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Development of An Invasive Species Information System  
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Final Report: June 2001

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Environmental Science Policy and Management

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16. Abstract This work addressed augmenting an existing online plant information system, The CalFlora Database (www.calflora.org), to better serve information needs related to invasive species. We addressed four areas: 1) increasing photo and data holdings available through CalFlora's online library, 2) developing infrastructure for online contribution of new species occurrence data, 3) developing a data processing module to facilitate standardization of location data, and 4) improving usability of online interface for Caltrans users. We added of 53,321 occurrence records for exotic and invasive species, obtained nomenclature data on all exotic taxa now known to be naturalized in California, and digitized and databased 1100 weed photos. We created online input forms for data and photo contribution and contributor registration, and wrote a program that derives standard UTM, latitude-longitude, and postmile from incoming data in diverse formats.			
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and others



# Development of An Invasive Species Information System

## Table of Contents

<b>Disclosure</b>	<b>ii</b>
<b>Disclaimer</b>	<b>ii</b>
<b>Acknowledgements</b>	<b>iii</b>
<b>Introduction</b>	<b>1</b>
<b>Achievements</b>	
<b>1. Expand Data and Photo Holdings</b>	<b>3</b>
<b>Data Holdings</b>	<b>3</b>
<b>Data Sharing Relationships</b>	<b>4</b>
<b>Photo Holdings</b>	<b>6</b>
<b>2. Construct Online Input Forms</b>	<b>7</b>
<b>3. Develop Data Processing Module</b>	<b>9</b>
<b>4. Caltrans/CalFlora Interface</b>	<b>10</b>
<b>Caltrans User Feedback</b>	<b>10</b>
<b>Caltrans Query and Reporting Forms</b>	<b>11</b>
<b>Presentation to Caltrans Users</b>	<b>11</b>
<b>Figure</b>	<b>12</b>
Figure 1. Distribution data example: <i>Carduus pycnocephalus</i>	
Figure 2. Photos for <i>Carduus tenuiflorus</i>	
Figure 3. Photo annotation form, full annotation display	
Figure 4. Reviewer registration form	
Figure 5a. and 5b. Online data contribution form	
Figure 6. Arcview display of CalFlora distribution	
<b>Appendix A</b>	<b>A-1</b>
CalFlora - Plant Information Online (information <i>sheet</i> for Caltrans, internal distribution)	



**Final Report to Caltrans  
Development of An Invasive Species Information System  
Contract Number 65A0092  
June 30, 2001**

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Environmental Science Policy and Management

Ann Dennis, Ph. D., and Tony Morosco, The CalFlora Database

**Background**

Invasive species present a rapidly changing picture. Adequate analysis as recommended by the Federal Highway Administration requires access to good, current information on the distribution of both exotic species of concern and native species vulnerable to their impacts. Rapid detection and response to invasive species greatly reduces the need for herbicide use, critical to meeting Caltrans goals for reduction pesticide use.

CalFlora, provides online access to information on all native and non-cultivated exotic vascular plant species of California. Through CalFlora, users have access to libraries of photographs and specific occurrence data from federal and state agencies, academic institutions, private organizations, and individuals. Cal Flora makes these data available in forms convenient for a range of applications. Caltrans biologists, planners, and other staff already make extensive use of CalFlora's online system so far this year (through May 2001) Caltrans users have made 11,500 database queries.

The purpose of the work performed here was to expand functions and resources of the existing CalFlora system to serve the need for rapid exchange of information about invasive plants. These improvements are intended to serve the needs of Caltrans for planning, analysis, and management related to invasive species, as well as serving the needs of other agencies and the general public who also use CalFlora and cooperate with Caltrans in weed control efforts.

Online services and collaboration on technical developments were provided by the UC Berkeley Digital Library Project, a National Science Foundation-funded research group in the UCB Division of Computer Science. The CalPhotos collection, online repository for the photo resources developed under this contract, is managed by the UCB Digital Library Project.

**Project Overview**

Work focused in three areas: expanding data and photo holdings of the existing CalFlora system, creating software and implementing a system for online data input, and

developing software for extracting standardized location data from original data in diverse formats. This work was a pilot project for development of online data input functions that would facilitate data input from other agencies, thus increasing the library of data available to Caltrans users. Our specific objectives were as follows.

Develop a pilot project to:

1. Expand data and photo holdings on invasive species and other exotics to include major datasets currently maintained by public agencies and additional datasets to be identified through research contacts.
2. Construct online data input forms and mechanisms designed to receive data from Caltrans right-of-way inventories and related projects.
3. Develop a data processing module for extracting variable-format location data from occurrence records and computing standard georeference coordinates and precision estimates, including conversion to and from special location systems used by Caltrans.
4. Expand the existing Caltrans/CalFlora interface to provide information on exotic species in a manner tailored to needs of Caltrans employees.

## ACHIEVEMENTS

**1. Expand Data and Photo Holdings Data Holdings** At the beginning of the project period, the CalFlora system included 43,468 occurrence observations of exotic species, on the whole far fewer per species than for natives. Work under this contract was intended to improve representation of invasives and other exotics in our system by identifying new data sources and assisting their owners in preparing datasets for inclusion in CalFlora. An additional work plan objective in this area was to seek nomenclature data on exotic species recently discovered in California and additional synonyms for taxa previously known.

For this project, we made contact with the major land management agencies and the agencies and organizations involved in weed research or control in California. We conducted interviews to discover extent and nature of weed photo and data holdings, and made informational presentations to publicize our project and solicit additional leads on data sources. We have now established data exchange relationships with six major institutional entities that are likely to be producing weed information in the future, and have brought most of the major existing weed datasets into our data acquisition streams. We added 53,321 occurrence records for exotic and invasive species, obtained nomenclature data on all exotic taxa now known to be naturalized in California, and expanded our historical nomenclature data.

