



National Plant Monitoring Scheme

Online Training Materials 17: Introduction to Rock Outcrops, Cliffs and Screens

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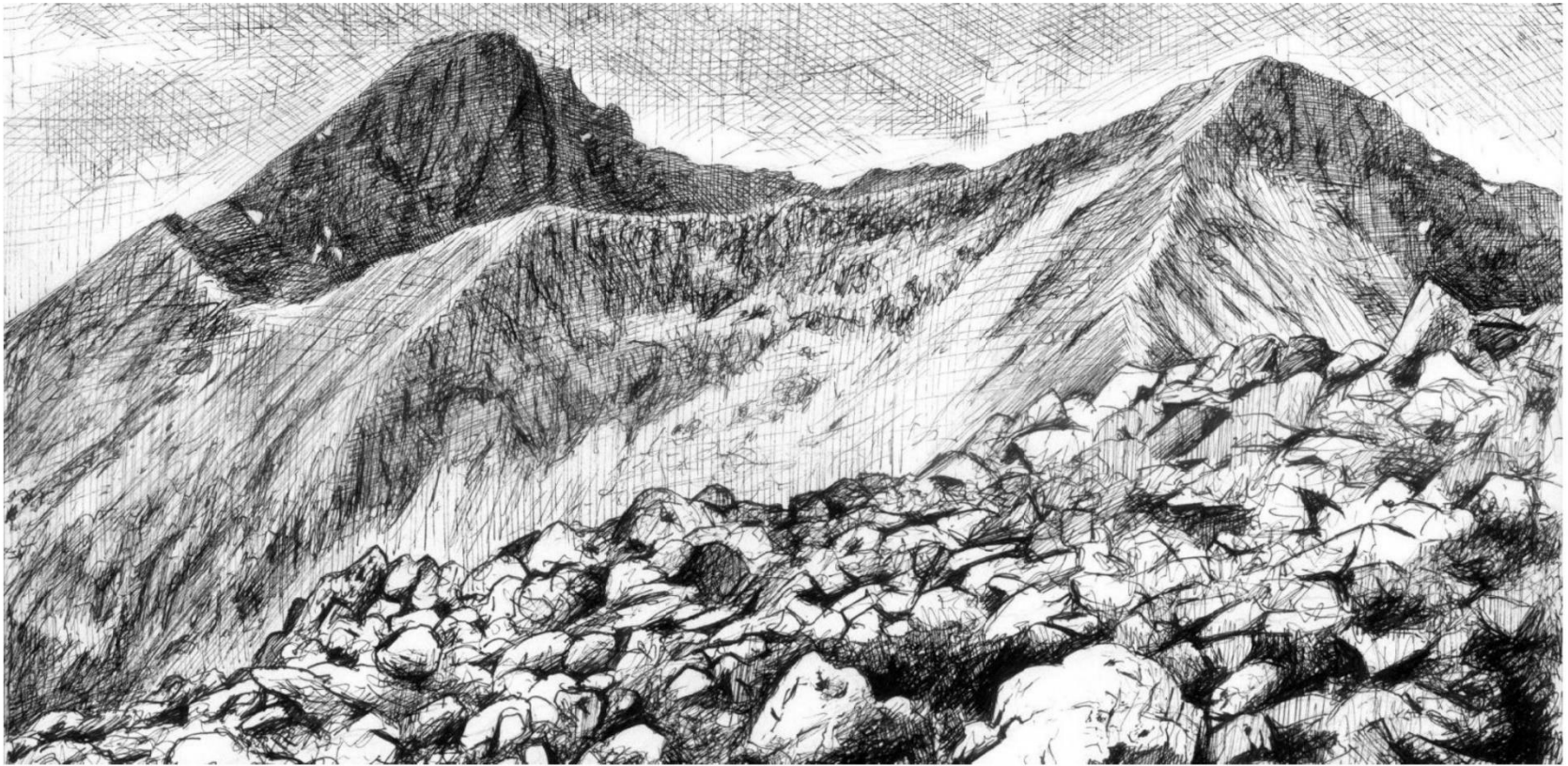
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National Plant Monitoring Scheme

An introduction to UK National Plant Monitoring Scheme broad habitat type

ROCK OUTCROPS, CLIFFS AND SCREES



Produced by Ben Averis for the NPMS in August 2020



UK National Plant Monitoring Scheme broad habitat type Rock outcrops, cliffs and screes

This covers natural rock outcrops and screes that are not coastal. It is divided into two fine-scale habitat types:

Inland rocks and scree fine-scale NPMS habitat. The NPMS guidance describes this fine-scale habitat as “ledges and crevices of cliffs, crags, rocky outcrops and screes in lowland and submontane regions (<600 m) including quarries, cuttings and the grykes of limestone pavements”, but excluding man-made structures such as dams, stone walls and buildings. It also notes that these habitats can be rich in ferns such as wall-rue and maidenhair spleenwort.

Montane rocks and scree fine-scale NPMS habitat. The NPMS guidance describes this fine-scale habitat as “ledges and crevices of natural cliffs, crags, rocky outcrops and screes in montane regions (>600 m) of the Scottish Highlands, northern England, north Wales and the Mourne Mountains in Northern Ireland”. It also notes that “these rocks tend to be acidic in nature, with ferns such as parsley fern along with fir clubmoss and bilberry (blaeberry)”, and that “calcareous cliff communities are much more localised but usually support a rich assemblage of arctic-alpine species including saxifrages, mountain willows and alpine lady’s-mantle”.

A 600 m threshold applied across the UK is simple but misleading because the montane zone (above the presumed natural altitudinal limit of woodland, with a harsh montane climate and including montane plant species) comes lower down in N-NW Scotland. The upper part of this hill in Sutherland has montane vegetation, with montane plant species, in heath, bog and rock habitats at just 350-400 m. Such places are better classed as montane than non-montane.





Let's start with the **non-montane** fine-scale habitat: **INLAND ROCKS AND SCREE**. This is the commonest of the two fine-scale habitats and is very widespread in Britain, occurring in lowlands and uplands but not in the montane zone. The NPMS guidance mentions that **ferns** can be common, so here are five pages of photos of typical species:



Wall rue *Asplenium ruta-muraria*.
Small and green or greyish-green.
Common on rocks (esp. basic) + walls.
NPMS positive indicator in this habitat.



