

# Assessing Limber Pine Stand Conditions after Mountain Pine Beetle Outbreaks in the Rocky Mountains (INT-EM-B-11-01)



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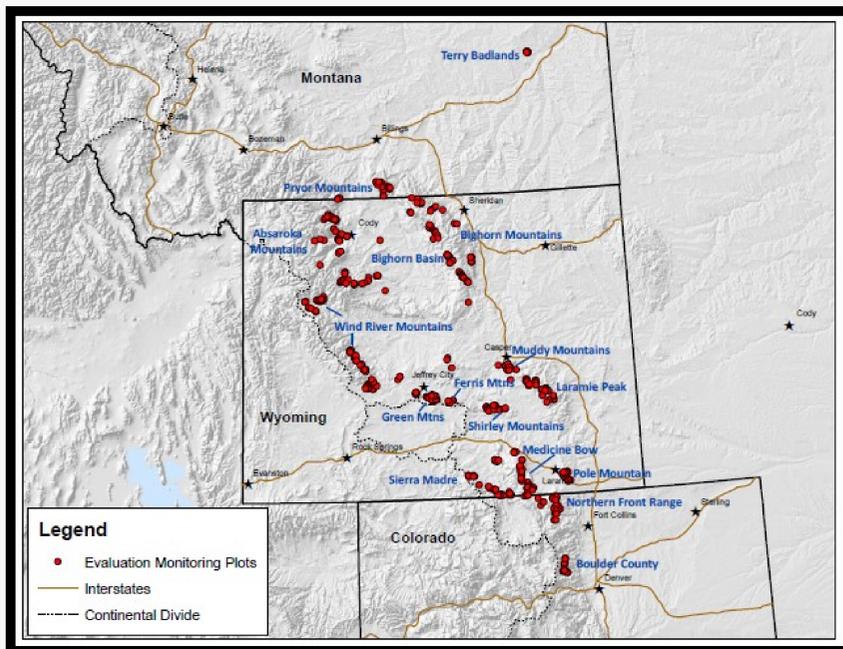
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## Introduction

Mountain pine beetle (MPB) and white pine blister rust (WPBR) threaten limber pine stands in the Rocky Mountains. MPB is killing mature trees and limber pine is a preferred host. The added impacts of WPBR may devastate some areas since small trees are particularly susceptible. Information on the current status of limber pine is needed to develop appropriate recovery plans. The objective of this study is to provide land managers with information needed to develop, prioritize, and implement restoration strategies for limber pine stands impacted by MPB. The specific objectives are to:

- 1) Determine the extent and severity of mortality from MPB in the study area.
- 2) Assess white pine blister rust (WPBR) impacts on remaining limber pine trees.
- 3) Assess stocking, composition, structure, and health of remaining trees and regeneration.
- 4) Use stand data for aerial detection surveys (ADS) accuracy assessment and improving predictive models of mortality.



In FY11 and FY12, 508 plots were established within 25 study areas extending from Terry Badlands, MT south to Boulder County, CO.

## Preliminary Results

We established 508 plots in 2011 and 2012 within 25 study areas in Colorado (Boulder County and Northern Front Range), Wyoming (Medicine Bow North & South; Sierra Madre; Pole Mountain; Ferris Mountain; Green Mountains; Shirley Mountains; Absaroka North & South; Bighorn Basin; Bighorn North, South & East; Cody Area; Jeffrey City Area; Laramie Peak East & West; Muddy Mountain; Wind River Reservation; and Wind River South & North), and eastern Montana (Pryor Mountains and Terry Badlands).

### Plot Summary

- Mean elevation of plots was 2376 m (range 857 – 2797).
- Plots occurred on a variety of slopes, aspects, slope positions, and stand structures.

### Tree Summary

- A total of 22,541 limber pines were evaluated over the course of the study.
- Mean DBH of live limber pine was 11.9 cm and dead limber pine was 15.9 cm.
- Mean BA of live limber pine was 17.7 m<sup>2</sup>/ha and BA of limber pine snags was 15.9 m<sup>2</sup>/ha.

### Limber Pine Health

- 17% of all limber pines evaluated were killed by mountain pine beetle.
- 26% of all live limber pines evaluated were infected with WPBR.
- 50% of all limber pines were in poor health status (either declining, dying, or dead).

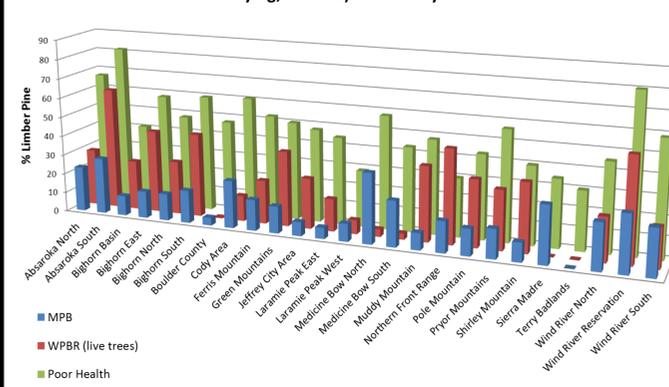
## Methods

Stands with at least 40% limber pine stems/ha were identified using FHM-ADS data, previous surveys, and local experts. Stand data collected included: lat/long, slope, elevation, aspect, structure, and disturbance history. Tree and regeneration data collected included: species, DBH, health status, WPBR status, canker lengths, MPB status, and other damages including cause and year of death. Ground cover, understory vegetation, invasive plant species and alternate hosts were assessed in fixed area subplots.

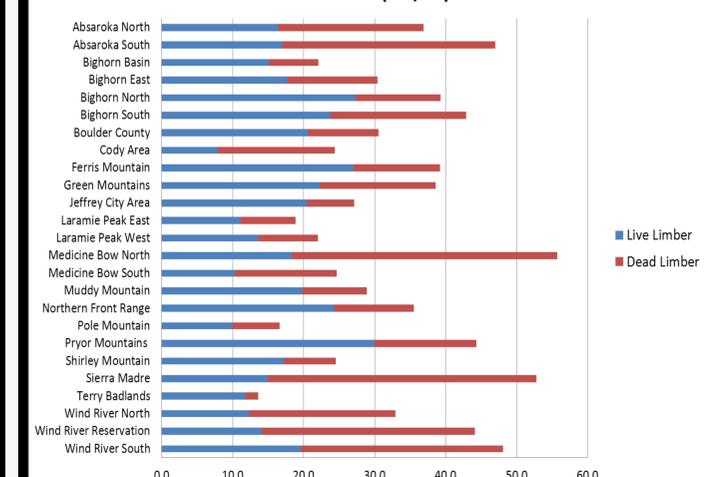
## References

Burns KS, J Blodgett, M Jackson, B Howell, WR Jacobi, A Schoettle, AM Casper, and J Klutsch. 2012. Monitoring limber pine health in the Rocky Mountains and North Dakota. Chapter 18 in: Potter, K.M, and Conklin, B.L. (eds). Forest Health Monitoring 2009 National Technical Report. USDA Forest Service, Gen. Tech. Rep. SRS-XX, Asheville, NC.

Incidence of MPB, WPBR, and Poor Health (trees classified as declining, dying, or dead) in 25 Study Areas



Basal Area (m<sup>2</sup>/ha)



## Future Plans

Data analysis and writing are ongoing. Christy Cleaver plans on completing her MS program by the end of 2013.

To complement this study, Forest Health Protection staff are in the process of remeasuring 83 long-term limber pine health monitoring plots (Burns and others 2012). Field work will be completed in FY13. Analysis and report writing will continue into FY14.

## Acknowledgments

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