Cairngorms Special Area of Conservation (SAC)
Conservation Advice Package - supporting document on favouring one feature over another

Contents

Summary
This is a supporting paper for the Cairngorms SAC Conservation Advice Package and sets out the rationale for favouring one feature over another within the Cairngorms SAC. It generally supports the expansion of Caledonian forest onto other habitats in the SAC, primarily dry heath, wet heath and blanket bog. Exceptions are to be considered on a case by case basis for specific habitats that have a restricted distribution or limited area, and are an important component of the biodiversity of the SAC, for example, species rich grasslands and bearberry heath.

1 Background

1.1 This document sets out the priorities between different features of the Cairngorms SAC in the Conservation Advice Package. It is an internal document for NatureScot and is background information in support of the package.

1.2 The features of other overlapping Natura sites, Special Protection Areas, are considered in a separate Habitat Regulations Appraisal, see A3230908.

1.3 All of the features on Cairngorms SAC are important in their own right. There are a few cases where decisions need to be made on prioritising one feature over another, as outlined below.

1.4 This document is intended to set out the conservation priorities in the context of a long time scale, for example 200 years. It is recognised that our understanding of ecology and conservation over that time period will alter due to climate change and other factors. The priorities are based on our current understanding and will need to be amended to reflect changes in the future.

1.5 The information on features and the area of features used in this document is based, wherever possible, on published information. The areas for habitats are based on the Site Data Form. It is recognised that other figures exist, depending on which survey is used and how data is analysed, but these would only be used if they substantially change the substance of the argument.

2 Approval by Scottish Government in 2010 to prioritise Caledonian forest and bog woodland habitat expansion over other qualifying interests

2.1 In 2010 the Scottish Government approved a paper which allowed the expansion of Caledonian Forest over other, specific, Annex 1[1] habitats in the Cairngorms SAC, for a 20 year period. The habitats affected were dry and wet heath and blanket bog. Bearberry heath, National Vegetation Community (NVC) H16, and species-rich Nardus grasslands were exempted from this.

2.2 The reason for allowing the forest expansion over designated habitats was that the Cairngorms SAC supports the largest extent of native pinewood in the UK, in a number of forests, which is almost half of the remaining Annex 1 Caledonian Forest habitat in Scotland. These contain internationally important assemblages of plants and animals, for example Caledonian Forest is noted for several uncommon northern species, including creeping lady's-tresses *Goodyera repens*, twinflower *Linnaea borealis* and the moss *Ptilium crista-castrensis*. Some stands support populations of notable bird species, such as western capercaillie *Tetrao urogallus* and Scottish crossbill *Loxia scotica*.[2] Well studied sites such as Abernethy have been found to be home to 3,800 different species (Summers 2018).

[1] Annex 1 of the European Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora – the Habitats Directive.

[2] From JNCC website https://sac.jncc.gov.uk/habitat/H91C0/

2.3 The limits of acceptable change were as follows*: up to 4900 ha of the Annex I priority qualifying habitats (Caledonian forest and bog woodland) within the Cairngorms SAC at the expense of areas of other qualifying habitats; principally wet heath (250 ha), dry heath (3900 ha) (both non–priority habitats) and the priority habitat blanket bog (750 ha), over a twenty year period.* This applies to the whole SAC, and the twenty-year period expires in 2030.

2.4 The underlying principles from the paper are set out below. These are used in the analysis for the Conservation Advice Package. They are:

a) *A qualifying habitat should not be disadvantaged by a non-qualifying habitat.*
b) *A priority habitat should not be disadvantaged by a non-priority habitat.*
c) *The global assessment grading of the affected habitats should not be reduced.*

It is also important that an appropriate monitoring framework must be in place.

2.5 Where habitats are affected, the following safeguards would apply:

i. *Reduction in area of the habitat is limited so the site's status for the habitat is not affected.*
ii. *Distribution of the habitat within the site is maintained.*
iii. *Significant fragmentation of the habitat is avoided.*
iv. *Quality of the habitat is maintained, in terms of the range of ecological subtypes represented and any special characteristics of the habitat on the site.*

3 Caledonian forest and bog woodland on dry heath, heath with juniper, wet heath and blanket bog

3.1 The current extent of Caledonian Forest and the likely extent of expansion in the long term is shown on the map in Appendix 4[3]. The boundary is approximately 500m from existing forest. See Appendix 1 for explanation of how this map was derived. The area likely to be colonised by Caledonian Forest within Cairngorms SAC is estimated as a likely maximum of approximately 20,440 ha for the long term and beyond the provisions set by the Scottish Government up to 2030[4]. The map shows that the vast majority of dry heath, wet heath and blanket bog in the SAC is not close to an area of Caledonian Forest and so extensive areas of these habitats would be unaffected by the expansion of the forests from natural regeneration– see Appendix for maps. Even within the regeneration zone, there would be large areas of habitats which would not be suitable for tree establishment for a variety of reasons, for example, too high, exposed, wet, with too poor a soil or with dense existing vegetation and mosses. The area will therefore be an overestimate.

3.2 Nearly all the bog woodland occurs within existing areas of Caledonian Forest, so does not need to be considered separately in terms of prioritising one habitat over another.

3.3 Subject to the principles and safeguards being maintained, this document recommends that Caledonian pinewood should be allowed to extend from existing forests by natural regeneration, onto dry heath, wet heath and blanket bog beyond the limits set out above, within a 200 year time limit. The possible range of this extension is shown by

[3] Based on the Caledonian Pinewood Inventory produced by Scottish Forestry.
[4] Measured as 20,440 ha using the buffer zone on the map of Caledonian Forest. This extends past the regeneration zone and provides an estimate of potential expansion for the long term. The area is 20,440 ha minus the area of existing Caledonian Forest at 7499 ha = 12,941ha.

the Scottish Forestry expansion and buffer zone (see Appendix 1 for derivation). The rationale is discussed below.

3.4 The assumption would be that natural regeneration would be allowed to progress over most of the SAC where habitats are suitable. However, there are exceptions to this which are set out below land managers would not be obliged to allow trees to spread over other qualifying habitats if they decide it is not appropriate. Natural regeneration could also be removed for management reasons, such as to create patches of open ground to facilitate deer control within the forest or the forest edge. Removal of trees is controlled by forestry regulations and Scottish Forestry advice should be sought before trees are removed. NatureScot advice about impacts to the designated sites (SAC, SPA and SSSI) should also be sought and consent may be required.

3.5 For the areas of habitats affected within Scottish Forestry's Caledonian Forest Expansion Zone, see table below. These figures are derived from an analysis of the habitat maps of the Cairngorms SAC, see Appendix 3.

Table 1: Area of habitat within Caledonian pinewood regeneration zone

Habitat	Total area in the SAC (ha). Source is NVC maps	Percentage of the habitat within the Caledonian forest expansion zone (to nearest percent)
H4010 - Wet heaths	4551.3	37
H4030 - Dry heaths	17,169.50	45
H4060 - Alpine and Boreal heaths	9658.2	14
H4080 - Montane willow scrub	0.3	0
H5130 - Juniper on heaths	73.5	88
H6150 - Siliceous alpine and boreal grasslands	6884.6	0.2
H6210 - Semi-natural dry grasslands	109.4	20
H6230 - Species-rich Nardus grassland	163.7	53
H6430 - Hydrophilous tall herb	9.4	0
H7130 - Blanket bogs	6,846.60	35
H7140 - Transition mires	26.3	98
H7220 - Petrifying springs	0.1	0
H7240 - Alpine pioneer formations	33.7	43
H8110 - Siliceous scree	9.4	32
H8220 - Siliceous rocky slopes	3400.8	4
H16 *Arctostaphylos* heath	390.6	90

The table below shows the status and areas of dry heath, wet heath, blanket bog and Caledonian forest

Table 2

	Dry heath (ha)	Wet heath (ha)	Blanket bog (ha)	Caledonian forest (ha)
Priority habitat	Not priority	Not priority	Priority	Priority
Primary reason for site selection	Yes	Yes	Yes	Yes

	Dry heath (ha)	Wet heath (ha)	Blanket bog (ha)	Caledonian forest (ha)
Qualifying feature for Cairngorms SAC	Yes	Yes	Yes	Yes
Overall resource in UK (km^2) [5]	722,298	508,817	2,182,200	80,294
Overall resource in Scotland (ha)	479,000 [6]	370,000 [7]	1,759,000 [8]	80,294 [9]
Overall resource in Scottish SAC network (ha) [10]	128,768	71,441	221,131	15,177.84
Resource in Cairngorms SAC (ha) [11]	11,538.35	3461.50	4788.41	7,499.92
Conservation status as in Article 17 assessments	Unfavourable – bad (U2)	Unfavourable – bad (U2)	Unfavourable – bad (U2)	Unfavourable – bad (U2)
% of Cairngorms SAC resource which could be affected	45	37	35	Not relevant
Is the habitat proposed to be a winner or loser in other CAPs	At all the sites with overlapping features, Caledonian Forest has been prioritised over wet heath, dry heath and/or blanket bog. These are Ballochbuie SAC, Glen Tanar SAC, Loch Maree Complex SAC and Strathglass Complex SAC. At Ballochbuie and Strathglass, this was approved by the Scottish Government.			Not relevant

3.6 Key issues from the table above:

The overall resource of Caledonian Forest in Scotland is considerably less than the areas of wet heath, dry heath and blanket bog.

[5] Source for UK and Scottish habitat resource – note that the original is in km^2, not hectares: Country/Offshore Habitat Supporting Information (Summary Spreadsheet) XLSX http://data.jncc.gov.uk/data/081db8a3-afa7-442b-bd0d-701aaf830bdc/Article17-country-habitat-supporting-documentation-2019.xlsx

[6] https://jncc.gov.uk/jncc-assets/Art17/H4030-SC-Habitats-Directive-Art17-2019.pdf
[7] https://jncc.gov.uk/jncc-assets/Art17/H4010-SC-Habitats-Directive-Art17-2019.pdf
[8] https://jncc.gov.uk/jncc-assets/Art17/H7130-SC-Habitats-Directive-Art17-2019.pdf
[9] https://jncc.gov.uk/jncc-assets/Art17/H91C0-SC-Habitats-Directive-Art17-2019.pdf
[10] UK-Natura2000-2019-03-26 (1) A2770600
[11] From Cairngorms SAC Site data form

At all the sites with both Caledonian Forest and dry heath, wet heath and blanket bog, Caledonian Forest has been prioritised. The reason is that on all sites the Caledonian Forest needs to regenerate to be in favourable condition, and when natural processes are allowed to occur, much of this regeneration occurs on adjacent habitat, most of which contains qualifying features.

