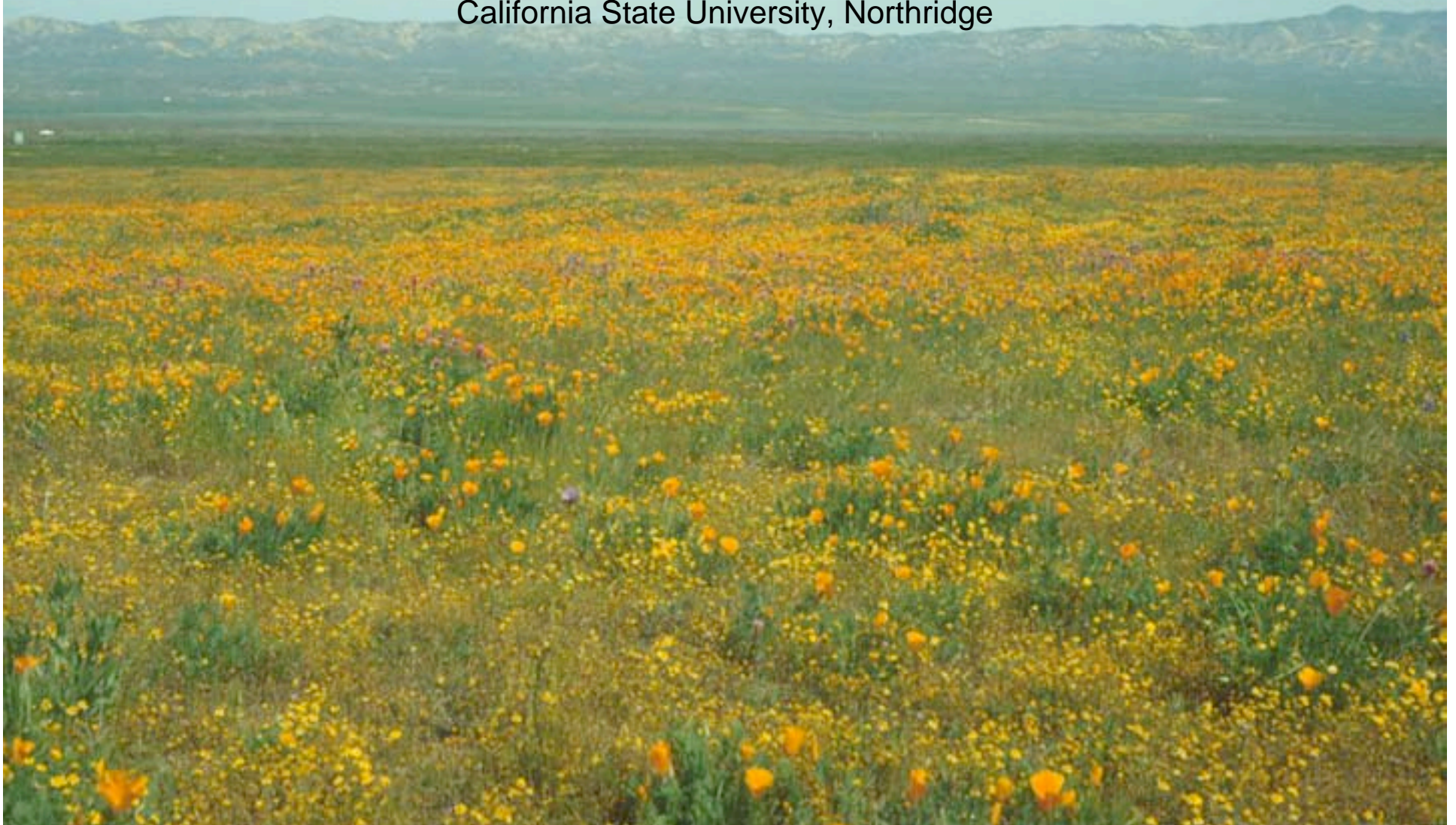
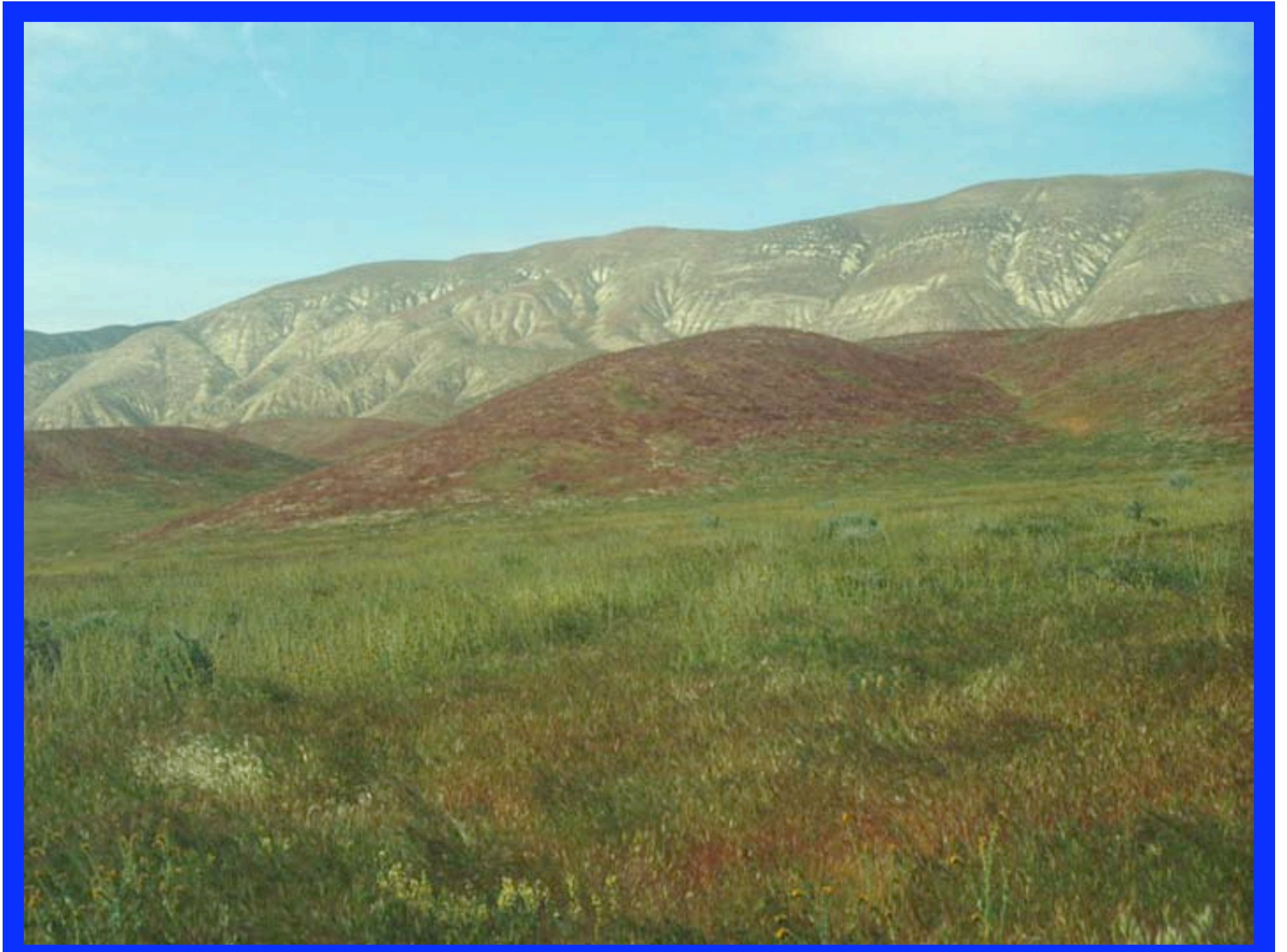


