

The Other Clams: Native Freshwater Species in California



Jeanette Howard

Annual 2010
IEP Workshop
May 26, 2010

Non-native mussels in the news

Los Angeles Times | ARTICLE COLLECTIONS

Klondike Lake boat ban aims to keep mussel at bay

May 19, 2009 | Margot Roosevelt and Louis Sahagun

There's an uproar over the infamous freshwater quagga mussel at Klondike Lake, one of the few patches of water in the sprawling Owens Valley open to motorized recreation.

Tiny creatures, big problems for reservoirs

February 22, 2008 | Pete Thomas

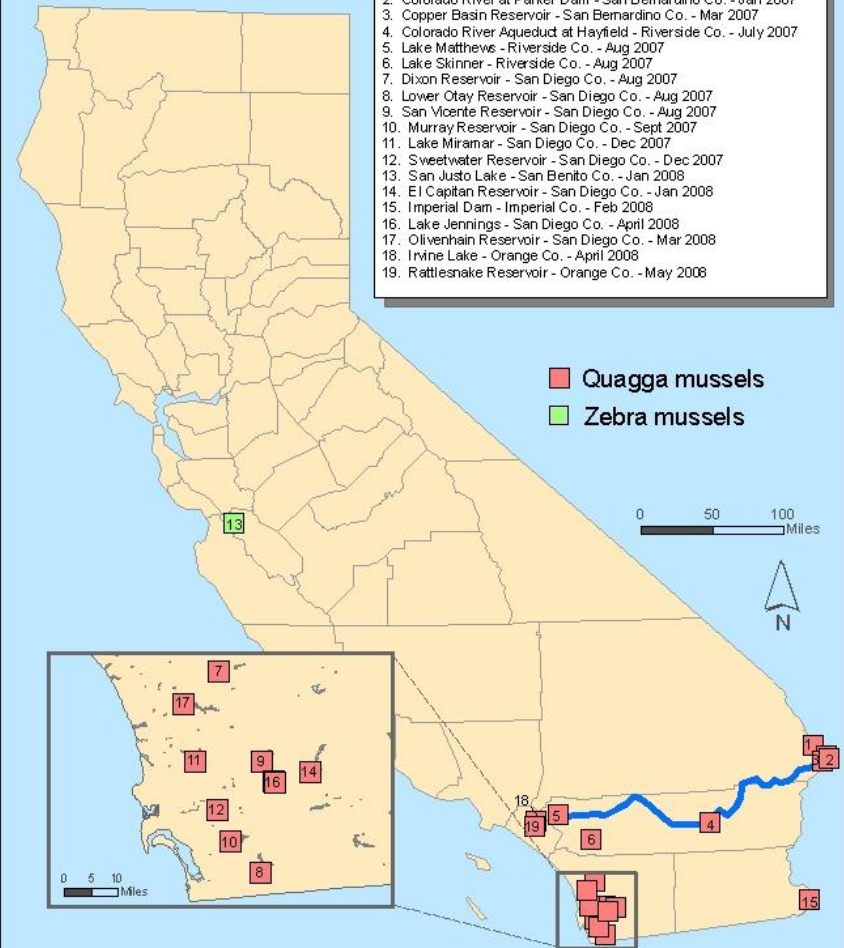
It's a spring-like morning at Lake Casitas and bass anglers sense that any day now the quarry they're so passionate about will begin to rise and aggressively feed.

QUAGGA AND ZEBRA MUSSEL SIGHTINGS DISTRIBUTION IN CALIFORNIA

2007 - 2008

LOCATIONS

1. Lake Havasu - San Bernardino Co. - Jan 2007
2. Colorado River at Parker Dam - San Bernardino Co. - Jan 2007
3. Copper Basin Reservoir - San Bernardino Co. - Mar 2007
4. Colorado River Aqueduct at Hayfield - Riverside Co. - July 2007
5. Lake Matthevs - Riverside Co. - Aug 2007
6. Lake Skinner - Riverside Co. - Aug 2007
7. Dixon Reservoir - San Diego Co. - Aug 2007
8. Lower Otay Reservoir - San Diego Co. - Aug 2007
9. San Vicente Reservoir - San Diego Co. - Aug 2007
10. Murray Reservoir - San Diego Co. - Sept 2007
11. Lake Miramar - San Diego Co. - Dec 2007
12. Sweetwater Reservoir - San Diego Co. - Dec 2007
13. San Justo Lake - San Benito Co. - Jan 2008
14. El Capitan Reservoir - San Diego Co. - Jan 2008
15. Imperial Dam - Imperial Co. - Feb 2008
16. Lake Jennings - San Diego Co. - April 2008
17. Olivenhain Reservoir - San Diego Co. - Mar 2008
18. Irvine Lake - Orange Co. - April 2008
19. Rattlesnake Reservoir - Orange Co. - May 2008



Why are NATIVE mussels interesting?

- ❑ Greatest diversity in North America
- ❑ Highly endangered
- ❑ Links with salmonids and other fishes
- ❑ Relatively stationary – continuously record environment
- ❑ Long-lived - (> 100 years)
- ❑ Provide link between pelagic and benthic environments
- ❑ Often largest biomass in benthic environment