Maidenhair spleenwort *Asplenium trichomanes*.
Small, with very dark stem contrasting with short green pinnae. Common on rocks and walls. NPMS positive indicator in all rock/screes habitats.



Green spleenwort *Asplenium viride*. Like maidenhair spleenwort but with green stem and less common (shaded basic rocks in upland areas).



Ferns of Inland rock/scree fine-scale NPMS habitat – page 2 of 5:



Rustyback fern *Ceterach officinarum*. Small, thick-textured + rusty colour beneath. On basic rocks + walls in SW half of Britain & Ireland.

Polypody *Polypodium vulgare*. Pinnae undivided. Fronds arise from a creeping stem. On rocks, walls and trees. (**Hard fern *Blechnum spicant*** is tufted, has a tougher, leathery, glossy texture and grows on acid soil.)



Ferns of Inland rock/scree fine-scale NPMS habitat – page 3 of 5:



Black spleenwort *Asplenium adiantum-nigrum*. Small and firm-textured. Lower part of main stem very dark. Mainly on basic rocks and walls.



Brittle bladder-fern *Cystopteris fragilis*. Small and thin-textured. On shaded basic rocks in N and W (mainly in upland areas). NPMS positive indicator in both rock/scree fine-scale habitats.



Ferns of Inland rock/scree fine-scale NPMS habitat – page 4 of 5:



Oak fern *Gymnocarpium dryopteris*. Small triangular fronds with very thin stems/branches. Pinnae/pinnules blunt-ended. Forms patches; shoots arise singly from underground creeping rhizomes (as in bracken). In upland woods and rocky habitats. NPMS positive indicator in montane rock and scree habitat, but at least as common in non-montane places.

Limestone fern *Gymnocarpium robertianum*. Triangular fronds more densely and intricately divided than in oak fern. An uncommon species of limestone areas. Mainly in S Cumbria-N Pennines, Peak District, NE Wales, S Wales, Cotswolds and Mendips.



Ferns of Inland rock/scree fine-scale NPMS habitat – page 5 of 5:



Hartstongue *Phyllitis scolopendrium*. Distinctively simple, leathery, shiny green fronds. On basic rocks and soils. Can be common on and among limestone outcrops and pavements. NPMS positive indicator in this habitat.



Hard shield-fern *Polystichum aculeatum*. Tufted, with rather leathery fronds and pinnules with bristle-tipped marginal teeth. On shaded basic rocks and soil.



In the usual NPMS tradition, it's QUESTION TIME!

Q1. How do you tell maidenhair spleenwort from green spleenwort?

Q2. If someone tells us they've seen "*patches of miniature bracken*", what species of fern is it likely to have been?





Answers to questions 1-2:

- A1. **Maidenhair spleenwort** has a **dark, blackish stem** contrasting with the green pinnae, but **green spleenwort** has a **green stem** (so the stem and pinnae are all the same colour).
- A2. **Oak fern**. It's like bracken in having an underground rhizome from which many single individual shoots arise. But it's so much smaller than bracken and the stems are so thin and wiry and delicate... it doesn't really look anything like bracken at all.



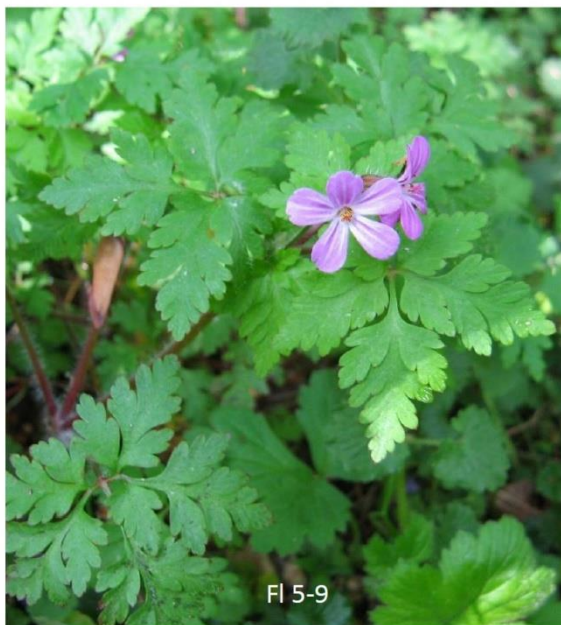


Some of those ferns (especially the first three pages of them) are rock/scree specialists, but many of the other plant species found in the Inland rock/scree fine-scale NPMS habitat are at least as common in heath, grassland or woodland. Much of the vegetation among rocks and screes could be seen as extremely sparse and fragmented forms of grassland, heath or woodland. This and the next ten pages show some of the flowering plants found in these rocky habitats. All three on this page are listed as NPMS positive indicators in this fine-scale NPMS habitat.



Fl 2-4

Dog's mercury *Mercurialis perennis*. Oval, toothed leaves in opposite pairs. Green catkin-like flowers in spring. Plants can form large patches. Mainly in woodland on more or less basic soils, but also in shaded rocky habitats outside woods.



Fl 5-9

Herb Robert *Geranium robertianum*. Leaves deeply divided in a palmate (hand-shaped) pattern. Stems and leaf stalks hairy and can be reddish. Flower quite small and pink, with some white stripes. Mainly in woodland on neutral to basic soils, but also in rocky habitats outside woods.



Fl 4-5

Hairy violet *Viola hirta*. The flower is probably pretty (having seen the species loads of times in many places over many years, I've never actually seen it in flower!) but the hairiness of the leaf and leaf stalk is distinctive. Mainly on basic soils in grasslands, dunes, among rocks, etc., in the lowlands of England, Wales and SE Scotland. Scarce in the uplands.



Here are three common herbs of these rocky places:



Common dog-violet *Viola riviniana*

As hairy violet is listed as a positive indicator species in this habitat we should note that common dog-violet is actually more common here, though not listed as a positive indicator. Its purple flower has a pale 'spur' projecting up and backwards, and its leaves aren't very hairy. This specimen looks quite normal but was actually flowering unusually late in the year, on 10th August!