While bringing existing datasets into CalFlora is important, we count our major achievements in terms of new relationships formed that will produce data over years to come and that will bring new participants into a circle of open data exchange. Searches conducted under this project confirm that this view is particularly apt for weed data weed occurrence data resources are, on the whole, not well developed at present. In the past, weed related efforts have generally been focused on direct control activities rather than surveys and monitoring, the latter being the primary source of occurrence data. New weed control funding initiatives and awareness of the need for strategic allocation of effort holds promise for increased data gathering in the next few years. Most of the new weed data we added during the contract period came to us from general floristic datasets, not weed-focused sources.

### Data Acquisition Steps

1. Identify potential contributor
2. Develop mutual understanding of data-related activities, motivations, and institutional constraints; identify or develop specific mutual objectives
3. Acquire sample data set, and show contributor how their data would be prepared for and presented in the CalFlora system

4. Answer contributors questions about policy and technical matters, help contributor become comfortable with open data sharing concept
5. Wait for contributor to consult with other concerned parties
6. Develop data sharing agreement
7. Acquire full dataset, prepare and document, show results to contributor
8. Get contributors, go-ahead to incorporate prepared dataset into online system

### **Data Sharing Relationships**

#### **California Department of Food and Agriculture (CDFA)**

We find that CDFA is owner of by far the most extensive existing sets of weed occurrence data (see also report on photos below). CDFA also takes a lead role in interagency data collection efforts, and consequently provides a gateway to additional data resources. Through CDFA, we obtained 9,865 observation records from the Sierra Nevada Cooperative Yellow Star Thistle Mapping and Assessment Project, now ready for incorporation in CalFlora. We also obtained an expanded and updated version of the CDFA herbarium specimen database, as well as a new dataset of containing occurrence reports of A and B rated weeds submitted to CDFA by state and county staff over the last century (8,043 records).

Through CDFA Senior Plant Taxonomist Fred Hrusa, we obtained a listing of all exotic species found new to California since publication of the Jepson Marmal. The information has been provided to us in database form with the fields needed for creating CalFlora taxon and synonymy table entries for these taxa. The authors of this list; Fred Hrusa, Andy Sanders, and Barbara Ertter, have given LIS permission to make these data available online following journal publication of this material. Dr. Hrusa also provided additions and corrections to our synonym, database, including expanded synonymy for exotic species.

CDFA has various modes of involvement with the growing network of locally-based Weed Management Areas, including providing training to WMA's for occurrence mapping. CDFA has agreed to include submitting data to CalFlora as part of the protocol they will teach. We made a presentation at the Annual Statewide Weed Management Area Meeting in October 2000, explaining how to use CalFlora's weed information resources and contribute data, and extending our request for photo review and leads on existing weed datasets. We reached an audience of 94 people directly involved in weed management in 47 counties.

#### **Bureau of Land Management (BLM)**

We initiated contact and developed a major relationship with BLM, bringing them in as collaborators on this project. BLM has become a formal CalFlora

cooperator, and has agreed to make their plant photos and occurrence data available through CalFlora. They have provided a staff biologist to discover weed-rich occurrence datasets in BLM field units and prepare them for inclusion in CalFlora. At present, BLM does not have any centralized holdings of plant occurrence data or photos. BLM does, however, manage a significant portion of California's wildlands. Their inventory and management activities do generate data suitable for inclusion in CalFlora, data that currently reside in dispersed repositories. In our judgment, the relationship and activities initiated through this project will produce valuable results for CalFlora users over years to come.

### **US Forest Service**

CalFlora was initially developed as a project of the Forest Service's Pacific Southwest Research Station, and has for a number of years been a repository for several Forest Service plant occurrence datasets. We did a thorough investigation to discover data not previously included that would be rich in weed occurrences. We found that, except for participation in an interagency yellow star thistle project (described under CDFA above) weed occurrence data is not currently collected or aggregated in a systematic manner, though plans exist for increasing weed monitoring efforts in the future. The Forest Service is an established collaborator in the CalFlora project, and we are well positioned to receive data from such efforts as they become available.

### **UC Davis**

Our investigation showed that, of the major herbaria in California, UC Davis' collection is especially rich in weed specimens. We obtained a sample dataset from the UCD herbarium and an agreement in concept that they would like to make their data available through CalFlora. At the present time, they feel that they have not done sufficient checking and correction of errors, and would like to delay online presentation until they feel that their data meet higher quality standards. We frequently see this type of pause at this stage in an acquisition process. We will continue our conversation with them, and expect to eventually add their data to Our CalFlora's online library.

We contacted two UC Davis researchers who are producing weed data as part of their research, and gained their willingness to contribute data to CalFlora. We expect to receive occurrence data on giant reed (*Arundo donax*) and cape ivy (*Delairea odorata*) through this path.

### **National Park Service/USGS-BRD**

We discovered two major datasets on plant distributions in Yosemite National Park. One contains complete species lists for plots systematically located throughout the park, the other is a focused weed survey for selected areas.

We have obtained the former dataset and prepared it for online presentation. The second dataset is the subject a research project, and will not be available for online presentation until that work is published. We expect that the relationship we have built in securing the first dataset will streamline acquisition of the second, as well as other data that may be generated in the interim.

