

California Department of Fish & Game

U.S. Fish and Wildlife Service: Endangered Species Act (Section-6) Grant-in-Aid Program

FINAL PERFORMANCE REPORT

1. State:	California
Grant Number:	E-2-P-31
Grant Name:	Seed Collection and Banking of 50 Plant Species of Critical Conservation Concern
Grant Year:	2006
2. Report Period:	12/31/08 - 3/31/2010
Final Report Due:	3/31/2010
Grant Period:	10/16/2006 - 3/31/2010

3. **Summary:** When proposed, this project envisioned collection of seed from 50 species of critical conservation need. This figure was revised to 36 species due costs for long-term seed conservation storage. The species were prioritized for collection following criteria developed by the Department. Focus was placed on special status plants that had extremely restricted ranges, were known from five or fewer locations statewide, and were often in rapidly-urbanizing areas where they were susceptible to stochastic or human-caused extirpation. Seed collections were deemed necessary to ensure their continued survival and to provide potential material for enhancement efforts in existing populations, repatriations (i.e., returns to locations formerly occupied), and/or introductions to new sites.

4. **Location of work:** Statewide.

5. **Objectives and Results:** The objectives of proposed project were:

- **Objective 1:** Develop prioritized seed collection lists for listed or otherwise sensitive species of plants (e.g. CNPS Lists 1 and 2) on a statewide basis within each of the six DFG Regions.
- **Objective 2:** Evaluate existing seed collections, such as that at Rancho Santa Ana Botanical Garden, to determine whether they are adequate to prevent extinction of all known populations of each taxon and provide material for future enhancements, repatriations and/or introductions.
- **Objective 3:** Develop a strategy to accomplish any additional collections which are determined to be needed.

Results: The project envisioned collection of seed from 50 species of critical conservation need. This figure was revised to 36 species due to the 2006 funding levels and costs for long-term seed conservation storage. We created a list of more than 200 species of plants that met criteria we developed: State or federally-listed or on CNPS Lists 1 and 2; not represented or with few, low-number, or older collections in Center for Plant Conservation seed storage facilities; and, with fewer than five populations statewide. The target list by DFG Region and provided to DFG field staff and other interested parties.

We reviewed seed collections in the following institutions: Rancho Santa Ana Botanic Garden, Claremont, CA; the Botanic Garden at U.C. Berkeley; San Diego Zoo Institute for Conservation Research, San Diego, CA; Santa Barbara Botanical Garden; Berry Botanic Garden, Portland, OR; USDA National Center for Genetic Resources Conservation, Ft. Collins, CO; and Royal Botanic Garden, Kew, Great

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Britain. There was no or poor representation of the majority of the species on our targeted species list.

We found that collections for a number of taxa were more than 10 years old and many more than 20 years old. Due to the potential incremental decrease in germinability, as well as loss of genetic diversity with successive seed increases, targeting species with older seeds in storage should also be considered in a collection strategy. Most importantly, this project clearly identified a major gap in species conservation: all conservation efforts, including mitigation for project impacts, should mandate that seed be placed in conservation storage to provide potential material for enhancement efforts in existing populations, repatriations (i.e., returns to locations formerly occupied), and/or introductions to new sites.

We did not reach our goal of adding accessions of 36 taxa over the life of the project; however, 39 accessions from 17 taxa were placed in storage. Some accessions represented multiple collections of a single species across the range of the species, such as was done for three gabbro plant species in El Dorado County, California. The lands on which these species occur are subject to intense development pressure. Other collections attempted to capture genetic variability between populations of species at a very small scale, such as between vernal pools on the Santa Rosa Plain, Sonoma County, California. Collections from several species, for example Clara Hunt's milkvetch (*Astragalus claranus*), San Mateo woolly sunflower (*Eriophyllum latilobum*), and Suisun Marsh thistle (*Cirsium hydrophilum*) represented first time accessions for these species at Rancho Santa Ana Botanic Garden.

Please see attached seed collection reports for information on specific accessions placed into conservation storage.

6. Findings or Current Progress: This project will continue under Phase 2 (E-2-P-32).

7. Financial Information:

Fund Source	Obligated	Spent to Date	Balance
U.S. Fish and Wildlife Service (Federal): \$	100,000.00	\$ -	\$ 100,000.00
State of California (State): \$	-	\$ -	-
Total Federal: \$	100,000.00	\$ -	\$ 100,000.00
Total Match \$	33,333.00	\$ -	\$ 33,333.00
Total Project: \$	133,333.00	\$ -	\$ 133,333.00

8. Literature Cited: N/A

9. If the work in this grant was part of a larger undertaking with other components and funding, present a brief overview of the larger activity and the role of this project. N/A

10. Discuss differences between work anticipated in grant proposal and grant agreement and that actually carried out with Federal Aid grant funds; include differences between expected and actual costs.

When proposed, this project envisioned collection of seed from 50 species of critical conservation need. This figure was revised to 36 species due to the 2006 funding level and costs for long-term seed conservation storage. We had anticipated that DFG field staff would make the majority of collections during the course of their daily work. In reality, however, increased workloads, a reduction in the number of staff positions, and travel restrictions limited such collections. This project was also constrained by highly variable rainfall patterns, as well as the many wildfires the state experienced. Drought conditions or delayed rainfall reduced

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seed set; many annual plants did not germinate. Increased fuel costs limited participation by volunteers. It was also difficult to obtain assistance from qualified individuals and access to some sites was not granted by the landowner. Consequently, we did not reach our goal of adding accessions of seeds of 36 taxa over the life of the project although 39 accessions from 17 taxa were placed in storage.

11. List any publications or in-house reports resulting from this work. N/A

10. Name, title, phone number, and e-mail address of person compiling this report:

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March 26, 2010

E-2-P-31
Rancho Santa Ana Botanic Garden
Seed Collection Records

California Department of Fish & Game

U.S. Fish and Wildlife Service: Endangered Species Act (Section-6) Grant-in-Aid Program

SEED ACCESSIONS - TRADITIONAL SECTION 6 GRANT E-2-P-31				
Scientific Name	Common Name	Status	# Acc	Comments
<i>Astragalus claranus</i>	Clara Hunt's milkvetch	ST/FE	4	Collections at CNDDDB EOs 3, 11, 12, 13. Three collections in vicinity of St. Helena, Napa County, California; one from Alpine School, Sonoma County, California, as bulk collection from three separate groups. Percent germination: 93% - 100%.
<i>Astragalus tener</i> var. <i>titi</i>	Coastal dunes milkvetch	SE/FE	2	Collections from two subpopulations of CNDDDB EO 2 along 17-mile Drive, Monterey Peninsula, CA. The collections represent 56 and 89 maternal lines, respectively. Percent germination was 87%.
<i>Blennosperma bakeri</i>	Sonoma sunshine	SE/FE	4	Laguna de Santa Rosa Preserve, Sonoma County, California. The four accessions represent 365 maternal line collections. Seed germination was 90% for accessions with a sufficient amount of seed. These collections draw on genetics data obtained in three Section 6 grants: E-2-P-23, E-2-P-26, and E-P-28.
<i>Calystegia stebbinsii</i>	Stebbin's morning-glory	SE/FE	3	Gabbro endemic. The three accessions represent bulk collections. Two accessions are from the vicinity of Cameron Park and Ponderosa while the 3 rd is from Pine Hill Preserve, all in El Dorado County, California. 90% germination.
<i>Ceanothus roderickii</i>	Pine Hill ceanothus	SR/FE	1	Gabbro endemic. Seed collected in Cameron Park, El Dorado County, California. 5% germination with one normal individual out of six seeds.
<i>Cirsium fontinale</i> var. <i>fontinale</i>	Fountain thistle	SE/FE	3	Restricted to Crystal Springs Reservoir in San Mateo County, California. Collections from east side of Crystal Springs Reservoir (different populations over different seasons) 21 Range of germination: 56% - 92% .
<i>Cirsium hydrophilum</i> var. <i>hydrophilum</i>	Suisun Marsh thistle	FE	2	126 seed collected from two sites in the California Department of Fish and Game Grizzly Slough Wildlife Area: Joice Island area and Hill Slough area. 90% germination. Solano County, California.
<i>Clarkia imbricata</i>	Vine Hill clarkia	SE/FE	2	Known only from Vine Hill area, Sonoma County, California. One bulk collection; one maternal line collection.

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SEED ACCESSIONS - TRADITIONAL SECTION 6 GRANT E-2-P-31				
Scientific Name	Common Name	Status	# Acc	Comments
<i>Eriophyllum latilobum</i>	San Mateo woolly sunflower	SE/FE	1	Endemic to Crystal Springs area, San Mateo County, California. Known only from four populations, two extant based on available data. Collected from "San Mateo Creek population" on San Francisco Public Utility District land (SFPUD). Very little seed set observed in the wild for this species. 28% germination
<i>Fremontodendron decumbens</i>	Pine Hill flannelbush	SR/FE	1	Gabbro endemic. Collected in the vicinity of Pine Hill, El Dorado County. Germination tests not conducted due to too few seed.
<i>Fritillaria roderickii</i>	Roderick's fritillary	SR	1	One collection ca 4.0 mi south of Point Arena, Mendocino County. No germination test made: too few seed.
<i>Lasthenia burkei</i>	Burke's goldfields	SE/FE	3	Laguna de Santa Rosa Preserve, Sonoma County, California. The three accessions represent 254 maternal lines. These collections draw on genetics data obtained in three Section 6 grants: E-2-P-23, E-2-P-26, and E-P-28. Germination for each accession: 45%, 92%, 98%.
<i>Limnanthes vinculans</i>	Sebastopol meadowfoam	SE/FE	3	Laguna de Santa Rosa Preserve, Sonoma County, California. The accessions represent 68 maternal lines. These collections draw on genetics data obtained in three Section 6 grants: E-2-P-23, E-2-P-26, and E-P-28. Germination not tested due to small quantity of seed.
<i>Packera layneae</i>	Layne's ragwort	SR/FT	4	Four collections in vicinity of CNDDDB EOs 6, 13, 34, and 38, El Dorado County, California. Collections across range of species in El Dorado County. Germination 73%.
<i>Phlox hirsuta</i>	Yreka phlox	SE/FE	1	One accession comprised of two collections at China Hill, Siskiyou County, California. Germination approx. 85%.
<i>Sidalcea stipularis</i>	Scadden Flat checkerbloom	SE/FE	1	Two collections combined into one accession. Vicinity of Nevada County Fairgrounds, Nevada County, California. Germination ranged from 30% to 60%.
<i>Wyethia reticulata</i>	El Dorado County mule ears	CNPS List 1B.2	3	Two of the three accessions from Pine Hill area; one from N of Rescue, El Dorado County, California. No germination. Viability of seeds questionable.
	Total		37	

E-2-P-31
Rancho Santa Ana Botanic Garden
Species Collection Records



RANCHO SANTA ANA BOTANIC GARDEN

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SEED BANK COLLECTION REPORT 20 October, 2009

Accession information

Astragalus claranus Fabaceae (Clara Hunt's milkvetch)

22966 ... SD wild collected in USA (CNDDDB EO# 13)

United States: California: Napa: Inner North Coast Range: East of St. Helena, Spring Valley off Taplin Rd. west of north tip of Lake Hennessey - USGS Rutherford quad. North Coast Ranges: grassland. 360 ft. 38.50369°N, 122.41993°W. State sponsored bulk sampled funded conservation seed collection; also found with *Lotus humistratus*. Full sun to semi-shade Jake Ruygt s.n. 5 May 2009.

