

**INT-EM-06-03 Monitoring limber pine health in the Rocky Mountains.**

**LOCATION:** This project will be located in the Rocky Mountains of central Montana, Wyoming, and northern Colorado (Regions 1, 2, and 4).

**DURATION:** Year 1 of 3-year project    **FUNDING SOURCE:** Base

**PROJECT LEADER:** Kelly S. Burns, USFS, R2-FHM, Pathologist, Lakewood Service Center (LSC), (303) 236-8006, ksburns@fs.fed.us.

**COOPERATORS:** Bill Jacobi (Professor, Colorado State University), Anna Schoettle (Plant Ecophysiological, RMRS), Jeff Conner (Natural Resources Specialist, Rocky Mountain National Park), Jim Blodgett (R2-FHM, Rapid City Service Center), Marcus Jackson (R1-FHP, Missoula Field Office), John Guyon (R4-FHM, Ogden Field Office).

**PROJECT OBJECTIVES:**

- To assess the long-term ecological health of limber pine within white pine blister rust-infested and threatened areas of the Rocky Mountains.
- To provide baseline information necessary to sustain, protect, and restore limber pine stands in the Rocky Mountains.

**JUSTIFICATION:**

**Linkage to FHM Detection Monitoring:** Standard Forest Health Monitoring and FIA plots record damages and declines in limber pine but they are not designed to provide important information on ecological impacts of white pine blister rust (WPBR) and other damaging agents. Annual aerial surveys may not be able to detect the early stages of WPBR. Recent EM surveys (Harris and Hoffman 2002, Sullivan 2004, Lockman and others 2003) and other surveys (FHP, STDP, PTIPS, CAPS) have identified the extent, distribution, and intensity of WPBR and other damaging agents in limber pine. This would be the first study specifically designed to evaluate the long-term, unexpected changes resulting from the disease and other damaging agents.

**Significance in terms of geographic scale:** 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 WPBR infestations have been discovered within Region 2 and the disease front in northern Colorado is within 12 miles of Rocky Mountain National Park (RMNP).

**Biological and political importance:** The purpose of this project is to assess the long-term ecological health of limber pine and to provide land managers with baseline information needed to sustain, protect, and restore limber pine as outlined as a priority in the 2003 National Report (Managing for healthy white pine ecosystems in the United States to reduce impacts of white pine blister rust, R1-03-118) and the National Strategy and Implementation Plan for Invasive Species Management (FS-805).

**Feasibility or probability that the project will be successfully completed:** This project is feasible because we will use established and tested methods and will use previously evaluated study sites.

**DESCRIPTION:**

**a. Background:** WPBR, caused by the invasive fungus *Cronartium ribicola*, is a serious disease of 5-needle pines. The fungus causes cankers which result in mortality of the portion of the branch or stem above the canker. Ecological impacts may be severe. For example, trees weakened by blister rust become susceptible to other damaging agents such as bark beetles and small trees are easily killed because infections generally occur close to the main stem. Furthermore, WPBR may adversely impact reproductive potential and ultimately regeneration by killing off cone-bearing branches. White pine blister rust requires an alternate host (currants and gooseberries) to complete its life cycle; however, researchers have recently identified naturally occurring *C. ribicola* infections on non-*Ribes* species hosts including *Pedicularis racemosa* and *Castilleja miniata* (McDonald and others, In Press). This new discovery could dramatically affect our understanding of WPBR epidemiology.

Recent EM surveys and other surveys have discovered new WPBR infestations heightening concern about the status of limber pine in the Rocky Mountains, a species that has been largely ignored in the past. New infestations have been discovered in limber pine in southern Wyoming in the Snowy (Kearns 2005) and Sierra Madre Mountains (Brian Geils 2005, personal communication) and in Colorado in the Sangre de Cristo (limber and bristlecone pine) and Wet (limber pine) Mountains. A serious concern in Colorado is the threat to limber pines in RMNP, a national treasure which lies only 12 miles south of the current disease front.

In 2002, Regions 1, 2 and 4 initiated an EM project to monitor WPBR spread and establishment in 5-needle pines of the central Rocky Mountains. Another EM project is currently underway to develop an interactive database (with a GIS component) that maps the distribution of whitebark and limber pines in western North America and provides information on known locations of WPBR and health status (Lockman, DeNitto, Courter and Koski). Surveys in Montana (Jackson and Lockman 2002), where WPBR has been present for decades, show variable levels of WPBR and substantial mortality associated with recently discovered *Dothistroma needlecast* in limber pine. Kearns (2005) modeled the potential distribution of WPBR for white pines in Colorado and estimated that approximately 50 percent of Colorado's white pine stands are at risk for WPBR establishment. These studies have provided critical information on the distribution and intensity of WPBR and current health status but we have little information on the long-term changes that will result from this invasive disease and other damaging agents. By characterizing ecological impacts, this project will provide baseline information necessary for protection and restoration of these ecosystems.

**Methods (Brief description of the methods including data availability):**

- Synthesize EM and other white pine surveys to identify sites with a range of WPBR intensities and duration. Stratification will address risk factors such as elevation and duration of infestation. Data is available from R1, R2, and R4 studies addressed above.
- Survey methods will follow those developed by the Whitebark Pine Ecosystem Foundation (WPEF, [www.whitebarkfound.org](http://www.whitebarkfound.org)). We will work closely with USFS-RMRS/CSU statistical consultants to insure a quality sampling and data collection strategy.
- Long-term ecological impacts will be evaluated by characterizing changes in stand structure

and species composition of tree and plant species, WPBR impacts on crown structure and reproductive capability (potential cone production), other abiotic/biotic damages and their severities, changes in fuel loading, and presence or absence of *Ribes* and non-*Ribes* sp. alternate hosts. Once established, plots will be revisited every 3-5 years and will be maintained internally. Additionally, potential plus trees identified in this survey will be monitored for use in restoration efforts.

**c. Products:**

- Posters and/or presentations at the Central Rockies White Pine Health Working Group, the Western International Forest Disease Work Conference, and the Forest Health Monitoring Working Group meeting.
- A technical report describing ecological impacts to limber pine stands and providing baseline information necessary to restore impacted stands.

**d. Schedule of Activities:** In 2006, we will establish monitoring plots in southern Wyoming and northern Colorado (Including RMNP). In 2007, we will cover northern and western Wyoming and central Montana.

Activity	2006	2007	2008
Synthesize data and identify study sites	*	*	
Plan field season	*	*	
Conduct surveys/establish monitoring plots	*	*	
Analyze data	*	*	*
Progress report	*	*	
Final Report			*

**e. Progress/Accomplishments: NA**

**COSTS:**

		Item	Requested FHM EM Funding	Other-Source Funding	Source
<b>2006</b>	<b>Administration</b>	Salary*	24,000	*	
		Overhead			
		Travel	14,000		
	<b>Procurements</b>	Equipment	1,500		
Supplies		500			
Total		40,000			
<b>2007</b>	<b>Administration</b>	Salary	36,000		
		Overhead			
		Travel	22,000		
	<b>Procurements</b>	Equipment	1,500		
Supplies		500			
Total		60,000			
<b>2008</b>	<b>Administration</b>	Salary	18,000		
		Overhead			
		Travel	2,000		
	<b>Procurements</b>	Equipment			
Supplies					
Total		20,000			

\*Salary/travel for 3/GS-5 technicians for 3 months/year. R1,2,4-FHM/FHP personnel time/travel will be contributed to accomplish this project. References available by request