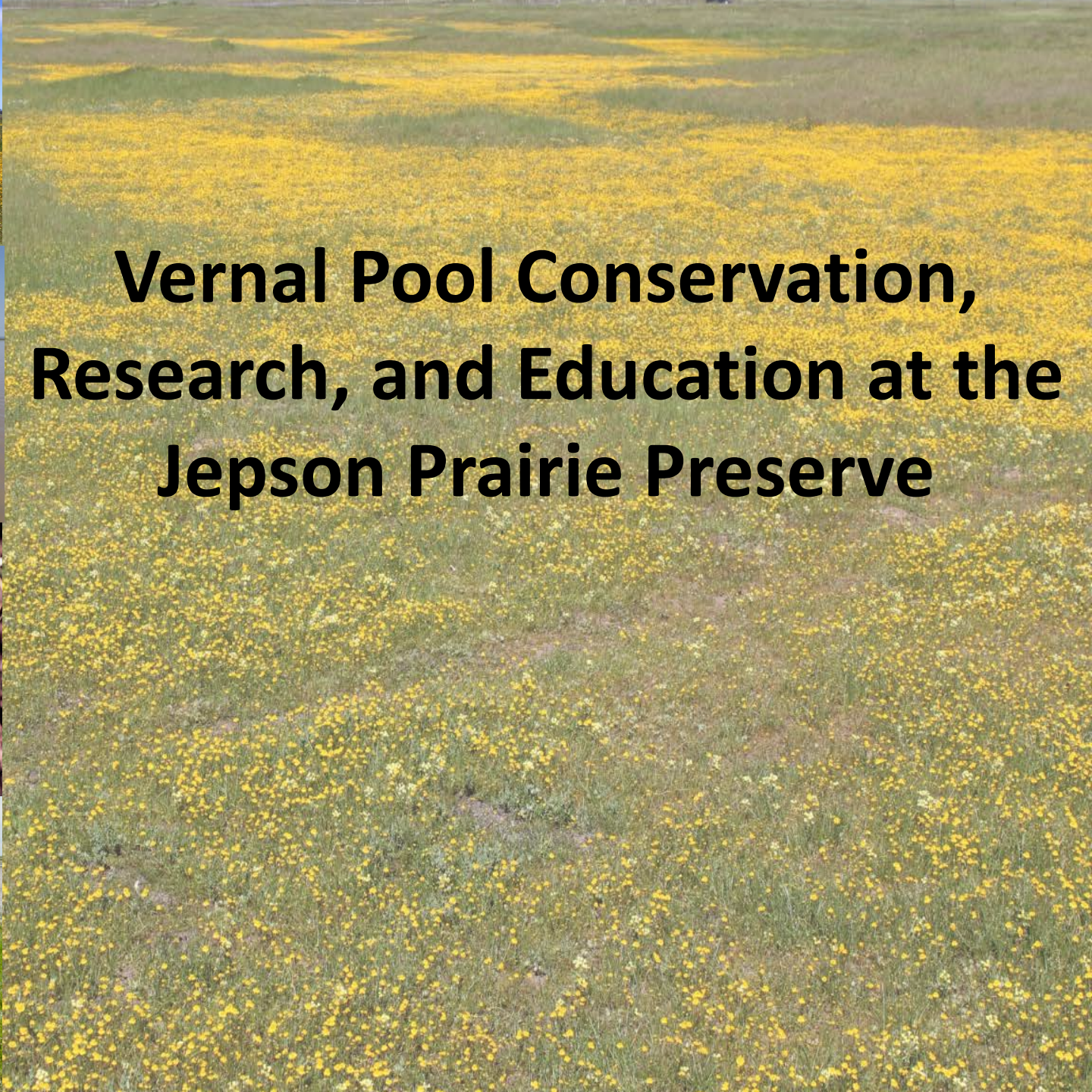




Vernal Pool Conservation, Research, and Education at the Jepson Prairie Preserve

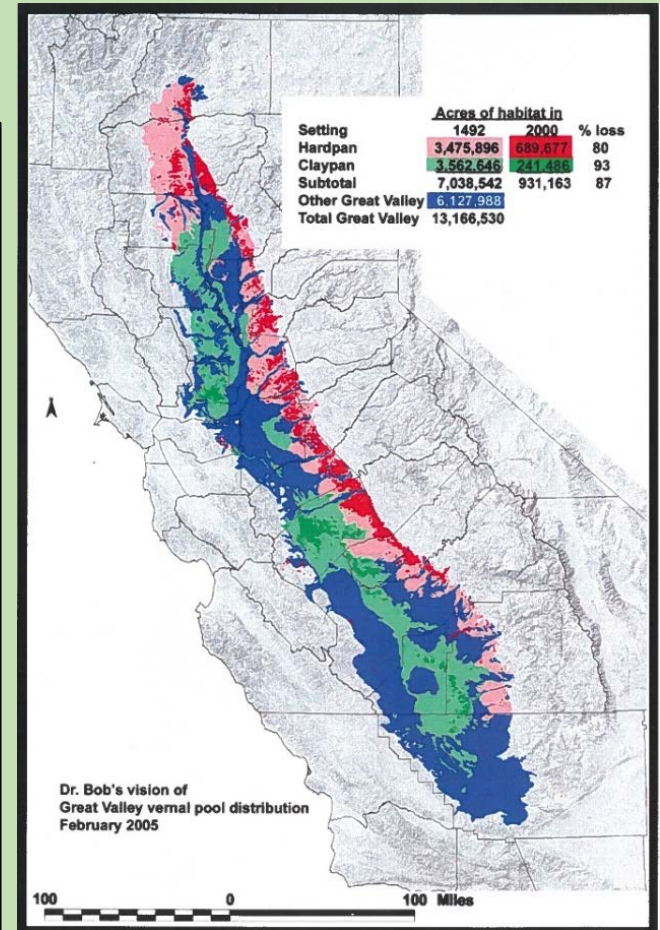
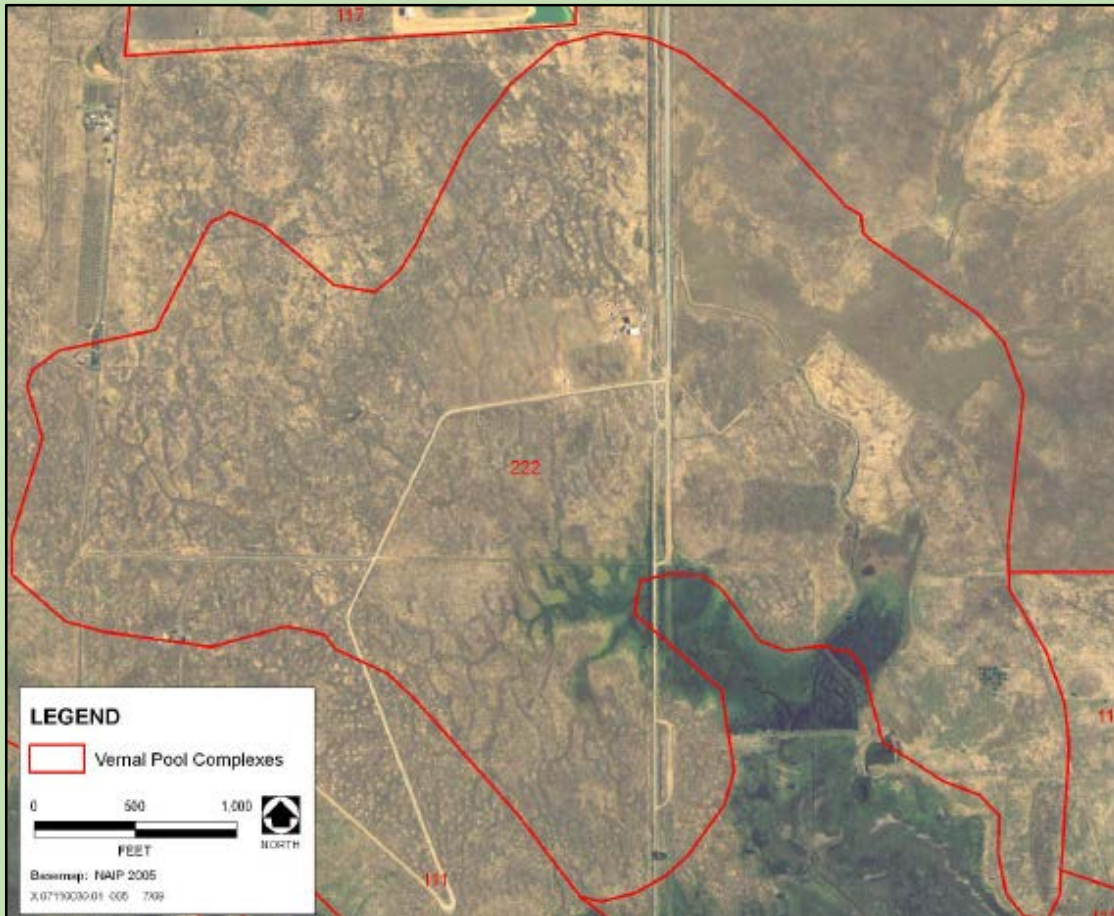


