

## Pinus sylvestris in Europe: distribution, habitat, usage and threats

T. Houston Durrant, D. de Rigo, G. Caudullo

The most widely distributed pine species in the world, the conifer *Pinus sylvestris* (Scots pine) can be found all the way across Eurasia. The huge pine forests of Siberia are the largest stands of an individual tree species in the world. Even the name “*sylvestris*” comes from the Latin “of forests”. Having such a large range means that it is genetically very variable and a number of sub-species and varieties exist. However, it can often be easily recognised because of its distinctive orange-red coloured bark. Scots pine is a pioneer species, frost and drought tolerant and able to grow on very poor soils, so it can be found in many ecologically diverse habitats. Its timber is valued for its good strength to weight ratio and it is both commercially and culturally a very important species in a number of European countries, particularly in the more northerly regions.

*Pinus sylvestris* L. (Scots pine) is a medium-sized conifer. It reaches 23-27 m in height on average but can attain over 40m<sup>1</sup> and live for 400 years or more: one tree in Lapland is reported to be over 750 years old<sup>2</sup>. The bark on the upper part of the stem develops a distinct reddish-orange colour while the lower part is furrowed brown to grey-brown and becomes deeply fissured. Its blue-green or grey-green needles are in pairs, generally slightly twisted and are around 5-7 cm long<sup>3</sup>. They stay on the tree for at least 2, and in some cases up to 6 years<sup>1</sup>. The needles are adapted to deal with cold and drought, having imbedded stomata and a waxy layer on the thick-walled epidermis to protect the needle from water loss<sup>4</sup>. It is a wind-pollinated species and is normally **monoecious** but mature trees may very occasionally bear only male or only female flowers<sup>5</sup>. The male flowers cluster at the base of new shoots and are yellow or pink; the female flowers occur at the tips of new, strong shoots and develop a rose-purple shade. The cones develop the year following pollination and are conic-oblong 5-8 cm in size<sup>3,6</sup>. They require alternating periods of dry and wet weather to open and shed the winged seeds, which can be dispersed some way from the parent tree<sup>7</sup>.

### Distribution

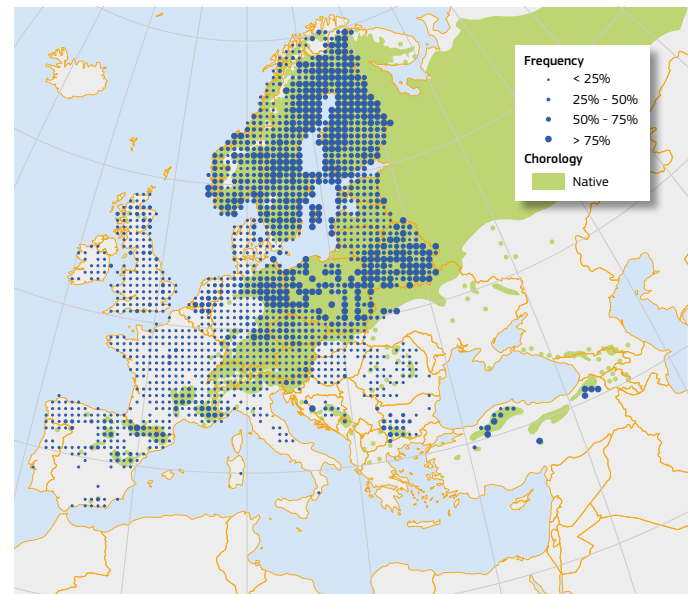
Scots pine is the most widespread species of the *Pinus* genus in the world, and the second most widespread conifer after common juniper (*Juniperus communis*)<sup>8</sup>. It occupies a range from Spain in the west to the far east of Russia. In terms of latitude it can be found from northern Scandinavia (70°N) to the mountains of Sierra Nevada in southern Spain (37°N). It grows at a wide range of elevations, from sea level in the northern parts of its range to over 2600m in the Caucasus. It has also been widely planted in the United States (where it is referred to as Scotch pine), especially in the Northeast, Lake States, Central States and the Pacific Northwest<sup>7</sup>.

In Europe, Scots pine forests now exceed 28 million hectares,

comprising over 20% of the productive forest area<sup>9</sup>. The tree varies widely in form throughout its range and there is debate over how many separate subspecies should be recognised<sup>8</sup>. Its modern genetic diversity is probably caused by its isolation in a number of glacial refugia during the last ice age<sup>10</sup>.



⋯ The upper part of the trunk is a distinctive reddish-orange colour. (Copyright Alfonso San Miguel: CC-BY)



⋯ Map 1: Plot distribution and simplified chorology map for *Pinus sylvestris*. Frequency of *Pinus sylvestris* occurrences within the field observations as reported by the National Forest Inventories. The chorology of the native spatial range for *P. sylvestris* is derived after EUFORGEN<sup>32</sup>.



