

FIVE RARE PLANTS OF THE PINE HILL PRESERVE: IMPROVING GERMINATION SUCCESS

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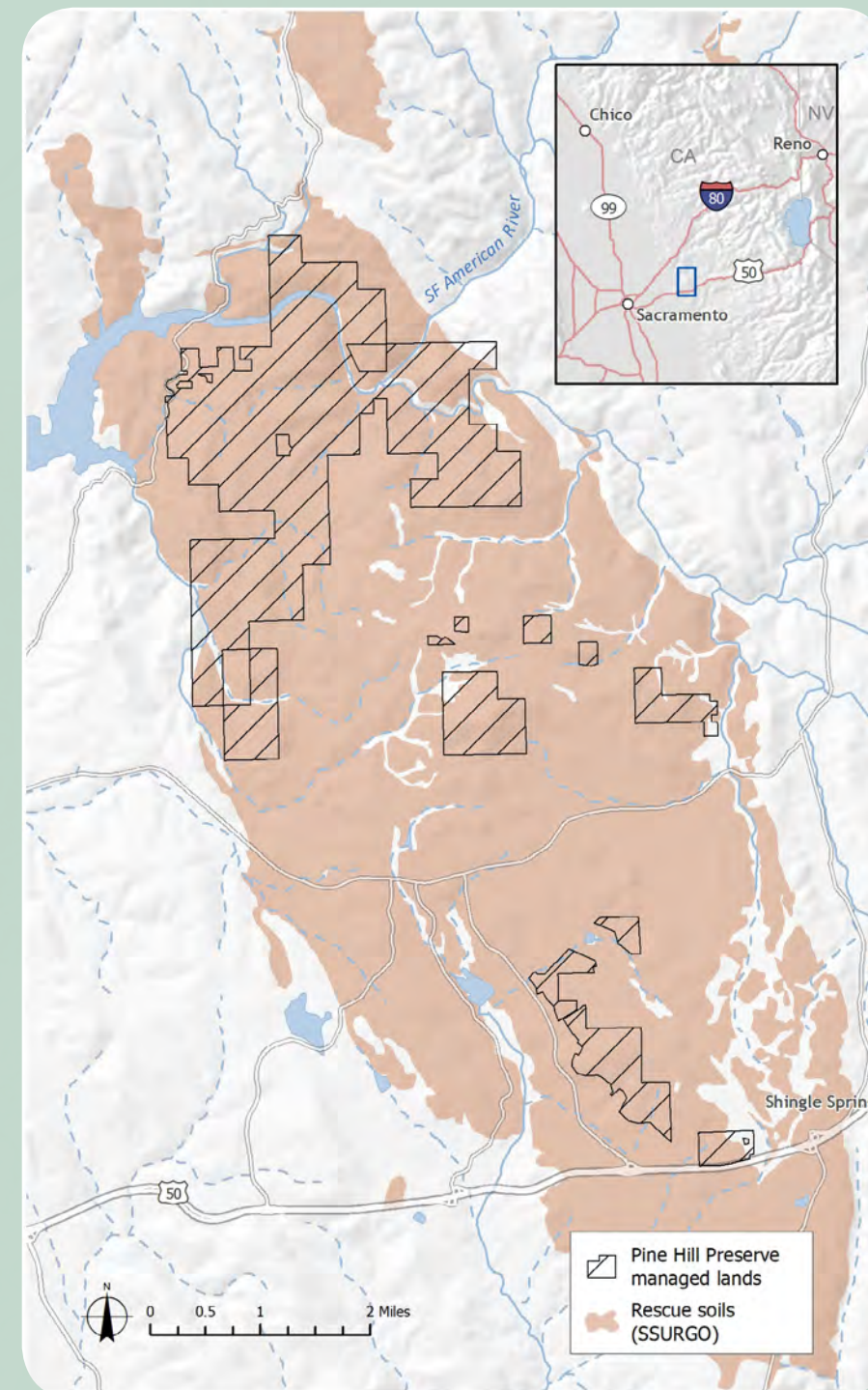
DRIVING QUESTION

What seed treatments most positively affect germination and establishment of five special-status species native to the unique Rescue soils under post-fire conditions?

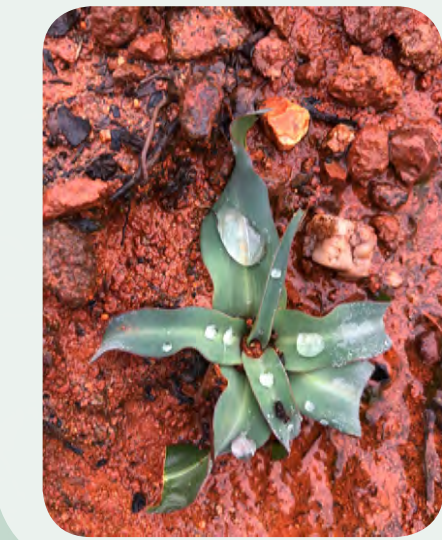
BACKGROUND

The Pine Hill Preserve (PHP) in El Dorado County, CA, is a site of national significance for species diversity and presents rich and new botanical research opportunities. The PHP:

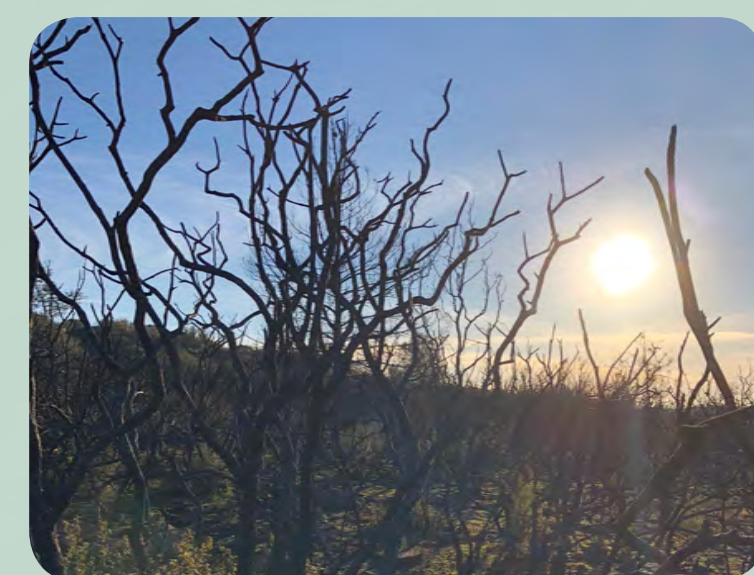
- Is 7.5-square miles within 47-square miles of unique Rescue soils (classified within gabbro).
- Contains many special-status plants and unusual plant communities.
- Was established in 2001 to protect special-status plants, most of which were described in the last 50 years.



Lands managed under the Pine Hill Preserve include federal, State, and County parcels that are important to the conservation of many special-status plants associated with unique Rescue soils. Rescue soils support >10% of California's native plants.



Fires burned in several sites of the PHP in 2016. The Bureau of Land Management is working to restore these areas and ensure they are not colonized by invasive, non-native plants. One burned three-acre site was selected as a site for re-introduction of special-status plants, and serves as mitigation for potential losses of special-status plants elsewhere in the PHP. These five special-status species, all of which are endemic to California and threatened by habitat loss, are being planted into the three-acre burned area.



METHODS

Summarize existing knowledge and information gaps regarding conditions associated with germination success of five special-status plants found in the PHP by:

- Reviewing literature.
- Consulting species experts for additional sources and unpublished data.
- Consolidating findings.
- Using findings to direct the next Phase of PHP replanting project.

SPECIES INFORMATION

Calystegia stebbinsii (Stebbins' morning glory)

- Perennial rhizomatous herb in the Convolvulaceae family
- FE/CE/CRPR 1B.1
- Documented in El Dorado and Nevada counties
- 5 historic and 10 recent (≤ 20 years) occurrences; 11 presumed extant



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Ceanothus roderickii (Pine hill ceanothus)

- Perennial evergreen shrub in the Rhamnaceae family
- FE/CR/CRPR 1B.1
- Documented in western El Dorado County
- 3 historic and 5 recent occurrences; 8 presumed extant



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Chlorogalum grandiflorum (Red hills soaproot)

- Perennial bulbiferous herb in the Agavaceae family
- CRPR 1B.2/BLM Sensitive
- Documented in Amador, Butte, Calaveras, El Dorado, Placer and Tuolumne counties
- 17 historic and 110 recent occurrences; 127 presumed extant



Virginia Meyer

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Packera layneae (Layne's ragwort)

- Perennial herb in the Asteraceae family
- FT/CR/CRPR 1B.2
- Documented in Butte, El Dorado, Placer, Tuolumne, and Yuba counties
- 20 historic and 32 recent occurrences; 50 presumed extant



BLM PHP

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Wyethia reticulata (El Dorado County mule ears)

- Perennial herb in the Asteraceae family
- CRPR 1B.2/BLM Sensitive
- Documented in El Dorado and Yuba counties
- 5 historic and 20 recent occurrences; 25 presumed extant



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RESULTS

Literature review and species experts' knowledge indicated that germination rates vary by species and treatment, and revealed important data gaps for replanting these special-status species.

Treatments were selected to maximize germination rates and to fill in data gaps.

	<i>Calystegia stebbinsii</i>	<i>Ceanothus roderickii</i>	<i>Chlorogalum grandiflorum</i>	<i>Packera layneae</i>	<i>Wyethia reticulata</i>
Heat scarification boil water, cool to 190°F and leave immersed for 24 hours	Nosal 1997, Ayres 2011, Namoff 2017*	Ayres 2011, Boyd 1987			
Heat scarification followed by 5 weeks moist-cold stratification boil water, cool to 190°F and leave immersed for 24 hours; stratify in a refrigerator at approximately 40 °F for 5 weeks	Ayres 2016*	Boyd 2007, James 1996, Ayres 2016*			
Five weeks moist-cold stratification stratify in a refrigerator at approximately 40 °F for 5 weeks			Ayres, 2016*	Ayres, 2016*	Ayres 2011, Ayres, 2016*
Hudson method boil water, cool to 190°F, add liquid smoke and leave immersed for 24 hours; stratify in a refrigerator at approximately 40 °F for 5 weeks		Hudson 2017**			
No treatment				Marsh & Ayres 2002	Ayres 2011

*Species expert recommendations, not published results.

**Hudson method has been successful with several *Ceanothus* spp, but has not been tested on *C. roderickii* specifically.

CONCLUSIONS

Heat scarification as well as heat followed by moist cold stratification both result in high rates of germination success for *Calystegia stebbinsii* and *Ceanothus roderickii*, and there is no basis for suggesting further study on those species. The remaining three species had either inconclusive results or very little research. As such, experimentation of multiple treatment types for these three species (*Chlorogalum grandiflorum*, *Packera layneae*, and *Wyethia reticulata*) is recommended to identify the most effective techniques for successful germination.

NEXT STEPS

- Apply treatments as indicated in above table to seeds of the five plant species.
- Plant in PHP using stratified random design.
- Report success rates associated with treatments per species.



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