# The Role of Animals and Disturbance in Plant Invasions: Lessons from the Carrizo Plain

Paula Schiffman  
Department of Biology  
California State University, Northridge

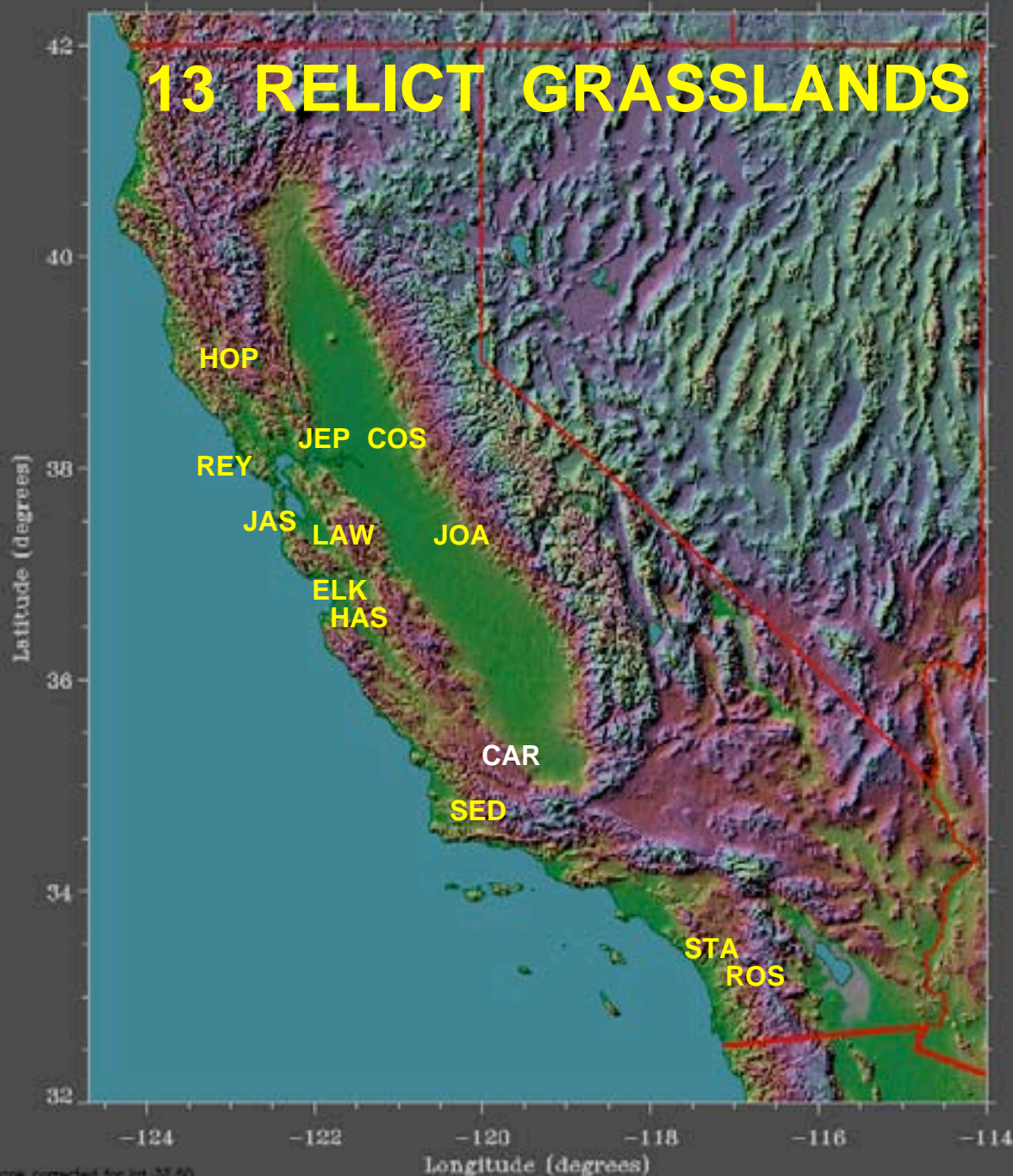




# non-native invaders



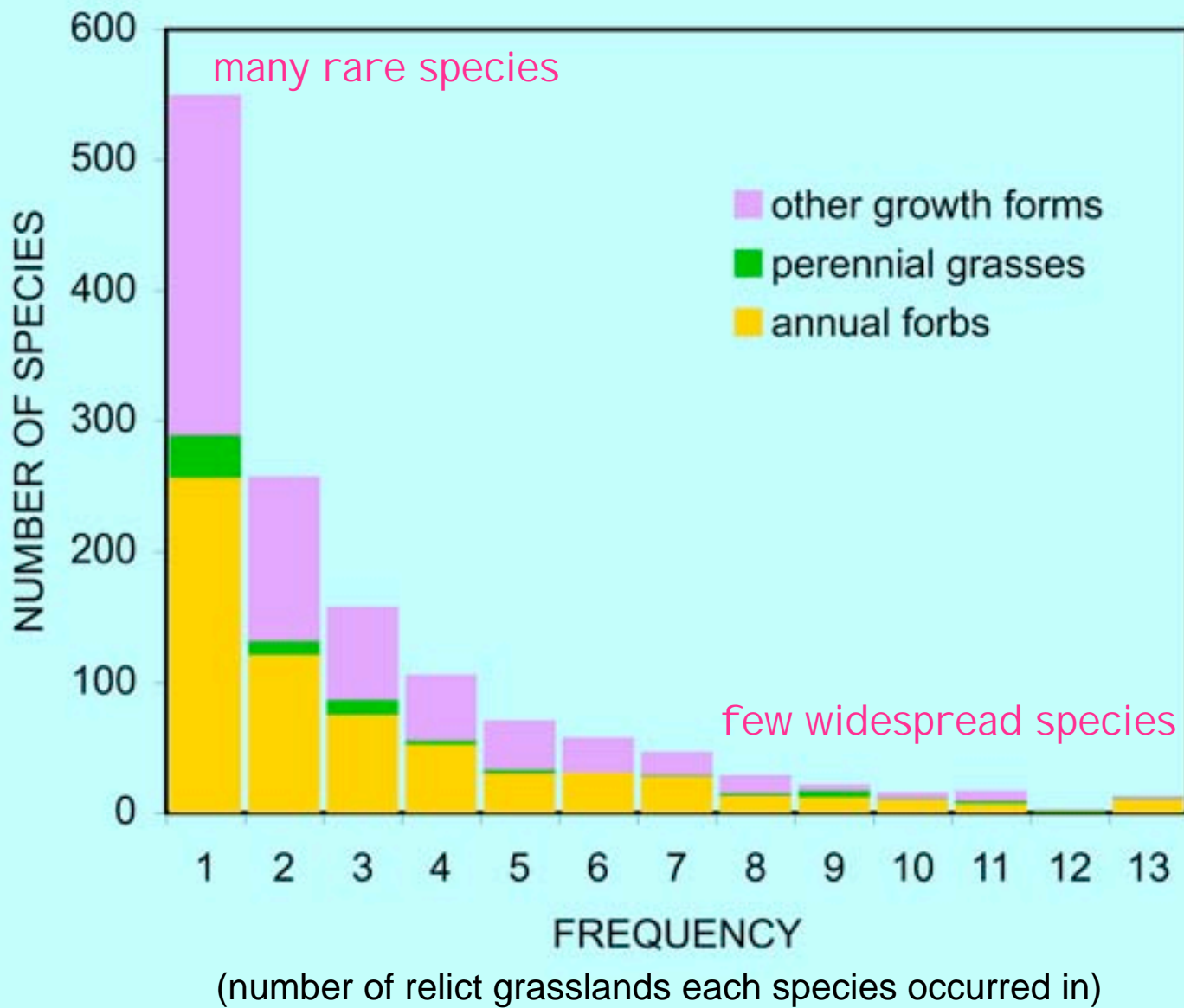
# 13 RELICT GRASSLANDS

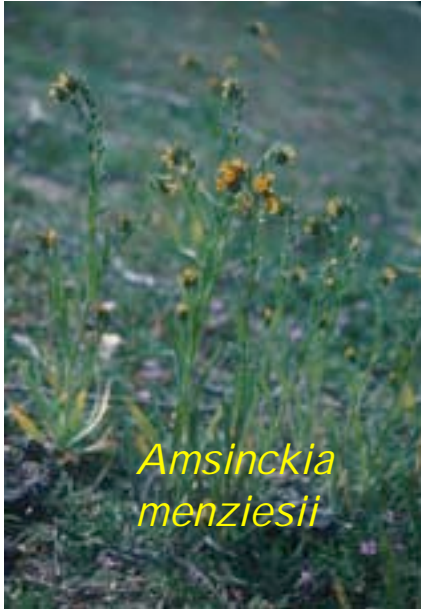


- **HOP** - Hopland Research and Extension Center
- **COS** - Cosumnes River Preserve
- **JEP** - Jepson Prairie Reserve
- **REY** - Point Reyes National Seashore
- **LAW** - Lawrence Livermore National Laboratory Site 300
- **JAS** - Jasper Ridge Biological Preserve
- **JOA** - San Joaquin Experimental Range
- **ELK** - Elkhorn Slough National Estuarine Research Reserve
- **HAS** - Hastings Natural History Reservation
- **CAR** - Carrizo Plain National Monument
- **SED** - Sedgwick Reserve
- **STA** - Starr Ranch Sanctuary
- **ROS** - Santa Rosa Plateau Ecological Reserve