### **California Interagency Noxious Weed Coordinating Committee (CINWCC)**

We attended a meeting of CINWCC, making an informational presentation about CalFlora and learning about data gathering efforts and data exchange needs of participating agencies. Discussion with representatives of the agencies present confirmed our perception that inventory and monitoring, the types of activities that produce the kind of occurrence data we're seeking, are generally not part of weed control projects, and that few agencies have internal repositories for collecting weed occurrence data. Ifte primary benefit of this contact was raising awareness of information resources already available through CalFlora and our existence as a readily available mechanism for future data exchange.

### **California Exotic Pest Plant Council (CalEPPC)**

We made a presentation at the CalEPPC Symposium in October to an audience of about 200 people involved in various aspects of weed science aid management. Again, we described CalFlora's existing weed information resources and readiness to serve future information exchange, and extended our call for expert review of photos and leads on weed occurrence datasets.

Figure 1: Distribution data map display example

### **Photo Holdings**

Soon after beginning work under this contract, we identified two major collections of weed photos within CDFA, one in the herbarium and one in the Integrated Pest Management Division. It was apparent that these collections alone would fill many of the gaps in the existing photo collection, and that making these slides available in databased, digital format, both online and on CD, would provide a substantial mutual benefit to CDFA and CalFlora. These collections are far more extensive than anticipated in our contract budget, and additional funding and in-kind services were acquired to complete the task of bringing these 1046 slides into the CalPhotos image library. Digitizing and databasing have been completed, and all data and image files have been submitted to the UC Berkeley Digital Library Project for inclusion in CalPhotos. All of the photos received from CDFA have been reviewed by experts. Eight reviewers contributed 94 ID confirmations and annotations of other photos of invasive exotics in CalPhotos collections. In addition, we received contributions of 56 weed photos via online contributions. We added links to taxon pages in CalFlora so that users now have easy access to photos in CDFA's Encycloweedia (<http://pi.edfi.ca.gov/weedinfo/Index.html>),

as well as to photos in the USDA PLANTS collection.

We are grateful for the major contributions of James B. Gratiot (volunteer database work), Custom Process Inc. (discounted rate on digitization services), and the East Bay Chapter of the California Native Plant Society (contribution toward digitization costs).

Figure 2. Photos for *Carduus tenuiflorus*, showing ID review status

## 2. Construct Online Input Forms

Timely response to invasions of exotic plants depends on current information compiled from many observers. Online input of observation data by state and local agencies, academic institutions, and individual observers allows rapid sharing of weed observation data among agencies, as well as facilitating data aggregation in forms useful to Caltrans. This will enable Caltrans, to detect and manage infestations at early stages, when cost and herbicide requirements are at a minimum.

This contract provided for development of mechanisms for online input and reporting of data from Caltrans right-of-way inventories and related projects as a pilot system for receiving and displaying comparable data from other agencies, institutions and the public. An additional work plan objective was to solicit and incorporate feedback from Caltrans personnel on data input and reporting functions.

Plant Survey Procedures Early in the contract period, discussions with Caltrans Division of Environmental Analysis personnel, both in Sacramento and in district offices, led us to the conclusion that Current Caltrans programs do not produce weed data at specific locations. At this time, Caltrans employees would benefit most from rapid access to data from non-Caltrans sources. In consultation with Caltrans, we shifted focus of this pilot phase to developing general purpose data input infrastructure rather than one tailored to specific Caltrans surveys. Drawing on a broad range of contributors will produce higher levels of activity and provide a better test of the system, as well as providing more immediate benefits to Caltrans staff.

Caltrans Division of Environmental Analysis personnel provided us with information on their Biological Right-of-Way Inventory database, a Microsoft Access-based system for tracking locations of special status plants, animals, and habitats. This system writes observation data to tables that can be readily transcribed to CalFlora occurrence format within our existing processing system. Users of this database can submit plant observations to CalFlora via email by simply attaching a copy of the database file. A prior step will be establishing a data sharing agreement that clarifies who within Caltrans has permission to submit data to CalFlora and what guidelines CalFlora will follow in making Caltrans data available to the public.

### Data and Photo Submission Tools

We have now completed online systems for contributing occurrence data and photos, as well as a system for online annotation of photos. We have established a system for registering both online contributors and online reviewers, and managing their transactions. These tools can be viewed online at the locations in the table below.

<b>Online Submission Tools</b>	
<b>Contributor Registration</b>	
photos	<a href="http://elib.cs.berkeley.edu/photos/conuibutions.html">http://elib.cs.berkeley.edu/photos/conuibutions.html</a>
data	<a href="http://www.calflora.org:8080/calflora/oce/add/add.slit.1">http://www.calflora.org:8080/calflora/oce/add/add.slit.1</a>
annotations	<a href="http://www.elib.cs.berkeley.edu/cgi/reviewers_query?form=1">http://www.elib.cs.berkeley.edu/cgi/reviewers_query?form=1</a>
<b>Input and Upload</b>	
photos	<a href="http://elib.cs.berkeley.edu/photos/add.shtm">http://elib.cs.berkeley.edu/photos/add.shtm</a> (password required)
	<a href="http://elib.cs.berkeley.edu/photos/add_photo_meta.GIF">http://elib.cs.berkeley.edu/photos/add_photo_meta.GIF</a> (example)
	<a href="http://elib.cs.berkeley.edu/photos/about_contrib.html">http://elib.cs.berkeley.edu/photos/about_contrib.html</a> (explanation)
data	<a href="http://www.calflora.org:8080/calflora/occ/add/addocform.shtml">http://www.calflora.org:8080/calflora/occ/add/addocform.shtml</a>
annotations	<a href="http://elib.cs.berkeley.edu/photos/annotate.html">http://elib.cs.berkeley.edu/photos/annotate.html</a>
	<a href="http://elib.cs.berkeley.edu/photos/annotations.html">http://elib.cs.berkeley.edu/photos/annotations.html</a> (explanation)

In each of the three systems, prospective contributors fill out and submit an online form with relevant identification, contact, and qualifications information. This information is reviewed by CalFlora staff, and a password is issued by email. A new registrant's submissions are reviewed before incorporation in the online system. After a track record of responsible use has been established, the registrant is cleared to contribute directly. In the case of photo annotations, the original contributor receives an automatically generated email notice of annotations that have been attached to his or her photo.

