

**2008 WHITEBARK PINE  
RESTORATION PROJECT PROGRESS REPORT**

**Project Title:** Whitebark pine regeneration after the 1988 Yellowstone fires.

**Project Contact:** (Name, email, phone #) Jodie Canfield [jcanfield@fs.fed.us](mailto:jcanfield@fs.fed.us), 496-522-2554; Marion Cherry [mbcherry@fs.fed.us](mailto:mbcherry@fs.fed.us), 406-587-6739; Dan Tyers [dtyers@fs.fed.us](mailto:dtyers@fs.fed.us), 406-848-7375 ext 26.

**Location:** (state, agency unit, etc.) Absaroka Beartooth Wilderness; portions of Gallatin, Custer and Shoshone National Forests.

**Size of Treated Area:** (acres, trees, etc. or N/A) Sampling area= 85 belt transects; total length: 8.9 miles/14,310 meters; total area: 506,500 square feet/47,055 square meters.

**Reported in FACTS (if applicable)? (Y/N/na)** N/A

**Objective(s)** (from original request): Determine the amount of whitebark pine regeneration in areas affected by the 1988 Yellowstone fires at 10 and 20 year intervals post-fire; determine the effects of a landscape level disturbance on whitebark pine stand reestablish potential.

<b>Budget</b>	<b>Requested Funding \$</b>	<b>Other Funding \$</b>	<b>Description /Source/in-kind</b> Please list origin of matching funds
Salary	\$5,000	\$20,000	\$10,000 volunteer in-kind; \$5,000 GYCC; \$5,000 Bennett/Ohman foundations
Travel			
Contracting			
Equipment			
Supplies			
Other (specify)			
<b>Totals</b>	<b>\$5,000</b>	<b>\$20,000</b>	

Did FHP funding get used or obligated; if not briefly explain (were any funds taken by fire borrowing?)

Used

**Project Status:** (Is the project complete? If not, what remains to be accomplished? – provide time line)

Field work, data analysis, and executive summary completed; article preparation in progress- by April; submission for publication- by May.

**Results:** (what did you accomplish and what have you learned) (see attached report)

We were able to resample 85 of the original 89 transects. Two could not be located and 2 were inaccessible on 2 separate visits because grizzly bears were present at the sites (scavenging on hunter-generated elk gut piles). Consequently, we surveyed 8.9 miles (14,310 meters) of 10'-wide belt transects, which is equivalent to 506,500 square feet, total area (47,055 square meters). Trees included in the sample were characterized as: SE ½- trees <½ meters tall, SE-

trees <1" DBH, SA- trees >1"<5" DBH. In 1998, 27 of the 85 transects had no new whitebark pine establishment, and in 2008 this was the case for only 3. Moreover, in 1998 there were 720 whitebark pine established on these transects, but in 2008 there were 2,142, a three-fold increase. Of the trees sampled in 2008, only 3 trees were infected with blister rust.

**Changes needed or Problems Encountered:** (briefly discuss changes or problems and effects they had on your project) We could not sample 4 or the original 89 sites: we could not find 2 sites and were prevented from reaching 2 more because grizzly bears were scavenging on elk gut piles generated by hunters. We made 2 separate trips to the latter sites, but, as stated, could not reach them.

**Sharing Results/Products/Outcomes:** (If applicable, please attach or send reports, photos, presentations, websites, etc.) A brief report has been prepared that presents the descriptive statistics (see attached document). These data are available to appropriate managers. The intent is to work on a publication with more sophisticated analysis over the winter for submission to a peer-review journal.

**Suggestions for how the overall program can be improved to better meet your needs:** (suggestions regarding RFP solicitation and evaluation process, etc.) none

**Executive summary: Whitebark pine regeneration after the 1988 Yellowstone fires in the Absaroka Beartooth Wilderness**

The whitebark pine, a high-elevation keystone species, is currently threatened by blister rust, pine beetles, and competition from other conifers. One of the methods suggested for invigorating whitebark pine forests involves removing competing spruce and fir trees, which can be accomplished through stand replacing fires. Moreover, Clark's Nutcrackers cache seeds in burned forests, promoting seedling establishment. The Yellowstone ecosystem, including the Absaroka Beartooth Wilderness, experienced landscape level fires in 1988, providing an opportunity to investigate reforestation rates following a major disturbance.

