

Biodiversity Partners in Informatics: Natural History Museums and Field Stations

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Becca Fenwick, UC Natural Reserve System;
Rosemary Gillespie, Essig Museum of Entomology;
Joyce Gross, Berkeley Natural History Museums;
Charles Marshall, Museum of Paleontology



Longterm

Biodiversity Partners in Informatics:

Longterm, in two meanings:

- historically, organizations founded on average 100 years ago
- our future is dependent on commitment to collaborations and partnerships necessary for research and sustainability

Longterm repositories
for natural history data
needed for research to
understand change and
predict the future



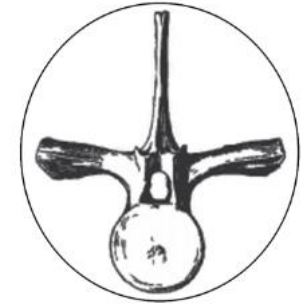
Wieslander Vegetation Map
Project (VTM)



Natural Reserve System
Field Station Data



Calphotos



VertNet



University and Jepson
Herbaria



University Museum of
Paleontology



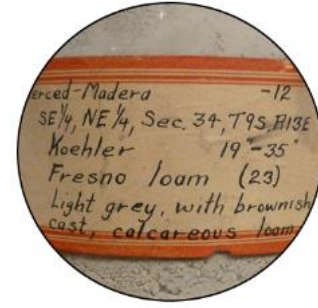
Essig Museum of
Entomology



Museum of Vertebrate Zoology



Pollen Core Data



Soil Database



Natural Reserve System
Environmental Sensor Array



Climate Data

Challenge

Making high-quality natural history data accessible in easy to use portals without programming.

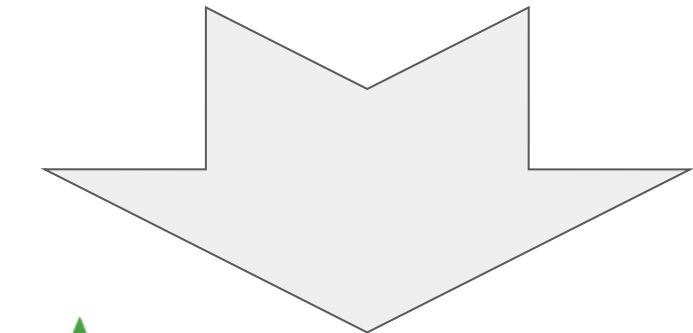




Berkeley Natural History Museums:

Observational Datasets: Georeferenced specimens

- o Vertebrates: >700,000 specimens (100% digitized)
- o Plants: 2.2 million specimens (~18%)
- o Fossils: 6.5 million specimens (<5%)
- o Insects: 6.5 million specimens (<2.5%)



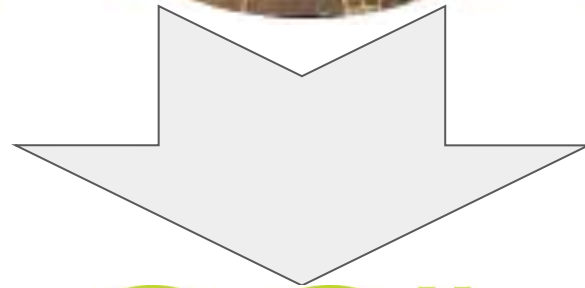
938M observational records
so far!



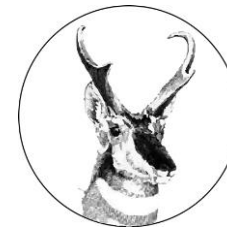
Berkeley Natural History Museums:

Observational Datasets: Natural History Images

CalPhotos - over 600,000 images

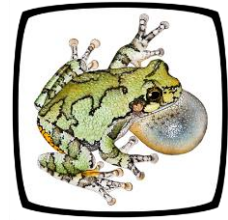


Encyclopedia of Life



American Society of
Mammalogy
Diversity Database

Society for the Study
of Amphibians and
Reptiles Taxonomy
Database



ETC



Weislander Vegetation Type Mapping (1920-30's)



