



National Plant Monitoring Scheme

Online Training Materials 5: Introduction to Heathland



UK Centre for
Ecology & Hydrology



Botanical Society
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National Plant Monitoring Scheme

An introduction to UK National Plant Monitoring Scheme broad habitat type:

HEATHLAND



Produced by Ben Averis for the NPMS in May 2020



UK National Plant Monitoring Scheme broad habitat type: HEATHLAND

For NPMS purposes this broad habitat type is defined as dry heath of which at least 25% of the vegetation cover is made up of one or more of the following five dwarf shrub species:



Fl 7-9

Heather *Calluna vulgaris*. Leaves tiny and not in whorls. Very small pale pink flowers. NPMS positive indicator in both sub-types.



Fl 7-9

Bell heather *Erica cinerea*. Leaves in whorls of 3. Bright mid pink-purple flowers. NPMS positive indicator in both sub-types.



Fl 4-6

Bilberry (Scottish = blaeberry) *Vaccinium myrtillus*. Stems green and ridged. Leaves oval and pointed, with toothed edges. NPMS positive indicator in dry heathland.



Fl 6-8

Cowberry *Vaccinium vitis-idaea*. Stems browner, not ridged. Leaves dark, evergreen, blunt and untoothed. NPMS positive indicator in montane dry heath.



Fl 5-6

Crowberry *Empetrum nigrum*. Leaves in whorls or not; quite thick + white stripe running up underside. NPMS pos. indicator in both sub-types.

Note: in this document, flowering periods of plant species are given numerically (e.g. 5-6 = May-June); this information is taken from Collins Flower Guide ISBN 978-0-00-718389-0



Dry heath is mainly on nutrient-poor acidic soils. Dry heath, wet heath and bog share many so many species that there is potential for confusion among them, so their differences are explained a few pages further on. Wet heath and bog are in a separate NPMS broad habitat with the well-chosen name of ‘bog and wet heath’: obviously someone’s outside-the-box ‘Eureka!’ moment during the running-this-past-each-other stage of a multi-NGO sub-committee’s aims-and-objectives-task-focused working group blue-sky-thinking session! (It’s OK – I know it wouldn’t have been like that!) Actually – quick change of mind as I’m writing this – let’s do that dry heath / wet heath / bog comparison right here, now. Then we’ll be well placed to look more closely at the heathland broad habitat and its two subdivisions.

Dry heaths are on well-drained acid soils (e.g. sand, gravel or peat) and have an abundance or dominance of one or more of the five dwarf shrub species on the previous page, but little or nothing of any of the following wetland species (photos on next page): cross-leaved heath *Erica tetralix*, deergrass *Trichophorum germanicum*, purple moor-grass *Molinia caerulea*, common/hare’s-tail cottongrasses *Eriophorum angustifolium/vaginatatum* and bog myrtle *Myrica gale*.

Wet heaths and **bogs** are on wetter peaty soils and have extensive total cover of one or more species from the above wetland group (species combinations being very varied). Any of the dwarf shrubs from the previous page can be common here too, though *Erica cinerea* is rare in bogs. Wet heaths and bogs can therefore look alike, but bogs have an abundance (collectively) of one or more of *Eriophorum vaginatatum* and the mosses *Sphagnum papillosum* (big and ochre-coloured) and *S. magellanicum* (big and dull red; split in recent years into *S. divinum* and *S. medium*). Those bog indicators are no more than very sparse in wet heaths and dry heaths. Bog vegetation is mostly, but not entirely, on peat >50 cm deep, and wet heath is mainly on shallower peat, but where deep bog peat has dried (for example by draining and/or burning) the vegetation can change to wet or dry heath. So – even though some habitat classifications include those heaths on deep peat under ‘bog’, peat depth does not totally determine the nature of the vegetation.





Species found commonly in wet heaths and bogs, but either absent from dry heaths or very sparse there:



Fl 7-9



Fl 5-6 (fruits 7-8)



Fl 7-9



Fl 5-6 (fruits 6-9)



Fl 4-5 (fruits 5-6)



Fl 4-5

Cross-leaved heath
Erica tetralix.
Greyish-green leaves in whorls of 4 and with whitish hairs.