Vernal Pool Regions of California



Vernal Pools Landscapes
Widespread Throughout
the State

Evaluating Vernal Pool Loss



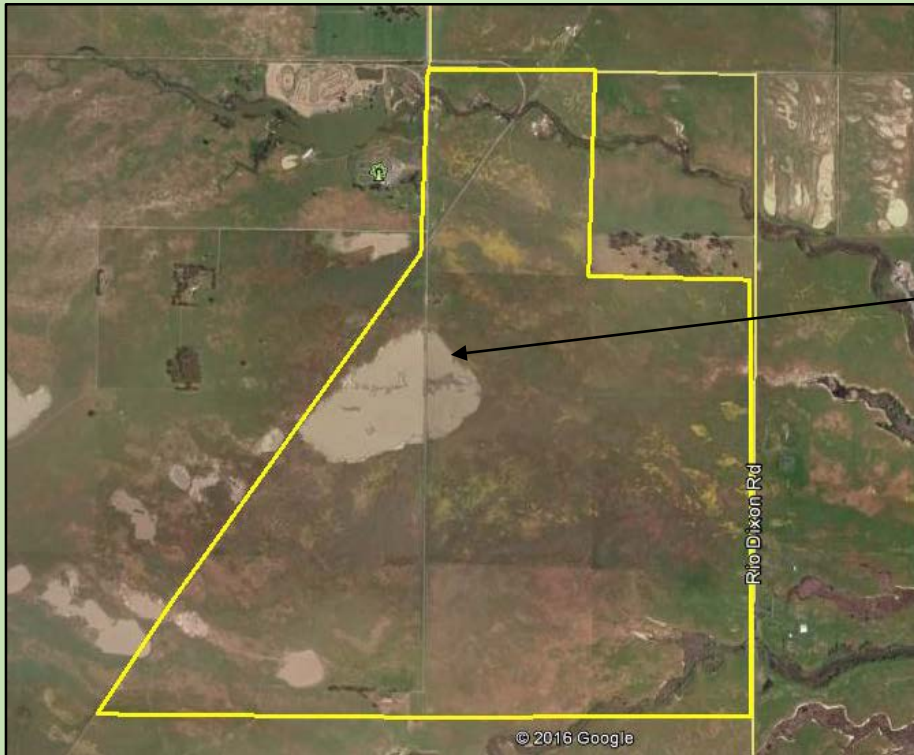
Over the last century vernal pool landscapes have become increasingly rare and threatened. Estimates are over 90 % of the vernal pool habitat in the state has been lost.



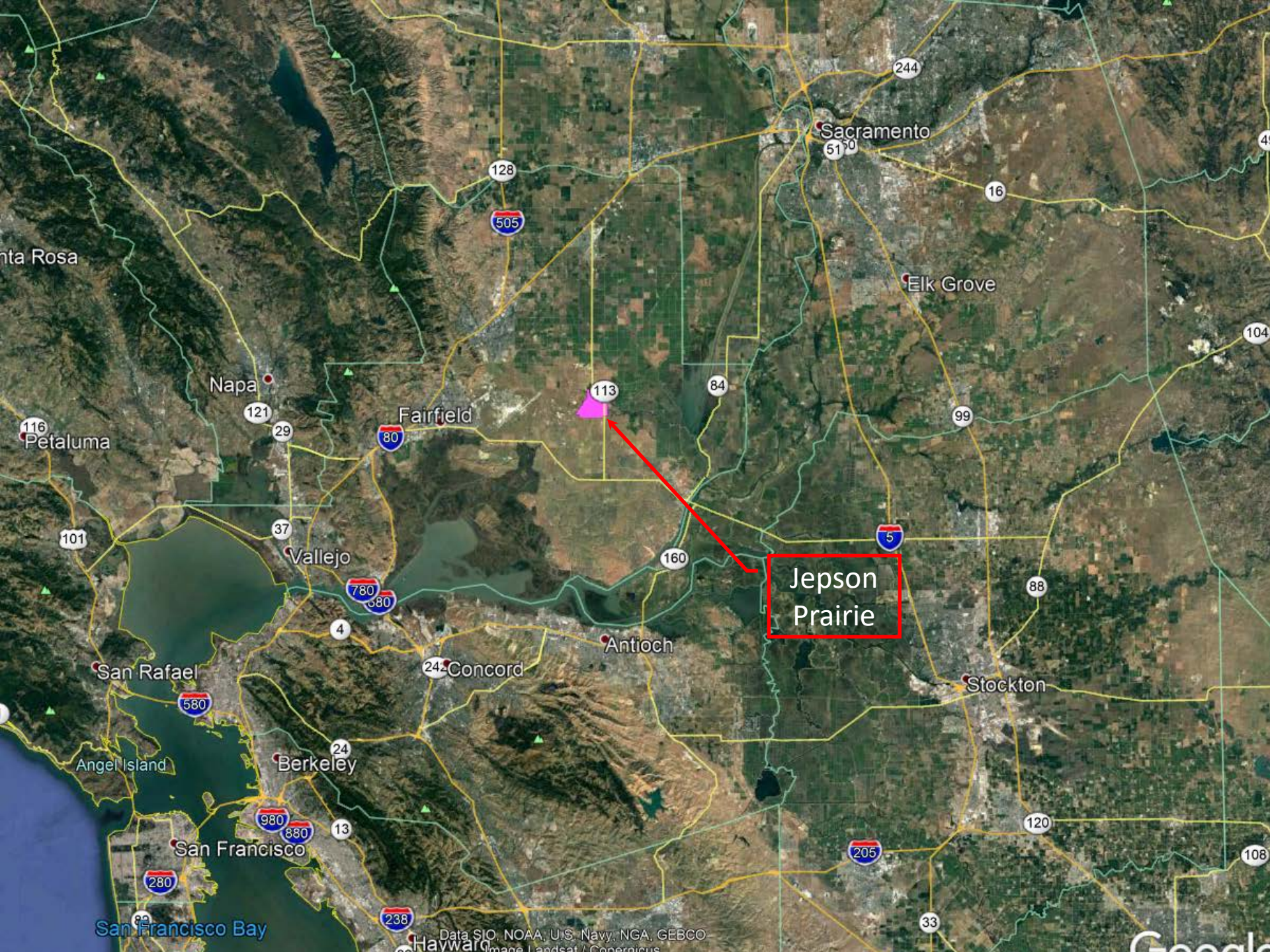
In the mid-1970's a vernal pool preservation committee was established to address vernal pool conservation and protection.



