

The Consortium of California Herbaria: Integrating curation, information, and research



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& Dept. Of Integrative Biology
University of California, Berkeley

CCH Background



- Serves vascular plant data from California
- Founded in 2003 as a project to digitize and publish CA herbarium specimens records from the UC system
- In 2015, has 35 participants, including some from out of state
 - 2,147,819 specimen records
 - 1,605,682 georeferenced (75% of total)
 - Records publicly searchable and mappable
 - Cited in over 120 scholarly works since 2007



ucjeps.berkeley.edu/consortium/



Consortium of California Herbaria

[Participants](#) [News](#) [Search](#) [About](#) [Help](#) [Donate](#)

Search Results – 447 specimen records retrieved (300 records with coordinates)

Results for search: Scientific name=Calochortus clavatus (including nomenclatural synonyms); [More information: Jepson Online Interchange](#)

Mapping Options:

[BerkeleyMapper with county and bioregion layers](#)

[BerkeleyMapper without layers.](#)

[KML export](#)

(Note: only records with coordinates are mappable)

Download Options:

[Select all records](#) · [Select records with coordinates](#)

☐ Include annotations and voucher information

Please cite data retrieved from this page: Data provided by the participants of the Consortium of California Herbaria (ucjeps.berkeley.edu/consortium/).

Records are made available under the [CCH Data Use Terms](#).

Click on column header to sort data (* sorts by family); click in leftmost checkbox to select record. [CCH Help Page](#).

[Turn on yellow flags](#) to show possible range discrepancies. [Read more ...](#)

?	Specimen ID	Determination *	Collector	Collection Date	Collection Number	County	Locality	Elevation in meters	Feedback
<input type="checkbox"/>	RSA808835	Calochortus clavatus var. gracilis	Duncan S. Bell, Caitlin Elam, Evan Meyer	Jun 13 2013	5093	Los Angeles	Sheep Mountain Wilderness; Coldwater Canyon off of Cattle Canyon, on the southwestern flanks of Mount San Antonio.	898	Comment
<input type="checkbox"/>	UCR229410	Calochortus clavatus var. avius	George K. Helmkamp, E. A. Helmkamp	Jul 30 2011	17951	El Dorado	Northern Sierra Nevada Mountains Omo Ranch Road, 7.4 miles southeast of Omo Ranch, 1.9 mi. NW (304°) airline of Hwy 88 junction	1372	Comment
<input type="checkbox"/>	RSA779255	Calochortus clavatus var. clavatus	Pam De Vries	Apr 22 2011	7758	Los Angeles	Western Transverse Range, southwest portion of the Liebre Mountains; about 2.5 air miles NNE of the intersection of Copper Hill and McBean Parkway (Santa Clarita); about 0.5 air miles west of San Francisquito Canyon Road	602	Comment
<input type="checkbox"/>	RSA778575	Calochortus clavatus var. gracilis	D. E. Bramlet, D. Pugh	Jun 3 2010	4680	Los Angeles	Transverse Ranges; Liebre Mts. region: Portal Ridge. 146 m N of Poor Road and 312 m E of 70th Street West	1085	Comment
<input type="checkbox"/>	UCD105572	Calochortus clavatus var. clavatus	Robert E. Preston	05 19 2010	2783	San Luis Obispo	San Luis Obispo County: Temblor Range, 5.2 mi ENE of Simmler	998	Comment



Accession Detail Results

UCR is the home institution for this record

Please cite data retrieved from this page: Data provided by the participants of the Consortium of California Herbaria (ucjeps.berkeley.edu/consortium/; Thu Apr 23 14:59:34 2015).

Records are made available under the [CCH Data Use Terms](#).

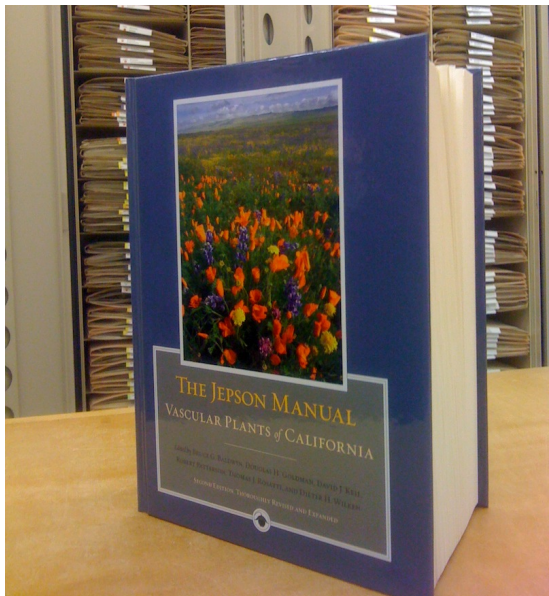
Specimen number	UCR229410
Determination	<i>Calochortus clavatus</i> var. <i>avius</i> More information: Jepson Online Interchange
Collector, number, date	George K. Helmkamp, E. A. Helmkamp, 17951, Jul 30 2011
County	El Dorado
Locality	Northern Sierra Nevada Mountains Omo Ranch Road, 7.4 miles southeast of Omo Ranch, 1.9 mi. NW (304°) airline of Hwy 88 junction
Elevation	1372 m
Habitat	Coniferous forest.
Coordinates	38.54333 -120.47167 BerkeleyMapper [or without layers, here]
Datum	Not recorded; ER = 100 m
Coordinate source	Collector GPS
Annotations and/or curatorial actions	<i>Calochortus clavatus</i> var. <i>avius</i>
Notes	USGS quad: Caldor 7.5' Q.; Uncommon and apparently very local; on an open rocky bank.;
Comment	
Help	

Related searches:

1. [taxon=Calochortus clavatus var. avius](#)
2. [county=El Dorado; taxon=Calochortus clavatus var. avius](#)
3. [county=El Dorado; collector=Helmkamp](#)
4. [collector=Helmkamp; taxon=Calochortus clavatus var. avius](#)
5. [collector=Helmkamp; number=17951](#)

The Jepson Flora Project

- A major flora project spearheaded by the Jepson Herbarium, with ca. 300 authors.
- *The Jepson Manual 2nd ed. (print)* and *Jepson eFlora* both published in 2012.
- Reciprocal relationship between JFP knowledge and CCH data.



ucjeps.berkeley.edu/IJM.html

Jepson eFlora: Taxon page
Key to families | Table of families and genera

Indexes to all accepted names and synonyms (old interface):
A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z |

Calochortus striatus
ALKALI MARIPOSA LILY

Higher Taxonomy

Family: Liliaceae	Description	Dichotomous Key
Genus: Calochortus	Description	Dichotomous Key

Calochortus striatus Parish

NATIVE
Stem: 1--5 cm. **Leaf:** basal 10--20 cm, generally withering; cauline 1--2, 6--8 cm. **Inflorescence:** +- umbel-like; flowers 1--5, erect; bracts 1--3 cm, linear. **Flower:** perianth bell-shaped, base narrowed; sepals 10--20 mm, lanceolate; petals 20--30 mm, obovate to wedge-shaped, irregularly toothed above, white to lavender, purple-veined, sparsely hairy near nectary, nectary not depressed, oblong, densely simple-hairy; filaments 5--7 mm, +- dilated below, anthers 4--6 mm, oblong, lilac, purple. **Fruit:** erect, 4--5 cm, linear, angled. **Seed:** flat, light +- yellow or tan, net-like.
Ecology: Alkaline meadows, moist creosote bush scrub. **Elevation:** 800--1400 m. **Bioregional Distribution:** s SNF, w DMOj. **Distribution Outside California:** western Nevada. **Flowering Time:** Apr--Jun **Note:** Threatened by grazing, urbanization.
eFlora Treatment Author: Peggy L. Fiedler
Jepson Online Interchange
Listed on CNPS Rare Plant Inventory

List of species

Previous taxon: Calochortus splendens
Next taxon: Calochortus superbus

Name Search Submit Name

Contact/Feedback

Citation for this treatment: Peggy L. Fiedler 2014. *Calochortus striatus*, in Jepson Flora Project (eds.) *Jepson eFlora*, http://ucjeps.berkeley.edu/cgi-bin/get_IJM.pl?tid=16761, accessed on September 14, 2015.
Citation for the whole project: Jepson Flora Project (eds.) 2014. *Jepson eFlora*, <http://ucjeps.berkeley.edu/IJM.html>, accessed on September 14, 2015.