Slope corrected for lat 37.50

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*Amsinckia menziesii*



*Claytonia perfoliata*



*Eschscholzia californica*



*Lasthenia californica*



*Juncus bufonius*



*Lotus wrangeliansis*



*Crassula connata*



*Calandrinia ciliata*



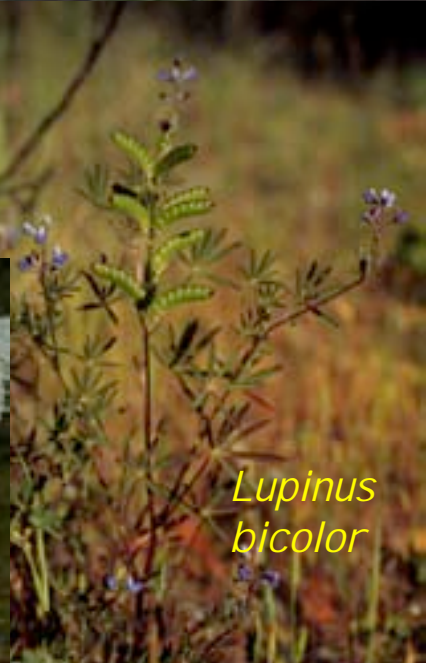
*Mimulus guttatus*



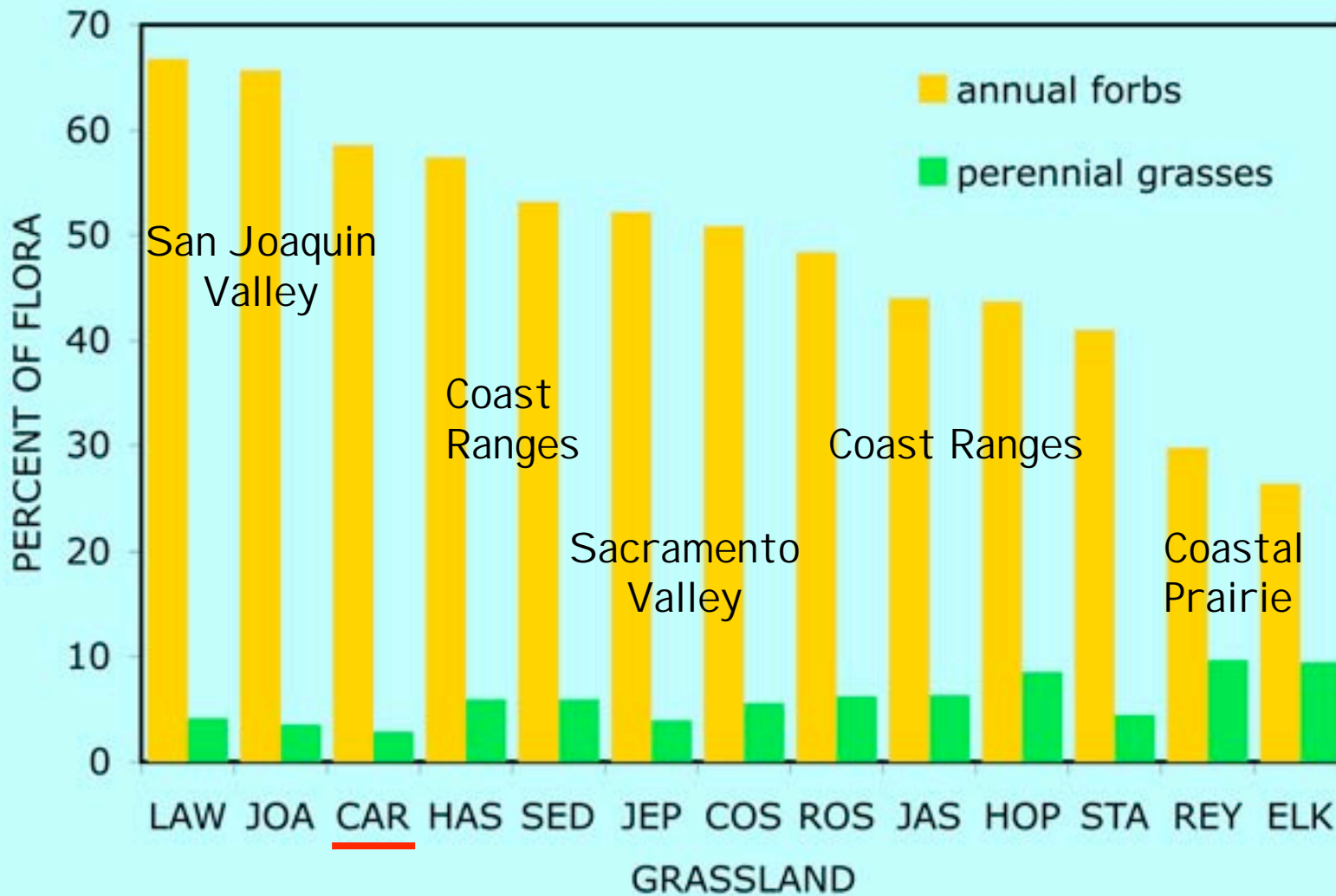
*Trifolium willdenovii*



*Achillea millefolium*

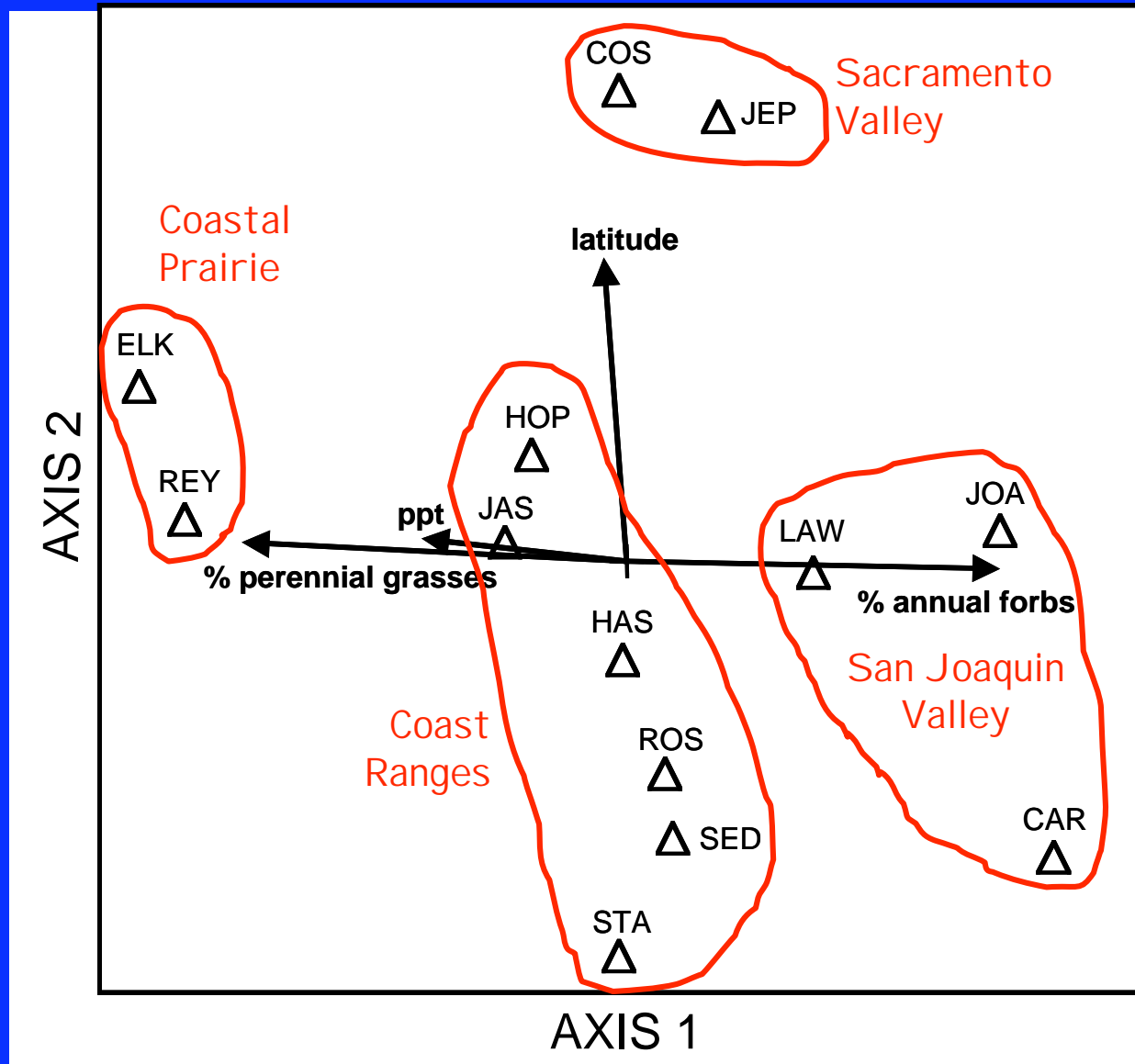


*Lupinus bicolor*



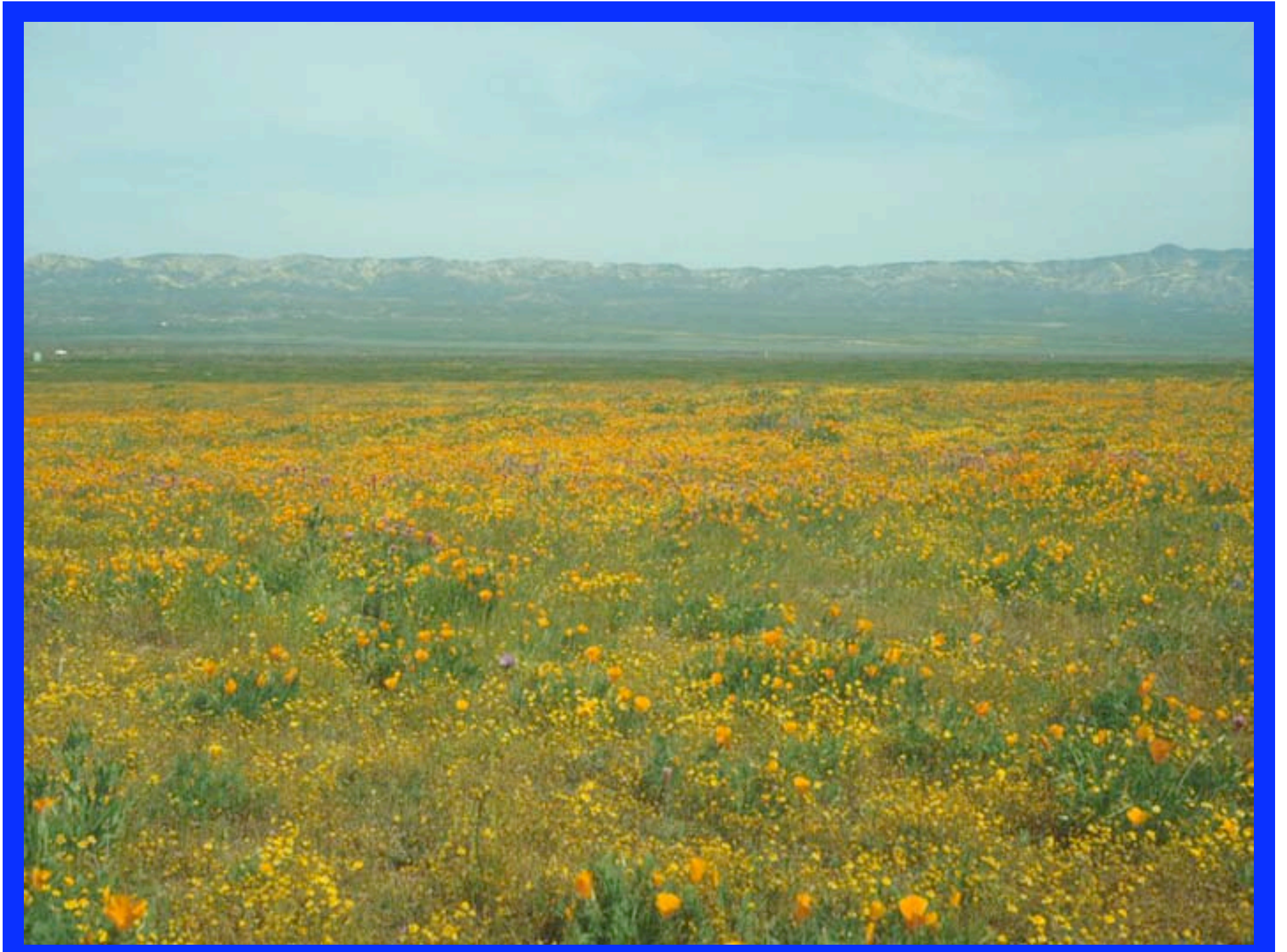
from Schiffman (2007a)

