



Mountain birch (*Betula pubescens tortuosa*)

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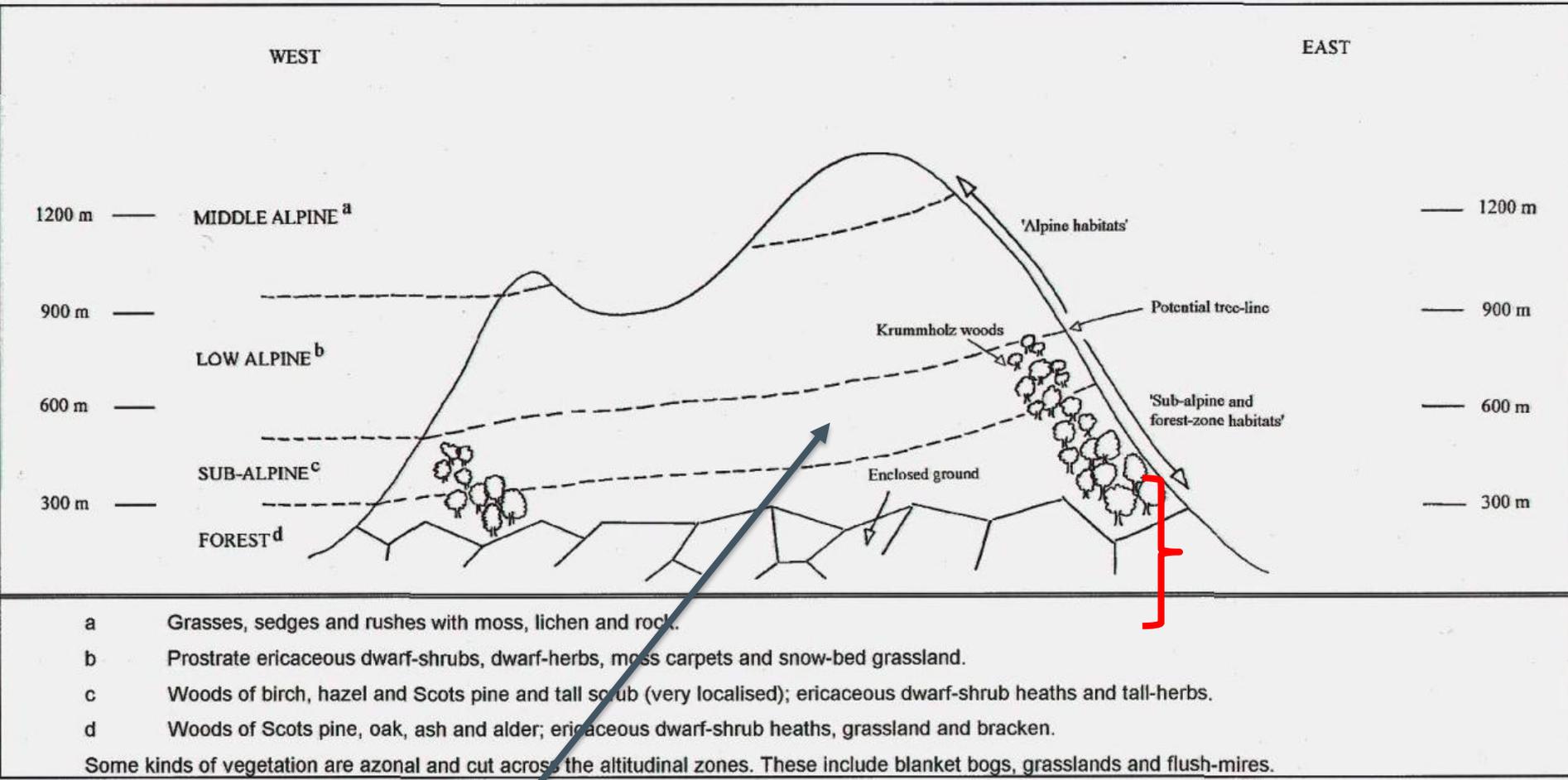


- Mountain birch *B.p. tortuosa* is the high altitude/latitude form of *Betula pubescens*
- It is freely interfertile with lower ground forms and intermediate forms are usual at intermediate altitudes. The subspecies designation is to a degree a human line-drawing exercise imposed on a continuous nature.
- However, the form maintains itself despite a line of contact with the lower ground form up and down every glen in the Scandinavian and other mountain regions (e.g. Alps, Carpathians), and in the high arctic transition
- This indicates there are features of the form which adapt it to life at high latitudes/altitudes, as does the failure of attempts to establish birchwoods at those altitudes in Scotland using lower ground seedlings
- In common with other species/forms of higher altitude tree in Britain (such as montane willows*), it is now extremely rare – a few individuals or clumps, mainly in refugee habitats such as cliffs.
- The extinction of this zone as a habitat in Britain can make it hard for people to realise what has been lost.