Figure 3. Photo annotation form, full annotation display  
 Figure 4. Reviewer registration form

We have fully implemented the contribution, annotation, registration systems for the photo collections on the public version of CalFlora. This is providing us with a test of all technical aspects of both the photo and occurrence data contribution systems, and provides us with user feedback on various aspects of usability and policy. Further, it provides us with information on ongoing administration costs for online input systems.

We have implemented the occurrence data contribution system on the restricted-access version of CalFlora only. Feedback from prospective users suggests that we should expect a large number of individual registrants for this system, including many amateurs. We expect a large volume of correspondence and high demand for review of credentials and submissions when we go public with this system. Until we secure adequate ongoing funding for these services, we will be operating the online data contribution system on an

invitation-only basis. We are very excited about the possibilities of this system. Linked to our GIS viewer, Contributors can zoom in on an orthophoto quad and/or topographic map, find their precise location coordinates and elevation, and enter these directly into their occurrence report.

Figure 5a. and b. Online data contribution form

**3. Develop Data Processing Module** Caltrans personnel use GIS (Geographic Information System) tools in planning and carrying out weed control activities. In order to make best use of weed occurrence data, observations in the library of location data available through CalFlora must be translated into a uniform format that can be readily used in GIS applications.

We created a computer program for accomplishing these translations within the CalFlora occurrence data processing environment. After analyzing format inconsistencies in mayor datasets, we wrote processing scripts to detect and standardize format variants and flag clearly erroneous entries. Subsequent programming steps translate location formats most frequently found in occurrence datasets for California into standard formats most useful for GIS applications and calculates the precision of the original location datum. Additional steps compare the latitude-longitude against a look-up table developed by Augie Cruz, Caltrans Division of Environmental Analysis to find the nearest post-mile, a format especially useful for Caltrans purposes.

The processing module reads data from the following incoming location formats (including numerous format variants of each):

- meridian township range section
- township range section (meridian deduced where possible)
- UTM10
- UTM11
- latitude longitude degrees
- latitude longitude decimal

The processing module fills the following fields:

- latitude longitude decimal
- UTM
- Nearest postmile
- Location precision (hectares denoted by original location datum)

Qinghua Guo, UC Berkeley graduate student and developer of this module, has tested this program and demonstrated it to CalFlora staff. It has been implemented for CalFlora

data intake processing. Results can be seen in CalFlora occurrence data listings and online GIS viewer displays, and are included in downloaded datasets that can be imported to users' GIS systems such as the Arcview system that produced the display below. (Figure 6)

Figure 6. Arcview display of CalFlora distribution information for *Quercus douglasii*

#### 4. Caltrans/CalFlora Interface

##### Caltrans User Feedback

We conducted interviews with 4 Caltrans biologists who use CalFlora frequently in conjunction with their job duties, Lisa Schicker (San Luis Obispo), Hal Dario (Oakland), and Richard Burg (Sacramento), and Scott Quirmell (Irvine). We also received input from Ellie Wagner, summarizing her own views and those of coworkers she consulted. We found that these users primarily use CalFlora to learn what species are likely to occur in a particular analysis area and to view photos, both as an aid in search for rare species and to Streamline specimen identification subsequent to field visits. Access to habitat descriptions attached to occurrence records in CalFlora are also viewed as an important resource. Access to additional records for rare species beyond those available in NDDDB was also regarded as an important benefit they get from CalFlora. Users reported that they currently make use of wced photos as identification aids. One user mentioned that growing focus on weed control may increase his need for this information in the future

We also interviewed 4 Caltrans Landscape Architecture staff members, Jim Pittman and Steve Miller (Bishop), Ernest Figueroa (San Bernardino), and Jim von Dohlon (Stockton). These staff members all reported that their primary need is for information and photos about plants that have been specified or are being considered for particular projects. Three of them said they and their coworkers make regular use of CalFlora for this purpose, in conjunction with other online information sources. The fourth staff member said personnel in his office generally use print references and phone conversations with nurseries to obtain needed information. One person reported making extensive use of CalFlora to generate lists of species native to particular locations and communities. He said he finds the existing Caltrans Query Form very convenient for this purpose, much more so than the general taxon query form. These Landscape Architecture personnel, in contrast to the biologists we spoke with, make little use of specific occurrence reports, although they do make use of generalized distribution information. They use the photo collections to observe form and appearance, not for plant identification.

Caltrans users we spoke with, even though they use CalFlora regularly, were not aware of the full range of query and reporting utilities available. None of the users had discovered the GIS viewer utility for displaying occurrence data, and only one user had discovered

and used the data download utilities. Users we spoke with had not investigated the photo contribution and annotation utilities, although they were glad to have them pointed out. They approved of the registration and screening procedures in place for online contributions and annotations. Several users suggested that adding a 'query by quad' utility parallel to the one available for NDDDB would be useful. Users had not discovered the existing 'query by range of latitude and longitude' utility already available on the occurrence database advanced query form.

