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

INVERPOLLY SPECIAL AREA OF CONSERVATION (SAC)

CONSERVATION ADVICE PACKAGE

Cul Beag taken by Lorne Gill (NatureScot)

Site Details

Site name:	Inverpolly
Map:	https://sitelink.nature.scot/site/8277
Location:	Highlands and Islands
Site code:	UK0030171
Area (ha):	11,881.94
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	20 July 2010	Unfavourable - Bad
Acid peat-stained lakes and ponds	Favourable Maintained	25 July 2004	Unfavourable - Bad
Wet heathland with cross-leaved heath	Favourable Recovered	28 December 2005	Unfavourable - Bad
Dry heaths	Unfavourable No change	28 December 2005	Unfavourable - Bad
Alpine and subalpine heaths	Unfavourable Recovering	21 July 2013	Unfavourable - Bad
Montane acid grasslands	Unfavourable No change	21 July 2013	Unfavourable - Bad
Blanket bog	Unfavourable Recovering	21 July 2013	Unfavourable - Bad
Very wet mires often identified by an unstable 'quaking' surface	Favourable Maintained	21 July 2013	Unfavourable - Bad
Depressions on peat substrates	Unfavourable Recovering	20 November 2005	Unfavourable - Bad
Acidic scree	Unfavourable Recovering	28 December 2005	Unfavourable - Inadequate
Plants in crevices on acid rocks	Favourable Maintained	5 June 2017	Unfavourable - Inadequate
Western acidic oak woodland	Unfavourable Declining	28 February 2005	Unfavourable - Bad
Freshwater pearl mussel (Margaritifera	Unfavourable Declining	31 October 2016	Unfavourable - Bad

margaritifera)			
Otter (Lutra lutra)	Favourable Maintained	13 September 2011	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.

Other overlapping Protected Areas:

Inverpolly SSSI, Cam Loch SSSI and, Inverpolly, Loch Urigill & nearby lochs SPA

Key factors affecting the qualifying features

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

This habitat type at Inverpolly comprises both oligotrophic (nutrient-poor) and mesotrophic (moderate nutrient levels) waters. It includes a range of waterbodies which range from small unnamed lochans to the largest loch on the reserve Loch Sionascaig. Whilst these lochs are low in productivity they support a diversity of plant species including *Juncus bulbosus, Littorella uniflora* and *Lobelia dortmana*. The diversity of plant species is further enhanced by the range of habitats found in these lochs which includes open stony shores, soft sediment embayments and wetland areas.

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

Further information about Clear-water lakes or lochs with aquatic vegetation and poor to moderate nutrient levels can be found here.

Acid peat-stained lakes and ponds

Acid peat-stained lochs and lochans most often occur on blanket bogs, and may include isolated seasonal pools, permanent waters, and arrays of pools and small lochs. At Inverpolly these pools are small un-named waters (usually <1ha) on the SAC, which are highly acidic, of very low productivity, and are often characterised by the presence of Sphagnum moss growing in them. The small size of lochans in this category and their remote geographical location protects them from any significant damage, although the health of these lochs is often closely linked with the surrounding bog.

Key requirements for this habitat type are the maintaining of an appropriate hydrological regime and prevention of pollution.

Further information about Acid peat-stained lakes and ponds can be found here.

Wet heathland with cross-leaved heath

This habitat is one of the commonest vegetation types over the site, being found especially on thinner peat on ground where there is a mosaic of peat, rock and lochans. It is generally widespread though most dominant on the gentle to moderately steep lower slopes of Cùl Beag, Cùl Mòr, Stac Pollaidh and An Laogh.

The habitat has been subject to excessive grazing pressure in the past that had led to it being in unfavourable condition. A reduction in sheep numbers in 2004 and ongoing deer management have allowed the habitat to recover and the assessment to be changed to 'Favourable recovered'. However, a survey of herbivore impacts in 2007 shows that there are still some problems with trampling and browsing damage.

Further information about wet heathland with cross leaved heath can be found here.

European dry heaths

The dry heaths at Inverpolly are generally confined to steeper, more sheltered slopes – often on the northern side of hills, or else around rock outcrops where the peat is thin. Thus areas with significant amounts of dry heath include the north side of An Laogh, frequent patches on the north side of Cùl Mòr, around the rocky knolls of An Leitrichean above Loch Veyatie and on the sides of many of the rockier knolls in the Lewisian landscape north and west of Loch Sionascaig.

The current condition assessment, based on field work in 2005, is unfavourable no change. A reduction in sheep numbers in 2004 and ongoing deer management may contribute to recovery. On a more recent visit a general assessment of this feature from walkover indicated a low level of browsing, open bushes and an intact bryophyte layer. The heath has also suffered from wildfires, after which regrowth can be slow particularly as deer and sheep can focus attention in areas where pioneer shoots of the new heather provide tender and nutritious fodder.

Further information about European dry heath can be found here.

Alpine and subalpine heaths

Alpine and subalpine heaths are mainly found on exposed ground above 500m, principally on Cùl Mòr, but with some areas on Cùl Beag and the summit of An Laogh. 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. Subalpine 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.

Monitoring of the habitat in 2005 and 2013 found the effects of high grazing pressures such as an overabundance of grassland species in some places and excessive ground disturbance and tracking in parts of the site. As deer and sheep numbers have been reduced since 2004 the impacts seen on the habitat are due to historical grazing pressures.

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.

Further information about Alpine and subalpine heaths can be found here.

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.

At Inverpolly the habitat is largely confined to Cùl Mòr with some small patches on Cùl Beag. On Cùl Mòr the feature is dominant on gentle slopes, and on the stony summit ridges.

The overall assessment of feature condition is 'unfavourable no change', with disturbed bare ground and a high cover of grassland species the main reasons for failure. Some of this is attributed to historic impacts, e.g. from sheep, and the current trampling impacts are attributable to both deer and hikers across the summit plateau of Cul Mor.

Further information about Montane acid grassland can be found here.

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.