3.7 Bearberry *Arctostaphylos* heath and species rich heaths

One of the types of dry heath is bearberry *Arctostaphylos* heath, and the case approved by Scottish Government in 2010 states that "*the dry heaths in the Cairngorms SAC include extensive areas of the NVC community H16: Calluna vulgaris – Arctostaphylos uva-ursi heath. This is a rare ecological sub-type in a European context and is a characteristic feature of the dry heaths within the site. It is therefore important that woodland expansion is targeted to avoid any significant loss of this community and that active, positive management of this community is included in any woodland proposals that may otherwise adversely affect it. Future woodland expansion proposals will be guided towards areas where commoner, more widely distributed dry heath sub-types, such as H12 Calluna vulgaris – Vaccinium myrtillus heath, predominate*".

H16 heath is usually found on free draining soils below 650m. It is often managed by muirburn which helps maintain its species diversity. Its distribution is centred on North-East Scotland with outlying and fragmentary stands in the southern uplands and Orkney (see McVean and Ratcliffe 1962 and map in Averis et al. 2004). This type of heath supports rare and scarce invertebrates such as the netted mountain moth *Macaria carbonaria*, the small dark yellow underwing moth *Coranarta cordigera* and the bearberry case-bearer moth *Coleophora arctostaphyli* (NatureScot 2019 and Smedley, 2019).

There are few NVC maps of undesignated land so it is not possible to estimate the area of this habitat in Scotland. Its extent is thought to have declined in area in recent decades due to colonisation by scrub and trees, and by afforestation. For more information on the distribution of *Arctostaphylos* heath, see Appendix 5 below.

A map of H16 in Cairngorms SAC has been produced by NatureScot's Geographic Information Systems team – see Appendix 4 below (A3266020). Many if not most upland habitats are mosaics. The map shows habitat with an element of H16, which is not necessarily the predominant vegetation community. The key areas are Tulloch Moor on Abernethy, the Braes of Abernethy, the Northern Corries, Glen Feshie and three areas at Mar Lodge. There is a restricted patch in Gleann Eanich and some patches at Inchrory. Other areas are shown for example Meall Gaineimh, but this is mostly H13 Heather – lichen *Calluna vulgaris – Cladonia arbuscula* heath. Inshriach is also shown with large areas of H16 but this is part of a mosaic with predominantly other dry heath types.

Most (90%) of these are within the expansion zone on the Scottish Forestry map. Heath, including *Arctostaphylos* heath, is also a habitat which is likely to be suitable for tree seedlings, being dry and with soils suitable for Scots pine and birch. Areas outside the expansion zone are Meall Gaineimh, and some areas, or parts of areas, at Inchrory, Mar Lodge and Glen Feshie.

Cairngorms SAC is important for the rare species rich type of H16 largely restricted to north east Scotland with plants such as petty whin *Genista anglica* and intermediate

wintergreen *Pyrola media*, as occurs at Tulloch Moor[12][13] which also has some of the SAC's known *Arctostaphylos* heath below 250 m in altitude[14].

Without appropriate management, H16 is likely to be colonised by trees such as Scots pine and birch where there are nearby woodlands.

It is proposed that where H16 heath occurs within the Caledonian pine expansion zone, management decisions on whether to prioritise forest or heath are made on a case-by-case basis. Factors to be considered might include the type of H16 heath, its extent and representivity, and the feasibility of management.

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Other species-rich grass-heaths, for example species-rich H10 *Calluna vulgaris – Erica cinerea* heath and associated species-rich areas of H12 *Calluna vulgaris – Vaccinium myrtillus,* are very limited in extent and mostly occur at Inchrory where they should be maintained as open ground, to maintain the range of heath types on the SAC. Inchrory has the largest extent of species rich heath (NVC community H10d) in North East Scotland

3.8 Heath with juniper

At some locations, there can be changes from dry heath to the European habitat *Juniperus communis* formations on heaths or calcareous grasslands. In the Cairngorms SAC, it is usually juniper over heath although for example at Inchrory, it occurs in calcareous grassland.

The JNCC description for Cairngorms SAC notes that the Cairngorms has the third-largest extent of juniper Juniperus communis formations in the UK and is one of several sites representing the habitat type in north-east Scotland. The site is exceptional for the wide range of ecological situations in which juniper occurs. Creag Fhiaclach is unique in having the most natural altitudinal tree-line in the UK. At around 640 m there is mixed tree-line woodland with stunted Scots pine Pinus sylvestris and juniper, giving way at higher altitude to alpine juniper scrub. The alpine juniper scrub is developed extensively and often occurs in a stunted form transitional between ssp. communis and ssp. nana. On most of the site juniper occurs on acidic granite, while at Inchrory juniper occurs on both neutral and calcareous soils. Juniper also occurs at the margins and as part of the understorey of 91C0 Caledonian forest within the site.

Most of this habitat occurs within the Caledonian Forest expansion zone. Juniper is a component of Caledonian Forest and at lower altitudes, heath with juniper may precede a transition to forest. With low grazing levels, we would expect both expansion of juniper onto heath and expansion of Caledonian Forest into the juniper on heath habitat. There should be an overall increase in both habitats. Although some heath with juniper might change to Caledonian Forest, natural processes should result in a net increase in juniper, as a species. The only caveat is that this assumes that nothing else affects juniper, for example, the widespread disease *Phytophora*.

Juniper can be an important component of the tree line Caledonian Forest, as occurs at Creag Fhliaclach. The tree-line is moving up the hill as a result of herbivore control, as trees become denser and able to provide mutual support, and as the climate changes. Further heath with juniper might be expected to develop above this where conditions are suitable.

[12] Brooks and Hepburn 1996-1998

[13] Wood 1991, Abernethy Forest SSSI report no 2: Loch Garten and North Abernethy Sections, RSPB

[14] Urquhart 1986, Arctostaphylos heath in North East Scotland, NCC CSD report 698

At Inchrory, areas of heath with juniper should be maintained. This is in keeping with management to maintain the species rich grassland and heath at Inchrory (see 5.7 below).

Of the 15 SACs (9 in Scotland) where heath with juniper is a primary reason for site selection, Cairngorms is the only one where Caledonian Forest occurs. There may be other factors that affect the extent and condition of heath with juniper, such as *Phytophora,* which is adversely affecting this habitat at least one site in Scotland.

In summary, at Cairngorms SAC juniper would be generally allowed to colonise the European heath habitats, as this would create the European habitat heath over juniper. Where Scots pine colonises this habitat, it would become Caledonian Forest, which is a priority European habitat. These changes would be allowed where they are natural establishment from existing seed sources.

3.9 Underlying principles from the document approved by the Scottish Government in 2010

A qualifying habitat would not be disadvantaged by a non-qualifying habitat

All the habitats are qualifying ones, so this test is met.

A priority habitat should not be disadvantaged by a non-priority habitat

Caledonian Forest colonising blanket bog would arguably create bog woodland, where the bog is intact. If the bog is degraded, then tree colonisation will gradually lead to further drying out and more typical Caledonian Forest. Bog woodland is another priority habitat and much more uncommon than either Caledonian Forest or blanket bog, both within this SAC and across Scotland.

In terms of wet heath and dry heath, this test is met, but blanket bog is also a priority habitat. There is less blanket bog[15] than Caledonian Forest in the SAC, at 4788.41 ha of blanket bog, and 7499.92 ha of Caledonian Forest. However, across Scotland there is approximately 17,590 km^2 of blanket bog[16] and 802.94 km^2 of Caledonian Forest[17]. Caledonian Forest is much rarer than blanket bog and this emphasises the importance of the Caledonian Forest in this site. For this reason, and because the Caledonian Forest needs to regenerate by natural processes, the forest is prioritised.

The global assessment grading of the affected habitats should not be reduced

Table 3: Relative quality and importance of qualifying interests of Cairngorms SAC

Habitats	Subsidiary grades			Global assessment
	Represent	Relative surface	Cons status	
Caledonian forest	A	A	A	A
Dry heath	A	C	A	A
Wet heath	A	C	A	A
Blanket bog	B	C	C	B

For explanation of the terms see Appendix 2.

[15] NS website see https://www.nature.scot/landscapes-and-habitats/habitat-types/mountains-heaths-and-bogs

[16] As set out in reporting to the EU See https://jncc.gov.uk/jncc-assets/Art17/H7130-SC-Habitats-Directive-Art17-2019.pdf

[17] See https://jncc.gov.uk/jncc-assets/Art17/H91C0-SC-Habitats-Directive-Art17-2019.pdf

The Scottish Forestry map of Caledonian Forest gives a likely expansion area. Using the widest buffer, it was estimated that the likely increase of the forest is 35% of the area of the site. Using the estimates of area in the GIS analysis[18], the estimated changes are:

Wet heath – 4551 ha to 2864 ha
Dry heath – 17,169 ha to 9479 ha
Blanket bog – 6846 ha to 4451 ha.

Table 4: Changes in grading

Factor	Existing grading	Anticipated change
Caledonian Forest Representativity	A = excellent representativity	A – the forest at Cairngorm SAC would remain an excellent representation of the Annex 1 habitat type
Caledonian Forest – relative surface	A = outstanding examples of the feature in a European context	The relative surface grade would remain A because the area of forest would increase.
Caledonian Forest – conservation status	A = excellent conservation	The conservation status remains as good or better. A
Caledonian Forest – global grading	A = outstanding examples of the feature in a European context	Caledonian Forest would remain at this grading. A
Dry heath - representativity	A = excellent representativity	The heath would remain an excellent example of the range of heath types on similar sites. See notes on *Arctostaphylos* heath. Remains at A.
Dry heath – relative surface	C = significant representativity = less than 2% of the UK resource.	Dry heath is the habitat most likely to be effected by successful natural regeneration. Overall resource in the UK 7222.98 km^2. At 9,479 ha the new area would be approximately 1.3% of the national resource. Graded at C
Dry heath – conservation status	A = excellent conservation	Overall heathland management would not change from excellent. Low deer levels are likely to improve the condition of the habitat, as defined by Site Condition Monitoring. There would be a change in area, but this is noted above. Remains at A.
Dry heath – global grading	A = outstanding examples of the feature in a European context	A = outstanding examples of the feature in a European context
Wet heath - representativity	A= excellent representativity	The type and range of wet heath would not change and would remain excellent representativity. A
Wet heath – relative surface	C = significant representativity = less than 2% of the UK resource.	The UK national resource is 508,817 ha. The area would be 2864 ha which is 0.5% of the national resource and would remain at less than 2%. C

[18] These figures are based on the Habitat Map of Scotland (HabMoS), whereas those in Table 2 are sourced from the dataform, which was completed before HabMoS was produced.

