

**TITLE:** Assessing Limber Pine Stand Conditions after Mountain Pine Beetle Outbreaks  
INT-EM-B-11-01

**LOCATION:** USFS Northern and Rocky Mountain Regions (no. CO, WY, and central MT)

**DATE:** September 30, 2011

**DURATION:** Year 2 of a 3-year project

**FUNDING SOURCE:** Base EM

**PROJECT LEADER(s):**

Kelly Burns (R2-FHP, Lakewood, CO, 303-236-8006, [ksburns@fs.fed.us](mailto:ksburns@fs.fed.us))

Jim Blodgett (R2-FHP, Rapid City, SD, 605-716-2783, [jblodgett@fs.fed.us](mailto:jblodgett@fs.fed.us))

**COOPERATORS:**

Bob Means, BLM, Cheyenne, WY; 307-775-6287; [robert\\_means@blm.gov](mailto:robert_means@blm.gov)

Bill Jacobi, CSU, Fort Collins, CO; 970-491-6927; [william.jacobi@colostate.edu](mailto:william.jacobi@colostate.edu)

Anna Schoettle, RMRS, Fort Collins, CO; 970-491-1333, [aschoettle@fs.fed.us](mailto:aschoettle@fs.fed.us)

Jose Negron, RMRS, Fort Collins, CO; 970-498-1252, [jnegron@fs.fed.us](mailto:jnegron@fs.fed.us)

Marcus Jackson, USFS, FHP, Missoula, MT; 406-329-3282, [mbjackson@fs.fed.us](mailto:mbjackson@fs.fed.us)

**FHP SPONSOR/CONTACT:**

Kelly Burns (R2-FHP, Lakewood, CO, 303-236-8006, [ksburns@fs.fed.us](mailto:ksburns@fs.fed.us))

**PROJECT OBJECTIVES:** To provide land managers with information needed to develop, prioritize, and implement restoration strategies for limber pine stands impacted by mountain pine beetle (MPB). Specific objectives include:

- 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.
- 5) Determine the relationship between stand conditions and meteorological factors.

**JUSTIFICATION:**

**a. Linkage to FHM Detection Monitoring:** ADS have identified nearly 1.5 million acres of 5-needle pines affected by MPB from 1996-2009 in R2. These surveys provide estimates of mortality but more detailed information, such as current stand conditions, the incidence of WPBR, and regeneration success, is needed to develop and implement restoration plans. Limber pine health was assessed in these areas before MPB mortality noticeably increased (INT-EM-06-03) but a large portion of limber pine's distribution in WY (BLM lands in particular) has not been evaluated on the ground or by ADS. FIA data for these areas is incomplete and on a slow

re-measurement cycle. The need for information is urgent; MPB is quickly killing mature trees and WPBR, which is particularly damaging to young trees, continues to spread and intensify.

**b. Significance in terms of geographic scale:** From 1997-2008, the highest levels of MPB-caused limber pine mortality occurred in CO and WY (Gibson et al. 2008) and levels continued rising in 2008 & 2009. Researchers predict that beetle populations will remain high until hosts are depleted or weather conditions become unsuitable to the beetles. Meanwhile, white pine blister continues to spread and intensify (Burns et al. 2008, Kearns and Jacobi 2007).

**c. Biological impact/political importance:** Limber pines often grow in fragile ecosystems where little else can grow. The combined effects of MPB, WPBR, and climate change could greatly impact the biodiversity of these ecosystems. Intervention will be necessary to restore/maintain impacted stands. Information on stand conditions is needed to facilitate these efforts. Ancient trees, resistant trees, and national treasures are a few examples of threatened resources. Genetic conservation of high elevation white pines is a priority for FHP, NPS, and BLM. Limber pine was added to the BLM's sensitive species list in WY in 2010.