One critical area identified included a large playa vernal pool (Olcott Lake) and the surrounding prairie and vernal pool landscape in Solano County. In 1980 the Nature Conservancy purchased 1,566 acres.



Olcott Lake ~88 acres



Jepson
Prairie

113

Sacramento

Elk Grove

Fairfield

Vallejo

Antioch

Stockton

Concord

San Rafael

Berkeley

San Francisco

San Francisco Bay

Data SIO, NOAA, U.S. Navy, NGA, GEBCO
Image Landsat / Copernicus

Google

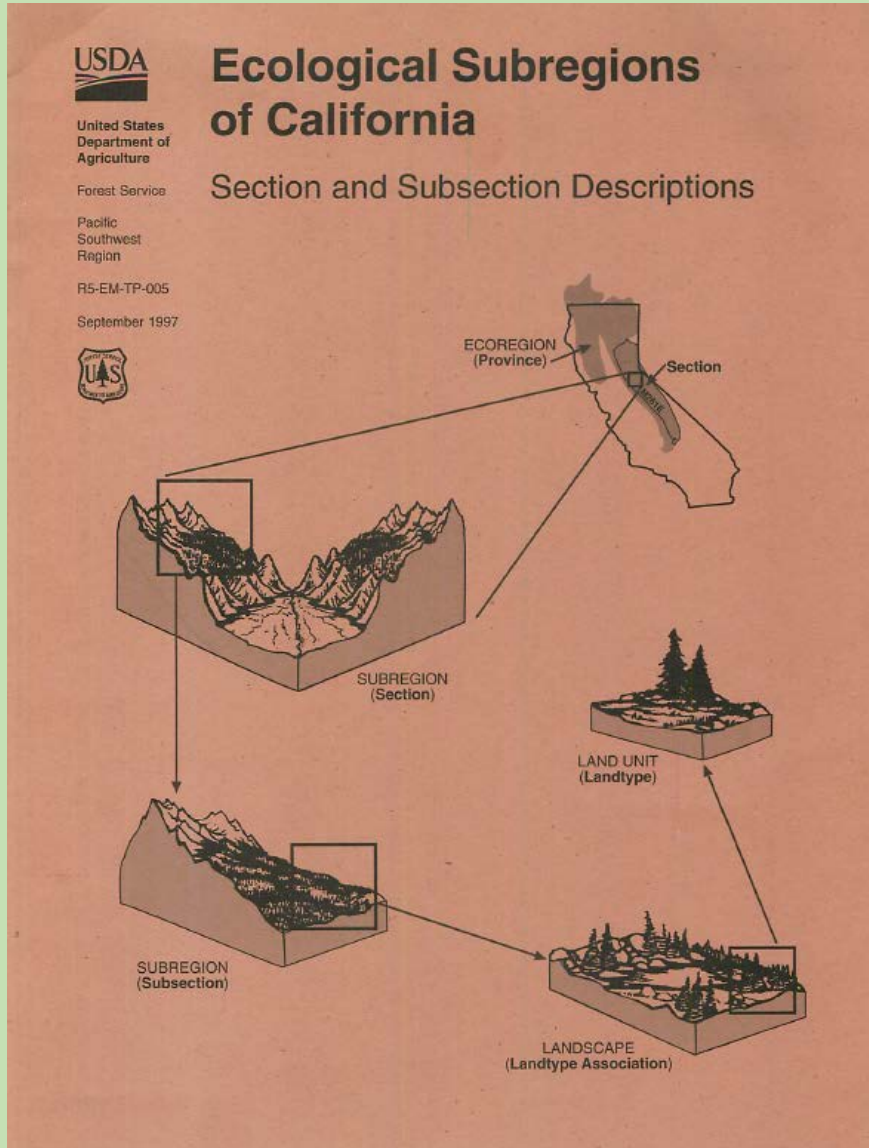
Regional and Ecological Setting



Great Valley Section

Sodic Claypan Terraces

- Late Quaternary Alluvial Plain on the lower west side of the Sacramento Valley
- Nearly level to gentle sloping landscape with elevation ranging from 20 - 120 feet



Surface Water. Streams in this subsection drain to the Sacramento River. All but the larger streams are generally dry during the summer. There are no lakes.

Subsection 262Ai Yolo - American Basins

This subsection is on an alluvial plain adjacent to the lower Sacramento River. Much of it is flooded during the winter or early spring. The climate is hot and subhumid. MLRAs 16e and 17e.

Lithology and Stratigraphy. This subsection contains recent alluvium of stream channel, stream overflow, and alluvial fan deposits. The alluvium is from granitic, volcanic, sedimentary, and metamorphic rock sources in mountains around the Sacramento Valley.

Geomorphology. This subsection is on nearly level to very gently sloping stream channels, levees, overflow basins, and alluvial fans. The subsection elevation range is from about 10 to about 40 feet. Fluvial erosion and deposition are the main geomorphic processes.

Soils. The soils are mostly Aquic Xerofluvents; Aeris Haplaquepts; and Cumulic and Vertic Haplaquolls. Pelloxererts and Chromoxererts are common on alluvial fans. The soils are moderately well drained to poorly drained. Soil temperature regimes are thermic, and soil moisture regimes are aquic and xeric.

