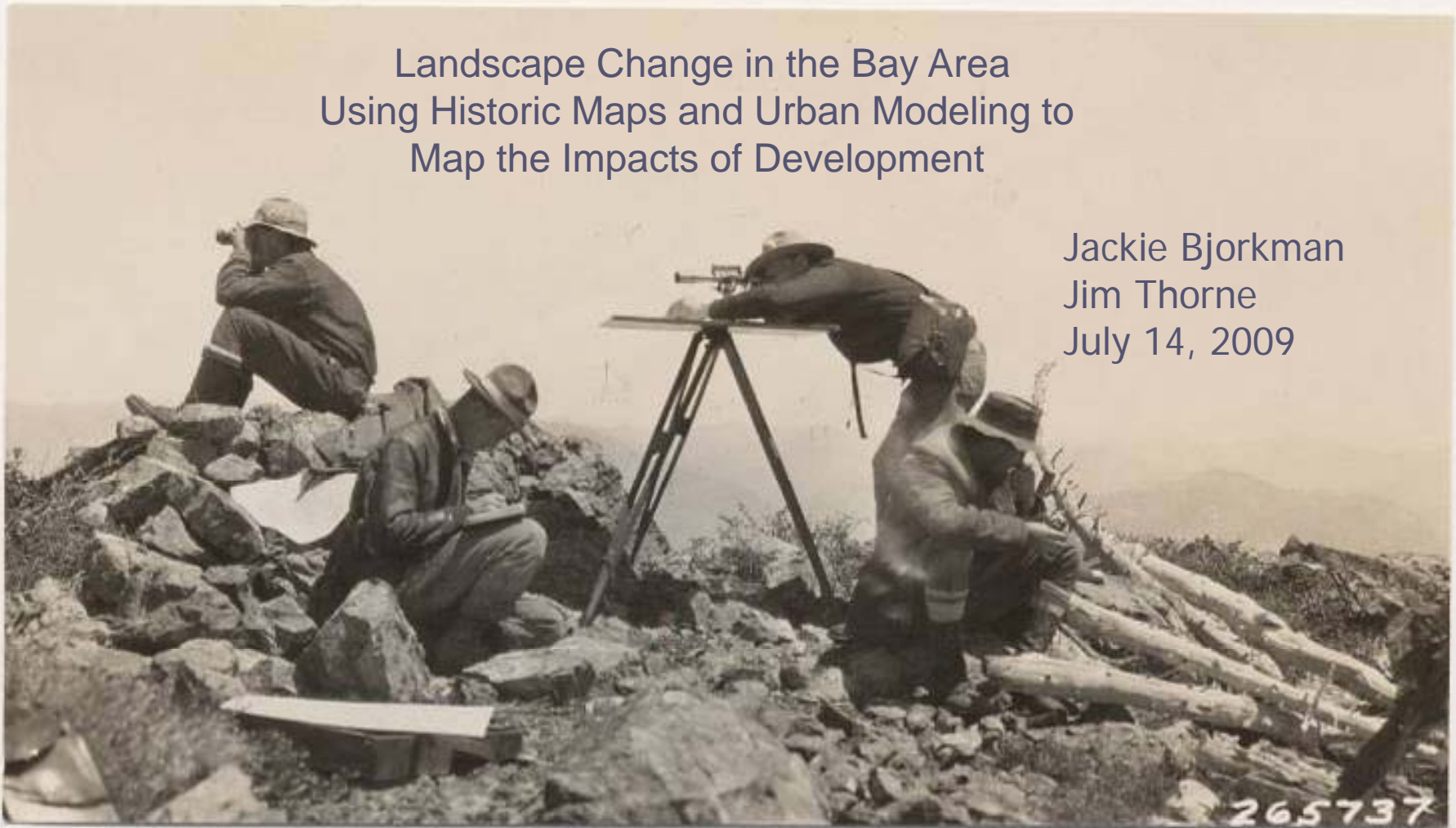


Landscape Change in the Bay Area  
Using Historic Maps and Urban Modeling to  
Map the Impacts of Development

