

Whitebark Pine and Other High Elevation Five-needle Pines in Pacific Coast Ecosystems: A Conference Preface

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Whitebark pine, a hardy, sub-alpine conifer is considered a keystone species throughout its range for its contributions to high elevation ecosystems including its value as a food source for wildlife, its ability to survive harsh environmental conditions, its effect of regulating snowmelt and reducing soil erosion, and for its aesthetic and symbolic values in the high mountains of western North America.

Much has been written about whitebark pine in the Rocky Mountains but comparatively little information has been compiled for whitebark pine along the Pacific Coast. There is, however, substantial interest in the Pacific Coast high elevation ecosystems. From the Coast Range of British Columbia, down through the Cascade Mountains of Washington, Oregon and Northern California, and south through the Sierra Mountains of California and into Mexico, several species of five-needle pines are critical components of alpine and subalpine forests. They are highly-valued for their aesthetic contribution to National Parks and Wilderness areas. High elevation five-needle pines contribute critical elements of habitat for many wildlife species. White pine blister rust, mountain pine beetle, and fire exclusion are having negative effects on these species and are influencing associated ecosystem process and function. The potential influence of climate change is of concern.

Based on these growing concerns for the health of whitebark pine ecosystems in Oregon and Washington, the USDA Forest Service, Pacific Northwest Region, USDI National Parks and others began a more concerted effort to gather information on the status of whitebark pine in Oregon and Washington. Early work included an informal information survey, seed collections to be used to examine natural genetic resistance to white pine blister rust and common garden studies to examine genetic variation, germination tests to examine longevity of seed in cold storage and germination procedures, protocols to grow whitebark pine seedlings, and surveys of the health of whitebark pine ecosystems. Beginning in 2004, this work intensified and a four year '*Pacific Northwest Albicaulis Project*' was initiated. <http://www.fs.fed.us/r6/genetics/publications/albicaulis-project>. During this period studies were also being undertaken in California and British Columbia.

In October 2005, a whitebark pine workshop held at Crater Lake National Park brought together a small group of biologists, geneticists, ecologists, entomologists, and pathologists

from California, Oregon, Washington and British Columbia. The workshop was an opportunity for participants working in Pacific Coast high elevation ecosystems to share information; discuss issues, and concerns; and to help develop a strategy to maintain and restore whitebark and other high elevation five-needle pines in our region. After presentations by Dr. Frank Lang, Emeritus Professor of Biology at Southern Oregon University on the ecology and biology of Pacific Coast high elevation five-needle pines and Dr. Diana Tomback, University of Colorado and the Whitebark Pine Ecosystem Foundation on the concerns and status of whitebark pine in the Rocky Mountains, participants engaged in more focused discussions about the questions that need to be answered regarding these species. Of key concern were issues such as:

Surveys and Data

- The status of the whitebark pines and other high elevation five-needle pine species: Are they healthy, are they reproducing?
- What is the distribution of whitebark pine on the landscape?
- Do we have/use standardized survey methods for blister rust?
- Should we have/use standardized reporting/outputs?

Genetics

- The need to develop a strategy to sample populations for genetic variation
- Long-term seed storage bank for gene conservation plus viability requirements for long-term seed storage
- Establishing Common Garden studies
- Prioritizing work areas/zones based on current status/risk
- Strategy for gene conservation throughout range
- Gene conservation seed collections (seed banking/screening)
- What is the level of white pine blister rust resistance in our native conifers?
- Field validation of resistance
- Climate change- will there be an effect on genetic variability? How many populations may be extirpated?
- Easy/economically feasible method to locate resistance (i.e. markers to complement traditional screening program)

Wildlife Interactions

- The need for surveys on populations of nutcrackers
- How can we provide for the disturbances nutcrackers need for seed caching?
- Impact of wildfire & prescribed fire on habitat of key species in these ecosystems?
- Will pathogens such as west nile virus have a significant impact on nutcracker populations?
- How to get regulatory agencies involved earlier to remove real or perceived barriers in whitebark pine restoration because of listed species?

Insects and Pathogens

- White pine blister rust/mountain pine beetle interaction – how well are they characterized?
- Do we understand host pathogen interactions in these high elevation ecosystems? Where does inoculum come from? What influences host susceptibility to rust or bark beetles?
- What sites are high, moderate, and low rust hazard?
- How may climate change affect rust epidemiology?
- What silvicultural tools are available for managing bark beetles and white pine blister rust?
- How/where/under what circumstances should Verbenone treatments be used? Can we protect whole stands?

- Can we develop a management strategy that reverses downward trend? What tools do we have or need to make a change?

Fire

- Interactions between fire and whitebark pine biology (i.e. survival, consequences of fire injury, seed dispersal etc.)
- What are fire regimes & fire history within the range of whitebark pine?
- Do current fire management strategies make things better/worse for whitebark pine?

Natural Resource Policy as it Relates to Restoration

- The need for a restoration/conservation strategy for whitebark pine and other high elevation five needle pines
- Increased education and outreach for policy makers to heighten awareness of the issue
- Recognize white pine blister rust as an invasive species despite its long term establishment
- How to resolve conflicting uses such as Threatened and Endangered Species –what are impediments to conservation?
- Much of the impact from the non-native blister rust and fire management is in wilderness areas or National Parks
- Need to collaborate with other agencies to help shape our management plans/policies
- Increasing multi-disciplinary participation in whitebark conservation
- Develop a common set of best management practices in wilderness.
- Strategies and funding will need to be long-term...

The conference and its proceedings, entitled *Whitebark Pine: A Pacific Coast Perspective* is a direct outcome of the workshop held in 2005. The workgroup concluded that while many of the issues are the same for the whitebark pine on the Pacific Coast and the Rocky Mountain whitebark, there are some unique characteristics which distinguish the Pacific Coast situation from that of the Rocky Mountains. Workshop participants determined that a conference pertaining specifically to the whitebark pine and other high elevation five-needle pines on the Pacific Coast of North America was an important step towards informing a larger audience of the issues and concerns related to these species and in garnering support for restoration efforts. New information, including numerous assessments of the status and health of whitebark pine and other high elevation five-needle pines that had been recently completed were now available pertaining directly to these ecosystems. The charge had been given to develop restoration strategies. The story of these ecosystems, from a Pacific Coast perspective, was waiting to be told.