In spite of difficulty users have finding the existing query and reporting utilities, they do find the reporting formats to be useful and that the query utilities, once discovered, do meet their needs.

### **Caltrans Query and Reporting Forms**

In consultation with the Caltrans contract manager, we decided not to make new Caltrans query and reporting forms. Instead we made revisions to existing public forms and added new fields to our taxon data table to support weed-related queries and reports. Changes include:

- added 'query by weed status' utility to CalFlora's species advanced query form
- added 3 fields to CalFlora taxon table: 'Federal Noxious Weed Status', '-CDFA Weed Status', and 'California Exotic Pest Plant Council Pest Plant List Status'.
- added 'invasive weed' tag to initial list display of query results for taxa with CDFEA, CalEPPC, or Federal rankings as noxious or invasive
- added text transcription of weed status fields to taxon summary display

### **Presentation to Caltrans users**

Our work plan proposed making a presentation at the Landscape Architecture Academy or other Caltrans workshop as a means of informing appropriate Caltrans users about CalFlora. We consulted with Dawn Grinstain in the Landscape Division, and learned that this year's Academy will be held after the end of our contract period, and that a report on our project would not fit with the objectives planned for this year's Academy. We have not learned of any other Caltrans workshop where such a presentation would be appropriate. We have created an information sheet for distribution within Caltrans as an alternative means of bringing CalFlora to the attention of Landscape Division staff (Appendix A).

We have already made presentations to 3 major statewide meetings that included Caltrans personnel involved in weed management, along with a broad spectrum of professionals and agencies that cooperate with Caltrans on weed control efforts. Our various actions to incorporate feedback from Caltrans staff in both the direction and the products of our work we described in several of the preceding sections of this report.

## Figures

Figure 1. Distribution data example: *Carduus pycnocephalus*, 419 observations from 7 sources

Figure 2. Photos for *Carduus tenuiflorus*, showing ID review status

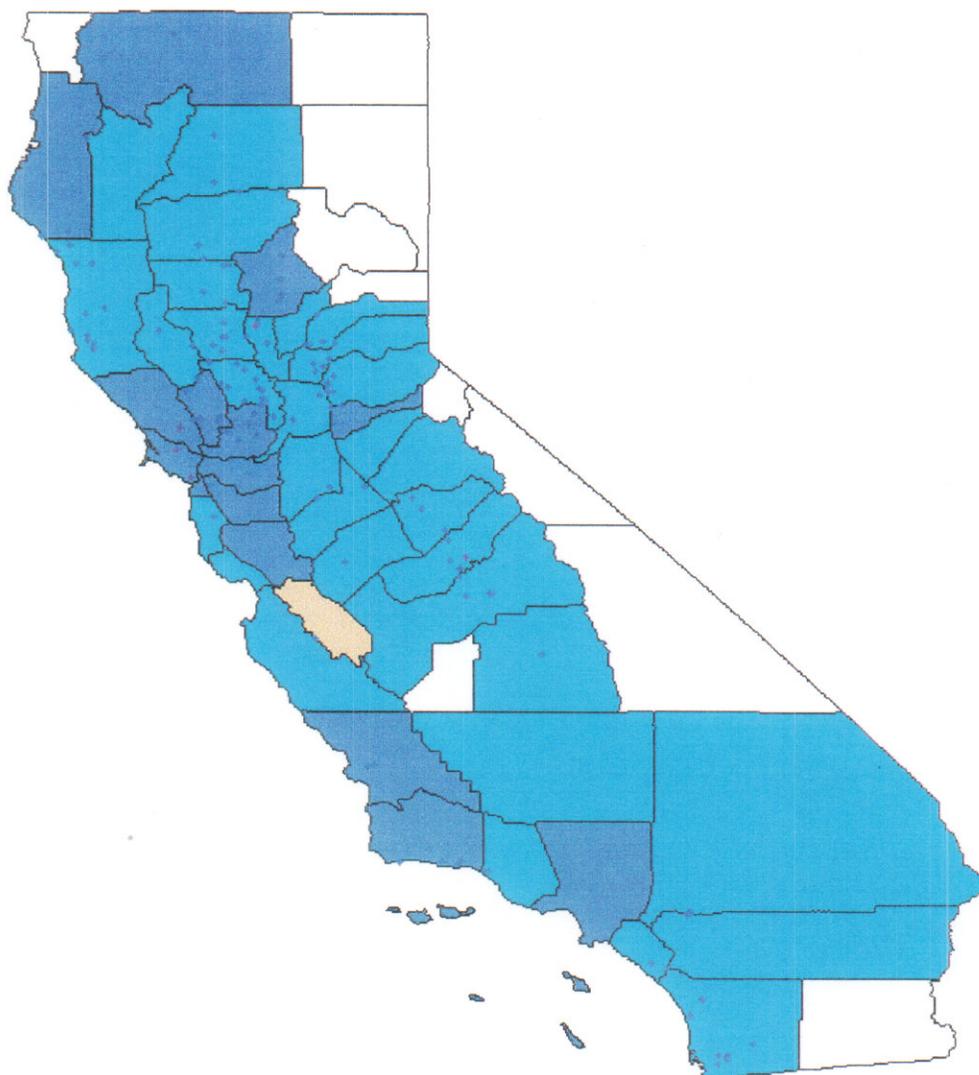
Figure 3. Photo annotation form, full annotation display

Figure 4. Reviewer registration form

Figure 5a. and 5b.: Online data contribution form

Figure 6. Arcview display of CalFlora distribution information for *Quercus douglasii*