Jackie Bjorkman  
Jim Thorne  
July 14, 2009



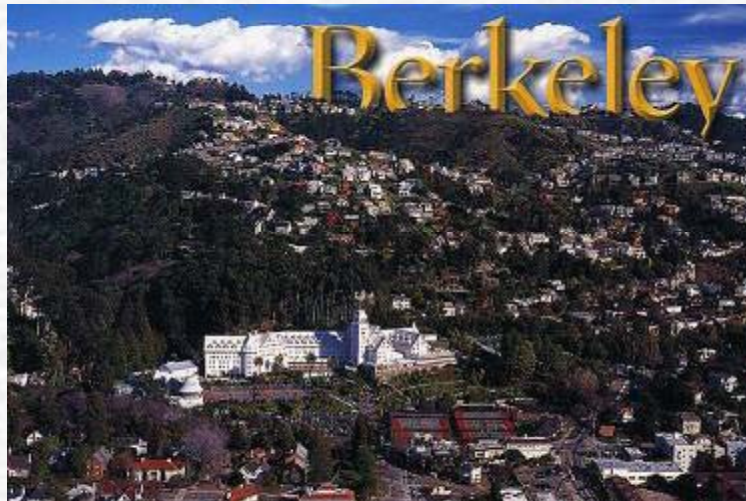
Information Center for the Environment, UC Davis

# Map of Talk

1. Introduction
2. Historic landscape, Wieslander VTM Project
3. Comparing historic maps to current maps
4. Future landscape, UPlan Model
5. Future impacts of growth on current landscape



CLAREMONT HOTEL  
BERKELEY, CALIFORNIA



# Introduction

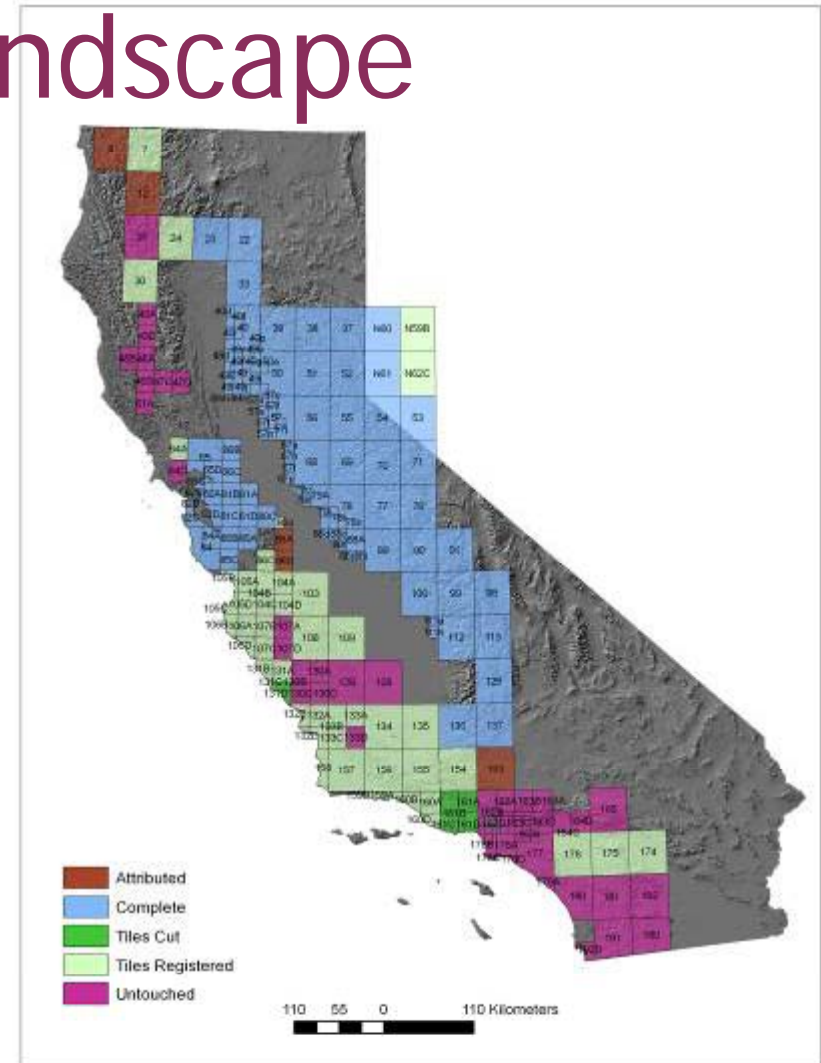
- How has the landscape changed in the Bay Area?
- Losses? Gains?
- How will future growth further impact the landscape?