Deergrass
Trichophorum germanicum. Dense tufts of straight stems, each with a small flower spike at its tip. Turns a rich golden colour in autumn.

Purple moor-grass
Molinia caerulea. Tussocks (can be large) of long leaves that turn buff in autumn. Long, narrow, branched flower heads.

Common cotton-grass
Eriophorum angustifolium. Multiple cottony heads. Leaves 3-6 mm wide; reddish in autumn. Does not form tussocks.

Hares's-tail cotton-grass
E. vaginatum. Single cottony heads. Dense tussocks of very narrow, wiry leaves, turning dull grey-brown in autumn. More or less confined to bogs.

Bog myrtle *Myrica gale.* Narrow oval leaves with a few large, shallow teeth. Leaves have a strong resinous scent. Young stems reddish.



All these lovely pictures!... so happy, so easy on the eye... everything so easy...

Except that I've been asked to think of some **QUESTIONS** to put to you about what you saw in those lovely pictures!

Q1: How do you tell heather and bell heather apart?

Q2: What else might you confuse bell heather with?

Q3: How can you tell crowberry from bell heather?

Answers on next page...



Answers to questions 1-3:

A1: Bell heather's leaves are longer and in whorls of 3. Also, its flowers are larger and darker.

A2: Cross-leaved heath (whose leaves are greyer and in whorls of 4 instead of 3, and whose flowers are paler).

A3: In crowberry, each leaf has a white stripe running along the middle of its underside.



A couple more questions:

Q4: How do you separate dry heath from wet heath?

Q5: Is the plant in this photograph

- (a) heather
- (b) bell heather or
- (c) cross-leaved heath?



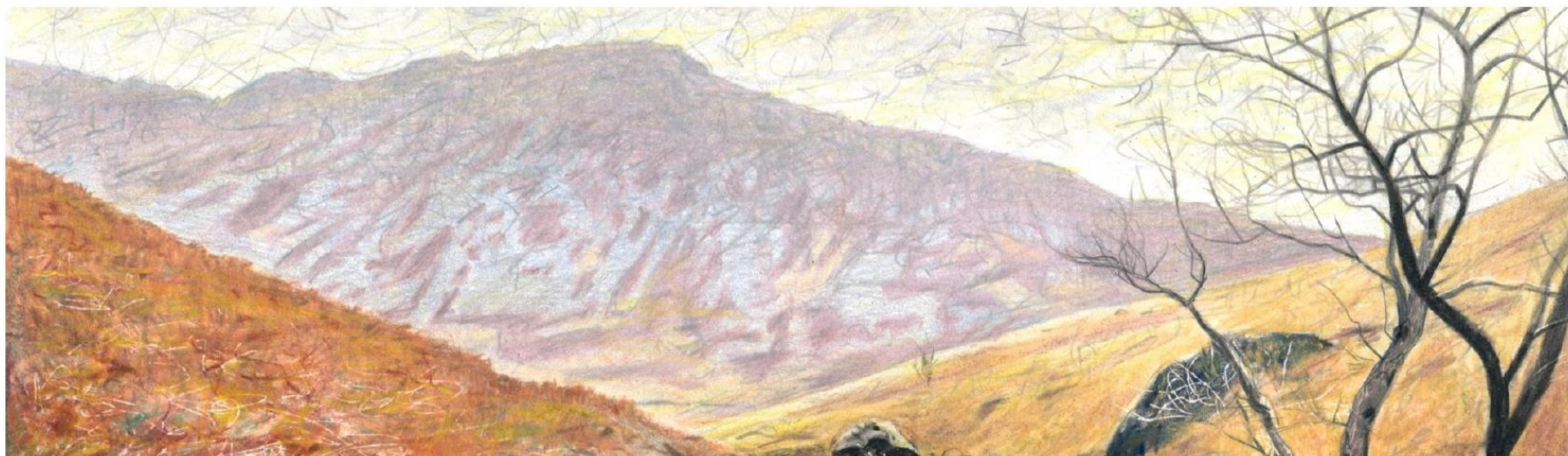
Answers on next page...