Calochortus striatus

© 2013 Neal Kramer

Calochortus striatus

© 2013 Neal Kramer

Calochortus striatus

© 2005 Thomas M. Elder, M.D.

Calochortus striatus

© 2010 James M. Andre

Calochortus striatus

© 2005 Thomas M. Elder, M.D.

Calochortus striatus

© 2010 James M. Andre

More photos of *Calochortus striatus* in CalPhotos

Geographic subdivisions for *Calochortus striatus*:
s SNF, w DMOj;

California Floristic Province
Sierra Nevada Foothills
Desert Province
Desert Mountains
Pojave Desert (exc DMtrns)

(Note: any qualifiers in the taxon distribution description, such as 'northern', 'southern', 'adjacent', etc., are not reflected in the map above, and in some cases indication of a taxon in a subdivision is based on a single collection or author-verified occurrence).

View elevation by latitude chart

Markers link to CCH specimen records. If the markers are obscured, reload the page [or change window size and reload]. Yellow markers indicate records that may provide evidence for eFlora range revision or may have georeferencing or identification issues.
READ ABOUT YELLOW FLAGS

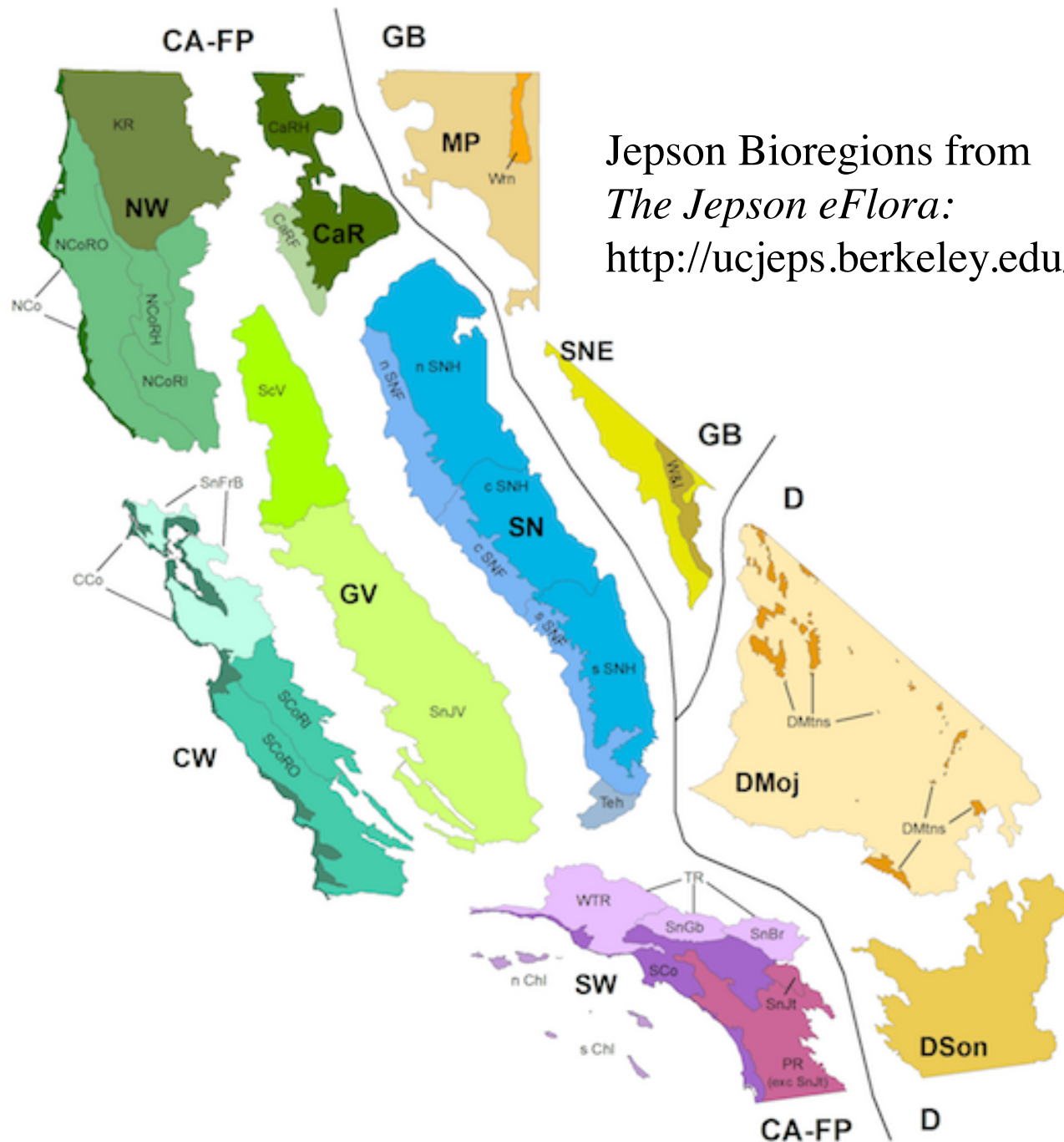
Map data ©2015 Google, (NEGI) Terms of Use Report a map error

Data provided by the participants of the Consortium of California Herbaria.
View all CCH records

CCH collections by month

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	0	0	0	0	0	0	0	0	0	0

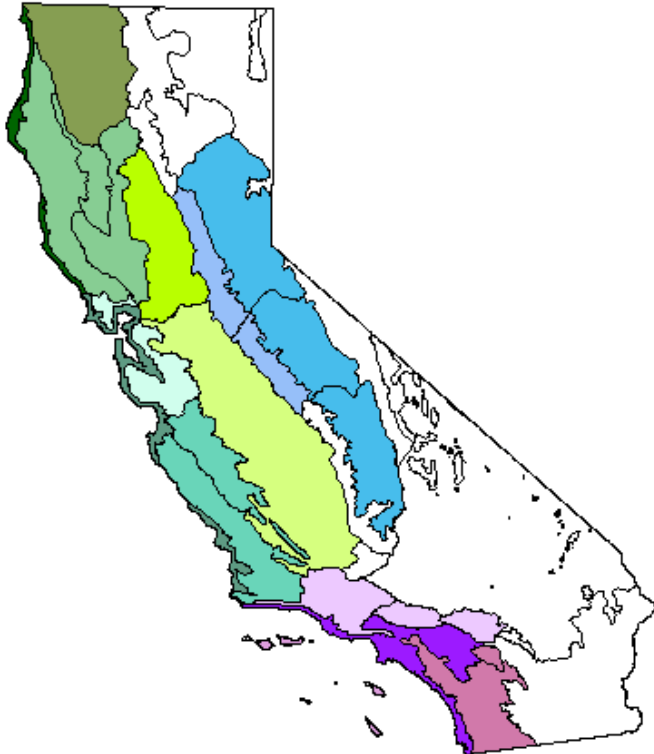
Duplicates counted since: synonyms included.
Species do not include records of infraspecific taxa.
Blue line denotes eFlora flowering time.



