# Whitebark Pine
RESOURCE MONITORING BRIEF

National Park Service
U.S. Department of the Interior

North Coast and Cascades Network
Inventory & Monitoring Network

## IMPORTANCE

Whitebark pine (Pinus albicaulis) is a keystone species of high-elevation ecosystems in Western North America. The whitebark pine plays an important role in the survival of the subalpine community by creating hospitable growing conditions for other subalpine plants and providing a nutritional food source for many animals. It is an early successional species that establishes both on harsh ridges and in subalpine areas following fire. Once established on a site, whitebark pine influences snowmelt patterns, soil development and provides important micro-sites for the establishment of other subalpine plant species. Whitebark pine seeds are an important food source for birds, squirrels, and bears. Clark's nutcrackers (Nucifraga columbiana), red squirrels (Tamiasciurus hudsonicus) and Douglas squirrels ((Tamiasciurus douglasii) extract the seeds from the closed cones. and then cache the seeds in subalpine meadows for future retrieval. Neglected seed caches can sprout, creating another generation of the species. The North Coast and Cascades Network monitors whitebark pine populations to…

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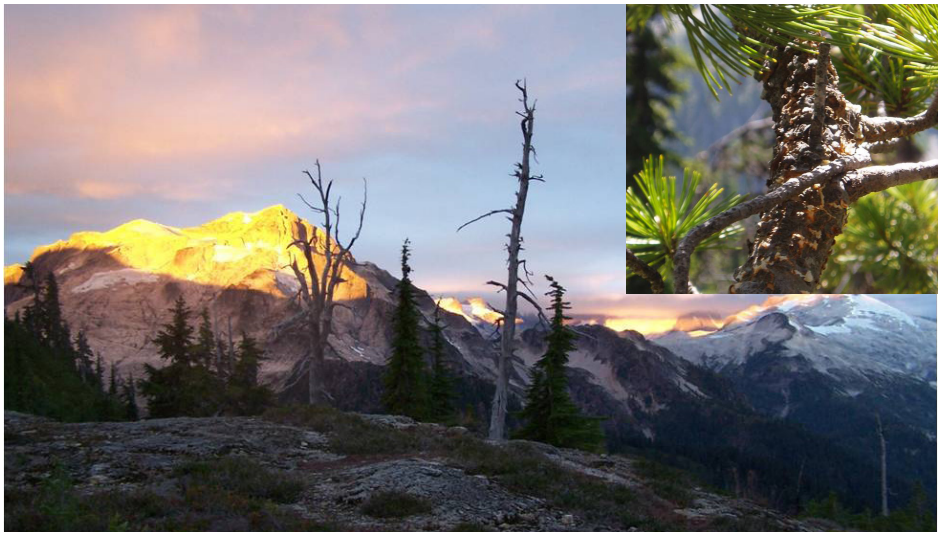
## Monitored at:

***Mount Rainier*** *National Park*

***North Cascades*** *National Park Service Complex*



**Dead whitebark pine among subalpine fir in North Cascades National Park. Inset: Stem canker.**

## STATUS and TRENDS

Whitebark pine grows/lives/inhabits in three parks within the North Coast and Cascades Network: Mount Rainier National Park, North Cascades National Park Service Complex, and Olympic National Park. Populations occur above 5,000 feet on the east of each park.

Today, white pine blister rust (Cronartium ribicola) and mountain pine beetles (Dendroctonus ponderosae) threaten the long-term survival of whitebark pine. Blister rust is a Eurasian fungus introduced to North America in 1910. Surveys have documented blister rust in all stands within the three parks. Extensive surveys in Mount Rainier and North Cascades National Parks (1994-1999) found that 31% of trees were dead, 22% of trees were infected, and 47% of all trees showed no signs of infection. Surveys of saplings (< 2.54 cm DBH) documented similar rates of infection and mortality. Generally, the percent of trees that were infected increased from west to east and with increasing elevation. Mortality rates decreased with elevation, which may be a result of shorter growing seasons at higher elevations and a longer time period for the infection to spread within the tree.

Mountain pine beetles are native insects that have only recently become a threat to whitebark pine survival in the NCCN. Although initial surveys of whitebark pine stands did not document any mortality by beetles, aerial surveys conducted by the US Forest Service Forest Health Protection Program in 2008 documented mortality caused by mountain pine beetle in some stands in North Cascades and Mount Rainier.

## DISCUSSION

Monitoring of whitebark pine is an important component of the NCCN long-term vegetation monitoring program. The monitoring program established plots in Mount Rainier and North Cascades National Parks in 2004 to document trends in rates of infection and mortality. These plots will be monitored in 2009 to determine if the status of whitebark pine stands has changed since the initial surveys. Research is also being conducted to determine patterns of genetic diversity, genetic resistance to blister rust, and methods to restore whitebark pine populations. In 2007, initial results of the genetic resistance screening indicated that progeny of Mount Rainier parent trees have the highest levels of rust resistance of any seed source yet tested in the Pacific Northwest by the US Forest Service. Results of research and monitoring will be utilized to develop site specific restoration strategies.

The North Coast & Cascades Network