Answers to questions 4-5:

A4: Dry heath has little or nothing of cross-leaved heath, deergrass, purple moor-grass, cottongrasses and bog myrtle. These species are common (one or more of them present; combined cover = high) in wet heath.

A5: (b) bell heather.



Mosaic of dry heath, rock outcrops and screes on Cadair Idris, Wales



These three species are very common in the Heathland NPMS habitat.



Fl 6-7

Wavy hair-grass
Deschampsia flexuosa

Branched head (branches thin and wavy). Leaves very thin and wiry. On acid soils in heaths, grassland, woods, bogs, etc. NPMS positive indicator for dry heathland (but listed as a negative indicator in montane heath).



Fl 5-9

Tormentil
Potentilla erecta

Flowers with 4 yellow petals. Leaves with 3 leaflets + 2 leaflet-like stipules at the point where the leaf leaves the stem. Grows mainly on acid soils in grasslands, heaths and woods.



Fl 6-8

Heath bedstraw
Galium saxatile

Small leaves in whorls of 4 to 8. Tiny hairs along leaf edge point outwards and forwards. No hairs on stem. Grows on acid soils. NPMS positive indicator for dry heathland and montane dry heathland.



The **NPMS heathland broad habitat** is divided into **two fine-scale habitat types**:

DRY HEATHLAND (in lowlands and uplands but not in the montane zone)

This takes in most of the dry heath in the UK, and most of it has abundant or dominant heather *Calluna vulgaris*. Most of this heath is in the uplands, where it can be very extensive and dominant at a landscape scale. Much of it is grazed by sheep and deer. Where grazing is more intensive the palatable dwarf shrubs heather, bell heather and bilberry can be reduced in height and cover; with continued heavy grazing the heath can change to grassland (mostly acid grassland). Large areas of dry heath are managed as grouse moor by regular burning of heather; this produces uniform-looking species-poor swards of even-aged heather; burning can also cause losses of some associated plant species. Dry heaths in the lowlands are less common but are locally prominent in some areas such as the New Forest and Breckland. This photo shows dry heath in an upland setting at about 330 m in the Lammermuir Hills, in East Lothian.



DRY MONTANE HEATHLAND (restricted to montane environments)

These heaths are on well-drained acid soils in places with a cold, harsh climate: mainly in the Scottish Highlands. Although they are mostly at high altitudes they can be found lower down (<200 m) in the far north and north-west: for example in NW Sutherland and the Outer Hebrides. South of the Scottish central belt they are much scarcer and confined to some of the higher hill ground in the Southern Uplands, Lake District, north Wales and Northern Ireland. Some montane heaths have abundant to dominant heather, but others are in environments too cold or with too much snow-lie for that species and instead have bilberry, cowberry and crowberry as the commonest dwarf shrubs. Much of the montane heath is grazed by sheep and deer, but there is less moor-burning here than in the non-montane dry heaths. This photo shows an example of montane dry heath on a high windswept ridge at about 880 m on Beinn a' Ghlo in Perthshire.





A CLOSER LOOK AT THE DRY HEATHLAND FINE-SCALE HABITAT

Although most of this dry heath fine-scale habitat has abundant to dominant heather, there is much variation in the mix of other species growing with the heather. As seen a couple pages back, wavy hair-grass, tormentil and heath bedstraw can be common throughout most of this dry heath (and also in much of the montane heath too), but to understand the main types of variation within dry heathland it helps to focus firstly on the three commonest dwarf shrub species here: heather, bell heather and bilberry.

- **Heather *Calluna vulgaris*:** common throughout.
- **Bell heather *Erica cinerea*:** mainly in warmer, drier or sunnier situations such as south-facing slopes with thin soils.
- **Bilberry *Vaccinium myrtillus*:** commonest in cooler or more shaded situations (e.g. northerly aspects) or ground with slightly deeper soils.