⋯ Male flowers are yellow or pink and clustered at the base of new shoots. (Copyright Andrey Zharkikh, www.flickr.com: CC-BY)

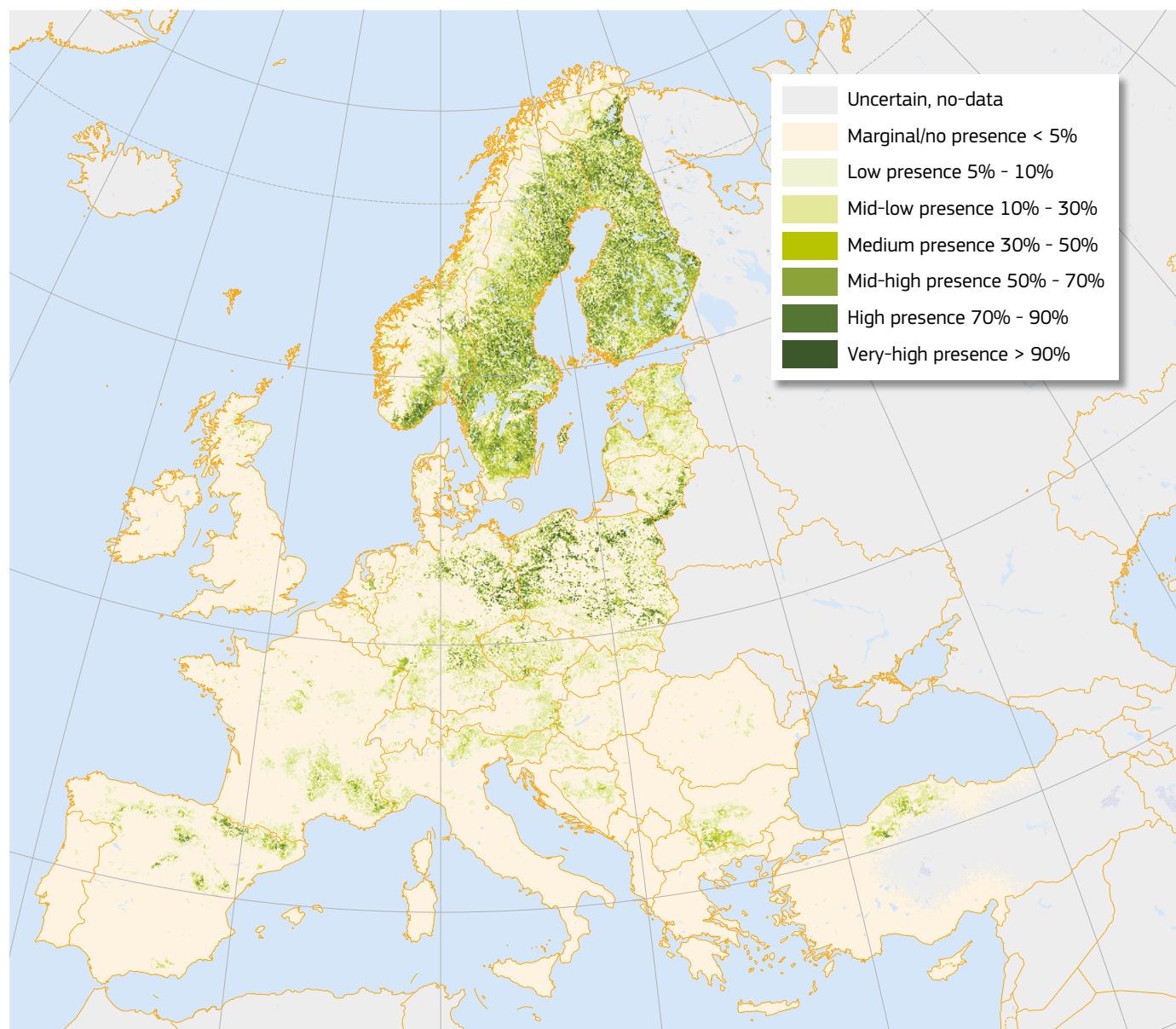
### Habitat and Ecology

It is a light-demanding pioneer species and can colonise recently disturbed sites if competition and grazing pressure are low<sup>11</sup>. It grows mainly on sunny to partially shaded, usually nutrient-poor sites<sup>12</sup>. With a pronounced drought tolerance and also good frost resistance, it is very undemanding as to site and water supply and can grow on the poorest sandy soils, even colonising acid highland moors<sup>13</sup>. However, it cannot cope with atmospheric pollution or salty sea winds<sup>14</sup> and on fertile sites it is often outcompeted by other species (usually spruce or broadleaved species)<sup>11, 15</sup>. It requires a period of winter chilling to break autumn dormancy, and starts to grow in the spring when temperatures reach about 5 °C<sup>4, 5</sup>. Under conditions of a warming climate it is likely to increase its presence in the north, but decline in the southern parts of its range<sup>16-19</sup>.

