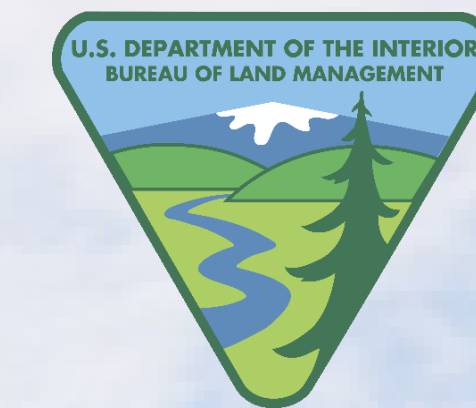


# SPECIAL-STATUS PLANTS OF THE PINE HILL PRESERVE: SEED TREATMENT AND PLANTING SUCCESS

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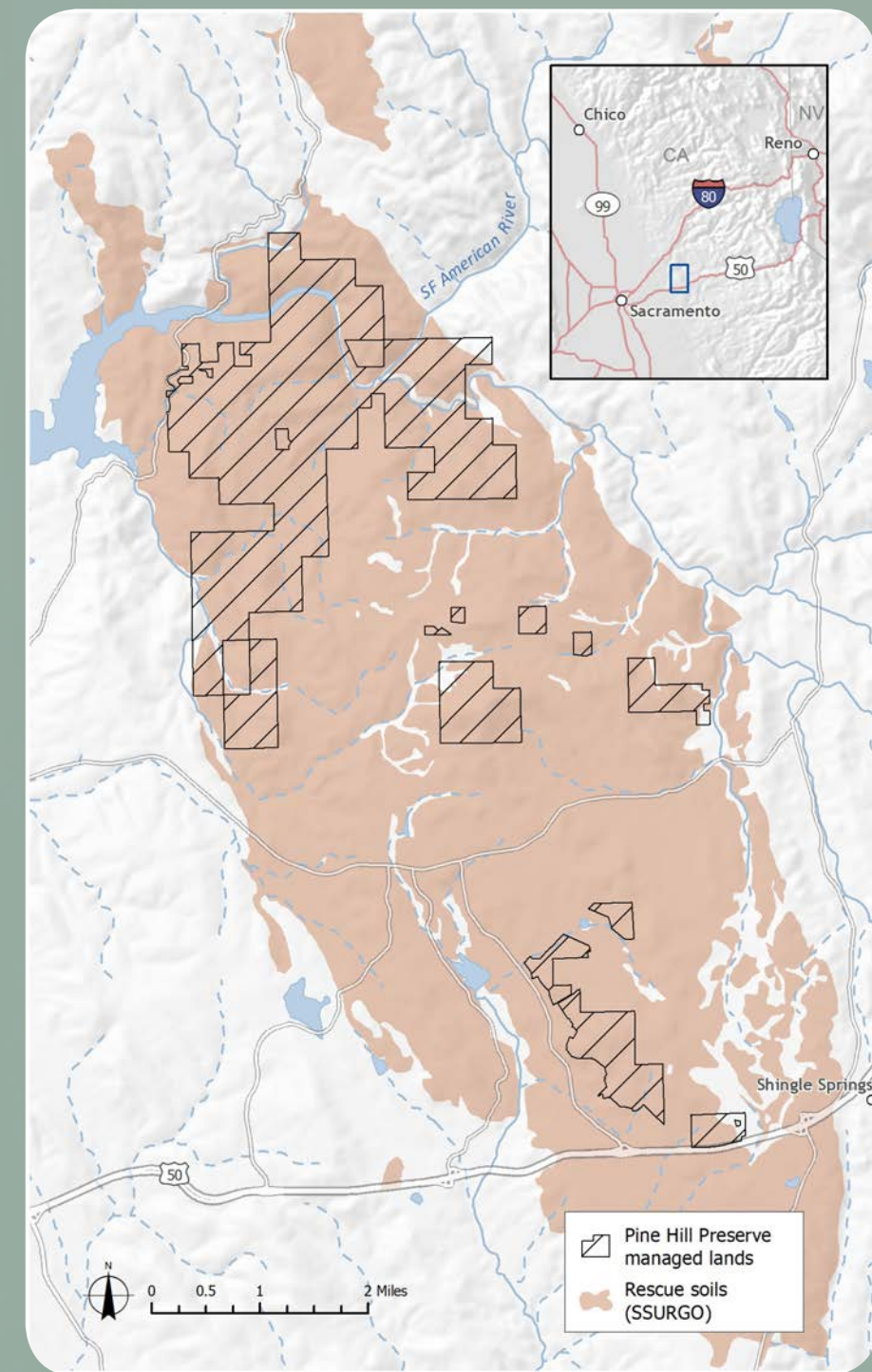
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## BACKGROUND