This habitat is very common across the site, especially on the gentler slopes north and west of Loch an Laoigh, south of Druim Donn and east of Stac Pollaidh. It is also the dominant vegetation type in the hollows between the knolls in the cnoc and lochan landscape north of Cùl Mòr and north and west of Loch Sionascaig.

Historically the habitat has been assessed to be in unfavourable condition due to high levels of trampling by deer in some locations. The most recent assessment has noted the negative impacts of an intense wildfire in 2011 and the effects of browsing on the recovering vegetation.

Further information about Blanket bog can be found here.

Very wet mires often identified by an unstable 'quaking' surface

The habitat occurs frequently across the north-western part of the site, predominantly across Eisg Brachaidh, and is found around pools and very wet ground around the centre of basin mires across this area.

Key factors affecting this habitat type are alterations to the hydrology, over/undergrazing and disturbance to the surface i.e., trampling, which has been noted to be a potential source of damage at Inverpolly. Although the habitat is found in the area that was affected by a wildfire in 2011, it was largely unaffected by this, possibly due to its inherent wet conditions.

A fuller account of the habitat can be found here.

Depressions on peat substrates

This feature is widespread but local within blanket bog and, to a lesser extent, wet heath vegetation throughout the site, and commonest on flatter areas. The feature is particularly common in the basin and valley bogs in the cnoc and lochan landscape north and northwest of Loch Sionascaig. The vegetation is typically very open, usually characterised by an abundance of white beak-sedge *Rhynchospora alba*.

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. Its condition has been assessed as unfavourable recovering due to the impacts of historic grazing pressures, although the reduction in deer and sheep numbers on the site will be contributing to its recovery. Despite the habitat occurring largely in the area affected by the 2011 wildfire, it has been relatively unscathed.

A fuller account of the habitat can be found here.

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..

At Inverpolly the habitat has been subject to localised historic herbivore pressure and trampling damage, although reductions in deer and sheep numbers will be contributing to its recovery. Elsewhere the scree runs are in some of the most inaccessible parts of the site and do not show any impacts from grazing or trampling.

A fuller account of the habitat can be found here.

Plants in crevices on acid rocks

This habitat 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 plant species are adapted to the stresses of drought and low nutrient availability. They can be sensitive to overgrazing and trampling although at Inverpolly are protected by inaccessibility. This means that no damage has been found to the habitat on this SAC.

A fuller account of the habitat can be found here.

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.

Inverpolly contains many separate and widely scattered woods including on some of the offshore islands. The largest woodland is over 90ha but most are much smaller. Birch is the most common tree species but rowan, alder, bird cherry and holly are

also widespread. Oak is currently limited to a few areas within the site but the soil is suitable for it to grow in all the woodlands, apart from those on the south side of Loch Veyatie.

A key factor that can affect this habitat is inappropriate levels of 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.

On Inverpolly, this means there is a lack of sufficient tree regeneration outside the current deer fenced exclosures. There are pockets of successful tree regeneration outside the exclosures but most of the unenclosed woodland is either moderately or heavily affected by grazing. The level of grazing is currently too high to allow enough young trees to grow to replace the old trees. Many of the woods are moribund with the age structure skewed towards old and dying trees. Both seedling and sapling trees are growing successfully within the exclosures, demonstrating that the mature trees can still produce viable seed and that the woodland will regenerate successfully if sheep and deer grazing is reduced.

The presence of non-native species such as Rhododendron can also impact the habitat and prevent natural regeneration. In the future new stresses to the feature, particularly from climate change and novel pests and pathogens, are anticipated.

Further information about Western acidic oak woods can be found here.

Freshwater pearl mussel

Freshwater pearl mussels are long-lived freshwater molluscs that live in the gravel beds of clear, unpolluted rivers. For part of their lifecycle they are dependent upon a healthy population of salmonids (young salmon or trout) which act as host species. The mussel larvae attach to the gills of salmonid fish in mid to late summer and drop off the following spring. When they detach from their hosts they must land in sandy or gravelly substrates to settle and grow to adulthood.

Freshwater mussel populations are vulnerable to changes to water quality (including pollution), hydrological alterations (including river engineering and abstractions), habitat degradation of river beds and banks, illegal pearl fishing and availability of host species.

The population at Inverpolly is found in 5 separate watercourses. It has been assessed to be in unfavourable condition because adult densities on all watercourses are much less than they should be, due to past pearl fishing and the time it is likely to take for the populations to recover. There is evidence that there is insufficient recruitment taking place in the SAC for the populations to be sustained in the long term.

Further information about freshwater pearl mussels can be found here.

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, persecution and habitat loss.

Further information about otters can be found here.

Feature Priorities

The Inverpolly woodlands are remnants of a formerly more extensive Western acidic oak woodland at the edge of its northern range within Scotland. These woodlands have been, and continue to be, in a long period of decline, becoming fragmented and contracting in extent due to the lack of natural regeneration. This decline has been a result of extensive historic grazing by sheep and cattle, and continual browsing by high deer numbers.

Today, much of the previously wooded area is open moorland, including dry heath and wet heathland. Therefore one of the objectives for the site is to prioritise the expansion of the qualifying habitat Western acidic oak woodland over two qualifying habitats, European dry heaths and wet heathland with cross-leaved heath. Conservation measures to address the inadequacy in extent (area) and the structure and function of Western acidic oak woodland are required at a site level to restore both site condition and the UK and biogeographical conservation status of these woodlands. Woodland expansion, increasing the connectivity between woodland fragments and improving woodland habitat condition therefore continue be a management priority at Inverpolly SAC. The expansion of these woodlands will continue to be achieved by natural regeneration and native tree planting in existing and new woodland enclosures. Woodland expansion will inevitably result in a reduction in extent of dry heath and wet heath habitats.

Two surveys of habitats considered to be at risk of continuing decline from herbivore impacts were undertaken in 2007. This included the woodland habitats. A further survey was carried out in 2009 which identified the areas of woodland that had the potential to expand.