1928

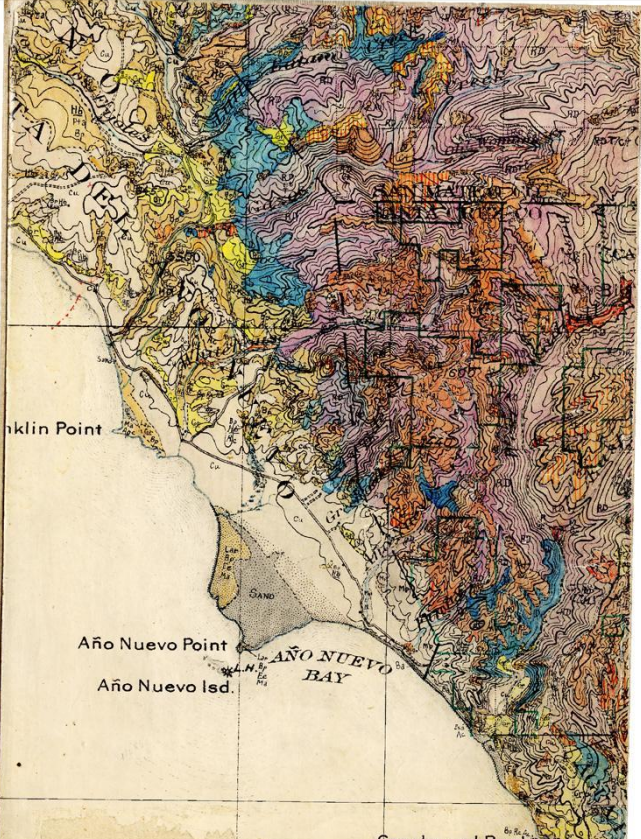


2008

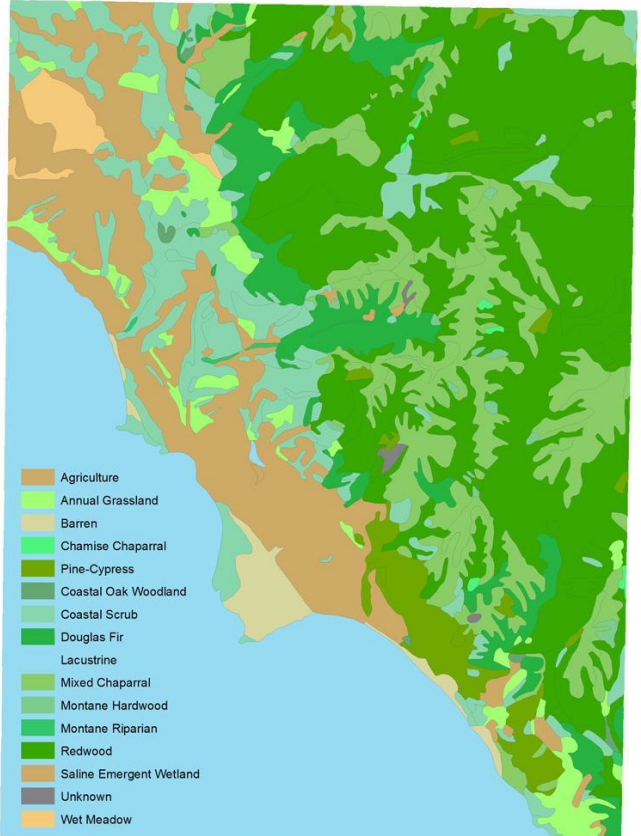


Weislander Vegetation Type Mapping (1920-30's)

