

**2014 WHITEBARK PINE  
RESTORATION PROJECT PROGRESS/FINAL REPORT  
Due November 14, 2014**

*Submit the following information electronically to Sandy Kegley ([skegley@fs.fed.us](mailto:skegley@fs.fed.us))*

**Project Title: Whitebark Pine (WBP) Regeneration Strategies: Direct seeding versus Planting Seedlings Evaluations: 2014 Evaluation and Monitoring.**

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**Table 1 Location of direct seeding Trials.**

Study Area	Location	Installation Date			Measurement
		2009 <sup>1</sup>	2010 <sup>1</sup>	2012	2013 <sup>2</sup> 2014
Ulm Peak	Lolo NF. ID	Direct Seed			5-Year
		2-year seedling			5-Year 2009
Thompson Peak	Lolo NF, MT	Direct Seed #1			5-Year 2009
		2-year seedling		Direct Seeding #2	1-Year 2013
Gold Pass	Lolo NF, MT	Direct Seed#1			5-Year 2009
		2-year seedling		Direct Seeding#2	1-Year 2013
Fairy Lake	Bozeman, MT	Direct Seed#1			5-Year
		2-year seedling			5-Year
Toboggan Ridge	Island Park, ID.	Direct Seed#1			5-Year
		2-year seedling			5-Year
Yellowstone Club	Big Sky, MT	Direct Seed#1			5-Year
		2-year seedling			5-Year
Sawtell Peak	Island Park, ID	Direct Seed#1			2-Year
		2-year seedling			2-Year
Teton Ski Area	Jackson Hole, WY	Direct Seed#1			2-Year
		2-year seedling			2-Year

<sup>1</sup>Direct seeding #1 was evaluating different direct seeding methods (refer to table 2).

<sup>2</sup>Direct seeding #2 was evaluating different sowing times and sowing depths (refer to table 2).

**Table 2. Design for 2009, 2012 and 2013 direct seeding installations, each regeneration technique is replicated 5 times on each site. Two replicates of surface temperature in shade and full sun are also on each site.**

Installation Year	Direct Seed Evaluation	Seedling Evaluation
2009 & 2012	Caged	No Cage
	Stratified seed	Stratified seed
	Scarified seed	Scarified seed
	Stratified & scarified seed	Stratified & scarified
2013	Stratified seed planted 0.75" & 1.5" depth	Not-stratified seed planted 0.75" & 1.5" depth
	Late July sowing	Late July sowing
	Late August sowing	Late August sowing
	Late September sowing	Late September sowing

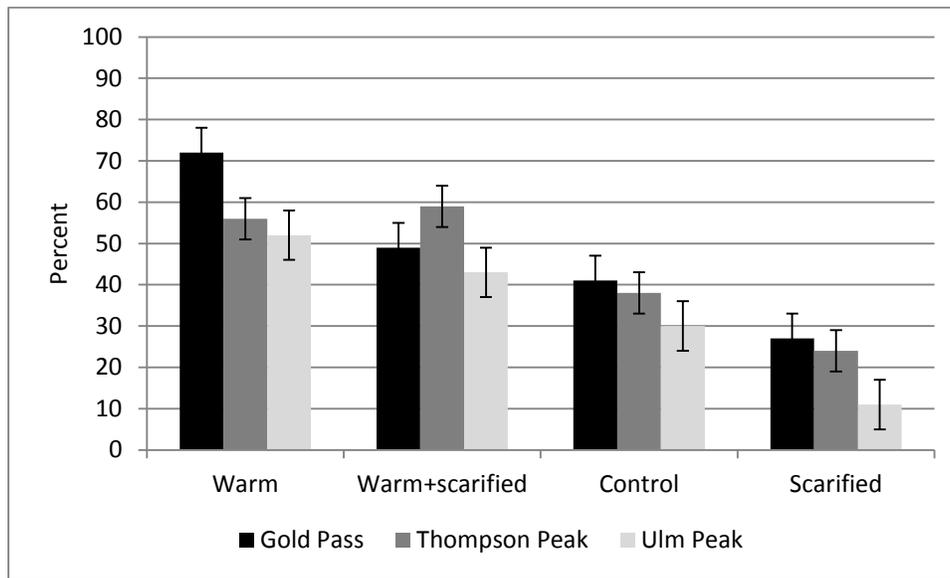
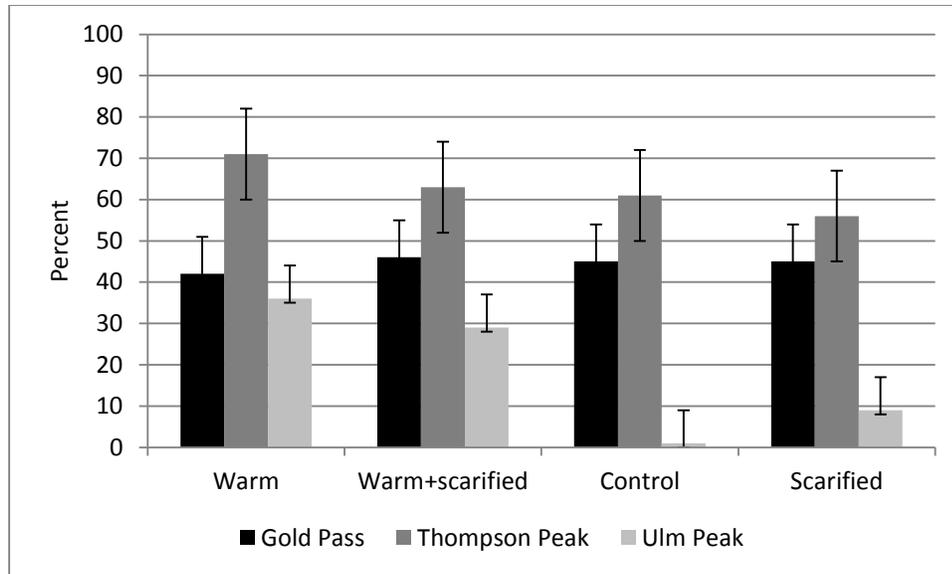


Table 3. For seed germination, statistical comparison among sites and treatments using least-squares means. Site and treatment were statistically significantly different, but there was not a statistically significant interaction between site and treatment. Caged versus not caged did not affect the germination results.

Site	Significance	Treatment	Significance
Gold Pass	A	Warm stratified	A
Thompson Peak	A	Warm stratified & scarified	A
Ulm Peak	B	Control	B
		Scarified	C

- Survival after germination was statistically significant among the sites but not among the treatments. Order of significance among sites: Thompson Peak (A) had 63% germinates survival after 5 years, Gold Pass (B) had 44% germinate survival, and Ulm Peak (C) had 18% survival.



- 2) Seeds established in 2013, did not germinate well the first year, but this is not unusual given the 2009 germinates continued to germinate 2-years post planting. It is critical we revisit sites in 2015.



Gold Pass germinates 5 years after planting.