The potential for natural woodland regeneration at Inverpolly SAC is restricted by natural and physical constraints. The main constraint limiting natural regeneration is deer browsing levels. In the absence of deer we would expect natural regeneration to occur up to about 500m from the existing woodland edge. Regeneration within 200 metres of existing seed trees might be relatively dense, with more scattered regeneration beyond this.

The management priorities for Inverpolly SAC ensure no adverse effect on site integrity and the long term coherence of the site network by complying with the following safeguards:

1) *A non-qualifying feature is not favoured over a qualifying feature;*
   Western acidic oak woodlands is a qualifying habitat of the SAC.

2) *A non-priority feature is not favoured over a priority feature;*
   There will be no loss of blanket bog habitat from the SAC.

3) *The qualifying features are maintained to a degree commensurate with their global grade at the site at the time of designation (Annex III of Habitats Directive);*
   The anticipated reduced in extent of both wet and dry heath will be sufficient to ensure adequate representation and viability of the habitats and typical species consistent with their 'relative surface' subsidiary grading of C.

Conservation Objectives

Overarching Conservation Objectives for all habitats

1. To ensure that the qualifying features of Inverpolly 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 improving 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 assessment 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 assessments 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 assessment. 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 Inverpolly SAC is restored by meeting objectives 2a, 2b and 2c for each qualifying feature.
The aim at this SAC is to restore the protected habitats in a favourable condition as a contribution to their wider favourable 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 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 habitat's extent, distribution or condition within the site which are brought about by natural processes, directly or indirectly, are normally considered compatible with the site's conservation objectives. An assessment of whether a change is natural or anthropogenic, or a combination of both, will need to be looked at on a case by case basis.

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 1840.51 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

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

The lochs on Inverpolly are either oligotrophic or oligo-mesotrophc. Typical species differ for each category of loch:

- mesotrophic lochs:

Isoetes echinospora	spring quillwort
Isoetes lacustris	lake quillwort
Litorella uniflora	shoreweed
Lobeliia dortmanna	water lobelia
Nitella sp (each species)	
Potamogeton alpinus	red pondweed
Potamogeton gramineus	various-leaved pondweed
Potamogeton perfoliatus	perfoliate pondweed
Potamogeton x nitens	
Sparganium angustifolium	floating bur-reed
Subularia aquatic	awlwort
Utricualria sp (each species)	bladderworts

- oligotrophic lochs;

Litorella uniflora	shoreweed
Lobeliia dortmanna	water lobelia
Subularia aquatic	awlwort
Isoetes echinospora	spring quillwort
Isoetes lacustris	lake quillwort

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

Alien species can have direct effects upon the natural plant communities through competition. They may also have more subtle effects as the niche they fill is different and this may directly or indirectly affect the rest of the ecosystem. A list of high impact species has been agreed as part of the Water Framework Directive. Other species that may also affect the integrity of the site include Elodea nutallii, E.canadensis and Crassula helmsii.

Filamentous algae are indicative of high nutrient levels. This can create dense blankets reducing light and which can cause problems when they die and decay.

Some of these lochs within Inverpolly SAC are also part of Inverpolly, Loch Urigill & nearby lochs SPA and provide habitat for Black throated diver.

Conservation Objectives for Natural Dystrophic lakes and ponds [H3160] (Acid peat-stained lakes and ponds)

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

There should be no measurable net reduction to the extent of the habitat and its distribution throughout the site. The extent of the Acid peat-stained lakes and ponds has been estimated at 300.61.

In contrast to most loch habitats this habitat can be composed of many relatively small lochs and lochans scattered throughout the site. Drainage and forestry could dry out the peat catchment associated with the lochs.

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

The structure and function of lochs are strongly influenced by activities within their catchment. Changes in land management or development can affect the integrity of the feature which will manifest itself in changes to the loch.

Physical Attributes

-Surface Area

Changes to surface area can indicate pressures on the structure and function of lochs. Because they tend to be small and rather shallow the surface area of dystrophic lochs may fluctuate naturally more than other lochs. However changes to surface area and the associated change to depth can adversely affect the character of the loch. Artificial fluctuations to depth from activities such as abstraction 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 be caused by issues 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. The habitat is rain fed but may be affected by fluctuations in the water table of the surrounding bog.

-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. Sediment type can be indicative of exposure. The substrate of the majority of dystrophic lochs is dominated by peat although there are rare examples on more mineral gravels. Changes to the substrate character may 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.

-Natural sediment load

Accumulation of nutrient-rich sediment may have a strong effect on the water quality and biology of the loch. Enrichment can be caused by the release of nutrients bound to silt. 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. Release of sediment from afforested catchments particularly during site preparation and harvesting is a particular issue. Eroding peat within the catchment may also be an issue for this type of loch. Evidence is growing that an increase in storm events associated with climate change may increase the amount of sediment deposited in lochs. Poaching of loch margins and feeder burns may also be important.

-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. Poaching of loch edges can damage or destroy the

characteristic edges and marginal vegetation

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. Dystrophic lochs should have pH of less than 5. Careful consideration should be given to afforestation of catchments with low buffering capacity

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

Nitrogen is the other main nutrient important in loch ecosystems. Although generally less likely to be limiting than phosphorus it can be limiting either on its own or co-limiting with P and nitrate has been found to adversely affect macropytes. Both Nitrogen and Phosphorus should be low. The target for all lochs is that Annual Mean Total Nitrogen should not exceed 1.5mg/l. with no deterioration from baseline.

-Filamentous algae
Filamentous algae is a negative indicator associated with high nutrient levels. Some species can form dense floating rafts or coat macrophytes. Filamentous algae should only generally be found at low levels in dystrophic lochs.

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

There should be a low to medium diversity and characteristic species with a macrophyte community typical of the lake type with appropriate species richness and a natural assemblage.

