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Pinus monticola

This species is complete.
April 19, 2010 by Michael Case
Author(s) Expertise: **7**
Print species as a PDF [1]

Sensitivity Factor	Sensitivity 1 - 7 (one being least sensitive, seven being most sensitive)	Confidence 1 - 5 (one being least sensitive, five being most sensitive)
Generalist/Specialist	3 Medium	3 Fair
Physiology	3 Medium	3 Fair
Life History	2 Medium-Low	3 Fair
Habitat		4 Good
Dispersal Ability	6 High	3 Fair
Disturbance Regimes	6 High	5 Very Good
Ecology	5 High	3 Fair
Non-Climatic	3 Medium	3 Fair
Other (weight)		3 Fair

Sensitivity Score : 52 Medium

Sensitivity Score

100 * [(0.5 *(Dispersal Distance + Dispersal Barriers) + Disturbance Regimes + (0.5 * Generalist/Specialist) + Physiology + (0.5 * Life History) + Sensitive Habitats + Ecology + Non-Climatic Stressors + (Other * Weight) / 49 + (7 * Weight)]

Note: if Sensitive Habitats are identified, this factor automatically gets a value of seven, otherwise it remains zero.

Confidence Score : 3 Fair

Confidence Score

The Confidence Score is an average of the Confidence column above.

Overall User Ranking: 3 Medium

Author Expertise:
7

Common Name:
Western White Pine

Is this Species completed:
Yes

Taxonomy

This is a description of the whole group

Scientific Name:
Pinus monticola

Geography:
Entire range

Realm:
Terrestrial

Kingdom:
Plant

Phylum:
Coniferophyta

Class:
Pinopsida

Order:
Pinales

Family:
Pinaceae

Genus:
Pinus

Global Rank:
G4G5 (2009)

Rounded Global Rank:
G4 - Apparently Secure

IUCN:
Lower Risk/least concern ver 2.3 - 1998

US Endangered Species Act Code:
Not Listed

Species Element Code:
PGPIN040M0

Generalist/Specialist

Broadly, where does this species fall on the spectrum of generalist to specialist? :
3

Confidence in your assessment of the degree to which the species is a generalist or specialist:
3 Fair

Please further describe the relationships that make the species more of a specialist:
Species that may be also present in Western White Pine: grand fir (Abies grandis), subalpine fir (A. lasiocarpa), California red fir (A. magnifica), lodgepole pine (Pinus contorta), ponderosa pine (P. ponderosa), western larch (Larix occidentalis), western redcedar (Thuja plicata), western hemlock (Tsuga heterophylla), Douglas-fir (Pseudotsuga menziesii), Engelmann spruce (Picea engelmannii), and mountain hemlock (Tsuga mertensiana). Shrubs associated with western white pine include huckleberry (Vaccinium spp.), willow (Salix spp.), honeysuckle (Lonicera spp.), wintergreen (Gaultheria spp.), azalea (Rhododendron spp.), prickly currant (Ribes lacustre), sticky currant (R. viscosissimum), Rocky Mountain maple (Acer glabrum), Greenes mountain-ash (Sorbus scopulina), princes-pine (Chimaphila umbellata), snowberry (Symphoricarpos albus), whipplea (Whipplea modesta), ocean-spray (Holodiscus discolor), serviceberry (Amelanchier alnifolia), ninebark (Physocarpus malvaceus), rustyleaf menziesia (Menziesia ferruginea), spirea (Spiraea betulifolia), pachistima (Pachistima myrsinites), and twinflower (Linnaea borealis).

Comments:
wind-dispersed pollen. Western white pine is restricted to climates characterized by dry summers and a predominance of winter precipitation. The most extensive and best stands of western white pine are found in the river bottoms and less steep lower slopes of the Priest, Coeur d'Alene, St. Joe, and Clearwater River basins. Western white pine grows on a wide variety of soils within its range, the majority of which have been classified as Spodosols. Along the West Coast, it attains best development on deep, porous soils, but it is most common on poor, sandy soils. In northern Idaho and other inland sites, it is found on shallow to deep soils, with the surface layers composed of loess or loessial-like material. Parent materials include granite, shist, basalt, and sedimentary rocks. The pH ranges from 4.5 to 6.8 with a mean of 5.4. Western white pine is generally a montane species, but grows at a wide range of elevations

Citations:
1. Fowells, H. A., compiler. 1965. Silvics of forest trees of the United States. Agric. Handb. 271. Washington, DC: U.S. Department of Agriculture, Forest Service. 762 p. 2. Graham, Russell T. 1990. Pinus monticola Dougl. ex D. Don western white pine. In: Burns, Russell M.; Honkala, Barbara H., technical coordinators. Silvics of North America. Volume 1. Conifers. Agric. Handb. 654.. Washington, DC: U.S. Department of Agriculture, Forest

Service: 385-394. 3. Burns, Russell M. (1991). Silvics of North America. U.S. Department of Agriculture, Forest Services. Washington D.C.

