

October 16, 2009

Re: Tensleep Canyon Limber Pine, 2009; RCSC-02-10

To: Forest Supervisor Bighorn National Forest

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On August 19, 2009 I examined limber pine (*Pinus flexilis* James) trees on the west side of Tensleep Canyon, Bighorn National Forest of Wyoming. The objectives were to do a quick assessment of the limber pine condition, to check seed cone numbers and maturity, and to record locations of potential white pine blister rust (WPBR) (*Cronartium ribicola*) resistant trees.

### **Limber pine condition**

The limber pine on approximately 27 acres were examined on the west side of the canyon. There is high mortality in the area that can be attributed to WPBR, mountain pine beetle (MPB) (*Dendroctonus ponderosae*), and/or a combination of WPBR and MPB.

Most of the trees are or were infected with WPBR. WPBR has killed several of the smaller trees and saplings in the area. This disease also is or has killed several tree tops and branches of the larger limber pine.

MPB is killing and has killed many of the larger pine in the area. The smaller trees and saplings have no evidence of bark beetle associated mortality. Most of the MPB-killed trees have clear evidence of WPBR infections that caused mortality of either tree tops or branches prior to MPB attack.

Other insects also occur in the area. There are some *lps* that might be contributing to mortality. Some *lps* galleries were observed under the bark of stems and major branches,



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but most of the galleries were MPB caused. Many of the trees are infested by twig beetles that are causing lower branch mortality, but tree mortality due to twig beetles was not observed. Red turpentine beetle (*Dendroctonus valens*) and pitch moth (*Synanthedon sequoiae*) were also observed in the area.

### **Seed cone numbers and maturity**

More than 200 live limber pine trees were examined for cones on the west side of the canyon. About 20, two-year-old cones were observed. Only four of the cones could be reached, and three were completely infested with cone and seed insects. The one that had seed was still very young and not ready for collection. Very few one-year-old cones were observed in the area, so cone collections next year in this area might not be possible. Based on the large numbers of brown and gray cones on the ground, 2007 and 2008 were good cone years.

### **Potential white pine blister rust resistant trees**

Given the large number of WPBR branch and stem cankers in the area and the WPBR associated mortality, any limber pine in the area with no evidence of WPBR are likely resistance to WPBR. Four such potential WPBR resistant trees were found and their locations were recorded (**Table 1** and **Fig. 1**). The trees are close to the road. They were flagged with 4 strips of pink-and-black striped ribbon flag per tree, but the flagging will not last long. The candidate trees appeared healthy with no evidence of WPBR or MPB. Most of the other trees in this area are clearly infected/infested or dead. Therefore, the location information should be adequate for relocating these potential WPBR resistant trees.

A few dead branch tips were observed on two of the four trees, but WPBR could not be confirmed. The dead tips might have been caused by branch shading, Ips, or twig beetles. These four trees span about 96 yards (88 meters) apart. The elevation midpoint for the trees is 2,212 meters, and the geographic location midpoint for the trees is latitude 44.125992 and longitude -107.255978 (WGS 1984). The four potential WPBR resistant trees did not have any cones, as with most of the trees in the stand.

There are a few trees with only few, small WPBR branch cankers that were difficult to detect. These trees might have healthy crowns, but since they are infected with WPBR

they should not be considered resistant trees. For example, at the parking location suggested (**Table 1**), there are trees with full crowns, but with small branch cankers that might be difficult to see. There are, however, likely other WPBR resistant trees in the canyon. At least two other potential WPBR resistant trees that were not recorded are south-west of the four candidate trees.

## Recommendations

- Protection of potential WPBR resistant trees:

Treatment of the few WPBR resistant trees with an appropriate, registered insecticide such as carbaryl can prevent MPB caused mortality. The timing of application is critical, because preventive treatments are ineffective if applied after MPB attack a tree.

Actions that reduce tree stress, including thinning, lower the probability of attack from tree-killing bark beetles. Removing beetle infested trees reduces the local beetle population which protects adjacent trees. Limber pine infected by WPBR and those showing signs of root disease or having been hit by lightning are especially attractive to tree-killing bark beetles. Additional management options for MPB and limber pine engraver are included in our recent Forest Health Management, Rocky Mountain Region Disease & Insect Training Manual<sup>1</sup>.