Tormentil *Potentilla erecta*

Flowers with four yellow petals. Each leaf is divided into three leaflets (each leaflet with a few marginal teeth), and there are two leaflet-like stipules at the point where the leaf base joins the stem. Grows mainly on acid soils in grasslands, heaths and woods, and among rocks and screes. Listed as a NPMS positive indicator in the Inland rock and scree fine-scale NPMS habitat.



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 mainly in grasslands, heaths, woods, etc., on acid soils, and also found among acidic rocks and screes.



All species on this page are listed as NPMS positive indicators in this Inland rock and scree fine-scale NPMS habitat.



Fl 7-9

Marjoram *Origanum vulgare*. Oval leaves in opposite pairs, and clusters of pale pink flowers. Can form patches. On dry basic soils, including those among rock outcrops. Also on walls. A lowland species.



Fl 7-9

Wall lettuce *Mycelis muralis*. Leaves deeply cut into toothed lobes on left and right, with larger end lobe. Small yellow flowers in openly branched inflorescences. On shaded basic soils and among rocks (esp. limestones) and on walls.



Fl 5-7

Horseshoe vetch *Hippocrepis comosa*. Leaves with many small pairs of leaflets, as in many other vetches, but with a terminal leaflet and no tendrils. Yellow flowers in circular groups. Fruits are markedly wavy pods. In dry calcareous grassland and on limestone rock ledges. Mainly in chalk/limestone lowlands of southern Britain (N to central Britain in Cumbria/Yorkshire); not in Scotland or Ireland.



The three photographed species on this page are listed as NPMS positive indicators in this fine-scale NPMS habitat.



Rue-leaved saxifrage *Saxifraga tridactylites*. A small hairy annual with deeply divided and commonly reddish-coloured leaves, and white 5-petalled flowers. On thin dry soils and among rock outcrops and screes. Mainly in lowlands in S half of Britain.



Salad burnet *Sanguisorba minor*. Leaves with many pairs of sharply toothed oval leaflets arranged in pairs along left and right sides of the central leaf stalk. Small, dense roundish clusters of green or pink-green flowers. On dry calcareous soils and among calcareous rocks.



Barren strawberry *Potentilla sterilis*. Leaves with 3 hairy leaflets; hairs on undersides stick out. No fruits. NPMS positive indicator here. **Wild strawberry *Fragaria vesca*** is similar but has edible fruits; lower leaflet surface has closely appressed hairs; fl 4-7. Not a NPMS positive indicator here. Both species found in woods and among rocks (barren s. also in grassland).



Many grasses can be found among non-montane rock outcrops and screes. These include:



Common bent *Agrostis capillaris*. Very common in all upland grasslands. Leaf to 4 mm wide, tapering gradually to a pointed tip. Ligule <2 mm long. Conical branched flower head (old ones persist well into winter). Grows in non-montane and montane habitats.



Sweet vernal-grass *Anthoxanthum odoratum*. Leaf to 5 mm wide + long hairs at base of blade. Ligule to 5 mm long. Unbranched flower head with long flowers: glossy green at first; pale gold later. Very common in all upland grasslands. Grows in non-montane and montane habitats.



Sheep's fescue *Festuca ovina*. Short dense tufts of v. thin wiry leaves <15 cm long, and flowering stems 10-25 cm tall (flower head narrow). Ligule very short and hard to see. Very common on upland acid and calcareous grasslands. Grows in non-montane and montane habitats.



Red fescue *F. rubra*. Basal leaves wiry, to 40 cm long; stem to >30 cm tall with open-branched flower head; stem leaves to 3 mm wide. Ligule very short (hard to see). Very common in all non-montane grassland types.



Early hair-grass *Aira praecox*. Like a small sheep's fescue but annual (s.f. is perennial). Small scattered plants (not dense tufts) with small hair-like projections (awns) on the florets in the flowering head. On thin dry acid to mildly basic soils and among rock outcrops and screes.



Here are some more grasses found among non-montane rock outcrops and screes:



Fl 6-7



Fl 6-7



Fl 6-8

Crested hair-grass *Koeleria macrantha*. A bit like sheep's fescue in being short and forming dense tufts, but the leaves are not so thin and wiry and have parallel grooves and ridges running along the length of their upper surfaces. The leaves can be inrolled along their edges though, making them look narrower than they actually are. The flower heads are narrow and not branched. This grass grows mainly at low altitudes, in dry neutral to calcareous grasslands and among rock outcrops.

Meadow oat-grass *Helictotrichon pratense*. Tufted, with rather stiff leaves grey-green above and shiny darker green below. Leaf tip shortly pointed. Mainly on dry basic soils in grasslands; also among rocks – for example on cliff ledges.

Quaking grass *Briza media*. The flower heads are unmistakable with large flattened spikelets hanging on delicate wiry branches. Grows mainly in calcareous and neutral grasslands; also in base-enriched flushes, and can grow on very small pockets of soils among rock outcrops (for example on cliff ledges). NPMS positive indicator in this fine-scale habitat.



Nearly forgot – **wavy hair-grass** *Deschampsia flexuosa*. A very common grass of acid soils in upland (including montane) and lowland habitats. In grasslands, heaths, woods and various wetlands (such as bogs), and also in very rocky places. Has tufts of very thin wiry leaves like those of red and sheep's fescues but with a longer ligule, up to 3 mm (ligule barely visible in the fescues) and with delicate branched flower heads bearing silvery or purplish spikelets. Listed as NPMS positive indicator in the montane rock/scree fine-scale habitat, but equally common in non-montane rocky places.





Also – **mat grass *Nardus stricta***. This species forms distinctive dense tufts of rough-textured wiry leaves, many of the leaf blades sticking out at a wide angle. The flower head is very narrow and dark, but later turns pale with individual flowers sticking out in a fishbone-like way (see small photo). The whole plant turns very pale in winter. It isn't very palatable to sheep, deer and cattle, so in places where those other grasses are much reduced in cover and height by heavy grazing, mat grass gets a stronger competitive edge and can become very abundant. Mainly in upland acid grasslands, heaths and rocky habitats. Listed as a NPMS positive indicator in the Inland rocks and scree fine-scale habitat, but at least as common in the montane fine-scale habitat.





