



Monitoring Limber Pine Health in the Rocky Mountains

(Year One of a Three-Year Study)

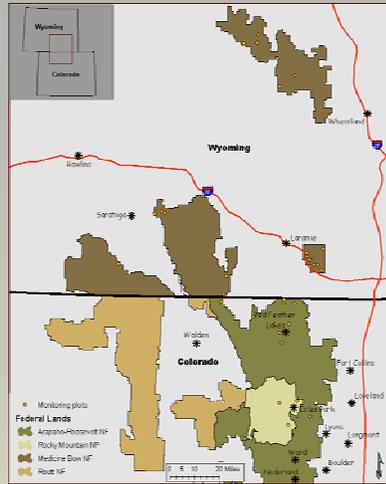
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INTRODUCTION

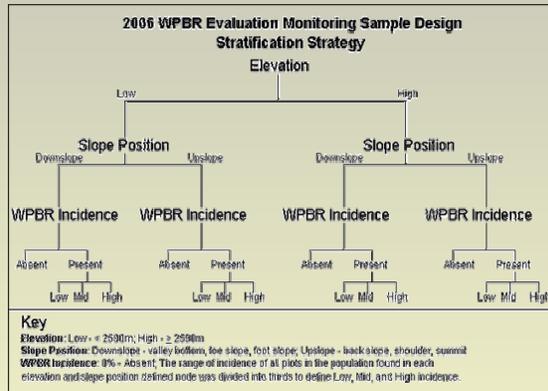
Limber pines are well distributed within the Rocky Mountains and are especially important because of their unique cultural and ecological characteristics (Schoettle 2004), however, recent surveys have suggested that significant ecological impacts may occur as the result of WPBR and other damaging agents. Additionally, several new white pine blister rust (WPBR) infestations have been discovered within Region 2 and the disease front in northern Colorado is within 10 miles of Rocky Mountain National Park (RMNP). Past studies have provided critical information on the distribution and intensity of the disease but we have little information on the long-term changes that will result from this invasive disease. By characterizing ecological impacts, this project will provide baseline information necessary for protection and restoration of these ecosystems. In the first year of this ongoing study, work was focused on northern Colorado and southern Wyoming.



36 monitoring plots were installed on federal land WPBR was the most common damage agent observed

PRELIMINARY RESULTS

- 36 long term limber pine health monitoring plots established in northern Colorado and southern-central Wyoming, 29 of which sampled WPBR infected limber pines.
- The incidence of WPBR in limber pine ranged from 0-80%. Plots with the highest incidence were all located in the Pole Mountain, Wyoming area.
- Other common damaging agents observed were mountain pine beetle, twig beetles and limber pine dwarf mistletoe.
- The most commonly observed *Ribes* species were *R. cereum* and *R. inerme*.
- Cones were collected from 6 potential plus trees in the vicinity of plots in the Pole Mountain, Wyoming area. Seedlings will be evaluated for resistance by the Dorena Genetic Research Center.

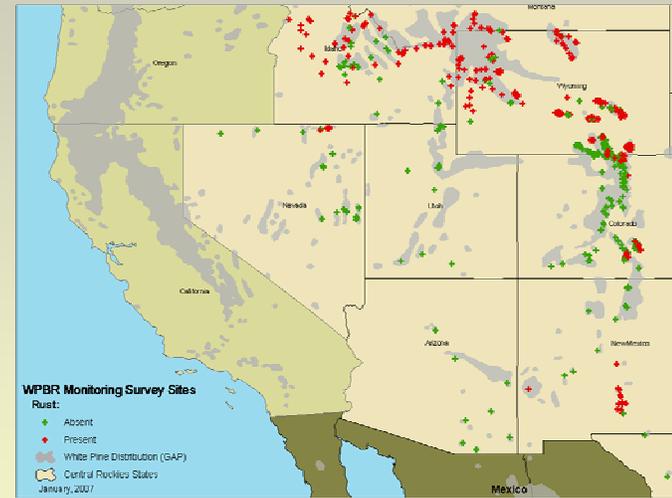


Stratification strategy employed in plot selection.

METHODS

- Survey locations on national forest lands were selected randomly from the set of over 400 plots established by Kearns (2005) in this area. Plot selection was stratified based on incidence of rust, elevation and slope position.
- Survey locations in RMNP were selected using GIS vegetation coverages combined with the Kearns (2005) model. Plots were established where the model predicts a presence of rust.
- Plots were monumented with labeled rebar, subplots with PVC pipe. Trees were tagged with unique numbers on forest service lands and stem-mapped in RMNP.
- Methods were adapted from Smith and Hoffman (2000) and the Whitebark Pine Ecosystem Foundation (Tomback et al. 2004).
- 50 ft by 200 ft plots were established perpendicular to the slope and divided into three sections.
- Site data collected included: elevation, slope, aspect, stand structure, slope position, species mix and disturbance history.
- Three 1/100th acre subplots were established in each plot to measure regeneration and understory vegetation.
- Limber pine variables included: DBH, height, health status, crown class, crown ratio, % canopy killed, incidence of cones, number and size of WPBR cankers, distance of cankers from bole, number and severity of stem cankers height of lowest green needles within 12" of the bole, and other damages and severities.

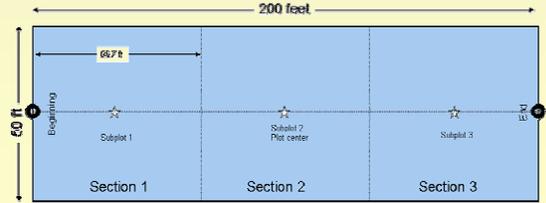
Distribution of WPBR in the Central Rockies



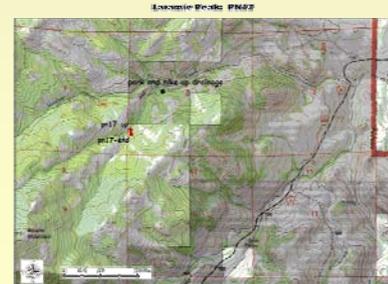
A GIS database that geographically displays the nearly 1000 stands that have been surveyed in the central Rockies since 1997 has been updated with the findings of this study.

OBJECTIVES

- 1) To assess the long-term ecological health of limber pine within WPBR-infested and threatened areas of the Rocky Mountains.
- 2) To provide baseline information necessary to sustain, protect, and restore limber pine stands in the Rocky Mountains
- 3) Potential plus trees will be identified and monitored for use in restoration efforts.



Plots were belt transects. All trees ≥4.5 ft tall were measured within plots, understory vegetation and regeneration were measured in three subplots.



Maps of individual plot locations were prepared to ensure ease of relocation.



Mountain pine beetle (above), twig beetle (below) and limber pine dwarf mistletoe (right) were common damage agents.

FUTURE WORK

- In 2007 Jim Blodgett (R2) and John Guyon (R4) will oversee the establishment of plots in northern and western Wyoming. Marcus Jackson (R1) will oversee the establishment of plots in central Montana.
- In 2008 all data will be compiled and analyzed. A final report will be produced.

REFERENCES

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