Physiology

Species' physiological sensitivity:
3

Confidence in how physiologically sensitive the species is to climate change:
3 Fair

Please specify whether or not this species is physiologically sensitive to one or more of the following:
temperature
precipitation

Life History

Species' reproductive strategy:
2

Confidence in your assessment of the species' reprodcutive strategy:
3 Fair

Comments:
Western white pine can begin producing strobili at 7 years of age, but production can be limited by moisture stress and timing. Moisture stress in the early summer of the year strobili mature leads to abortion, while moisture stress in the early summer of the first and second years prior to strobili emergence causes an increase in the number of strobili. Moisture stress in the late summer prior to strobili emergence causes a decrease in strobili numbers. Seed production requires 3 years from the onset of bud initiation. Good seed crops occur every 3 to 4 years. "Three complete growing seasons are required for seed to mature."

Citations:
1. Graham, Russell T. 1990. Pinus monticola Dougl. ex D. Don western white pine. In: Burns, Russell M.; Honkala, Barbara H., technical coordinators. Silvics of North America. Volume 1. Conifers. Agric. Handb. 654.. Washington, DC: U.S. Department of Agriculture, Forest Service: 385-394. [13397] 2. Rehfeldt, G. E.; Stage, A. R.; Bingham, R. T. 1971. Strobili development in western white pine: periodicity, prediction, and assoication with weather. Forest Science. 17(4): 454-461. [12901] 3. USDA Forest Services database. Accessed online at http://www.fs.fed.us/database/feis/plants/tree/pinmot/references.html#11 on April 27, 2010. 4. Burns, Russell M. (1991). Silvics of North America. U.S. Department of Agriculture, Forest Services. Washington D.C.

Sensitive Habitats

Confidence in whether the species depends on the listed sensitive habitat types:
4 Good

Level of philopatry:
none

Comments:
This species will grow on a variety of soils and is most common on poor, sandy soils, but will thrive in deep, porous soils. Well-adapted to poor soils.

Citations:
1. Arno, S.F. and R.P. Hammerly. 2007. Northwest Trees: Identifying and Understanding the Region?s Native Trees. The Mountaineers Books, Seattle, Washington. 2. Burns, Russell M., and Barbara H. Honkala, tech. coords. (1990) Silvics of North America: 1. Conifers. Pinus monticola. Agriculture Handbook 654. U.S. Department of Agriculture, Forest Service, Washington, DC. vol.2, 877 p. Retrieved: 30, December, 2009 from http://www.na.fs.fed.us/spfo/pubs/silvics_manual/Volume_1/pinus/monticola.htm 3. Williams, Ralph E. 1989. Distribution and impacts of annosus root disease in forests of the northern Rocky Mountains. In: Otrosina, William J.; Scharpf, Robert F., technical coordinators. Proceedings of the symposium on research and management of annosus root disease (Heterobasidion annosum) in western North America; 1989 April 18-21; Monterey, CA. Gen. Tech. Rep. PSW-116. Berkeley, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Forest and Range Experiment Station: 51-56. [11322]

Dispersal Ability

Maximum annual dispersal distance:
<1km

Confidence in maximum annual dispersal distance:
4 Good

Within the context of dispersal distance above, do barriers to dispersal exist?:
5

Confidence in barriers to dispersal exists:
3 Fair

Please select the types of barriers relevant to dispersal:
Mountains

Please enter any known specific restrictions to dispersal:
Lack of open areas in conifer forests.

Comments:
Wind-dispersed and some dispersed by squirrels, mice, and birds (most dispersed within 120 m of parent tree, but some over 800 m from parent tree). No natural reproduction via sprouting or layering.

Citations:

Burns, Russell M., and Barbara H. Honkala, tech. coords. (1990) Silvics of North America: 1. Conifers. Pinus monticola. Agriculture Handbook 654. U.S. Department of Agriculture, Forest Service, Washington, DC. vol.2, 877 p. Retrieved: 30, December, 2009 from http://www.na.fs.fed.us/spfo/pubs/silvics_manual/Volume_1/pinus/monticola.htm

Disturbance Regimes

How sensitive is this species to one or more disturbance regimes:
6 definitely sensitive

Confidence in how sensitive is this species on one or more disturbance regimes:
5 Very Good

Please check all disturbance regimes upon which the species is sensitive:
Fire
Wind
Pollution

Please describe the disturbance regimes upon which the species is sensitive (frequency, timing, severity, duration):
Requires stand-replacing disturbance, including harvest, fire, or wind, to regenerate.