It frequently grows in large single-species stands, but across its huge range it may also be found with most of the boreal species of Europe and Asia<sup>20</sup>. In Europe it can be found growing with broadleaved trees such as oaks (*Quercus petraea*, *Quercus robur*), beech (*Fagus sylvatica*) and birch (*Betula pendula*), and other conifers including spruce (*Picea abies*), larch (*Larix decidua*), fir (*Abies alba*) and other pines (*Pinus nigra*, *Pinus uncinata*)<sup>9</sup>, but no single species or species group is associated with it over its entire range<sup>15</sup>.



⋯ Native Scots pine woodlands in Glen Affric, Scotland. (Forestry Commission, www.forestry.gov.uk: © Crown Copyright)



⋯ Map 2: High resolution distribution map estimating the **relative probability of presence**.





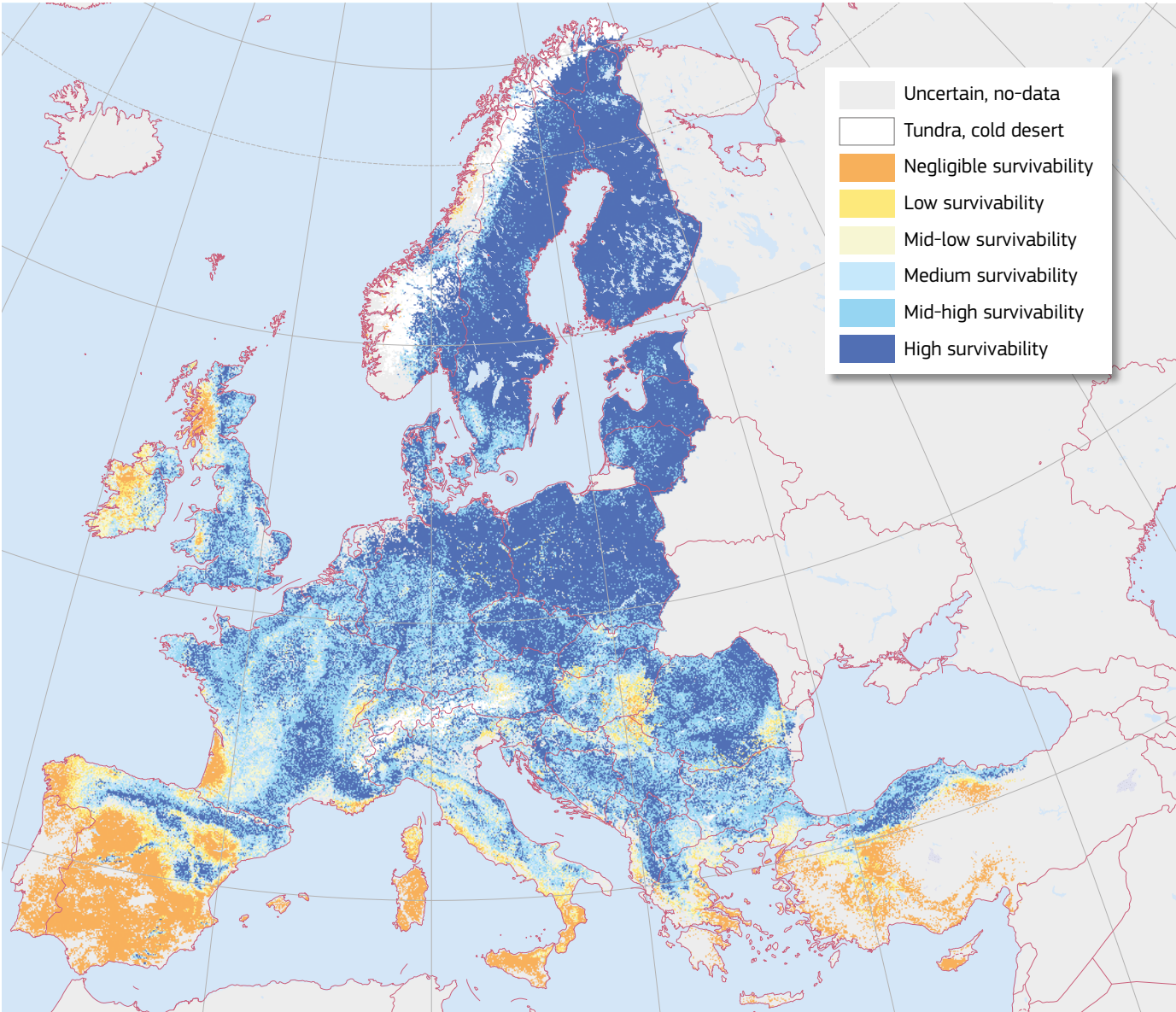
Cones develop in one year and are 5-8 cm long. (Copyright Alfonso San Miguel: CC-BY)