# Historic Landscape

## Wieslander VTM Project

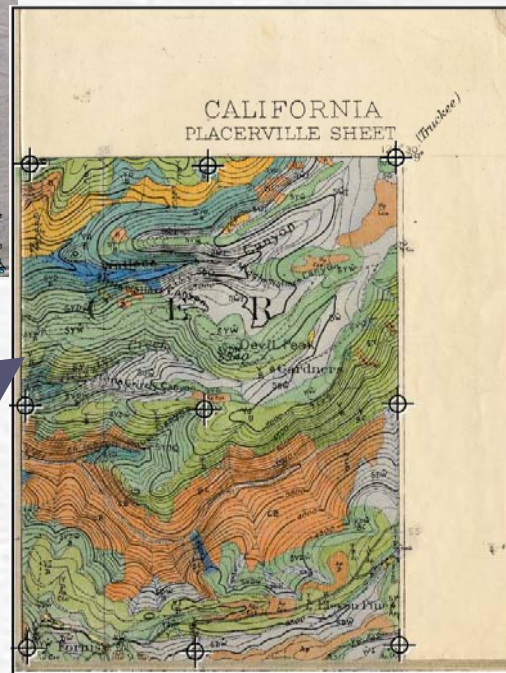
- Conducted in the 1930s, led by Albert Wieslander
- Basis for much of current understanding of California Vegetation
- Surveyed about 1/3 of California