*There are also distinct montane forms of juniper, rowan, and bird cherry. It is probable that grey alder *Alnus incana*, for which cliff refugia were unsuitable even as 'refugee habitat', was also formerly present at these altitudes in Britain; but is now extinct.

- The form is of low to medium height, usually not more than 4m to only about 20cm.
- It is characteristically (though with exceptions) branching and twisted in form. Typically (though with exceptions) has smaller leaves than the lower ground form.
- It is **the** main tree species/form from the upper pine limit to the low alpine zone. The woodland formed is mainly an open mosaic, with a diverse ground layer.
- In most of Scotland this would be from about 600m-900m, limits depending on local climate.
- It is very robust to exposure, for example growing on ridges at 900m where snow blows off in winter in Byklehei, SW Norway (very similar in climate and geology as the Cairngorms).
- But also grows where snow cover lasts for months, and in mild, wet parts of the extreme SW without any reliable winter snow.
- Very tolerant of different soils and geologies.
- But vulnerable to long-term overgrazing, as seedlings are very palatable.

Fig. 1. Diagram of altitudinal vegetation zones in the uplands of Scotland. The altitudinal ranges are indicative, and descend lower in exposed areas of the north-west and far north. The left hand side provides European Continental terms, and the right hand side gives recommended terms for Scotland.



From: Scottish Natural Heritage

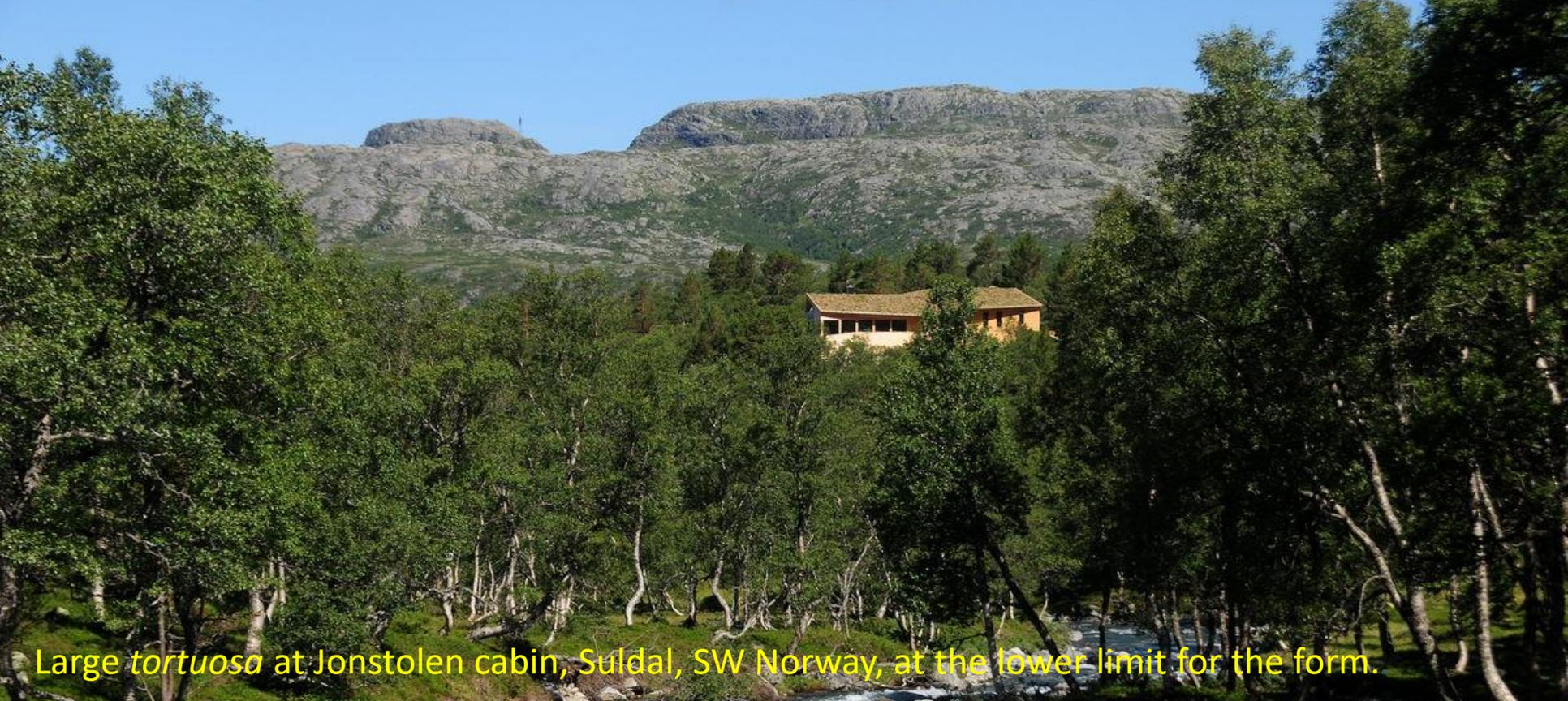
Aka 'birch belt' and 'willow region' (vernacular Norwegian). Both are extinct as habitats in Scotland. *Tortuosa* dominates the birch belt, and is common in the 'willow region' (where montane willows common, not necessarily dominant). Typically open associations, with a rich ground layer.