22967 ... SD wild collected in USA (CNDDDB EO# 12)

United States: California: Napa: Inner North Coast Range: South of St. Helena, 0.5 miles S of Sulphur Spring Avenue, Lewelling Ranch: USGS Rutherford Quad. North Coast Ranges: Woodland. 360 ft. 38.48044°N, 122.46480°W. State sponsored bulk sampled funded conservation seed collection; also found with *Perideridea kelloggii*. Full sun to semi-shade Jake Ruygt s.n. 26 May 2009.

22968 ... SD wild collected in USA (CNDDDB EO# 11)

United States: California: Napa: Inner North Coast Range: East of St. Helena, Conn Valley Rd. north east shore of Lake Hennessey: USGS Rutherford Quad. North Coast Ranges: grassland. 330 ft. 38.50170°N, 122.38352°W. State sponsored bulk sampled funded conservation seed collection. Full sun Jake Ruygt s.n. 21 May 2009.

23012 ... SD wild collected in USA (CNDDDB EO# 03)

United States: California: Sonoma: Inner North Coast Range: Alpine School/Hayfork Ranch, 5240 St Helena Rd. ca. 6 miles NE of Santa Rosa. North Coast Ranges: Grassland. 794 ft. 38.5019309°, 122.6459300°. Bulk collection from 3 separate groups with this population. Parcel in conservation easement. John Herrick s.n. 1 Jun 2009.

LOT NUMBER	ACCESSION NUMBER	COLLECTION YEAR	QUANTITY OF SEED	NUMBER OF FRUITS	NUMBER OF PLANTS
4171	22966	2009	64	13	13
4172	22967	2009	255	60	60
4173	22968	2009	38	8	8
4177	23012	2009	1,612	343	xx



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Processing and collection quality assessment

Fully matured fruits from each population were sent in a well sealed envelope and received on 17 August and 01 October, 2009. To extract the seeds from the indehiscent fruits each fruit was hand threshed on a rubber mat. The extracted seeds were then placed into a seed blower to separate the seed from the floral chaff. The blower was then used to separate out any lighter weight hollow or aborted seeds. The average number of viable seed per fruit for all of the three population samples was 4.6. After processing, the seeds were stored to equilibrium at 12% relative humidity, placed into heavy duty foil/plastic laminate seed storage pouches, sealed and placed into storage at -18° C.



Seeds and fruits of *Astragalus claranus* taken by John Macdonald

Germination test results

Germination tests were conducted on 0.5% bacto-agar at 11 hr. (20° C) day and 13 hr. (12° C) night environmental conditions. To allow imbibition the thick waxy seed coat was scarified by cutting a thin slice of the seed coat at the cotyledon end of the seed, just deep enough to expose the embryo tissue. Due to low quantity of seeds in two of the four collections tests were limited to two of the larger accessions.



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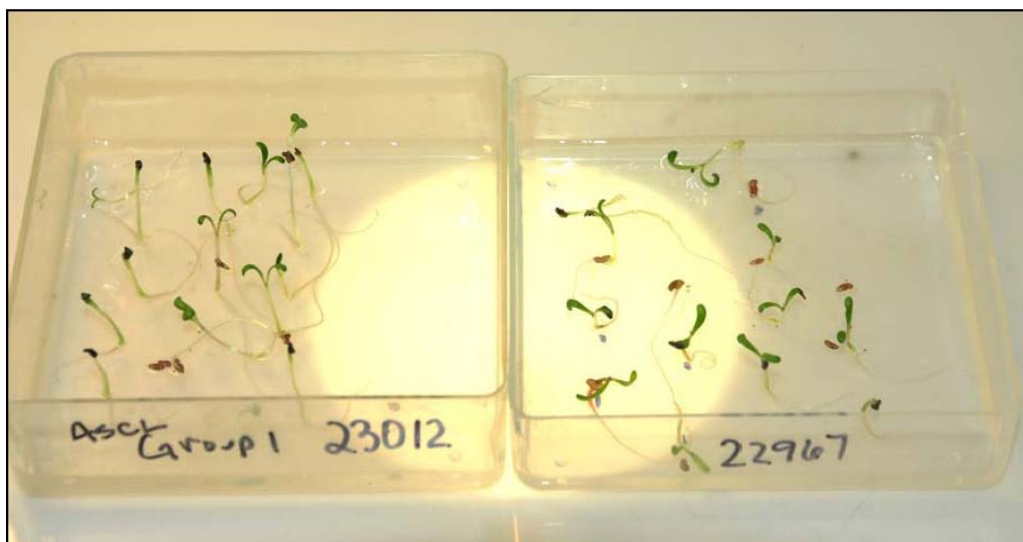
# TEST	START DT	END_DT	# TESTED	# GERM	% GERM	PRETREATMENT	MISC
4172*1	30-Sep-09	19-Oct-09	15	14	93	Clip; rupture seed coat using pin, knife, or scalpel	all seedlings with healthy vigorous root and cotyledon development
4177*1	7-Oct-09	19-Oct-09	15	15	100	Clip; rupture seed coat using pin, knife, or scalpel	all seedlings with healthy vigorous root and cotyledon development



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Seedlings of *Astragalus claranus* on agar test plates. Photo taken 20 October, 2009



Michael Wall - Seed Conservation Program Manager
Genevieve Arnold - Seed Program Technician



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SEED BANK COLLECTION REPORT

15 March, 2010

22200 *Astragalus tener* var. *titi*

CNDDDB EO# 11

Fabaceae

(coastal dunes milkvetch)

22200 ... SD wild collected in USA United States: California: Monterey Co: Monterey Peninsula: Along trail parallel to 17 mile drive north of bird rock in compacted bald, subpopulation 1. Californian. Coastal strand. 0 ft. 36°35.711'N, 121°57.68'W. Voucher taken at 36 degrees 35.67' N, 121 degrees 57.665'. Thibault, Tim 509. 17 May 2007.

22201 *Astragalus tener* var. *titi*

CNDDDB EO# 11

Fabaceae

(coastal dunes milkvetch)

22201 ... SD wild collected in USA United States: California: Monterey Co: Monterey Peninsula: Along foot path between 17 mile drive and golf course north of bird rock road, subpopulation 2. Californian. Coastal strand. 9 ft. 36°35.607'N, 121°57.706'W. Thibault, Tim 509. 17 May 2007.

LOT NUMBER	ACCESSION NUMBER	COLLECTION YEAR	STATUS CNPS	STATUS FED STATE	SEED QUANTITY	MATERNAL LINES
3665	22200	2007	1B	FE/SE	4632	56
3663	22201	2007	1B	FE/SE	1304	89

Based on the quantity of seed and the number of individuals sampled these collections **are** considered sufficient to serve their intended purpose as permanent conservation seed collections. A majority of this seed was sent to the National Center for Genetic Resource Preservation while a smaller component of each collection is being stored here at RSABG. See attached number of seeds per individual worksheet.

Seeds were extracted from the fruits by hand threshing over soil sieve large enough to allow the seeds to fall through. This process was repeated for each maternal sample. Extracted seeds were then placed into a seed blower to separate out any parasitized or aborted seed. The seed lot table above shows the quantity of filled sound seed that was extracted from the total number of seed received. The estimated viability (% live seed) of each sample is greater than 95%.





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Each maternal sample was packaged in a glassine envelope and dried to equilibrium at 14% relative humidity. After three weeks the seeds were put into heavy duty foil/plastic storage pouches, heat sealed, and placed into storage at -18° C.

Germination Test Results

Initial germination tests were conducted on 0.5% agar solution on clear plastic examination plates maintained at 11 hrs. light at 20° C and 13 hrs. dark at 12° C. Test results indicate that there is no dormancy in fresh seed and when the hard seed coats are scarified germination is initiated.

LOT_NUM	ACC #	# TESTED	START_DT	END_DT	# GERM	% GERM	SEED TYPE	PRE TREATMENT	MISC
3663*1	22201	23	01-Aug-07	21-Aug-07	20	87	Fresh seed	CL, clip seed coat	all with very healthy root and cotyledon development



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SEED BANK COLLECTION REPORT

2 March 2010

23041 *Blennosperma bakeri*

CNDDDB EO# 9

Asteraceae

(Baker's Blennosperma)

23041 ... SD wild collected in USA United States: California: Sonoma: Central Coast: W of Santa Rosa, S of Piner Rd. W of Fulton Rd. Vernal pool name "YCPA": USGS Sebastopol Quad. Californian: vernal pool. 131 ft. 38.465339°N, 122.774866°W. Conservation seed collection funded under Department of Fish and Game Agreement No. PO685104. Christina Sloop s.n. 24 Nov 2009.

LOT NUMBER	ACCESSION NUMBER	COLLECTION YEAR	STATUS CNPS	STATUS FED STATE	SEED QUANTITY	MATERNAL LINES
4240	23041	2010	1B	FE/SE	560	132

Based on the quantity of seed and the number of individuals sampled this collection **is** considered sufficient to serve its intended purpose however the quantity of seed is low.

23042 *Blennosperma bakeri*

CNDDDB EO# N/A

Asteraceae

(Baker's Blennosperma)

23042 ... SD wild collected in USA United States: California: Sonoma: Central Coast: SE of Sonoma County Airport, N of Wood Rd. W of Fulton Rd. Vernal pool name "MAGG": USGS Sebastopol Quad. Californian: vernal pool. 128 ft. 38.485076°N, 122.78191°W. Conservation seed collection funded under Department of Fish and Game Agreement No. PO685104. Christina Sloop s.n. 24 Nov 2009.

LOT NUMBER	ACCESSION NUMBER	COLLECTION YEAR	STATUS CNPS	STATUS FED STATE	SEED QUANTITY	MATERNAL LINES
4241	23042	2010	1B	FE/SE	314	85

Based on the quantity of seed and the number of individuals sampled this collection **is** considered sufficient to serve its intended purpose however the quantity of seed is low.

23043 *Blennosperma bakeri*

CNDDDB EO# N/A

Asteraceae

(Baker's Blennosperma)

23043 ... SD wild collected in USA United States: California: Sonoma: Central Coast: SE of Sebastopol, S and W of Todd Rd. N of the Santa Rosa River. Vernal pool name "TCMB36": USGS Sebastopol Quad. Californian: vernal pool. 76 ft. 38.383826°N, 122.77793°W. Conservation seed collection funded under Department of Fish and Game Agreement No. PO685104. Christina Sloop s.n. 24 Nov 2009.