Any of these five dwarf shrub species can occur among acidic rock outcrops and screes, typically as sparsely scattered plants.



Heather *Calluna vulgaris*. Leaves tiny and not in whorls. Very small pale pink flowers. Grows in non-montane and montane habitats.



Bell heather *Erica cinerea*. Leaves in whorls of 3. Bright mid-pink-purple flowers. Grows in non-montane and montane habitats.



Bilberry (Scottish = blaeberry) *Vaccinium myrtillus*. Stems green and ridged. Leaves oval and pointed, with toothed edges. Small reddish or red-green flowers develop into edible dark blue berries. Grows in non-montane and montane habitats.



Cowberry *Vaccinium vitis-idaea*. Stems browner, not ridged. Leaves dark, evergreen, blunt and untoothed. Grows in non-montane and montane habitats.



Crowberry *Empetrum nigrum*. Leaves in whorls or not; quite thick + white stripe running up underside. Grows in non-montane and montane habitats.



These two colourful dwarf shrubs grow in many rocky places where the rocks are not so acidic:



Thyme *Thymus polytrichus*. Low trailing stems that are thin but actually woody (so it's a dwarf shrub). Small evergreen oval-oblong leaves. Short spikes of pale pink flowers in summer. Very common in short grassland on thin dry basic soils in upland (including montane) and lowland areas. Also among rock outcrops and screes.

Rockrose *Helianthemum nummularium*. Like thyme but with larger leaves whose upper sides have a distinct groove (with central vein). Leaf undersides are very pale. also two tiny leaf-like stipules at the base of each leaf. Flowers large and yellow. Habitat as for thyme but can also grow on slightly deeper soils and rare in the montane zone.



Wood sage *Teucrium scorodonia* grows among dry non-montane acid to quite basic rock outcrops. Here it is, with the rare pink-flowered **sticky catchfly** *Lychnis viscaria* on S-facing basalt outcrops near Stirling. *Teucrium* in foreground; *Lychnis* beyond.





More questions!

Q3. Thinking back to **horseshoe vetch** with its yellow flowers – how do we tell it from **common bird's-foot trefoil** (which also has yellow flowers)?

Q4. In the absence of fruits, how do you separate **barren strawberry** from **wild strawberry**?

Strawberries!





Answers:

- A3.** The leaves of **horseshoe vetch** have **4-5 pairs of leaflets arranged left and right** along the leaf stalk (+ a terminal leaflet), but in **common bird's-foot trefoil** there are just **three leaflets**, all arising from the same point at the end of a short leaf stalk. Note: common bird's-foot trefoil also has two leaflet-like stipules at the base of the leaf stalk, but even if you saw them and thought that made total of five leaflets, it's still fewer than in horseshoe vetch.

Common bird's-foot trefoil
Lotus corniculatus (fl 6-8)



- A4.** Look at the **hairs on the undersides of the leaflets**. Hairs **sticking out** = **barren strawberry**; hairs lying closely **appressed** = **wild strawberry**. (With fruits = wild strawberry; no fruits = could be either species, so check the leaves... unless the reason for no fruits is because you've just eaten them!)



Looking now at the habitat level, here are **cliffs and screes of Carboniferous limestone** with calcareous grasslands and (at top of slope in lower left photo) *Calluna* heath in NE Wales, and (bottom right photo) **outcrops and screes of igneous rocks** among acid grasslands and bracken in the Lake District.





This is **limestone pavement** in Sutherland: Cambrian limestone weathered into distinct blocks and intervening cracks.



Also in this same Inland rock outcrop and scree fine-scale habitat are these steep outcrops of Torridonian sandstone

Limestone pavements are more extensive in Carboniferous limestone areas in the middle of Britain (in Cumbria, Co. Durham and Yorkshire) and in W Ireland (Burren). I've never been to those pavements and don't have any photos ...



... except for a distant, zoomed-in view from the car on the M6 motorway. I was a passenger of course! The limestone pavements are pale grey. These pavements are typically associated with calcareous grassland, woodland and scrub.





Here are **cliffs and screes** of igneous rock at Salisbury Crags in the city of Edinburgh, occurring in association with grasslands (various types) and gorse scrub:





These remarkable **conglomerate outcrops** in the East Lammermuir Deans nature reserve in East Lothian have sparse but botanically interesting vegetation including rockrose and juniper.





Next picture... just grabbing my camera... and heading to the window of our house...



... some more Inland rocks and scree fine-scale habitat, albeit at a bit of a distance. But it shows the landscape setting of the acid to slightly basic outcrops of this igneous intrusion (+ a similar hill beyond). What it doesn't show is the uncommon moss *Hedwigia integrifolia* growing abundantly as sheets of gold on those steep rock faces. Fortunately I have a photo of it, taken there some years ago. It's actually a western species; this is an unusually eastern site for it here in East Lothian. But mosses are not part of NPMS! OK – better forget what I've just written about this moss. Pretend you've never heard of it. **“Really? *Hedwigia integrifolia*? Well I never! I've never heard of that one before!...”**





Another rocky habitat is **boulder-field**, where big boulders have tumbled down from upslope. This example is in the Lake District.





This boulder-field in Wester Ross is all within birch woodland and best classed as part of that broadleaved woodland NPMS habitat.





Rock faces and piles of loose rocks in **quarries** such as this partly wooded one on the western edge of Edinburgh also belong in the Inland rocks and scree fine-scale habitat...





... but built structures such as walls are excluded, so I'm afraid we can't count this...



... which is a bit unfair because without roads it would be harder to get to rocky habitats that *are* allowed, like *this*...