# ordination of Jaccard distances



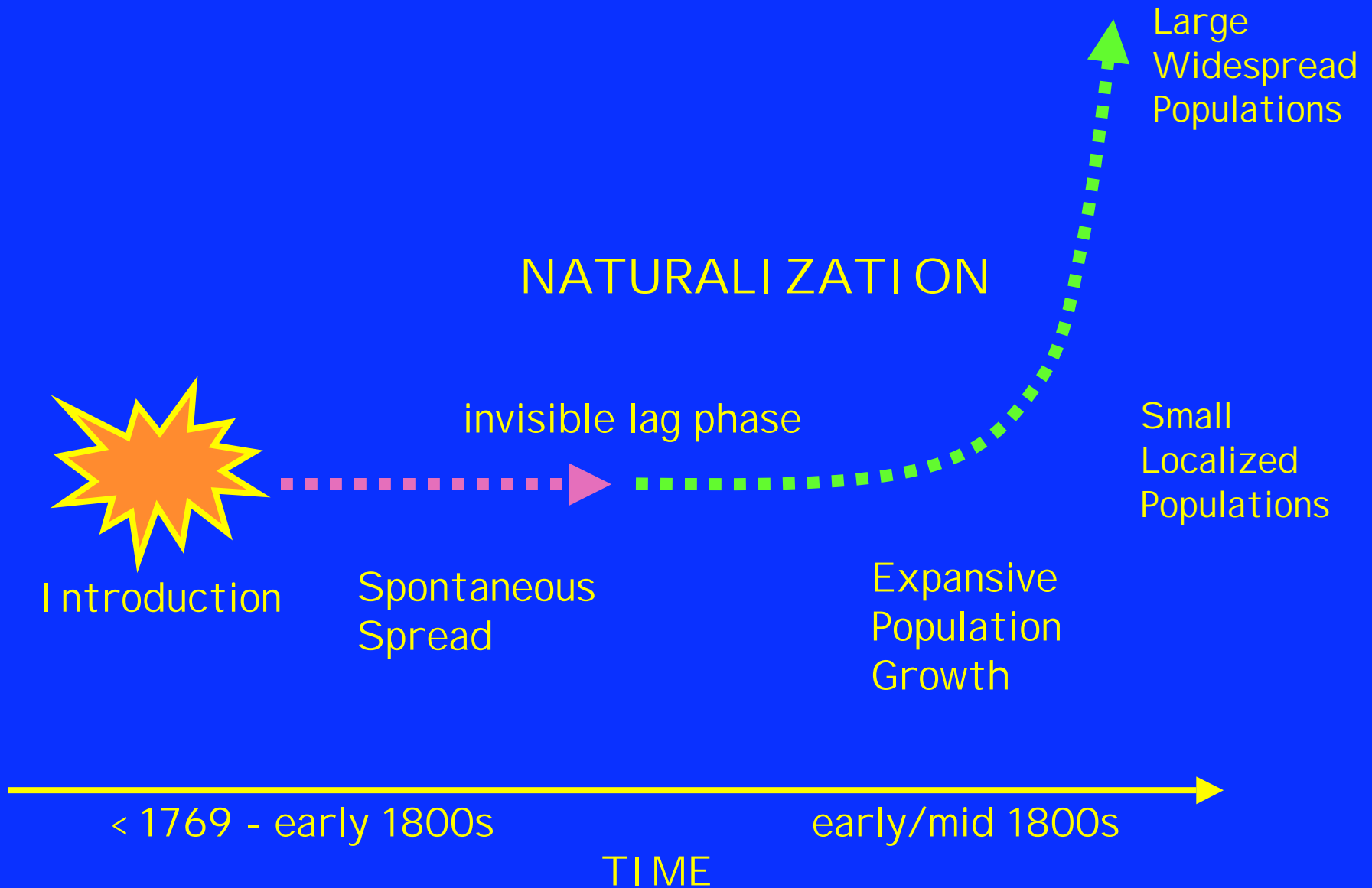
from Schiffman (2007a)







# NATURALIZATION



from Schiffman (2007b)

# “VERBAL BLINDNESS”

- Harrison (1982)





giant kangaroo rat burrow mounds (“precincts”)



# pocket gopher burrow mound



pocket gopher burrow mounds





gophers turn over most of the surface soil every 3 - 15 years



*“a level plain much undermined by the tusas of which there were infinite numbers in all the plains”*

- Francisco Garcés (1776)



California Ground Squirrel  
(*Spermophilus beecheyi*)



*“these tiny animals so  
honeycombed the surface of the  
ground”*

- Hugo Reid (1832)

*“these animals are innumerable”*

- George Derby (1850)

*“there were millions of ground  
squirrels all over this country”*

- Harris Newmark (1857)

*“ground squirrels really in  
countless numbers”*

- Janos Xántus (1857)

*“myriads of ground squirrels”*

- William H. Brewer (1860)

Native people living near  
Kern Lake called themselves

*Po-hal'-lin-Tin'leh*

a name that translated to  
“squirrel holes”

- Stephen Powers (1877)



# Native Soil Disturbers





rodent  
burrow  
mounds ?