LOT NUMBER	ACCESSION NUMBER	COLLECTION YEAR	STATUS CNPS	STATUS FED STATE	SEED QUANTITY	MATERNAL LINES
4242	23043	2010	1B	FE/SE	498	112

Based on the quantity of seed and the number of individuals sampled this collection **is** considered sufficient to serve its intended purpose however the quantity of seed is low.



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23044 *Blennosperma bakeri*

CNDDDB EO# N/A

Asteraceae

(Baker's Blennosperma)

23044 ... SD wild collected in USA United States: California: Sonoma: Central Coast: SE of Sebastopol, S and W of Todd Rd. N of the Santa Rosa River. Vernal pool name "TCMB87": USGS Sebastopol Quad. Californian: vernal pool. 76 ft. 38.38383°N, 122.77793°W. Conservation seed collection funded under Department of Fish and Game Agreement No. PO685104. Christina Sloop s.n. 24 Nov 2009.

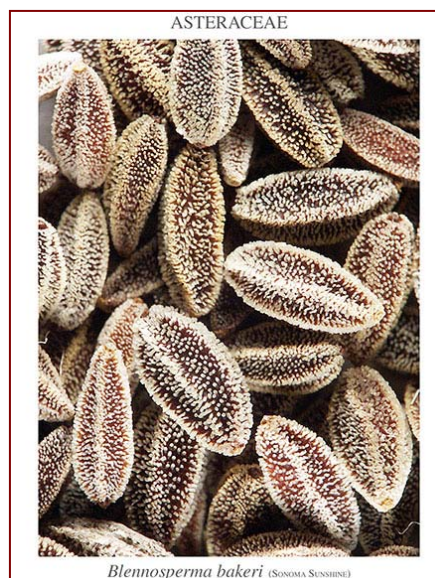
LOT NUMBER	ACCESSION NUMBER	COLLECTION YEAR	STATUS CNPS	STATUS FED STATE	SEED QUANTITY	MATERNAL LINES
4243	23044	2010	1B	FE/SE	135	38

Based on the quantity of seed and the number of individuals sampled this collection **is not** considered sufficient to serve its intended purpose. Unless the other accessions can serve as regeneration stock for this population then additional seed should be collected to augment this collection.

These seed collections were received already cleaned of any floral chaff. Due to the high number of samples and small quantity of seeds per individual any underdeveloped or damaged seeds were removed by hand under magnification. The seed lot table shows the quantity of filled sound seed that was extracted from the total number of seed received. The estimated viability (% live seed) of each sample is greater than 90%.

Each sample was packaged in a glassine seed envelope and dried to equilibrium at 12% relative humidity. After three weeks the seeds were put into heavy duty foil/plastic seed pouches, heat sealed, and placed into storage at -18° C.

For these collections there was insufficient seed to send backup samples to the USDA National Center for Genetic Resource Preservation in Ft. Collins.



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Germination Test Results

Initial germination tests were conducted on 0.5% agar solution on clear plastic examination plates maintained at 11 hrs. Light at 20° C and 13 hrs. Dark at 12° C. Test results indicate that there is no dormancy in fresh seed when exposed to these test conditions.



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LOT NUM	ACC #	# TESTED	START DATE	END DATE	# GERM	% GERM	SEED TYPE	PRE TREATMENT	MISC
4240*1	23041	30	12-Feb-10	23-Feb-10	27	90	Fresh seed	No Treatment	test on 5 maternal lines; seedlings: all with very healthy root and cotyledon development
4241*1	23042	30	12-Feb-10	23-Feb-10	27	90	Fresh seed	No Treatment	test on 6 maternal lines; seedlings: all with healthy root and cotyledon development
4242*1	23043	30	15-Feb-10	23-Feb-10	27	90	Fresh seed	No Treatment	test on 5 maternal lines; seedlings: all with healthy root and cotyledon development

Rancho Santa Ana Botanic Garden
 California's Native Garden

Accession # 23041

Collection Date: <u>24-Nov-09</u>	Received Date: <u>3-Dec-2009</u>
Species Name: <u>Blennosperma bakeri</u>	
Collector Name: <u>Christina Sloop*</u>	Collection #: _____
Associate Collectors: _____	
Voucher? <input checked="" type="checkbox"/> No <input type="checkbox"/> Yes	Location of voucher: _____
Country: <u>USA</u>	State: <u>California</u>
Physiographic Region: <u>Central Coast</u>	Elevation: _____ FT. <input type="checkbox"/> M. <input type="checkbox"/>
Locality: <u>Blennosperma Baker Rd. 1/4 of Fulton Rd. (near pool name "YC-A")</u>	
CNDDDB EC: <u>9</u>	Landowner: <u>City of Santa Ana</u>
Latitude: <u>N 33° 53' 24"</u>	Longitude: <u>W 117° 22' 74.866"</u>
Map Quad: <u>107N</u>	<u>R 108W</u> <u>SE 8</u> <u>1/4 S</u>
Sampled population size: <u>31</u>	Seeds: <u>144</u>
Number of individuals sampled: _____	Spore <input type="checkbox"/> Cutting <input type="checkbox"/> Other: <input type="checkbox"/>
Locally: common <input checked="" type="checkbox"/> scattered <input type="checkbox"/> rare <input type="checkbox"/>	Plant <input type="checkbox"/> Bulb/Corm <input type="checkbox"/>
Associated species: _____	
California Floristic Province: <u>Sierran/Inland</u>	Sierran/Inland <input type="checkbox"/> North Coast Ranges <input type="checkbox"/>
California: <u>✓</u>	Sonoran: Mojave <input type="checkbox"/>



SEED BANK COLLECTION REPORT
21 January, 2010

Accession information

Calystegia stebbinsii (3 accessions) Convolvulaceae
(Stebbins' Morning-Glory)

22995 ... SD wild collected in USA (CNDDDB EO #1)

United States: California: El Dorado: Northern Sierra Nevada Foothill Region: Ponderosa Unit. North of Hwy 50 along dirt road that parallels the Hwy. Near to and SW of EO#1. Lat/Long coordinates are converted from UTM coordinates provided with the seed collection. - USGS Shingle Springs Quad. Californian: Chaparral. 1460 ft. 38.660134°N, 120.95275°W. Funded bulk sampled Conservation Seed Collection. Collected under Federal Fish and Wildlife Permit TE142437-0. RSA-DFG Contract No. P0685104. Large population in recently burned area. Site threatened by proposal to pave and widen the dirt road that these plants border. Full sun; also found with *Rhamnus tomentella*, *Chloragalum grandiflorum* Melanie Gogol-Prokurat s.n. 18 Jun 2007.

22996 ... SD wild collected in USA (CNDDDB EO #1)

United States: California: El Dorado: Northern Sierra Nevada Foothill Region: Cameron Park. North of Hwy 50 along dirt road that parallels the Hwy. Near to and SW of EO#1. Lat/Long coordinates are converted from UTM coordinates provided with the seed collection. - USGS Shingle Springs Quad. Californian: Chaparral. 1460 ft. 38.68020°N, 120.97896°W. Funded bulk sampled Conservation Seed Collection. Collected under Federal Fish and Wildlife Permit TE142437-0. RSA-DFG Contract No. P0685104. Large population in recently burned area. Site threatened by proposal to pave and widen the dirt road that these plants border. Full sun; also found with *Rhamnus tomentella*, *Chloragalum grandiflorum* Melanie Gogol-Prokurat s.n. 11 Jun 2007.

22997 ... SD wild collected in USA (CNDDDB EO #3)

United States: California: El Dorado: Northern Sierra Nevada Foothill Region: Cameron Park. Population is in a cleared and graded area within Pine Hill Preserve. Largest known population of this species in the Cameron Park region. Lat/Long coordinates are converted from UTM coordinates provided with the seed collection. - USGS Shingle Springs Quad. Californian: Chaparral scrub. 1428 ft. 38.66622°N, 120.96752°W. Funded bulk sampled Conservation Seed Collection. Collected under Federal Fish and Wildlife Permit TE142437-0. RSA-DFG Contract No. P0685104. Large development project proposed SE of the population. Full sun; also found with *Iris microsiphon*, *Leontodon taraxicoides*, *Carex brainerdii*, *Chloragalum grandiflorum* Melanie Gogol-Prokurat s.n. 11 Jun 2007.

LOT NUMBER	ACCESSION NUMBER	COLLECTION YEAR	QUANTITY OF SEED	NUMBER OF HEADS	AVG SEEDS PER HEAD
4187	22997	2007	178	na	na
4188	22996	2007	66	na	na
4189	22995	2007	146	na	na

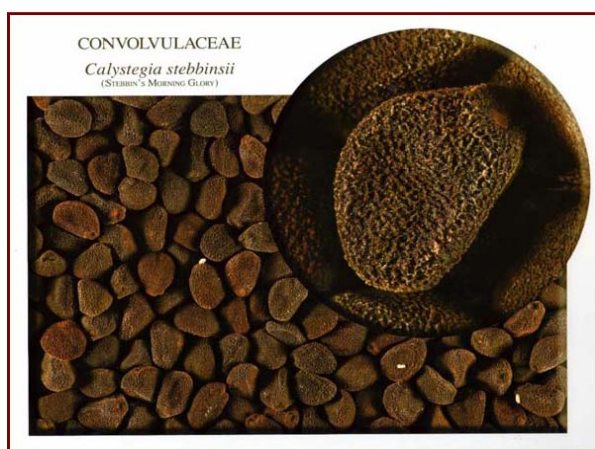


RANCHO SANTA ANA BOTANIC GARDEN

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Processing and collection quality assessment

The preceding table shows the quantity of filled sound seed that was extracted from the total number of seed received. Hollow, sterile, or parasitized seeds were removed using an air blower unit. Viability (% pure live seed) is estimated to be greater than 95% based on a dissection exam where 2 of 2 of the lightest weight seeds were filled and sound at 4.0 blower speed. The seed collection is next dried to equilibrium at 12% relative humidity. There was insufficient seed to send backup samples to the USDA National Center for Genetic Resource Preservation in Ft. Collins. After three weeks in dry storage at room temperature the seeds are placed into heavy duty foil/plastic seed pouches, heat sealed, and placed into storage at -18° C.



Germination test results

LOT NUM	ACC #	# TESTED	START DATE	END DATE	# GERM	% GERM	SEED TYPE	PRE TREATMENT	MISC
4187	22997	10	3-Dec-09	23-Dec-09	9	90	Indoor stored seed	Clip; rupture seed coat using pin, knife, or scalpel	seedlings: healthy root and shoot development



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SEED BANK COLLECTION REPORT

21 January, 2010

Ceanothus roderickii Rhamnaceae

(Pine Hill Ceanothus, lilac, Roderick's ceanothus)

22998 ... SD wild collected in USA (CNDDDB EO #7)

United States: California: El Dorado: Northern Sierra Nevada Foothill Region: Cameron Park, within open areas in mosaic of dense to open Chaparral. Lat/Long coordinates are converted from UTM coordinates provided with the seed collection. - USGS Shingle Springs Quad. Californian: Chaparral. 1651 ft. 38.67419°N, 120.96814°W. Site appears to have burned within the past 10 years. Shrubland with young emerging *Pinus sabiniana*. Funded bulk sampled. Conservation Seed Collection. RSA-DFG Contract No. P0685104. Collected under Federal Fish and Wildlife Permit TE142437-0. Full sun; also found with *Carex brainerdii*, *Rhamnus tomentella*, *Helianthella californica*, *Calystegia stebbinsii*, *Chloragalum grandiflorum* Melanie Gogol-Prokurat s.n. 11 Jun 2007.