Heather
Calluna vulgaris
Very widespread



Bell heather
Erica cinerea
In 'warm' heaths



Bilberry/blaeberry
Vaccinium myrtillus
In 'cool' heaths

The balance of abundance between bell heather and bilberry is commonly related to warmth and slope aspect, with bell heather more abundant in sunnier places and bilberry commoner on cooler, shadier aspects. This reflects the wider distributions of the two species: bell heather has a western oceanic distribution in Europe and does not extend far into Scandinavia (only in the south there). Bilberry is more cold-tolerant, with its distribution extending up to northern Scandinavia and Iceland and a long way east into Russia. That's why I tend to think of heaths with more bell heather than bilberry in them as 'warm heaths' and those with more bilberry than bell heather as 'cool heaths'.



Photographs of the two commonest forms of heather-dominated heath:



Calluna heath with bell heather *Erica cinerea* on a SW-facing slope at 90 m in Wester Ross in July



Calluna heath with blaeberry *Vaccinium myrtillus* on an E-facing slope at 530 m in Perthshire in July



Of course there are some intermediate *Calluna* heaths with bell heather and bilberry in about equal amounts, as for example in this *Calluna-Erica-Vaccinium* heath in Argyll (photographed in August).



In general, however, the bell heather/bilberry gradient of variation can be traced through much of our dry *Calluna* heaths from northern Scotland to southern England. In general the further west and south one goes in Britain and Ireland the greater the tendency of bell heather to grow more abundantly and on a wider range of slope aspects. In many far western areas such as the Hebrides, bilberry is not seen to be plentiful until one ascends well up the hills, but in the colder uplands of eastern Scotland this species is very abundant.



Another gradient of variation in dry heaths involves other dwarf shrub species that are not as common as heather, bell heather and bilberry.

Some of these additional dwarf shrubs grow mainly in **colder and/or higher altitude heaths in the north**. The main ones are cowberry *Vaccinium vitis-idaea* and crowberry *Empetrum nigrum* – both illustrated on the same page as heather, bell heather and bilberry a few pages back. Not surprisingly, they also grow in higher/colder ‘montane dry heathland’ fine-scale habitat which is described later in this document.

Other additional dwarf shrubs grow mainly in heaths in **warmer, lower altitude areas in the south**. These are types of gorse – western gorse *Ulex gallii* and dwarf gorse *U. minor*. These are illustrated, along with the much commoner gorse *U. europaea* on the next page. *U. europaea* can grow in low-altitude dry heaths in northern and southern areas, but *U. gallii* is distinctly south-western (SW England, Wales, Ireland and the W side of N England) and *U. minor* southern to south-eastern (mainly in Dorset, Hampshire, Berkshire, Surrey, Sussex and Kent). When in flower each of these gorse species can add bright splashes of yellow to the otherwise darker colours of the ericoid shrubs, but as *U. gallii* and *U. minor* grow shorter than *U. europaeus* they can be more intricately mingled with the heathers in such a way as to give the southern heaths where they grow an attractive pink-purple and yellow patterning (‘happy’ heaths? – maybe, especially as most of them are ‘warm’ heaths too), as seen in the photos of heaths with flowering *U. gallii* and *U. minor* on the next pages; these distinctive multi-coloured heaths can be found as far north as parts of Northern Ireland.





The **three species of gorse *Ulex*** in Britain and Ireland: all of these grow in the dry heathland NPMS fine-scale habitat.



Gorse *Ulex europaeus*

The most widespread and common species. Up to 3 m tall. Calyx 10-17 mm long and bracteole 3-5 mm wide (see inset photo of flower). Leaves greyish-green and deeply grooved. On dry to damp ground with acid to quite basic soils, mainly in heaths and grassland; also shingle, cliffs, scrub and woodland margins.



Western gorse *Ulex gallii*

Up to 2 m tall. Calyx >9 mm long and bracteole 0.6 mm wide. On dry to damp, mainly acid soils in heaths and grassland. Mainly in SW England, Wales and Ireland, but also NW England and extreme S Scotland. Listed as an NPMS positive indicator in both sub-types, but does not occur in montane habitats. Leaves not so greyish-green and only shallowly or faintly grooved.



Dwarf gorse *Ulex minor*

<1 m tall. Calyx <9 mm long and bracteole 0.6 mm wide. On dry to damp acid soils in lowland heaths in S-SE England, with outlying populations in Nottinghamshire and N Cumbria. Listed as an NPMS positive indicator in both sub-types, but does not occur in upland areas. Leaves green and faintly grooved, as in *U. gallii*.