Typical form and size of *tortuosa* birch





Calf-height *tortuosa* (and juniper) at the extreme upper limit of growth



Large *tortuosa* at Jonstolen cabin, Suldal, SW Norway, at the lower limit for the form.



Tortuosa growing near its altitudinal limit, 950m in Bykle , SW Norway (Dagmar Hagen explains the habitat to a group of visiting Scots)



A natural transition from *tortuosa* –dominated open woodland associations to low alpine vegetation, c. 900m, Bykle, SW Norway



Mature *tortuosa* open woodland, Rogaland, SW Norway



A mixed-species association of *tortuosa*, montane willows, and juniper with open patches, at the upper limit of growth; c. 950m, Bjåen, SW Norway.



Seedling *tortuosa* birch.
Palatable to grazers!



Tortuosa-dominated montane woodland at Sloaros, SW Norway; c. 850-900m asl. Note typical open character, and cabin providing scale. Geology here is base-rich.



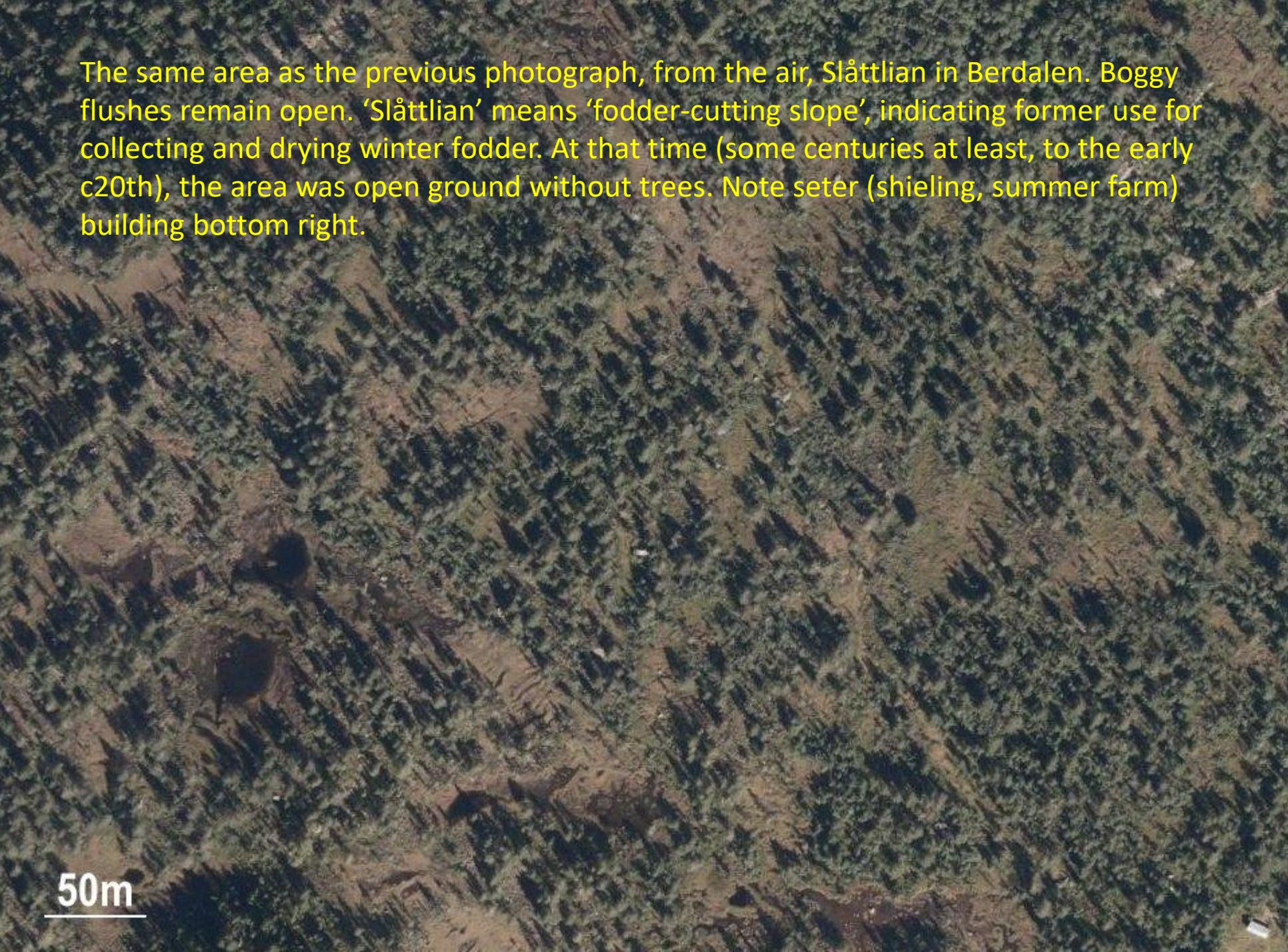
Ground layer in recently regenerated *tortuosa* woodland, Berdalen, SW Norway, in August.
Granite geology, c. 800m asl.