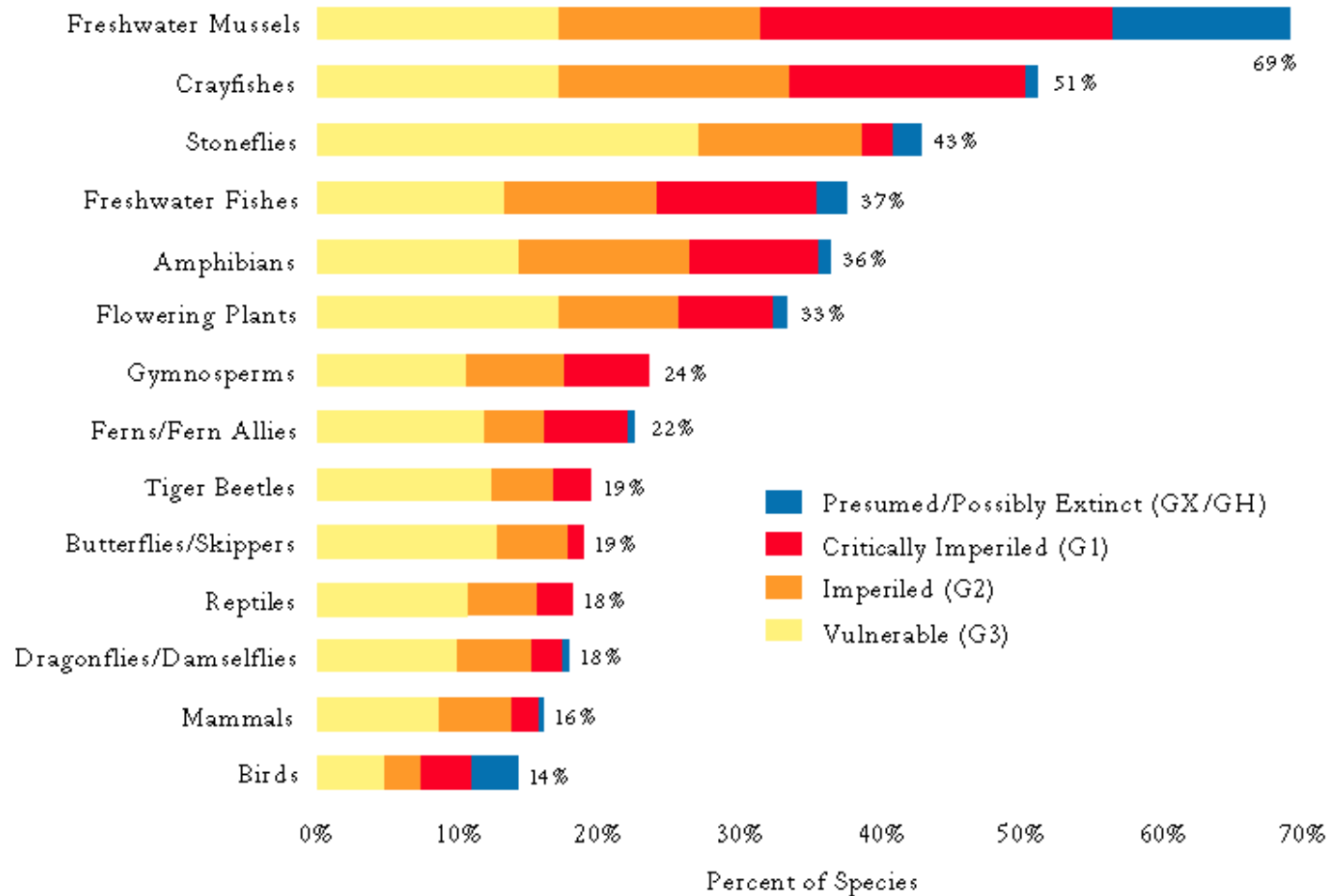


North American Mollusk Fauna

	Gastropoda	Bivalvia	Total
Families	14	5	19
Genera	85	58	143
Species	601	344	945

Most diverse freshwater molluscan fauna in the WORLD

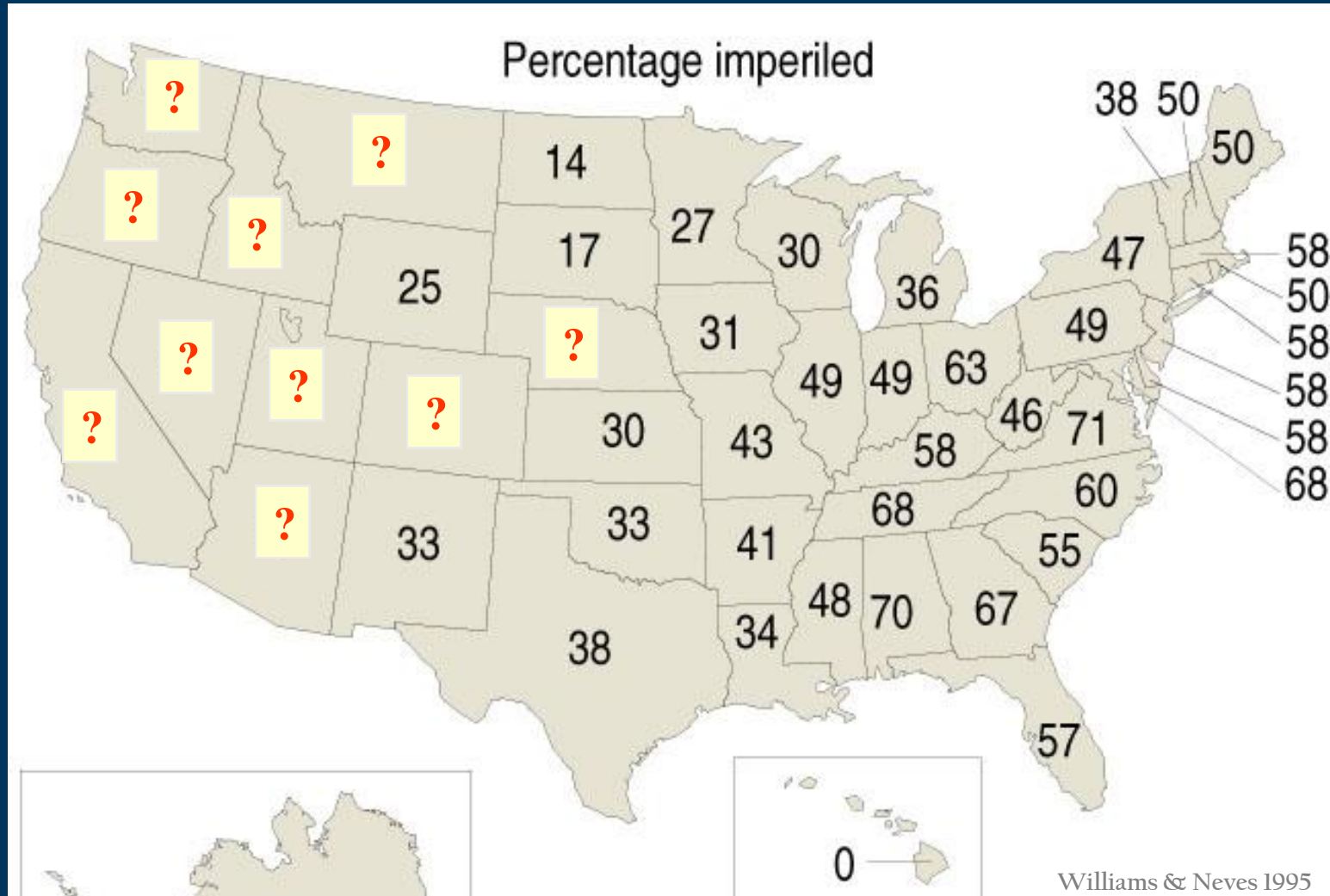
Species at risk by group



Lonely on the Western Frontier



Conservation Status



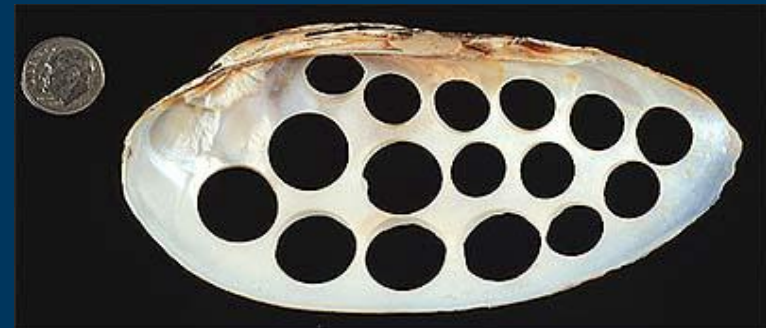
Commercial Use



Photograph by Clifton Adams, 1931, National Geographic Society



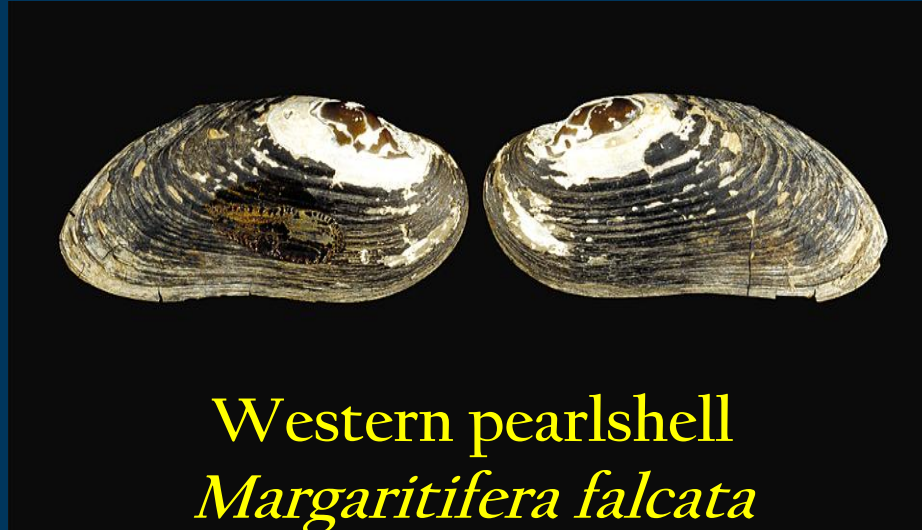
Photograph by Gary Andrashko, Illinois State Museum.



Photograph by Gary Andrashko, Illinois State Museum.

Freshwater mussel shells historically made into mother of pearl buttons

Western Species



Western pearlshell
Margaritifera falcata



Floater
Anodonta sp.



Western-ridged mussel
Gonidea angulata

Currently recognized Western Species:

Anodonta beringiana – Yukon floater (Middendorff 1851)

Anodonta californiensis - California floater (I. Lea 1852)

Anodonta dejecta - Woebegone floater (Lewis, 1875)

Anodonta kennerlyi - Western floater (I. Lea 1860)