LOT NUMBER	ACCESSION NUMBER	COLLECTION YEAR	QUANTITY OF SEED	NUMBER OF HEADS	AVG SEEDS PER HEAD
4190	22998	2007	280	na	na

Processing and collection quality assessment

The preceding table shows the quantity of filled sound seed that was extracted from the total number of seed received. Hollow, sterile, or parasitized seeds were removed using an air blower unit. Viability (% pure live seed) is estimated to be greater than 80% based on a dissection exam where 4 of 5 of the lightest weight seeds were filled and sound. The seed collection is next dried to equilibrium at 12% relative humidity. There was insufficient seed to send a backup sample to the USDA National Center for Genetic Resource Preservation in Ft. Collins. After three weeks in dry storage at room temperature the seeds are placed into heavy duty foil/plastic seed pouches, heat sealed, and placed into storage at -18° C.

Germination test results

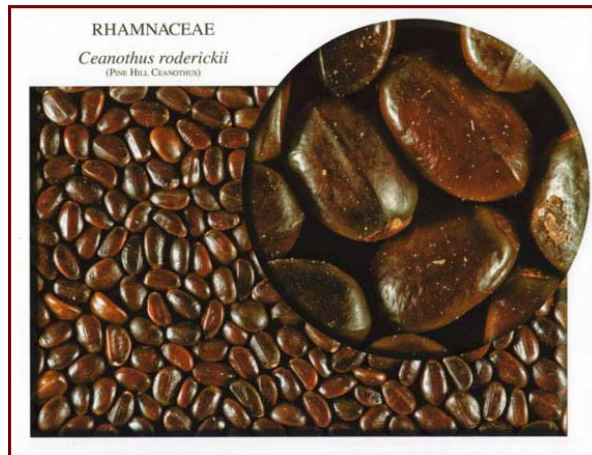
LOT #	ACC #	QTY	START DATE	END DATE	# GERM	% GERM	SEED TYPE	PRE TREATMENT	MISC
4190	22998	21	3-Dec-09	19-Jan-10	1	5	Indoor stored seed	Clip; rupture seed coat using pin, knife, or scalpel Alternating warm-cold-warm stratification	6 germinations initiated but all except one developing abnormally and slow.



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Only 1 normal germination after more than 6 weeks. This seedling exhibited low vigor in its development. Ungerminated seeds were filled and at the end of the test had splitting seed coats but low vigor. 4 excised embryos also with poor development.





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SEED BANKING COLLECTION REPORT

13 November, 2008

Accession information

Cirsium fontinale
(fountain thistle)

Asteraceae

22774 United States: California: San Mateo: SW San Francisco Bay:
East side of Crystal Springs reservoir on both sides of I-280 near Pulgas Ridge; CNDDDB EO# 1.
Serpentine seep. 400 ft. ele. 37.51282°N, 122.34562°W. Funded Conservation Seed Collection.
Seeds received from Tiffany Knight, Department of Biology, Washington. State permit #2081(a)-
09-11-RP. The purpose of the collection was in conjunction with a demographic and pollination
study they were conducting (how many inflorescences and seeds are produced per plant? Are
the plants self compatible? The seeds are from 14 plants in the open pollination treatment
(control plants that were not manipulated in any way). Tiffany Knight s.n. 21 Aug 2008.

LOT_NUM	ACC_NUM	STORE DT	QUANTITY	WEIGHT	FWS/DFG	CNPS
3967	22774	2008	577	2.574g	SE/FE	1B.1

Processing and collection quality assessment

Cleaned seeds were received in a sealed envelope. Any hollow aborted seeds were removed using an air blower sorting unit. Based on dissection exam results we estimate that 95% of the seed in this collection is viable. The cleaned seeds were placed for a minimum 3 week period at 14% RH. They were then placed into heavy duty foil/plastic seed storage pouches, heat-sealed and placed into storage at -18 deg. C.



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Germination tests

Germination tests were conducted on 0.5% bacto-agar at 11 hr. (20° C) day and 13 hr. (12° C) night environmental conditions.

Accession 22774

START_DT	END_DT	# TEST	# GERM	% GERM	PRETREATMENT	MISC
25-Sep-08	9-Oct-08	26	24	92	No Treatment	All seedlings with very healthy root and cotyledon development

To monitor storage tolerance and viability the collection will be retested after one, five and ten years in storage and every 10 years thereafter.

13 November, 2008

Michael Wall - Seed Program Manager

Genevieve Arnold - Seed Program Technician



SEED BANKING COLLECTION REPORT 11 March, 2009

Accession information

Cirsium fontinale var. *fontinale* Asteraceae
(Fountain thistle)

22855 ... SD wild collected in USA

United States: California: San Mateo: Central Coast: East side of Crystal Springs Reservoir off LCS Boat Ramp Road, USGS San Mateo quad. Californian: Serpentine Grassland. 294 ft. 37.514836°N, 122.354780°W. Large number of individuals reaching all of the way to waters edge of Lower Crystal Springs Reservoir. No clear serpentine seep or drainage as in other *Cirsium* sites. Department of Fish and Game funded bulk sampled conservation seed collection. Sonya Foree s.n. 8 Jan 2009.

LOT_NUM	ACC_NUM	STORE DT	QUANTITY	FWS/DFG	CNPS
4020	22855	2009	1486	SE/FE	1B.1

Processing and collection quality assessment

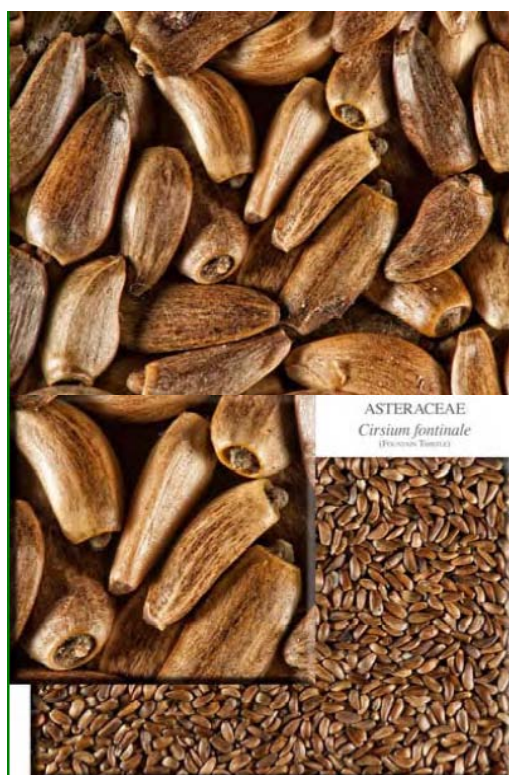
The thistle collections were received in two paper bags containing the several hundred flower heads that were in a very late stage of maturity. While much of the seeds likely had already dehisced on site prior to collection there still remained a good number of viable seeds deeply set within in the floral inflorescence. Top extract the seeds RSA Seed Conservation Program staff threshed the floral heads over a large screen, then sorted the material through a medium screen to remove the bulky chaff then over a small screen to remove the fine chaff and dirt. The remaining seed and chaff were placed into an air blower to separate the chaff, hollow, sterile, parasitized seeds and parasite larvae. Remaining heavy receptacle chaff was removed by hand. Healthy viable seeds were filled, firm, and moist within and ca. 0.8 – 1.1 mm wide with a seed weight of 254 seeds per gram. Some of the fertile fruits were loosely filled, with the tissue not filling all of the space within the seed but otherwise appeared normal and healthy. The quantity of sterile and parasitized fruits in this seed lot that was discarded was fairly low, about 30%.

LOT_NUM	ACC_NUM	STORE DT	QUANTITY	FWS/DFG	CNPS
4020	22855	2009	1486	SE/FE	1B.1



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Germination test results

Germination tests were conducted on 0.5% bacto-agar at 11 hr. (20° C) day and 13 hr. (12° C) night environmental conditions. It was surprising that the germination was only 57% for this species as the germination on the previous accession for this species was 92%. At this point I have to guess that it may have something to do with the moderate quantity of seeds that were only partially filled and these may be the seeds that either produced the deformed seedlings and/or the ungerminated seeds with brownish embryos.

# TEST	START DATE	END_DT	# TESTED	# GERM	% GERM	PRETREATMENT	MISC
4020*1	24-Feb-09	10-Mar-09	30	17	57	No Treatment	first 17 seedlings with healthy root and cotyledon development with the later 4 producing retarded growth; ungerminated seeds (9 of 30) filled but with brownish colored tissue



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Michael Wall - Seed Conservation Program Manager
Genevieve Arnold - Seed Conservation Program Technician



SEED BANK COLLECTION REPORT
21 January, 2010

***Cirsium fontinale* var. *fontinale* Asteraceae**
(Fountain thistle)

23029 ... SD wild collected in USA (near to CNDDDB EO #8) United States: California: San Mateo: Santa Cruz Mountains: San Francisco Peninsula Watershed at Lower Crystal Springs Boat Ramp Road, west of Skyline Boulevard across from GGNRA fountain thistle pop. #8: USGS San Mateo Quad. North Coast Ranges: Grassland. 294 ft. 37.514836°N, 122.35478°W. Collected near and at reservoir edge, most northern and western edge of population. Full sun; also found with *Deschampsia caespitosa* Sonya Foree 2. 18 Sep 2009.

LOT NUMBER	ACCESSION NUMBER	COLLECTION YEAR	QUANTITY OF SEED	NUMBER OF INDIV.	AVG SEEDS PER INDIV.
4205	23029	2009	2,350	414	5.7

Processing and collection quality assessment

The preceding table shows the quantity of filled sound seed that was extracted from the total number of seed received. Many hundred flower heads were received in a large paper shopping bag. After threshing the heads to extract the seeds the high percentage of hollow, sterile, or parasitized seeds were removed using an air blower unit. A large number of insect larvae were also removed in the process. Viability (% pure live seed) is estimated to be greater than 95% based on a dissection exam where 5 of 5 of the lightest weight seeds were filled and sound at 30 blower speed. The seed collection is next dried to equilibrium at 12% relative humidity. A backup portion of the seed will be sent to the USDA National Center for Genetic Resource Preservation in Ft. Collins. After three weeks in dry storage at room temperature the seeds are placed into heavy duty foil/plastic seed pouches, heat sealed, and placed into storage at -18° C.