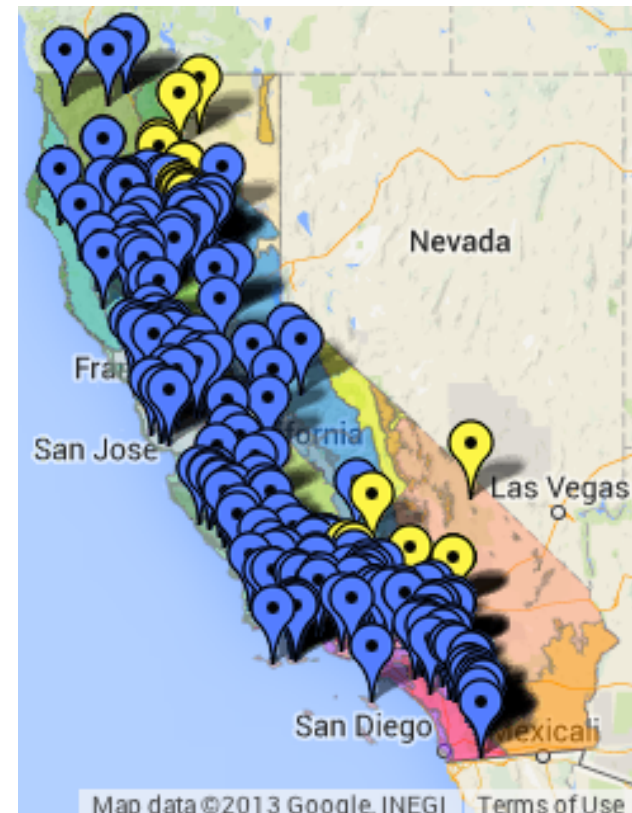
Jepson Bioregions from
The Jepson eFlora:
<http://ucjeps.berkeley.edu/eflora/>

Comparing Geographic Assertions

- Jepson “distribution strings”



CA range of *Stellaria nitens* as represented in the Jepson eFlora



CCH records determined as *S. nitens*, those outside range colored yellow



Curating CCH Data

- 120,000 yellow flags (7% of georeferenced records)
- False positives:
 - Incomplete eFlora representation
 - Sharp boundaries
- Other errors
 - Georeferencing errors
 - Misidentified specimens
 - Nomenclatural issues
- Actual range extensions

Xylococcus bicolor

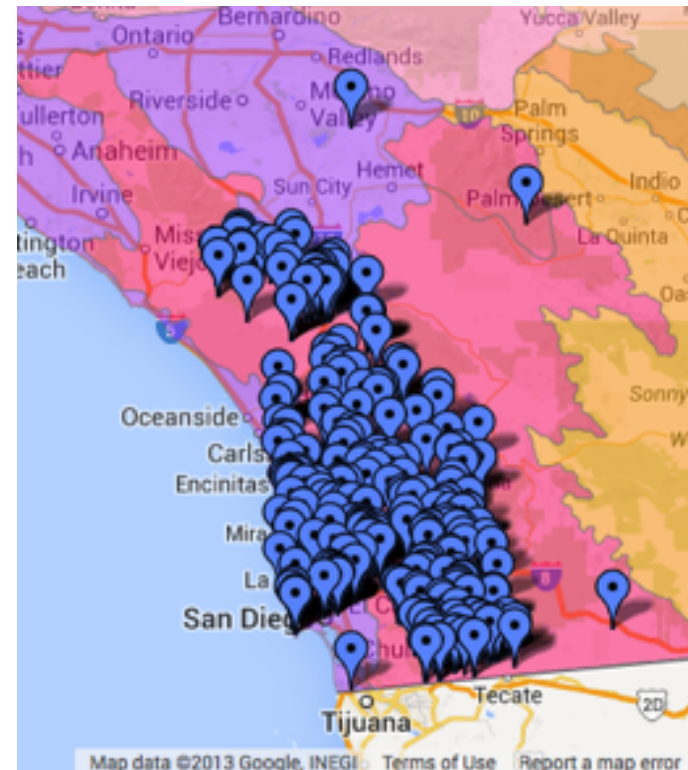
- Jepson “distribution strings”



©1995 Saint Mary's College



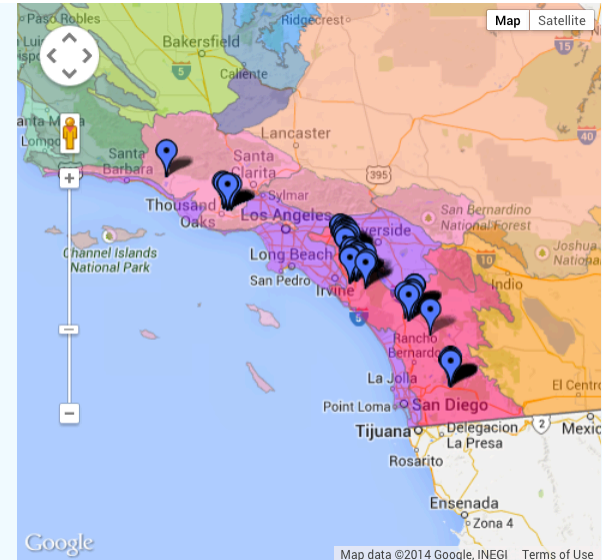
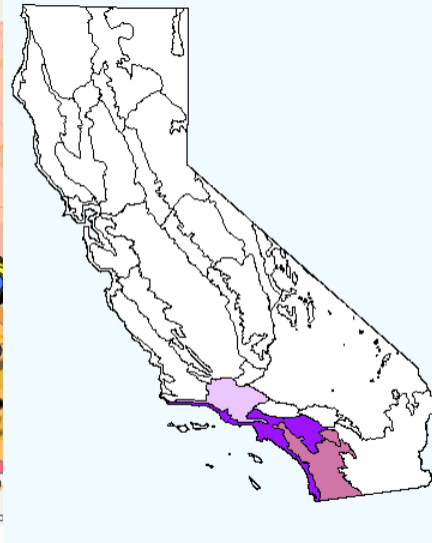
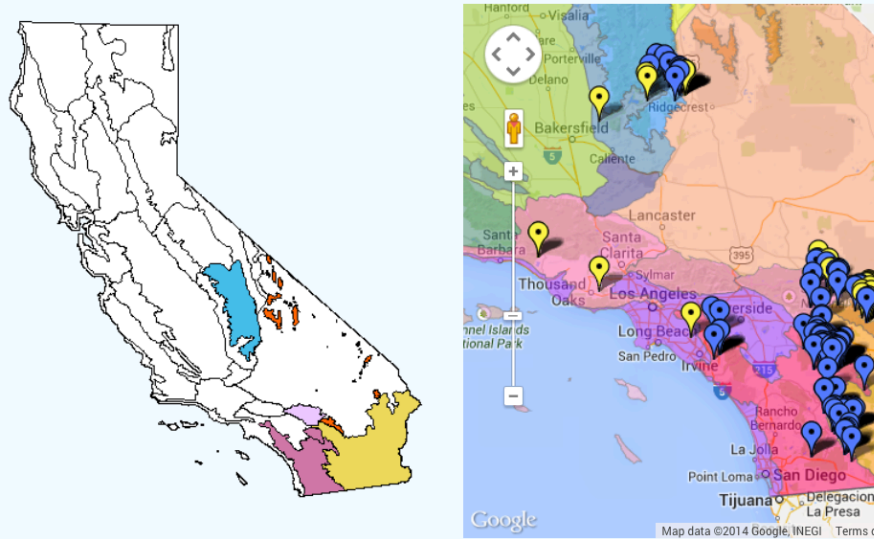
Original eFlora statement had *X. bicolor* restricted to SCo



