



National Plant Monitoring Scheme

Online Training Materials 2: Introduction to Native Pinewood and Juniper Scrub



UK Centre for
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An introduction to UK National Plant Monitoring Scheme broad habitat

NATIVE PINWOOD AND JUNIPER SCRUB



Produced by Ben Averis for the NPMS in May 2020



UK National Plant Monitoring Scheme broad habitat type 2:

NATIVE PINWOOD AND JUNIPER SCRUB

For NPMS purposes this broad habitat type is defined as consisting of:

NATIVE SCOTS PINE WOODLAND: Woodland in the Scottish Highlands with abundant to dominant native Scots pine *Pinus sylvestris*, commonly accompanied by other trees such as downy birch *Betula pubescens*, silver birch *B. pendula* and rowan *Sorbus aucuparia*. Juniper *Juniperus communis* can form an open shrub layer. These woods are mostly on damp to dry ground with heathy vegetation including heather *Calluna vulgaris*, bilberry (Scottish name = blaeberry) *Vaccinium myrtillus* and cowberry *V. vitis-idaea* (and, less commonly, bell heather *Erica cinerea*, cross-leaved heath *E. tetralix* and crowberry *Empetrum nigrum*). Plantations of *P. sylvestris* in the Highlands with a heathy ground layer can also be included in this category; some mature pine plantations in this area have a very similar flora to native stands and can be difficult to separate from them.

JUNIPER SCRUB: Juniper scrub in upland areas of Scotland, northern England, Wales and the Mourne Mountains (N Ireland). This is generally on acidic soils. Lowland juniper scrub on calcareous soils, on sandy soils (including dunes) or on shingle is not included here.



Native pine woodland in the Black Wood of Rannoch, Perthshire



Juniper scrub in the Southern Uplands



Related NPMS habitats that this pine/juniper habitat can grade into or be confused with:

- **Broadleaved woodland:** pine and juniper can occur in broadleaved woodland, especially birch woodland on acid soils in upland areas, but in such places broadleaves are dominant and pine and juniper no more than minor components of the canopy. It is natural for some woodland to be intermediate between pinewood and broadleaved woodland or to be a small-scale mosaic of pinewood and broadleaved woodland.



Mature pinewood mixed with large areas of younger birch in Glen Moriston



- **Heathland:** Open heath with scattered pine and/or juniper can grade into thicker stands of pine or juniper woodland/scrub. It can be hard to define the exact position of the heath-woodland boundary, as it is normal and natural for many vegetation boundaries to be gradual and indistinct.



Heath and native pines in Deeside



However, many patches of juniper scrub scattered among heaths are dense, with quite sharp boundaries



Patches of juniper scrub among heath near Slochd, between Inverness and Speyside

- **Bog and wet heath:** Bog and wet heath can show blurred boundaries with pine woodland and juniper scrub.



Pinewood and bog in Speyside



- **Planted pine woodlands outside the Scottish Highlands**, such as this pine woodland in East Lothian, are not included in the NPMS.



- **Lowland juniper scrub** (no photo I'm afraid) on calcareous or sandy soils or on shingle differs from the pine-juniper NPMS habitat in its lowland (mainly south-eastern) distribution and in the accompanying vegetation: less heathy and with a greater contribution made by grasses and herbs. Lowland juniper scrub is geographically separated from the NPMS pine/juniper habitat; the two do not occur together.



- **Heath with abundant dwarf juniper *Juniperus communis* ssp. *nana*** is quite different (very short, as you can see in this photo taken in Sutherland in July) and belongs in the Heathland NPMS habitat. Heaths with dwarf juniper are uncommon and found mainly in windy places in the uplands of the west Highlands and Hebrides.





Scots pine *Pinus sylvestris*, seen here in Deeside (L) and the Black Wood of Rannoch, in Perthshire (R), is of course an essential component of native pine woodland...



... but is not on the list of NPMS positive indicators for this pine/juniper habitat, which is understandable really because it simply must be present in all examples of native pinewood anyway, as a defining feature. So, let's check out which species are on that list of NPMS positive indicators in the pine/juniper habitat...



Tree and shrub species listed as NPMS positive indicators in pine woodland and juniper scrub:



Juniper
Juniperus communis

Conifer shrub of varied shape and size. Sharply pointed leaves in whorls of three.



Downy birch
Betula pubescens

Oval to diamond-shaped leaves with singly-toothed edges.



Silver birch
Betula pendula

Leaves more diamond-shaped with double teeth and more drawn-out pointed tips.