Dystrophic lochs vary greatly in their macrophyte communities some having none at all. The target species can be found from previous monitoring including notable species from each site. The target is no loss. Generic characteristic species are:
Dreplanocladus spp
Eleogiton fluitans
Juncus bulbosus
Menyanthes trifoliata
Nymphaea alba
Potamogeton polygonifolius
Sparganium angustifolium
Aquatic *Sphagnum* spp
Utricularia spp

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

The recorded extent of the habitat on the standard data form is 3304ha. This extent should be maintained, although this is subject to the plans for woodland expansion described above. Changes to the extent of the habitat as a result of the expansion of the extent of oak woodland will not undermine this conservation objective.

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 subalpine heath, usually in areas with some topographic shelter.

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

Northern Atlantic wet heath with *Erica tetralix* is sensitive to inappropriate grazing or burning that may affect the habitat structure and function in two main ways. Overgrazing/burning, can lead to creation of a grass sward. Overgrazing, by livestock, can also result in high levels of nutrient input and trampling. Under grazing/burning can lead to the habitat type being colonised by non-typical species.

The structure of the habitat is based around the presence of:

- at least 25% (up to 90%) cover of dwarf-shrub heath species with *Erica tetralix* as the defining dwarf-shrub.
- less than 33% of the last complete growing season's shoots of dwarf-shrub species (collectively but excluding *Betula nana* and *Myrica gale*) should show signs of browsing.
- less than 10% of the Sphagnum cover should be crushed, broken, and/or pulled-up.
- less than 10% of the ground cover should be made up from disturbed ground (i.e. bare ground is where a substrate of bare humus, bare peat, bare mineral soil, bare gravel, or soil covered only by an algal mat, has its surface broken and imprinted by hoof marks, wallows, human foot prints, or vehicle and machinery tracks.
- less than 10% of the total feature area should show signs of active (i.e. facilitates the movement of water away from the site) drainage, resulting from ditches or heavy trampling or tracking.
- less than 20% of vegetation cover should be made up of scattered native trees and scrub (excluding *Betula nana* and *Myrica gale*).
- less than 10% of vegetation cover should be made up of bracken.
- less than 1% of vegetation cover should be made up of non-native species.

Therefore the predominant requirement for wet heath is suitably managing active drainage in conjunction with the appropriate levels of grazing and burning; such levels will vary according to a number of factors such as altitude, aspect, location (i.e. montane, coastal etc). Management effort should therefore be directed to maintain (or restore) species composition, vegetation mosaics and ground/soil structure and integrity. This should also

avoid surface erosion and deposition, introduction of alien and invasive species and scrub and habitat fragmentation.

2c. Maintain 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 key indicator 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	
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)

Typically associated birds are red grouse (*Lagopus l. scotica)*, golden plover (*Pluvialis apricaria*), dunlin (*Calidris alpina schinzii)* and greenshank (*Tringa nebularia*) golden eagle (*Aquilla chrysaetos*), merlin (*Falco columbarius*) and hen harrier (*Circus cyaneus*).

Conservation Objectives for European dry heaths [H4030]

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

The recorded extent of the habitat on the standard data form is 1183ha. This extent should be maintained, although this is subject to the plans for woodland expansion described above. Changes to the extent of the habitat as a result of the expansion of the extent of oak woodland will not undermine this conservation objective.

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 level of grazing
- avoidance of negative effects of access and recreation

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

European dry heaths are closely associated with scrub and woodland habitats, which would form the climax habitat without heathland management. Therefore maintaining dry heath is a fine balance between degrading to grasslands as a result of intensive management, and succession to scrub or woodland from too low a level of browsing, or grazing.

The structure of the habitat is based around the presence of at least 25% cover of dwarf shrub heath species, but can be up 90%. In particular heather *(Calluna vulgaris)*, as a dominant species, 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. At least 10% of the heather cover should be in the late mature/degenerative phase. Appropriate burning or cutting can contribute to the variation in age phase, but it is important that this does not result in a monoculture of large areas of same age heather.

Further targets to achieve suitable habitat structure include:

Grazing/browsing

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

Trampling/disturbance

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

Invasive native and non-native species

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

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

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

In the uplands the sub-montane heaths are dominated by heather (*Calluna vulgaris*), blaeberry (*Vaccinium myrtillus*) and crowberry (*Empetrum nigrum*)

Other indicator species for European dry heath are:
Arctostaphylos spp.
Betula nana
Erica spp.
Loiseleuria procumbens
Minuartia sedoides
Phyllodoce caerulea,
Salix lapponum
Racomitrium lanuginosum

Vaccinium spp.
Genista anglica
Myrica gale
Salix repens
Ulex gallii

Associated vertebrates of upland heaths are red deer (*Cervus elaphus*) and mountain hares (*Lepus timidus*), red grouse (*Lagopus l. scotica)*, black grouse (*Tetrao tetrix*), golden plover (*Pluvialis apricaria*), twite (*Carduelis flavirostris*), hen harriers (*Circus cyaneus*), merlin (*Falco columbarius*) and golden eagle (*Aquila chrysaetos)*.

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

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

Maintain to approximately 93.87ha. The area figure for this SAC has been taken from the Standard Data Form, and is an estimate based on the fact that Alpine and subalpine heaths can grade into other heath types, especially the latter into floristically-similar European dry heaths. However there should be no measurable net reduction in the extent of the habitat and its distribution throughout the site.

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

- an appropriate level of grazing
- habitat loss through increased extent of adjacent natural habitats
- the effects of access and recreation

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

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

As with many other Scottish upland habitats, maintaining Alpine and subalpine heaths is a fine balance between degrading to grasslands with intensive management and succession to scrub/ woodland with too low a level of browsing, grazing or burning. This is especially the case with the subalpine heaths where there may be only subtle differences between them and some adjacent habitats.

The structure of the habitat is based around:

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

human foot prints, or vehicle and machinery tracks. The emphasis is on 'disturbed' rather than 'bare'.)