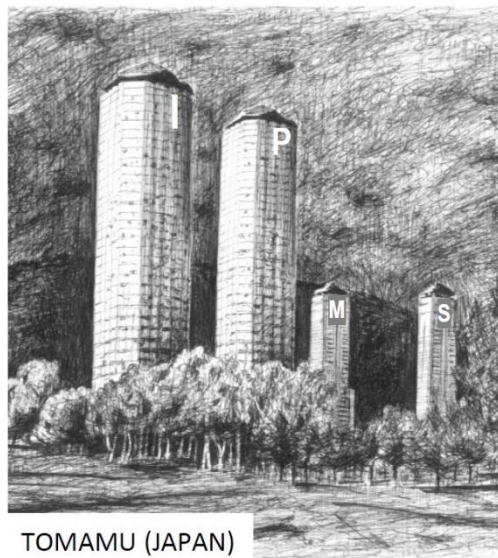




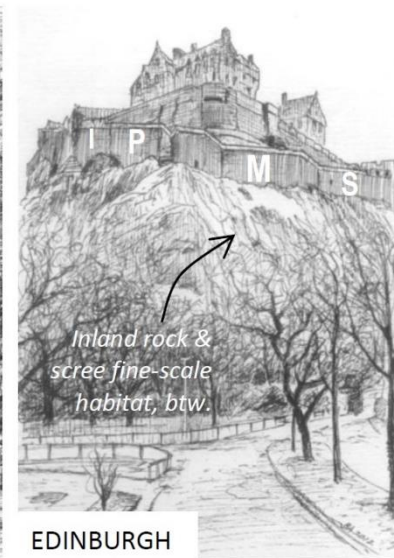
... except that those two places are in America so they aren't allowed for that reason... unless NPMS changes to **International Plant Monitoring Scheme (IPMS)**, which will need a bigger HQ somewhere:



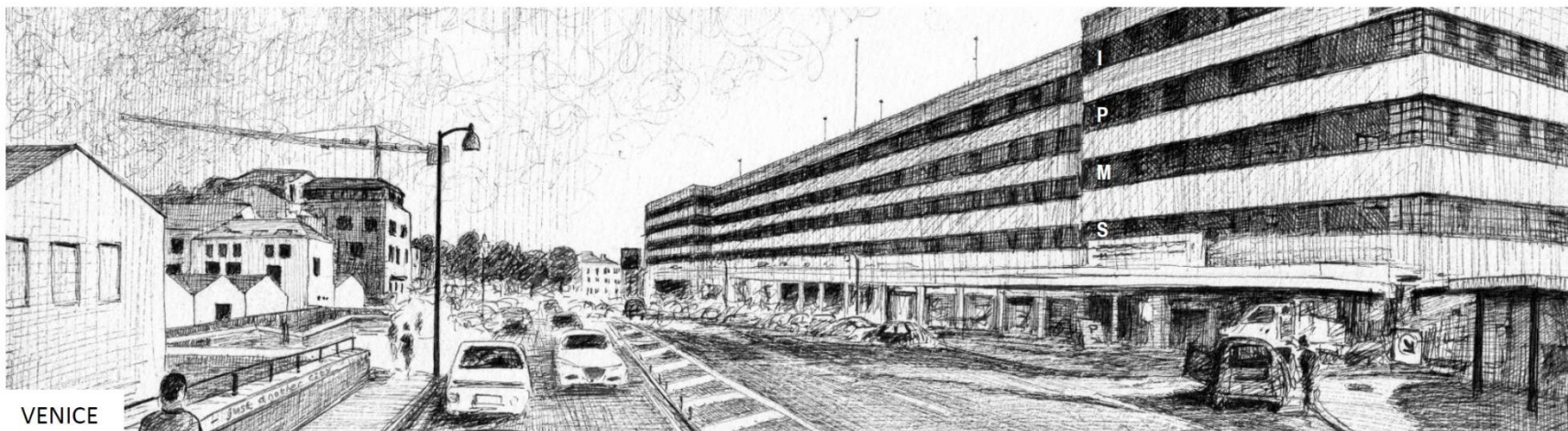
DETROIT



TOMAMU (JAPAN)



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VENICE



Anyway, getting 'back to earth' we see that the Inland rock and scree fine-scale habitat includes **old metal mine spoil** (example at left, among grasslands on Carboniferous limestone at low altitude in NE Wales) and **natural outcrops of metalliferous metamorphic rocks** (example at right; serpentinite outcrops among upland acid and calcareous grasslands in Ayrshire). These habitats have a specialized flora including thyme, sheep's fescue, common bent...





... and the uncommon **spring sandwort** *Minuartia verna* – a small plant of metalliferous rocky/stony places in non-montane uplands where the bedrock is mainly limestone or metamorphic rock. It is listed as a NPMS positive indicator in the montane fine-scale habitat type but is actually scarce in montane habitats; it is mainly lowland to submontane.





Thinking of mine waste, here's some more of it at an **old metal mine** site in NW Wales. The mine waste here must be pretty **toxic** stuff – just look at these plants of bilberry *Vaccinium myrtillus* (photo below). Dwarfed by toxicity. No berries to harvest here. And even if there were they wouldn't fill us up much, and we wouldn't eat them anyway, because we don't want this kind of thing to happen to us, right?





As if that's not negative enough, here are the NPMS **negative indicator species** in this fine-scale habitat:



Stinging nettle *Urtica dioica*. Classed as a negative indicator because it can increase in response to unnaturally (and variably damaging) high levels of nutrients.

Creeping thistle *Cirsium arvense*. Prickles on leaves but not on stems. A negative indicator in various habitats because it favours places that are affected by artificial nutrient enrichment or disturbance (including trampling and eutrophication by livestock).

Bramble *Rubus fruticosus*. Presumably counted as a negative indicator here because it can spread and potentially outcompete smaller plants.

Butterfly bush *Buddleja davidii*. This non-native bush colonises artificially disturbed ground in the lowlands, especially in or near urban areas. Its habitats include stony ground and rocky places such as old quarries. The narrow oval leaves (with whitish undersides) are in opposite pairs. Pale purple flowers in distinct spikes.

Red valerian *Centranthus ruber*. This non-native herb can colonize open and artificially disturbed rocky places in the lowlands, and also more natural steep rocky slopes in the lowlands (especially if they are close to human habitation); in all of these situations it has the potential to outcompete smaller native plants.



