

November 17, 2014

Re: Harney Peak Limber Pine - 2014, RCSC-03-15

To: Forest Supervisor, Black Hills National Forest

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This is an update¹ regarding the known limber pines (*Pinus flexilis* James) on and near Harney Peak in the Black Hills National Forest (BKF) of South Dakota. Limber pine was designated a Species of Local Concern on the BKF in 2011. There are currently 27 documented live limber pine individuals on BKF administered land; 10 of these were newly documented in 2014. On June 25, July 2, August 18, and October 15, 2014 Cheryl Mayer (Black Hills National Forest Botany Technician) and/or James T Blodgett (Plant Pathologist) examined trees on and near Harney Peak. The objectives were to assess changes in the limber pine condition, look for additional limber pines, perform BKF forest plan monitoring, install verbenone pouches, check cone numbers and maturity, collect cones, and prune white pine blister rust (WPBR) (*Cronartium ribicola*) branch cankers when practical. In 2014 we started photographing and recording heights for seedlings. Photographs and DBH measurements started in 2009 for saplings and trees.

Observations and Changes since the 2012 Report

June/July: Most of the trees (T#) were examined for cankers and cones. One new seedling (T28) and one new sapling (T29) were found (**Fig. 1 & 2, Table 1**). Over 63 cones were observed on T2, T3, and T4 combined. Cankers were pruned from T1, T2 (**Fig. 3**), and T29. WPBR killed T6. The canker was in the main stem of T6 and could not be pruned earlier. On July 2, Cheryl added verbenone to T9 and T10 and observed several cones on both trees.

August: Two new seedlings (T30 and T31) and one new sapling (T32) were found. Eighty limber pine cones were collected from T2 (10 cones), T3 (9 cones), T4 (48 cones), and T10 (13 cones). Cones were sent to Richard Gilbert (Nursery Manager) at the Bessey Nursery in Halsey, NE, on

¹ Blodgett, J. T. 2012. Harney Peak Limber Pine, 2012. USDA For. Serv., Rocky Mountain Region, For. Health Mgt., Rpt. RCSC-02-13.



August 20, 2014. A few of the cones had rodent and/or insect damage, but the damaged cones likely contained some good seeds. A stem canker was pruned from T2 (**Fig. 3**), removing the smaller of the two main stems (2 inches diameter). It is expected WPBR will kill T32. The sapling has three branch cankers and two stem cankers, including a canker in the lower main stem that cannot be pruned.

October: Four new seedlings (T33, T35, T36, and T37) and two new saplings (T34 and T38) were found. It is estimated T37 was killed by WPBR in 2009. It is expected WPBR will kill T38. The sapling has three branch cankers and one stem canker (**Fig. 3**) in the lower main stem that cannot be pruned. One confirmed and one potential branch canker were observed in T9. The cankers were too high in the tree to prune.

Management Recommendation Updates

The recommendations provided in the 2009² and 2011³ reports are still suggested. Verbenone pouches were used as a preventive treatment for MPB since 2012 for T9 and T10. Branch pruning to control WPBR spread and prevent the diseases from reaching the main stems has been applied since 2011. Seeds were collected in 2009, 2011, and 2014. Forest plan monitoring started in 2011.

Additional suggestion: Previously it was suggested that the small population in the area could be increased by planting. Given the localized high mortality of ponderosa pine due to mountain pine beetle, there are several areas free of competing tree vegetation. These areas would provide better soils than the rock cracks where many of the limber pine now survive. Richard Gilbert, Bessey Nursery Manager, would need to be contacted regarding the collected seed and producing limber pine nursery stock.

Plantings at administrative sites such as the Supervisor's Office or District Offices of the BKF is another suggestion. Along with providing areas free of competing vegetation and improved soils, these areas would offer easier monitoring and future seed collecting opportunities. The ease of access would also offer public education opportunities.

Bulk seed collections were made in 2009 and 2011. However, since then WPBR has been detected in 13 trees including T2, one of the seed producing trees. Individual tree seed collections were started in 2014, and are now suggested. This will allow for future assessment of WPBR resistance.

² Blodgett, J. T. 2009. Harney Peak and Custer State Park Limber Pine, 2009. USDA For. Serv., Rocky Mountain Region, For. Health Mgt., Rpt. RCSC-01-10.