Here are more photos of those southern heaths with southern gorse species:



Heath with heather, bell heather and western gorse in SW Wales in August



Heath dominated by western gorse, with some heather, bell heather, and, placing the vegetation halfway toward wet heath, cross-leaved heath *Erica tetralix* and purple moor-grass *Molinia caerulea*.



Left: heath with heather, bell heather, western gorse and bristle bent on Exmoor in June. Right: close-up of **bristle bent** *Agrostis curtisii* – a grass found in heaths and acid grasslands in SW England and the extreme south of Wales. With its thin wiry leaves it looks rather like wavy hair-grass but the leaves are stiffer and greyer green and the flowering heads are narrower with smaller and more numerous individual florets.



Heath with bell heather and dwarf gorse in Berkshire in July



Non-flowering dwarf gorse with heather and bell heather in Berkshire in July



TIME FOR QUESTION 6!

Can you put these four species in increasing order of 'thermophily', starting with the one that has the strongest association with cold places and ending with the one that appears to have the strongest need for warmth?

Bell heather (*Erica cinerea*)

Bilberry (*Vaccinium myrtillus*)

Western gorse (*Ulex gallii*)

Cowberry (*Vaccinium vitis-idaea*)



Answer to question 6:

Cowberry (*Vaccinium vitis-idaea*)

Bilberry (*Vaccinium myrtillus*)

Bell heather (*Erica cinerea*)

Western gorse (*Ulex gallii*)



In great contrast to those 'happy' heaths with southern gorse species are heather-dominated heaths **on steep, sheltered, shaded, cool NW-E-facing slopes in upland areas**, especially in the north, with a microclimate sufficiently cool and damp as to allow the moss *Sphagnum capillifolium* to grow very well, forming reddish-coloured patches among the other mosses under the heather. *Sphagnum* mosses are commonest in poorly-drained wetland habitats, but the occurrence of *S. capillifolium* here is not an indication of poor drainage as much as a response to the cool, humid microclimate. The absence or near-absence of cross-leaved heath, deergrass, purple moor-grass, cottongrasses or bog myrtle precludes classification as wet heath, so this vegetation still belongs here in the dry heathland category, despite containing *Sphagnum*. This photo shows an example of this kind of heath, on the island of Skye in December.



DON'T LET THE ~~*****~~ *SPHAGNUM* ~~GW~~ ET YOU DOWN! ('cos this ain't no wet heath!)



While we're on the subject of *Calluna* heath on north-facing slopes with *Sphagnum capillifolium*, you might be interested in a couple of things:

1. Some examples can have really extensive carpets of *S. capillifolium* that amount to almost 100% cover beneath the heather for many square metres, this being a greater extent of *Sphagnum* than in some wet heaths (indeed, not all wet heaths contain *Sphagnum*) and even some bogs – but in relation to the three broad heath/bog classes (i.e. dry heath, wet heath and bog) they are still in the dry heath category (as there is very little or no cross-leaved heath, deergrass, purple moor-grass, cottongrasses or bog myrtle).
2. Straddling the boundary between the dry heathland and montane dry heathland NPMS fine-scale habitat types are examples of this kind of heath in the W Highlands and Hebrides (and, less commonly, W Ireland, the Lake District and NW Wales) containing an amazing multi-coloured assemblage of uncommon liverworts whose world distributions reflect their need for a cool and very wet climate. Some of these liverwort species show interestingly disjunct world distributions, with concentrations in Scotland/Ireland, SE Asia (esp. the Himalaya area) and Alaska/W Canada. Here are some photos of some of them in Wester Ross – a particularly good area for liverwort-rich heaths. These mixtures of colours are really just as 'happy', albeit at a smaller scale, as those in the warmer southern heaths with gorse.





Some (but not all) **coastal** dry heathland includes maritime species. The heath here is generally dominated by heather, and there can also be some bell heather or crowberry. Bilberry is comparatively rare in coastal heaths with maritime species. In coastal heaths on firm mineral soil, commonly on rocky ground, maritime species can include buck's-horn plantain (a NPMS positive indicator in the dry heathland fine-scale habitat), sea plantain and thrift. On looser sand one can sometimes find dune heath with species including sand sedge.