Now to the **MONTANE ROCKS AND SCREE FINE-SCALE NPMS HABITAT**





First, let's look at some of the characteristic species of montane rocky places, and then look at the habitats at more of a landscape scale. Some typical montane species found in these rock habitats are shown in this and the next eight pages:



Stiff sedge *Carex bigelowii*. Has relatively stiff, thick stems – hence the name. Stems markedly 3-angled. Dark flower/fruit spikes clustered near shoot tip. Leaves dull or greyish green. On acid soils. In montane grasslands, moss heaths, dwarf shrub heaths and snowbeds.



Least willow *Salix herbacea*. A tiny willow with broad oval to roundish leaves that can look like those of bilberry/blaeberry but are generally more rounded, with more of a net-veined pattern on the upper surface and with the leaf commonly folded up each side of the central vein. On thin soils, especially in exposed places.



Alpine lady's-mantle *Alchemilla alpina*. Distinctive starry leaves with silvery undersides. On acid to basic soils. NPMS positive indicator in the montane rock and scree fine-scale habitat.



Montane species of cliff/scree habitats in the montane zone – page 2 of 9:



Purple saxifrage *Saxifraga oppositifolia*. Non-flowering plants can look like thyme, but the leaves are relatively shorter with distinct marginal hairs, and can be very densely packed together. Montane base-rich habitats. NPMS positive indicator in montane rock/scree.



Mountain avens *Dryas octopetala*. Creeping woody stems with evergreen crinkly-edged leaves (dark above; pale below) and white flowers later becoming feathery fruits. In base-rich habitats.



Arctic bearberry *Arctostaphylos alpinus*. Low and creeping. Mostly in exposed short montane heaths and exposed rocky places in the Highlands; also in montane bogs. On acid soils. Leaves turn red in autumn.



Limestone bedstraw *Galium sternerii*. Like heath bedstraw but leaves with tiny backward-pointing marginal hairs (forward-pointing in heath b.). On base-rich soil. NPMS positive indicator in montane rock/scree.



Montane species of cliff/scree habitats in the montane zone – page 3 of 9:



Fl 7-8

Northern bedstraw *Galium boreale*. Leaves hairless, in whorls of four, each with 3 parallel veins. Small white flowers. Mainly in montane calcareous grassland, base-enriched flushes and in various montane rocky habitats.



Fl 6-8

Globeflower *Trollius europaeus*. Like a buttercup but with big globe-shaped flowers and hairless leaves cut into lobes in a star-like pattern. On neutral to basic soils in upland grassland and flushes, and on damp mountain cliff ledges.



Fl 6-9

Yellow saxifrage *Saxifraga aizoides*. Rather fleshy, narrow leaves (with hairs along their margins), reddish stems and many narrow-petalled yellow flowers. In basic flushes and damp, flushed calcareous grassland. NPMS positive indicator in montane rock/scree.

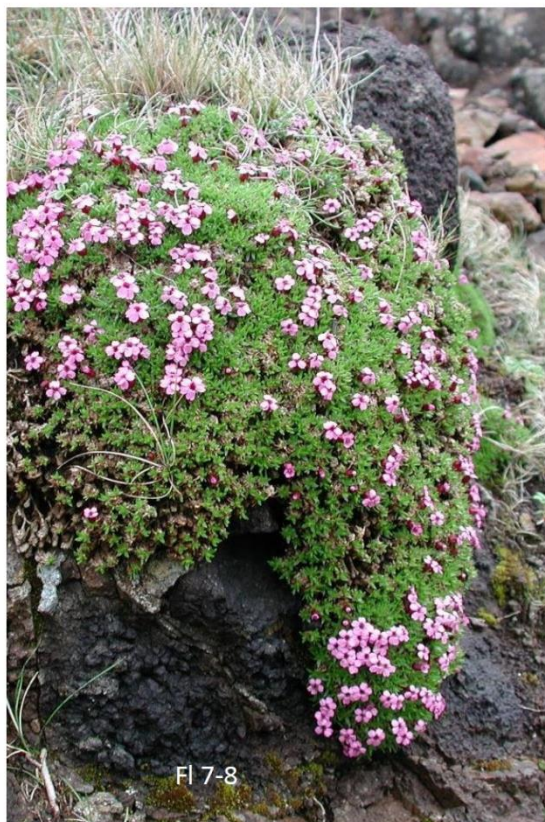


Fl 6-8

Alpine bistort *Persicaria vivipara*. Oval hairless leaves dark above and pale (with conspicuously raised central vein) below. Narrow spikes of white flowers later becoming bulbils instead of seeds. In montane to submontane base-enriched grassland and flushes, and in rocky habitats. NPMS positive indicator in montane rock/scree.



Montane species of cliff/scree habitats in the montane zone – page 4 of 9:



Moss campion *Silene acaulis*. Forms dense cushions of small narrow but thick-textured leaves. Flowers are small and pink. Grows on basic rocks and soils, mainly in montane grasslands and on montane cliffs.



Mountain sorrel *Oxyria digyna*. The leaves are roundish or heart-shaped and the flowers are green or green and reddish, like those of dock and common sorrel. Grows on rocky or stony ground in the mountains. The leaves are edible, with an acidic taste. NPMS positive indicator in montane rock/scree.



Alpine sawwort *Saussurea alpina*. The flowers are purplish but you probably won't see them (I haven't, but I've seen the leaves a lot). The leaves are tough-textured with tiny well-spaced teeth, some purplish colour (e.g. stalks or leaf edges) and rather woolly undersides. Montane cliffs and grassland; on basic soils.



Montane species of cliff/scree habitats in the montane zone – page 5 of 9:



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.



Parsley fern *Cryptogramma crispa*. An unmistakable fern with very finely-divided, parsley-like fronds forming dense clumps. Very characteristic of acidic montane and non-montane screes in the uplands. This example in Lanarkshire is not montane. Occurrences in montane screes can look very similar but can (a) have the sparse associated flora including some montane vascular plant and bryophyte species, and (b) have different adjacent vegetation (the adjacent well-grown heather and not-too-distant farmland in this photo show that conditions are not montane). NPMS positive indicator in montane rock/screes.



Montane species of cliff/scree habitats in the montane zone – page 6 of 9:

Holly fern *Polystichum lonchitis*. This forms tufts of tough, leathery fronds that are divided in a simple way, rather like those of hard fern *Blechnum spicant*, but with spiny/bristly teeth along the edges of the pinnae. It grows mainly in recesses among basic montane rocks such as basalt and limestone.