Hand drawn
veg cover on
15" topoquads

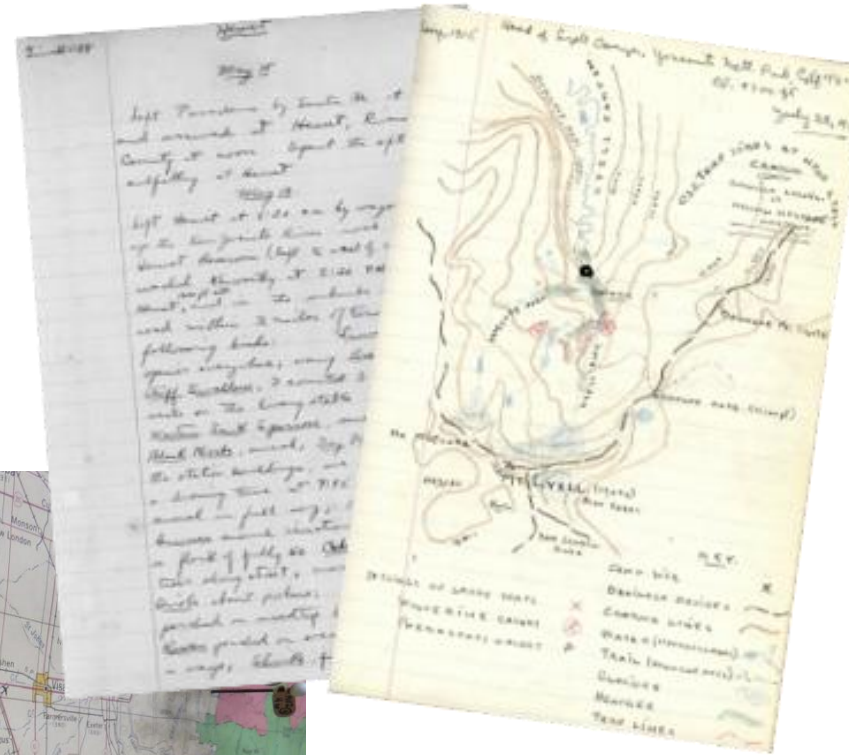


Digitized GIS
layer





Berkeley Natural History Museums: Archives



Personal Papers

- Field notes
- Manuscripts
- Faculty papers
- Photographs

Museum Records

Annotated maps

Pictorial media

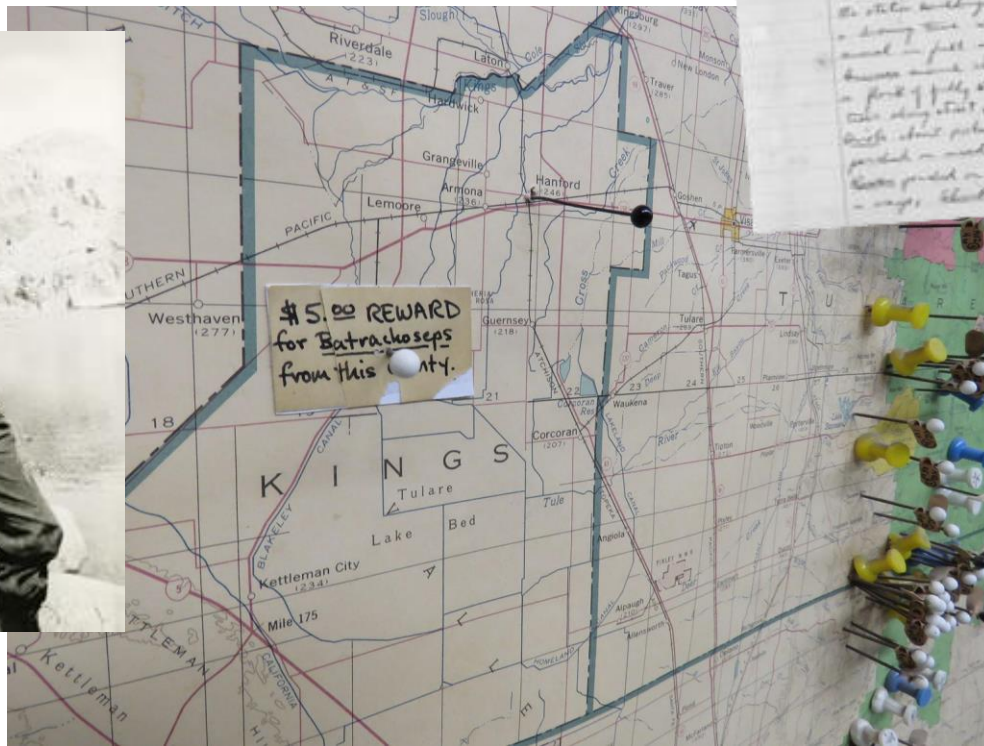
- Prints
- Negatives
- 35mm slides
- Glass plate negatives
- Lantern slides
- Moving film