Confirmed with *Xylococcus* author that *X. bicolor* also occurs in PR

Nolina parryi

cf. *Nolina cismontana*

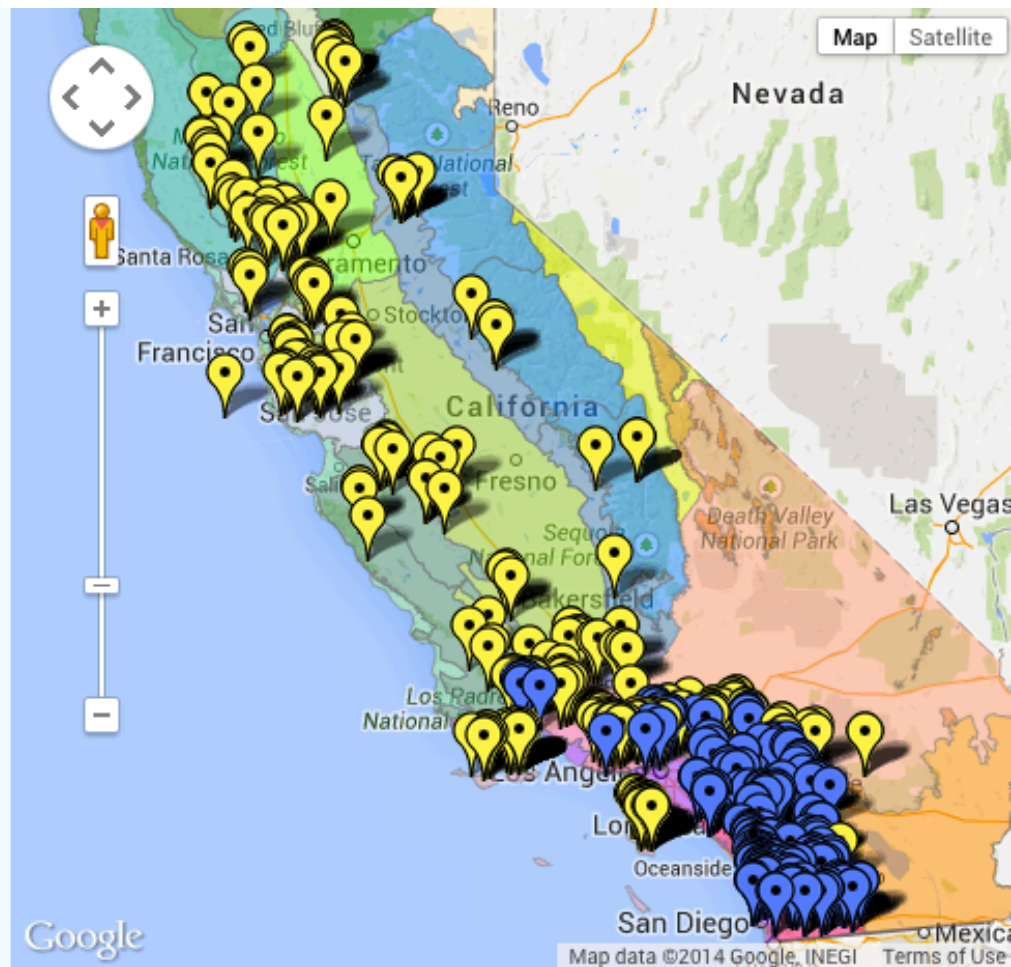
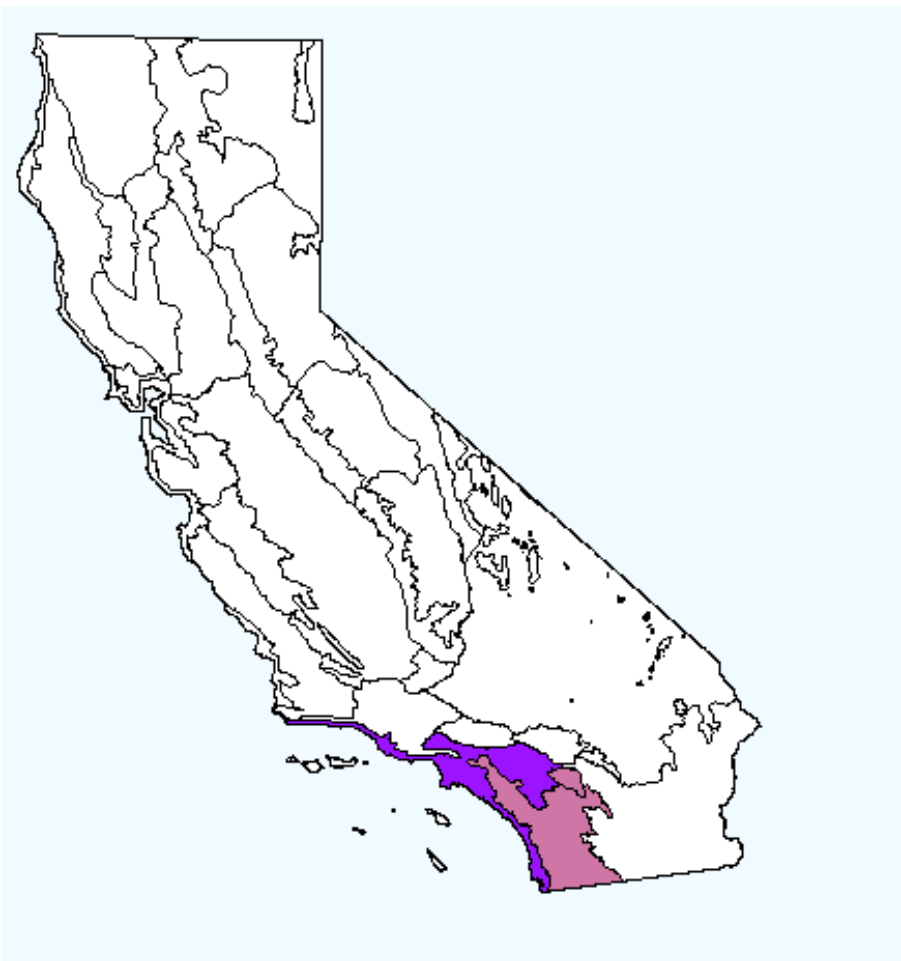


©2007 Neal Kramer

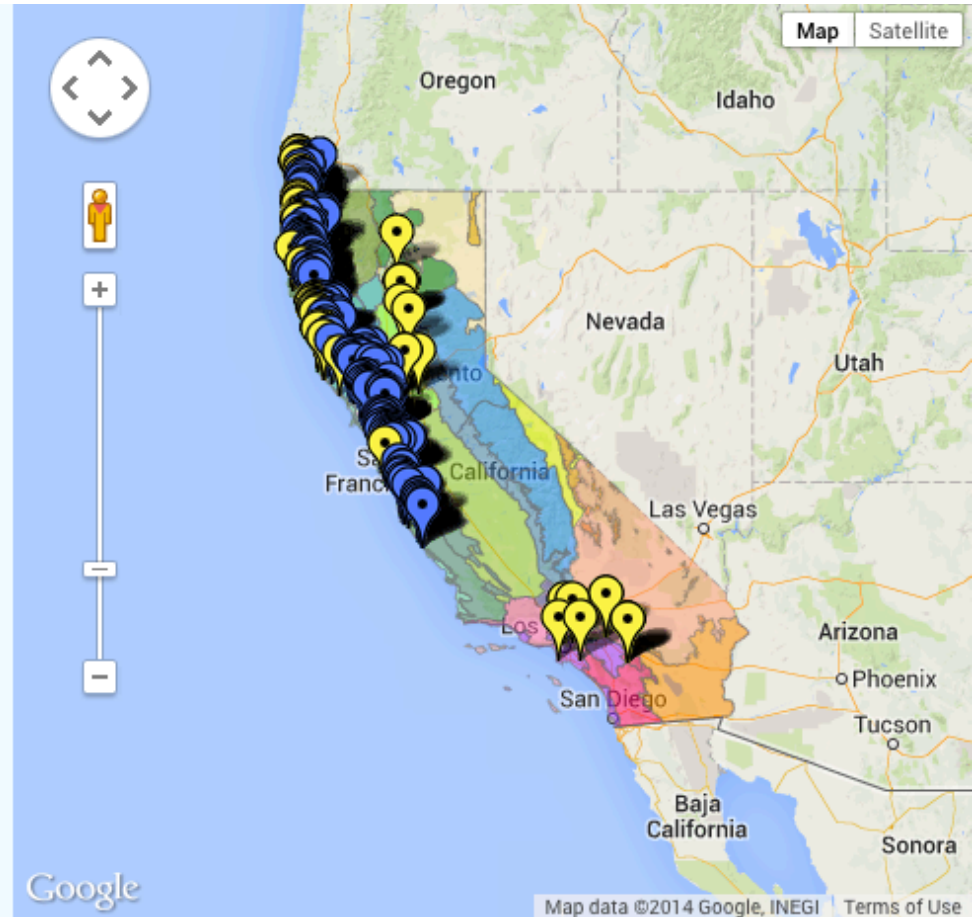
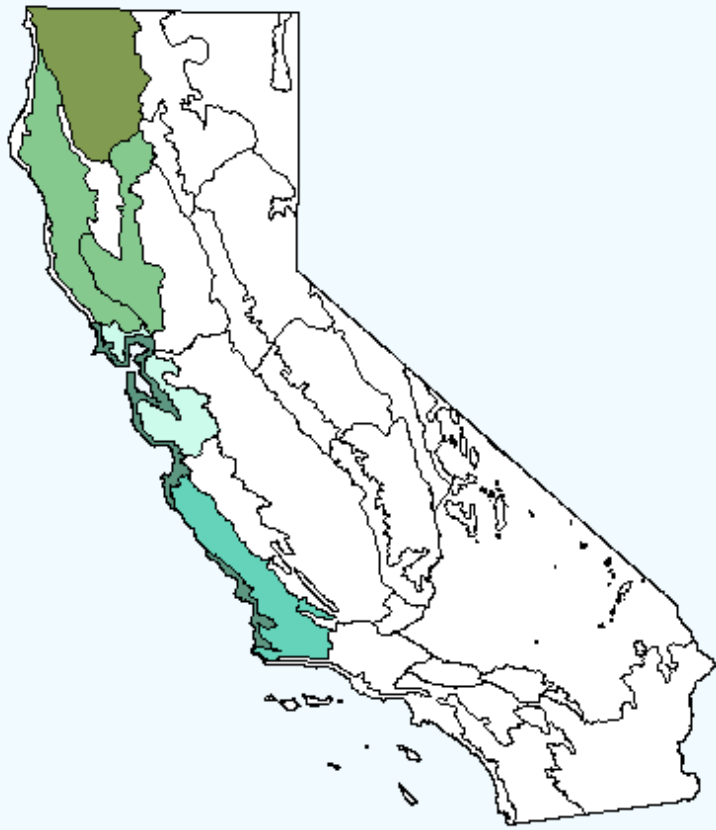