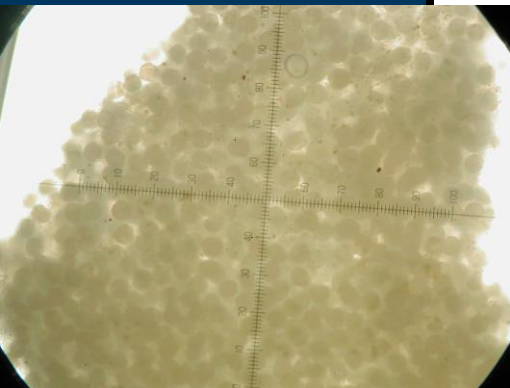
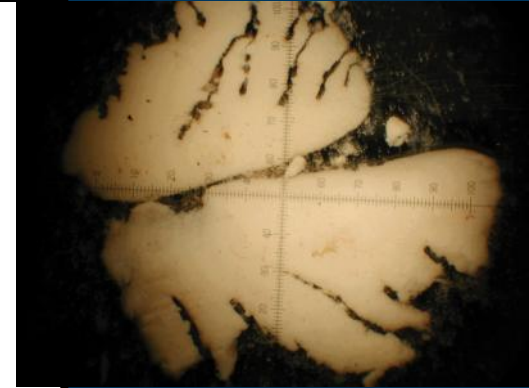
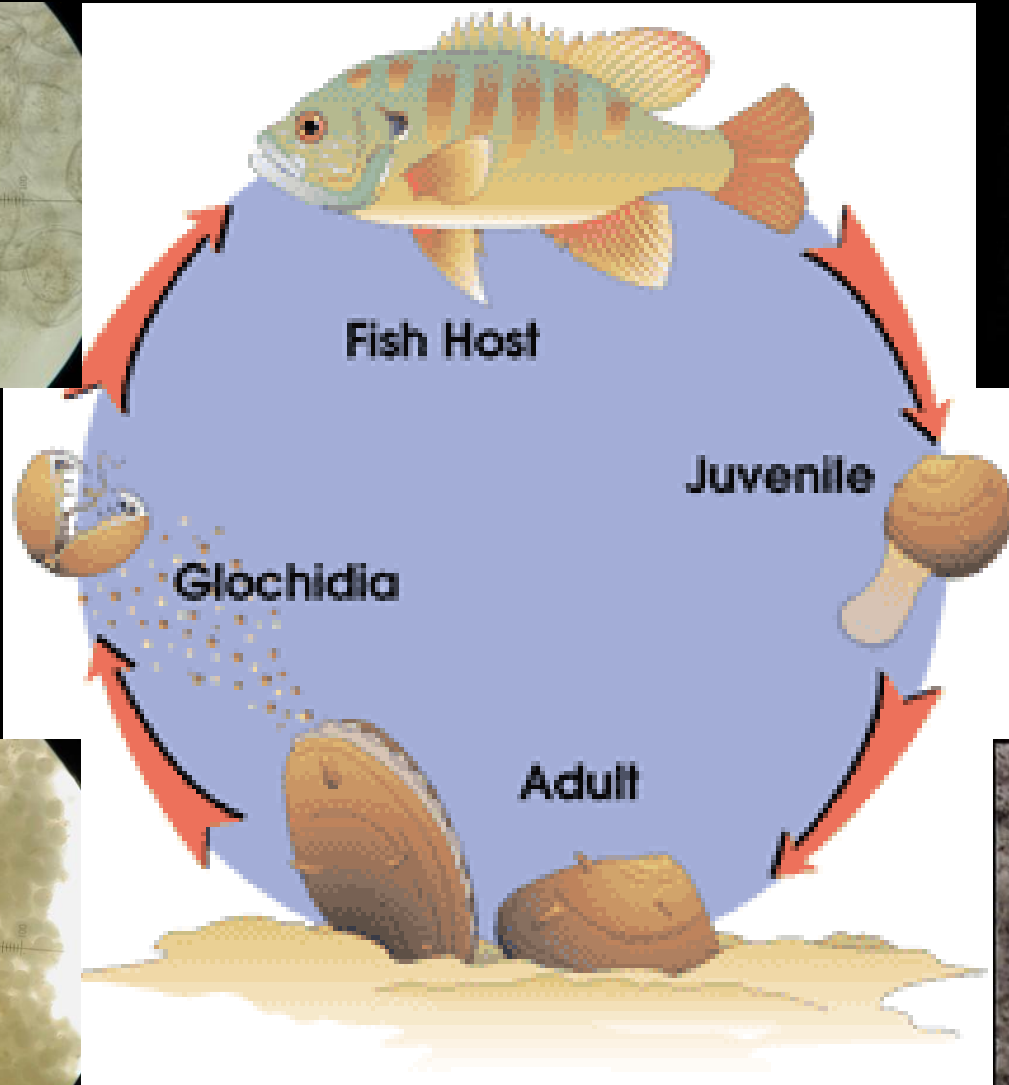
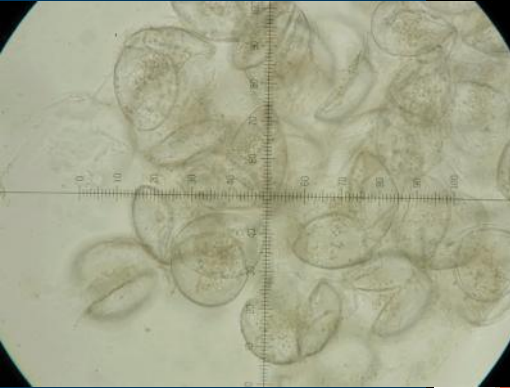
Anodonta nuttalliana - Winged floater (I. Lea 1838)

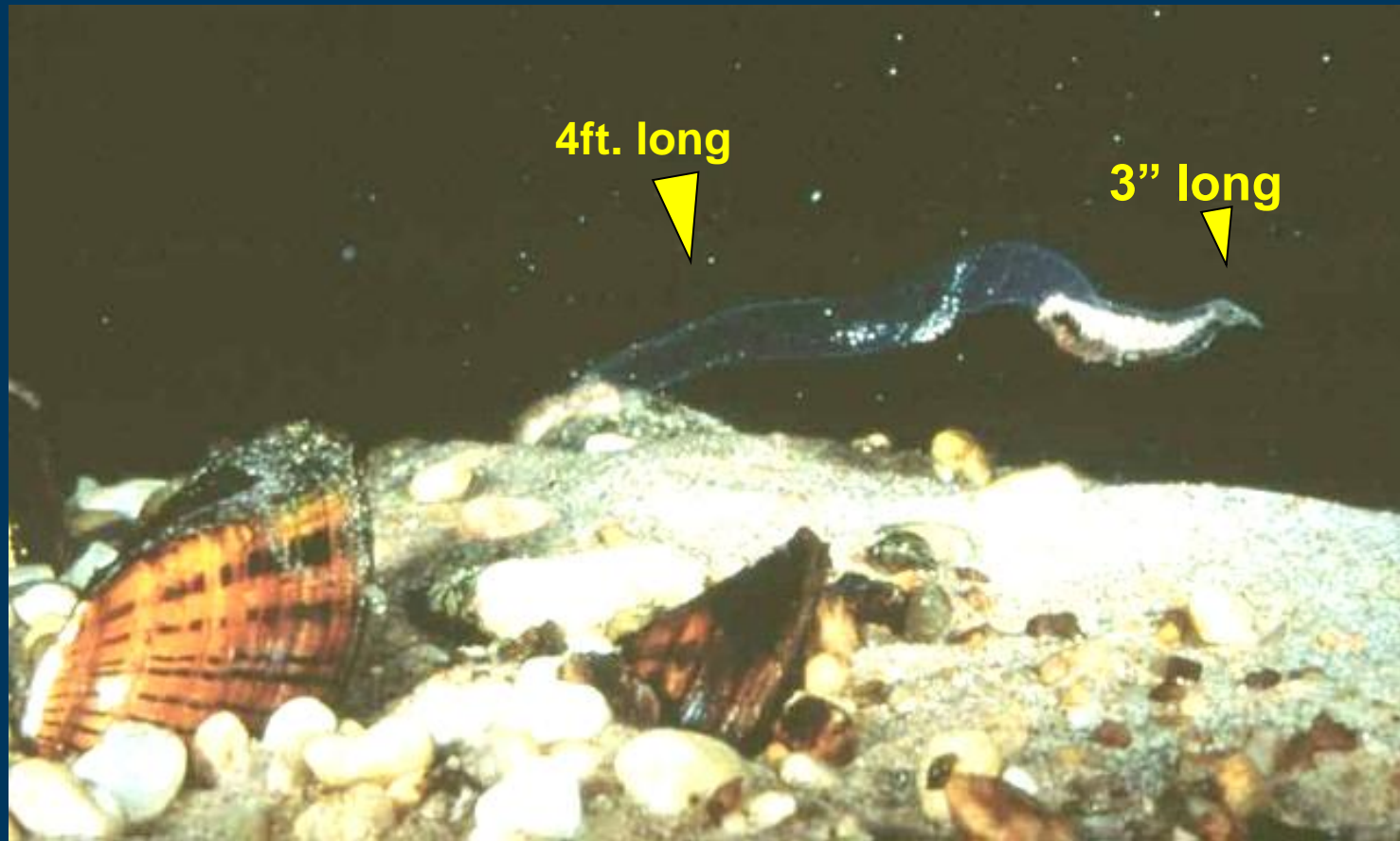
Anodonta oregonensis – Oregon floater (I. Lea, 1838)

Gonidea angulata – Western ridged mussel (I. Lea 1838)

Margaritifera falcata – Western pearlshell (Gould, 1850)

Freshwater Mussel Life Cycle





Lampsilis subangulata – Shinyrayed pocketbook

Described by Isaac Lea in 1840

Super conglutinate lure discovered in 1994



Photo by Shane Ruessler,
USGS, SFSC, Gainesville,
FL



Photo by Shane Ruessler, USGS,
FCSC, Gainesville, FL



Villosa iris
Swan Creek, Taney Co., Missouri
Copyright © 1999 Wm. Roston

What they do:

- Improve water quality
- Act as conveyer belts – transport nutrients from water column to benthos
- Influence macroinvertebrate community
- Stabilize substrate



What is potentially lost as their numbers decline?