Rowan
Sorbus aucuparia

A bit like ash, but the leaves are not arranged in opposite pairs along the twigs.



Dwarf shrubs of pine woodland and juniper scrub (all but one = listed as NPMS positive indicators in this habitat):



Heather
Calluna vulgaris
NPMS positive indicator.
Leaves tiny and not in whorls. Very small pale pink flowers (paler than in *Erica* species).



Bell heather
Erica cinerea
NPMS pos. indicator.
Leaves in whorls of 3. Bright mid pink-purple flowers in short to long spikes.



Cross-leaved heath
Erica tetralix
Not on the positive indicator list. Leaves hairy, in whorls of 4. Round clusters of pale pink flowers.



Bilberry/blaeberry
Vaccinium myrtillus
NPMS pos. indicator.
Stems green and ridged. Leaves oval and pointed, with toothed edges.



Cowberry
Vaccinium vitis-idaea
NPMS pos. indicator.
Stems browner than in bilberry. Leaves dark, evergreen, blunt and untoothed.



Crowberry
Empetrum nigrum
NPMS pos. indicator.
Leaves in whorls or not, and quite thick, with white stripe running up underside.



Ferns that are NPMS positive indicator species in pine woodland and juniper scrub:



Hard fern
Blechnum spicant

Forms tufts or low tussocks on acid soil. Fronds are leathery and single-pinnate (side divisions not divided further).



Oak fern
Gymnocarpium dryopteris

Triangular fronds not in tufts. Fronds are very subdivided with end divisions rather blunt-tipped. Stem and branches thin, so plant looks delicate.



Lemon-scented fern
Oreopteris limbosperma

Forms tufts of tall, finely divided fronds whose side divisions continue (becoming very short) almost down to base of main stem.



Oh – going back to birch trees for just a sec...

I forgot to say earlier that the trunks of silver birch (L) – the older ones at least – can become thick, grey and deeply and regularly furrowed, looking quite different to those of downy birch (R) which are more irregular in form and colour, with more of that distinctive ‘birchy’ mix of whitish bark and dark horizontal markings. Silver birch can also grow taller, with a straighter trunk.



These differences can be useful, along with the leaf shape – what was it now, something about teeth and tips? More about birches on the next page...



Hello – you're through to the 'next page', with more about birches.

Which one is this? (not so obvious with all that moss/liverwort cover!)



Downy birch

... and this?



Actually I just put this in for interest. *Betula ermanii* in Japan!

And the answer to the question on the previous page:

- silver birch leaf – double teeth + longer sharper tip
- downy birch leaf – single teeth + shorter, less sharp tip



Some more NPMS positive indicator species in pine woodland and juniper scrub:



Sweet vernal-grass
Anthoxanthum odoratum

Distinctive flower head with narrow spikelets.



Wavy hair-grass
Deschampsia flexuosa

Branched head (branches thin and wavy). Leaves very thin and wiry. Grows on acid soils.



Wood anemone
Anemone nemorosa

Leaves deeply divided in star-like pattern. Rather large white 6-petaled flowers.



Wood sorrel
Oxalis acetosella

Smaller white flowers with 5 petals (looking big here just because of scale of photo). Clover-like leaves with three leaflets.



I didn't have enough room back there on that last page to say how to tell wood sorrel's leaves from clover leaves (which are also divided into three leaflets). 1. Each clover leaflet has many veins on each side, all straight and running right out to the very edge of the leaflet, but each wood sorrel leaflet has just three or so curved, indistinct veins on each side. 2. Many clover leaflets have little teeth along their edges, but those of wood sorrel are untoothed. 3. Wood sorrel leaflets are heart-shaped, but clover leaflets are oval with a tip that has no indentation or just a tiny notch. By the way, I recently came across some populations of wood sorrel with some pink flowers. Here's a photo. And talking of pink...

Q1: can you place the three heathery types of dwarf shrub in these pine-juniper habitats in order of darkest to palest pink flower colour?

And here are three more questions:

Q2: which dwarf shrub species is this? >>>>>>>>

Q3: how do you tell rowan from ash?

Q4: and Scots pine from Lodgepole pine?





Answers to questions on previous page:

A1: Bell heather = darkest

Cross-leaved heath = in the middle of these three

Heather = palest

A2: Bilberry/blaeberry. Even without the leaves you can tell it by the distinctive green stems with longitudinal ridges running up them. These stems actually look very much like those of broom, which of course is much bigger.