Subsection 262Aj Sodic Claypan Terraces

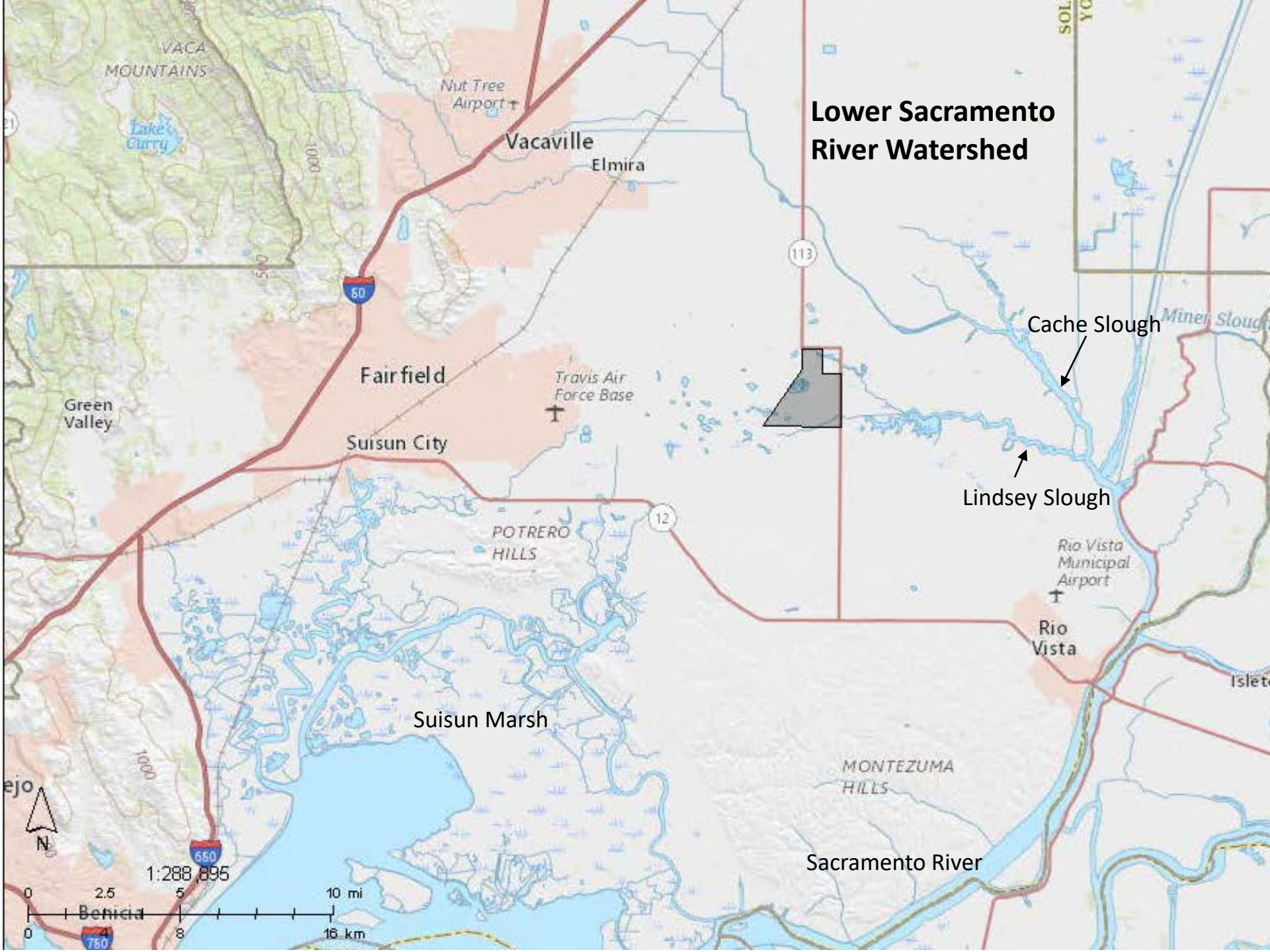
This subsection is on a late Quaternary alluvial plain on the lower west side of Sacramento Valley. The climate is hot and subhumid. MLRA 17e.

Lithology and Stratigraphy. This subsection contains late Quaternary alluvium from volcanic, sedimentary, and metamorphic rock sources.

Geomorphology. This subsection is mainly nearly level to gently sloping late Pleistocene and recent alluvial fans from the southern end of the northern California Coast Ranges. The subsection elevation range is from about 20 to about 120 feet. Fluvial erosion and deposition are the main geomorphic processes.