In 1998, 10 years post-fire, we established 89 transects in whitebark pine forests where fire had killed all trees (Figure 1). The transects were 10'-wide variable-length belts; length varied from 300 to 1,050 feet. All trees were recorded by size class and characterized as SE1/2 (<1 meter tall), SE (>1 meter tall and <1" DBH), and SA (>1" and <5" DBH). Larger trees were not present. In addition to whitebark pine trees, Englemann spruce, subalpine fir, lodgepole pine, and Douglas fir were recorded.

In 2008, 20 years post-fire, 85 of the original 89 transects we re-visited. Two transects could not be found and 2 more were inaccessible on 2 separate visits because of grizzly bear activity. A total of 8.9 miles (14,310 meters) were involved, the equivalent of 506,500 square feet (47,055 square meters) (Table 1).

Transects	85	
Total Length	46,950	Ft
	8.9	Miles
	14,310	Meters
Average Length	552	Ft
	168	Meters
Total Area	506,500	sq ft
	47,055	sq meters
Average Area	5,959	sq ft
	554	sq meters

**Table 1: Summary Statistics for 2008 Burned Whitebark Transects**

The number of trees (Table 2), all species, increased 3-fold between 1998 and 2008 from 915 trees to 3,078 trees. Specific to whitebark pine, the total number of trees increased by three times from 720 to 2,142 trees, while the number of small seedlings increased from 695 to 1421, seedlings increased from 25 to 693, and saplings from 0 to 28. Incidence of blister rust was nominal during each sampling interval (1 and 3 trees in 1998 and 2008, respectively). The number of subalpine firs increased 10-fold from 53 to 527. Engelmann spruce increased 3-fold from 46 to 147. The number of lodgepole pine increased from 91 to 240 trees. There was no increase in the number of Douglas firs.

Table 2 also demonstrates that the number of SA in 2008 was about the same as the number of SE in 1998 (28 versus 25). In addition, the number of SE in 2008 was about the same as the number of SE ½ in 1998 (693 versus 695). Although every attempt was made to sample the same transect locations, the success of this effort is unknown. Therefore, it is unknown if the same trees were counted each time. Regardless, the similarity in numbers between the smaller and next larger size classes for the respective sampling periods suggests that mortality of establishing trees was low.

Because most whitebark pine germinated from unclaimed Clark’s Nutcracker caches, it is expected that trees would be found in clusters. On average, whitebark pine were found in clusters of 2.01 trees, while trees in the size class SE1/2 were found in clusters of 2.5 trees per group (Table 2).