- Seed conservation:

It would be good to try to collect seed every year. Limber pine seed does not remain viable for as long as other pine species in storage, but it can be stored for about 5 – 15 years effectively. If seeds are collected each year, there would not be a problem when a year with poor or no cone production occurs, since a viable seed store would be maintained.

- WPBR disease management:

WPBR resistant growing stock would be the best long term option regarding disease management. It would be prudent to determine if the candidate trees really are resistance to WPBR by testing locally collected seed. Anna Schoettle (USDA Forest Service, Rocky

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<sup>1</sup> < <http://www.fs.fed.us/r2/fhm/bugcrud/manual/mpb.pdf> > and < [http://www.fs.fed.us/r2/fhm/bugcrud/manual/limber\\_pine\\_engraver.pdf](http://www.fs.fed.us/r2/fhm/bugcrud/manual/limber_pine_engraver.pdf) >

Mountain Research Station) expressed an interest in including the Bighorn National Forest population in her white pine blister rust resistance screening studies. Other WPBR disease management options include pruning of branch cankers and *Ribes* spp. eradication. Pruning and *Ribes* control have been shown to be effective WPBR disease control measures in the Lake States. Detailed management options for WPBR are included in the recent regional management guide (Burns, et al. 2008<sup>2</sup>).

- Promote natural regeneration of limber pine:

Actions that promote regeneration of limber pine are recommended. Presently, there is poor natural limber pine regeneration in the area. WPBR is likely contributing to seedling mortality and is contributing to sapling mortality limiting regeneration in the area. Another limiting factor to limber pine regeneration in the area is competing vegetation of both other tree species and the ground vegetation. Fires burn off competing vegetation, and limber pine normally does not regenerate well in the absence of fire. Therefore, recent fire suppression activities limit limber pine regeneration. If some of the competing vegetation in the area is cleared, potentially by using a controlled burn, it would promote natural regeneration.

- Locate other sites with potential WPBR resistant trees:

Based on a systematic survey conducted in the summer of 2002<sup>3</sup>, five additional sites have potential as cone collection areas for candidate WPBR resistant trees (**Table 2**). These areas are suggested given their high WPBR pressure, and because they were 50% or more limber pine in relatively large stands of at least a few acres, and were relatively dense stands for limber pine. The high WPBR pressure will increase the chance of infection of susceptible trees, and the large, dense limber pine stands will increase the chance of having a few resistant trees in a relatively small area. These stands may no longer be 50% or more limber pine, due to WPBR and MPB mortality, but the areas should be ideal for locating WPBR resistant trees.

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<sup>2</sup> Burns, K.S., Schoettle, A.W., Jacobi W.R., and Mahalovich, M.F. 2008. Options for the Management of White Pine Blister Rust in the Rocky Mountain Region. Gen. Tech. Rep. RMRS-GTR-206. Fort Collins, CO: USDA Forest Service, RMRS. <[http://www.fs.fed.us/rm/pubs/rmrs\\_gtr206.pdf](http://www.fs.fed.us/rm/pubs/rmrs_gtr206.pdf)>

<sup>3</sup> Blodgett, J. T., Schaupp, Jr., W. C., and Long, D. F. 2005. Evaluation of white pine blister rust and mountain pine beetle on limber pine in the Bighorn National Forest. USDA For. Serv., Rocky Mountain Region, For. Health Mgt., Bio. Evaluation R2-05-08

**Table 1.** Location of potential white pine blister rust resistant limber pine and a suggested parking location in Tensleep Canyon, Bighorn National Forest of Wyoming.

<b>Tree</b>	<b>Longitude<sup>a</sup></b>	<b>Latitude<sup>a</sup></b>	<b>Elevation (meters)</b>
1	-107.25566900	44.12640991	2,211
2	-107.25589348	44.12607906	2,218
3	-107.25618394	44.12576798	2,211
4	-107.25616713	44.12570988	2,208
Parking <sup>b</sup>	-107.25603504	44.12361902	2,167

<sup>a</sup> Latitude/Longitude, WGS 1984.

<sup>b</sup> A suggested parking location, but the trees are infected with white pine blister rust.