Northern rock-cress *Arabis petraea*. A small plant forming clumps of pinnately-lobed leaves that are not very conspicuous until the relatively large white flowers appear. An uncommon species of montane cliffs and screes in the Scottish Highlands and islands, Snowdonia and (very rare) Ireland.



If anyone says mountain plants are insignificant bits and pieces unworthy of our attention, then we can point them in the direction of **roseroot *Sedum rosea***. This impressive plant is a kind of giant stonecrop. Its leaves are greyish-green and very thick and succulent. The stems are very thick too, and the thick stems combined with fleshy leaves sticking out in all directions makes the plant look almost artificial and of course very easy to recognize. The flowers are small and yellow but grouped together in dense flat-topped clusters. Roseroot grows mainly on mountain cliffs. Here it is on basalt cliffs on the island of Skye in June. NPMS positive indicator in montane rock and scree habitats.





Stone bramble *Rubus saxatilis* has stems that creep over ground and steep rocky banks. It has some similarities to bramble (to which it is related) but is not prickly, has much thinner stems and is very low-grown. The leaves have three leaflets and toothed edges. They can look very much like those of wild strawberry, but their terminal leaflet is on its own short length of stalk; in wild strawberry all three leaflets arise from the same point. Stone bramble grows mainly on neutral to basic soils and rocks in woods and on cliffs in northern upland areas or Britain. NPMS positive indicator in montane rock and scree habitats.





Some base-enriched montane cliff ledges have rare **montane willows** such as these (clockwise from top left): downy willow *Salix lapponum*, woolly willow *S. lanata*, mountain willow *S. arbuscula* and whortle-leaved willow *S. myrsinites*.





Questions:

Q5. What species is this?



Q6. And this?





Answers to questions 5-6.

A5 Parsley fern *Cryptogramma crispa*.

A6 Yellow saxifrage *Saxifraga aizoides*. The reddish stems and narrow, parallel-sided, rather fleshy leaves sticking out in all directions are distinctive, even in the absence of the yellow flowers.

Q7. What are these photos of?





Answer to Q7:

Two different species here: **Left photo = stone bramble *Rubus saxatilis*** (terminal leaflet stalked).

Right photo = wild strawberry *Fragaria vesca* (terminal leaflet unstalked).

Both species can creep over stony ground. Creeping stems are visible in each photo.

After going through those species let's now look at montane rock/scree at the **habitat** and **plant community** level...





Here is an example of **montane tall herb vegetation** on more or less basic cliffs on the island of Skye in June. The rich flora here includes roseroot, globeflower, mountain sorrel, angelica, yellow saxifrage, meadowsweet, water avens, early purple orchid and various ferns including green spleenwort.





The less thickly-vegetated parts of many **montane cliffs** have a sparser cover of grasses, ferns and herbs. This example is on limestone in Perthshire and has species including alpine lady's-mantle, green spleenwort and yellow saxifrage.





Patches of **mountain avens** *Dryas octopetala* can be a significant component of a certain type of species-rich vegetation on some montane cliffs where the rock is base-rich. The species is typically accompanied by thyme (as in this photo taken on a basalt mountain cliff in Morvern in July) and various herbs and mosses. The *Dryas* here is past the flowering stage and bears the distinctive fluffy fruits.





Rock outcrops and screes can be closely **associated with other montane habitats** such as heaths, as here with cliffs, scree, boulders and heath in the Glen Coe area (left) and heaths and screes on Beinn a' Ghlo in Perthshire (right).





Here at 1100-1200 m altitude on the upper eastern slopes of Aonach Mór in the Ben Nevis range are **cliffs and screes** in close association with (and merging into) **bryophyte-dominated late snowbed vegetation** with a rich montane flora. The greener areas are mainly **montane grassland** with abundant tufted hair-grass *Deschampsia cespitosa*.





On the other (western) side of this same hill are extensive steep slopes with intricate small-scale mosaics of **rock outcrops**, montane **acid grasslands** and montane **bilberry-crowberry *Vaccinium-Empetrum* heaths**.





A distinctive form of the montane rocks and scree fine-scale habitat is **fell-field**. This looks like bare, gravelly ground and occurs mainly in very windswept places at medium to high altitudes in the Scottish Highlands and islands. Basalt is particularly prone to weathering in this way, as seen here at 500-500 m in Morvern. The fell-field on this hill has a montane flora including spiked woodrush, hairy stonecrop and the moss *Racomitrium ellipticum* – a small dark cushion-forming species that is very characteristic of western basalt fell-fields. Other basalt fell-fields on Mull and Skye have populations of the very rare Iceland purslane *Koenigia islandica*. Basalt fell-fields are more common in the Faroe Islands, where they descend to low altitudes.





Here are photos of three of the species just mentioned for fell-field on the previous page: **spiked woodrush *Luzula spicata*** (left; on Quinag, Sutherland), **hairy stonecrop *Sedum villosum*** (middle; on Beinn Iadain, Morvern) and the moss ***Racomitrium ellipticum*** (right; on Quinag). “But the moss is growing sideways on a vertical rock face – not upright on gravelly ground in fell-field!” Yes, I know. I could have just flipped the photo 90° and you’d never have noticed, but (a) that would have been technically wrong, and (b) it would not have informed you of the fact that this uncommon western moss can indeed grow on steep surfaces of rock outcrops too.





OK, my curiosity just got the better of me! Looks pretty convincing... the lighting very natural... yes, I could probably have got away with this! Too late now, but at least we've seen it both ways. One moss; two experiences! And, even better, you can do this *yourself, on the spot*, with *any* moss you find! Just (1) look at it, and then (2) turn your head 90° and take a second look. (And then turn around to see someone looking at *you*... with their head slightly on one side...)