Importance and Usage

Scots pine is one of the most commercially important species<sup>1</sup>, particularly in the Nordic countries<sup>9</sup>. The wood is easily workable and is one of the strongest of the softwoods, with a good strength to weight ratio. It is used in particular as building and construction timber, and also for furniture, pulp and paper. It lasts well in wet conditions and was formerly used for mining props<sup>12</sup>, waterwheels and piles<sup>21</sup>. It is frequently used for land reclamation purposes and for binding loose sands because of its tolerance to poor soils<sup>1</sup>. In Eastern Europe and the former USSR, Scots pine was widely tapped for resin<sup>1, 13</sup>. In America it is widely used as a Christmas tree<sup>7</sup>. Scots pine is frequently used in **dendrochronology**, because it is relatively long lived and often grows in marginal conditions, where small fluctuations in temperature and/or moisture can have a noticeable effect on its growth<sup>8, 22</sup>.

Threats and Diseases

Pests can be a problem in large plantations, where they can spread through a wide area. In particular, the fungi *Fusarium* and *Alternaria* can cause high mortality of seedlings. Butt rot of mature trees may be caused by species of *Armillaria* and *Fomes*<sup>1</sup>. The saw fly species *Diprion pini* and *Neodiprion sertifer* can cause severe defoliation, rendering the tree susceptible to attack by other pests<sup>23, 24</sup>. The large pine weevil (*Hylobius abietis* L.) is among the most serious pests affecting young coniferous forests in Europe<sup>25, 26</sup>. Scots pine is vulnerable to *Ips typographus*



Map 3: High resolution map estimating the maximum habitat suitability.

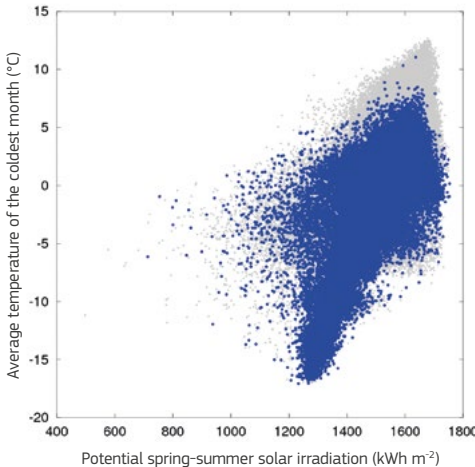
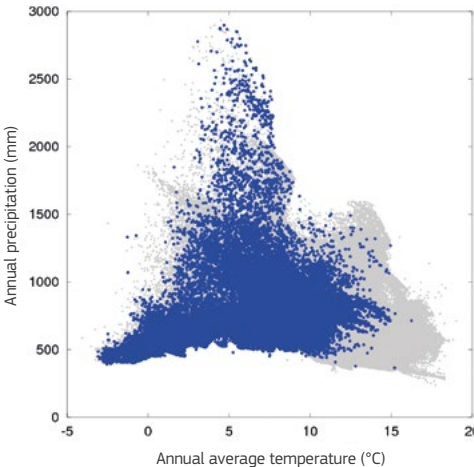
which may also be a vector of different fungal pathogens<sup>27-30</sup>. The pine woolly aphid (*Pineus pini*) feeds on the foliage and young shoots. Crown defoliation may be caused by the larvae of some

*Lepidoptera*: the most damaging include *Bupalus piniarius*, *Panolis flammea* and *Lymantria monacha*. It may also be attacked by the red band needle blight (*Mycosphaerella pini*, syn. *Dothistroma septosporum*)<sup>29, 31</sup>. The leaves, shoots and bark are all grazed by a variety of animals including sheep, deer, rabbits and squirrels<sup>5</sup>.

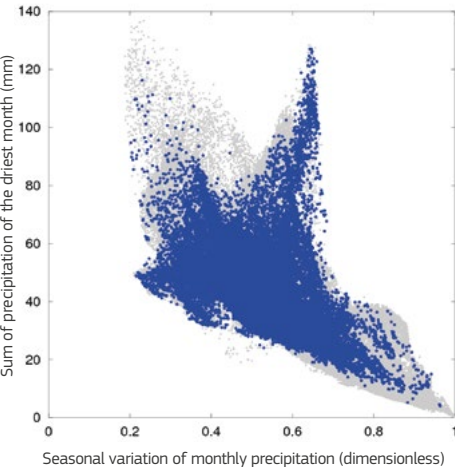


Ancient large tree in Sierra de Guadarrama, Spain. (Copyright Alfonso San Miguel: CC-BY)

Field data in Europe (including absences) ● Observed presences in Europe ●



Autecology diagrams based on harmonised field observations from forest plots.



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