A3: Ash leaves arise in pairs along the twigs, but those of rowan do not. Also, ash is a bigger tree, and rowan has creamy-white flowers, red berries and more shortly pointed leaflets. Rowan is commoner than ash on acid soils.

A4: Yes, that one was unfair of me (sorry!) because we haven't yet looked at Lodgepole pine (*Pinus contorta*) in this document. It's an American species, planted a lot in the uplands. It can look very like Scots pine but its leaves are not so bluish-green, its bark is greyer, lacking the reddish-orange often seen on Scots pine's trunks and branches, and the cone scales commonly have a bristly projecting spine (noting that actual 'bristlecone pine' is a completely different tree species).

Why am I asking you all these questions? Well, the NPMS people thought it would be a good idea. For your sake of course. They reckoned you'd like it. For botanical practice, and for a feel of communication or being interactive



Another page of NPMS positive indicator species in pine woodland and juniper scrub:



Wild strawberry
Fragaria vesca

Hairs on underside of leaflets are closely appressed (hard to see; underside can look quite smooth). Plant can have edible fruits.



Barren strawberry
Potentilla sterilis

Hairs on leaflet underside stick out, looking more hairy than in *Fragaria*. Also, leaf is duller green and terminal tooth very small. No fruits.



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.



Let's give a whole page to chickweed wintergreen *Trientalis europaea*! Not just because it's another NPMS positive indicator in this habitat, but also because it is such a distinctive and characteristic north-eastern species, growing on acid soils in pine, birch and juniper woods and in heaths, under bracken and even in bogs, and "because it's worth it!" in being beautiful, with its white flowers held up on long thin stalks above the whorl of uneven-sized leaves turning pinkish in autumn. I shouldn't really tell you this (because mosses are outside the remit of NPMS) but the moss in the autumn photo is *Rhytidiadelphus triquetrus*: a common companion of *T. europaea* in east Highland woods.





Just two more pages of NPMS positive indicator species in pine woodland and juniper scrub:



Harebell
Campanula rotundifolia

Pale blue flowers on delicate stalks. Leaves small and heart-shaped at plant base but long and very narrow (more linear) up the stem.



Bitter vetch
Lathyrus linifolius

2-4 pairs of leaflets, so leaflets are fewer and larger than in most vetches. Flowers pink-purple, in groups of 2 to 6.



Common cow-wheat
Melampyrum pratense

Narrow oval leaves in opposite pairs. A bit like greater stitchwort but stems not square-sectioned and flowers yellow.



Last page of NPMS positive indicator species in pine woodland and juniper scrub:



Common dog-violet
Viola riviniana

In the NPMS list this is written as common dog-violet / early dog-violet *V. riviniana* / *reichenbachiana*, but *V. reichenbachiana* (which looks like *V. riviniana* but has a dark 'spur' sticking up from the back of the flower) is a species of more or less calcareous soils in the lowland of the southern half of Britain, so it is not to be expected in this pine/juniper NPMS habitat.



Stone bramble
Rubus saxatilis

Stems creep over ground and steep rocky banks. Has some similarities to bramble (to which it is related) but is not prickly, has much thinner stems and is very low-grown. Leaves have three leaflets and can also look like those of wild strawberry but with terminal leaflet on its own short length of stalk. Found mainly on neutral to basic soils in northern upland areas.



Common mouse-ear
Cerastium fontanum

Short, with hairy stems and small oval hairy leaves in opposite pairs. Small white flowers with 5 petals (each one with a notch at its tip). Found mostly in grassland, where it is very common.



Two pages of uncommon wildflower specialities of pine woodland. More details about these are in the Plantlife booklet 'Managing Scotland's pinewoods for their wild flowers' at https://www.plantlife.org.uk/application/files/7314/8233/9572/25747_PinewoodFlowersLRes.pdf



Common wintergreen *Pyrola minor*. Leaf broad oval and blunt, with 16+ shallow teeth per side; leaf stalk typically a bit shorter than leaf.



Intermediate wintergreen *P. media*. Leaf broad oval to rounded, with <16 shallow teeth per side; leaf stalk at least as long as leaf.



Serrated wintergreen *Orthilia secunda*. Leaf oval and pointed, with obvious teeth (11-15 per side).



One-flowered wintergreen *Moneses uniflora*. Solitary flower. Roundish leaf + short stalk + many small, pointed teeth. Very rare.



Second page of uncommon wildflower specialities of pine woodland:



Twinflower *Linnaea borealis*

Low trailing stems with small roundish leaves in opposite pairs. Flowers in pairs on upright, branched stalk. Can form extensive patches carpeting the ground.



