acidic scree**
- **Siliceous rocky slopes with chasmophytic vegetation**
- **Calcareous rocky slopes with chasmophytic vegetation**

Issue	Measure	Responsible party
Herbivore impacts (grazing and/or trampling)	Red deer are present in the higher parts of the site. Deer should be managed on the SAC to maintain sustainable levels. These habitats all benefit from low levels of grazing and low trampling impacts. Targeted culling in areas where these habitats occur would benefit these features.	Land managers, NatureScot, Deer Management Groups
Colonisation and/or shading by native and/or non-native species (e.g. bracken, trees)	Ensure colonisation or shading of this habitat by tree growth; woodland expansion; bracken; is minimal to maintain cover of the typical species, including bryophytes. In areas where bracken is expanding over these habitats then bracken management should be considered.	Land Managers, NatureScot

Habitat Management	Management is delivered through the respective deer management plans. On Beinn Eighe habitats are managed through the Beinn Eighe NNR Habitat Management Plan.	NatureScot, landowners, land managers.
Recreation activity	Ensure trampling by walkers is minimal to maintain cover of typical species.	Land owners, land managers.

Current and recommended management for

- **Western acidic oak woods**
- **Caledonian forest**
- **Bog woodland**
- **Alder woodland on floodplains**

Issue	**Measure**	**Responsible party**
Herbivore impacts	Ensure that herbivore impacts are low based on the SF/NatureScot Herbivore Impact Assessment Process. Red and roe deer (and small numbers of Sika deer) range over most of the SAC including the islands. Feral goats and sheep are also present in some areas. High levels of browsing can prevent natural regeneration of trees and shrubs which can also limit the spread of different age-classes. Very low levels of browsing are beneficial to sustain woodland habitats. Some woodland areas are fenced to exclude deer and goats. Deer Management Plans for local DMGs have been written to try to address conflicts between deer management and woodland expansion. In some areas there is an urgency to reduce herbivore impacts as current levels are restricting the ability of the woodland to develop naturally. Parts of the SAC are within the Beinn Eighe National Nature Reserve (NNR). These areas are managed in accordance with an approved NNR management plan.	Land managers, NatureScot, Deer Management Groups
Woodland management	Encourage a diverse structure with a mix of age classes across the site, especially where management has resulted in single age stands with dense canopies. Where natural regeneration has occurred, Scots pine naturally forms single age stands and these should be retained. Allow broadleaved trees amongst the pine. Retain dead wood.	
Bracken	Very dense areas of bracken could prevent natural tree regeneration. In these areas some bracken intervention might be	

	beneficial to promote natural regeneration and young age-classes of tree and shrub.	
Trampling (human, stock & wild mammal) and other mammalian plant damage	Excessive trampling can increase bare soil and exacerbate erosion as well as damaging under storey plants and regenerating trees and shrubs. Low levels of trampling can create areas for tree regeneration and seedling establishment.	Land manager Local authority
Hydrology	Ensure natural hydrological processes are maintained where they support significant populations of typical wooded ravine bryophytes and lichens.	Landowner SEPA NatureScot
Invasion by non-native species	In some areas Rhododendron cover is greater than 5%. Management measures are in place to remove Rhododendron from the site. Further work is ongoing to remove scattered bushes from the site, especially along the roadside, to avoid recolonisation.	Land manager
Agricultural reclamation	Agricultural areas should not be expanded into existing SAC woodlands. Woodlands that are currently grazed by livestock should be grazed at levels that allow for natural woodland processes to occur.	Land manager
Future threats (e.g. Dothistroma)	A coordinated resilience planning process should be developed to respond to anticipated future threats to the habitat. Management actions arising from the resilience planning process, and site-level plans, should be implemented to anticipate future threats to the habitat on the site This resilience work may also include further research to understand the vulnerabilities of the habitat.	NatureScot Land managers
Bog Woodland - Maintenance of surrounding woodland structure	Retain Scots pine woodland around bog woodland to provide seed source for pine regeneration.	Land manager
Maintain hydrological regime and increase naturalness	This is especially important for bog woodland and Alder woodland on floodplains. Allow natural processes to operate and maintain natural hydrological regime. Allow sites to get wetter if this happens naturally	Land owners Land managers NatureScot
Research and monitoring	To identify emerging impacts on the habitat and their causes, in order to understand the long term issues, identify refugia, review site-level resilience plans in the light of updated future threat projections and to inform future management of the habitat across Scotland.	NatureScot, Universities, land managers

Current and recommended management for Otters

Issue	Measure	Responsible party
Ongoing species protection	Otter are a European protected species and therefore the species protection provisions of the Habitats Regulations apply.	All
Water quality monitoring	Implement and maintain monitoring of key water quality parameters.	NatureScot /SEPA

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