Coastal heath on firm soil on rocky shore



Buck's-horn plantain *Plantago coronopus*



Sea plantain *Plantago maritima*



Thrift *Armeria maritima*



Sand dune heath



Sand sedge *Carex arenaria*



Superimposed onto all that variation among these dry heaths are the effects of land use, especially:

(1) Grazing – the more heavily grazed heaths generally have shorter and less extensive dwarf shrub cover and are more grassy. That effect of past grazing can be seen in this relatively herb-rich example in Angus (photographed in September), though the profuse flowering of grasses and bell heather suggests a more recent reduction in grazing.





(2) Burning – mostly on grouse moors, this produces an artificial patterning of sharp-edged burned areas within each of which the heather tends to be even-aged and uniform. The vegetation can be very species-poor and can even lose all other dwarf shrubs so that the resulting species-poor ‘plain’ heather heath cannot be placed on the bell heather to bilberry gradient described earlier.



Dry heathland that has been repeatedly burned for grouse moor management, in Aberdeenshire in July



We have already seen some NPMS positive indicators in the dry heathland fine-scale habitat. Here are three more:



Fl 6-8



Fl 5-6



Fl 4-8

Heath-spotted orchid *Dactylorhiza maculata*

Widespread in dry and wet heaths (and grassland and various wetland habitats), especially in upland areas. The commonest orchid in many heaths.

Petty whin *Genista anglica*

Dry heath is an important habitat for this species, which has a rather patchy distribution in Britain. Flowers in spring, adding bright colour to the dark heaths. Looks delicate but has spines!

Heath milkwort *Polygala serpyllifolia*

Widespread and common in dry heaths and acid grasslands, especially in upland areas. Lower leaves in opposite pairs (all leaves not opposite in common milkwort *P. vulgaris*).



“HEY GUYS! WHAT’S UP?”

“Everything’s up! Because we’re now in... the **DRY MONTANE HEATHLAND** fine-scale habitat!”

These montane heaths are much less widespread and extensive than those in the previous fine-scale habitat. However, the montane environment is a varied one and this variation is reflected in the range of different types of montane dwarf shrub heath. As I said earlier, they show variation in the dwarf shrub canopy, from...

... from ... what? ... to ... what?

How cruel – seeing if you can remember what I wrote so many pages back! Especially after we’ve just been stuck into a load of other stuff about non-montane heaths, southern heaths with southern gorses... Well, there’s no gorse up here in the montane zone. Not even ordinary gorse. So – none of that bright, happy yellow. Not much sun and warmth. Plenty of wind and rain. Who would want to look at heaths in these places? And they’re mostly on acid soils and don’t have much in the way of ‘pretty wild flowers’ or lush colourful swards or rare orchids or very high species-richness or whatever. No. It’s short vegetation in bleak landscapes up here:



At 550 m on Quinag, Sutherland, in August



At 880 m on Sgairneach Mhòr in Perthshire, in August



Yes, you got it! The answer to that that variation question is: **from heathery heaths** (left photo on previous page) **to greener ones with bilberry, cowberry and crowberry** (right photo on previous page). That is the major floristic split among these montane heaths. The heathery ones have heather growing in the harshest climatic conditions it can tolerate. But there are limits. While we can be amazed that heather (and even the warmth-loving bell heather too) can tolerate places that are so topographically exposed and so incredibly windy that its woody stems have to creep low against the stony ground, their orientation reflecting the direction of the prevailing and often fierce winds, and the vegetation in general barely able to grow more than about 5 cm in height, as here in Sutherland...