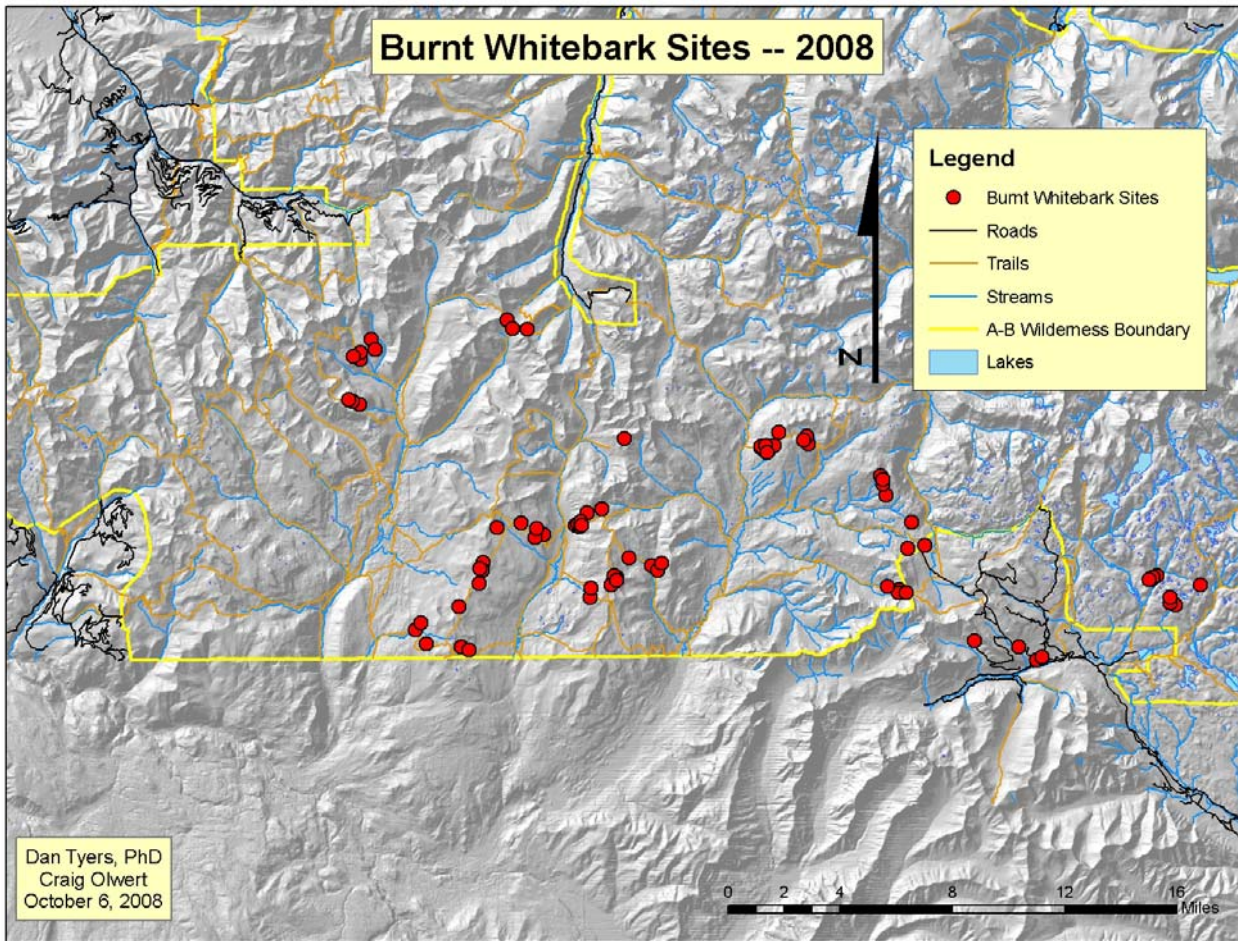
Effort		Overall	WB SE1/2	WB SE	WB SA	WB Rust	PICO	ABLA	PIEN	PSME
1998	Number of Trees	915	695	25	0	1	91	53	46	5
	Number of Clusters	390	237	13	0	1	79	44	28	5
	Average Trees per Cluster	2.35	2.93	1.92	0.00	1.00	1.15	1.20	1.64	1.00
2008	Number of Trees	3078	1421	693	28	3	240	527	164	5
	Number of Clusters	1529	557	367	19	3	218	365	147	5
	Average Trees per Cluster	2.01	2.55	1.89	1.47	1.00	1.10	1.44	1.12	1.00
Notes:	WB: Whitebark pine PICO: Lodgepole pine ABLA: Subalpine fir PIEN: Engelmann spruce PSME: Douglas fir		SE ½: Seedling, less than ½ meter tall SE: Seedling, less than 1in trunk diameter at breast height SA: Sapling, diameter of trunk greater than 1in at breast height							

**Table 2: Tree Count Data, 1998 and 2008**

Of the 85 transects, 22 had no trees in 1998, while in 2008 only 1 was treeless (Table 3). The presence of whitebark pine also increased among the transects; no whitebark pine trees were found in 27 transects in 1998 but only 3 had none in 2008.

	1998	2008
No Trees	22	1
No WB	27	3
% No Trees	26%	1%
% No WB	32%	4%

**Table 3: Number of Transects with Trees or Whitebark Present (out of 85)**



**Figure 1: Location of Burnt Whitebark Transects**