

Species: Balsam Fir (*Abies balsamea*)

Global Rank: G5

State Rank: S3

Climate Change Vulnerability Index: Extremely Vulnerable

Confidence: Moderate

Habitat:

Balsam fir is widely distributed in North America. The species occurs from Newfoundland west across northern Quebec, northern Ontario, central Manitoba, and Saskatchewan to most of Alberta. In the United States, balsam fir is found in northern Michigan and Wisconsin extending east to the New England states. To the south, scattered populations occur in southern Michigan and Wisconsin, northeast Iowa, Pennsylvania, West Virginia, and northern Virginia (Uchytel 1991; NatureServe 2011). In Pennsylvania, balsam fir is infrequently found in cool bogs and swamps with peat soils in the northern tier of the state (Rhoads and Klein 1993; Rhoads and Block 2007).

Current Threats:

The biggest threats to balsam fir are insect pests and fire (Uchytel 1991). Insect pests such as spruce budworm, hemlock looper, blackheaded budworm, and balsam wooly adelgid can defoliate, stress, and kill trees (Uchytel 1991). Balsam fir is susceptible to severe damage or death from fire due to flammable needles, branches located close to the ground, shallow root systems, and thin, resinous bark.

Main Factors Contributing to Vulnerability Rank:

*Distribution relative to natural barriers:* Balsam fir occurs in isolated high elevation wetlands in northern Pennsylvania where dispersal to suitable habitat may be limited by extensive forests.

*Dispersal and movement:* Seed dispersal is limited to within 60 m to 160 m of the source (Frank 1990; Uchytel 1991).

*Predicted micro sensitivity to changes in temperature:* Balsam fir occurs in microsites/microhabitats towards the cooler end of the spectrum.

*Predicted macro sensitivity to changes in precipitation, hydrology, or moisture regime:* Within the species range in Pennsylvania, the species has experienced a small precipitation variation in the past 50 years.

*Predicted micro sensitivity to changes in precipitation, hydrology, or moisture regime:* Balsam fir is somewhat dependent on a moisture regime that is highly vulnerable to loss or reduction with climate change and the expected direction of moisture change is likely to reduce the species' distribution, abundance, or habitat quality.

*Forms part of a mutualism:* Reliance on a mycorrhizal symbiont somewhat increases the vulnerability of balsam fir to climate change effects.

References:

Frank, R.M. 1990. *Abies balsamea* (L.) Mill. Balsam fir. In: Burns, R.M. and B.H. Honkala, technical coordinators. *Silvics of North American*. Volume 1. Conifers Agricultural Handbook 654. Washington, DC: U.S. Department of Agriculture, Forest Service: 26-35.

NatureServe. 2011. NatureServe Central Databases. Arlington, Virginia. USA.

Rhoads, A. and T. Block. 2007. *The plants of Pennsylvania*. 2nd Edition. Philadelphia. University of Pennsylvania Press.

Rhoads, A. and W.M. Klein. 1993. *The vascular flora of Pennsylvania annotated checklist and atlas*. American Philosophical Society, Philadelphia, PA.

Uchytel, R.J. 1991. *Picea mariana*. In: *Fire Effects Formation System*, [Online]. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Science Laboratory. Available: <http://www.fs.fed.us/database/feid/> [Accessed April 2011].