... while we can be amazed at all that tolerance, we also have to be understanding that the impressively tolerant heather has weaknesses too. Well, even the strongest things – like the strongest people, whether they be strong physically, financially, socially or intellectually – have weaknesses. And that's perfectly OK, so we shouldn't sneer at heather just because it can't cope with a particular degree of cold or with long periods of time under snow. Where there is more prolonged snow-lie, or where, as in many high-altitude environments, all-round conditions are just too cold, heather is rare or absent and there is instead more bilberry, cowberry and crowberry – the main dwarf shrubs in the very highest-altitude montane dwarf shrub heaths. There is altitudinal overlap between the two types though, and within the overlap zone we can often see heather-dominated heaths on windy, exposed ridges and shoulders, and bilberry/cowberry/crowberry heaths in slight hollows where snow lies for longer into the spring. Montane and non-montane heather-dominated heaths can also overlap altitudinally, with the montane ones on the more wind-exposed ground. In some places you can be in montane wind-clipped heathery heath and then walk *upslope* into taller, non-montane heather-dominated heath on a steeper and less windy slope: non-montane higher up than montane!



Schiehallion, Perthshire: L = at about 700 m, bilberry/crowberry montane heath in small hollow where snow is likely to lie later than on adjacent ground with non-montane heather-dominated heath (background). R = at about 850 m, bilberry/crowberry montane heath extensive among screes.



Montane heath in Sutherland in May, with dwarfed, wind-pruned heather and abundant *Cladonia* lichens:





In the heaths with dwarfed heather there can be a lot of moss, especially the grey-coloured *Racomitrium lanuginosum*, visible in the photo a couple of pages back and particularly abundant in western forms of this heath, or whitish or creamy-coloured lichens of the genus *Cladonia*, forming a ‘frosting’ as seen in the photo on the next page and more common further east in the Highlands. Dotted among the heather, mosses, lichens and stony or bare-ish ground we can find small mountain plants such as stiff sedge *Carex bigelowii*, least willow *Salix herbacea*, trailing azalea *Kalmia procumbens* and alpine lady’s-mantle *Alchemilla alpina*.



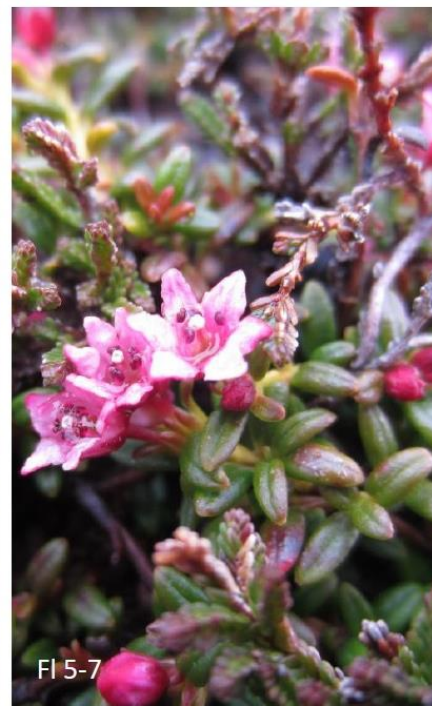
Fl 6-7 (fruits 7-8)

Stiff sedge *Carex bigelowii*. Has relatively stiff stems – hence the name. On acid soils. A NPMS positive indicator here.



Fl 6-7

Least willow *Salix herbacea*. A tiny willow with broad oval to roundish leaves. On thin soils, especially in exposed places.



Fl 5-7

Trailing azalea *Kalmia procumbens*. Crowberry-like leaves (but lacking white under-stripe) + pink flowers. In exposed places.



Fl 6-8

Alpine lady’s-mantle *Alchemilla alpina*. Distinctive starry leaves with silvery undersides. On acid to basic soils.



These four dwarf shrubs are characteristic plants of some montane heaths:



Dwarf juniper *Juniperus communis* ssp. *nana*. Low and creeping. In short heaths, on cliffs and in other rocky places. Mainly in the far NW from sea level to mountains. NPMS montane heath positive indicator.

Bearberry *Arctostaphylos uva-ursi*. Low and creeping. Mainly in the Highlands. NPMS montane heath positive indicator. In submontane heaths it can increase temporarily after burning (i.e. while the heather is shorter, giving bearberry more space).

Arctic bearberry *A. alpinus*. Low and creeping. In the Highlands; mostly in exposed short montane heaths; also in montane bogs. Leaves turn red in autumn.

Bog bilberry *Vaccinium uliginosum*. Not so creeping. Blunt leaves are bluish-green. Grows mainly in less wind-exposed heaths and bogs in the montane zone in the Highlands.