**d. Scientific basis/feasibility:** This study is scientifically sound and feasible for the following reasons: 1) we will build upon previous studies and surveys to increase efficiency, 2) we have an experienced team of scientists and land managers working together, and 3) we have a proven track record of timely information exchange.

**e. Priority issues addressed:** This project will address priority issues: 1) tree mortality, 2) drought, and 3) filling data gaps in models. Current levels of MPB caused mortality are the highest ever documented historically. Concerns about climate change are increasing. Information on limber pine, a non-timber species, is limited. Results from this study will help fill these data gaps and ultimately facilitate our management capabilities.

## **DESCRIPTION:**

**a. Background:** MPB and WPBR are causing extensive decline and mortality throughout R1 & R2 leaving most limber pine stands at risk. MPB, the most immediate threat, kills mature, cone-bearing trees and limber pine is a more favorable host for MPB than lodgepole pine. The added impacts of WPBR, which continues to spread and intensify in limber pine, could be devastating in some areas since small trees are particularly susceptible. Two new alternate hosts (genera *Pedicularis* and *Castilleja*) for WPBR were verified in 2004 by RMRS. Information on stand conditions, regeneration, the extent and severity of MPB/WPBR and presence of alternate hosts are needed to make recommendations and to develop appropriate recovery plans.

**b. Methods:** Stands affected by MPB will be identified with ADS data, previous surveys, and local experts. Field data will be collected using established methods. Stand data collected will include: lat/long, slope, aspect, topography, structure, understory species, and occurrence and

abundance of alternate hosts. Tree data collected will include: species, DBH, health status, WPBR status, cone abundance, MPB status, and mortality cause/yr. Phloem thickness and radial growth will be recorded on a subset of trees. Regeneration will be assessed in fixed area subplots.

**c. Products:** A final report including management recommendations, field data for ADS accuracy assessment and improving the Risk Map and other predictive models, at least one full-length publication. The final dataset will be imported into the Whitebark Pine and Limber Pine Information System (WLIS) (Lockman and DeNitto). Results will be presented at the FHM Working Group and other national and regional meetings.

**d. Schedule of Activities:** Summer 2011: Develop protocol for all assessments and start CO & so.WY assessment; winter 2011: Organize/analyze data and present progress report at FHM meeting; summer 2012: No. WY & MT assessment and finish CO & So. WY; fall 2012: Data analyses and present progress report at FHM meeting; summer 2013 - spring 2014: Data analyses, present final report at FHM, and regional meetings.

**e. Progress/Accomplishments:** We assessed limber pine stands on 8 mountain ranges in northern CO and southern WY in FY11. Plots were located on the Roosevelt and Medicine Bow NFs and BLM lands in the Green and Shirley Mountains. Over 176 plots were established and 15 permanent plots were remeasured. Data is being analyzed and a preliminary report will be available in two months. In FY12, we plan on surveying two more sections of BLM lands in WY, the Shoshone and Big Horn NFs, and central MT. We will also continue remeasuring our network of permanent plots in CO, WY, and MT.

**COSTS:**

	Item	Requested FHM EM Funding	Other-Source Funding CSU	Other-Source Funding FHM
<b>YEAR 2012<sup>a</sup></b>				
<b>Administration</b>	Salary	\$41,383	\$6,450 <sup>b</sup>	\$24,000
	Overhead <sup>b</sup>	\$8,457	\$21,388	\$1,600
	Travel	\$12,500	\$0	\$4,000
<b>Procurements</b>	Other	\$ 500	\$0	\$0
	Equipment	\$0	\$0	\$2,000
	Supplies	\$2,000	\$0	\$500
<b>Total</b>		\$64,840	\$27,838	\$32,100

<sup>a</sup> A similar budget is expected in 2013. Due to the unique forest health concerns associated with limber pine on BLM lands in WY, BLM will actively pursue FY12/13 funding to ensure unsurveyed BLM lands are included.

<sup>b</sup> Overhead and cost share are based on the assumption of a challenge/cost share agreement.