Subsection 262Aj, Jepsen Prairie area southeast of Vacaville — Glen Stanisewski



Lower Sacramento River Watershed

Cache Slough

Lindsey Slough

Sacramento River

Suisun Marsh

POTRERO HILLS

MONTEZUMA HILLS

Fairfield

Vacaville

Elmira

Suisun City

Rio Vista Municipal Airport

Rio Vista

Travis Air Force Base

Nut Tree Airport

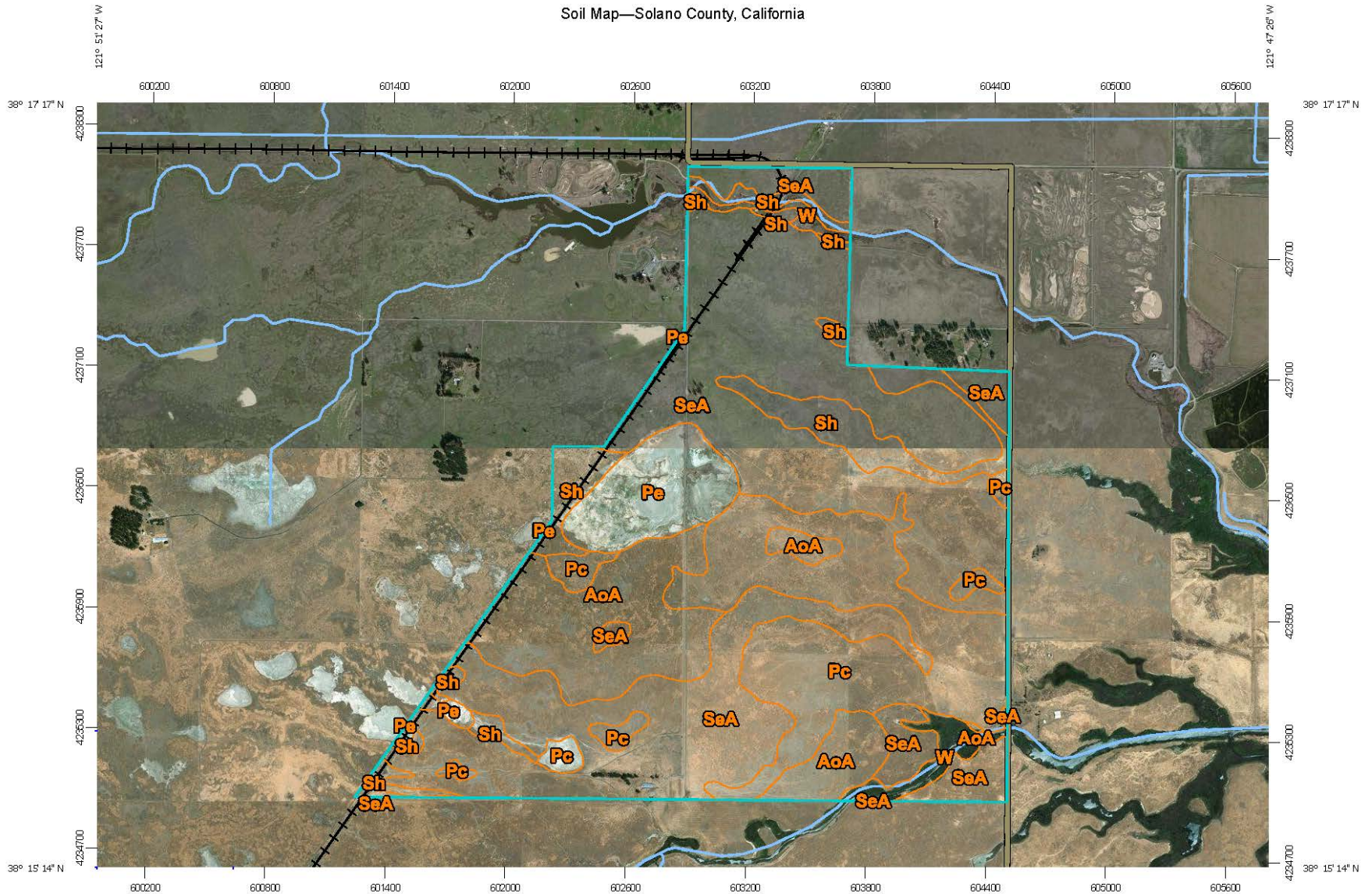
VACA MOUNTAINS

Lake Garry

Green Valley



Soil Map—Solano County, California



Map Scale: 1:26,800 if printed on A landscape (11" x 8.5") sheet.

0 350 700 1400 2100 Meters

0 1000 2000 4000 6000 Feet

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 10N WGS84

Two Primary Soil Series

Parent Material: Alluvium derived from sedimentary rock

San Ysidro sandy loam, 0 to 2 percent slopes ~ 50%

0 to 14 inches: sandy loam

14 to 28 inches: clay loam

28 to 54 inches: sandy clay loam

54 to 68 inches: stratified sandy loam to clay loam

Depth to restrictive feature: 12 to 20 inches to abrupt textural change

Pescadero clay and clay loam ~26%

0 to 4 inches: clay loam

4 to 34 inches: clay

34 to 69 inches: clay loam

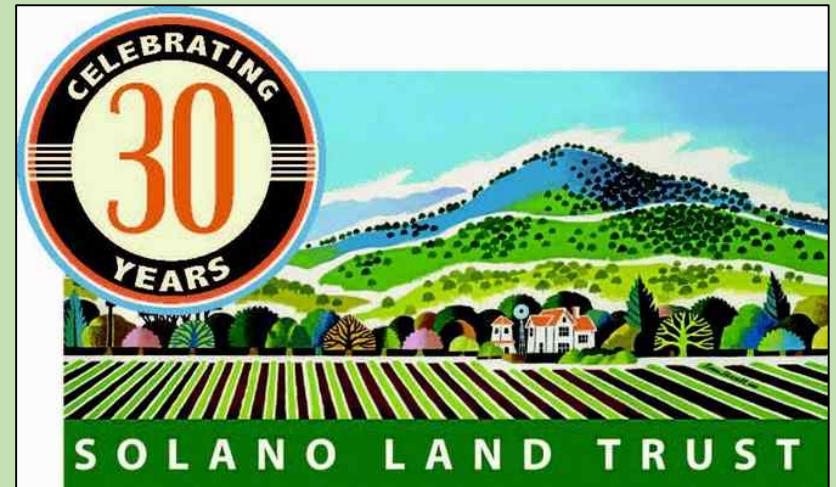
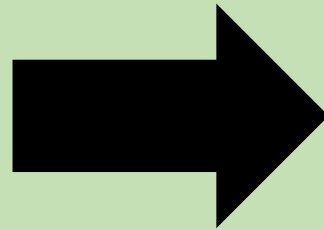
Depth to restrictive feature: 4 inches to natric (A special kind of clay horizon that contains enough exchangeable sodium to have an adverse effect on the physical condition of the subsoil.)



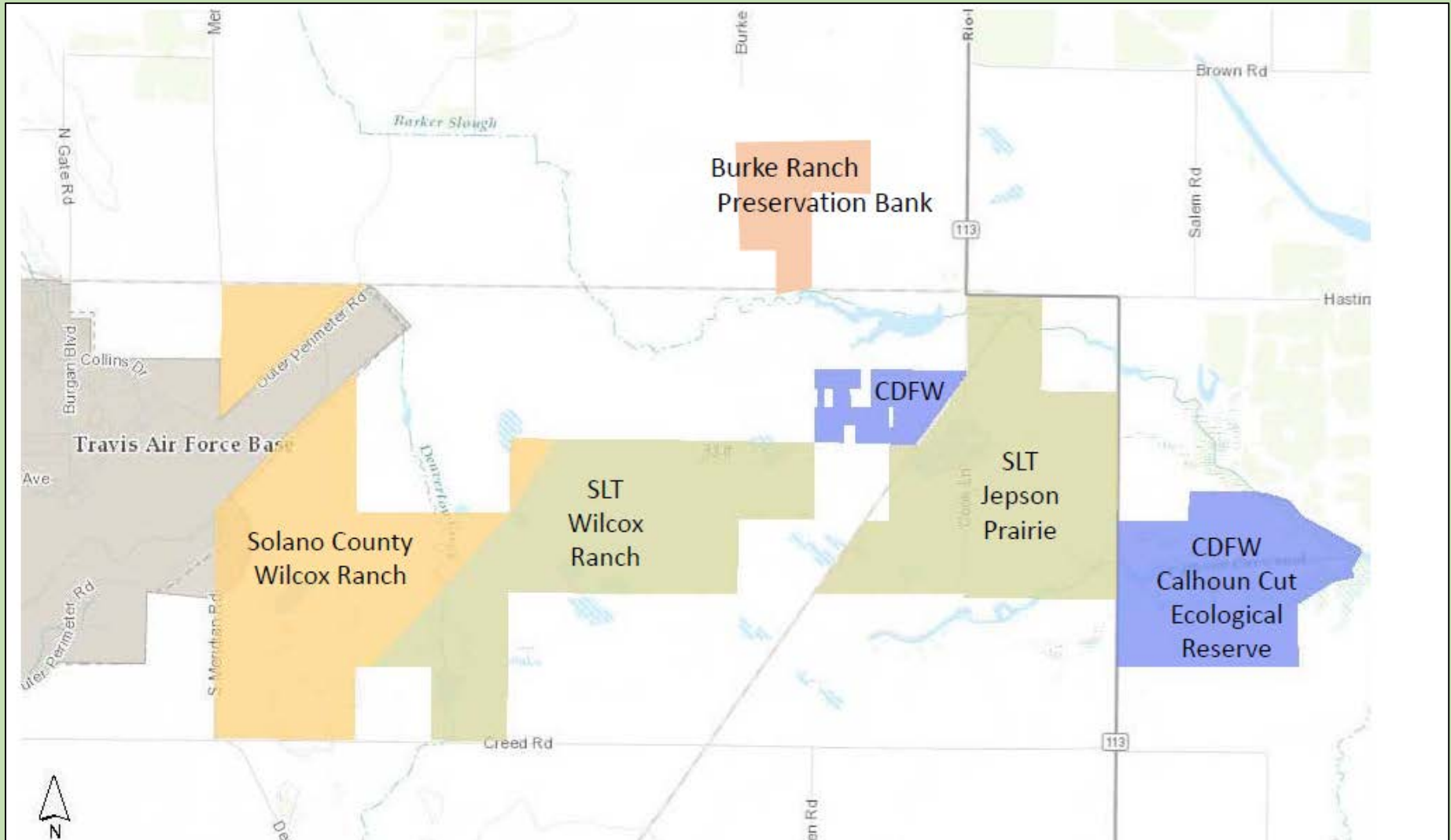
Conservation and Biological Diversity



In 1987 the Nature Conservancy transferred ownership of the property to the Solano Open Space and Farmlands Foundation; now Solano Land Trust