Creeping ladies-tresses *Goodyera repens*

Oval, blunt, untoothed dull green leaves in low rosettes (see inset photo). Spike of white flowers; the spike can show some degree of spiral twist.



Lesser twayblade *Neottia cordata*

A small orchid with just one pair of leaves a short distance up from the base of the stem, and a spike of small brownish flowers.



Question time again!

- Q5: Of all the species we've seen so far, which two stand out in having leaves that are noticeably variable or inconsistent? In what ways are their leaves variable and inconsistent?** (The two species differ in the nature of the inconsistency, by the way.)
- Q6: What do common cow-wheat and twinflower have in common?**





Here are the answers to the questions on the previous page:

A5: The two species are:

1) chickweed wintergreen, which has a single whorl of leaves that are quite ordinarily oval in shape but are of varying sizes within the whorl (photo at top right), and

2) harebell, whose lower leaves (small and heart-shaped to roundish, and looking a bit like small violet leaves) are totally unlike the very narrow leaves growing up the stems. Here are two photos. They look like different species!

A6: They both have leaves in opposite pairs.

What? They both grow in pinewoods? Ah – so they do!





Now is the time to turn our attention to the species with the dubious honour of having made it to the list of NPMS **negative indicators** in this pine woodland and juniper scrub habitat:



Stinging nettle
Urtica dioica

Native, but classed negatively because it is an indicator of eutrophication: it can increase in response to artificial nutrient enrichment (e.g. runoff from fields treated with agricultural fertilisers, or dung and urine from livestock) and can then outcompete other plants.



Creeping thistle
Cirsium arvense

Distinguished from other thistles by its leaves being prickly but its stems actually lacking prickles. Native and very common, especially where there has been some ground disturbance such as trampling, or where such disturbance is combined with nutrient enrichment.



Bracken
Pteridium aquilinum

Fronds arise singly (not in tufts), spreading from an underground rhizome – hence it can spread a lot and come to dominate large areas. A native fern found mostly on neutral to acid soils in woods and in the open. More common in broadleaved woodland than in this pine-juniper habitat.



Rhododendron
Rhododendron ponticum

This non-native species is a very big problem because it spreads through woodland, overshadowing almost all the native plants beneath, and is hard to eradicate. Particularly bad in many western broadleaved woods, but also present and problematic in some native pinewoods too, like this one in Wester Ross.



Some other things of interest in this habitat

Native pinewoods can be very good places for mosses, including the beautiful *Ptilium cristacastrensis* – a northern species that grows on acid soil and humus in woods of pine, birch and oak, and also in heaths.





Pinewoods vary from dry, with species such as bell heather (as seen here in a pinewood on a south-facing slope at Dungreggan, in Glen Moriston)...





... to damp, with species including the red-coloured moss *Sphagnum capillifolium*, seen here near Loch Arkaig in the west Highlands. Damp pinewood is commonest on northerly aspects and in the west.





Although pinewoods typically have heathy ground vegetation, some examples differ in that the ground layer is grass-dominated.

They can have a dry grassy layer (see photo at right, taken in east Sutherland) including species such as wavy hair-grass, sweet vernal-grass and bent grasses (*Agrostis* species) mixed with herbs such as heath bedstraw, wood sorrel, chickweed wintergreen and tormentil *Potentilla erecta*, and other plants such as hairy woodrush *Luzula pilosa* and bracken.

Or they can be wetter, with abundant purple moor-grass *Molinia caerulea* (see photo below, taken near Loch Arkaig).

Either way, you can usually find some dwarf shrubs in these grassy swards, but sparse and inconspicuous compared with the usual heathy ground layer.