Correspondence

Rare books

Fine Art

Born digital content





Field Stations: Living laboratories

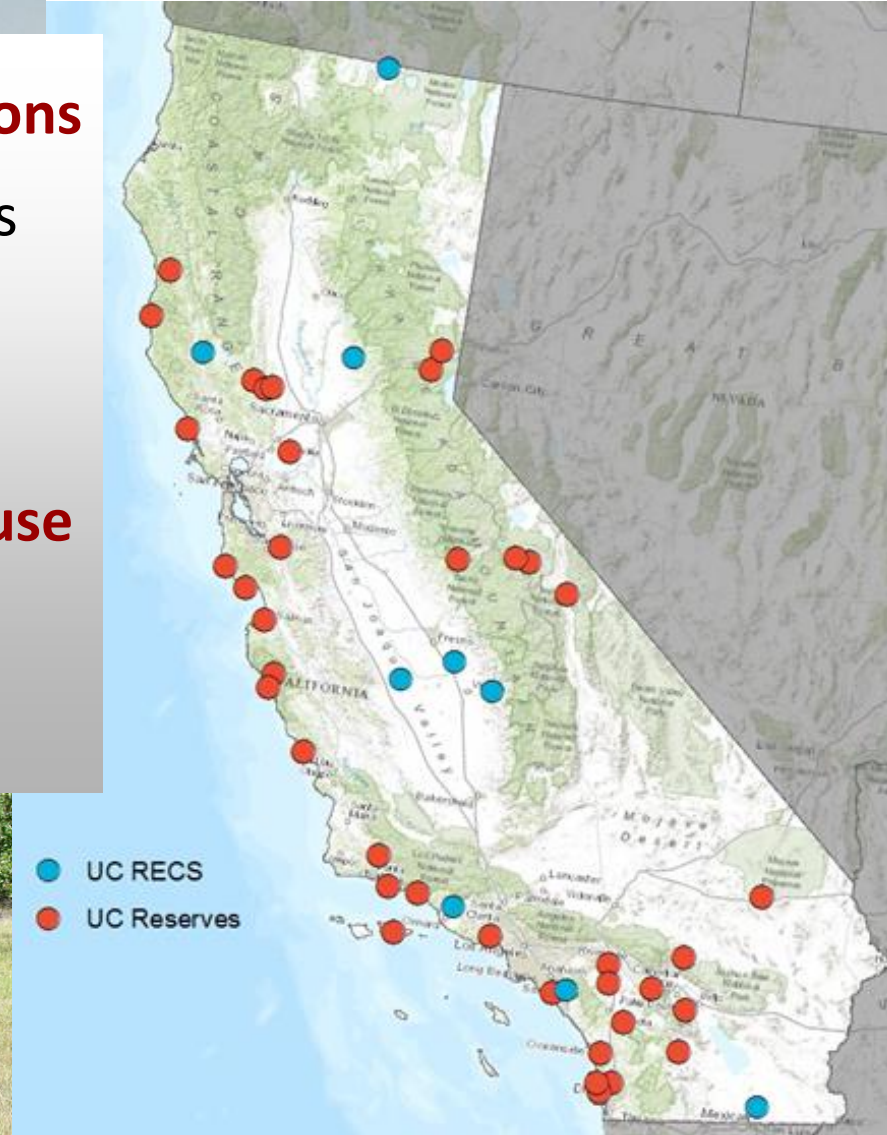


Over 100 years of observations

- o Field/ experimental notes
- o Photos
- o Species Lists

New technology clearinghouse

- o UAV imagery
- o Sensor arrays



Solutions

Using flexible, modern tools and languages, build easy to use portals that *integrate* datasets.