Figure 1. Distribution data map display example



www.CalFlora.org 2001

*Carduus pycnocephalus*, 419 observations

Sources:

- Botanical Literature Summary of Reported Ranges (20)
- California Department of Food and Agriculture (315)
- G.F. Hrusa checklists (14)
- San Jose State Herbarium (4)
- The Nature Conservancy (5)
- USDA NRCS-National Plants Data Center: Botanical Literature (34)
- University and Jepson Herbaria (27)

Figure 2. Photos for *Carduus tenuiflorus*, showing ID review status

**CalPhotos** Berkeley Digital Library Project

**Number of matches:** 8  
**Query:** SELECT \* FROM img WHERE (genre = "Plant" OR genre = "Fungi") and namesoup like "%CARDUUS TENUIFLORUS%" order by taxon

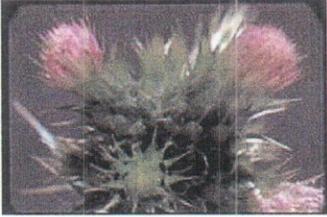
		
<p>Carduus tenuiflorus Italian Thistle <input checked="" type="checkbox"/> ID reviewed</p>	<p>Carduus tenuiflorus Italian Thistle <input type="checkbox"/> ID not reviewed</p>	<p>Carduus tenuiflorus Italian Thistle <input checked="" type="checkbox"/> ID reviewed</p>
<p>Brousseau 5207 1611 1109 0051 <a href="#">more information</a></p>	<p>Brousseau 5207 1611 1109 0055 <a href="#">more information</a></p>	<p>Webber 8120 3181 4902 0036 <a href="#">more information</a></p>

Figure 3. Photo annotation form, full annotation display

CalPhotos:  
Annotations and Corrections

instructions

see also:

[about plant identifications](#)

[about annotations](#)

[CalPhotos home](#)

[about the photos](#)

[animals](#)

[plants](#)

[landscapes](#)

[africa](#)

[photographers](#)



Photo ID: 8120 3181 4002 0036  
 Current Identification: *Carduus tenuiflorus*  
 Photographer: Charles Webber  
 Date of photo: 05/01/1933  
 Location: United States, CA, Bay Area Hills  
 Photographer's ID: *Carduus tenuiflorus*  
 Photo Submitted: 12/01/1998  
 Annotation: 1 annotation

Click for Enlargement

Photo © 1998 California Academy of Sciences

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### Annotation History

Date	Name	Action	Plant Name Before Changes	Plant Name Changed to
Annotation Notes				
03/15/2001	Fred Hrusa	✓ Plant ID Verified	<i>Carduus tenuiflorus</i>	

**Submit a ID verification, correction, or comment for this photo**

Your Name:  Not listed? Sign up now!

Your Password:   save password?

Annotation type:

Verify Plant Identification

Correct Plant Identification

Comment on Photo

Corrected Taxon Name:

Scientific name, no authorship.

Annotation Notes:

Generating this form took: 1 second

---

**Instructions:**  
 see also: [about annotations](#)

To review or comment on a photo, you must be a registered reviewer with the CalPhotos Database.  
 To become a registered reviewer, click here. Registration can take up to 72 hours pending review by a Digital Library Project staff member.

Annotations can be comments about a photo, ID verification for a photo, or changes to the identification of a photo.

Please enter name from the list and enter your race correctly whenever

Figure 4. Reviewer registration form

## CalPhotos: Reviewer Registration

**Register to submit corrections, annotations and verifications to the CalPhotos Image collections**

**Instructions:** Use this form to create a new record for the [Reviewers database](#). Fill out the required fields and as many of the optional fields as possible, and then click on "submit". If you are already registered, you may also [Update your profile](#). You can view reviewer profiles [here](#). Items marked by \* are required. You will receive an automated email to verify your email address, please follow the instructions that it contains. [Additional details are below.](#)

<b>Last Name *</b>	<input type="text"/> example: Smith
<b>First Name *</b>	<input type="text"/> example: John C.
<b>Password *</b>	<input type="password"/> example: Delphinium
<b>Confirm Password *</b>	<input type="password"/> exactly as typed above
<b>Affiliation</b>	<input type="text"/> example: California Native Plant Society
<b>Contact Information</b>	<input type="text"/> example: 927 San Pablo Ave, Albany, CA 94706 Phone: 510 528-5426
<b>Email Address *</b>	<input type="text"/> example: jsmith@nature.com
<b>Your Web Page</b>	<input type="text"/> example: http://www.somewhere.com/~jsmith
<b>Credentials/Background* (1024 characters max)</b>	<input type="text"/> example: Experienced at vascular plant identification, especially central California Coast Ranges. B.S. Plant Biology, Arizona State U.
<b>Area of Expertise (1024 characters max)</b>	<input type="text"/> example: Ranunculaceae (esp. Delphinium), aquatic monocots, animals of the Santa Monica Mountains.

Generating this form took: 1 second

**Details:**

The CalPhotos photographic database is composed of images donated from various collections and photographers to the UC Berkeley Digital Library Project. Species names on the photos are initially those supplied by the photographer. Because of the scale of the CalPhotos collection - over 80,000 photos as of Summer 1999 - it is not possible to have each photo reviewed by a appropriate expert for correct identification. However anyone may register to annotate or correct photographs in CalPhotos. Annotations and corrections are reviewed by Digital Library Project staff to ensure responsible use.

In the case of disagreement on the identification of a photo, identification will be made at the next higher level of agreement, and opinions noted in the annotations.