Today, Jepson Prairie is part of a nearly 7,000-acre regional complex of preserves in Solano County



Greater Jepson Prairie Ecosystem
Regional Management Plan



Prepared for:
Solano Land Trust
1001 Texas Street, Suite C
Fairfield, CA 94533
(707) 432-0150

Prepared by:
Carol W. Witham, Consulting
1141 37th Street
Sacramento, CA 95816
(916) 452-5440



December 29, 2006

2006 Greater Jepson Prairie Ecosystem Regional Management Plan

Prepared by Carol Witham – botanist, vernal
pool ecologist, and conservation advocate



“The purpose of the plan is to provide a framework for the long term management of the ecosystem and natural communities of the greater Jepson Prairie ecosystem within the context of existing land uses.”

Jepson Prairie is one of the best remaining examples of northern claypan vernal pools and California prairie habitat























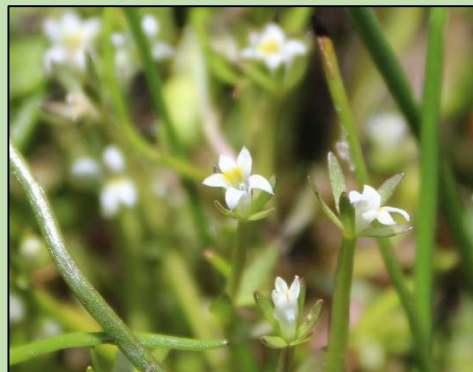








- Nearly 400 species of vascular plants
- 16 that are rare, threatened, or endangered



Over 130 Species of Birds



20 confirmed mammals with an additional 7 suspected or potential species



16 Species of Reptiles and Amphibians



**California Tiger Salamander -
Federal and Stated-Listed
Threatened Species**



Rare Vernal Pool Branchiopods



Conservancy Fairy Shrimp
(*Branchinecta conservatio*)
Federally-Listed
Endangered



Vernal Pool Tadpole Shrimp
(*Lepidurus packardii*)
Federally-Listed
Endangered



Vernal Pool Fairy Shrimp
(*Branchinecta lynchi*)
Federally-Listed
Threatened

Rare Vernal Pool Branchiopods



Conservancy Fairy Shrimp
(Branchinecta conservatio)
Federally-Listed
Endangered



Vernal Pool Tadpole Shrimp
(Lepidurus packardii)
Federally-Listed
Endangered



Vernal Pool Fairy Shrimp
(Branchinecta lynchi)
Federally-Listed
Threatened

Also:
Midvalley Fairy Shrimp
Branchinecta mesovallensis

Delta Green Ground Beetle
(*Elaphrus viridis*)
Federally-Listed Threatened



Research



Research has been going in at the site since the 1950's, when Beecher Crampton, an agronomist at the University of California Davis, first discovered a new species of grass – Solano Grass (*Tuctoria mucronata*) growing in the dry bed of Olcott lake.



Due to over collecting Solano Grass was extirpated from its type locality on Jepson Prairie – efforts are currently underway to reestablish the population

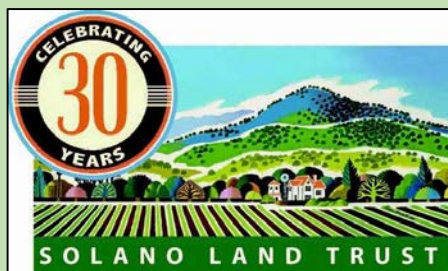




Natural Reserve System

UNIVERSITY OF CALIFORNIA

In 1983 TNC established a cooperative agreement with the University of California to manage educational and scientific activities on the preserve as part of the University's Natural Reserve System.



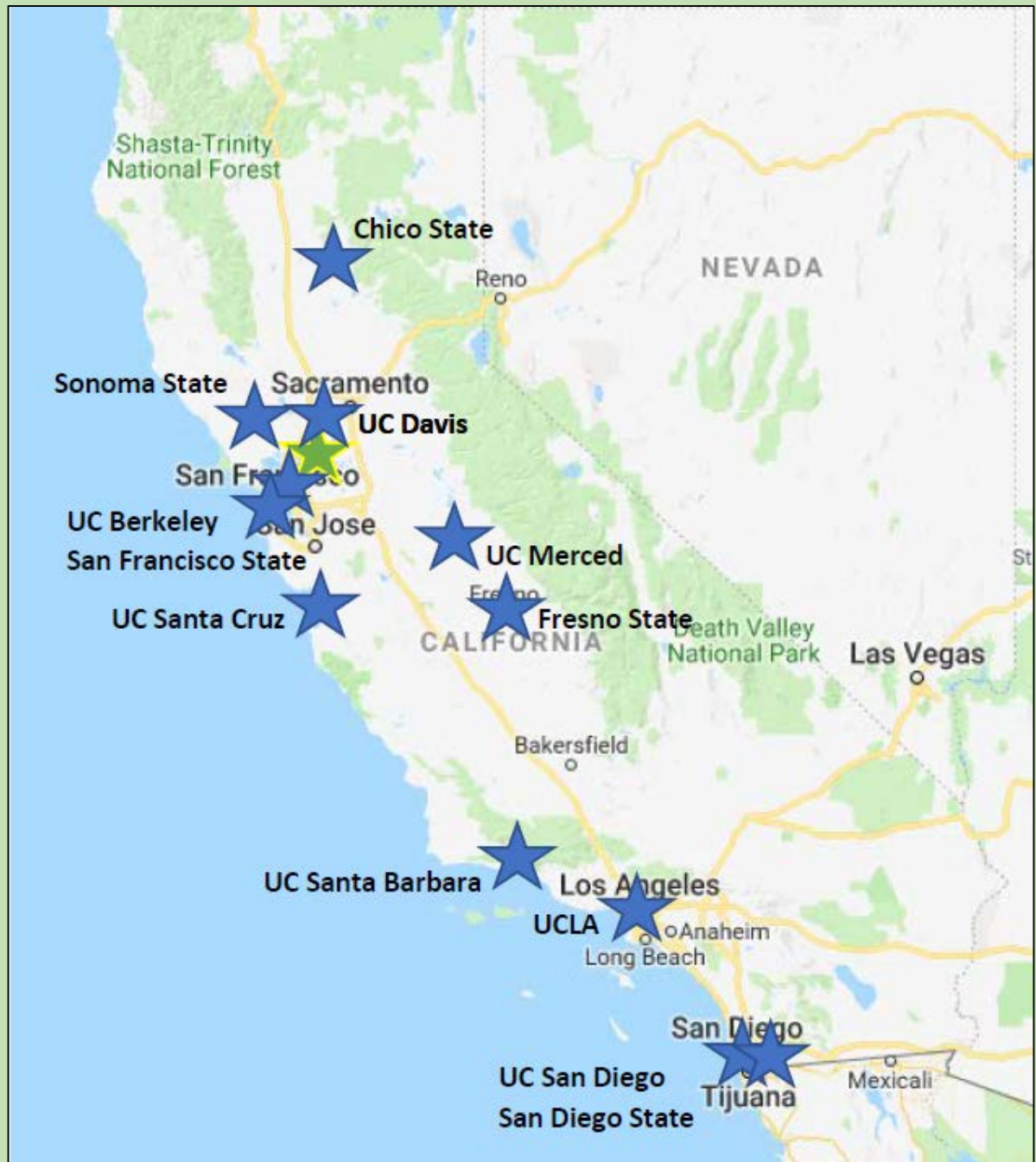
There are currently 143 research projects for Jepson Prairie in the UC Natural Reserve System Database



Reserve Research

Find descriptions of current and former research projects by searching the NRS's Reserve Application Management System (RAMS), which tracks reserve use.