©2005 Santa Monica Mountains
National Recreation Area

Quercus dumosa



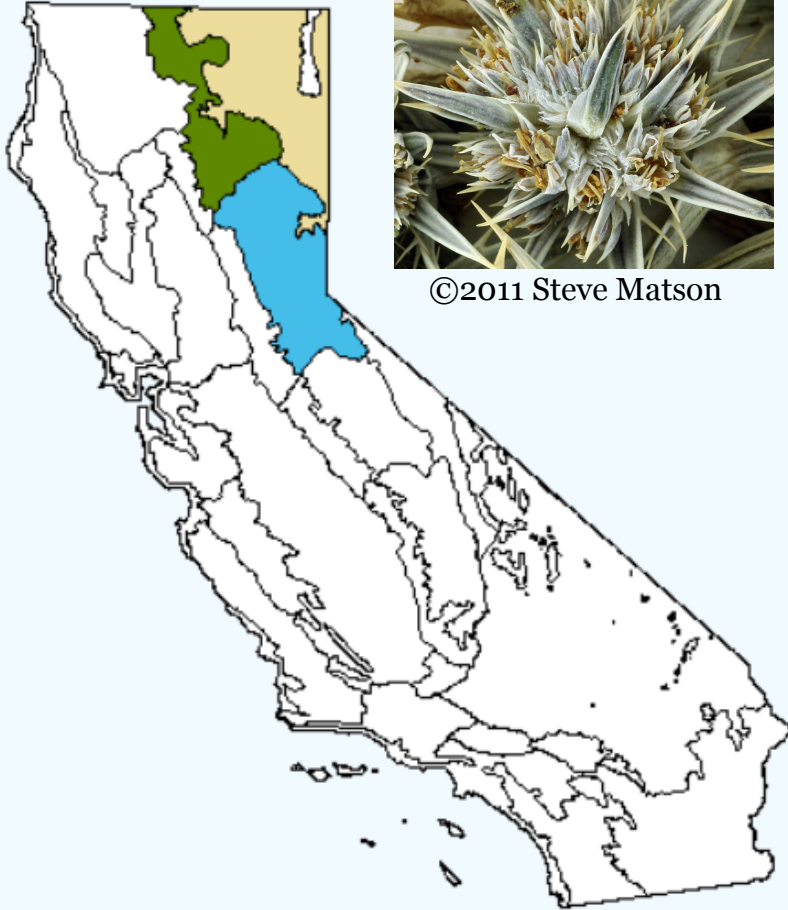
Sequoia sempervirens



Eryngium alismifolium



©2011 Steve Matson

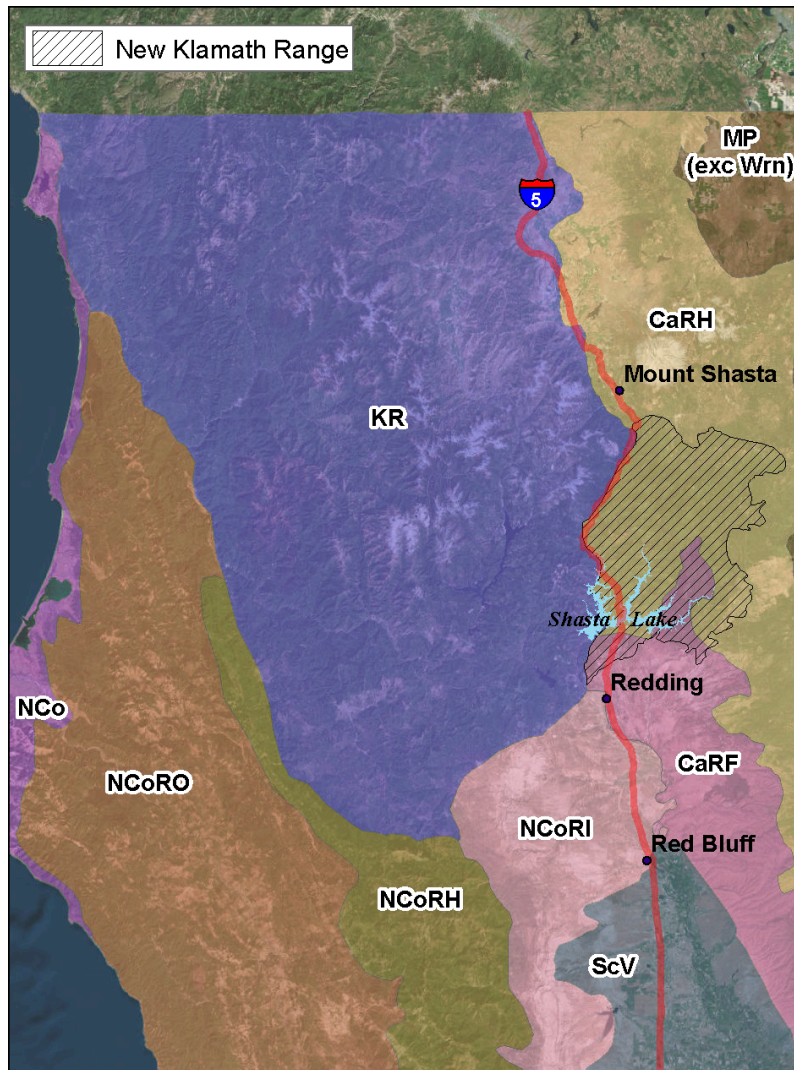


Introducing... Purple Flags:

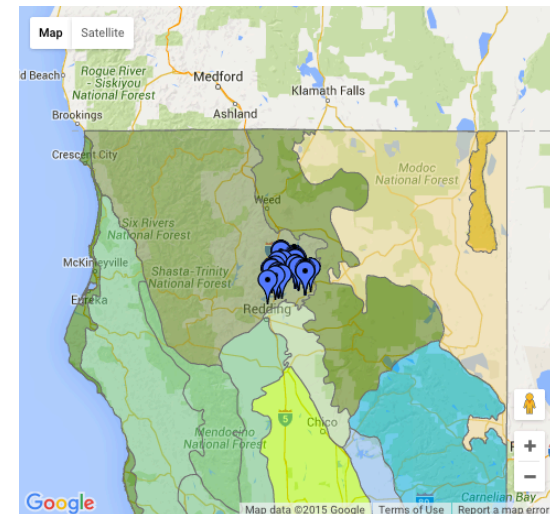
- Specimens collected from cultivation
- Specimens of native plants naturalized outside native ranges



Interactions with the community



©1993 Dean Wm. Taylor



Neviusia cliftonii

The many uses of collections databases:

- Important practical applications, taking advantage of temporal aspects of collection data:
 - Climate change modeling
 - Spatial ecology / mapping historical habitats and landscapes
 - Tracking the introduction of pathogens and invasive species
 - Phenology estimates through time
- Floristics / faunistics:
 - Identification of under-collected areas (targeted exploration) and other collection biases (e.g., timing taxon emphasis)
 - Production of floras, identification tools
- Systematics:
 - Discovery of previously undescribed taxa in the collections
 - Raw material for anatomical and DNA studies
- Ecology and evolution:
 - Reconstructing assembly of communities
 - Biogeography, diversification studies, bioregionalization
 - Assessing biodiversity using new phylogenetic approaches

Studies Using CCH Records (over 120 since 2007)

OPEN ACCESS Freely available online



Climate Change and the Future of California's Endemic Flora

Scott R. Loarie^{1*}, Benjamin E. Carter^{2,4,5}, Katharine Hayhoe³, Sean McMahon¹, Richard Moe⁴, Charles A. Knight², David D. Ackerly^{4,5}

1 Nicholas School of the Environment & Earth Sciences, Duke University, Durham, North Carolina, United States of America, **2** Department of Biological Sciences, California Polytechnic State University San Luis Obispo, San Luis Obispo, California, United States of America, **3** Department of Geosciences, Texas Tech University, Lubbock, Texas, United States of America, **4** Jepson Herbarium, University of California Berkeley, Berkeley, California, United States of America, **5** Department of Integrative Biology, University of California Berkeley, Berkeley, California, United States of America

 **Global Change Biology**

[Explore this journal >](#)

Primary Research Article

Climate change and the invasion of California by grasses

Brody Sandel , Emily M. Dangremond

2176–2188

 ORIGINAL ARTICLE

Modelling the distribution of a threatened habitat: the California sage scrub

Erin C. Riordan* and Philip W. Rundel

ucjeps.berkeley.edu/consortium/citations/

Herbarium data used to project the effects of climate change

Climate Change and the Future of California's Endemic Flora.

Scott Loarie, Benjamin E. Carter, Katharine Hayhoe, Sean McMahon, Richard Moe, Charles A. Knight, and David D. Ackerly. PLoS ONE (2008)



Blue Oak *Quercus douglasii*

Current Range

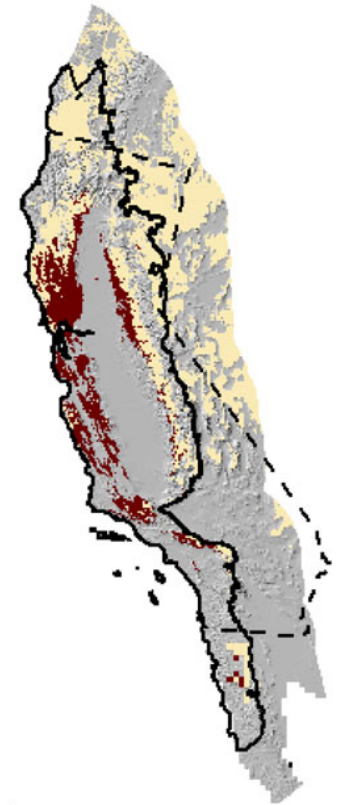
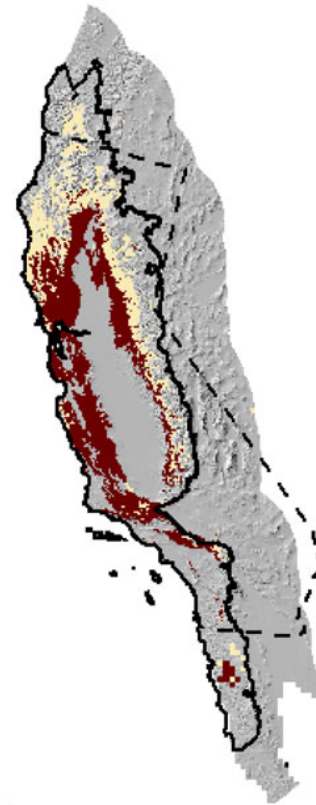
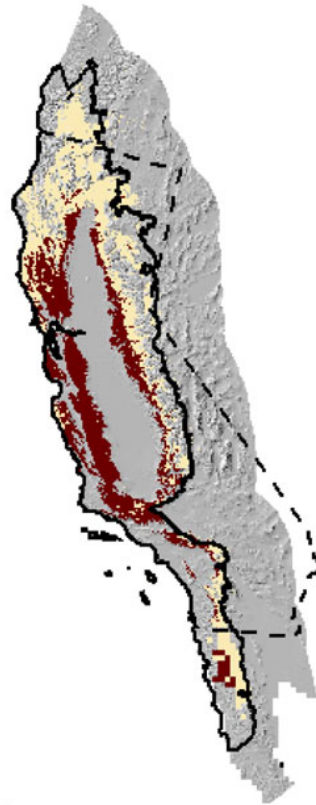
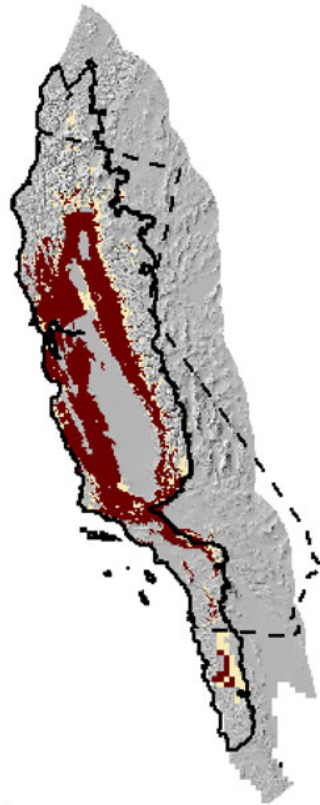
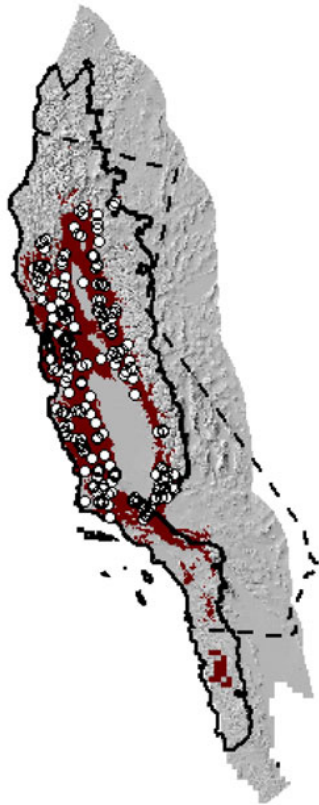
Future Range

Less sensitive simulation
Lower emissions

Less sensitive simulation
Higher emissions

More sensitive simulation
Lower emissions

More sensitive simulation
Higher emissions



■ Current range ○ Herbarium specimens

■ Future range

■ Future range (pending dispersal)