Wet heath – conservation status	A = excellent conservation	The conservation would not change – low deer levels are likely to improve the habitat over time. Remains at A.
Wet heath – global grading	A = outstanding examples of the feature in a European context	A = outstanding examples of the feature in a European context
Blanket bog - representativity	B = good representativity	Expansion of Caledonian forest is not likely to much effect blanket bog, or if it does, it would create the European habitat bog woodland. The existing representativity would remain. B
Blanket bog – relative surface	C = significant representativity = less than 2% of the UK resource.	The UK resource is 2,182,200 ha. The new figure would be 4,451 ha which is 0.2% of the national resource. This is still less than 2%, so the grading remains at C.
Blanket bog – conservation status	C = average or reduced conservation	It is not clear why the Cairngorms was graded at C for blanket bog. Low deer and stock numbers would benefit blanket bog, and there are many peat restoration projects on the site. It is suggested that this grading could be increased to a B.
Blanket bog – global grading	B = Sites holding excellent examples of the feature, significantly above the threshold for SSSI notification but of somewhat lower value than grade A sites.	Overall the grading is unlikely to change due to the proposed management. B

It is concluded that the gradings would not be decreased by the proposed management. For blanket bog, it could be increased from C to B because there are generally low red deer and stock numbers across the site, there are many peat restoration projects being currently undertaken, and these are greatly improving the condition of the blanket bog where they have been carried out.

Where habitats are affected, the following safeguards would apply:

Reduction in area of the habitat is limited so the site's status for the habitat is not affected

Reduction in habitat (i.e., dry heath, wet heath and blanket bog) is currently estimated at 35% as a maximum for the foreseeable future. This depends on the time period being considered, as tree expansion by natural regeneration is likely to continue over time, as long as grazing is maintained at a low level. Geographically, tree expansion will be restricted in some locations for a variety of reasons. The limiting factors include grazing and browsing, the altitudinal limit, wetness and the available seed source.

Even at a large estimate of future expansion of forest, it is estimated that 65% of these habitats would be unaffected, and because Cairngorms SAC is such a large site: this is a very extensive area by UK standards. The reduction in area would not be large enough to affect the site's status for the habitat.

Distribution of the habitat within the site is maintained
The distribution of dry heath, wet heath and blanket bog would not be significantly affected because the expansion is by natural regeneration from existing forests. These are peripheral to the site. It is these forest edge habitats which would change to Caledonian Forest in the long term.
Significant fragmentation of the habitat is avoided
Most of the Caledonian Forest is on the edges of Cairngorms SAC at Abernethy, Glenmore, Inshriach and Invereshie, Glen Feshie and Mar Lodge. For that reason, extension from the existing forests would not further fragment the upland habitats.
Quality of the habitat is maintained, in terms of the range of ecological subtypes represented and any special characteristics of the habitat on the site
The vast majority of dry heath, wet heath and blanket bog would remain as good examples of the habitat types, and the current good management (low grazing and trampling levels) over much of the site is improving their condition. Management decisions should aim to retain the range of sub-communities of H16 *Arctostaphylos* heath in the SAC. The description of Caledonian forest by the JNCC states: "the majority of this habitat corresponds to NVC type W18 *Pinus sylvestris – Hylocomium splendens* woodland, but it also includes some birch-dominated stands of W17 *Quercus petraea – Betula pubescens – Dicranum majus* woodland and W4 *Betula pubescens – Molinia caerulea* woodland." Caledonian Forest is therefore defined as being dominated by Scots pine, but it may contain areas of native broadleaved trees where this is ecologically appropriate, as determined by the ecology of each species, the local seed source, and the soil type. These broadleaved species are generally preferred by deer, and may increase under lower browsing pressure, leading to increased diversity, and improved condition, of the habitat. There will be losses and gains of individual species as the habitat changes. For example, the rare heathland moss *Dicranum spurium* can occur on south-facing slopes in glades in pine woods to the east of the SAC, and could reduce in abundance and distribution due to shading. Changes in light levels can affect epiphytic lichen abundance from shading by young trees in habitats which previously were open, heavily grazed forest. However, there is unlikely to be a complete loss of typical species of the forest or three open ground habitats as a result of the projected changes. Open ground species are well-represented in other parts of the site, outwith the woodland expansion zone and many of them will also continue to exist in more open areas of the forest. For species which occur within the forest, the scale and patchiness of the forest should ensure that different areas remain suitable for species with different habitat requirements. It should be noted that there is a rare type of species-rich heath; H10 *Calluna vulgaris – Erica cinerea* heath, developed on the base and/or lime-rich soils at Inchrory. This heath is very limited in extent and should be maintained as open ground, to maintain the range of heath types in the SAC.

3.10 Given that some H16 might be lost at this site, and the need to maintain the habitat overall, it is important that other SACs with this feature maintain the heath in a favourable condition, to maintain favourable conservation status at a Scottish level**.**

3.11 European dry heath was one of the primary reasons for selection of this site, as is Caledonian Forest. As they are both reasons for selection of this site, neither is prioritised

over the other for this reason. See Appendix 6 for table showing the primary reasons for site selection.

4 Caledonian forest and alpine and boreal heath

4.1 Alpine heath is too high for tree regeneration by definition (JNCC[19]). Trees can germinate and grow on boreal heath. Due to the altitude, soils and climate, trees tend to be scattered, small, and grow very slowly. Arguably scattered trees and shrubs can be considered as part of a boreal heath (pers com, NatureScot habitat advisors Andrew Coupar and Mike Smedley).

4.2 Trees on boreal heath are at the upper limit of tree growth – the tree-line. The description of Caledonian Forest at Cairngorms SAC by the JNCC recognises the importance of tree-line woodland "this complex of woodlands is the most extensive area of native pinewood in the UK and comprises almost half the total area of ancient Caledonian forest in Scotland. In common with the rest of Scotland, the upper limits of the pine woodland are mostly artificially depressed by grazing, but a more natural tree-line occurs at 640 m on Creag Fhiachlach. This is the highest altitudinal limit of woodland in the UK, and consists of bushy stunted growth of Scots pine Pinus sylvestris admixed with juniper Juniperus communis of a similar stature."

4.3 The natural expression of Caledonian Forest should include native trees up to the tree line, and to achieve this the forest is allowed to expand onto boreal heaths, where this occurs by natural regeneration from existing forests. The species is likely to differ at different locations and could be Scots pine, juniper, birch or other species depending on the seed source, soils, exposure or wetness. Tree line woodland is an extremely rare habitat in the UK.

4.4 The impacts on Alpine and boreal heath would be minimal because this is an extensive habitat with approximately 9658 ha on the site[20]. Only a small proportion (14%) of the heath on the SAC would be affected, as most of the heath is not close to Caledonian Forest and so has no seed source nearby. Where a seed source occurs, at this altitude trees tend to be small, scattered and very slow growing so the heath would remain in situ between the trees. In addition:

- Caledonian Forest is a priority habitat and the alpine and boreal heath is not a priority habitat.
- There would be no fragmentation of the heath because the Caledonian Forest occurs on the edges of the site, and no impact on the structure and function of the alpine and boreal heath over the vast majority of its area.
- There are species which would benefit, such as black grouse, which will utilise a heath with scattered trees.

[19] NVC map analysis – see A3274993
[20] Site Data Form

5 Caledonian forest and the grasslands:

- **Species-rich grassland with mat-grass on silicious substrates in mountainous areas**
- **Semi-natural dry grasslands and scrublands on chalk or limestone**

5.1 This discussion is restricted to the priority grassland qualifying features for Cairngorms SAC. The definition of these habitats is given below.

In Cairngorms SAC the **species-rich grassland with mat-grass in upland areas** includes CG10 *Festuca ovina – Agrostis capillaris – Thymus praecox* grassland, and also CG11 *Festuca ovina – Agrostis capillaris – Alchemilla alpina* grassland, where they occur on silicious substrates, although there may be enrichment from flushing through base-rich strata in siliceous rock.

The **semi-natural dry grassland and scrublands on chalk or limestone** is described by the JNCC as follows. "Most stands of the upland NVC type CG10 *Festuca ovina – Agrostis capillaris – Thymus praecox* grassland have a very muted calcicolous component and are not referable to the Festuco-Brometalia. However, a few examples over limestone in Scotland have a significant representation of Mesobromion species, and have therefore been referred to this Annex I type."

The two European communities can both include CG10 and can therefore be floristically very similar. They can also occur in mosaics. For this reason, they are together described as calcareous grasslands below. This follows the wording in NatureScot's Site Condition Monitoring guidance.

5.2 These grasslands are very restricted in area in both Cairngorms SAC and Scotland. A map can be found in Appendix 4 below showing the location of the species rich grassland with Mat grass and dry grassland on limestone within the Cairngorms SAC. The largest areas are at Inchrory and Glen Feshie. Other sites are also at Glen Lui, Clais Fhearnaig, Creag an Dail Bheag and along the River Gairn, and the Braes of Abernethy. Of these, the sites at Glen Feshie, Abernethy and the low ground at Mar Lodge are within the Caledonian Forest regeneration zone. The other sites such as Glen Lui, Clais Fhearnaig, Creag an Dail Bheag and along the River Gairn and alpine levels on Mar Lodge on open moorland.

5.3 The ideal grazing level for calcareous grasslands is higher than for other features. This issue was recognised in Holland et al (2010), which states that calcareous grasslands require the highest level of grazing of the different habitats to maintain their favourable condition and therefore their requirements can potentially be in conflict with any of the other feature types (p70). It is therefore not possible to maintain the grassland habitats in good condition, as defined by Site Condition Monitoring, and to achieve regeneration of Caledonian Forest where they are in close proximity, without fencing. Fencing and grazing by domestic stock is not practical in the high altitude areas which are currently not fenced. Fencing in areas with capercaillie, or in capercaillie habitat, is unlikely to be acceptable due to mortality from birds colliding with fences.

5.4 It is proposed that Caledonian Forest can be allowed to expand over the grasslands where the two are in close proximity and the expansion is by natural regeneration from

existing Caledonian Forest. Where the two are not in proximity, species-rich grassland will be managed as open habitat. In the future, when abundant tree regeneration has been achieved, there will be scope for deer numbers to increase again and this is likely to benefit the species-rich grasslands due to higher grazing levels.

5.5 In broad terms, the grasslands are split into areas within the Caledonian Forest expansion zone, Inchrory SSSI, and grasslands on the open hill.

5.6 In the areas zoned for the regeneration of Caledonian Forest, this feature can be favoured over the grasslands where expansion is occurring from natural regeneration from existing forests (see map in Appendix 4). However, there is no obligation to allow trees to establish or grow, but this prioritising document states that they can be prioritised, where it is decided that this is appropriate. Decisions would be made on a case by case basis.