These four clubmosses grow in montane heaths too.



Alpine clubmoss *Diphasiastrum alpinum*. Low and creeping, with short, overlapping, scale-like leaves. In short montane and submontane vegetation. A NPMS montane heath positive indicator.



Fir clubmoss *Huperzia selago*. Tufts of upright shoots with stiff leaves like short, thick, spreading, yellowish-green conifer needles. In short montane and submontane vegetation. NPMS positive indicator in montane heaths.



Stag's-horn clubmoss *Lycopodium clavatum*. Creeping, branched stems; leaves end in white hair-points. In various upland habitats. A NPMS positive indicator in montane heaths.



Interrupted clubmoss *Lycopodium annotinum*. Like *L. clavatum* but leaves without hair-points. In taller montane and submontane *Calluna* heaths. Rarest of these four.



And finally, here are three more species found in montane heaths:



Fl 6-7



Fl 7-8



Fl 6-8

Mountain everlasting *Antennaria dioica*

Distinctive low rosettes of small oval leaves with whitish undersides, and small, dense whitish flower heads. In short and sparse vegetation.

Dwarf cornel *Cornus suecica*

Oval leaves in opposite pairs on upright stems. Leaf side veins curved (so they don't reach the edge of the leaf). Flower = creamy-white + black centre. Mainly in the taller montane heaths.

Cloudberry *Rubus chamaemorus*

Lobed leaves with toothed edges and a wrinkled texture. White flowers similar to those of bramble. Fruits like bramble but orange. Mainly in taller montane/submontane heaths and bogs.



Well, it's been such happy times in these wonderful heaths that until now I'd forgotten about the **NPMS negative indicators**! So here are photos of the main ones, all of which are listed as negative indicators for the dry heathland fine-scale habitat. The last two are listed also for montane dry heathland, along with common bent, sweet vernal-grass and wavy hair-grass: three grasses that can increase with more grazing but which occur naturally in these heaths anyway.



Birch *Betula pendula / pubescens*. Young birch grows well (and naturally) in some heaths if grazing is sufficiently light, and is seen more positively where new woodland is desired.

Bracken *Pteridium aquilinum*. Spreads by underground rhizomes from which arise numerous single (not tufted) shoots. Can colonize heath and grassland.

Bramble *Rubus fruticosus*. Palatable to large herbivores, despite its prickles, so it can do well in places with little or no grazing.

Stinging nettle *Urtica dioica*. Favours nutrient-rich soils, so not a typical heath plant but can occur, for example where the remains of a dead sheep or deer has caused very local nutrient enrichment.

Creeping thistle *Cirsium arvense*. Prickles on leaves but not on stems. Not a typical heath plant (favours richer soils) but can occur in association with localised enrichment or disturbance.



Having seen ‘warm’, ‘cool’ and ‘happy’ heaths, and then those negative indicators, we might ask: are there any ‘**sad**’ heaths? And if so, why are they sad? Is it because of negative indicator species? Or are there worse things than that? Different people will probably have different views. For me, the saddest heaths are not naturally sad but artificially so: **burned** heaths (as in the photo to the right), because fire suppresses the natural processes in heathland vegetation dynamics and can cause losses of some uncommon plants such as dwarf juniper, arctic bearberry and many mosses and liverworts. The owner or manager of a grouse moor would probably disagree with me there! **Overgrazing** can make heaths more grassy, which can involve losses of some species of interest, though many grazed heaths still retain a lot of botanical interest. Among the negative indicators, bracken can certainly colonize heathland (and grassland too), but I think the others are less worrying, and all of them less worrying than burning. Some sad heaths can become happier again if treated well – just like us, really. Anyway, here is a more healthy-looking view in northern Sutherland, looking out across bogs and lochans from a hilltop with very fine montane heath.





So – here we are now at the end of that wee tour of dry heaths of the UK, and with this view of Suilven in western Sutherland, with its skirt of dry heath and scree below monumental sandstone cliffs (all sitting on a wet heath and bog-dominated landscape on peat and older gneiss bedrock), I wish you all good times in whatever heaths you find yourselves in and I hope you found this introduction interesting and enjoyable.