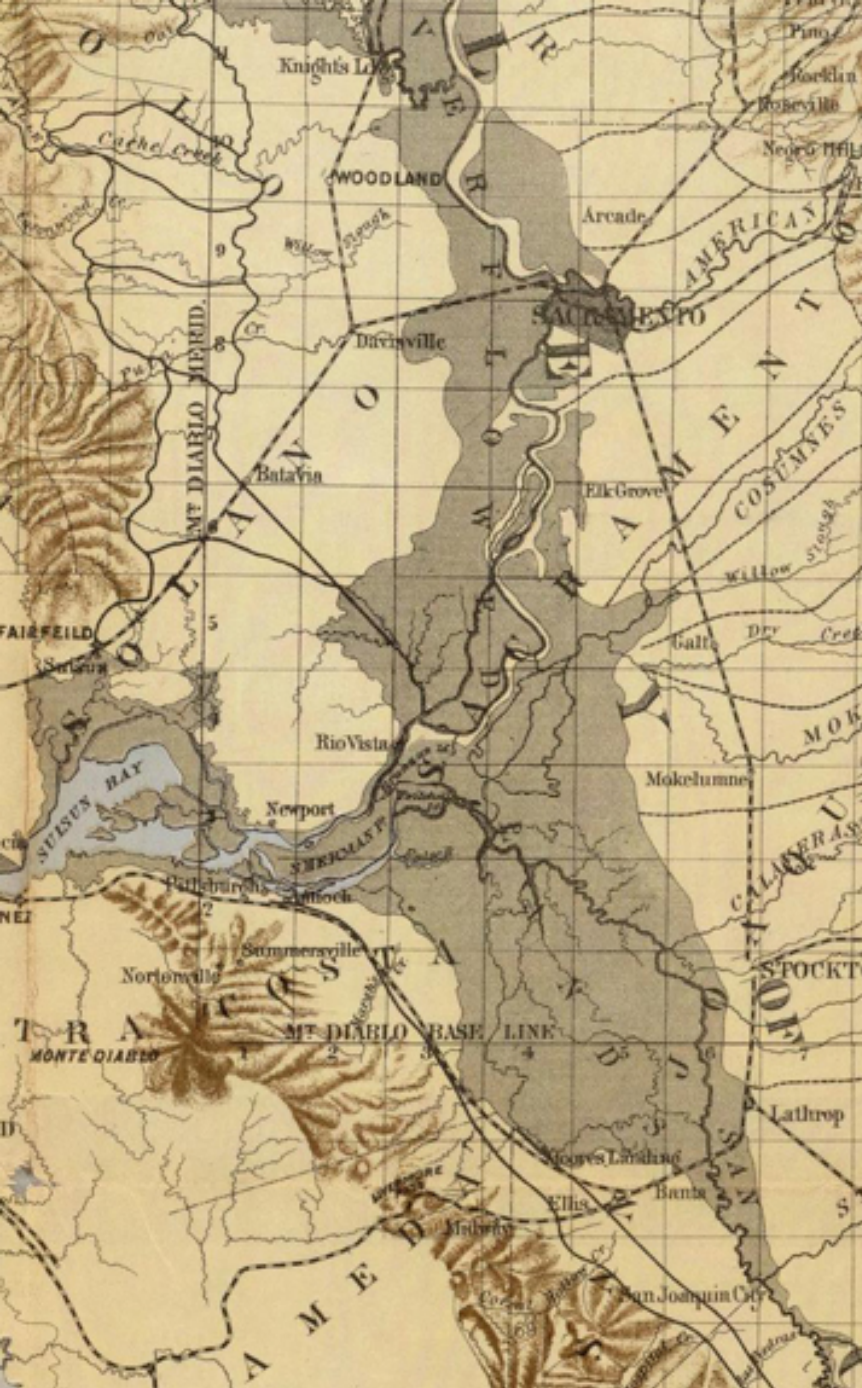
New application of specimen data

Charting the month of peak collection

Arctostaphylos densiflora		Jan 1	Feb 6	Mar 45	Apr 4	May 3	Jun 1	Jul 1	Aug 3	Sep	Oct 6	Nov 3	Dec 3	n=76
Leptosiphon croceus		Jan	Feb	Mar	Apr 4	May 7	Jun 2	Jul	Aug	Sep	Oct	Nov	Dec	n=13
Streptanthus batrachopus		Jan	Feb	Mar	Apr 1	May 5	Jun 9	Jul 2	Aug 2	Sep	Oct	Nov	Dec	n=19
Carex tiogana		Jan	Feb	Mar	Apr	May	Jun	Jul 4	Aug 2	Sep 1	Oct	Nov	Dec	n=7
Deinandra minthornii		Jan	Feb	Mar 1	Apr	May 1	Jun	Jul 3	Aug 2	Sep 1	Oct 12	Nov 4	Dec	n=24

Specimens grouped by month of collection. Blue line indicates flowering time from the second edition of *The Jepson Manual*










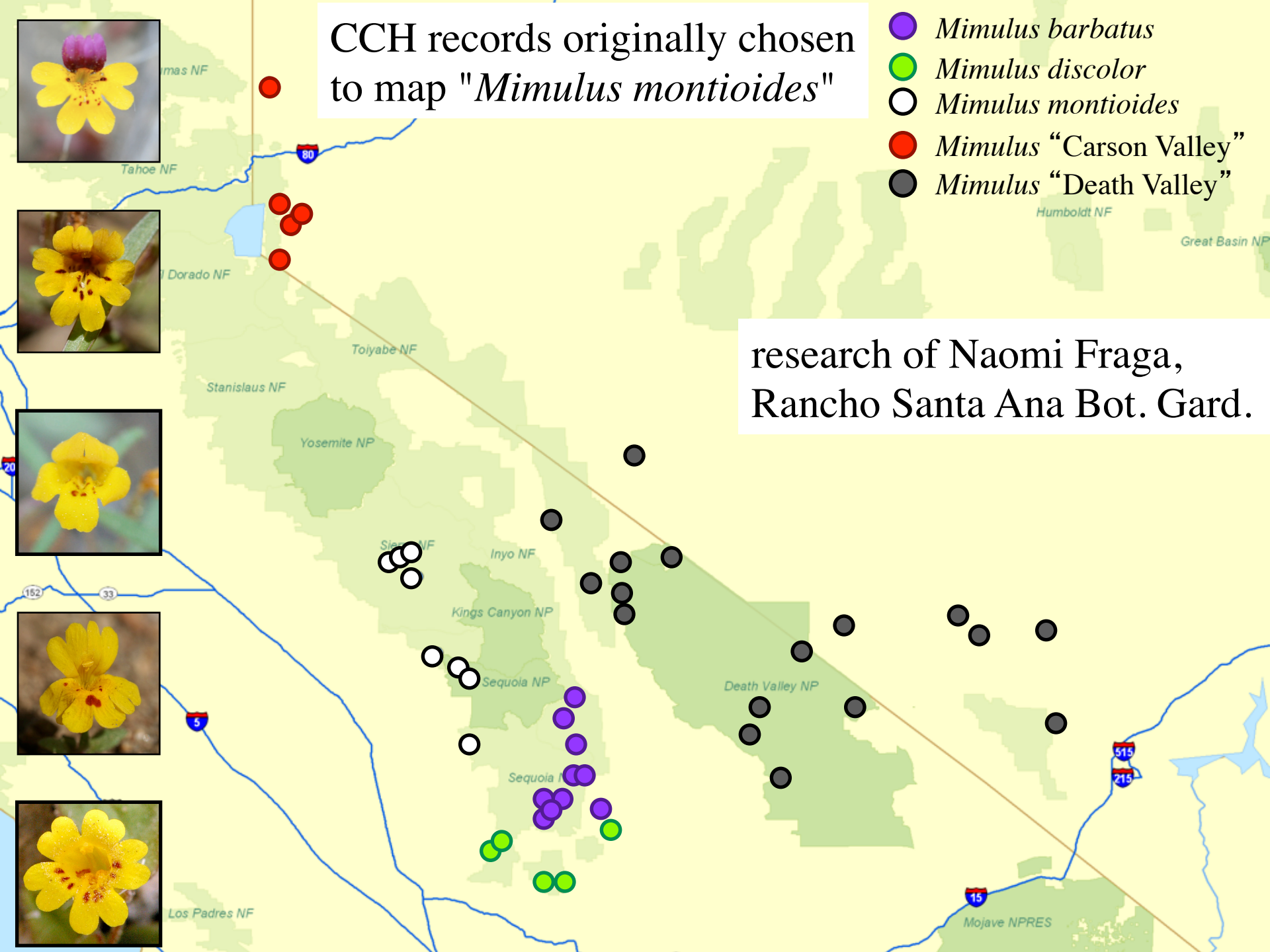
Historical ecology study of the Sacramento-San Joaquin Delta

- Specimen data are being used to help develop a clear understanding of what the Delta looked like and how it functioned ecologically and hydrogeomorphically prior to significant Euro-American modification.