Germination test results

LOT #	ACC #	QTY	START_DT	END_DT	# GERM	% GERM	SEED TYPE	PRE TREATMENT	MISC
4202	23029	50	17-Dec-09	31-Dec-09	28	56	Fresh seed	No Treatment	seedlings: healthy; early root to root and cotyledon development; 5 seedlings abnormal not counted in total; ungerminated seeds filled healthy within



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SEED BANKING COLLECTION REPORT

30 October, 2007

Accession information

Cirsium hydrophilum var. *hydrophilum*

Asteraceae (Suisun thistle)

22623 ... SD wild collected in USA. United States: California: Solano: Suisun Marsh, Grizzly Island Wildlife Area, Joice Island Unit, between a myriad of "mosquito ditches" 150 m from Cutoff Slough in brackish tidal marsh. Californian: Wetland. 0 ft. 38°11'43.785"N, 122°00'04.534"W. Sarah Estrella Voucher, Gene Cooley SN. 28 Jun 2007. CNDDDB EO# 5

22626 ... SD wild collected in USA. United States: California: Solano: Suisun Marsh, Grizzly Island Wildlife Area, Hill Slough area 8. Californian: Wetland. 0 ft. 38°13'23.839"N, 121°59'06.699"W. Sarah Estrella COOLEY SN. 28 Jun 2007. No CNDDDB EO# for this population.

LOT_NUM	ACC_NUM	STORE_DT	QUANTITY	WEIGHT	FWS/DFG	CNPS
3720	22623	2007	46	0.230g	FE	1B.1
3721	22626	2007	80	0.559g	FE	1B.1

Processing and collection quality assessment

Seeds were received already removed from the flower heads. Hollow sterile fruits were removed using an air blower sorting unit. For accession 22623 140 seeds were received and 57 were filled (41%). 11 of these seeds were used in the dissection exam and germination testing leaving a total of 46 for storage. 105 total seeds of accession 22626 were received and 80 were estimated to be filled (76%) at the same blower speed as used on 22623. The cleaned seeds were placed for a minimum 3 week period at 14% RH. Each accession was then put into separate heavy duty foil/plastic seed storage pouches, heat-sealed and placed into storage at -18 deg. C. See attached worksheet for information on the number of seeds per individual for accession 22626.



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Germination test results

Germination tests were conducted on 0.5% bacto-agar at 11 hr. (20° C) day and 13 hr. (12° C) night environmental conditions.

# TEST	START DT	END_DT	# GERM	% GERM	PRETREATMENT	MISC
11	3-Oct-07	15-Oct-07	10	90	No Treatment	Note: 6 of 11 clipped to check if filled; seedlings: 9 of 11 with healthy root and cotyledon development; 2 abnormal due to damage during clipping; 1 new seedling with healthy root protrusion germinated in natural light at room temperature

Michael Wall - Seed Program Manager
Genevieve Arnold - Seed Program Technician



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SEED BANKING COLLECTION REPORT - MARCH 2010

23085 *Clarkia imbricata*

CNDDDB EO# 4

Onagraceae

(Vine Hill Clarkia)

23087 ... SD wild collected in USA United States: California: Sonoma: North Coast Range: Vine Hill Preserve on Vine Hill School Road about 0.5 mile east of Vine Hill Road, north of Sebastopol, USGS Sebastopol quad. 250 ft. 38.46995°, 122.85440°. Permanently protected 1-acre CNPS Preserve in a matrix of rural ranchettes, vineyards, and hobby farms. Vine Hill manzanita and Coast live oak encroaching into areas where *Clarkia imbricata* occurs. Some illegal dumping of yard waste. *Holcus lanatus* increasing. in full sun, other associated taxa include *Danthonia californica*, *Holcus lanatus*, *Rubus californicus*, *R. discolor*, & *Plantago* spp. Kate Symonds s.n. 15 Sep 2009. Bulk sampled funded conservation collection.

23087 *Clarkia imbricata*

CNDDDB EO# 4

Onagraceae

(Vine Hill Clarkia)

23087 ... SD wild collected in USA United States: California: Sonoma: North Coast Range: Vine Hill Preserve on Vine Hill School Road about 0.5 mile east of Vine Hill Road, north of Sebastopol, USGS Sebastopol quad. 250 ft. 38.46995°, 122.85440°. Permanently protected 1-acre CNPS Preserve in a matrix of rural ranchettes, vineyards, and hobby farms. Vine Hill manzanita and Coast live oak encroaching into areas where *Clarkia imbricata* occurs. Some illegal dumping of yard waste. *Holcus lanatus* increasing. in full sun, other associated taxa include *Danthonia californica*, *Holcus lanatus*, *Rubus californicus*, *R. discolor*, & *Plantago* spp. Kate Symonds s.n. 15 Sep 2009. Maternal line sampled funded conservation collection.

LOT NUMBER	ACCESSION NUMBER	COLLECTION YEAR	STATUS CNPS	STATUS FED STATE	SEED QUANTITY	MATERNAL LINES
4249	23085	2009	1B	FE/SE	1081	n/a
4250	23087	2009	1B	FE/SE	3793	55

Based on the quantity of seed and the number of individuals sampled these collections **are** considered sufficient to serve their intended purpose as permanent conservation seed collections. See also attached number of seeds per individual worksheet.

Both collections were received in small paper coin envelopes containing a few to several fruits and dehiscent seed. Seeds were extracted from the fruits by gently threshing over a # 16 soil sieve large enough to allow the seeds to fall through. This process was repeated for each maternal sample. Extracted seeds and seed chaff was then blown to 28 using an Oregon seed blower to separate out the chaff and any parasitized, underdeveloped, or aborted seed. The seed lot table above shows the quantity of filled sound seed that was extracted from the total number of seed received. As with most *Clarkia* the percentage of viable seeds produced per fruit was very high. Two of the maternal line samples had '0' viable seeds. The estimated viability (% live seed) of each sample is greater than 95%.

Each maternal sample was packaged in a glassine envelope. The collections are then dried to equilibrium at 14% relative humidity. After three weeks the seeds were put into heavy duty foil/plastic storage pouches, heat sealed, and placed into storage at -18° C.



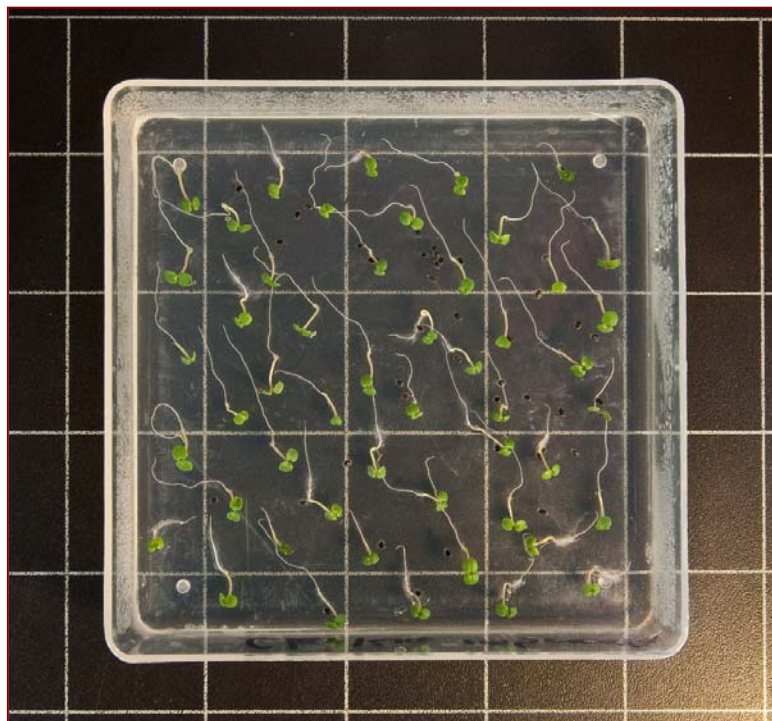
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Germination Test Results

Initial germination tests were conducted on 0.5% agar solution on clear plastic examination plates maintained at 11 hrs. light at 20° C and 13 hrs. dark at 12° C. Test results indicate that there is no dormancy in fresh seed under these test conditions. To conserve the material no tests were conducted on the maternal line collection 23087.

LOT_NUM	ACC #	# TESTED	START_DT	END_DT	# GERM	% GERM	SEED TYPE	PRE TREATMENT	MISC
4249*1	23085	50	3-Mar-10	9-Mar-10	50	100	Fresh seed	No Treatment	all seedlings with healthy and vigorous roots and cotyledon development; etiolated on agar plate



18 March, 2010

Michael Wall – Seed Conservation Program Manager

Genevieve Arnold – Technician, Seed Conservation Program



SEED BANK COLLECTION REPORT
21 January, 2010

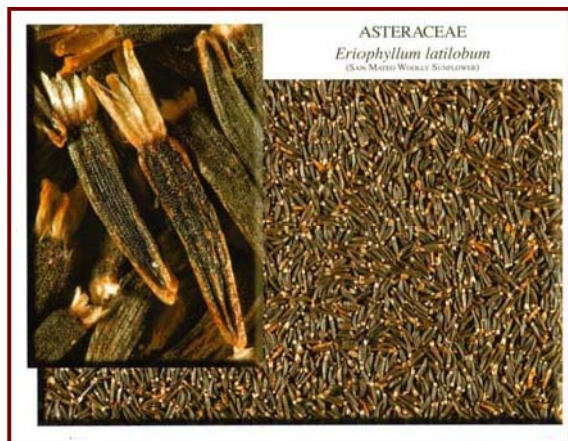
***Eriophyllum latilobum* Asteraceae**
(San Mateo woolly sunflower)

23030 ... SD wild collected in USA (CNDDDB EO #4) United States: California: San Mateo: Santa Cruz Mountains: San Francisco Peninsula Watershed, near San Mateo #2 Dam, collected from about 1000' along roadside from sharp curve in road to stairs to the dam. San Mateo creek population (Dr. John Mooring); USGS Montana Mountain Quad. North Coast Ranges: Mixed evergreen forest woodland. 500 ft. 37.54579°N, 122.40290°W. Productive year for plant species (CNDDDB occurrence lists ~207 plants in 2004) but most plants on the steep, erosive eastern side of road. Collected from sun and shade sites all along road, clumps of plants, not continuous. Semi shade Sonya Foree s.n. 8 Oct 2009.

LOT NUMBER	ACCESSION NUMBER	COLLECTION YEAR	QUANTITY OF SEED	NUMBER OF INDIV.	AVG SEEDS PER INDIV.
4201	23030	2009	7,788	254	30.7

Processing and collection quality assessment

The preceding table shows the quantity of filled sound seed that was separated from the total number of seed received. Any hollow, sterile, or parasitized seeds were removed using an air blower unit. Viability (% pure live seed) is estimated to be greater than 95% based on a dissection exam where 10 of 10 of the lightest weight seeds were filled and sound at 22 blower speed. The seed collection is next dried to equilibrium at 12% relative humidity. A backup portion of the seed will be sent to the USDA National Center for Genetic Resource Preservation in Ft. Collins. After three weeks in dry storage at room temperature the seeds are placed into heavy duty foil/plastic seed pouches, heat sealed, and placed into storage at -18° C.





