Monitoring Whitebark Pine, Blister Rust and Fuels in the Frank Church - River of No Return Wilderness Area

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Introduction

Over the past two decades, populations of whitebark pine (*Pinus albicaulis*) have declined dramatically in much of the species' range. Causal factors include: *Cronartium ribicola*, the exotic fungus that causes white pine blister rust; fire suppression, which drives successional replacement to more shade tolerant species; extended periods of drought, which weaken trees stressed by low moisture conditions; and attack by mountain pine beetle, which kills trees in a single season. Because mature trees are lost, these conditions destroy potental seed sources, thereby reducing the reproductive capacity of the populations, building up fuels on the forest floor and reducing the availability of favorable seedbed conditions for regeneration.

Whitebark pine seed is a primary, high energy food source for grizzly bears and Clark's nutcrackers through much of the species' range. In the Frank Church Wilderness Area, nutcrackers are relatively abundant but grizzly bears do not currently inhabit the area. Nonetheless, grizzly bear reintroduction has been proposed. With this keystone species potentially at risk in the Frank Church Wilderness Area, baseline information on the condition of the native populations is critical for developing evaluation criteria for ecosystem function and to determine the best mitigation steps, should they become necessary.

Although the status of this species has been the focus of many recent studies, the condition of populations in the Frank Church River of No Return Wilderness Area remains largely undocumented. The rugged, largely roadless character of the area poses substantial challenges for field research.

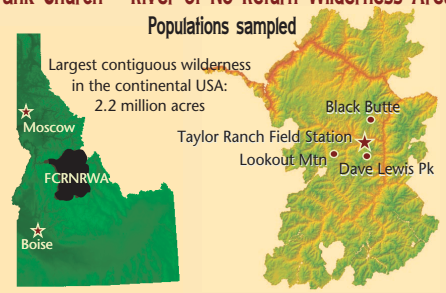
Objectives

After a preliminary evaluation that verified the presence of blister rust in the Frank Church, it was clear that a more thorough assessment of the status of whitebark pine in these populations would provide important information that could be used in current as well as future management regimes. Our objectives were to:

1. Establish permanent monitoring plots in whitebark pine stands in the FCRNRWA to evaluate stand health and composition dynamics.
2. Collect and summarize baseline data to determine the influence of habitat type and fire history on the stand health and composition.
3. Assess levels of forest fuels data to estimate risk of losses to wildfire of remaining trees.
4. Collect seed and screen for genetic resistance to blister rust.

Methods

During the summer of 2005, we established a total of 47 plots distributed across 3 populations, and 3 burn and 3 habitat categories in the FCRNRWA. Plots were laid out as 150' x 30' transects in which all trees 4.5' or taller were unobtrusively tagged.[3,4] Data collected included DBH, rust status, mountain pine beetle status, damage, mortality, vegetation, humus, regeneration, fuels, topography and current and developing cones. Where possible, putatively rust-resistant trees were identified. Plots were photo-documented and GPS co-ordinates recorded.



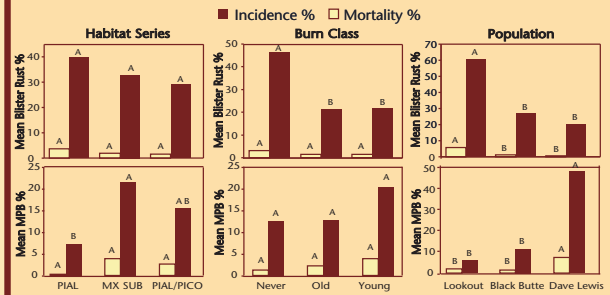
Burn Classes:
Never (>100 yrs ago), Old (15-100 yrs), Young (<15 yrs)

Habitat Classes:
PIAL (>85% whitebark pine),
MX SUB (>25% subalpine fir and >25% whitebark pine),
PIAL/PICO (>25% lodgepole pine and >25% whitebark pine)

Data were analyzed using factorial ANOVA, correlations and stepwise linear regression and in SAS and Excel. Where required, variables were transformed to meet assumptions of normality and variance homogeneity; actual values are reported here. All effects were considered random, populations nested within factors.

Results

- Stands were heterogeneous and very patchy
- Rust and MPB levels were unrelated to slope, aspect, clumpiness
- Populations differed in rust, MPB levels and mortality



- Unburned sites, plots with higher whitebark pine densities and taller regeneration had comparatively high levels of blister rust
- Significant interactions: site-specific effects only
  - Elevation negatively correlated with WPBR infection
  - Plots with more, larger lodgepole pines had more MPB
- Burn class did not affect mature tree or regeneration abundance
- Later successional stands had less medium to large coarse woody debris (CWD)
- Early successional stands had far more small CWD than later phases
- Mixed subalpine habitat series had the most CWD, especially larger size classes (>3" diameter) and rotting wood
- Recently burnt sites had slightly more rotten CWD

Follow-up

Activities proposed for 2006 and 2007:

1. Sample and tag additional populations.
2. Monitor health status of selected populations.
3. Collect cones/seeds for rust screening.

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3 Tomback, D.F., Keane, R.E., McCaughey, W.W., Smith, C. 2005. Methods for surveying and monitoring whitebark pine for blister rust infection and damage. Whitebark Pine Ecosystem Foundation, Missoula, MT. 30 pp.
4 Permanent and obvious monumenting is restricted in Wilderness Areas.

Acknowledgements
Catherine Roberts was a fantastic field assistant. Holly and Jim Akenson, Managers/Research Scientists of Taylor Ranch Field Station, provided logistical support. D. Ferguson, J. Byrne and J. Schwandt, USFS, provided materials, training and data analysis. This project was funded by USFS grant 05-DG-11010000-005.