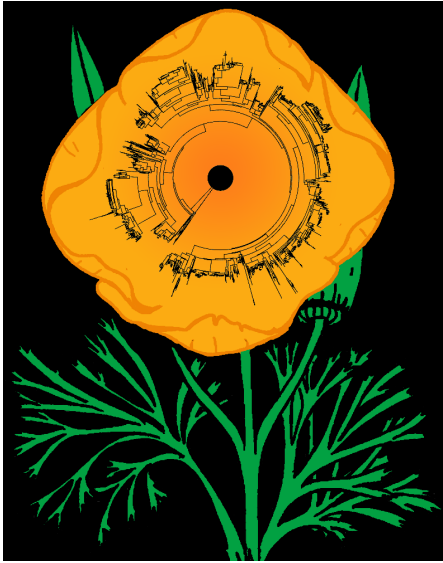
CCH records originally chosen
to map "*Mimulus montioides*"

-  *Mimulus barbatus*
-  *Mimulus discolor*
-  *Mimulus montioides*
-  *Mimulus* "Carson Valley"
-  *Mimulus* "Death Valley"

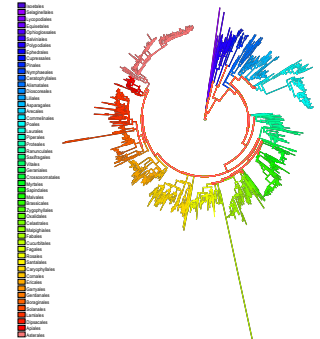
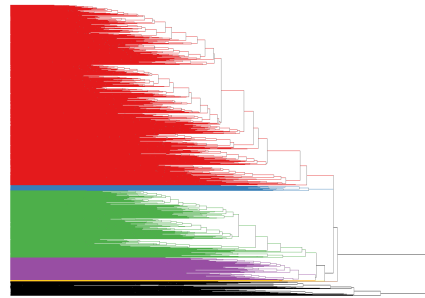
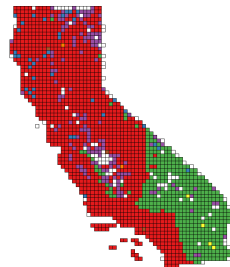
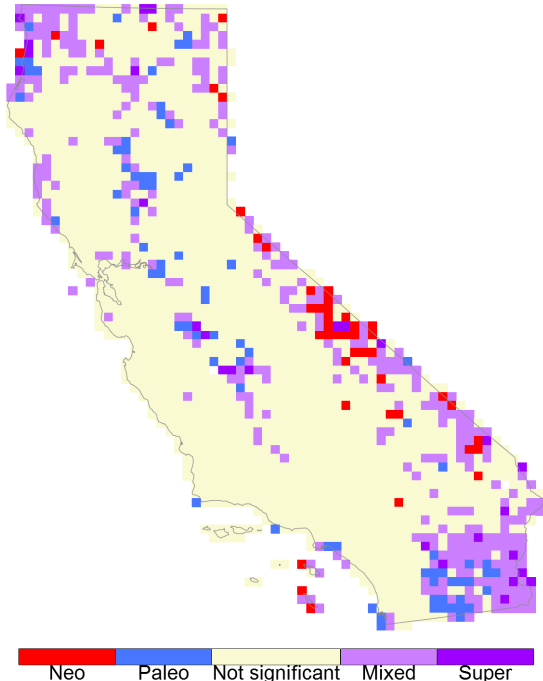
research of Naomi Fraga,
Rancho Santa Ana Bot. Gard.



The California Plant Phylodiversity Project

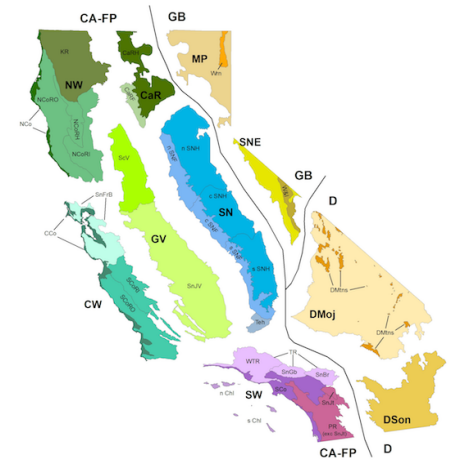


- Build a phylogeny of California's vascular plants using Genbank + new sequences.
- Assemble a clean spatial data set based on herbarium specimens (CCH).
- Phylogenetically re-assess patterns of richness, endemism and turnover on the landscape.
- Study biogeography, ecology, and evolution of California plants.
- Use the results to inform conservation.
- Integrate the phylogeny into the *Jepson eFlora*.



Improving value and useability of CCH Data and its interactions with the Jepson Flora Project

- Current efforts:
 - Investigating and resolving yellow flags
 - Metadata requirements for georeferences
 - Revising Jepson regions
 - Collaborative comment interface
 - Filtered eFlora keys specific to subregions of CA
- Future directions:
 - Other filters/flags for specimen data allowing users to know what data they are getting.
 - Phylogeny-based searching/browsing of both the landscape of CA and the eFlora.





Conclusions I

- In the complex biodiversity IT ecosystem, a portal project at a given geographic scale needs a carefully thought-out niche to justify its existence.
- The value of regional consortia, as compared to continental or global consortia, is that the former can be more highly curated and standardized.
- A close interaction between portal project staff and users including researchers is needed.
- There are important synergistic interactions between a flora project and a specimen portal having the same spatial and taxonomic scope. E.g., the yellow flag interplay between CCH and the JFP.



Conclusions II

- Specimens are becoming ever more valuable as time goes on – there is a diverse array of applications of specimen data to date but there should be many more -- so continue to be creative in the use of specimen databases.
- Increasing use of phylogenies to link specimen data to the landscape in novel ways.
- Increasing development of better web-based tools, including for citizen science.
- But, also continue to support physical museum specimens!
 - New, targeted collections with high quality metadata are vital.
 - Support for physical curation – use is increasing because of online data exposure -- a good thing, but institutional budgets are declining across the board.
 - We need more programs that train taxonomists and naturalists at all levels.

CCH Acknowledgements

Funding:

- California Digital Library; initial funding (2003–2006)
- National Science Foundation; planning meeting (2006)
- USDA Forest Service; georeferencing (2006 & 2007: Tehama, Trinity, Shasta, and Siskiyou counties)
- Andrew W. Mellon Foundation; digitization of type specimens (2008–2013)
- Global Biodiversity Information Facility; georeferencing records of non-native specimens (2008–2009)
- Institute of Museum and Library Services (Museums for America program); databasing and georeferencing historical specimens collected in San Diego County (2005–2009).
- National Science Foundation; databasing, georeferencing, and technical support (2010–2014), with an additional supplement in 2012

People:

David Baxter

Staci Markos

Bruce Baldwin

Dick Moe