**CALIFORNIA REPUBLIC**

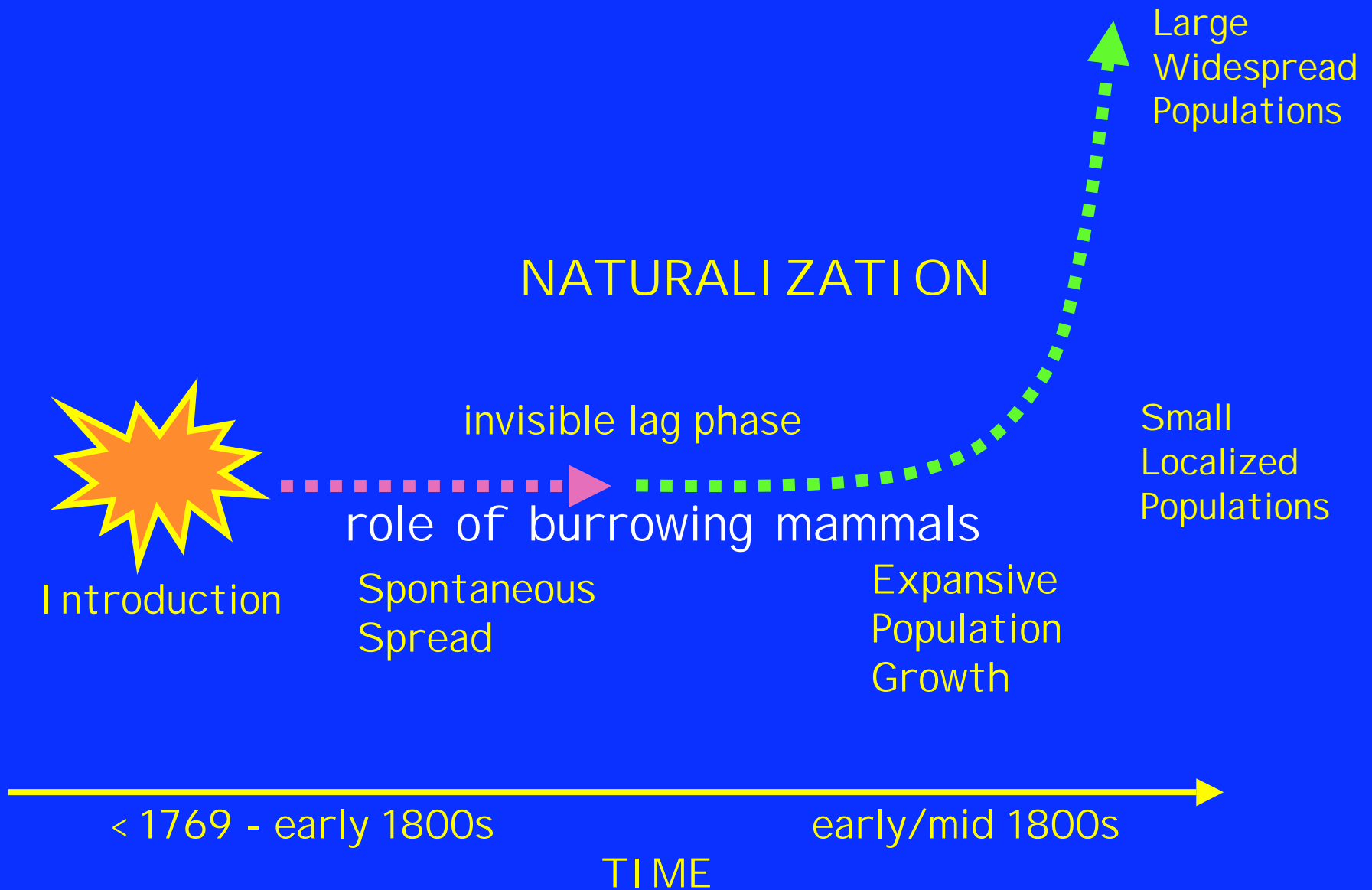
Grizzly Bear (*Ursus arctos*)

# Secondary Users of Rodent Burrows



Chad Lane

# NATURALIZATION



from Schiffman (2007b)



burrow mounds = “nascent foci” ?

- Moody and Mack (1988)

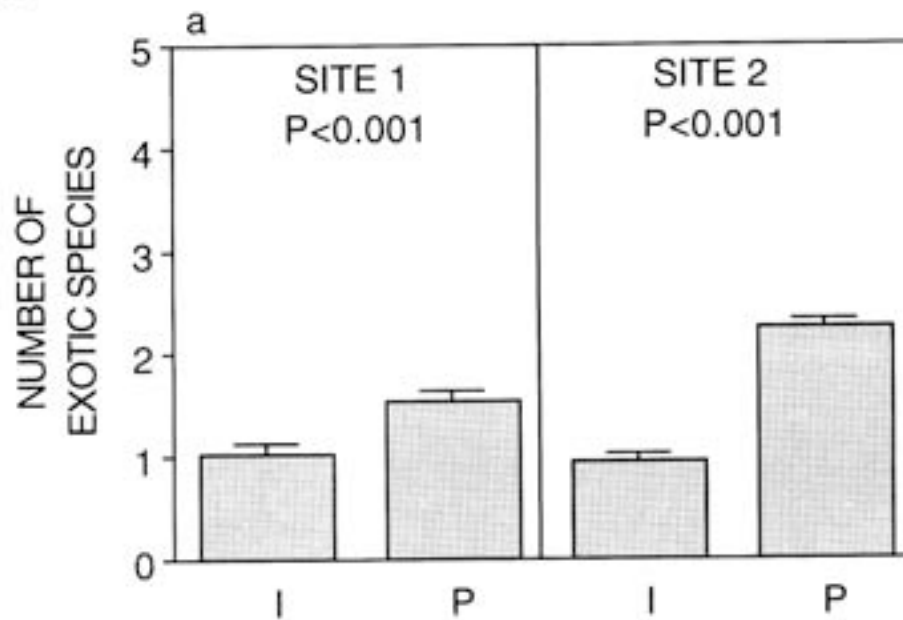


giant kangaroo rat burrow mound (“precinct”)