Current Project Objectives

Develop understanding of distribution, species diversity and abundance of freshwater mussels at historical sites throughout California.



Museum Collections

Smithsonian (Washington DC)

Academy of Natural Sciences (Philadelphia)

California Academy of Sciences (SF)

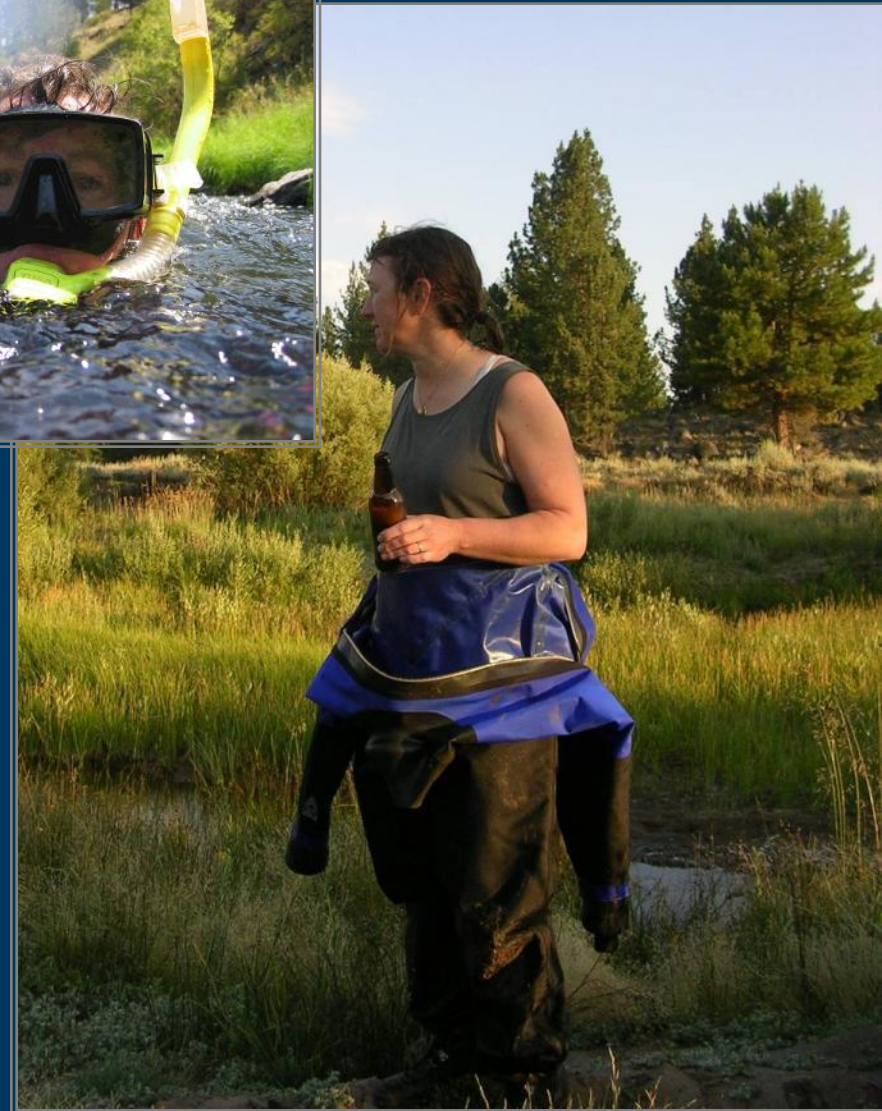
Published and gray literature records



Methods: Current Status

Field Surveys:

- Snorkel
- Scuba
- Timed searches
- At least 5 geomorphic units



Results: Historical Records

400 total historical records (pre 1995):

- 152 Cal Academy, San Francisco
- 53 Smithsonian, Washington DC
- 40 Academy of Natural Sciences, Philadelphia
- 153 Published
- 2 Personal communication



Results: Historical Records

400 total historical records yet only 114 separate historical collection sites (multiple records from individual sites)