BNHM Technical Ecosystem



calphotos



Source Data

Field Note Images

Research Data

CalPhotos

Sensor Data

Climate / GIS Layers

Specimen DBs

Observation Data

Checklists

Parks Boundaries

Aggregation Tools



EcoEngine

Dendra

CalAdapt

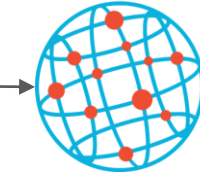
GBIF API



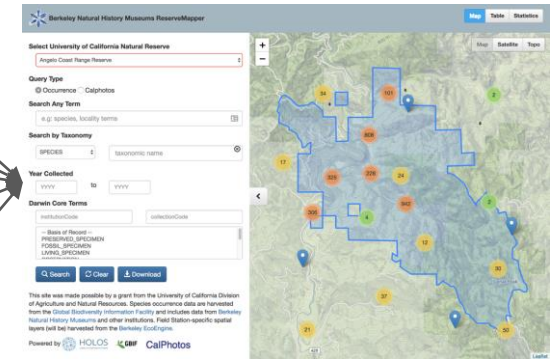
California Protected Areas



Interfaces



HOLOS
BERKELEY ECOINFORMATICS ENGINE



Reservemapper

DEMOS

ReserveMapper

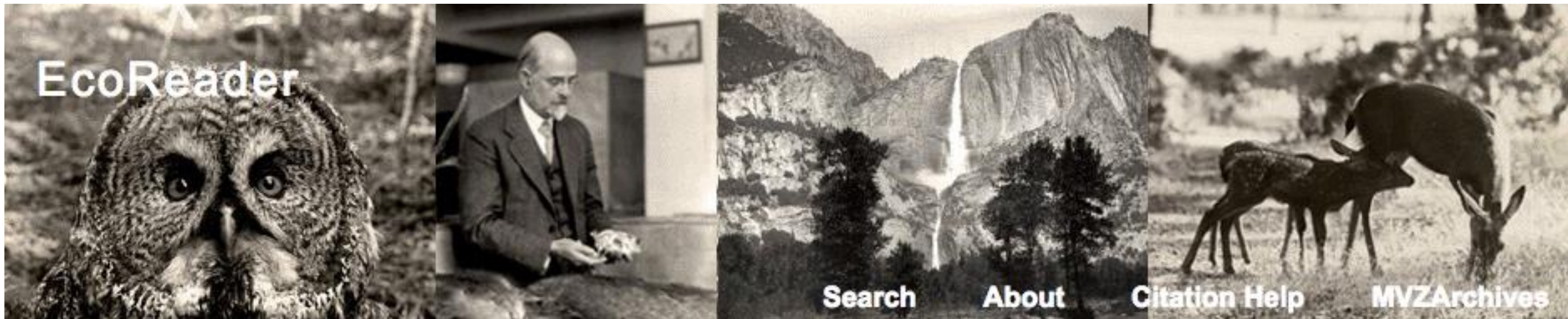
(<https://reservemapper.berkeley.edu/>)

EcoReader


(<http://ecoreader.berkeley.edu/>)

EcoReader (<http://ecoreader.berkeley.edu/>)

- Search and read fieldnotes online
- “Metadata Object Description” files generated from Archivist Toolkit to populate dropdown query interfaces
- Supports Geographic searches
- Dynamic link to hosted digitized field note pages
- Created modular system to support multiple installations.



EcoReader -- Search and Read Field Notes Online



Author Name

Year From

Geographic

Section Title

Field Notes:

Section 0: Gen...

Section 1: Sou...

Section 2: Alas...

Section 3: Hawaiian Islands 1910 [\[view section\]](#)

Section 4: Vancouver Island, British Columbia [\[view section\]](#)

ARCHIVE 1910 Dec. 1 Cordoba Island Co., Cal. 126

Dec. 1 Cordoba Island Co., Cal.

1097 ♀ 147-52-12 *Peromyscus gambeli*
1098 ♀ 148-44-22 *Microtus*
1099 ♀ 151-76-15 *Peromyscus*
1100 ♂ 152-42-22 *Microtus*

Sat and 21 traps in Salicornia near Spring
Cove about 10 miles. Caught some *Peromyscus*
gambeli for all. Red winged black birds
very abundant in Salicornia. Thought
I took a boat down the slough towards
evening the black bird congregating on
tules near Spring Cove. I saw several
females and immatures? Song Sparrows
were very common near Spring Cove. Yellow
Warblers and Wrens in the pasture near
Spring Cove. flocks of Lark and robins

Dec. 2

Sat and 31 traps in Salicornia - caught
Peromyscus gambeli
Microtus and *Peromyscus*. *Microtus* was all.