LOT #	ACC #	QTY	START DATE	END DATE	# GERM	% GERM	SEED TYPE	PRE TREATMENT	MISC Germination test results
4201	23030	50	17-Dec-09	6-Jan-10	14	28	Fresh seed	No Treatment	all seedlings with healthy root and cotyledon development; ungerminated seeds 2 of 2 filled and firm within



SEED BANK COLLECTION REPORT
21 January, 2010

***Fremontodendron californicum* ssp. *decumbens* Sterculiaceae**
(Pine Hill Flannelbush)

23009 ... SD wild collected in USA (CNDDDB EO #2) United States: California: El Dorado: Northern Sierra Nevada Foothill Region: NE of Pine Hill within and at the very corner of the reserve off Lazy Knoll Rd. Lat/Long coordinates are converted from UTM coordinates provided with the seed collection. - USGS Shingle Springs Quad. Californian: Chaparral. 1630 ft. 38.729277°N, 120.979907°W. Funded bulk sampled Conservation Seed Collection. Collected under Federal Fish and Wildlife Permit TE142437-0. RSA-DFG Contract No. P0685104. Semi shade; also found with *Rhamnus tomentella*, *Iris microsiphon*, *Polygala cornuta* Melanie Gogol-Prokurat s.n. 26 Jul 2007.

LOT NUMBER	ACCESSION NUMBER	COLLECTION YEAR	QUANTITY OF SEED	NUMBER OF HEADS	AVG SEEDS PER HEAD
4191	23009	2007	15	na	na

Processing and collection quality assessment

The preceding table shows the quantity of filled sound seed that was extracted from the total number of seed received. Hollow, sterile, or parasitized seeds were removed using an air blower unit. Viability (% pure live seed) is estimated to be 95% based on a dissection exam where 2 of 2 of the lightest weight seeds were filled and sound at maximum blower speed. The seed collection is next dried to equilibrium at 12% relative humidity. There was insufficient seed to send a backup sample to the USDA National Center for Genetic Resource Preservation in Ft. Collins. After three weeks in dry storage at room temperature the seeds are placed into heavy duty foil/plastic seed pouches, heat sealed, and placed into storage at -18° C.

Germination test results

No initial germination test was conducted due to the small quantity of seed in this collection.





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SEED BANKING COLLECTION REPORT

13 January, 2009

Accession information

Fritillaria roderickii

Liliaceae (Roderick's fritillary)

22030 ... SD wild collected in United States: California: Mendocino: W side of Hwy 1, ca 4.0 mi. S of Point Arena, just south of CNDDDB EO Index #4718. Californian: Coastal Prairie. 150 ft. Unfunded conservation collection. Clare Golec SN. 13 Sep 2006.

22619 ... SD wild collected in United States: California: Mendocino: W side of Hwy 1, ca 4.0 mi. S of Point Arena, just south of CNDDDB EO Index #4718. Californian: Coastal Prairie. Nearby occurrences of *Fritillaria affinis* var. *affinis*. Clare Golec SN. 25 Jul 2007.

LOT_NUM	ACC_NUM	STORE DT	QUANTITY	FWS/DFG	CNPS
3455	22030	2006	12	CE	1B.1
3685	22619	2007	21	CE	1B.1

Processing and collection quality assessment

1 pod was received in 2006 and 5 seed pods were received in 2007. Both seed collections were processed by hand to extract the seeds and check for viability. Seeds were placed in a seed blower to separate chaff and any parasitized or aborted seed. A dissection exam on the lightest weight seed is done to verify the presence of sound healthy tissue. The seed lot was then dried to equilibrium at 14% RH before being sealed in heavy duty foil laminate seed storage pouches.

Germination test results

No tests were conducted due to the small quantity of available material.

Michael Wall - Seed Program Manager
Genevieve Arnold - Seed Program Technician



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SEED BANK COLLECTION REPORT

2 March 2010

23046 *Lasthenia burkei*

CNDDDB EO# 15

Asteraceae

(Burke's Goldfield's, si me quieres, no me quieres)

23046 ... SD wild collected in USA United States: California: Sonoma: Central Coast: NE of Sebastopol, N of Occidental Ave. W of the Santa Rosa River. Vernal pool name "WILK": USGS Sebastopol Quad.

Californian: vernal pool. 85 ft. 38.42605°N, 122.81468°W. Conservation seed collection funded under Department of Fish and Game Agreement No. PO685104. Christina Sloop s.n. 24 Nov 2009.

LOT NUMBER	ACCESSION NUMBER	COLLECTION YEAR	STATUS CNPS	STATUS FED STATE	SEED QUANTITY	MATERNAL LINES
4237	23046	2010	1B	FE/SE	8071	74

Based on the quantity of seed and the number of individuals sampled this collection **is** considered sufficient to serve its intended purpose.

23047 *Lasthenia burkei*

CNDDDB EO# N/A

Asteraceae

(Burke's Goldfield's, si me quieres, no me quieres)

23047 ... SD wild collected in USA United States: California: Sonoma: Central Coast: W of Santa Rosa, S of Hall Rd. W of Wright Rd. Vernal Pool name "WOFU": USGS Sebastopol Quad. Californian: vernal pool.

90 ft. 38.435626°N, 122.77885°W. Conservation seed collection funded under Department of Fish and Game Agreement No. PO685104. Christina Sloop s.n. 24 Nov 2009.

LOT NUMBER	ACCESSION NUMBER	COLLECTION YEAR	STATUS CNPS	STATUS FED STATE	SEED QUANTITY	MATERNAL LINES
4238	23047	2010	1B	FE/SE	4101	68

Based on the quantity of seed and the number of individuals sampled this collection **is** considered sufficient to serve its intended purpose.

23048 *Lasthenia burkei*

CNDDDB EO# 22

Asteraceae

(Burke's Goldfield's, si me quieres, no me quieres)

23048 ... SD wild collected in USA United States: California: Sonoma: Central Coast: NW of Santa Rosa, N of Piner Ave. W of Fulton Rd. Vernal Pool name "WRIG": USGS Sebastopol Quad. Californian: vernal pool. 133 ft. 38.472119°N, 122.77529°W. Conservation seed collection funded under Department of Fish and Game Agreement No. PO685104. Christina Sloop s.n. 24 Nov 2009.

LOT NUMBER	ACCESSION NUMBER	COLLECTION YEAR	STATUS CNPS	STATUS FED STATE	SEED QUANTITY	MATERNAL LINES
4239	23048	2010	1B	FE/SE	9252	112

Based on the quantity of seed and the number of individuals sampled this collection **is** considered sufficient to serve its intended purpose.



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Maternal line samples were received partially cleaned of floral debris and chaff. Each sample was sorted through a #30 sieve to separate out any large chaff, and visually inspected under magnification. Any underdeveloped seeds were removed by hand. This rather labor intensive method was employed as some of the small seed could be lost using the seed blower. The seed lot table shows the quantity of filled sound seed that was extracted from the total number of seed received. The estimated viability (% live seed) of each sample is greater than 80%.

Each sample was packaged in a glassine seed envelope and dried to equilibrium at 12% relative humidity. After three weeks the seeds were put into heavy duty foil/plastic seed pouches, heat sealed, and placed into storage at -18° C.

All three collections had sufficient seed to send backup samples to the USDA National Center for Genetic Resource Preservation in Ft. Collins. See Number of Seeds per Individual Worksheet.

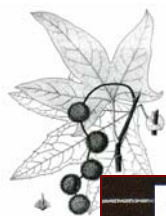
Germination Test Results

Initial germination tests were conducted on 0.5% agar solution on clear plastic examination plates maintained at 11 hrs. Light at 20° C and 13 hrs. Dark at 12° C. Test results indicate that there is no dormancy in fresh seed when exposed to these test conditions. It is undetermined why one of the tests had significantly lower germination.



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LOT NUM	ACC #	# TESTED	START DATE	END DATE	# GERM	% GERM	SEED TYPE	PRE TREATMENT	MISC
4237*1	23046	100	21-Jan-10	26-Jan-10	98	98	Fresh seed	No Treatment	seedlings: all with very healthy root and cotyledon development
4238*1	23047	100	21-Jan-10	9-Feb-10	45	45	Fresh seed	No Treatment	seedlings: healthy root and cotyledon development
4239*1	23048	100	21-Jan-10	26-Jan-10	92	92	Fresh seed	No Treatment	seedlings: healthy root and cotyledon development



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SEED BANK COLLECTION REPORT

2 March 2010

23045 *Limnanthes vinculans*

CNDDDB EO# 22

Limnanthaceae

(Sebastopol Meadowfoam)

23045 ... SD wild collected in USA United States: California: Sonoma: Central Coast: W of Santa Rosa, S of Hall Rd. W of Wright Rd. Vernal Pool name "WRIG": USGS Sebastopol Quad. Californian: vernal pool. 90 ft. 38.43562°N, 122.78856°W. Conservation seed collection funded under Department of Fish and Game Agreement No. PO685104. Christina Sloop s.n. 24 Nov 2009.

LOT NUMBER	ACCESSION NUMBER	COLLECTION YEAR	STATUS CNPS	STATUS FED STATE	SEED QUANTITY	MATERNAL LINES
4218	23045	2010	1B	FE/SE	74	34

Based on the quantity of seed and the number of individuals sampled this collection **is not** considered sufficient to serve its intended purpose. Additional seed should be collected to augment this collection.

23049 *Limnanthes vinculans*

CNDDDB EO# N/A

Limnanthaceae

(Sebastopol Meadowfoam)

23049 ... SD wild collected in USA United States: California: Sonoma: Central Coast: NE of Sebastopol N of Occidental Rd. E of Piezzi Rd. Vernal Pool name "MARI": USGS Sebastopol Quad. Californian: vernal pool. 76 ft. 38.42820°N, 122.79388°W. Conservation seed collection funded under Department of Fish and Game Agreement No. PO685104. Christina Sloop s.n. 24 Nov 2009.

LOT NUMBER	ACCESSION NUMBER	COLLECTION YEAR	STATUS CNPS	STATUS FED STATE	SEED QUANTITY	MATERNAL LINES
4219	23049	2010	1B	FE/SE	83	24

Based on the quantity of seed and the number of individuals sampled this collection **is not** considered sufficient to serve its intended purpose. Additional seed should be collected to augment this collection.

23050 *Limnanthes vinculans*

CNDDDB EO# N/A

Limnanthaceae

(Sebastopol Meadowfoam)

23050 ... SD wild collected in USA United States: California: Sonoma: Central Coast: SE of Sebastopol, S and W of Todd Rd. N of the Santa Rosa River. Vernal Pool name "TCMB 57". USGS Sebastopol Quad. Californian: vernal pool. 76 ft. 38.383826°N, 122.777933°W. Conservation seed collection funded under Department of Fish and Game Agreement No. PO685104. Christina Sloop s.n. 24 Nov 2009.

LOT NUMBER	ACCESSION NUMBER	COLLECTION YEAR	STATUS CNPS	STATUS FED STATE	SEED QUANTITY	MATERNAL LINES
4220	23050	2010	1B	FE/SE	43	18

Based on the quantity of seed and the number of individuals sampled this collection **is not** considered sufficient to serve its intended purpose. Additional seed should be collected to augment this collection.