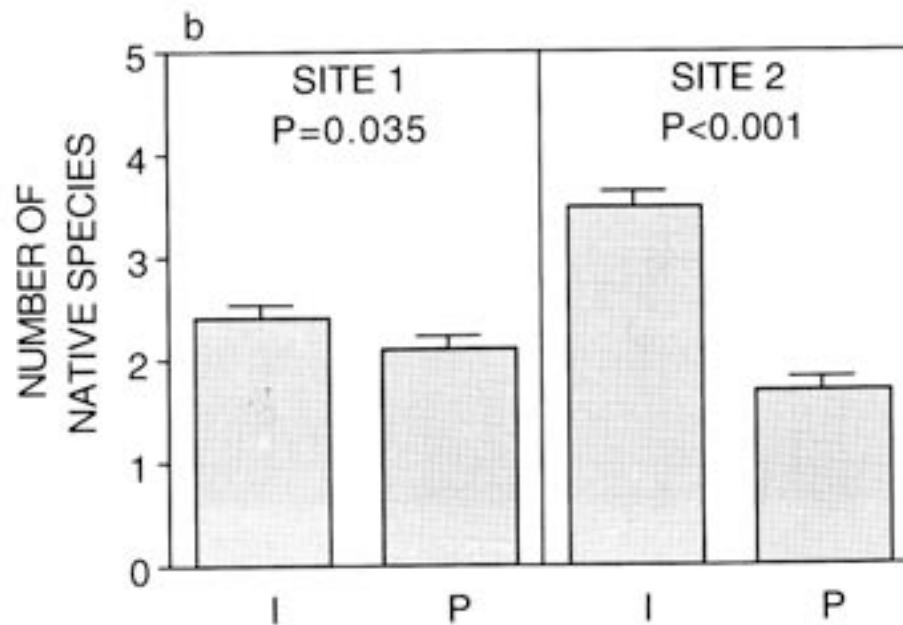


*Bromus madritensis* “haystack” on giant kangaroo rat precinct

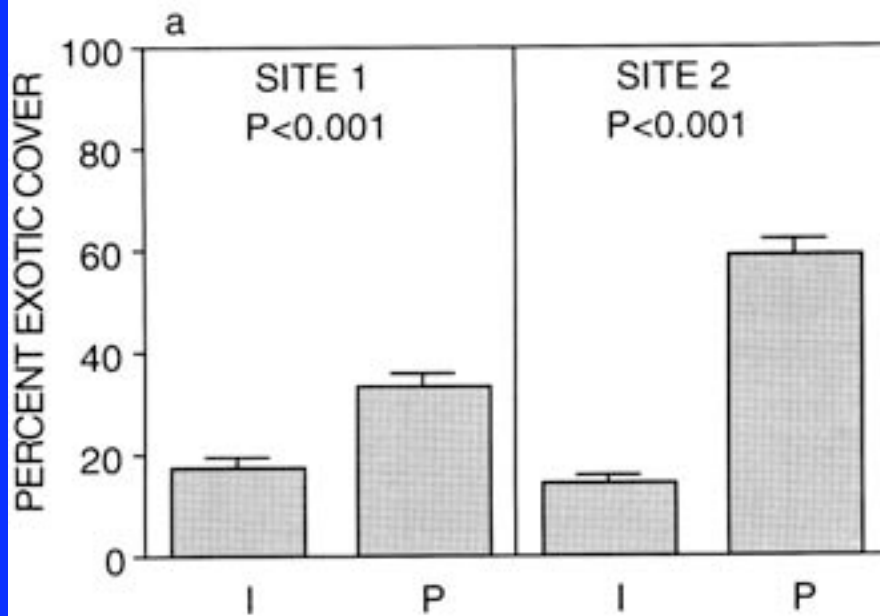




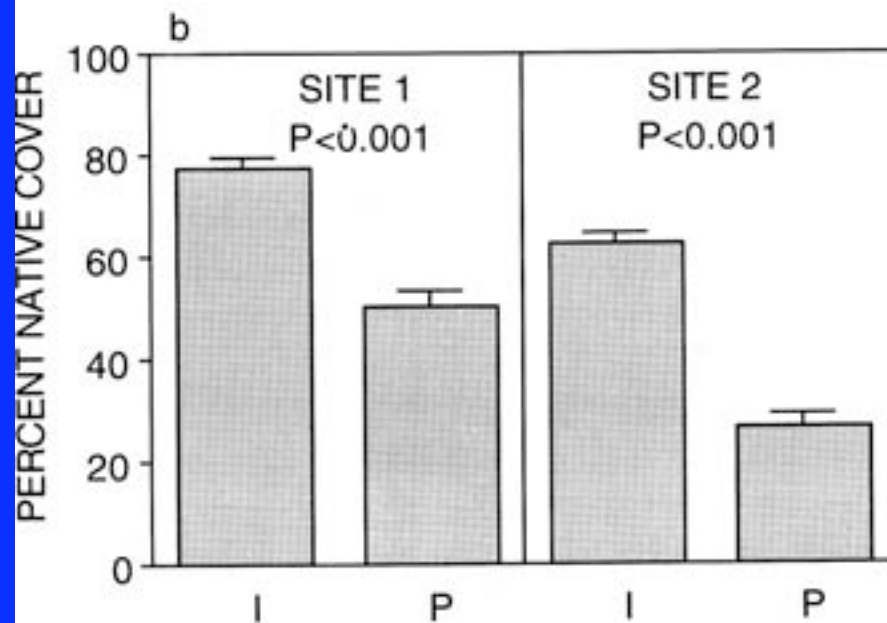
I = intermediate area  
P = precinct



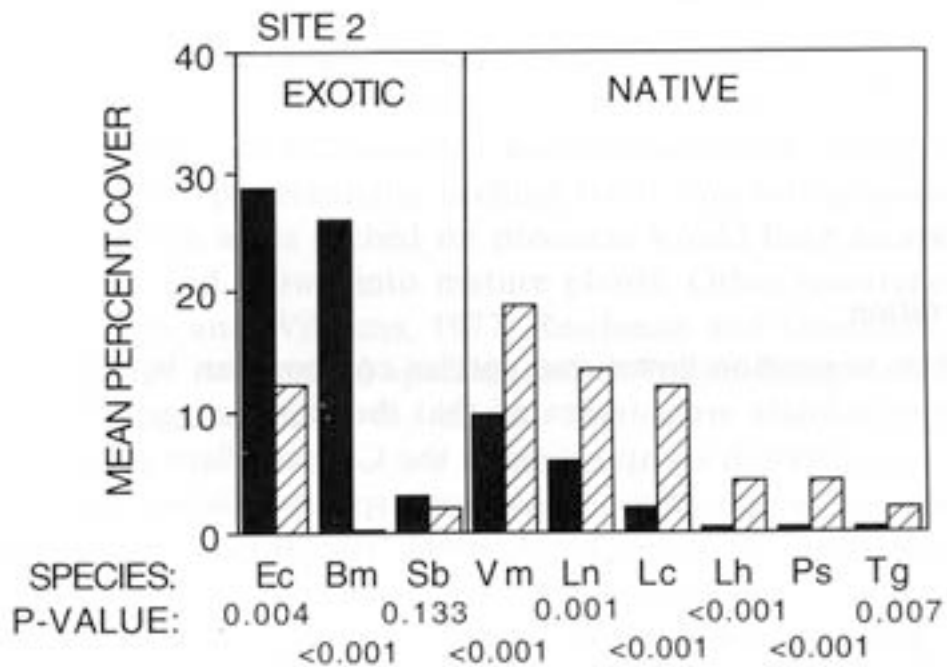
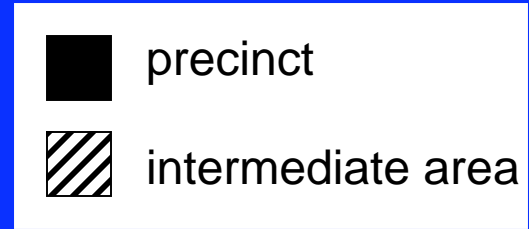
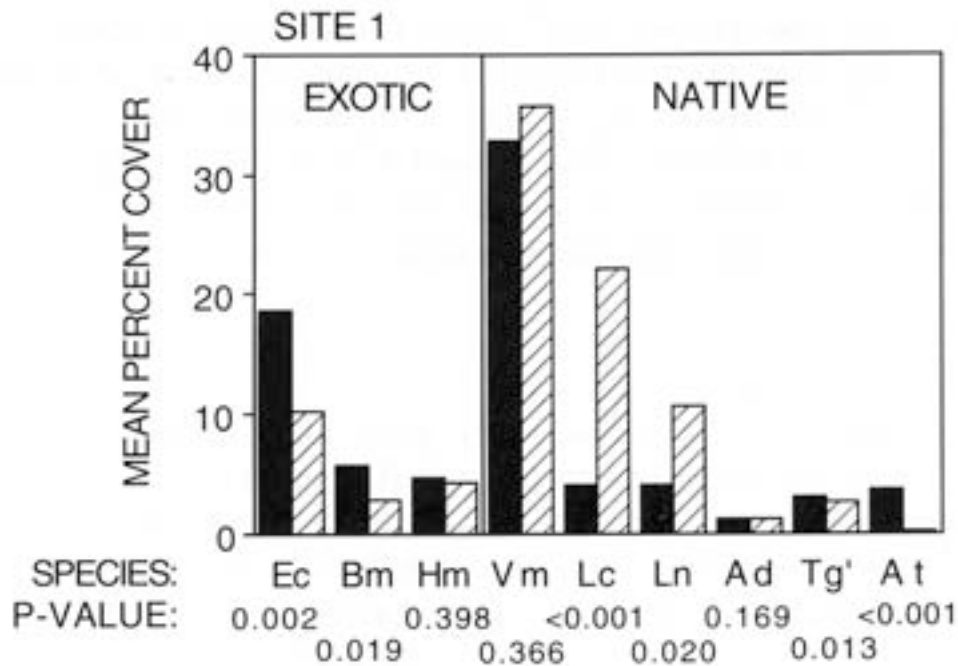
from Schiffman (1994)



I = intermediate area  
P = precinct



from Schiffman (1994)



from Schiffman (1994)

*Caulanthus californicus* (endangered)  
on giant kangaroo rat burrow mound



Is understanding plant-animal interactions necessary if we are to address the challenges posed by other invasive plants ?