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



- occupy 7.7-square miles within 47-square miles of unique Rescue soils (classified within gabbro);
- contain many special-status plants and unusual plant communities; and
- were established in 2001 to protect special-status plants, many of which were described in the last 50 years.

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 three-acre site was chosen as a candidate site for re-introduction of two special-status species. Planting in the burned area began in 2018.



Lands managed under the PHP 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.

### *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 6 recent occurrences; 9 presumed extant

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BLM

### *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
- 6 historic and 19 recent occurrences; 25 presumed extant

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UCSCA

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## SEED TREATMENT

Based on results of a literature review and coordination with species' experts, treatments were selected to maximize germination rates and fill in data gaps. Multiple rounds of treatments were conducted for both species over the past two years and the treatment methods were adjusted to achieve higher success rates.

Treatment	Description	<i>Ceanothus roderickii</i>	<i>Wyethia reticulata</i>	Adjustments for continued <i>Wyethia reticulata</i> treatments
<b>Treatment 1</b> Heat scarification	Boil water, cool to 190°F and leave immersed for 24 hours	Ayres 2011, Boyd 1987	Not applied	N/A
<b>Treatment 2a</b> Heat scarification followed by 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	Boyd 2007, James 1996, Ayres 2016*	Applied to fill data gap	<b>Treatment 2b:</b> decreased heat to <66°C and increased the stratification period to 6 weeks or first emergence of the radicle <b>Treatment 2c:</b> added a growth chamber stratification to compare against refrigerator method
<b>Treatment 3a</b> Cold stratification	Stratify in a refrigerator at approximately 40 °F for 5 weeks	Not applied	Ayres 2011, Ayres 2016*	<b>Treatment 3b:</b> increased the stratification period to 6 weeks or first emergence of the radicle <b>Treatment 3c:</b> decreased the stratification period to 3 weeks to compare against 6 week stratification <b>Treatment 3d:</b> added a growth chamber stratification to compare against refrigerator method***
<b>Treatment 4a</b> 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**	Initially not applied, then added in	<b>Treatment 4b:</b> decreased heat to <66°C and increased the stratification period to 6 weeks or first emergence of the radicle <b>Treatment 4c:</b> added a growth chamber stratification to compare against refrigerator method***
<b>Treatment 5</b> Control	No treatment	Not applied	Ayres 2011	None; dropped from subsequent treatment rounds based on low success

\*Species expert recommendations; not published results.

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

\*\*\*No data for this method yet.