5.7 At Inchrory SSSI, management will favour the grasslands because this is one of the best parts of the SAC for them. The calcareous grasslands are largely fenced and can be grazed by domestic stock. This would allow the most important area for the grassland habitats to be managed to benefit them, and it would ensure that they can be maintained in favourable condition.

5.8 There are two small patches of Caledonian Forest mapped in the Scottish Forestry's Caledonian Forest inventory at Inchrory, and these are close to the two grassland habitats. The aim is to keep the trees off the grasslands, but allow the Caledonian Forest to expand through natural regeneration onto dry and wet heath, which are far more extensive than the grasslands in the SAC, so these forest remnants can also improve in area and condition. Inchrory has the largest extent of species rich heath (NVC community H10d) in North East Scotland and that heath should be managed as open habitat (see section 3.8 above).

5.9 On Cairngorms SAC the upland habitats are mostly open range with no fencing, and most of the grazing is by red and roe deer, with sheep and cattle at some locations. Maintaining a low level of grazing benefits other Natura features, and contributes to their moving towards, or being in, favourable condition. Examples of relevant habitats are wet heath, dry heath, blanket bog, tall herb communities, and mountain willow scrub as well as Caledonian Forest. It should be recognised that even with a low level of grazing required for bogs and heaths, animals will tend to congregate on calcareous grasslands since they provide attractive and nutritious forage, and the grazing level is therefore likely to be higher than average across an area. Thus the potential loss of condition and extent may be less than expected.

5.10 Over the long term, red and roe deer grazing levels, and grazing by domestic stock, are likely to vary geographically, and to increase and decrease over time, according to the policies and resources of the landowners. Levels are never likely to be uniform across the site and some of the grasslands are always likely to be grazed hard, to their benefit.

5.11 The implications of this approach are examined below.

Table 5: abundance and status of the relevant Natura habitats

	Species-rich grassland with mat-grass in upland areas (ha)	Dry grasslands and scrublands on chalk or limestone (ha)	Caledonian Forest (ha)
Priority habitat	Priority	Non-priority	Priority
Primary reason for site selection	Yes	No	Yes

	Species-rich grassland with mat-grass in upland areas (ha)	Dry grasslands and scrublands on chalk or limestone (ha)	Caledonian Forest (ha)
Qualifying feature for Cairngorms SAC	Yes	Yes	Yes
Overall resource in Scotland	4,600 [21]	674 [22]	80,294 [23]
Overall resource in Scottish SAC network	4,572.91 [24]	259.87	15,177.84
Resource in Cairngorms SAC	1,153 [25]	115	7,499.92
Conservation status as in Article 17 assessments	Unfavourable – bad (U2)	Unfavourable – bad (U2)	Unfavourable –bad (U2)
% of Cairngorms SAC resource which could be affected	53% [26]	20%	Not relevant
Is the habitat proposed to be a winner or loser in other CAPs	On Beinn Dearg SAC, increased deer control to benefit blanket bog is prioritised over species rich grassland with mat-grass. At Ben Nevis SAC, increased deer control is prioritised to benefit a number of habitats.	No other Scottish site has both Caledonian Forest and dry grassland and scrublands on chalk or limestone.	Not relevant

The key issues from the table above are:

- Species rich grassland with Mat-grass is a priority feature, as is Caledonian Forest. Dry grasslands and scrublands of chalk and limestone is not a priority feature, but for the purpose of this assessment the two grassland habitats are considered together.

- There is much less dry grassland of chalk and limestone than species rich grassland with Mat-grass, both in Cairngorms SAC and in Scotland. There is more Caledonian Forest in the SAC than either grassland habitat.

[21] https://jncc.gov.uk/jncc-assets/Art17/H6230-SC-Habitats-Directive-Art17-2019.pdf
[22] https://jncc.gov.uk/jncc-assets/Art17/H6210-SC-Habitats-Directive-Art17-2019.pdf
[23] https://jncc.gov.uk/jncc-assets/Art17/H91C0-SC-Habitats-Directive-Art17-2019.pdf
[24] UK-Natura2000-2019-03-26 (1) A2770600
[25] From Cairngorms SAC Site data form
[26] Based on GIS analysis of habitat maps - see A3274993

5.12 Underlying principles from the document approved by the Scottish Government

A qualifying habitat would not be disadvantaged by a non-qualifying habitat.

All the habitats are qualifying ones, so this test is met.

A priority habitat should not be disadvantaged by a non-priority habitat.

No priority habitat would be disadvantaged by a non-priority habitat, so this test is met.

The global assessment grading of the affected habitats should not be reduced

Table 6: Relative quality and importance of qualifying interests of Cairngorms SAC

Habitats	Subsidiary grades			Global assessment
	Represent	Relative surface	Cons status	
Caledonian forest	A	A	A	A
Species-rich grassland with mat-grass in upland areas	B	B	B	B
Dry grasslands and scrublands on chalk or limestone	B	C	B	C

For explanation of the terms see Appendix 2

The change in area is estimated as

Table 7: Changes in grading for the grasslands

Factor	Existing grading	Anticipated change
Species-rich grassland with mat-grass: representativity	B = good representativity	Representativity would not change –remains at B
Species-rich grassland with mat-grass: relative surface	B = between 2 and 15% of the national resource	Approximately 53% of the resource is within the regeneration zone. Likely to remain between 2 – 15% of national resource but at a lower figure.
Species-rich grassland with mat-grass: conservation status	B = good conservation	Reduction to C to recognise that grazing levels are low for part of the area, and too low to maintain good condition.
Species-rich grassland with mat-grass: global grading	B = Sites holding excellent examples of the feature, significantly above the threshold for SSSI notification but of somewhat lower value than grade A sites.	There is an excellent example at Inchrory. The quality of other locations may deteriorate. C
Dry grassland on limestone: representativity	B= good representativity	Representativity would not change – remains at B
Dry grassland on limestone: relative surface	C = less than 2% of the national resource.	Remains at C
Dry grassland on limestone: conservation status	B = good conservation	Reduction to C to recognise that grazing levels too low in part of the site to maintain good condition

		under Site condition monitoring.
Dry grassland on limestone: global grading	C = Examples of the feature which are of at least national interest (i.e. usually above the threshold for SSSI notification on terrestrial sites) but not significantly above this. These features are not the primary reason for SACs being selected.	Remains at C

Species-rich grassland with mat-grass is one of the primary reasons for selection of this SAC.

It is concluded that the results of the proposed prioritisation would be a decrease in some of the gradings. It is critical therefore that when proposals are made for planting or other management which might damage these grasslands, species rich Nardus grassland should be favoured on other Scottish SACs (and where found outside SACs) to maintain Favourable Conservation Status.

Reduction in area of the habitat is limited so the site's status for the habitat is not affected.

It is important to recognise that for most of the grasslands, a low level of grazing would not result in their loss. It is likely to result in deterioration in the quality of feature, and this is considered in the section below. This section is concerned with the extent of the habitat.

In the areas which prioritise grazing levels to benefit the woodlands it is likely that at some locations, there would be a replacement by heath and possible colonisation by trees, primarily birch. This could be part of a Caledonian Forest, depending on the site. In some locations it may not be considered part of the Caledonian Forest habitat. It is unknown to what extent the area of the habitat would reduce.

Some changes are already occurring, and have been measured within the Cairngorms SAC[27]. Site condition monitoring by SNH in 2007 and 2015 found the species rich grassland to be in unfavourable condition, primarily due to undergrazing, but there was no measurable decline in condition between the two monitoring visits.

Comparing air photography from 2005 to the most recent available (2013 – 2018) showed the following:

- A large increase in heather was seen in CG10 on Mar Lodge (25 to 75%) but little change in tree cover in this habitat compared to 1995. On the flats a slight increase in heather was noted (1 or 2% to 5%).

- On Clais Fhearnaig on Mar Lodge a slight increase in heather was apparent in CG10 (75 to 80%).

- In Glen Feshie cover of heather increased in the mixed CG10/H10a on flats at NN858901, with a change on average across all CG10/CG11 polygons from 22 to 34%. There was little change in trees or scrub but locally frequent tree

[27] See work by Mike Smedley (2020) Changes in the cover and abundance of heather, trees and shrubs in areas of CG10 and CG11 grasslands in Cairngorms SAC

regeneration in heath associated with this grassland on the flats, and an increase in trees was apparent on crags and along some burns.

- At Inchrory heather cover appears to have slightly increased in many areas of CG10/CG11/U5c, on average from 14 to 18% (excluding burnt areas). This includes most areas with juniper in Glen Builg. Juniper has also increased in these areas (Juniper over heath European habitat). No changes in distribution or abundance of birch was apparent and this remains restricted to woodland fragments in small gorges, on outcrops and in screes.

- In Glen Gairn and on Creag an Dail Beag on Invercauld, little change in heather cover was apparent in CG10, U5c and CG11.

It is likely that heather has been released from grazing and is becoming more apparent in the calcareous grasslands in the vicinity of the pinewoods in Glen Feshie and Mar Lodge resulting in a decrease of around 12% in the extent of these grasslands. The grasslands have not changed significantly in Glen Gairn and at Inchrory. If grazing levels are allowed to increase in future, the balance of heather and grasses would be expected to tip towards grasses; in other words this change can be reversed.

Tree regeneration is occurring at the flats at Glen Feshie but not in the grasslands on most of the other sites. The soils that support calcareous grasslands are more likely to be suitable for birch than pine and this may partially explain why pine regeneration has been limited to date. Tree colonisation, including birch, could result in an expansion of the Caledonian Forest Annex 1 habitat, which can include broadleaves, but in some circumstances could result in other types of woodland which are not Caledonian Forest.

To date, no grasslands have been recorded as lost to either heather or trees, but in the long term this outcome is possible at some locations.

Distribution of the habitat within the site is maintained

This habitat occurs in relatively small patches and is widely scattered across Cairngorms SAC, as described above. The largest areas are at Inshrory and Glen Feshie. See maps in Appendix 4. Changes in the level of grazing are not likely to affect the distribution of the habitat – it would remain in the same locations with the same distribution so long as no major areas are lost. Changes in area and the condition of the habitat are considered above and below respectively. This test is met.

Significant fragmentation of the habitat is avoided.

The calcareous grasslands occur on base-rich rocks and soils which are limited in extent in the Cairngorms. They are therefore already naturally fragmented compared to many upland habitats. Changing grazing levels is not likely to fragment them further. This test is met.

Quality of the habitat is maintained, in terms of the range of ecological subtypes represented and any special characteristics of the habitat on the site.