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23051 *Limnanthes vinculans*

CNDDDB EO# N/A

Limnanthaceae

(Sebastopol Meadowfoam)

23051 ... SD wild collected in USA United States: California: Sonoma: Central Coast: SE of Sebastopol, S and W of Todd Rd. N of the Santa Rosa River. Vernal Pool name "TCMB 106". USGS Sebastopol Quad. Californian: vernal pool. 76 ft. 38.383826°N, 122.77793°. Conservation seed collection funded under Department of Fish and Game Agreement No. PO685104. Christina Sloop s.n. 24 Nov 2009.

LOT NUMBER	ACCESSION NUMBER	COLLECTION YEAR	STATUS CNPS	STATUS FED STATE	SEED QUANTITY	MATERNAL LINES
4221	23051	2010	1B	FE/SE	9	5

Based on the quantity of seed and the number of individuals sampled this collection **is not** considered sufficient to serve its intended purpose. Additional seed should be collected to augment this collection.

Maternal line samples were received cleaned of floral debris and chaff. Each sample was placed in a seed blower to separate out any inferior seeds. The seed lot table shows the quantity of filled sound seed that was extracted from the total number of seed received. The estimated viability (% live seed) of each sample is greater than 95%.

Each sample was packaged in a glassine seed envelope and dried to equilibrium at 12% relative humidity. After three weeks the seeds were put into heavy duty foil/plastic seed pouches, heat sealed, and placed into storage at -18° C.



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All four collections had an insufficient quantity of seed to send backup samples to the USDA National Center for Genetic Resource Preservation in Ft. Collins.

Germination test results

Due to the small quantity of seed initial germination testing was not performed for the *Limnanthes vinculans* collections. A 10 year follow-up testing on existing collections 16061 and 16062 placed into storage in 1989 germinated at 86% and 52% respectively.



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SEED BANK COLLECTION REPORT

21 January, 2010

***Packera layneae* Asteraceae (Layne's Ragwort) (4 accessions)**

22999 ... SD wild collected in USA (CNDDDB EO #34)

United States: California: El Dorado: Northern Sierra Nevada Foothill Region: Penny Lane parcel (near EO#34). Growing along the edge of SMUD/PG&E maintenance Rd. off Tiffany Hill Dr. Lat/Long coordinates are converted from UTM coordinates provided with the seed collection. - USGS Shingle Springs Quad. Californian: Chaparral. 1538 ft. 38.719521°N, 120.96497°W. High gravel cover. Funded bulk sampled Conservation Seed Collection. RSA-DFG Contract No. P0685104. Collected under Federal Fish and Wildlife Permit TE142437-0. Full sun to semi shade; also found with *Polygala cornuta* Melanie Gogol-Prokurat s.n. 3 Aug 2007.

23000 ... SD wild collected in USA (CNDDDB EO #13)

United States: California: El Dorado: Northern Sierra Nevada Foothill Region: Bald Mountain, large population on serpentine in cleared area under power lines surrounded by dense Chaparral. Lat/Long coordinates are converted from UTM coordinates provided with the seed collection. - USGS Georgetown Quad. Californian: Chaparral. 2992 ft. 38.953731°N, 120.803619°W. High gravel cover. Funded bulk sampled Conservation Seed Collection. RSA-DFG Contract No. P0685104. Collected under Federal Fish and Wildlife Permit TE142437-0. Full sun; also found with *Elymus multisetus*, *Calystegia occidentalis*, *Achnatherum nelsonii* Melanie Gogol-Prokurat s.n. 25 Jun 2007.

23001 ... SD wild collected in USA (near CNDDDB EO #6)

United States: California: El Dorado: Northern Sierra Nevada Foothill Region: Cameron Park. Cleared area near reservoir off Vera no Dr. Site cleared and burned 5 years ago. Near to EO#6. Lat/Long coordinates are converted from UTM coordinates provided with the seed collection. - USGS Shingle Springs Quad. Californian: Chaparral. 1481 ft. 38.674488°N, 120.97754°W. High gravel cover on site. Funded bulk sampled Conservation Seed Collection. Collected under Federal Fish and Wildlife Permit TE142437-0. RSA-DFG Contract No. P0685104. Full sun; also found with *Rhamnus tomentella*, *Piptatherum miliaceum* Melanie Gogol-Prokurat s.n. 2 Aug 2007.

23002 ... SD wild collected in USA (near CNDDDB EO 38)

United States: California: El Dorado: Northern Sierra Nevada Foothill Region: Cameron Park west of Pine Hill, Martel Creek parcel off Deer Creek Ct. Lat/Long coordinates are converted from UTM coordinates provided with the seed collection. - USGS Clarksville Quad. Californian: Chaparral. 1136 ft. 38.728467°N, 121.02692°W. Site burned in 1994 and is very open. Funded bulk sampled Conservation Seed Collection. RSA-DFG Contract No. P0685104. Collected under Federal Fish and Wildlife Permit TE142437-0. Semi shade; also found with *Quercus durata*, *Vulpia myuros*, *Bromus madritensis* Melanie Gogol-Prokurat s.n. 3 Aug 2007.



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LOT NUMBER	ACCESSION NUMBER	COLLECTION YEAR	QUANTITY OF SEED	NUMBER OF INDIV.	AVG SEEDS PER INDIV.
4192	22999	2007	44	10	4.4
4193	23001	2007	336	22	15.2
4195	23000	2007	42	10	4.2
4196	23002	2007	252	10	25.2

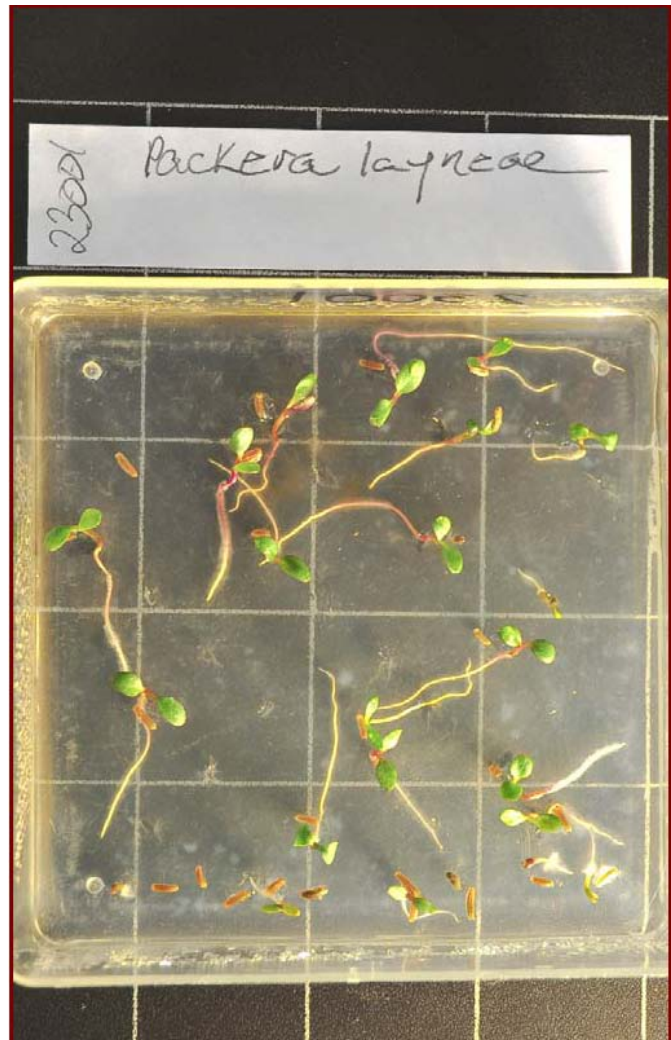
Processing and collection quality assessment

The preceding table shows the quantity of filled sound seed that was extracted from the total number of seed received. Hollow, sterile, or parasitized seeds were removed using an air blower unit. Viability (% pure live seed) is estimated to be greater than 80% based on a dissection exam where 4 of 5 of the lightest weight seeds at 41 blower speed were filled and sound. The seed collection is next dried to equilibrium at 12% relative humidity. There was insufficient seed to send a backup sample to the USDA National Center for Genetic Resource Preservation in Ft. Collins. After three weeks in dry storage at room temperature the seeds are placed into heavy duty foil/plastic seed pouches, heat sealed, and placed into storage at -18° C.



Germination test results

LOT #	ACC #	QTY	START DATE	END DATE	# GERM	% GERM	SEED TYPE	PRE TREATMENT	MISC
4193	23001	30	3-Dec-09	19-Jan-10	22	73	Indoor stored seed	Cold moist stratification; up to 14 days at 5° C	all seedlings with healthy root and cotyledon development; some mold; seeds germinated over an extended period of time





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SEED BANK COLLECTION REPORT

21 January, 2010

Phlox hirsuta Polemoniaceae

(Yreka phlox) (2 accessions same population)

23025 ... SD wild collected in USA (CNDDDB EO #4)

United States: California: Siskiyou: Klamath/Siskiyou: E of interstate 5 at the NE edge of the city of Yreka; plant population widespread on China Hill; USGS Montague Quad. Klamath/Siskiyou: Juniper woodland, grassland. 2900 ft. 41.746722°N, 122.61316°W. State sponsored bulk sampled funded conservation seed collection. Also found with *Eriogonum sphaerocephalum* var. *halimoides*, *Eriogonum strictum* var. *proliferum* Robin Fallscheer s.n. 12 Jun 2008.

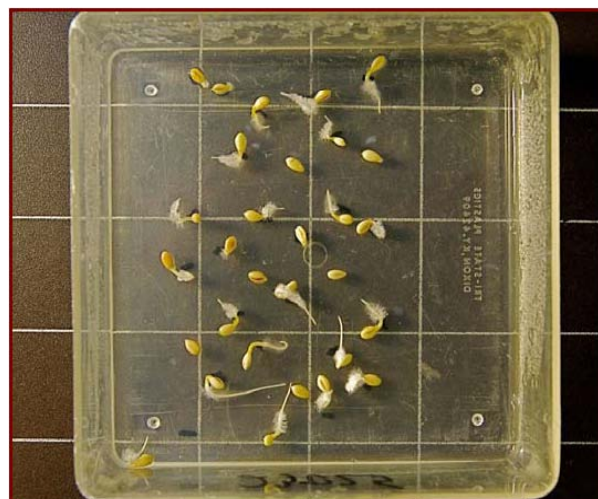
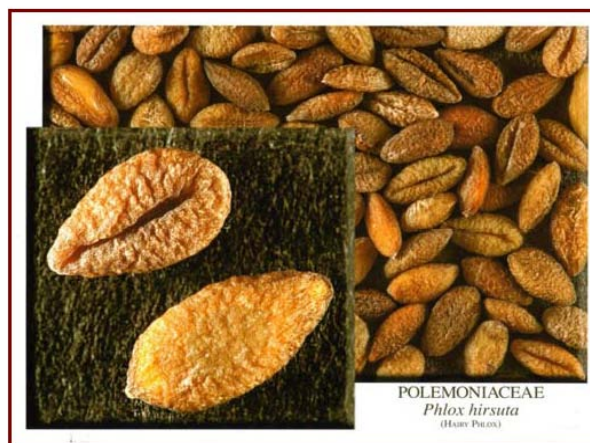
23026 ... SD wild collected in USA (CNDDDB EO #4)

United States: California: Siskiyou: Klamath/Siskiyou: E of interstate 5 at the NE edge of the city of Yreka; plant population widespread on China Hill; USGS Montague Quad. Klamath/Siskiyou: Juniper woodland, grassland. 2900 ft. 41.7467225°N, 122.61316°W. State sponsored bulk sampled funded conservation seed collection. Also found with *Eriogonum sphaerocephalum* var. *halimoides*, *Eriogonum strictum* var. *proliferum* Robin Fallscheer s.n. 18 Jun 2009.