Figure 5a. Online data contribution form

**The CalFlora Database**  
**Add Observations to CalFlora**  
**THIS IS A DRAFT FORM.**

**Instructions:** Use this form to create an observation record to be added to the CalFlora database. Fill out the required fields and as many of the optional fields as you like, and then click on "submit".  
 The fields in red are the ones you must complete

### About Your Observation

<b>data collection</b>	--select one--	Add your observation to which collection? Collections marked * require password authorization to make additions. See cooperating organizations to obtain authorization.
<b>nomenclature used</b>	Jepson Manual (1993)	Please indicate the nomenclature standard used for this observation.
<b>type of documentation</b>	this observation is a --select one--	Please see explanation of documentation categories.
<b>type of observation</b>	this observation is a part of a --select one--	Please see explanation of observation types.
<b>your unique record identifier</b>		Your unique record identifier. <b>Required</b> if you wish to do batch updates of records in the future.

### Observation Information

<b>plant observed</b>		Please use scientific name of a plant known from California. If the plant you observed is new to California, please contact us first.
<b>observation date</b>	Month Day YYYY --select precision--	at least year is required
<b>location description</b>		text description of location. (255 characters max)
<b>county</b>	--select one--	County where observation was made.

**GEOREFERENCED LOCATION**  
 fill out any **ONE** location type

<b>latitude and</b>	lat	--select format--	Latitude and longitude of observation. Format as:
---------------------	-----	-------------------	---

Figure 5b. Online data contribution form (continued)

Add Observations - Netscape

File Edit View Go Communicator Help

Back Forward Reload Home Search Netscape Print Security Shop Stop

Bookmarks Location: <http://www.calflora.org:8080/calflora/occ/add/addoccfom.shtml> What's Related

Google CalFlora Bryolab Pages Tony Morosco mail Fix Robust 404 CalFlora Google

### GEOREFERENCED LOCATION

fill out any **ONE** location type

latitude and longitude	lat <input type="text"/> --select format-- long <input type="text"/> --select datum--	Latitude and longitude of observation. Format as: -118.3444 (DD), or as -118d 20' 39.84" (DMS), or as -118 20 39.84 (DMS)
UTM Coordinates	Zone --select zone-- UTM Northing <input type="text"/> UTM Easting <input type="text"/>	UTM zone and coordinates of observation.
meridian, township, range and section (MTRS)	meridian --select meridian-- township <input type="text"/> range <input type="text"/> section <input type="text"/>	Meridian, township, range and section of observation.
route & postmile	county --select one-- route <input type="text"/> postmiles <input type="text"/> - <input type="text"/> prefix - postmile	Highway route number & post mile where observation took place. Will be converted to georeferenced point with precision of approximately 1/4 mile (approx. 400 meters).
precision of georeferenced location	± <input type="text"/> --select units--	The estimate of the error radius of the georeferenced point. ± said amount.