This test <u>is not met</u> for all the calcareous grasslands on the site. The likely changes would vary according to the vegetation present, soil acidity, depth and fertility, steepness and wetness of the ground. The following changes are likely where the grazing levels are low.

- Where heather and other heath species are present, they are often not very apparent under high levels of grazing due to continually being cropped. Where grazing levels are low, heather is likely to grow higher and increase in dominance

in the vegetation. The heather cover would appear to increase, but the dominance has changed, not composition. [28]

- In some locations and over decades, there is likely to be a genuine increase in the abundance of heather, heath rush, other dwarf shrub heaths and juniper compared to grasses. In the long term, on calcareous soils this may result in a species-rich heath with grassy patches.
- It is also likely that tall perennial grasses and sedges will dominate over forbs and over time, the cover of smaller plants such as thyme will decrease. In most locations flowers will still be present, but less abundant and less obvious.
- A thick thatch of previous years' growth is likely to build up, which would tend to suppress smaller forbs. Horsfield (2009) noted that litter build up may result in a gradual acidification of the soils, and this may favour vigorous grasses, forbs and heather.
- On steeper and more broken ground with a suitable seed source and soils, tall herb species would be able to colonise the grasses below, potentially resulting in an expansion of this SAC habitat. This is already happening in small parts of Glen Feshie with tall herb community on base-rich cliffs.

In a site visit to Glen Feshie in 2009, Horsfield and colleagues noted that the CG10 was still species-rich at the time of the site visit. He considered that the species-rich grasslands are likely to show a reduction in, or loss of, small herbs. The CG10 will change to resemble U4 as a few vigorous species tend to dominate.

It is not possible to determine the extent to which this test is not met. It will vary geographically depending on current grazing levels, past management, soils and other factors. It will also vary depending on the time scale being considered. In some locations the effects are reversible but in some circumstances they may not be.

5.13 The tests are not all met because of likely long term change in the grasslands in some parts of the site. The decision on which takes priority is a balance between the grassland and Caledonian Forest habitats.

5.14 The grasslands can be managed in other ways although there are significant cost implications and this may not be practical at some locations. Options include i) on open ground away from the forests, fencing and grazing by domestic stock, or topping on suitable areas, if opportunities arise and landowners choose to do this, or ii) temporal increased grazing pressures to favour the grasslands when it is deemed levels of natural regeneration of Caledonian Forest has occurred.

5.15 There are SACs in Scotland where there are no management conflicts between grasslands and other features, and these sites should be maintained in a good condition to ensure Favourable Conservation Status (FCS) at a Scottish level. On other Natura sites with management conflicts, a low grazing level has been prioritised – not necessarily to benefit Caledonian Forest, but for a number of habitats. There is therefore a potential cumulative issue at a national scale. As the area of species-rich Nardus grassland risks being reduced at a number of sites, a review of species rich grassland across the suite of Scottish SACs will be made. This will assess whether the cumulative impacts results in this feature deteriorating in terms of FCS at a Scotland level, and may require remedial action to be identified.

[28] Hewison (2019), discussing management and vegetation at Trotternish in Skye, stated that "it has been shown that floristic changes in species composition in semi-natural habitats in sub-montane environments are generally slow despite relatively rapid changes in their structural characteristics."

6 Caledonian Forest and chasmophytic vegetation

6.1 It was noted in Site Condition Monitoring that at one location the chasmophytic vegetation (plants in crevices) in base-rich rocks failed due to the establishment of trees and shrubs. This is most likely close to existing trees which provide a seed source. In most cases, where trees are spreading by natural regeneration from existing Caledonian Forest, this process would be allowed to occur, so long as no specific rare or scarce species is threatened. In the latter case, management may be undertaken to safeguard the rare or scarce species. This issue could apply to both base-rich rocks and acidic rocks, although to date it has only been recorded for base-rich rocks.

7 Mountain willow scrub expansion over other habitats

7.1 Mountain willows can occur on a variety of habitats and soil types. They tend currently to be restricted to cliffs and very steep ground due to browsing pressure from red deer and other herbivores, but they can grow elsewhere when grazing pressure allows.

7.2 Mountain willows are threatened in many locations due to grazing pressure, lack of snow cover and lack of regeneration. In places the willow stands cannot regenerate because all the trees are male, or female, or too old, or too few trees are present. Regeneration is essential if the habitat is to be maintained in the long term.

7.3 For this reason, mountain willows are allowed to expand onto other communities such as *alpine and boreal heath, dry heath, wet heath, montane acid grasslands, tall herb, dry grasslands and scrublands on chalk or limestone* and *species-rich grassland with mat-grass in upland areas*. The other habitats are more extensive, and the long-term survival of these habitats would not be threatened by a localised and small-scale increase of mountain willows.

7.4 The tall herb habitat is limited by grazing, and if grazing is reduced, they would be expected to expand and/or improve in condition. This is because tall herbs are preferentially grazed and they only occur, in most places, where grazing animals cannot reach. Hence if grazing levels are low, mountain willows might expand over open habitats, but those habitats would also benefit from low grazing levels.

7.5 Snow lying for long periods on mountain willow scrub can result in protection from grazing and frost/wind damage. Climate change may alter the amount of snow falling and how long it lasts, which could result in the willows being more exposed to grazing and to frost/wind damage. It may also increase the ability of lowland trees, including other willows, to survive in habitats which are currently too extreme for them.[29]

7.6 Mountain scrub is present as a qualifying feature, but not a primary reason for selection of this site. It thus has lower status on the site than the habitats that are primary reasons for selection. The reason for allowing expansion is that the mountain willows occur in small

[29] See https://www.nature.scot/sites/default/files/2017-07/Enhance%20opportunities%20for%20species%20to%20disperse%20-%20Montane%20willows%20-%20FINAL%20pdf%203.pdf

patches, and as outlined above, expansion is required if the habitat is to be retained in the long term.

7.7 Ideally expansion of mountain willow would be by natural regeneration, and achieved by reducing grazing by herbivores. However, under current conditions, it is likely that expansion would need to be achieved by planting on inaccessible ledges, and other areas where deer pressures allow. Planting could include new sites as well as extending existing ones, because this habitat is so restricted and small scale compared to the range of sites where it would naturally occur if grazing levels were lower. Willows can occur in small groups, single sex groups or only one tree, none of which is likely to contain adequate genetic diversity for a healthy population. Thus planting may be required to add new genetics to a stand of willows. New sites would help to create 'stepping stone' populations which will improve connectivity between isolated populations.

7.8 Expansion of willows by planting onto other European habitats would be assessed to ensure that the other qualifying habitats are not negatively affected by the willows. It would need to maintain the structure and function of the habitat/s, and the distribution and viability of typical species of the habitat/s. The cumulative area of the proposed expansion is not likely to be large, even across a number of sites.

7.9 Natural regeneration would be retained unless removal is critical to maintain another European habitat. Proposals would also need to be assessed via a Habitats Regulations Appraisal for Cairngorms SAC and also features of Cairngorms Massif SPA and Cairngorms SPA for cliff nesting birds such as golden eagle and peregrine falcon.

8 Very wet mires and Bog woodland

8.1 Scots pine would be allowed to colonise *very wet mires often identified by an unstable 'quaking' surface* where this is a natural process and the mire is not artificially drained, since this would create bog woodland which is a rare European habitat. Bog woodland is a priority habitat; very wet mires are not a priority habitat. The global status of the features would not be affected by this proposed prioritisation.

8.2 Bog woodland with a natural hydrology normally contains scattered, small trees, which would not affect the mire enough to alter its species or its functioning as a mire. If trees threaten to close their canopy, this would no longer be a bog woodland, and consideration would need to be given to removing trees and increasing the wetness of the mire. Climate change might affect this because if there is less rain, or a different seasonality of rain, or higher temperatures, this might favour tree growth over maintenance of the active bog surface.

9 Dry heath, wet heath, blanket bog and Atlantic salmon

9.1 Atlantic salmon are a qualifying species for the overlapping River Spey and River Dee SACs. Salmon would benefit from new riparian woodland because trees would shade rivers and streams, and they would increase the biomass of invertebrates from leaves and invertebrates falling into the water.

9.2 Salmon are a cold water fish and the temperatures of shallow upland streams can rise too high for them in summer sunshine, especially where water runs over rocks heated by the sun. Climate change is likely to increase the summer maximum temperatures, and create longer droughts, reducing water levels. Both result in higher water temperatures. Shade from trees lowers water temperature, which reduces the stress on salmon.

9.3 The upland streams being considered here are particularly important for the spring salmon part of the population. These fish travel furthest upriver, and are likely to derive the most benefit from shading of upland pools by trees.

9.4 Blanket bog is a priority habitat which must be prioritised over a non-priority feature such as salmon, but small amounts of trees or shrubs arising from natural regeneration could be accommodated alongside rivers and streams while keeping blanket bog habitat in good condition. Small amounts of trees and shrubs could also be accommodated in dry heath and wet heath, where the trees arise from natural regeneration or small scale tree planting. The wet heath, dry heath and blanket bog are extensive in the site and the loss of habitat from riparian woodland creation would be much less than 1% of the total area.

9.5 The Site Condition Monitoring guidelines allow for up to 20% of the dry and wet heath habitats to contain scattered trees or woodland, so these habitats would still be in good condition so long as the cumulative total does not exceed this.

9.6 Blanket bog is more sensitive and cases would need to be carefully considered. Each case would be assessed in a Habitats Regulations Appraisal.

10 Monitoring framework

10.1 Most monitoring of the habitats across the SAC is carried out by NatureScot for Site Condition Monitoring. There is a standard method for each habitat which is agreed by the four country nature conservation agencies and the Joint Nature Conservation Council (JNCC). There are other surveys and monitoring carried out by landowners on their own land which provide additional information and data.

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Appendix 1: Derivation of the area of Caledonian Forest

The map used for the area of Caledonian Forest is the Caledonian pinewood inventory, produced by Scottish Forestry and last updated in 2020. This provides a map of the forest regeneration zone, and a further buffer zone. The latter is generally approximately 500m from the edge of the existing forest.

The outer edge of the buffer zone is used for working out the potential for forest expansion. It is recognised that many areas within this zone will not support tree establishment due to being too rocky, too wet, too nutrient poor/poor soils or too exposed.

Most pine seedlings are found within approximately 100m of the seed source (Thomson, 2004). Very low numbers will establish further out with the maximum likely being 500m. Hence the 500m provides a reasonable long term estimate although, in some areas trees may establish further than 500m over a long time period.