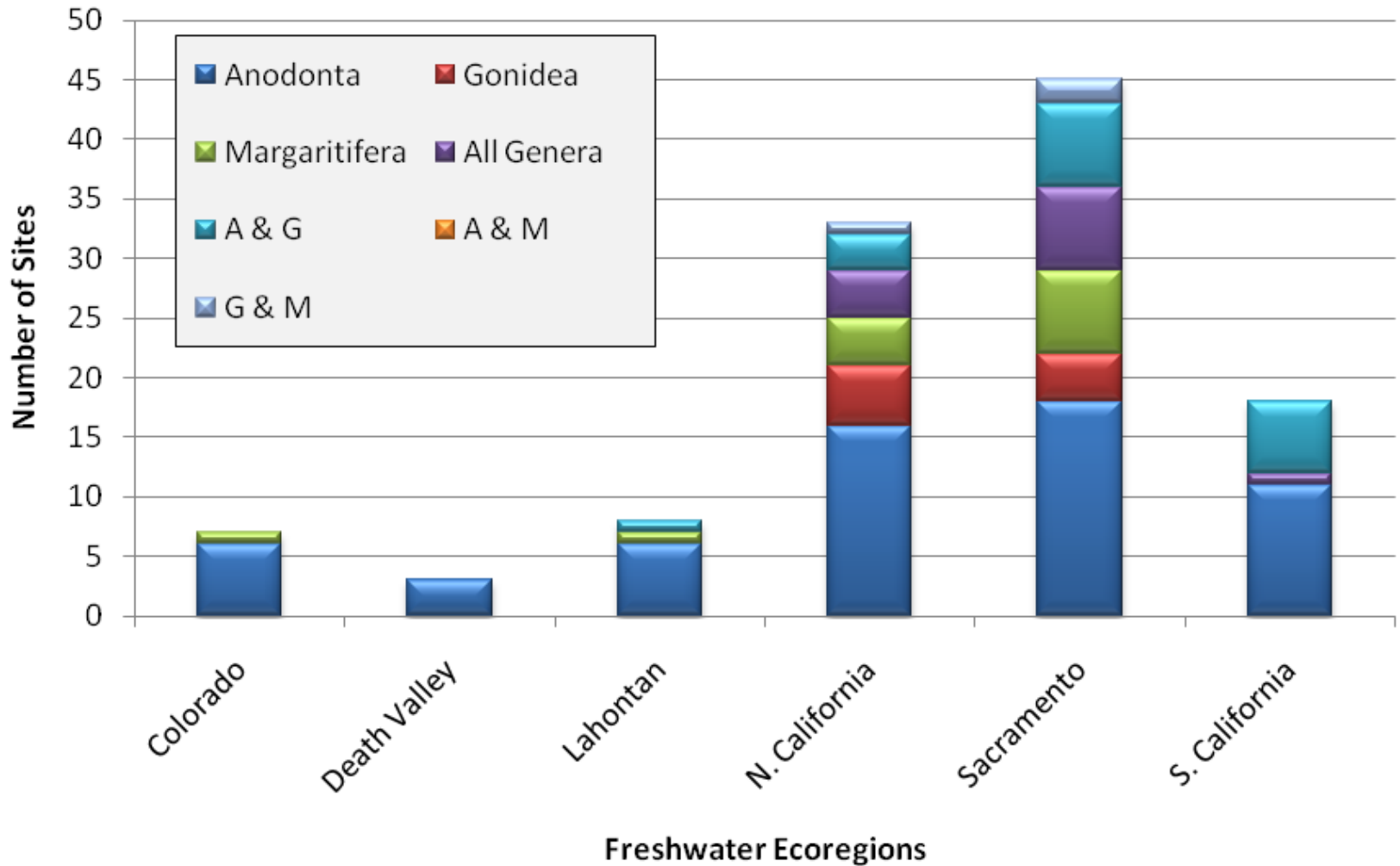


Results: Historical Records

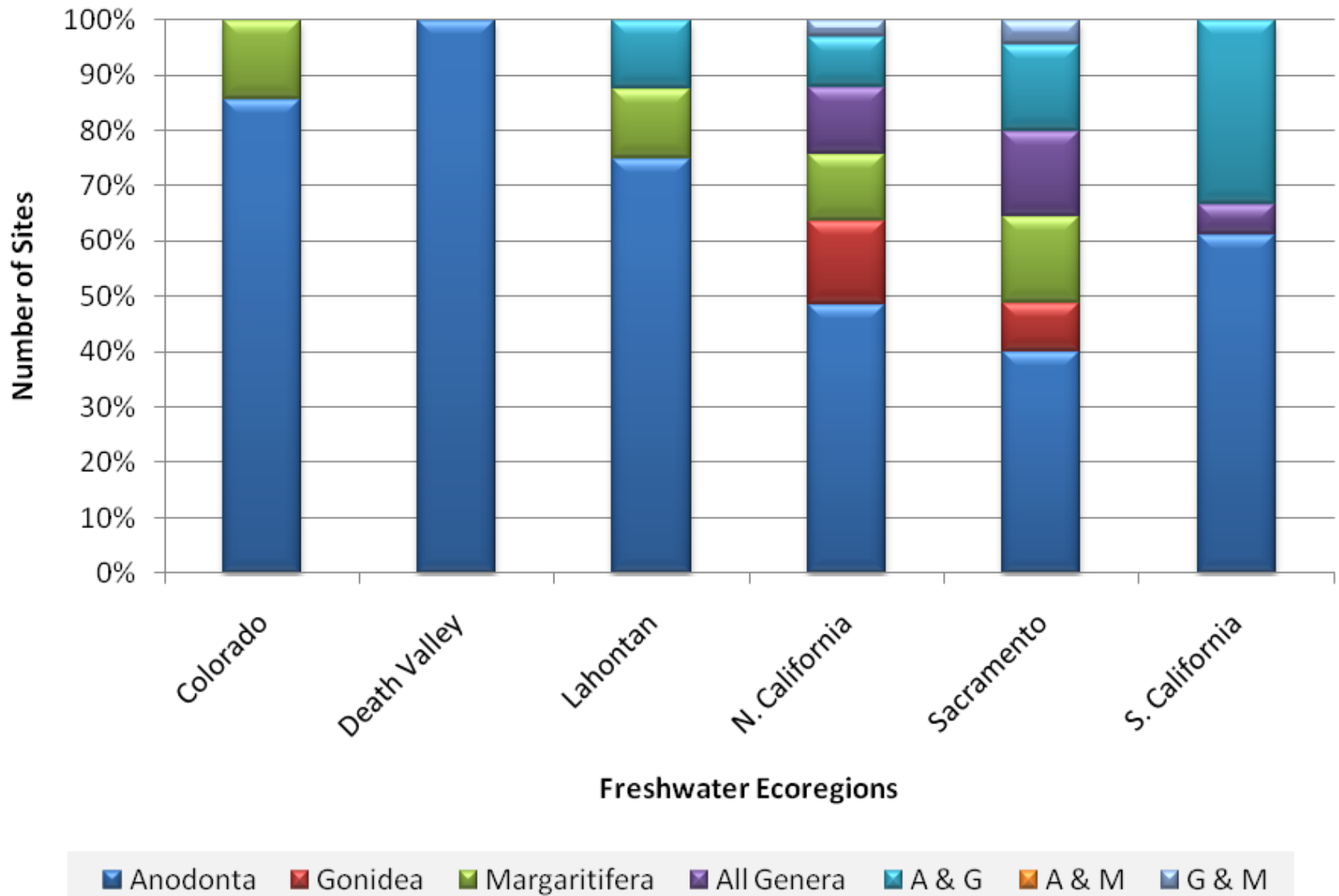
Oldest records:

Date	Data Source	Species	Location
1877	Smithsonian	<i>Anodonta nuttaliana</i>	Sierra Valley
1892	Cal Academy	<i>Anodonta wahlamatensis</i>	Mountain Lake, San Francisco
1897	Cal Academy	<i>Gonidea angulata</i>	Russian River near Wall Springs near Forestville