## TREATMENT RESULTS

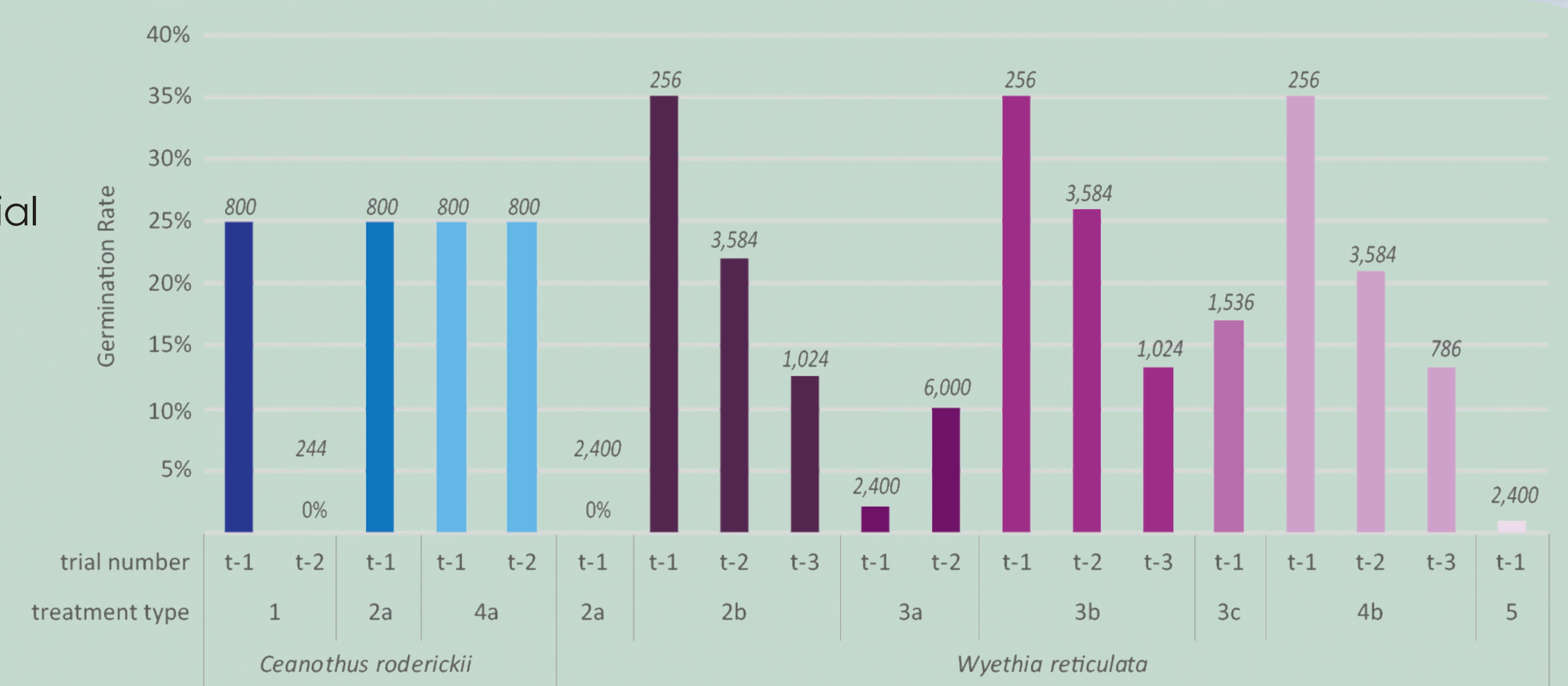
Germination results were lower than expected based on previous studies, and varied even within identical treatments on different trial dates. Results of some treatments (e.g., 2c) are not yet available.



Initial germination of treated *Wyethia reticulata* in cone-tainers



*Wyethia reticulata* seedlings entering dormancy after one growing season



## PLANTING LESSONS LEARNED

Planting has been challenging for both seeds and container plants; methods of planting and maintenance procedures have been reviewed and adjusted over time. In winter 2018, treated seeds were directly sown on site. Germination either failed or seeds were subsequently predated. In fall 2018, UC Santa Cruz Arboretum implemented CNPS Best Management Practices to reduce likelihood of introduction *Phytophthora* spp. (Swiecki and Bernhardt 2016a, b) and treated seeds were sown in a greenhouse and grown up to planting size. In March 2019 and December 2019 container plants were planted on site.



Planting



herbivory