1101 ♂ 152-42-22
1102 ♀ 159-58-15 *Peromyscus gambeli*
1103 ♂ 159-58-15
1104 ♀ 162-55-15
1105 ♂ 160-53-15

Download Image

Link to Image

click in center of image to enlarge

Go To Page:

< < > >

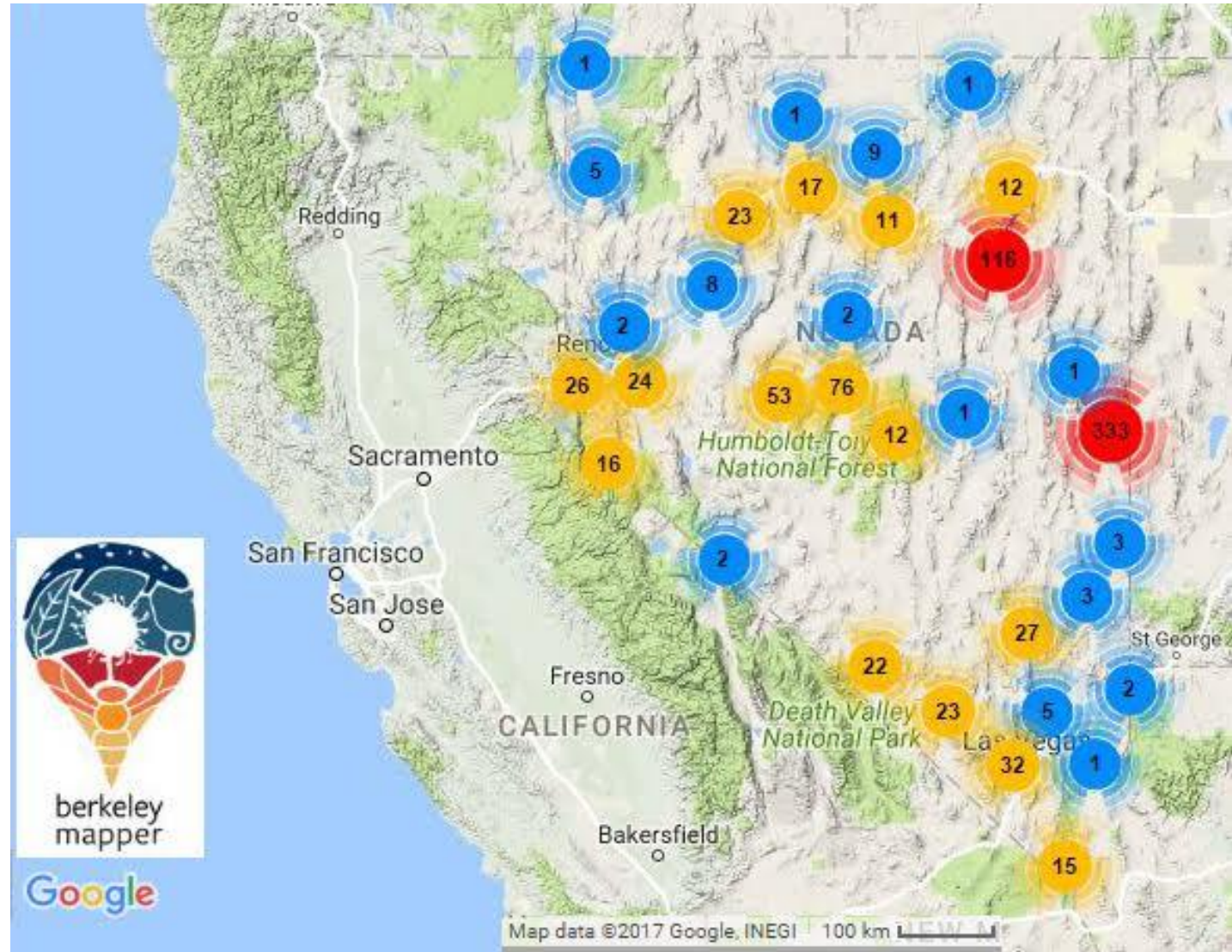
MVZArchives

page: 2

BerkeleyMapper

- Embedded in:

AmphibiaWeb, Arctos (MVZ), CSPACE (UCJEPS/PAHMA), Consortium of California Herbaria, UCMP, Essig Museum of Entomology



ReserveMapper - Mapping by Reserves

<https://reservemapper.berkeley.edu/>

Easy to use API viewer
and data discovery tool

Berkeley Natural History Museums ReserveMapper

Map Table Statistics

Select University of California Natural Reserve
Angelo Coast Range Reserve

Query Type
 Occurrence Calphotos

Search Any Term
e.g. species, locality terms

Search by Taxonomy
SPECIES taxonomic name

Year Collected
YYYY to YYYY

Darwin Core Terms
institutionCode collectionCode
-- Basis of Record --
PRESERVED_SPECIMEN
FOSSIL_SPECIMEN
LIVING_SPECIMEN
OBSERVATION

Search Clear Download

This site was made possible by a grant from the University of California Division of Agriculture and Natural Resources. Species occurrence data are harvested from the [Global Biodiversity Information Facility](#) and includes data from [Berkeley Natural History Museums](#) and other institutions. Field Station-specific spatial layers (will be) harvested from the [Berkeley EcoEngine](#).

Powered by HOLOS GBIF CalPhotos

Mapping by National Parks

result set is limited to 15000, narrow your search to view all results

Berkeley Natural History Museums ReserveMapper

Map Table Statistics

Select United States National Park
Yosemite N P

Query Type
 Occurrence Calphotos

Search Any Term
e.g. species, locality terms

Search by Taxonomy
KINGDOM Animalia
Animalia

Year Collected
YYYY to YYYY

Darwin Core Terms
institutionCode collectionCode
FOSSIL_SPECIMEN
LIVING_SPECIMEN
OBSERVATION
HUMAN_OBSERVATION
MACHINE_OBSERVATION

Search Clear Download

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Powered by HOLOS GBIF CalPhotos

Map Satellite Topo

Map

Statistics on Results



Select University of California Natural Reserve

Angelo Coast Range Reserve

Query Type

Occurrence Calphotos

Search Any Term

e.g: species, locality terms

Search by Taxonomy

SPECIES

taxonomic name

Year Collected

YYYY

to

YYYY

Darwin Core Terms

institutionCode

collectionCode

-- Basis of Record --
PRESERVED_SPECIMEN
FOSSIL_SPECIMEN
LIVING_SPECIMEN
OBSERVATION

Search

Clear

Download

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Total results included = 3247

Group and Count by:

Collection

BasisofRecord

Year

Kingdom

Phylum

Species

Locality

count institutionCode:collectionCode

1474 EMEC:EMEC

444 CAS:HERP

230 CLO:EBIRD

181 HSC:VascularPlants

116 USDA-ARS:BBSL

112 UC:VascularPlants

54 iNaturalist:Observations

48 CLO:EBIRD_PNW

41 MVZ:Amphibian and reptile specimens

36 McGill University:LEMQ

32 UCD:VascularPlants

31 CAS:ENT

27 RSA:VascularPlants

Mapping CalPhotos




Berkeley Natural History Museums ReserveMapper

Select United States National Park
Yosemite N P

Query Type
 Occurrence Calphotos

Search

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Powered by  HOLOS  GBIF  CalPhotos

