# *Ex Situ* Genetic Conservation of Vulnerable High Elevation Conifer Species in the Pacific Northwest, USA[1]

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Species with small or disjunct populations, and those populations at the southern margin of a species' range, are likely to be at higher risk from climate change. Two recent U.S. Department of Agriculture Forest Service (USDA FS) documents (Devine et al. 2012, Erickson et al. 2012) have advocated for *ex situ* genetic conservation of seed and evaluation of current seed inventories (including viability of older stored seedlots) for species and habitats most likely to be negatively impacted by the effects of climate change. Devine et al. (2012) ranked 57 widespread forest canopy species according to their assessed vulnerability to predicted climate change. High elevation conifers comprised the six most vulnerable species: whitebark pine (*Pinus albicaulis* Engelm.), subalpine fir (*Abies lasiocarpa* (Hook.) Nutt.), Pacific silver fir (*A. amabilis* (Douglas ex Loudon) Douglas ex Forbes), Englemann spruce (*Picea engelmannii* Parry ex Engelm.), subalpine larch (*Larix lyallii* Parl.), and noble fir (*A. procera* Rehder). In addition, Alaska yellow-cedar (*Xanthocyparis nootkatensis* (D.Don) Farjon & Harder), mountain hemlock (*Tsuga mertensiana* (Bong.) Carrière), and Brewer's spruce (*P. breweriana* S. Watson) were among those species most threatened by climate change and have additional conservation concerns. The USDA FS, Pacific Northwest Region (Oregon and Washington) has collected seed from over 835 individual whitebark pine trees for *ex situ* genetic conservation since 2009. Seeds are stored at the USDA Agricultural Research Service (ARS) Center for Germplasm Preservation in Fort Collins, Colorado and at the USDA FS Dorena Genetic Resource Center in Cottage Grove, Oregon. Recent *ex situ* genetic conservation activities have focused on other vulnerable high-elevation species. Collections have targeted the southern and western ranges of several species in southwestern Oregon and northern California, as well as the north Cascades in Washington State.

## Literature Cited

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