For background to the map itself, see https://data.gov.uk/dataset/9fe00904-da11-44f7-97c3-f4e617e34ec7/caledonian-pinewood-inventory

The metadata states:

“To prepare the Caledonian Pinewood Inventory, the current extent of the native pinewoods named by Steven and Carlisle, have been investigated. Some of the pinewood fragments

which they thought were too small to form discreet pinewood habitats, have also been considered. The total pinewood area now included in the Inventory is nearly 18000 hectares, and comprises 84 separate pinewoods of various sizes. In all cases the balance of probability suggests that they are genuinely native, that is, descended from one generation to another by natural seeding.

In addition, each pinewood has:

• a minimum density of 4 pine trees per hectare, excluding trees less than 2 metres in height, or at least 50 pine trees per hectare where sites have been extensively underplanted but are deemed capable of restoration to a more natural state;

• a minimum of 30 individual trees, unless the wood has historical, aesthetic or biological significance;

• vegetation which is characteristic of native pinewood, although possibly of a depleted diversity;

• a semi-natural soil profile, but accepting also sites with superficial cultivation such as shallow ploughing or scarification with some widely spaced drains.

Inventory Rules:

PINEWOOD FRAGMENT Recorded separately if more than 1.5km from another fragment.

REGENERATION ZONE Standard 100m but more if conditions indicate spread is likely to be greater (e.g. Glen Tanar). Where regeneration is likely to be less, such as a fragment of pine in an oakwood, then a smaller regeneration zone may be indicated (e.g. Loch Maree Islands). Area does not normally include open water unless the whole of the open water is within the pinewood and regeneration zone.

BUFFER ZONE Standard 500m beyond regeneration zone but can be extended further:- 500m beyond watershed or 700m above sea level (e.g. Gleann Fuar) link fragments together (e.g. Barisdale)

Buffer zones will not include extensive areas of open water (e.g. South Loch Arkaig) unless the whole of the open water is within the buffer zone. Where the buffer zone includes some ground on the other shore of a loch then the water will be part of the buffer zone (e.g. Loch Hourn).

PLANTED AREAS If of correct local origin then accept as pinewood if less than a third of total area of pinewood. The planted areas would be hatched on the maps and recorded as part of the regeneration zone not as part of the pinewood. Planted areas of correct origin, which are alongside pinewood, can have the regeneration zone round them (e.g. Doire Darach).

Where a planted area has just been planted or is to be planted and is more than a third of the area of the pinewood, then it may be considered as part of the buffer zone and the buffer zone may be extended to 500m beyond the planted area (e.g. Breda).

Planted areas of local origin which are more than 500m from the pinewood will be ignored."

Appendix 2: Global gradings: relative quality and importance of qualifying interests of Cairngorms SAC

This information was taken from the paper to the Scottish Government on favouring one feature over another.

1 – Habitat extent figures are derived from estimates submitted on the dataform. Where habitat extent is estimated as less than 0.05% of the total site area (i.e. < 28.8ha) no specific area estimates are given in the dataform and this is indicated by 'min'.

2 – The representativity grade relates to how typical the natural habitat on site is in relation to the standard definition in the Interpretation Manual on Annex I habitat types: A – excellent representativity. B – good representativity. C – significant representativity.

3 – The relative surface grade reflects the area of habitat within the site as a percentage of the total habitat resource within the UK: A – between 15 and 100% of the national resource. B – between 2 and 15% of the national resource. C – less than 2% of the national resource.

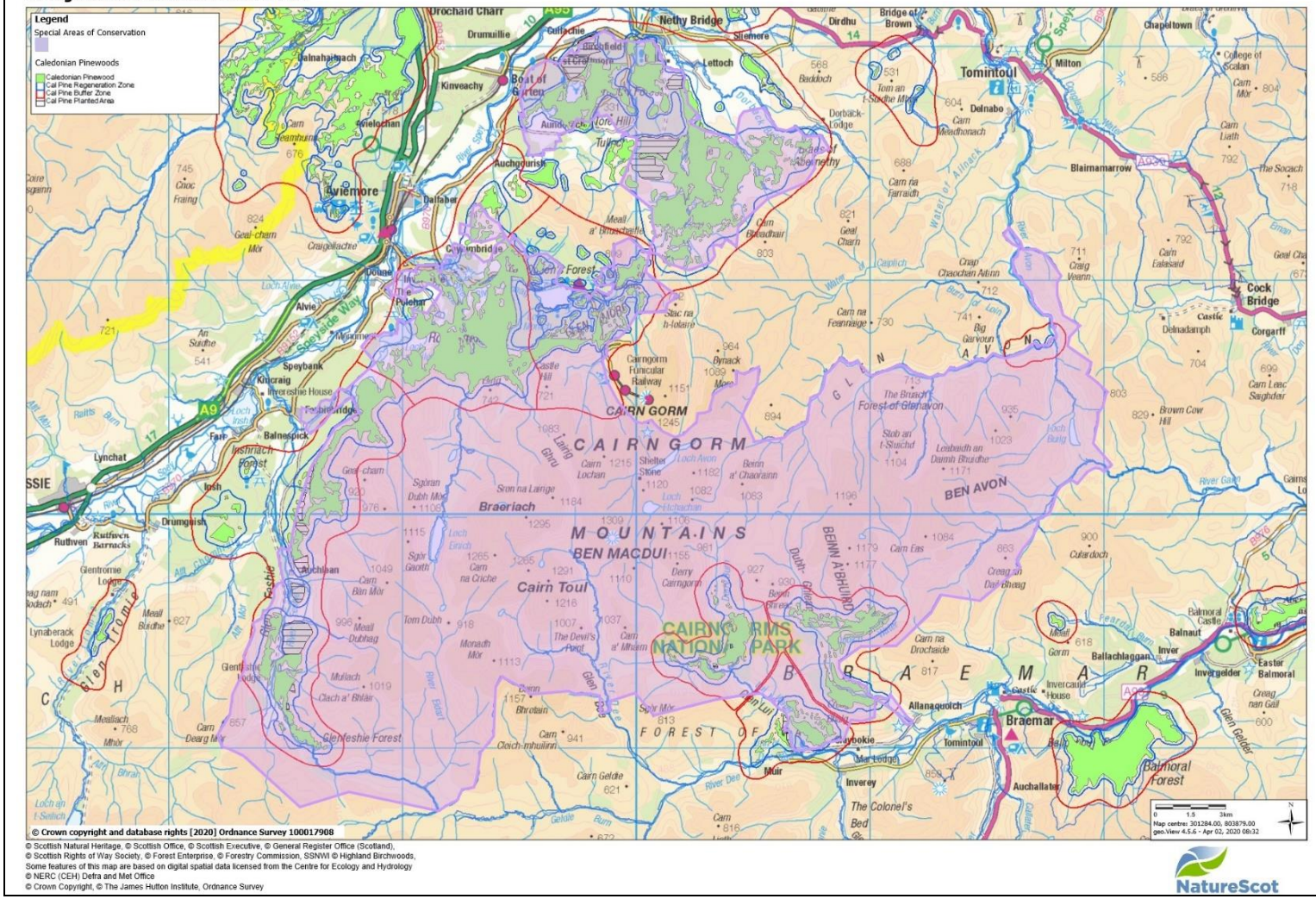
4 – The conservation status grade indicates the degree of conservation of the structure and functions of the natural habitat concerned, and restoration possibilities: A – excellent conservation. B – good conservation. C – average or reduced conservation.

5 – The global assessment is an expert judgement of the overall value of the site for the conservation of the relevant feature. Sites have been graded A, B or C, as described in European Commission's explanatory notes for the Standard Dataform (1995). In the UK these gradings have been interpreted as follows: A - Outstanding examples of the feature in a European context. B - Sites holding excellent examples of the feature, significantly above the threshold for SSSI notification but of somewhat lower value than grade A sites. C - Examples of the feature which are of at least national interest (i.e. usually above the threshold for SSSI notification on terrestrial sites) but not significantly above this. These features are not the primary reason for SACs being selected.

Appendix 3: Map analysis

The habitat analysis was produced by NatureScot's Geographical Information Systems team, and is based on habitat surveys. The SAC is covered by 36 separate NVC surveys, so overlaps needed to be removed before the map could be produced. The most recent map was preferentially used. See information in A3074413. The Annex 1 habitat information was based on the Habitat Map of Scotland maps. We recognise that conversion from earlier maps (Birks and Ratcliffe or NVC) into the Habitat Map of Scotland might not be perfect, but it was carried out by a specialist surveyor looking at each site individually. Within the context of each specific site, NVC codes were assigned their corresponding Annex I code, where applicable. Not all upland habitats fall within Annex 1 habitats. This conversion was based on national guidance. The polygons frequently have a mosaic of habitats and this has been taken into account.

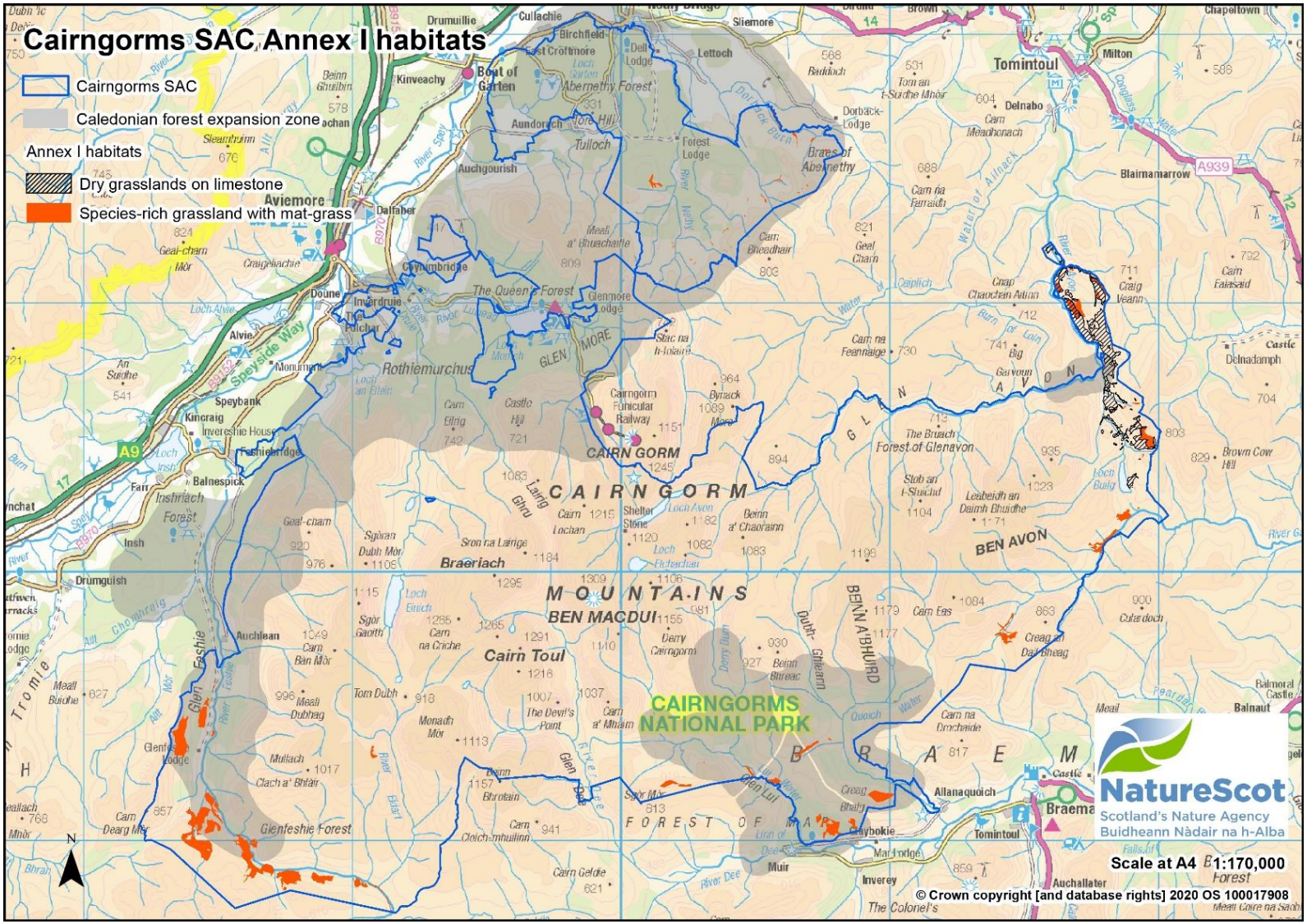
Appendix 4: Maps
Map 1: Area of Caledonian Forest and potential expansion (500m)