LOT NUMBER	ACCESSION NUMBER	COLLECTION YEAR	QUANTITY OF SEED	NUMBER OF INDIV.	AVG SEEDS PER INDIV.
4203	23025	2008	334	184	1.82
4204	23026	2009	489	260	1.88

Processing and collection quality assessment

The preceding table shows the quantity of filled sound seed that was extracted from the total number of seed received. Hollow, sterile, or parasitized seeds were removed using an air blower unit. Viability (% pure live seed) is estimated to be greater than 95% based on a dissection exam where 2 of 2 of the lightest weight seeds at maximum blower speed were filled and sound. The seed collection is next dried to equilibrium at 12% relative humidity. Due to the sampling method and limited quantity of seed collected it was decided to keep all of the collection at RSA and unless requested no seeds will be sent to the USDA National Center for Genetic Resource Preservation in Ft. Collins. After three weeks in dry storage at room temperature the seeds are placed into heavy duty foil/plastic seed pouches, heat sealed, and placed into storage at -18° C.



Germination test results

LOT #	ACC #	QTY	START_DT	END_DT	# GERM	% GERM	SEED TYPE	PRE TREATMENT	MISC
4203	23025	30	17-Dec-09	6-Jan-10	25	83	Indoor stored seed	Cold moist stratification; up to 14 days at 5° C	germination initiated in CS, all seedlings with very healthy root development
4204	23026	30	17-Dec-09	6-Jan-09	28	93	Fresh seed	Cold moist stratification; up to 14 days at 5° C	germination initiated in CS, all seedlings with very healthy root development



SEED BANKING COLLECTION REPORT 13 November, 2008

Accession information

Sidalcea stipularis

(Scadden Flat checkermallow)

Malvaceae

22761 ... SD wild collected in United States

United States: California: Nevada: Sierra Nevada Foothills: West of Grass Valley along Hwy 20 west of Hwy 49 on unwooded marshy area on private property parcel and Cal Trans right of way just west of Nevada County Fairgrounds; seed collected from sub-population "O1" and "T1" as designated on Monitoring Plan Map: Carla Wise, 1988. CNDDDB EO# 1 & 2. Wet Meadow. 2400 ft. ele. 39.20812°N, 121.08672°W. Plants growing in 6 small sub populations within an ca. 5.0 acre wet meadow area that is heavily degraded by non-native invasive *Rubus discolor* and *Holcus lanata*. Natural seep/spring present on this site. This species is clonally reproductive thus the population size is difficult to quantify; Virginia Moran 1, 31 Jul 2008.

22775 ... SD wild collected in United States

United States: California: Nevada: Sierra Nevada Foothills: West of Grass Valley along Hwy 20 west of Hwy 49 on unwooded marshy area on private property parcel and Cal Trans right of way just west of Nevada County Fairgrounds; seed collected from sub-population "O1" as designated on Monitoring Plan Map: Carla Wise, 1988. CNDDDB EO# 1. Wet Meadow. 2400 ft. ele. 39.20812°N, 121.08672°W. Plants growing in 6 small sub populations within an ca. 5.0 acre wet meadow area that is heavily degraded by non-native invasive *Rubus discolor* and *Holcus lanata*. Natural seep/spring present on this site. This species is clonally reproductive thus the population size is difficult to quantify; Virginia Moran 1, 31 Aug 2008.

LOT_NUM	ACC_NUM	STORE_DT	QUANTITY	WEIGHT	FWS/DFG	CNPS
3981	22761	2008	478	1.244g	SE	1B.1
3982	22775	2008	285	0.771g	SE	1B.1

Processing and collection quality assessment

Cleaned seeds were received in several envelopes labeled as to what parts of the population they were collected from. Hollow aborted seeds were removed using an air blower sorting unit. Approximately 30% of the seeds from each collection were either aborted or were only partially filled. Following testing the partially filled seeds were determined to be non-viable and were discarded. Based on dissection exam results we estimate that 95% of the seed in this collection is viable. The cleaned seeds were placed for a minimum 3 week period at 14% RH. They were then placed into heavy duty foil/plastic seed storage pouches, heat-sealed and placed into storage at – 18 deg. C.



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Germination tests

Germination tests were conducted on 0.5% bacto-agar at 11 hr. (20° C) day and 13 hr. (12° C) night environmental conditions.

Accession 22761

START_DT	END_DT	# TEST	# GERM	% GERM	PRETREATMENT	MISC
24-Sep-08	4-Nov-08	15	9	60	Clip; rupture seed coat using pin, knife, or scalpel	Clipping procedure was not deep enough and failed to puncture the inner membrane of the carpel. Seedlings with healthy root and cotyledon development.
25-Sep-08	7-Oct-08	32	0	0	Clip; rupture seed coat using pin, knife, or scalpel	Test on partially filled seeds separated from the collection during processing. All seeds failed to develop and were quickly covered in mold.

Accession 22775

START_DT	END_DT	# TEST	# GERM	% GERM	PRETREATMENT	MISC
24-Sep-08	4-Nov-08	20	6	30	Clip; rupture seed coat using pin, knife, or scalpel	Clipping procedure was not deep enough and failed to puncture the inner membrane of the carpel. Seedlings healthy root and cotyledon development.

To monitor storage tolerance and viability the collection will be retested after one, five and ten years in storage and every 10 years thereafter.

13 November, 2008

Michael Wall - Seed Program Manager
Genevieve Arnold - Seed Program Technician



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SEED BANK COLLECTION REPORT

21 January, 2010

Wyethia reticulata Asteraceae

(El Dorado County Mule Ears) (3 accessions)

23008 ... SD wild collected in USA (CNDDDB EO #7)

United States: California: El Dorado: Northern Sierra Nevada Foothill Region: Penny Lane parcel (near EO#7) N of Rescue and W of Deer Valley RD. In openings in oak woodland. Lat/Long coordinates are converted from UTM coordinates provided with the seed collection. - USGS Shingle Springs Quad.

Californian: Woodland. 1415 ft. 38.720942°N, 121.03632°W. High cover of moss and leaf litter. Funded bulk sampled Conservation Seed Collection. RSA-DFG Contract No. P0685104. Semi shade; also found with *Senecio aronicoides*, *Erythronium multiscapodeum* Melanie Gogol-Prokurat s.n. 6 Aug 2007.

23010 ... SD wild collected in USA (CNDDDB EO #4)

United States: California: El Dorado: Northern Sierra Nevada Foothill Region: Pine Hill Reserve of the summit road loop. - USGS Shingle Springs Quad. Californian: Chaparral. 1908 ft. 38.718698°N, 120.991913°W. Funded bulk sampled Conservation Seed Collection. RSA-DFG Contract No. P0685104.

Semi shade; also found with *Elymus multisetus*, *Carex brainerdii*, *Rhamnus tomentella* Melanie Gogol-Prokurat s.n. 26 Jul 2007.

23011 ... SD wild collected in USA (CNDDDB EO #XX)

United States: California: El Dorado: Northern Sierra Nevada Foothill Region: Martel Creek Parcel West of Martel Creek ca. 2.3 miles west of Pine Hill. Lat/Long coordinates are converted from UTM coordinates provided with the seed collection. - USGS Clarksville Quad. Californian: Chaparral. 867 ft. 38.723336°N, 121.0632°W. Funded bulk sampled Conservation Seed Collection. RSA-DFG

Contract No. P0685104. Semi shade; also found with *Quercus durata*, *Styrax officinalis*,

LOT NUMBER	ACCESSION NUMBER	COLLECTION YEAR	QUANTITY OF SEED	NUMBER OF INDIV.	AVG SEEDS PER INDIV.
4194	23008	2007	448	20	22.4
4198	23010	2007	138	20	6.9
4197	23011	2007	86	10	8.6

Processing and collection quality assessment

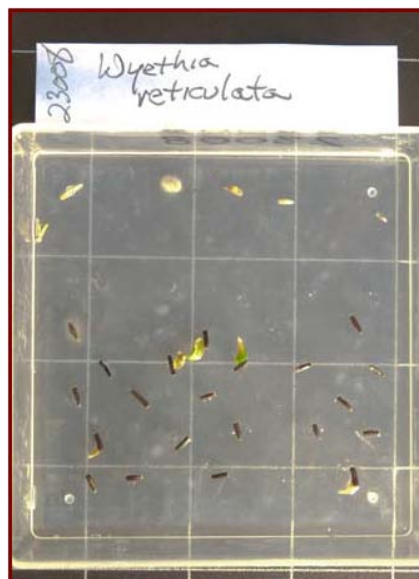
The preceding table shows the quantity of filled, sound seed that was extracted from the total number of seed received. Hollow, sterile, or parasitized seeds were removed using an air blower unit. Viability (% pure live seed) is estimated to be greater than 95% based on a dissection exam where 3 of 3 of the lightest weight seeds at 30 blower speed were filled and sound. The figure at the right shows the high percentage of hollow achenes removed during this viability assessment. The seed collection is next dried to equilibrium at 12% relative humidity. A portion of the seeds from accession 23008 will be sent



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to the USDA National Center for Genetic Resource Preservation in Ft. Collins. After three weeks in dry storage at room temperature the seeds are placed into heavy duty foil/plastic seed pouches, heat sealed, and placed into storage at -18° C.



Germination test results

LOT #	ACC #	QTY	START_DT	END_DT	# GERM	% GERM	SEED TYPE	PRE TREATMENT	MISC
4194	23008	30	3-Dec-09	19-Jan-10	0	0	Indoor stored seed	Alternating warm-cold-warm stratification; 14 - 90 day periods	all germinations retarded development; excised embryos turning brown on the plate; questionable viability

Germination test results with abnormal root and shoot development, lack of vigor, and rapid decline of excised embryos indicate poor viability for this collection. It is possible that storage conditions between the collection date (August 2007) and the date the seeds were tested (December 2009) could have shortened the life of this collection. A follow up germination test will be conducted and this test should verify the viability of this conservation seed collection. Until the viability of this collection is verified it should be assumed that it can not be relied upon to serve its intended function.

Michael Wall - Seed Conservation Program Manager