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

This habitat comprises a wide range of heath types, with variation related to climate, local exposure and snow-lie. On Inverpolly the dominant plants are dwarf-shrubs of heather *Calluna vulgaris*, blaeberry *Vaccinium myrtillus* or juniper *Juniperus communis.*

On less-exposed, more sheltered ground at the lower altitudes, *Calluna* is usually accompanied by other dwarf-shrubs, such as *V. myrtillus*, bell heather *Erica cinerea*, bearberry *Arctostaphylos uva-ursi* and crowberry *E. nigrum* ssp. *Nigrum*. On more exposed and windswept ground, a range of dwarf-shrubs 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 with *Cladonia,* woolly fringe-moss *Racomitrium lanuginosum,* dwarf juniper *Juniperus communis* ssp. *nana* or *Arctostaphylos alpinus* and *Loiseleuria procumbens.* At higher altitudes, where conditions are too extreme for heather, short or prostrate *Vaccinium* spp. and *E. nigrum* ssp. *hermaphroditum* dominate. On sheltered slopes where snow lingers, the dominant shrub is *V. myrtillus*, which is either the sole dominant or grows with *E. nigrum* ssp. *hermaphroditum*, dwarf cornel *Cornus suecica* and cloudberry *Rubus chamaemorus*.

In addition to this altitudinal zonation, in the more oceanic climate of the north-west and north, woolly fringe-moss, bell heather 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. Different structural forms of heath also occur, owing to differences in exposure, giving rise to closed or open heaths with crescentic waves (wave-form).

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*) and, on a very localised basis, snow bunting (*Plectrophenax nivalis*).

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 106.94ha.

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

Whilst these grasslands are some of the very few predominantly near-natural habitats remaining in the UK, they are very sensitive to changes in current pressures, especially grazing and nutrient input. Excessive grazing, and the associated manuring, may favour

grasses over bryophytes.

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

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

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

- No signs of burning inside the feature boundaries;
- Less than 10% of the ground cover should be disturbed bare ground
  a) distinct and clearly defined paths and tracks (exclude constructed tracks) across the feature or,
  b) diffuse/scattered disturbance of the ground, not on clearly defined paths or tracks.

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

The montane acid grassland habitat on Inverpolly consists of *Carex bigelowii* moss heath and *Nardus stricta-Carex bigelowii* grassland with small stands of *Juncus trifidus-Racomitrium lanuginosum* rush-heath. The moss heath vegetation is typical of exposed plateau and ledge habitat and is generally dominated by mixtures of *Carex bigelowii*, *Racomitrium lanuginosum*, *Cladonia* spp and dwarf-shrubs such as *Vaccinium uliginosum*, *Empetrum nigrum* sbsp *hermaphroditum* and *Vaccinium vitis-idaea*. The *Nardus stricta* dominated grasslands are more frequent on slopes or in less exposed locations and were typically dominated by *Nardus stricta* with *Carex bigelowii*, *Racomitrium lanuginosum* and some *Alchemilla alpina*.

This habitat also contains the nationally rare Norwegian mugwort *Artemisia norvegica* which is a feature of the Inverpolly SSSI in its own right.

In summary indicator species for Montane acid grassland are:

Alchemilla alpina	alpine lady's mantle
Carex bigelowii	stiff sedge
Empetrum nigrum ssp. hermaphroditum	crowberry
Juncus trifidus	three-leaved rush
Nardus stricta	mat-grass
Racomitrium lanuginosum	wooly hair moss

Conservation Objectives for Blanket bog [7130]

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

Blanket bog typically covers very large areas, forming complex mosaics with other wetland habitats as well as heath and grass habitats in drier areas. There should be no measurable net reduction in the extent of the habitat on the site such that the area of blanket bog is maintained to approximately 3832ha.

2b. Restore 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.

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.

In addition, reducing negative impacts caused by burning, inappropriate grazing, trampling and nitrogen deposition is important; these are often combined and can make the habitat more vulnerable to more frequent and intense weather events. Wind and heavy rainfall can have dramatic impacts resulting in erosion or even landslips.

In drier areas invasion of scrub and non-native species can further reduce the water table, and so coverage of trees and non-peat forming grasses, bracken and other plants should be minimised. Any non-native species should be removed.

The main targets for habitat structure for the SAC are:

- Restore all areas of eroding peat, re-establishing peat-forming vegetation so that the extent of eroding peat is less than the extent of stable re-deposited peat and new growth of bog vegetation.
- Manage grazing to maintain a natural, diverse and open sward of typical plant species by avoiding overgrazing that affects habitat condition.
- Reduce active drainage through targeted ditch damming and peat reprofiling as appropriate
- Burning should be avoided, but where it is considered necessary e.g. for wild fire control, agreed good practice should be adhered to, as set out in the Muirburn Code
- Appropriate management of the effects of access and recreation

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 indicator 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	cloud berry
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. Healthy bog vegetation relies on light to moderate grazing by livestock and/or wild herbivores, sufficient to maintain a diverse open structure but without causing surface damage/erosion or loss of more grazing-sensitive species.

Conservation Objectives for Transition mires and quaking bogs [H7140] (Very wet mires often identified by an unstable 'quaking' surface)

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

Maintain the extent of existing transition mires and quaking bogs at 49.9ha.

However, by definition this habitat is transitional with other adjacent wetland habitats so 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 Inverpolly this habitat is found frequently across the north-western part of the site.

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

This habitat is usually present as a mosaic with other wetland habitats. The term "transition mire" relates to vegetation that, in floristic composition and general ecological characteristic, is transitional between acid bog and alkaline fens, in which the surface conditions range from markedly acidic to slightly base-rich.

The maintenance of appropriate hydrology for this habitat is important to retain the structure and function. Management to prevent or reduce detrimental effects of drainage, including in the wider surrounding area, is key.

Colonisation of this habitat by vigorous native species, tree or scrub growth or invasive non-native species could led to irreversible habitat loss in the longer term, through shading, drying out of the habitat and possible conversion to other open-ground habitats or woodland.

Grazing, browsing and trampling by sheep and/or deer and/or recreation can damage the structure of this habitat and the wider mosaic of wetland habitats in which it is found.

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

Heavy trampling and/or tracking by deer, livestock or 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.