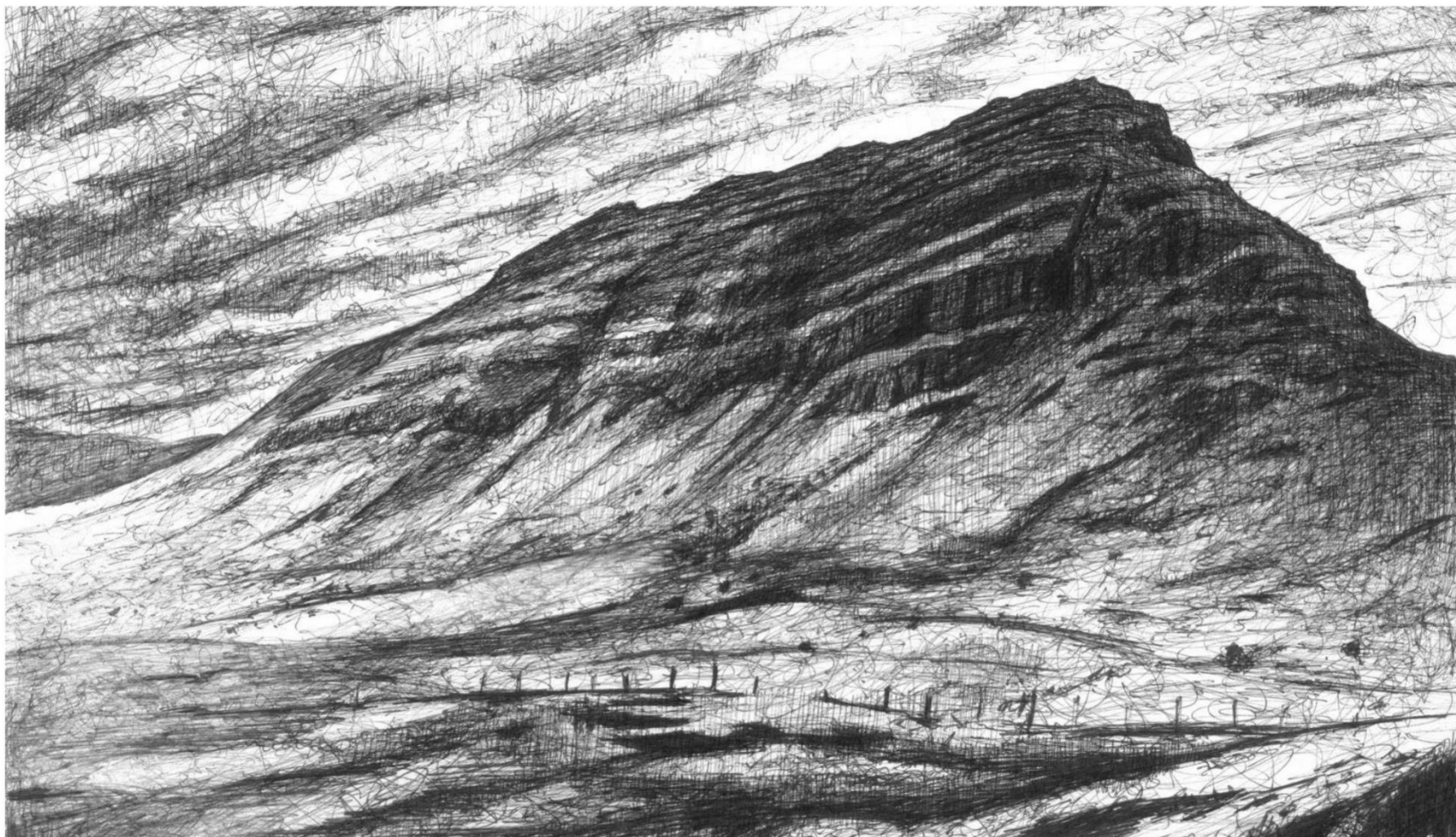


Just a quick reminder of something mentioned at the beginning of this document – the fact that rock outcrop, cliff and scree habitat of a montane nature, with a flora including montane species, can occur well below 600 m in the west Highlands. Here are two examples. Left = wind-exposed slabby outcrops and more sheltered steep cliffs at 350-550 m on acidic Lewisian gneiss and Torridonian sandstone on Quinag, in Sutherland. Right = cliffs of comparatively basic Tertiary basalt at 350-400 m on Beinn na h-Uamha in Morvern.





More montane rock habitat at a relatively low altitude: a stepped series of dark vertical basalt cliffs (with tall herb vegetation) interspersed with paler sloping benches of species-rich montane calcareous and acid grasslands, at 350-550 m on the upper northern slopes of Beinn Iadain in Morvern.





Here is some of the tall herb vegetation on those same basalt cliffs. Species here include roseroot, greater woodrush, lady's-mantle, water avens and (smaller photo) melancholy thistle.





Now to the species listed as NPMS **negative indicators** in this montane fine-scale habitat.



Stinging nettle *Urtica dioica*. This species can increase in response to unnaturally (and variably damaging) high levels of nutrients.



Creeping thistle *Cirsium arvense*. Prickles on leaves but not on stems. It favours places affected by unnatural levels of nutrient-enrichment or disturbance.



Bramble *Rubus fruticosus*. Presumably counted as a negative indicator here because it can spread and potentially outcompete smaller plants.



Ragwort *Senecio jacobea*. A robust plant with crinkly-edged lower leaves, narrow-lobed upper leaves and many yellow flowers. Toxic to grazing animals and to people.



Broad-leaved/curled dock *Rumex obtusifolius / crispus*. These tall docks are most common where there has been some kind of artificial disturbance.

These species might be (or at least might indicate) a problem if they are found to occur here, but they are actually uncommon in montane habitats. Artificial disturbance can cause problems among montane rocks and screes, but there are no particular plant species that commonly and clearly threaten the botanical/ecological interest here in montane rock and scree habitats.



With this distant view of Beinn Iadain, on top of which, in the name of habitat enhancement, I've done the obvious and 'built' a tower block, we come to the end of our quick whizz-around tour of the rock outcrop, cliff and scree NPMS habitat and to the end of my series of seven NPMS habitat presentations. I hope you found them interesting, useful and enjoyable. I say "thank you" to the NPMS for commissioning me to write these documents and provide the online training sessions, and to all of you volunteer recorders for attending the online workshops or downloading and reading these documents. I wish you all the very best with your NPMS work in the future.

Ben Averis, August 2020