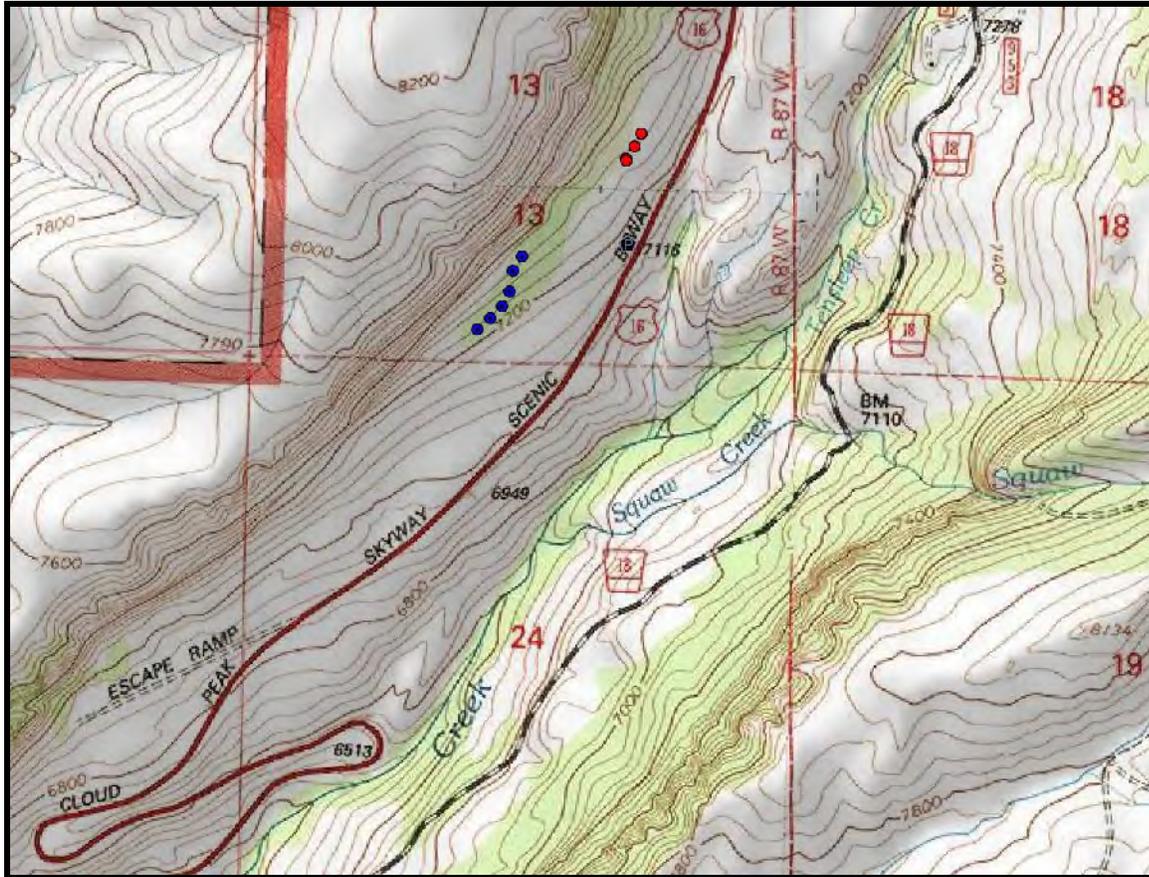
**Table 2.** Recommended locations where white pine blister rust resistant trees might be found in the Bighorn National Forest of Wyoming based on a previous survey<sup>a</sup>.

<b>Stand<sup>a</sup></b>	<b>Northing (utm<sup>b</sup>)</b>	<b>Easting (utm<sup>b</sup>)</b>	<b>Comment<sup>c</sup></b>
1	4985333	285489	moderately-high WPBR pressure
5	4887714	319140	Tensleep; high MPB & WPBR pressure
8	4963258	312844	high WPBR pressure
10	4932896	301043	high WPBR pressure
11	4942520	333776	high WPBR pressure
15	4943819	330785	high WPBR & DM pressure in some areas

<sup>a</sup> Stand numbers from Blodgett, J.T., Schaupp, Jr., W.C., and Long, D.F. 2005.

<sup>b</sup> UTM units in zone 13; datum NAD 27.

<sup>c</sup> WPBR = white pine blister rust, MPB = mountain pine beetle, DM = dwarf mistletoe.



**Fig. 1.** Potential white pine blister rust resistant limber pine in Tensleep Canyon (red circles), a parking location (blue polygon with P), and the Bighorn Biological Evaluation Plots in Tensleep Canyon (blue circles with black centers).