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

On Inverpolly, this habitat is found inupland situations in transition with other habitats and the typical species are dependent on the site and location of the habitat. On this site the following NVC types are found;

M9 *Carex rostrata – Calliergon cuspidatum/giganteum*
M1 *Sphagnum auriculatum*
M4 *Carex rostrata – Sphagnum recurvum*

The indicator species are: *Schoenus nigricans, Molinia caerulea, Eriophorum angustifolium, Carex viridula sbsp. brachyrhyncha, Carex echinata, Menyanthes trifoliata, Drosera intermedia, Carex limosa, Rhynchospora alba*, *Potamogeton polygonifolius*

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. The extent of the depressions on peat substrates feature has been estimated at 9.51ha.

This habitat is found in complex mosaics in wetter areas of bog and heaths and many sites support only very small (<1ha) extents and it is generally fragmented therefore 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. However, on certain sites this habitat is more extensive. On Inverpolly this habitat is widespread but local within blanket bog and, to a lesser extent, wet heath vegetation throughout the site, and commonest on flatter areas. The feature is particularly common in the basin and valley bogs in the cnoc and lochan landscape north and northwest of Loch Sionascaig.

2b. Restore 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, livestock or 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.

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

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

This habitat 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.*

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

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

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

The extent of the acidic scree feature has been estimated at 66.54ha. 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 Inverpolly there are several scree runs from Cioch a Chuil Bhig, to the north and west of Cul Beag and Cul Mor summits and over the steep scarps below these tops. The habitat is also closely associated with plants in crevices on acidic rock where the same rock type is also found forming the scree.

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

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

Additional disturbance may be seen through herbivore grazing, trampling and recreation activities. There is also the possibility of colonisation, particularly of more stable scree, by other species, including trees and scrub where there are seed sources.

Inappropriate grazing regimes 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.

Excessive grazing/browsing/trampling by deer and/or livestock can contribute to a deterioration in the habitat structure, having harmful effects on the typical species. This habitat is also very sensitive to muirburn.

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

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

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

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

The extent of the plants in crevices on acid rocks feature has been estimated at 237.64 ha. This should be maintained.

However, due to the localised and fragmentary nature of this habitat current baseline estimates may not be very precise and any changes in extent estimates as a result of new survey may not represent real change but greater precision. On Inverpolly this habitat is widespread within the site, often in the form of large boulders and rock slabs within wet and dry heath. Rock outcrops are frequent throughout and larger cliffs are found on the steep faces of the main hills within the site, Cul Mor, Cul Beag, An Laogh and Stac Pollaidh. The main vegetation associated with rocky slopes is wet and dry heath, but there is also some tall-herb vegetation on cliff ledges on the north-facing cliffs on Cul Mor.

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

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

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

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

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

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

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

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

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

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

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

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

The recorded extent of the habitat on the standard data form is 330ha. The overall aim for this habitat is for its extent to increase through natural regeneration.

Woodland is widely distributed throughout the site, especially on steep slopes, along streams and rivers and on islands in lochs. It is generally in places where the physical environment has made it more difficult for large herbivores to gain access and graze out the regenerating trees and shrubs.

There should therefore 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, minimising the risk of fire and preventing the dumping of waste.

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

This habitat type comprises a range of woodland types which include oak. It is found in areas of base-poor soils with at least moderately high rainfall, and when in a favourable condition, 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 which include Inverpolly, the diversity of ferns and particularly lichens and bryophytes dominates the species interest.

These characteristics can be achieved by ensuring an abundance of key tree and shrub species, and absence if invasive species such as rhododendron, and grazing levels that allow trees, shrubs and ground flora to develop naturally and flower, fruit &c

2c. Restore 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 woodland canopies consist mostly of downy birch, with smaller amounts of oak, rowan, hazel, aspen, eared willow and grey willow.

The ground flora varies from mixtures of purple moor-grass *Molinia caerulea* and mosses including *Sphagnum* species and common Haircap moss *Polytrichum commune* through drier, grassy mixtures of common bent *Agrostis capillaris*, sweet vernal grass *Anthoxanthum odoratum*, wavy hair-grass *Deschampsia flexuosa*, wood-sorrel *Oxalis acetosella*, common tormentil *Potentilla erecta*, heath bedstraw *Galium saxatile*, bracken *Pteridium aquilinum*, Hard fern *Blechnum spicant* and various mosses to more acidophilous (acid loving) mixtures of heather *Calluna vulgaris*, blaeberry *Vaccinium myrtillus*, and luxuriant moss carpets.

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.

Overarching Conservation Objectives for all protected species

1. To ensure that the qualifying features of Inverpolly 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 improving 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 assessment 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 assessments should be carried out in relation to maintaining site integrity is provided by objective 2 (including parts a, b, c and d). If broader information on the feature is available then it should be used to provide context to the site-based assessment.

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 Inverpolly SAC is maintained or restored by meeting objectives 2a, 2b, 2c and 2d for each qualifying feature

The aim at this SAC is to restore the protected species in a favourable condition as a contribution to their wider favourable conservation status. Therefore any impacts on the objectives shown in 2a, 2b, 2c, or 2d 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, 2c and 2d. 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, 2c or 2d 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 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, or a combination of both, will need to be looked at on a case by case basis.

Conservation Objectives for [S1029] Freshwater pearl mussel

2a. Restore the population of the species as a viable component of 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. These conditions include:

- avoiding effects that could lead to an inability of the population to successfully reproduce and recruit sufficient juveniles into the population (e.g. >20% of the population should be juvenile (<65mm long). Very young juveniles (<30mm long) should also be present).
- avoiding effects that could lead to a permanent reduction in the density and number of freshwater pearl mussels in the population, or that prevent a recovery in density and numbers, through mortality, injury or impacts caused by disturbance. These effects could be caused by development, water pollution, river engineering, land-use change, abstractions, and wildlife crime. For a healthy mussel population the aim is to have at least 5 mussels per m^2.
- ensuring high quality habitat in river reaches that support freshwater pearl mussels (see conservation objective 2c)
- allowing the species distribution within the site to recover (see conservation objective 2b)
- maintain the distribution and viability of the freshwater pearl mussel's host species, and their supporting habitat (see conservation objective 2d).