³ Blodgett, J. T. 2011. Harney Peak Limber Pine, 2011. USDA For. Serv., Rocky Mountain Region, For. Health Mgt., Rpt. RCSC-01-12.

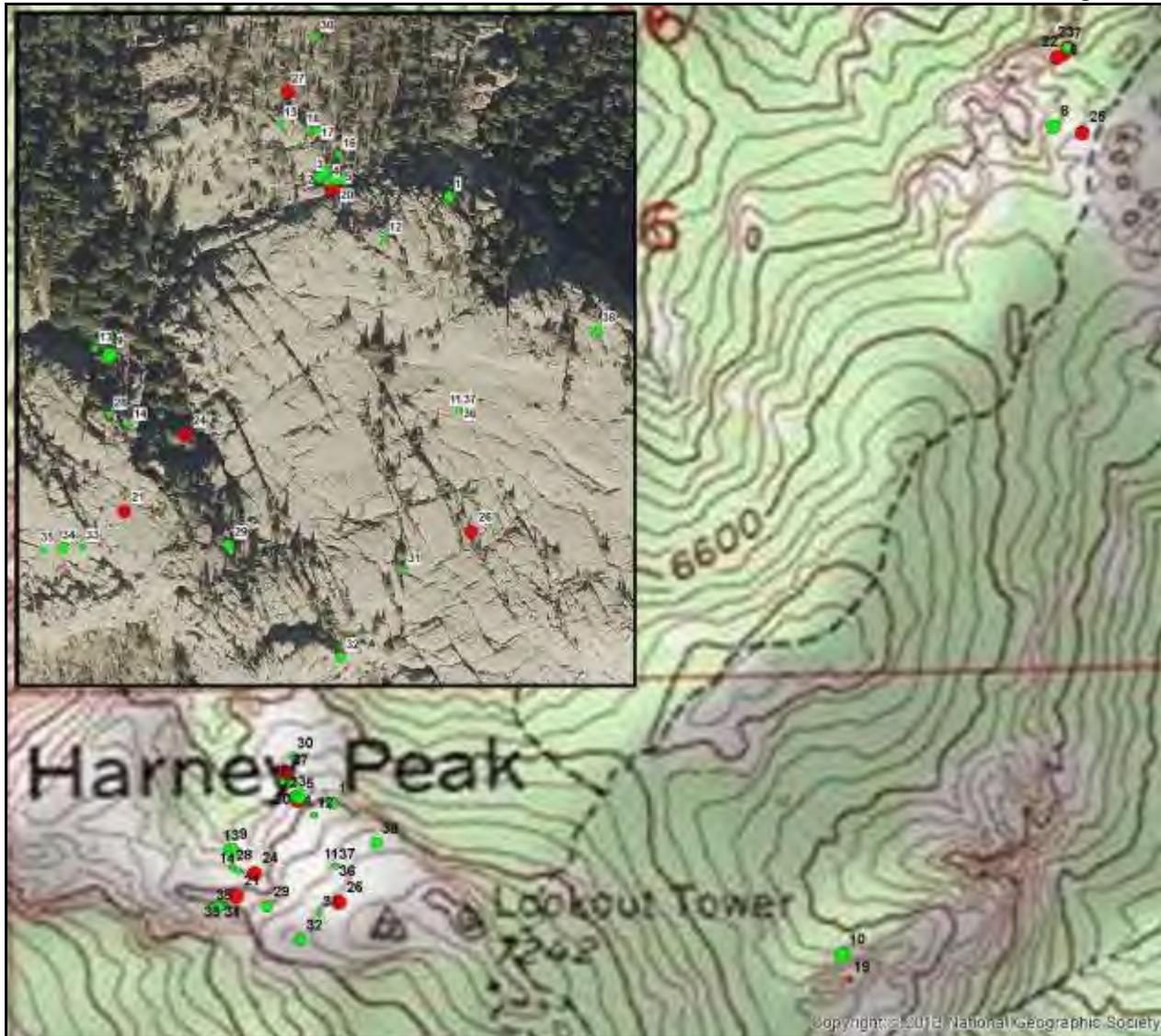


Figure 1. Map of the three location on the Black Hills National Forest where limber pine have been found, with aerial photo inlay of location with the most trees. Green circles represent live limber pine and red circles represent dead limber pine.