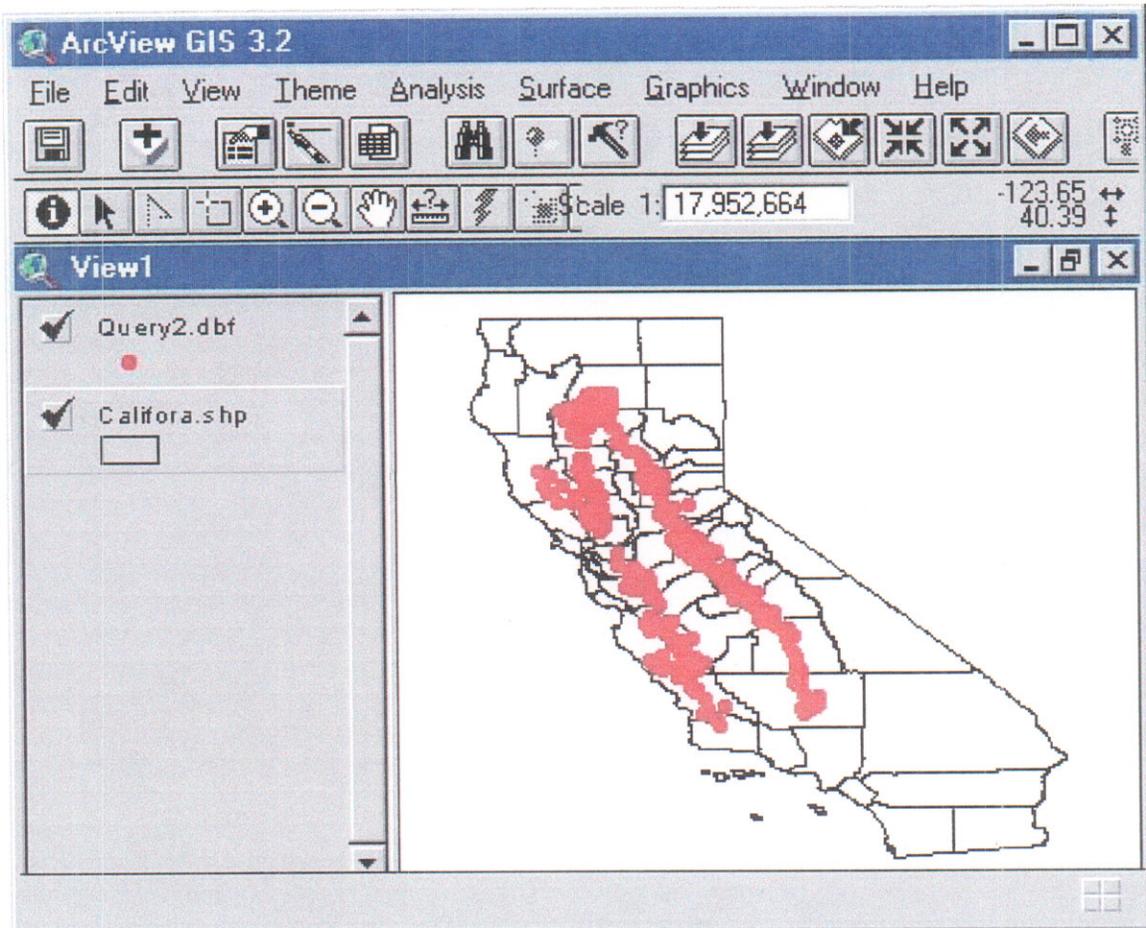
### OTHER INFORMATION

elevation	<input type="text"/> --select units--	Elevation of observation location
additional site information	<input type="text"/>	aspect, hydrology, environmental conditions, plant community etc.
plot information	Plot Identification: <input type="text"/> Plot Area: <input type="text"/> --select units--	Only for observations based on uniform sampling methodology.
Habitat Description	<input type="text"/>	Description of habitat in which plant was observed.
Name of Observer	<input type="text"/>	The name of the observer(s) plus collection number if specimen or vouchered.
Special Sub-Collection	<input type="text"/>	Special sub-collection within data collection
Other Notes	<input type="text"/>	Other details on this observation.

Submit Reset

Document: Done

Figure 6. Arcview display of Calflora distribution information for *Quercus douglasii*



## Calflora—Plant Information Online

CalFlora is the online gateway to information about California's wild plants. CalFlora has assembled a rich and diverse collection of data and photos. Holdings from many separate sources are integrated using advanced information management technology and made freely available over the Internet.

CalFlora provides:

- Comprehensive habitat and distribution information for wild plants--over 8,000 native and introduced species
- over 775,000 plant occurrence records including location, date, observer, and information about the data source and methods
- information on over 15,000 relationships between old and new names
- over 20,000 photographs of California plants (provided in collaboration with the UC Berkeley Digital Library Project)
- online tools that help users find, display, and download the information they need

There are many ways to enter CalFlora. The best place to start is **[www.calflora.org](http://www.calflora.org)**

### **How CalFlora functions**

At the heart of CalFlora is a vast library of plant occurrences—individual records of species seen or collected by a particular observer at a particular time and place. CalFlora taps data collected for a variety of purposes to extract core data into a uniform electronic format. Users can then search and analyze these observations online in a multiplicity of ways, or create custom datasets to download and use at home or work. CalFlora strives to fully document all data, providing the facts users need to interpret and evaluate each occurrence record.

### **Tools for visualization**

Through our collaboration with UC Berkeley researchers, CalFlora has helped develop an online JAVA-based GIS viewer, allowing users to display plant locations against topographic maps and other thematic layers. Users can annotate displayed information and share those annotations with other users.

### **Downloading data**

The information in CalFlora databases can in most cases be downloaded. It's easy to download whole tables, selected fields, or specific query results. Users can then analyze CalFlora data with their own tools and with their own data, or use CalFlora data as the foundation for new applications.

### **Photographs and user annotations**

Every day, thousands of people, from schoolchildren to scientists, use the CalPhotos collection to find images of California plants. Developed in collaboration with the UC Berkeley Digital Library Project, the CalPhotos collection is composed entirely of donated images. Contributing photographers provide information for each image, and online annotation tools allow qualified users to review, comment upon, and correct plant

identifications and other data. We are testing a similar annotation system for plant occurrence records.

### **Plant names**

We have species occurrence records reaching back well over 100 years, many under names that are no longer used. CalFlora's intelligent name translation allows users to tap into this wealth of historical information. Because our name translations are done in real-time, users can control and customize search rules to suit their own needs and preferences. Synonymy resources have been developed in cooperation with G. Fredric Hrusa, California Department of Food and Agriculture.

### **Automated upload of photos and occurrence data**

Users can now contribute photos to the CalPhotos collection using an automated online system. CalFlora and collaborators have built a similar system to accept online contributions of occurrence data, now in testing. Users will be able to rapidly exchange field observations, and CalFlora will expand its ability to accept datasets large and small.

### **Weed observation exchange through CalFlora**

Effective control of invasive species depends on good information and fast action, and requires coordinated efforts across ownership and agency boundaries. CalFlora has recently increased its online information resources on invasive weeds and other non-natives. Our focus is on facilitating rapid information exchange. CalFlora works with agencies, organizations and individuals to streamline both data contribution and data retrieval.

### **The CalFlora Community**

CalFlora served over 27,000 different users during May, 2001. CalFlora is a community resource, built by the collaborative efforts of many individuals and organizations. We welcome new collaborators, data contributors, and volunteers to participate actively in the development of CalFlora's technological and information resources. Current collaborators and data contributors include:

- U.C. Berkeley Digital Library Project
- California Academy of Sciences
- California Native Plant Society
- Santa Barbara Botanic Garden
- California Department of Food and Agriculture
- California Department of Transportation
- California Department of Fish and Game
- USDA Forest Service
- University of California Museum Informatics Project
- U.C. Davis Information Center for the Environment
- USDA National Plant Data Center
- U.S. Fish and Wildlife Service
- and many others

The CalFlora Database is a 501(c)(3) non-profit corporation.

### **CalFlora Plant Information Online**

CalFlora is the online gateway to information about California's wild plants. CalFlora has assembled a rich and diverse collection of data and photos. Holdings from many separate sources are integrated using advanced information management technology and made freely available over the Internet. There are many ways to enter CalFlora. The best place to start is **www.calflora.org**

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