Temporary short-term changes to a SAC qualifying interest due to anthropogenic influences may be considered not to compromise the conservation objectives within a site provided it can be demonstrated beyond reasonable scientific doubt that the population can fully recover. However, freshwater pearl mussels are in unfavourable condition at this site. Recovery of freshwater pearl mussel populations is notoriously difficult. This is partly due to their unusually long lifecycle and also due to their requirement for very high water quality and other habitat requirements, with the species requiring near natural conditions for important factors such as fine sediment and nutrients. These conditions generally need to be provided for all of the time. The early stages of the pearl mussels' lifecycle is also complex and delicate, as it relies on the presence of healthy, abundant, juvenile, native salmonid populations. It is therefore also important that the local salmonid populations are robust and able to access all relevant areas of an SAC.

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.

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

Distribution of mussels within the site can be affected by disturbance originating both within and outwith the site. Factors such as abstraction, water pollution, illegal pearl fishing, river engineering and intensification of land use can risk directly affecting freshwater pearl mussels. The species can be directly affected, or the species' habitat quality reduced such that recruitment is unsuccessful, leading to a contraction in the species' distribution in the site. It is important that both up- and down-stream distribution is maintained within the site. Freshwater pearl mussels may be present in the mainstem river within a site, as well as in tributaries (and tributaries may contain populations that are not currently known).

Plans and projects that cause disturbance, displacement and barrier effects to the host

species can also affect mussel distribution (see conservation objective 2d).

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

Freshwater pearl mussels are typically found in soft-water, gravel bed rivers, with extremely high water quality. They feed by inhaling river water and filtering out fine organic particles.

In order to maintain the supporting freshwater pearl mussels' habitat it is important that the species' high quality river habitat requirements are met. Freshwater pearl mussel populations are particularly vulnerable to nutrient enrichment and fine sediment increases, both of which can affect the juvenile mussels that predominantly live buried in river gravels. River engineering including weirs, croys, and other channel modifications also directly damage populations, and interrupt the supply of sediment that maintains habitat. Changes in land use have the potential to increase nutrient and fine sediment concentrations in the river. However land use changes, such as the establishment of native riparian woodlands, will improve habitat by providing shade that can mitigate damaging temperature peaks, stabilising river banks and reducing erosion.

Specific targets for some water quality parameters include:
- Nutrient concentrations should be near-natural. Soluble reactive phosphorus is particularly important (the annual mean should be <0.005mg/l, or if this is exceeded then a site specific target of reference conditions, or the tighter of Water Framework Direct High status or the target for Common Standards Monitoring river habitat should apply.
- Mean Biochemical Oxygen Demand should be <1 mg/L.
- Filamentous algae should have <5% coverage of the river bed during the summer months.
- Excess fine sediment is a considerable danger to freshwater pearl mussels and there should be no pronounced difference in the redox potential between open water and interstitial water at 5cm depth.

2d. Maintain the distribution and viability of freshwater pearl mussel host species and their supporting habitats

Salmonid fish (native salmon and trout) are an integral part of the freshwater pearl mussels' lifecycle and should be available in sufficient numbers to ensure continued recruitment of juvenile mussels to the population. It is important that juvenile host salmonids, including any range of genetic types, are present in all areas of the catchment to which they, and adult fish, have natural access and where freshwater pearl mussels have historically been present. It is important to note that in some sites, this can include naturally impassable waterfalls.

The host species can vary in different sites. At this site both salmon and trout are the primary salmonid host known to be used by the local freshwater pearl mussel population. An abundance of >0.1 native juvenile host salmonid per m^2 should ensure sufficient host species are available. More generally, the density of host juvenile salmonids should not differ significantly from those expected for the river type/reach under conditions of high physical and chemical quality.

Freshwater pearl mussel population viability is dependent upon host salmonid population viability, so any threats to host species stocks should be avoided. Factors that can affect the viability of host species include those that affect freshwater pearl mussel, but potential barriers to fish migration, inappropriate fish stocking and biosecurity are also further increased risk factors. Factors that also affect the marine survival, and therefore viability, of Atlantic salmon and sea trout populations should also be considered.

Host species should be able to continue to use and access all areas of importance within the site. Plans and projects that cause disturbance, displacement and barrier effects to host

species can affect their distribution and in turn the distribution of freshwater pearl mussels.

To ensure a viable population of host species is present supporting salmonid habitat should be maintained throughout the site. Atlantic salmon and trout, both require the presence of clean gravels for spawning. For Atlantic salmon and large trout, these typically occur at the tail of pools, although spawning may take place if suitable gravels and flows are present. On emergence, usually between March and early May, the young fry disperse and set up territories which they defend aggressively. Atlantic salmon fry prefer fast flows (>30 cm/s) and favour areas with surface turbulence (riffle habitat). They require a rough bed of pebble, cobble and gravel. Trout fry prefer areas of relatively low velocity water near the streambed. Cover from stones, plants or debris is required and good cover is essential for maintaining high fry densities.

Atlantic salmon that have survived their first winter (parr) prefer deeper water than fry (typically 15-40 cm) and a coarser substrate of pebbles, cobbles and boulders. Trout parr generally favour areas of relatively low current speed where cover is available. Juvenile trout are often to be found in cover alongside the banks, in undercuts, among tree roots or in marginal vegetation. Cover remains important for adult trout and Atlantic salmon particularly in smaller streams. In larger rivers this may be less important, as deep water, in pools and deep glides, provide refuge.