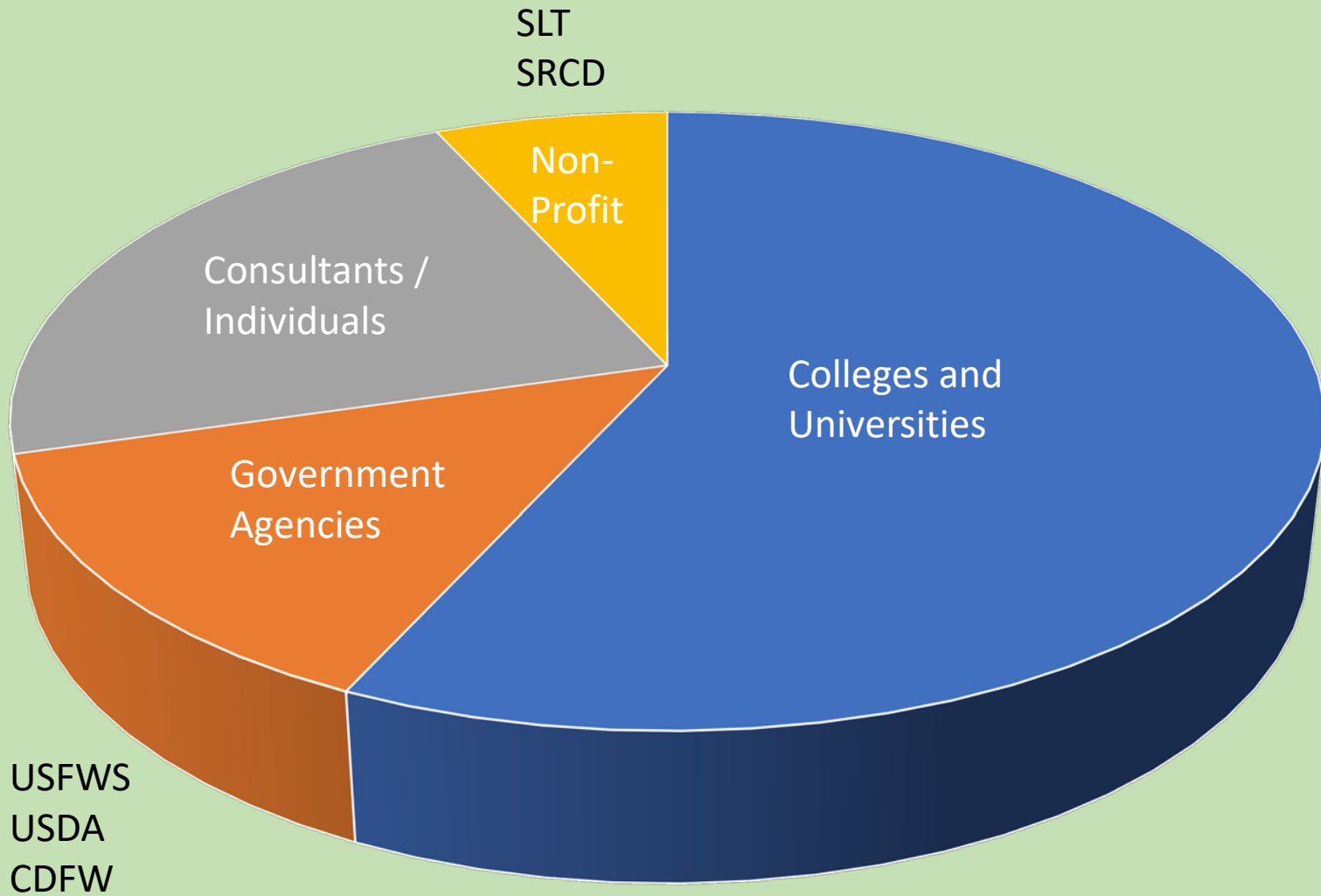
Students and faculty from 12 California State Colleges and Universities have done or are currently doing research at Jepson Prairie.



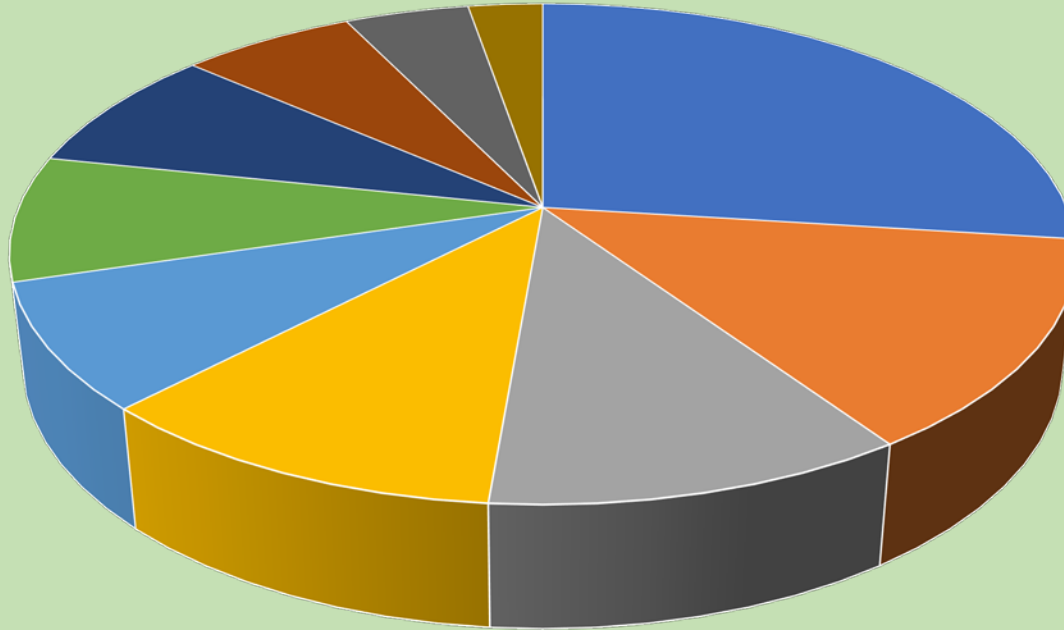
Eleven Universities from other states, the New York Botanical Garden, and the Canadian Department of Food and Agriculture also have current or previous research projects at Jepson Prairie .