Foreground flowers are Alpine blue sow-thistle, common in Norway except in heavily grazed regions; confined in Scotland to four isolated, treeless 'refugee habitat' cliff ledges (and severely inbred, rarely producing seed and that usually deformed). This is typical natural habitat.

Place names and maps indicate the site was open rough grazing for centuries at least, until the 20th century.

The same area as the previous photograph, from the air, Slåttilian in Berdalen. Boggy flushes remain open. 'Slåttilian' means 'fodder-cutting slope', indicating former use for collecting and drying winter fodder. At that time (some centuries at least, to the early c20th), the area was open ground without trees. Note seter (shieling, summer farm) building bottom right.

50m

An aerial photograph showing a dense forest of evergreen trees on a slope. The forest is interspersed with numerous small, irregularly shaped clearings or 'flushes' of brownish ground, which are described as boggy. The overall pattern is a mosaic of dark green and brown. In the bottom right corner, a small, light-colored rectangular structure is visible, identified as a seter building. A white scale bar is located in the bottom left corner.

Bygdeheii 1306m

'Birch zone' above conifer treeline.
Note gradual 'fade' into low alpine zone.

Old seter innmark (inbye field) boundaries

Seters were usually established in the birch zone, above the conifer woodland, because of the good ground layer forage and because the birches and other trees were also palatable to domestic stock. Over time this eliminated the birch and willow zones as habitats in most of SW Norway (and all of Scotland). There has since been extensive regeneration in SW Norway, especially since the 1950s, due to declines in grazing pressures.

c. 750m

Seter: summer farm, shieling. Typically cows were grazed (and milked) in the 'innmark', sheep and goats grazed in the 'utmark', or rough grazing, in summer. Hay harvested from suitable grass-dominated slopes. Animals were driven to lower levels for the winter.

View WSW from shoulder of Jarekollen at c. 900m

Voilenuten 1343m

Bosvatn 551m

Foreground is typical 'rabbe' vegetation - found on ridges, etc. where snow normally blows off in winter. Willow is typically found in more sheltered locations with snow lie.

View west from Hovednuten summit (1119m), SW Norway; granite geology and climate very similar to central Cairngorms. The loch is just above the local conifer treeline.

Lisle Storenut 1205m

Breivevatnet 759m



Another view from Hovdenuten (1119m), looking south



Low alpine zone

Willow region (small *tortuosa* common)

Birch belt (*tortuosa* dominates)

Hartevatnet 759m

Conifer zone



A redeveloping natural treeline sequence in coastal Trøndelag, with *tortuosa* birch beginning to form a belt above the conifer treeline. All the woodland in this photograph is less than 100 years old, and has regenerated naturally following reductions in grazing pressures.