Table 1. Tree numbers with old codes, health status and size, date GPS was recorded (*i.e.*, when 'found') with location, and cause of mortality for limber pine in the Black Hills National Forest

Number ^a	Old code ^a	Status	Size ^b	Date	Latitude ^c	Longitude ^c	MPB ^d	WPBR ^e
1	SA01	live	sapling	09/02/09	43.86733	-103.53322	.	.
2	SA02	live	sapling	09/02/09	43.86740	-103.53382	.	.
3	SA03	live	sapling	09/02/09	43.86742	-103.53379	.	.
4	SA04	live	sapling	09/02/09	43.86739	-103.53376	.	.
5	SA05	live	sapling	09/02/09	43.86739	-103.53372	.	.
6	SA06	dead	sapling	08/31/11	43.87560	-103.52164	no	yes
7	SA07	live	sapling	08/31/11	43.87567	-103.52158	.	.
8	T01	live	tree	08/31/11	43.87479	-103.52183	.	.
9	T02	live	tree	08/31/11	43.86682	-103.53480	.	.
10	T03	live	tree	10/14/11	43.86552	-103.52535	.	.
11	SE01	live	seedling	09/27/10	43.86661	-103.53319	.	.
12	SE02	live	seedling	09/27/10	43.86719	-103.53352	.	.
13	SE03	live	seedling	08/31/11	43.86684	-103.53487	.	.
14	SE04	live	seedling	08/31/11	43.86659	-103.53471	.	.
15	SE05	live	seedling	08/31/11	43.86758	-103.53399	.	.
16	SE06	live	seedling	08/31/11	43.86748	-103.53373	.	.
17	SE07	live	seedling	08/31/11	43.86756	-103.53383	.	.
18	SE08	live	seedling	08/31/11	43.86756	-103.53386	.	.
19	SE09	dead	seedling	10/14/11	43.86524	-103.52523	no	yes
20	D01	dead	tree	09/02/09	43.86736	-103.53376	yes	no
21	D02	dead	tree	09/02/09	43.86630	-103.53474	yes	no
22	D03	dead	tree	08/31/11	43.87557	-103.52176	probably ^f	maybe ^f
23	D04	dead	tree	08/31/11	43.87568	-103.52158	probably	maybe
24	D05	dead	tree	08/31/11	43.86655	-103.53445	probably	maybe
25	OD1	dead	tree	08/31/11	43.87472	-103.52139	old dead ^f	old dead
26	OD2	dead	tree	08/31/11	43.86621	-103.53315	old dead	old dead
27	OD3	dead	tree	08/31/11	43.86769	-103.53396	old dead	old dead
28	.	live	seedling	06/25/14	43.86662	-103.53480	.	.
29	.	live	sapling	06/25/14	43.86618	-103.53427	.	.
30	.	live	seedling	08/18/14	43.86787	-103.53382	.	.
31	.	live	seedling	08/18/14	43.86609	-103.53346	.	.
32	.	live	sapling	08/18/14	43.86580	-103.53376	.	.
33	.	live	seedling	10/15/14	43.86619	-103.53494	.	.
34	.	live	sapling	10/15/14	43.86618	-103.53503	.	.
35	.	live	seedling	10/15/14	43.86617	-103.53512	.	.
36	.	live	seedling	10/15/14	43.86661	-103.53319	.	.
37	.	dead	seedling	10/15/14	43.86661	-103.53319	no	yes
38	.	live	sapling	10/15/14	43.86687	-103.53255	.	.

^a Trees were assigned consecutive numbers (1, 2, 3, etc.) to replace tree size/condition codes used in previous reports.

^b Seedlings were < 4.5 ft tall, saplings were > 4.5 ft tall and < 4 inches DBH, and trees were > 4 inches DBH.

^c Projection: WGS 84.

^d Indicates if tree was killed by mountain pine beetle.

^e Indicates if tree was killed by white pine blister rust.

^f Tree was dead when found, thus cause of mortality was difficult or impossible to determine.