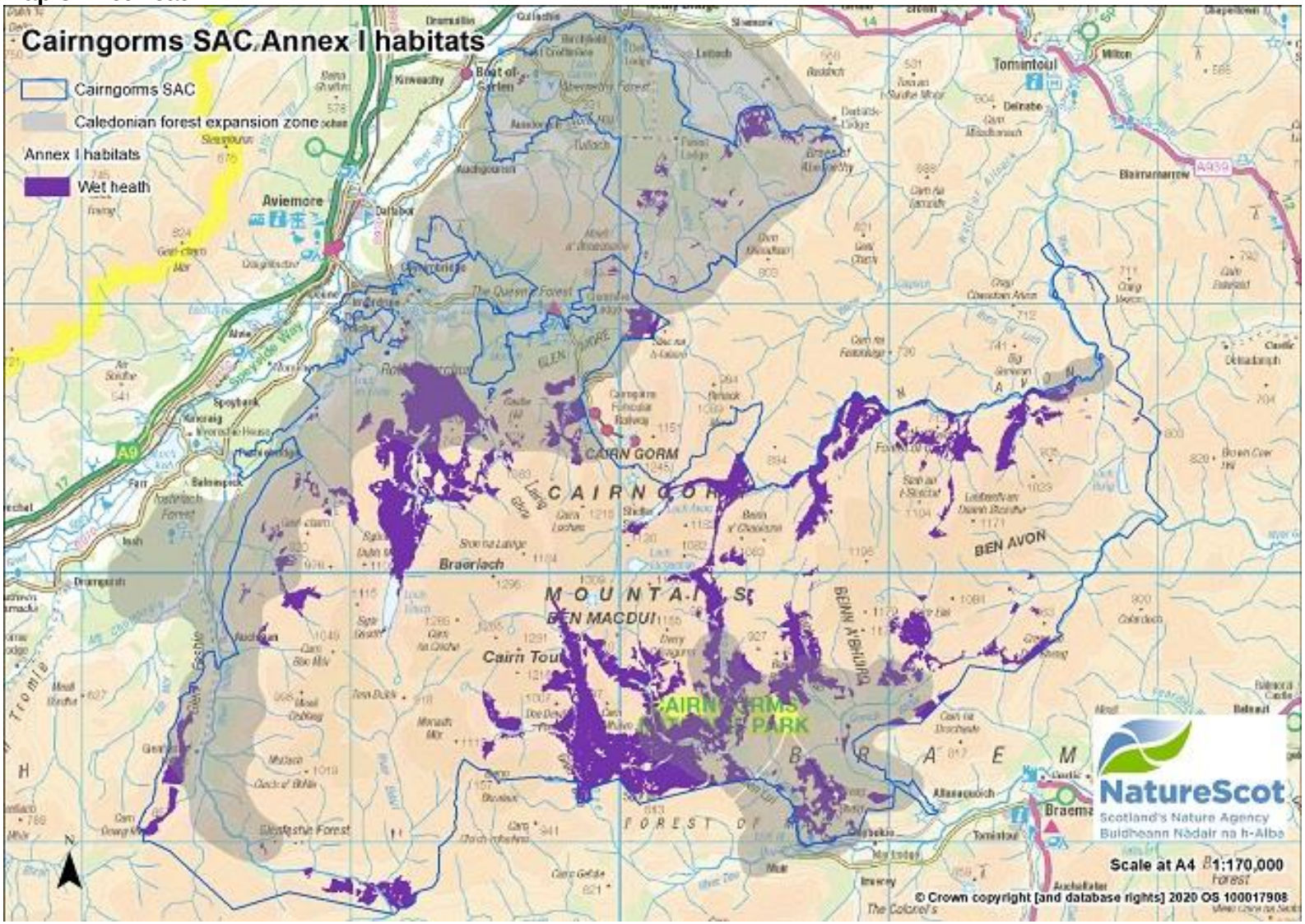
Pink = Cairngorms SAC.
Red line = outer regeneration zone.
Green = Caledonian pinewood.

The Caledonian Forest layer is provided courtesy of Scottish Forestry. The derivation of this is explained in Appendix 1.

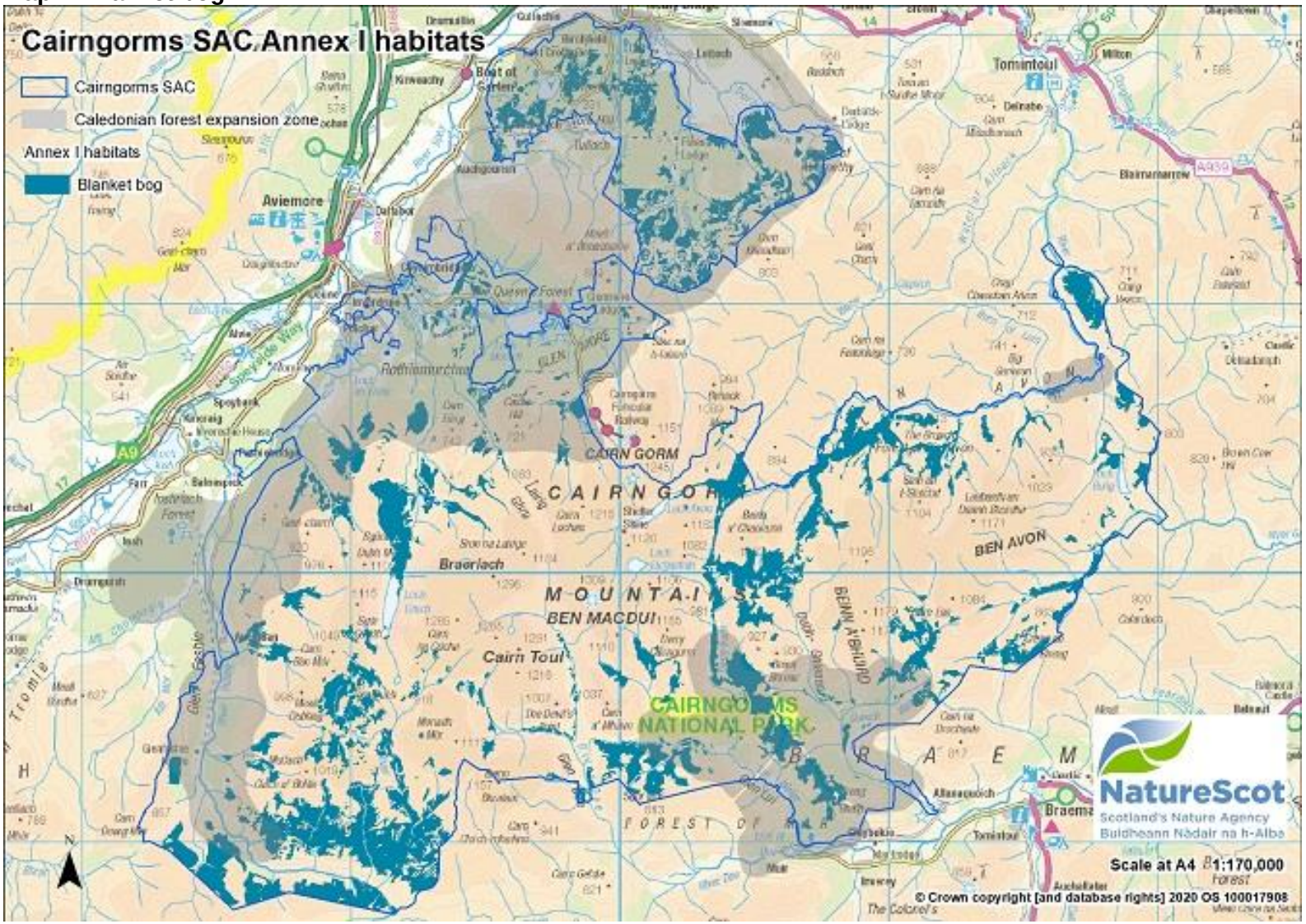
Map 2: Species-rich grassland with mat-grass in upland areas and Dry grassland on limestone