Who is doing the research?



General Types of Research



■ Botany

■ Rare Plants

■ Vernal Pool Crustaceans

■ Plant Interactions

■ Plant Ecology

■ Invasive Species

■ Invertebrate Ecology

■ California Tiger Salamander

■ Soil Microbial Communities

■ Native Bees

Dr. Robin Thorp, an entomologist at U.C. Davis, has identified and described several new species of solitary bees.



Solitary bees are specialists that are solely dependent on one particular species of flower.



The female of *Andrena blennospermatis* collects pollen only from yellow carpet (*Blennosperma nanum*)

Photo: Lars Anderson



A doctoral dissertation on the interactions of a vernal pool plant and a specialist solitary bee pollinator demonstrated the importance of the adjacent uplands and the need to maintain intact vernal pool ecosystems.

The research highlighted the problem of creating artificial pools in landscapes that lack the native pollinators.



Photo: Lars Anderson



Photo: Lars Anderson



Population genetic diversity and structure of two rare vernal pool grasses in central California

Sarah P. Gordon • Christina M. Sloop • Heather G. Davis • J. Hall Cushman



Photo: Carol Witham

Colusa grass (*Neostapfia colusana*)
Federally-listed Threatened



Photo: Carol Witham

Solano grass (*Tuctoria mucronata*)
Federally-listed Endangered

California Tiger Salamander (*Ambystoma californiense*) State and Federally-Listed Threatened Species



Life history studies began in 2002 by Dr. Brad Shaffer and his students from the University of California, Davis

“The Jepson population is one of the largest and healthiest in existence, serving as a benchmark population from which we can learn basic biology for application to other, lesser known populations” - Brad Shaffer

California Tiger Salamander Life History



Photo: Lou Silva



Photo: Michael Van Hatten



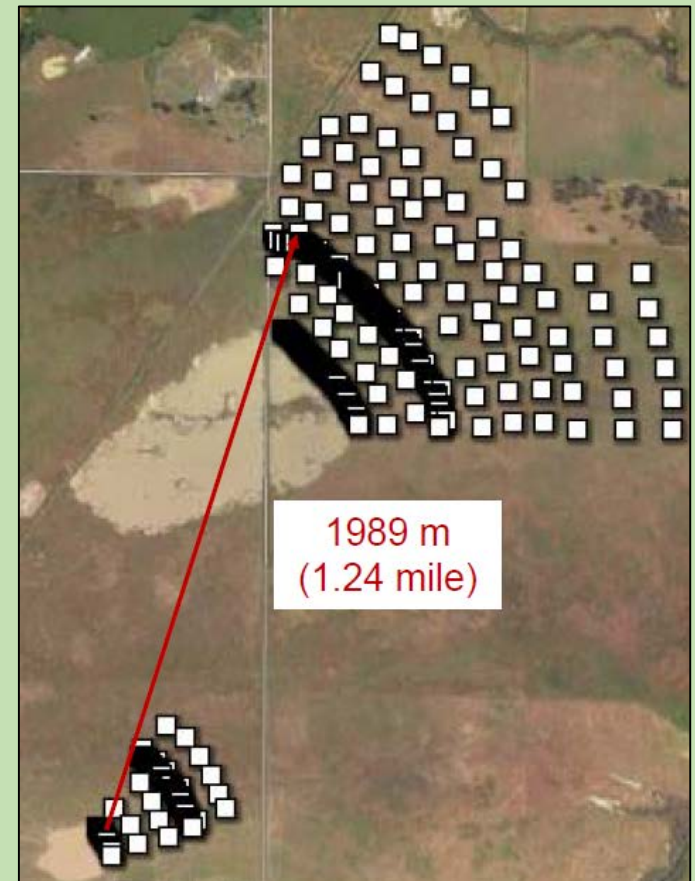
Photo: Gary Nafis



Photo: Chris Searcy



Drift fence array studies by Dr. Chris Searcy and others found adults may migrate over a mile from breeding ponds to upland burrow sites.



Research on CTS is ongoing and includes:

- Population and breeding studies
- Upland habitat Use
- Movement patterns



Carol Witham's long-term (> 20 Years) data collection on the population of Colusa grass (*Neostapfia colusana*) and the reintroduction of Solano Grass (*Tuctoria mucronata*) in Olcott Lake



A Few Examples of Other Research Projects



Genetic study of the morphological and ecological diversity of *Grindelia* spp.

– A. Moore, U.C. Berkeley



Effects of non-native brass buttons (*Cotula coronopifolia*) on vernal pool communities

– R. McKee, U.C. Davis

A Few Examples Of Other Research Projects



Restoration of rare vernal pool grasses
Neostapfia colusiana and
Tuctoria mucronata
– E. Gottschalk Fisher, CSU Chico



Adaptation and evolution of
reproductive barriers in goldfields
(*Lasthenia* spp.)
– J. Yost U.C. Santa Cruz

Adaptive Management Research

Management-related research projects include multi-year, multi-seasonal studies on the effects of grazing on the native perennial bunchgrasses, such as purple needlegrass (*Stipa pulchra*), and the effectiveness of managing invasive annual grasses such as Medusa head (*Elymus caput-medusae*)



Education

Faculty from the region's universities, colleges, and community colleges bring natural history, life sciences, wetland ecology, and even art classes to the preserve.



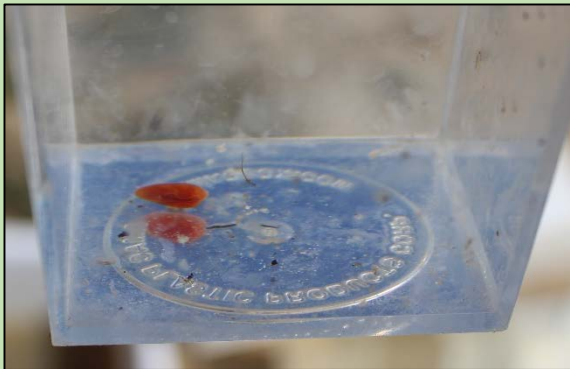


Docent Program Began in the early 1980's soon after the preserve was established.

Over 50 volunteer docents participate in leading public tours throughout the spring.



Docent Training Program



Docents go through an extensive training program to learn about the history, soils, botany, ecology, and management of the preserve.

“Public awareness of vernal pools has surged with news of threats to other vernal pool areas in the lower Sacramento Valley, and the Jepson Prairie is a location where interested people can satisfy their curiosity and learn more about vernal pools and their imperiled populations.” – Kate Mawdsley



Vernal Pool Landscapes and Soils



Aquatic Ecology



Plants



Photo: Roger Stephens



The Birds and the Bees



And we just enjoy the scenic views!



National Natural Landmark



The National Park Service has named Jepson Prairie a National Natural Landmark, a designation given to well-preserved sites that contain outstanding biological and geological resources and are exemplary in terms of rarity, diversity, and value to science and education.



Special thanks to:

- Solano Land Trust and the Jepson Docent Program
- The University of California Natural Reserve System
- Applied Technology and Science