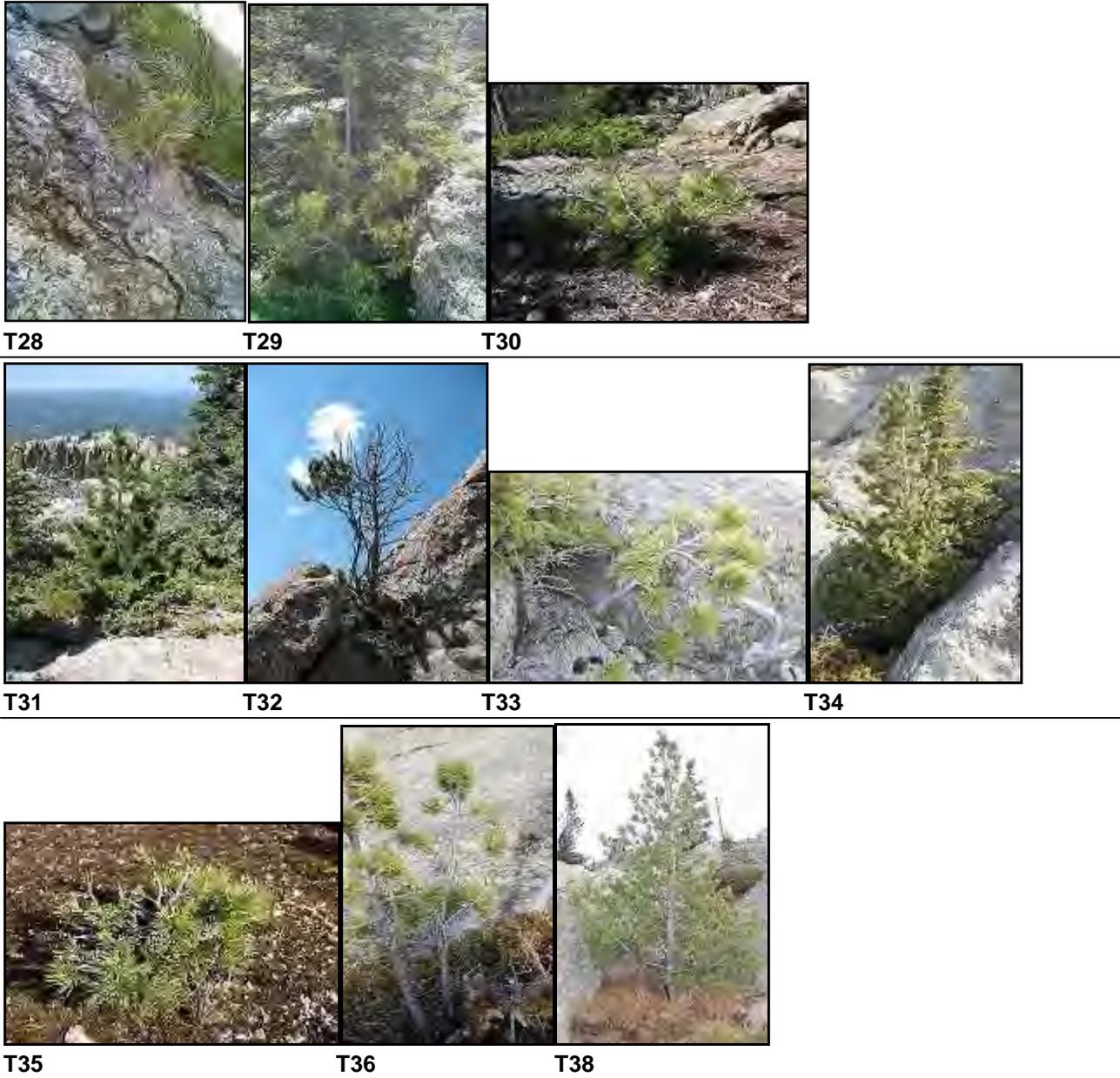


Figure 2. Live trees found in 2014; including tree numbers (T#) in lower left.



Figure 3. Removed branch with white pine blister rust canker in sapling T2 (left), removed stem with canker from T2 (middle), and sapling T38 with canker in lower branch/stem (right). Dead phloem is brown and live phloem is green.