Comments:
This species is dependent on fire or timber harvesting to reduce competing conifers and allow establishment of this early seral species. Intermediate fire-resistance (thin bark, moderately flammable foliage). Affected by a variety of diseases and insects including: western white pine blister rust, needle cast and butt rot fungi, Armillaria spp. root disease, mountain pine beetle, needle blight, and pole blight. Cone crop losses to beetles, moths, and rodents. The most serious damaging agent of western white pine is white pine blister rust (Cronartium ribicola). Western white pine is susceptible to three species of needle cast fungi: Lophodermella arcuata, Lophodermium nitens, and Bifusella linearis. Western white pine is susceptible to mountain pine beetle (Dendroctonus ponderosae) and emarginate ips (Ips emarginatus), and is the principal host for the ips beetle (Ips montanus). Pole blight is a physiological disorder brought on by drought. This disease caused significant mortality from 1935 to 1960. Tree mortality was believed to have resulted from rootlet mortality, which reduced western white pine's ability to absorb moisture. The disease is restricted to sites with shallow soils or soils with low moisture retention. This species is dependent on ice/snow regime. "Western white pine seed requires 30 to 120 days of cold, moist conditions before germination commences." Generally tolerant to frost but cold, drying winds can dessiccate needles.

Citations:
1. Griffith, Randy Scott. 1992. Pinus monticola. In: Fire Effects Information System, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2009, December 30]. 2. Burns, Russell M., and Barbara H. Honkala, tech. coords. (1990) Silvics of North America: 1. Conifers. Pinus monticola. Agriculture Handbook 654. U.S. Department of Agriculture, Forest Service, Washington, DC. vol.2, 877 p. Retrieved: 30, December, 2009 from http://www.na.fs.fed.us/spfo/pubs/silvics_manual/Volume_1/pinus/monticola.htm 3. Arno,

S.F. and R.P. Hammerly. 2007. Northwest Trees: Identifying and Understanding the Region?s Native Trees. The Mountaineers Books, Seattle, Washington. 4. Graham, Russell T. 1990. Pinus monticola Dougl. ex D. Don western white pine. In: Burns, Russell M.; Honkala, Barbara H., technical coordinators. Silvics of North America. Volume 1. Conifers. Agric. Handb. 654.. Washington, DC: U.S. Department of Agriculture, Forest Service: 385-394. [13397] 5. Klinka, K.; Feller, M. C.; Green, R. N.; [and others]. 1990. Ecological principles: applications. In: Lavender, D. P.; Parish, R.; Johnson, C. M.; [and others], eds. Regenerating British Columbia's forests. Vancouver, BC: University of British Columbia Press: 55-72. [10710] 6. Leaphart, Charles D.; Foiles, Marvin W. 1972. Effects of removing pole-blighted western white pine trees on growth and development of a mixed conifer stand. Res. Note INT-161. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station. 6 p. [12882] 7. Burns, Russell M. (1991). Silvics of North America. U.S. Department of Agriculture, Forest Services. Washington D.C.

Ecological Relationships

Please specify which of the following (if any) are sensitive to climate change for this species:
habitat
hydrology
Other

Confidence in how sensitive the species is to other effects of climate change on its ecology:
3 Fair

Which types of climate and climate-driven changes in the environment affect these aspects of the species' ecology?:
precipitation
CO2

How sensitive is this species? ecological relationships to the effects of climate change?:
5

Interacting non-climatic stressors

To what degree do other, non-climate-related threats, to the species make it more sensitive to climate change?:
3

Confidence in the degree to which non-climate-related threats affect the species' sensitivity to climate change:
3 Fair

Please check all of the stressors that make the species more sensitive to climate change:
habitat loss or degradation

other (please specify in the comment box below)

Comments:
White pine blister rust

Other Sensitivities

Confidence in other critical factors:
3 Fair

Confidence in the degree to which these factors make this species sensitive to climate change:
3 Fair

Overall User Ranking

In your opinion, how would you rank the overall sensitivity of this species to climate change?:
3

Confidence in your overall assessment of the sensitivity of this species to climate change:
2 Poor

Print species as a PDF [1]

Links:
[1] http://climatechangesensitivity.org/printpdf/598