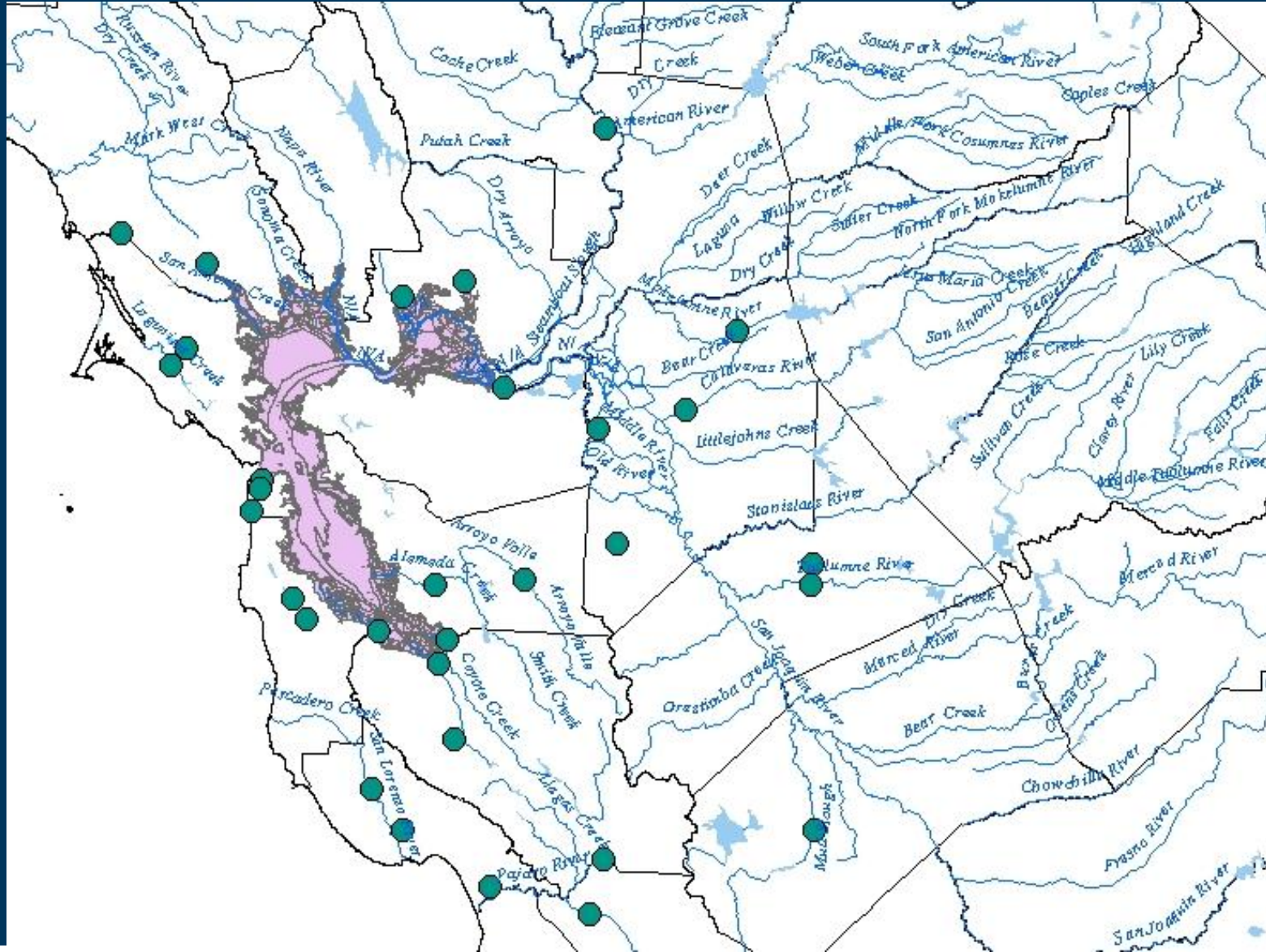
Results: Historical Sites



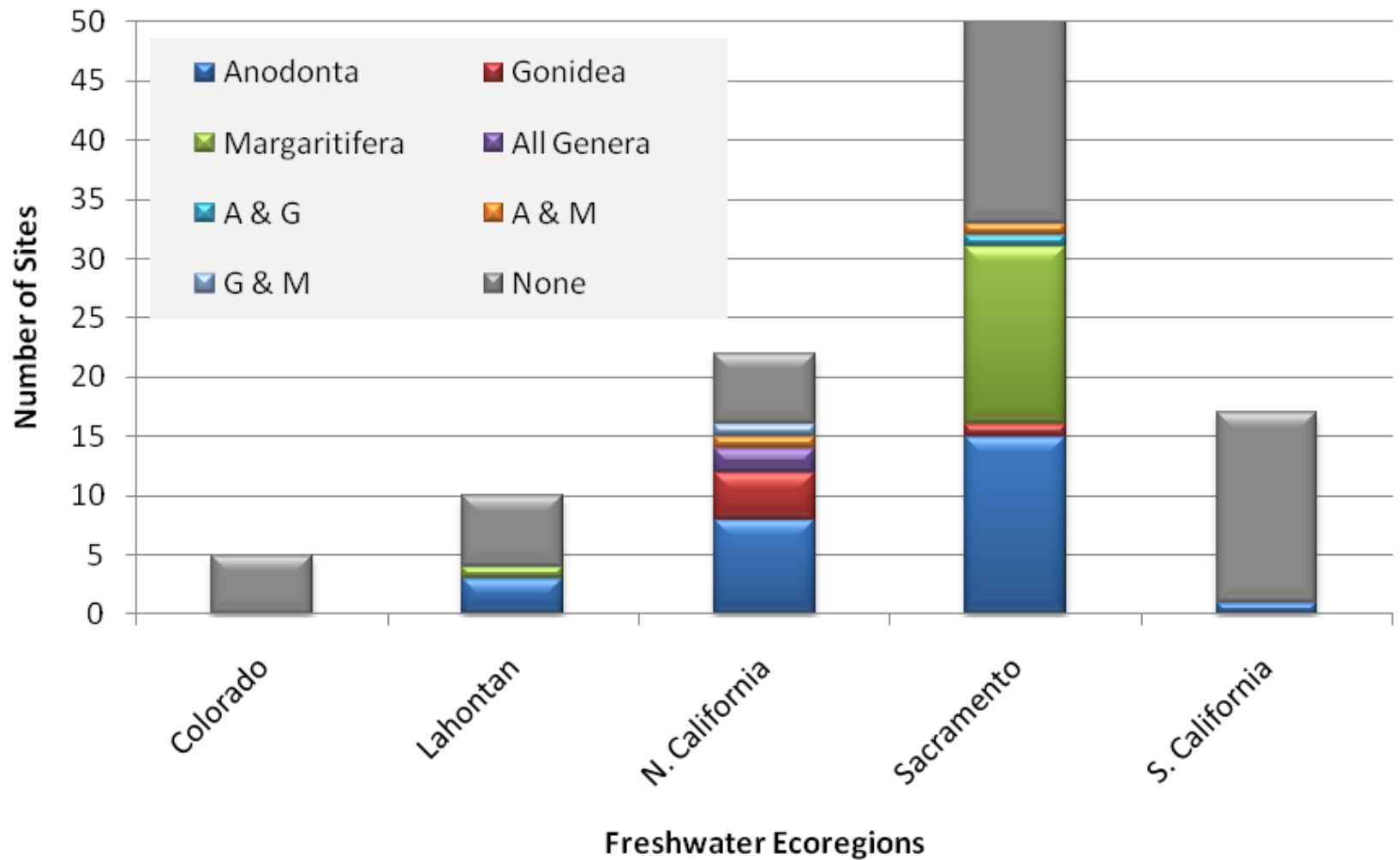
Results: Historical Sites



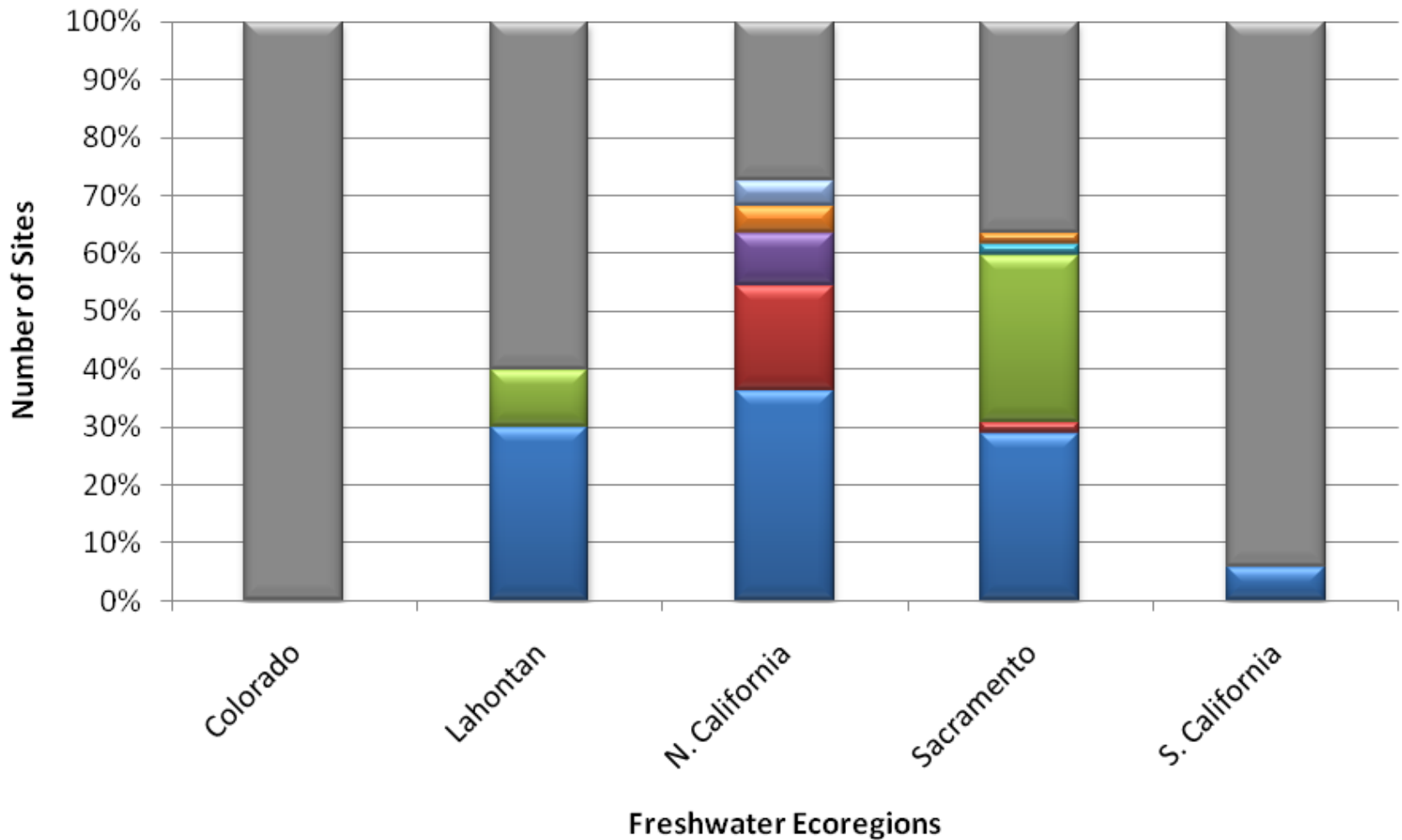
Results: Historical sites Delta region



Results: Field Surveys

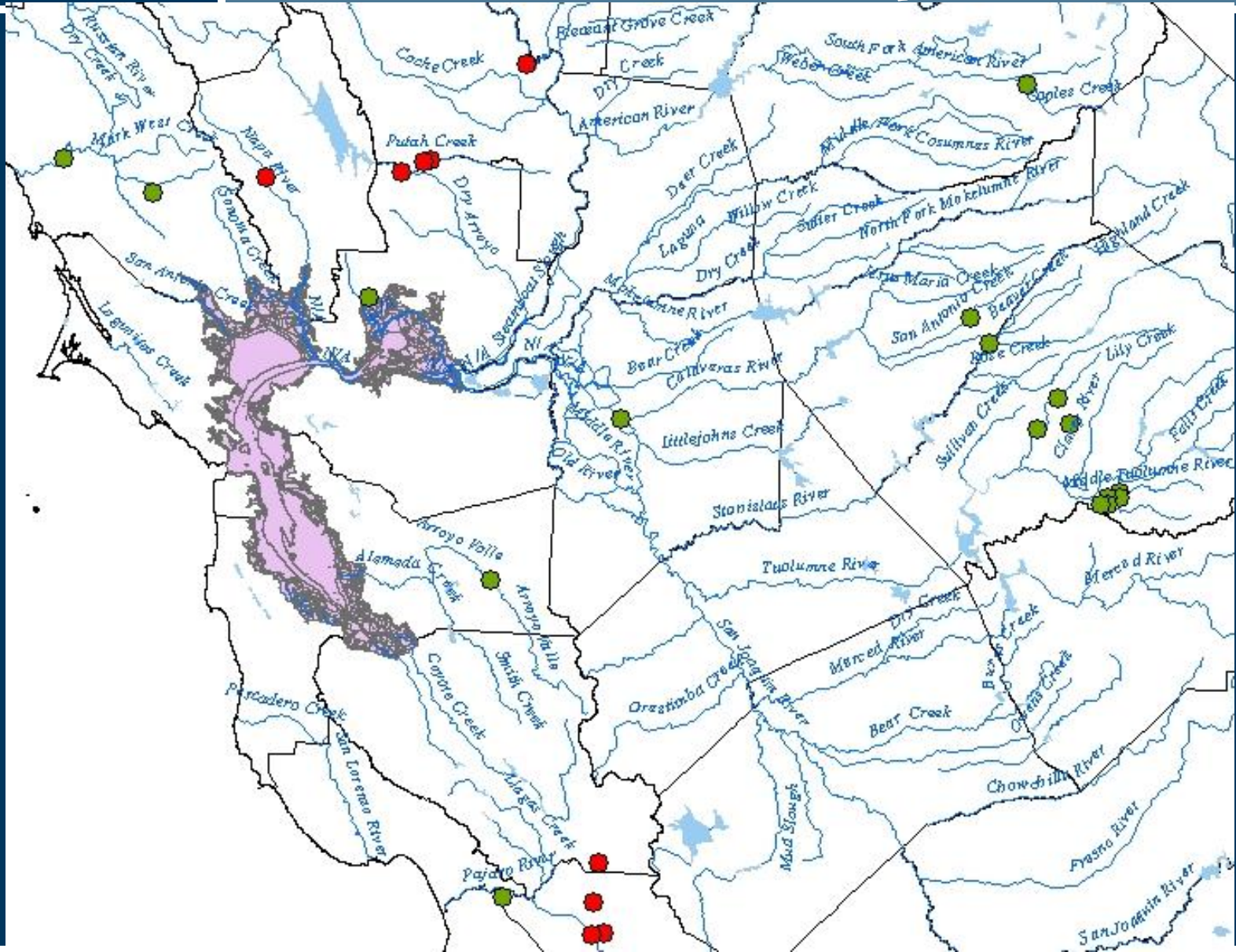