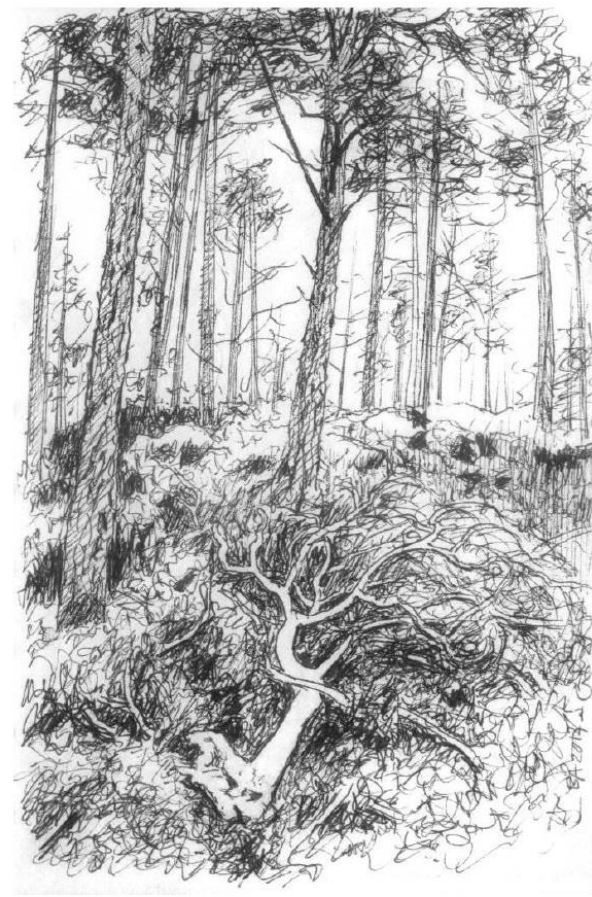


Some pinewoods (including plantations) in NE Scotland have an extraordinary ground layer consisting mainly of pale whitish lichens of the genus *Cladonia*. This can look like snow beneath the pines, and forms a floristic link with similarly lichen-rich boreal pine forests in Scandinavia. Here is an example on the south side of the Moray Firth.





Talking of snow – real snow this time – the dense foliage of pines can hold a lot of snow in winter. The weight of it can cause large branches to break off. Here are two examples in the Black Wood of Rannoch in Perthshire – they came down in winter 2009-2010. There are pines just up the road from our house here in East Lothian, and in early 2018 I was close by when a snow-laden branch snapped off, making a noise like a gunshot.





There can be a similar effect of snow on juniper too, and we can see that this process could play a significant role in determining the overall shapes of these trees and shrubs. We can see more extreme examples of this sort of process in other parts of the world, such as Hokkaido in northern Japan, where they get such massive amounts of snow in winter that trees such as these birches (*Betula ermanii*) in the right hand part of this photo grow with a pronounced slant that we in Britain would assume to be the result of wind. But here at Shiretoko it is snow more than wind.





Back here to the UK, and we can find that old dead pines like this one near Loch Arkaig are important habitats for fungi, lichens, mosses, liverworts and insects.





Juniper is very variable in its growth form. Some bushes are broad and low; others taller and columnar. Here are examples of different juniper growth forms in Speyside.





... and in Perthshire...





... and in the Lake District.





... oh, and here at Dundreggan in Glen Moriston too. (Yes, I know – we're really 'going to town' here with examples of multi growth form junipers! But that's OK – we all deserve a bit of indulgence from time to time.)





The ground vegetation in juniper scrub varies from grassy, as in this very grazed example between Inverness and Speyside (photo taken in May)...





... to more heathy, as here in the Lammermuir Hills.



Q7: Which species of fern is this?



A7: Yes, it is hard fern *Blechnum spicant*.

By the way, the other fern (a bit further left) is broad buckler fern *Dryopteris dilatata*, and its top part has been bitten off, presumably by a roe deer. Hard fern and most of the shuttlecock-style ferns (buckler ferns, male fern, lady fern, etc) are palatable to large herbivores, so their condition can be a useful clue to the amount of grazing in woodland. In some places grasses and certain other plants grow quite lush, giving an impression of minimal grazing until one finds bitten-back fronds of ferns, bitten leaves of greater woodrush *Luzula sylvatica*, and browsed plants of other palatable species such as bramble, raspberry and honeysuckle; it is then apparent that there is actually a bit more grazing than the initial first impression might have led one to believe. Bracken is very much in contrast to those ferns in being (a) not tufted and (b) not palatable to large herbivores. Here are some more photos of palatable ferns that have been grazed by deer. L-R: broad buckler-fern; male fern *Dryopteris filix-mas*; hard fern.





The trunks and branches of old junipers can look remarkably sculptural because of their complicated, twisted forms. This specimen, in the Lammermuir Hills in East Lothian, is on a dry and well-lit slope, which is why its old stems are dry and have a pale and an almost bone-like look.





In contrast, this old juniper at Dundgreggan, in Glen Moriston, is in a more shaded and humid setting, so it is well covered in mosses, liverworts and lichens.





Let's end with some close-up views of the foliage and cones/berries of Scots pine (L) and juniper (R). I hope you found this introduction to the pine-juniper habitat interesting and useful.

