

Monitoring Whitebark Pine, Blister Rust and Fuels in the Frank Church River of No Return Wilderness Area (Year Three)



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Introduction

Whitebark pine (*Pinus albicaulis*) is a slow-growing, long-lived species inhabiting subalpine zones of southwestern Canada and the western United States. The whitebark pine ecosystem provides valuable and crucial habitat for many wildlife species, including birds, squirrels and bears. Across the species' range, whitebark pine populations have been declining steadily due to the introduced disease white pine blister rust (*Cronartium ribicola*), mountain pine beetle (*Dendroctonus ponderosae*) infestation and successional replacement by subalpine fir (*Abies lasiocarpa*)^{4, 5}. Efforts are being made across the range of whitebark pine to understand and record its ecosystem dynamics including the role of wildland fire. This report includes third year evaluations of previously established plots in two whitebark pine populations in the Frank Church River of No Return Wilderness Area at Black Butte and Dave Lewis Peak and newly established plots at Cottonwood Butte/Coyote Springs.



Objectives

The study was launched in 2005 to provide information on fuel loadings, forest health, disease incidence, mortality and reproduction. These results may be used to complement existing research and restoration initiatives on whitebark pine. Overall project objectives were to:

1. Establish permanent monitoring plots in whitebark pine stands to evaluate the dynamics of stand composition and health
2. Collect baseline data on whitebark pine stands in the FCRONRWA in order to examine the influence of habitat type and fire history on the composition and health of stands
3. Identify potentially rust-resistant individuals, and
4. Collect information on forest fuels to estimate risk of population losses to wildland fire.

Our third year objectives were to collect data on the three previously established populations, set up and collect baseline data on a fourth population, if possible, and to locate potential candidate trees for inclusion in the USFS rust resistance testing and breeding program.

Methods

Data Collection

During the summer of 2007, we reevaluated 37 previously established plots distributed across 2 populations, 3 burn types and 3 habitat types in the FCRONRWA. Plots were established in an additional population at Cottonwood Butte/Coyote Springs. Plots were 150' x 30' transects in which all whitebark pine (WBP) trees 4.5' or taller were tagged. Third year data included overall health, blister rust status, mountain pine beetle attack, bark damage, mortality, regeneration, vegetation, fuels and current and developing cones. We were not able to reevaluate plots in the Lookout Mountain population due to the close proximity of wildland fires.

Burn Classes:

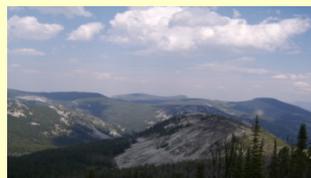
- Unburnt (>100 yrs ago)
- Old (15-100 yrs)
- Young (< 15 yrs)

Habitat Classes:

- PIAL (>85% whitebark pine)
- MX SUB (>25% subalpine fir; >25% whitebark pine)
- PIAL/PICO (>25% lodgepole pine; >25% whitebark pine)

Data Analyses

Plot means for variables were tabulated in Excel 2003 and SPSS 11.0. ANOVA was conducted in SPSS 11.0. Pearson correlation coefficients were calculated among topographic, and health variables. Where required, variables were transformed to meet assumptions of normality and homoscedasticity. Least-squares means of variables were calculated for each factor combination and Tukey's HSD test was used to assess significant differences within factor classes. All significance levels were set at $\alpha=0.05$. Preliminary analyses follow. Data will be analyzed more completely during 2008.



Preliminary Results¹

- Mountain pine beetle attack in the Dave Lewis Peak population was significantly lower in 2006 and 2007 than in 2005. We suspect this difference reflects overestimation of MPB attack in 2005.
- No other significant changes occurred between measurement years in blister rust infection/mortality and mountain pine beetle mortality.



¹Incidence percentages are based on live trees >4.5ft; mortality percentages are based on total trees >4.5ft.

Levels of blister rust infection were significantly higher at Black Butte and Cottonwood Butte/Coyote Springs than at Dave Lewis Peak.

- Mountain pine beetle attack was positively correlated with slope ($r = 0.27$, $p = 0.047$).
- Mountain pine beetle mortality was negatively correlated with elevation ($r = -0.31$, $p = 0.023$).
- CWD in the 0-.25" category was greater at Dave Lewis (recently burned) than in the other populations.
- CWD in the 0-.25" category was less in early seral phases than in late seral or climax phases.



Activities Planned for 2008

1. Establish new plots in additional populations
2. Record data on the health status of all populations
3. Continue to monitor and record locations of putatively resistant trees
4. Calculate fuel loadings and predict fire risk
5. Compare results between years as well as between populations

Acknowledgements:

Philip Harvey assisted in data collection during the summer of 2007. Terrie Jain, Steve Cook, Karen Neorr and Jim and Holly Akenson assisted in training and logistics for field work. John Byrne assisted in fuels analysis.

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