Results: Field Surveys

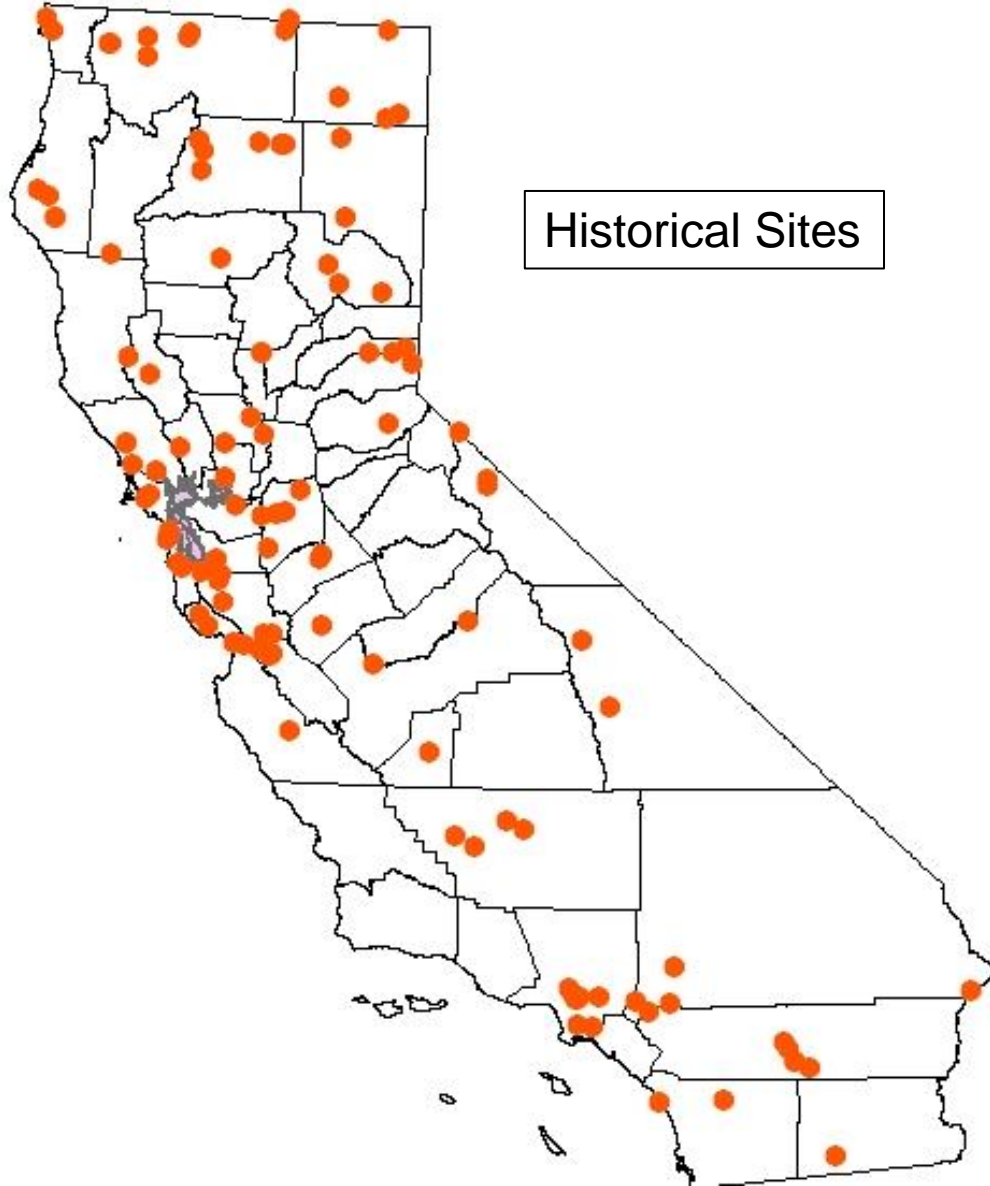


■ Anodonta
 ■ Gonidea
 ■ Margaritifera
 ■ All Genera
 ■ A & G
 ■ A & M
 ■ G & M
 ■ None

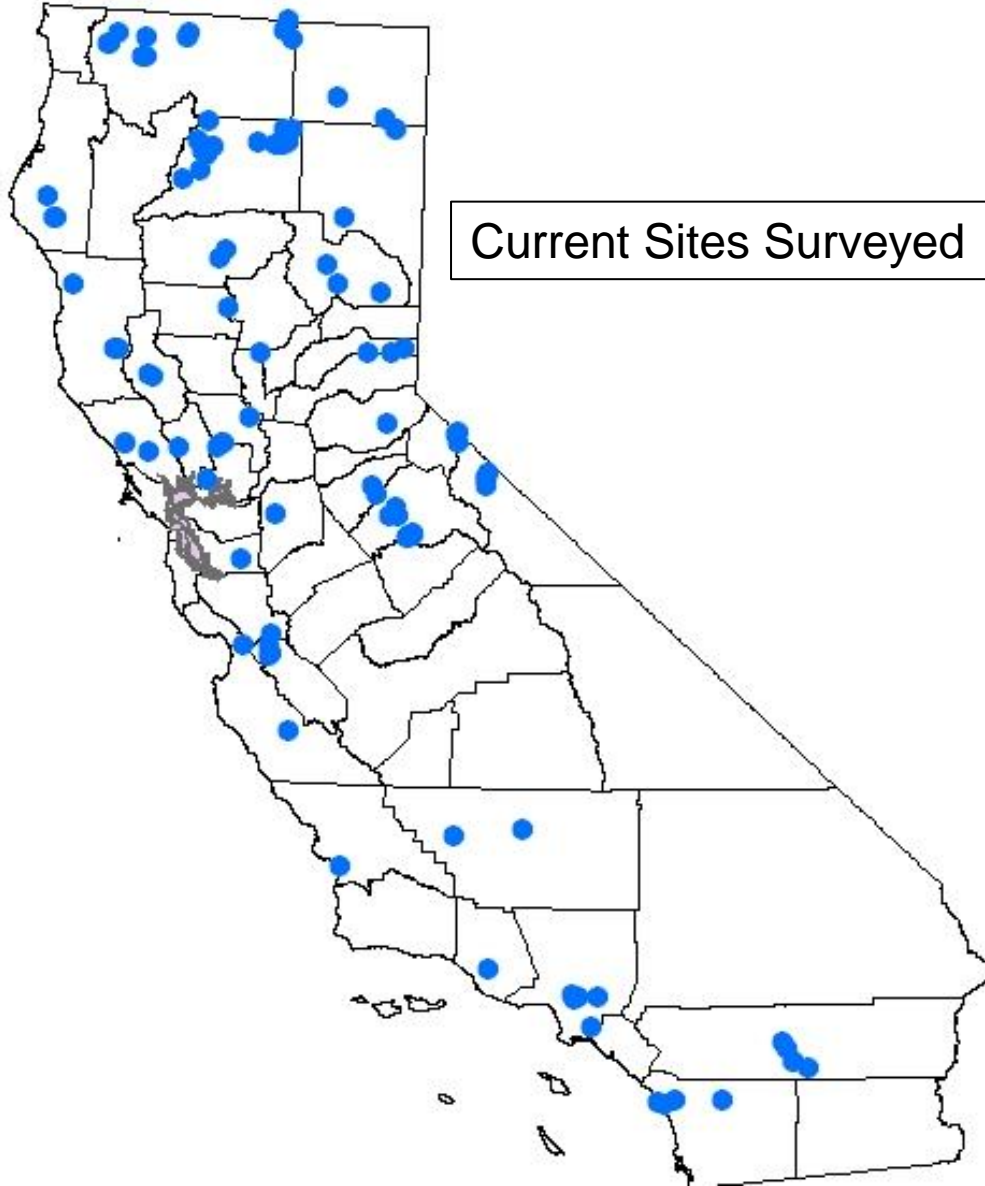
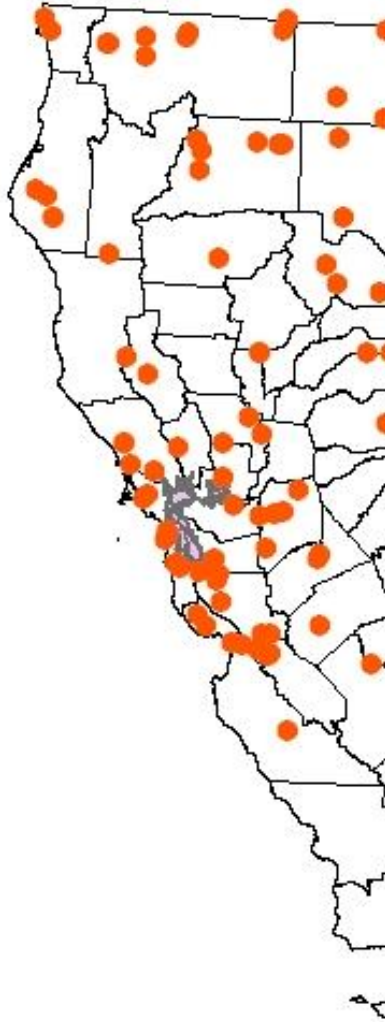
Results: Field Surveys Delta region