Conservation Objectives for Otter [S1355]

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 Inverpolly is reliant on suitable habitat in the surrounding wider countryside including the coast and freshwater rivers and streams 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. It will also vary between freshwater and coastal environments. In coastal areas otter densities may be as high as 0.5 - 0.7 animals/km. Males living in rivers and streams can have a mean linear range size of 48km and females living in the same habitat can have a mean linear range of 21km. 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 coastal areas their preferred habitat is rocky shore with abundant boulders, crevices and/or peat, or other cavity-forming features such as tree root systems to provide secure holt sites above high water. Dense scrub is also valuable for providing lie-ups and couches. These features should ideally be close to gently-shelving shallow inshore waters with good habitat for inshore fish species and crustaceans. Otters will forage in adjacent coastal waters however will also feed on freshwater fish and amphibians within the SAC. Ample sources of freshwater nearby are essential to enable animals to remove salt from their fur.

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

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

Current and recommended management for

- **Clear-water lakes or lochs with aquatic vegetation and poor to moderate nutrient levels**
- **Acid peat-stained lakes and ponds**

Factor affecting the feature	Measure	Responsible party
Water-based recreation	Take measures to address adverse impacts through the Scottish Outdoor Access Code	Local Authority Land managers
Sediment	Avoid activities such as ATV that can lead to bare peat	Land managers
Grazing	Ensure grazing levels are sufficiently low to avoid poaching of edges and peat erosion. Avoid related activities such as supplementary feeding and fencing close to lochs	Land managers
Development	Ensure any development proposals do not adversely affect the site.	Land managers Local Authority NatureScot
Invasive species	Maintain surveillance for invasive species and agree action with regulator	SEPA NatureScot

Current and recommended management for

- **Wet heathland with cross-leaved heath**
- **European dry heaths**
- **Alpine and Boreal heaths**
- **Montane acid grasslands**
- **Blanket bog**
- **Very wet mires often identified by an unstable 'quaking' surface**
- **Depressions on peat substrates**
- **Acidic scree**
- **Plants in crevices on acid rocks**

Factor affecting the feature	Measure	Responsible party
Grazing and trampling by deer	The main grazing animal is currently red deer although roe and sika deer are present. Management of deer should be at a level where the habitats do not erode faster than vegetation can recolonise, and the vegetation can flower, set seed, and the seedlings survive, and so that heather and other heath species are not suppressed. This is measured	Land managers

	by Site Condition Monitoring, and informed by Herbivore Impact Assessments. There is currently a Section 7 agreement in place for the SAC area, although the Deer Management Group should set cull targets for the wider area, based on the information provided by HIA and SCM, since deer are a wide ranging species and management needs to be at a population level. Eisg Brachaidh Estate have a plan in place to fence the entire estate and to reduce deer numbers to a level that is sustainable in the long term.	
Grazing and trampling by domestic stock	This site currently has very little grazing pressure from domestic stock. Cattle and some sheep are present on Eisg Brachaidh and Inverpolly estates. Should stock numbers increase in future, the aim is to manage them to achieve favourable condition for each feature in Site Condition Monitoring. Aim to ensure that herbivore impacts on the feature are 'low' based on the HIA Process, as for the deer impacts above.	Land managers
Muirburn	At present this site is not burnt, and this is benefiting the features.	Land managers
Vehicle tracks, footpaths and ATV use	ATVs should be used in accordance with best practice to minimise tracking or erosion. Existing tracks that are in a poor state and are leading to erosion of the surrounding habitats should be restored. Good quality footpaths help to minimise trampling and path braiding by people.	Land managers
Peat restoration	Aim to actively restore eroding peat on blanket bog.	Land managers
Non-native invasive species	The introduction of non-native species should be avoided. If invasive species become established, they should be controlled as early as possible after introduction.	Land managers
Research and monitoring	To identify emerging impacts on the habitats and their causes, in order to understand the long term issues, and to inform future management of the habitats.	NatureScot, Research community

Current and recommended management for Western acidic oak woods

Factor affecting the feature	**Measure**	**Responsible party**
Herbivore impacts (including trampling)	Ensure that herbivore impacts are low based on the FCS (Scottish Forestry)/SNH (NatureScot) Herbivore Impact Assessment Process and do not prevent the regeneration of native tree species.	Land managers, NatureScot, Deer Management Groups

Non-native invasive species	Non-native tree species are not currently an issue here but monitoring should be carried out to ensure this remains the case. Sika deer should continue to be targeted and controlled.	Land managers
Future threats	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 on the site. This resilience work may also include further research to understand the vulnerabilities of the habitat.	NatureScot Land managers
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 freshwater pearl mussels

Factor affecting the feature	**Measure**	**Responsible party**
Low number and density of mussels present	Freshwater pearl mussels are fully protected under Schedule 5 of the Wildlife and Countryside Act 1981 as amended. Offences include intentionally or recklessly killing, injuring or taking from the wild a freshwater pearl mussel.	All
	Continue to monitor for signs of illegal freshwater pearl mussel fishing, report any findings to the Police and implement agreed actions to deter criminal activity.	All
	Management planning to evaluate and manage potential pressures arising from marine finfish aquaculture in Scotland.	Marine Scotland/ NatureScot
	Research to better understand the reason for the low number and density of freshwater pearl mussels at the site.	NatureScot /SEPA
Improvements needed to river morphology	Evaluation of diffuse pollution and morphological pressures through the river basin planning process and the implementation of restoration measures to improve habitat. Complete necessary studies to design, plan and improve river morphology	SEPA
	Promotion of measures to increase resilience to climate change, particularly the creation of native riparian woodland and improved	All

	connection with floodplains. Measures to promote coordinated, catchment-scale activity are particularly important. Native tree planting along some of the rivers would help improve the riparian habitat.	
	Restore riparian and catchment peatlands to reduce fine sediment concentrations, improve floodplain connectivity and restore more natural hydrological regime.	All
	Applications for funding for improved water margin management, reduction of diffuse pollution and creation of native riparian woodlands through the Scottish Rural Development Programme that will be of benefit to the freshwater pearl mussel population are encouraged.	All
	Promote adherence to the Forest and Water Guidelines, and published best practice, during forest restructuring	All
Water quality monitoring	Implement and maintain monitoring of key water quality parameters.	NatureScot/SEPA

Current and recommended management for Otters

Factor affecting the feature	**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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Approved on 2 February 2024 by

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