Map Table Statistics

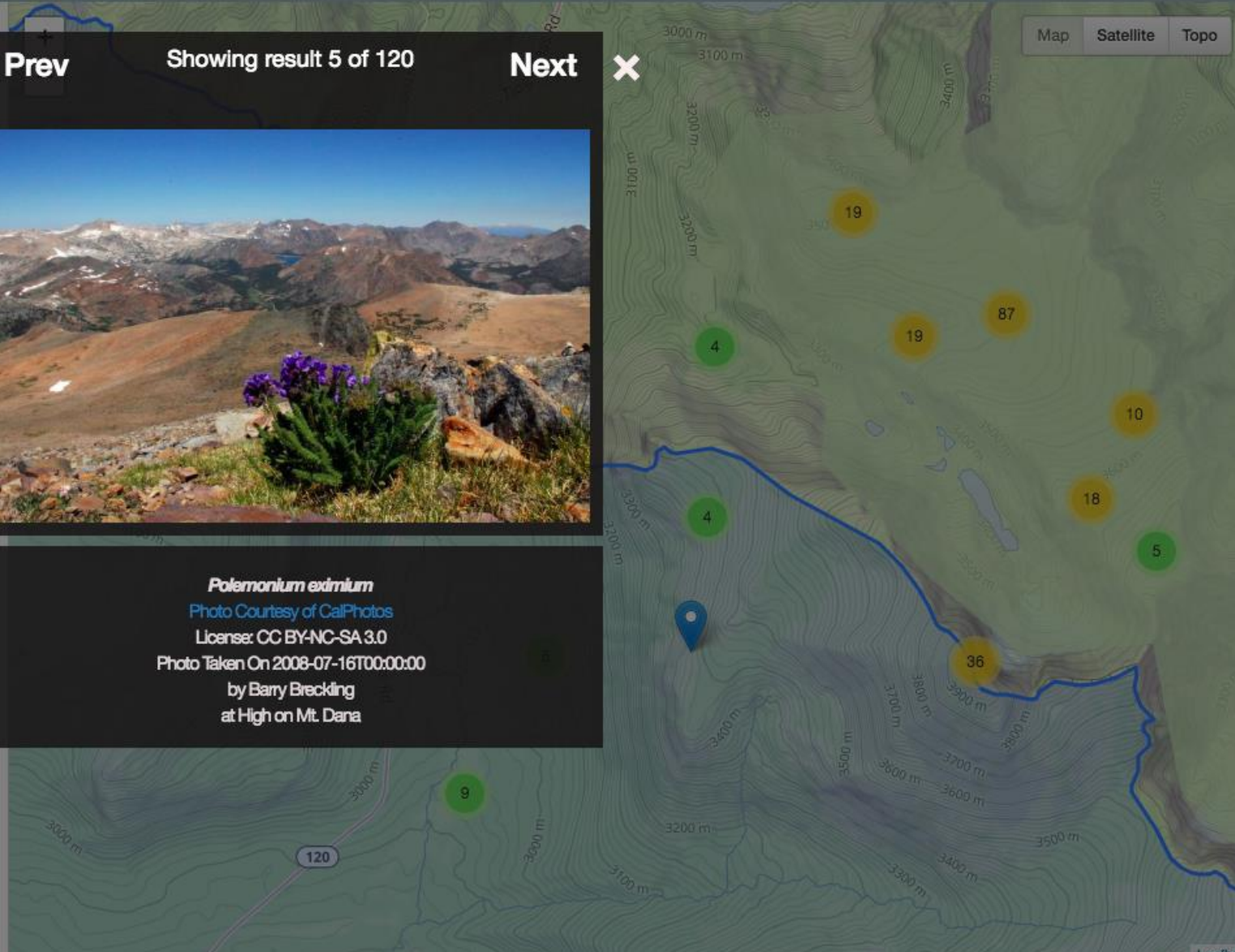
Map Satellite Topo

Showing result 5 of 120

Prev Next X



Polemonium eximium
Photo Courtesy of CalPhotos
License: CC BY-NC-SA 3.0
Photo Taken On 2008-07-16T00:00:00
by Barry Breckling
at High on Mt. Dana



Leaflet

Thanks to the Berkeley Natural History Museums IT Committee

Chair of Directors, Charles Marshall

Jason Alexander, UC & Jepson Herbaria

Michael Black, Hearst Museum of Anthropology

Carla Cicero, Museum of Vertebrate Zoology

Patricia Holroyd, Museum of Paleontology

Holly Forbes, UC Botanical Garden

Peter Oboyski, Essig Museum of Entomology