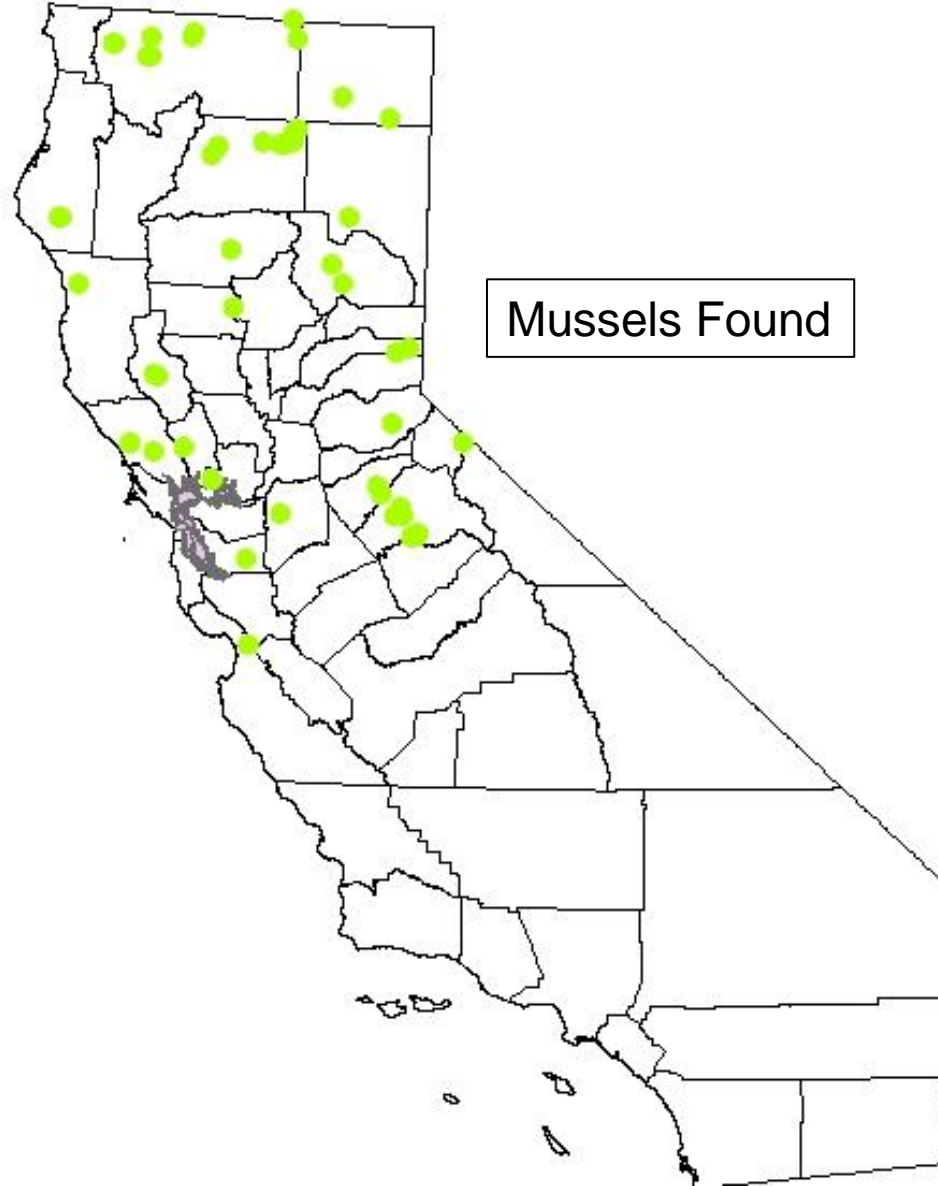
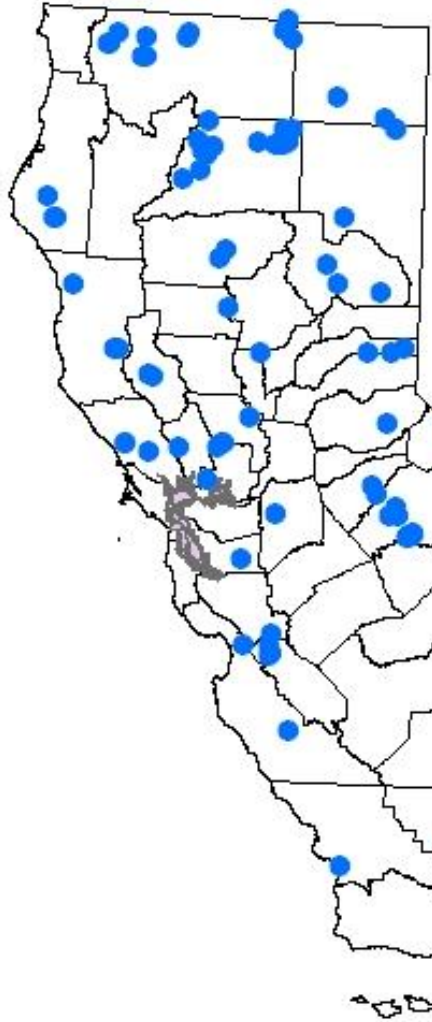
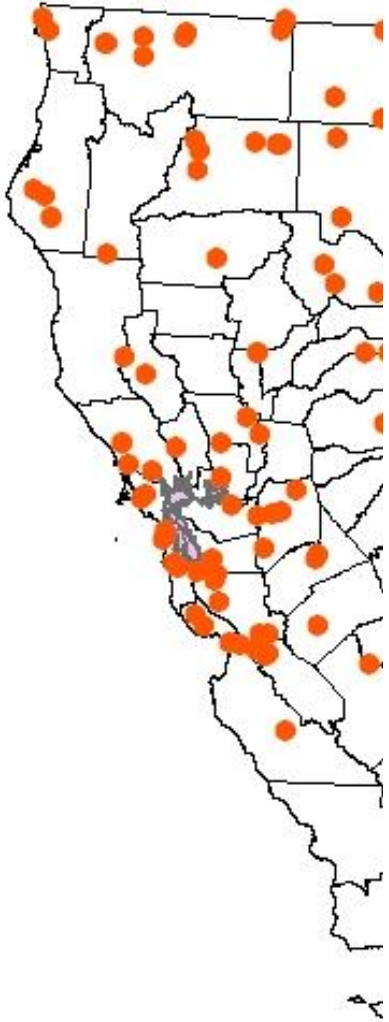
Results



Results



Results



Recap

- 400 historical records of mussels in CA (35 records too general to find sample rivers/sites)
- 114 historical sites
- 104 sites surveyed, including 59 historical locations
- Mussels founds at 50% of sites (n=54)
- Declining abundance at historical sites

Thank You

Joseph Furnish, USFS
Karen Mock, Utah State
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Jayne Brim Box
Laurie Bushman
Jordan Gold
Steve Novotny
Maria Ellis
Laurie Haley



Report and data available. Please contact Jeanette Howard at jeanette_howard@tnc.org