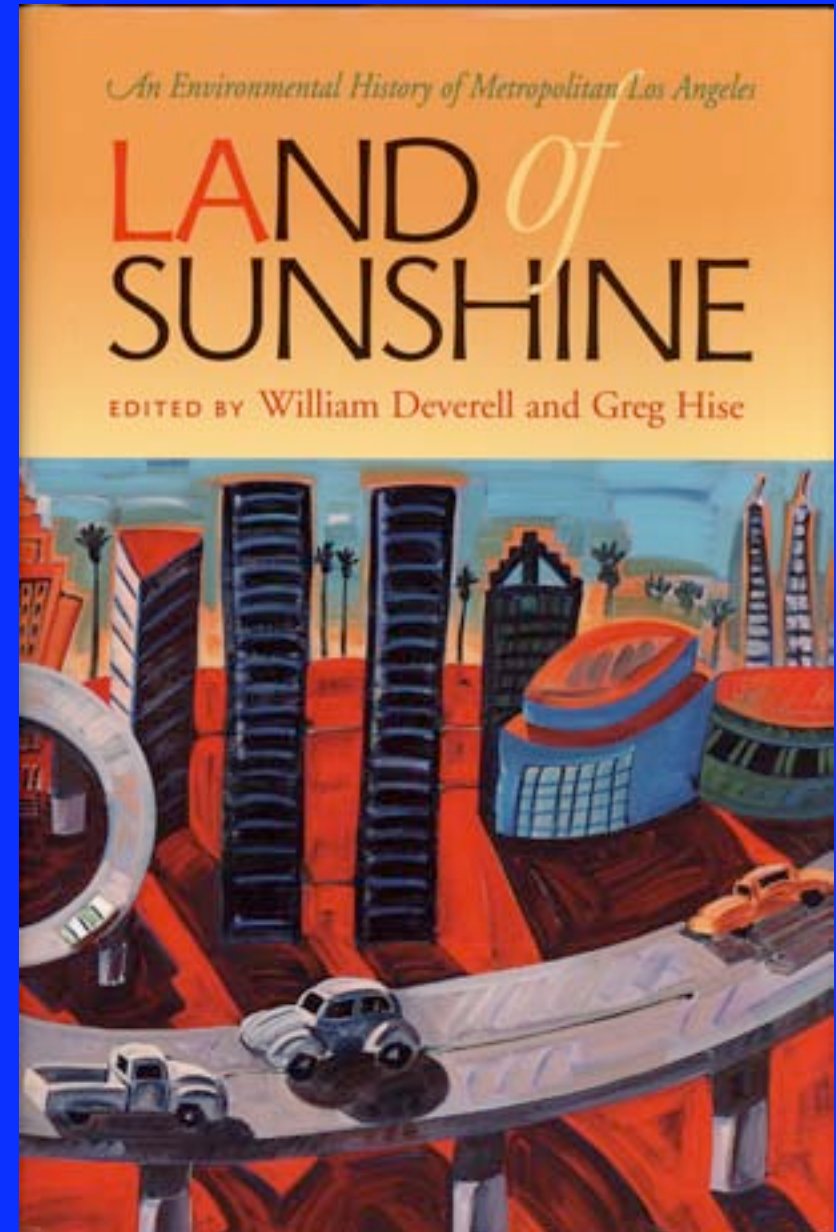
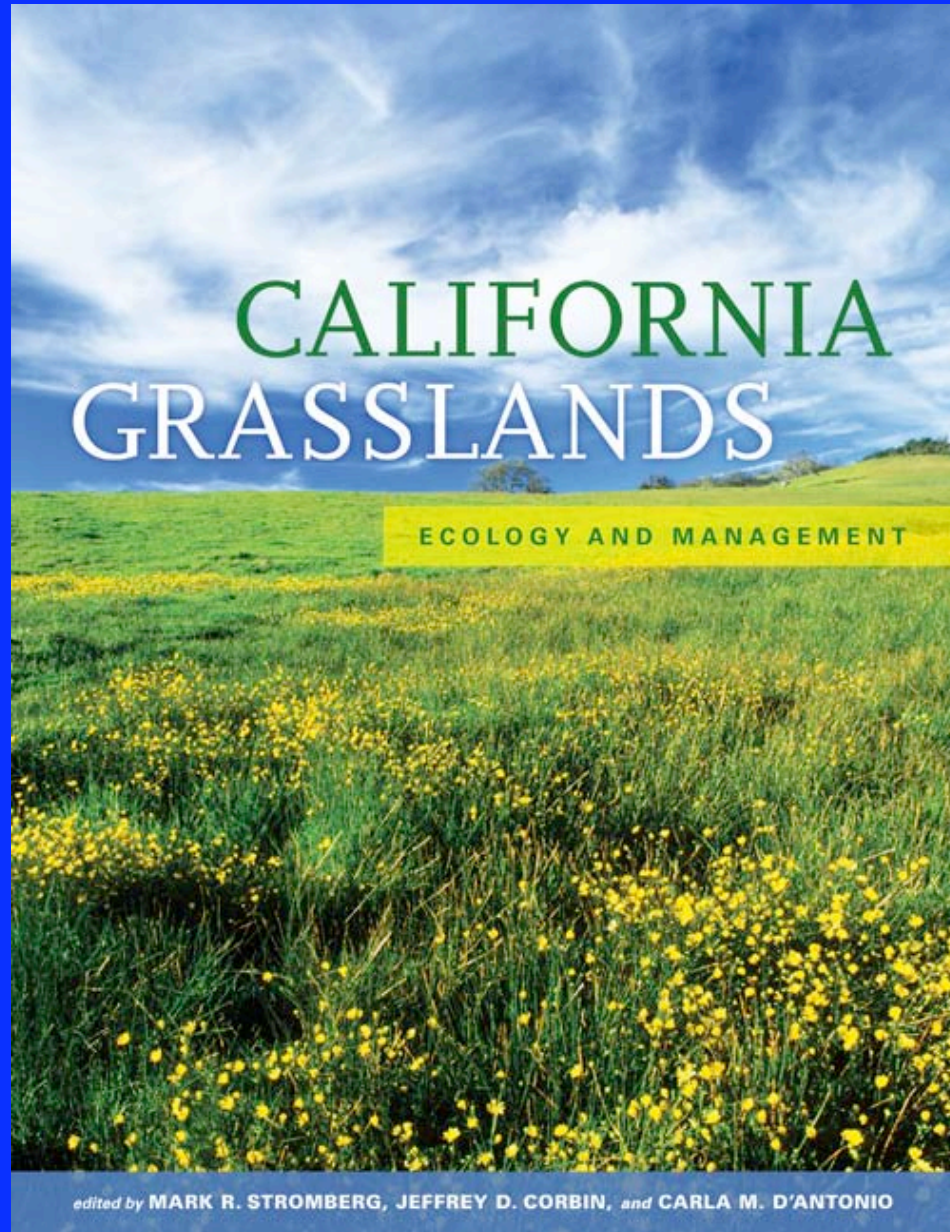




for more on this topic

Chapters 4 and 15

Chapter 2



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