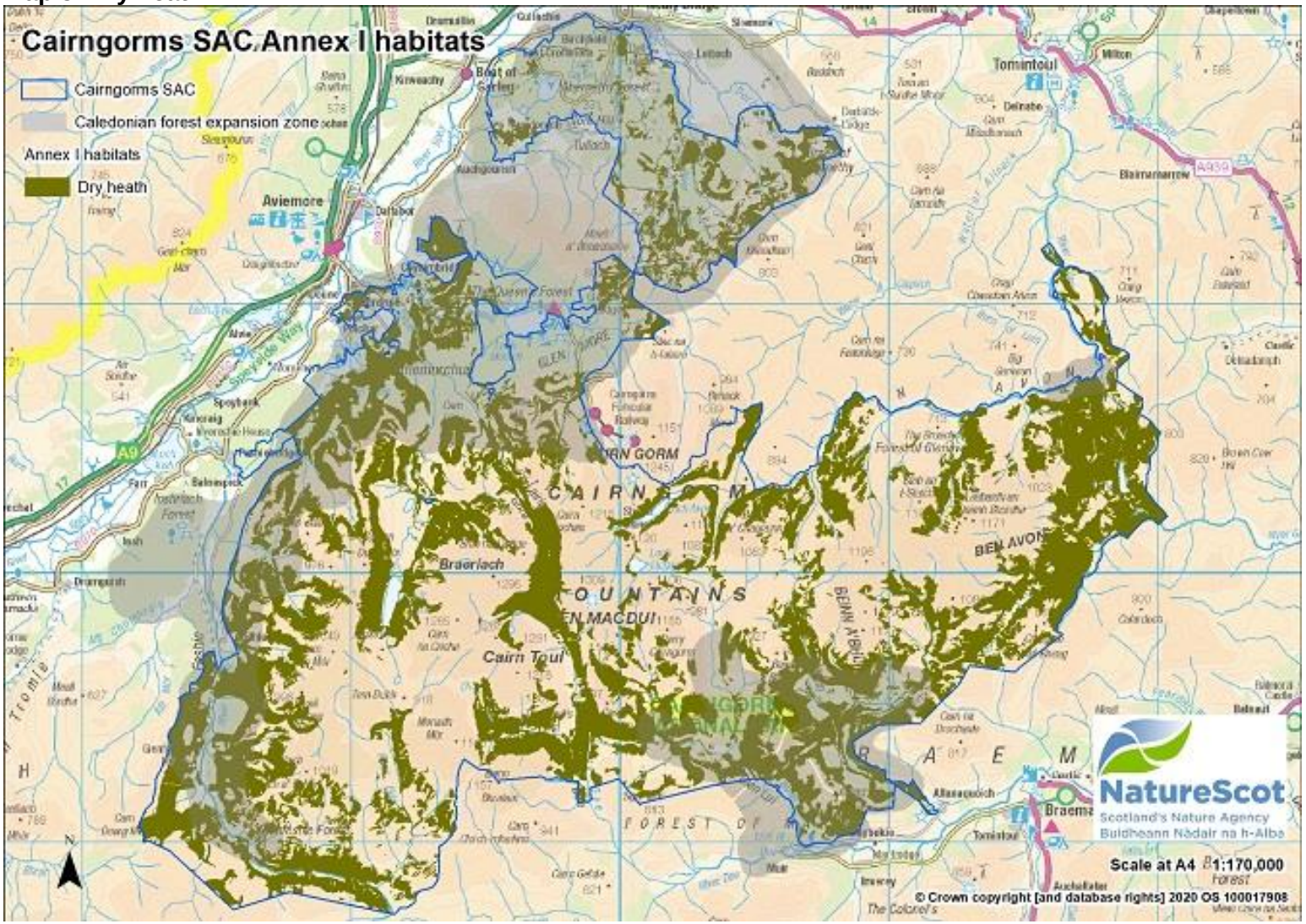
Map 3: Wet heath



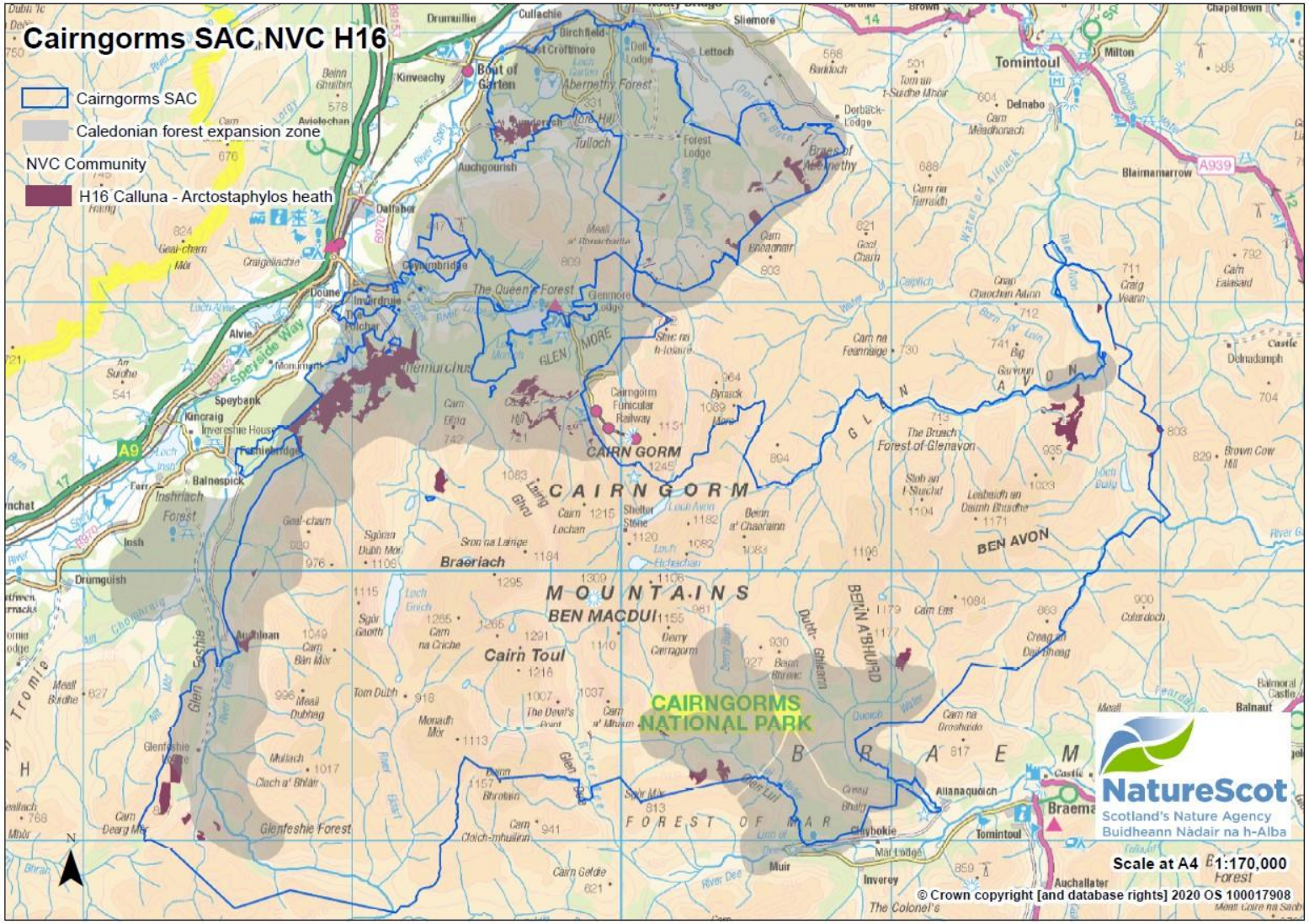
Map 4: Blanket bog



Map 5: Dry heath



Map 6: *Arctostaphylos* (bearberry) heath



Appendix 5: Definition and distribution of Arctostaphylos heath

Most upland habitats are mosaics of vegetation communities. The map above shows habitats with an element of H16. The H16 is not necessarily dominant.

Definition and composition

Arctostaphylos heathland was defined as a recognisable vegetation type in the Scottish Highlands by McVean & Ratcliffe (1962). It was termed *Arctostaphyleto-Callunetum*, distinct from *Callunetum vulgaris*. They described the association by the presence of species such as *Deschampsia flexuosa*, *Lathyrus montanus*, *Pyrola media* and *Genista anglica* along with *Arctostaphylos uva-ursi*, *Calluna* and *Erica cinerea*. Ward (1968), found McVean & Ratcliffe's association to be perhaps too rigid, and suggested it forms a continuum with *Callunetum vulgaris*. Ward also suggested that in addition to the differentials they noted, others such as *Hypericum pulchrum* and *Viola riviniana* are important (see table 1 in Urquhart 1986).

The NVC (Rodwell 1988, published as BPC vol 2**,** Rodwell 1991), defined H16 *Calluna-Arctostaphylos* heath as a *Calluna*-dominated submontane community with constant *Arctostaphylos* and common or frequent *Vaccinium vitis-idaea*, *Erica cinerea* and *Genista anglica*. Three subcommunities of H16 heath were recognised, with H16a being the most species-rich. Species listed as differential for this type include *Viola riviniana*, *Polygala seryllifolia* and *Succisa pratensis*, whereas *Pyrola media* was preferential and *Genista anglica* an associate of the community. The other two subcommunities, H16b-c, were less rich in these preferential species with more subshrubs or sedges.

Quadrat data are tabulated in McVean & Ratcliffe and Urquhart (36 quadrats) and a constancy table is given in the NVC, based on 56 quadrats.

Distribution

Being largely confined to the eastern Highlands with headquarters in Strathspey (McVean & Ratcliffe), H16 is recognised as the most characteristic of the eastern heaths (Horsfield, 2010). McVean & Ratcliffe, Ward and Urquhart all give similar distributions, with Rodwell extending it slightly to the south.

Fragmentary H16 is found as far east as Feughside, south-west of Banchory.

Arctostaphylos as a species occurs in other habitats and types of heath which are more widespread than H16.

Appendix 6: European habitats, primary reasons for site selection and priority features

European sites are managed to safeguard and improve the features they are designated for. For the Cairngorms SAC, these are:

European habitat	Is the habitat a primary reason for site selection?	Is the habitat a priority habitat?

Clear-water lakes or lochs with aquatic vegetation and poor to moderate nutrient levels	Primary reason for site selection	
Acid peat-stained lakes and ponds		
Wet heathland with cross-leaved heath	Primary reason for site selection	
Dry heaths	Primary reason for site selection	
Alpine and subalpine heaths	Primary reason for site selection	
Mountain willow scrub		
Juniper on heaths or calcareous grasslands	Primary reason for site selection	
Montane acid grasslands	Primary reason for site selection	
Dry grasslands and scrublands on chalk or limestone		
Species-rich grassland with mat-grass in upland areas	Primary reason for site selection	Priority
Tall herb communities		
Blanket bog	Primary reason for site selection	Priority
Very wet mires often identified by an unstable 'quaking' surface		
Hard-water springs depositing lime	Primary reason for site selection	Priority
High-altitude plant communities associated with areas of water seepage	Primary reason for site selection	Priority
Acidic scree	Primary reason for site selection	
Plants in crevices on acid rocks	Primary reason for site selection	
Plants in crevices on base-rich rocks		
Caledonian forest	Primary reason for site selection	Priority
Bog woodland	Primary reason for site selection	Priority
Otter (*Lutra lutra*)		
Green shield-moss (*Buxbaumia viridis*)		