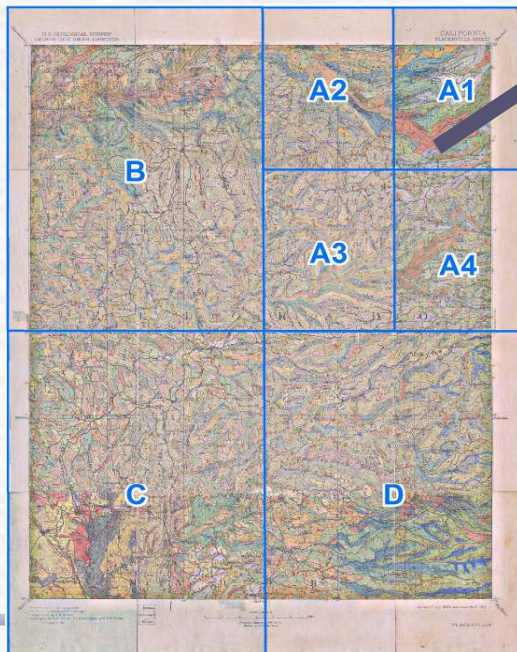
# Four types of VTM data

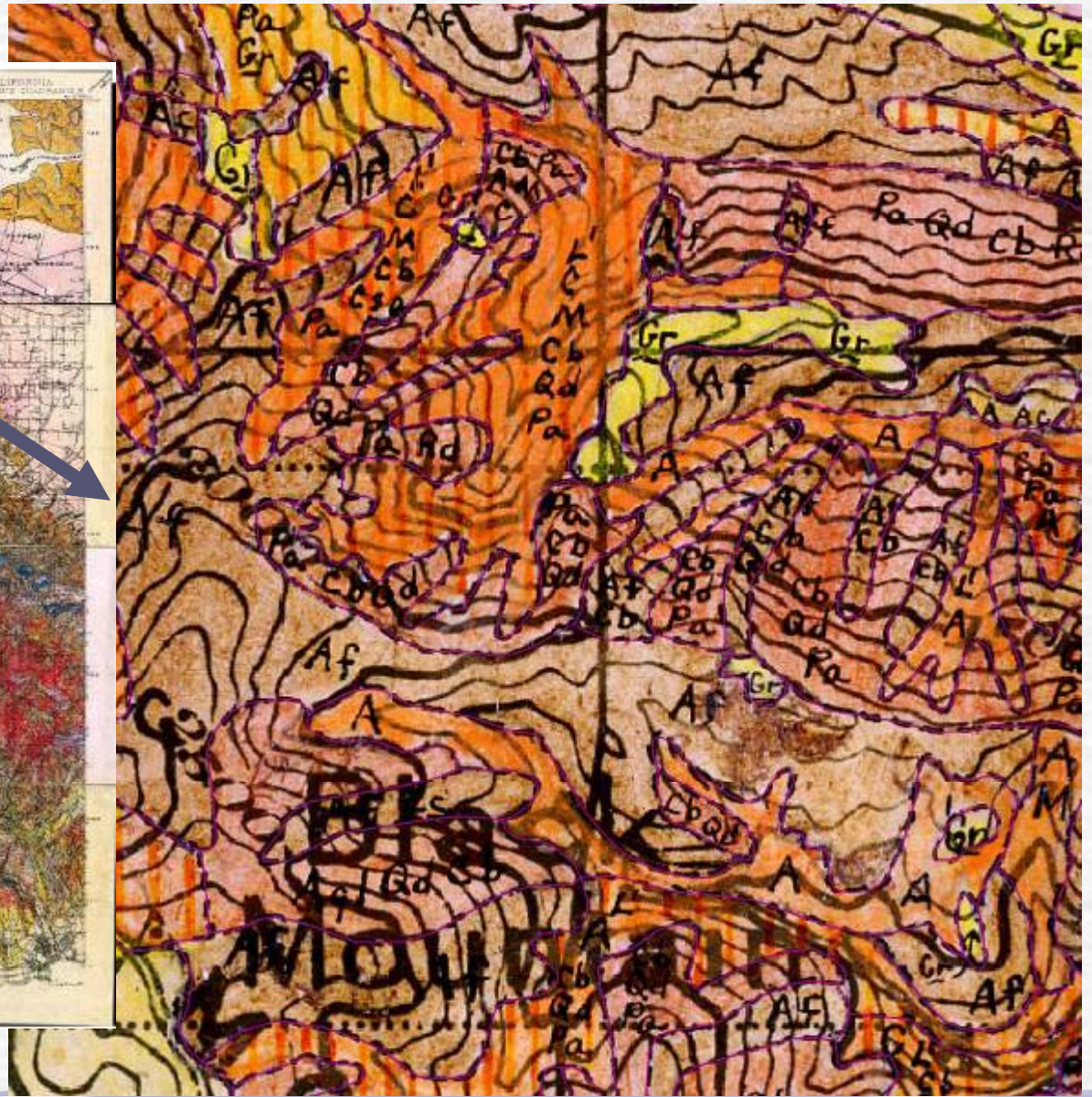
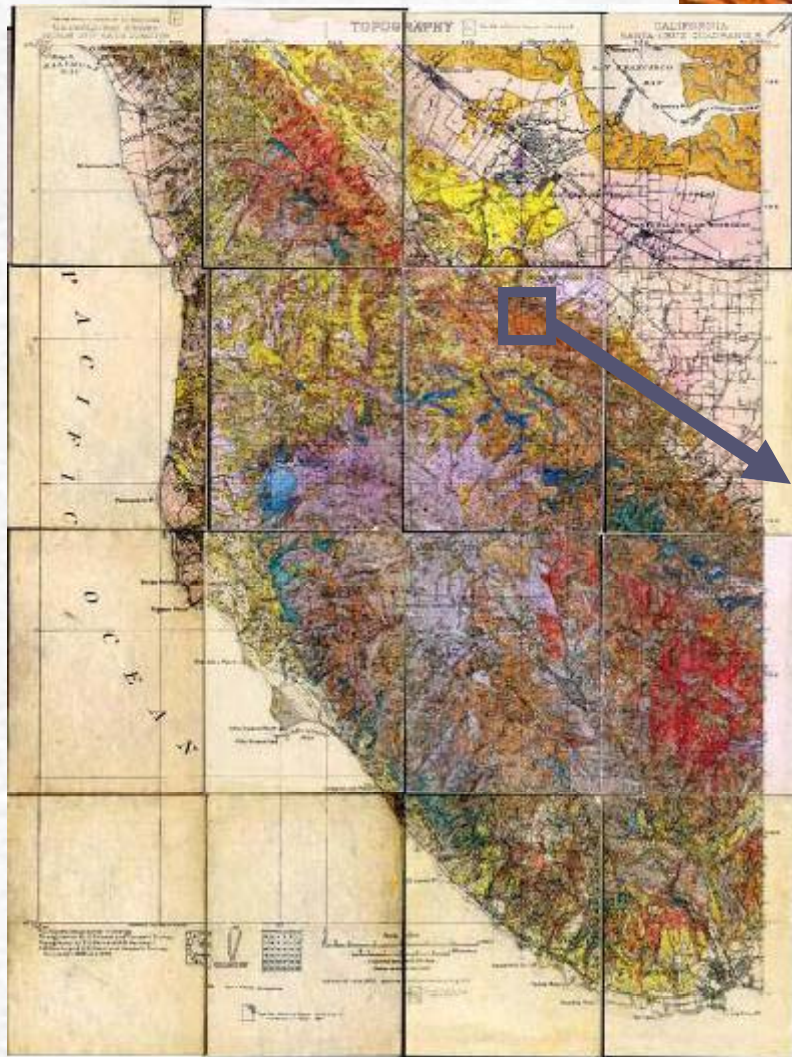
- Vegetation Plots- 17,000
- Voucher Specimens, Jepson Herbarium, 25,000 specimens.
- Landscape Photos- over 3000
- Vegetation Maps, covering 1/3 of California

# Digitization Efforts



- Obtain and scan tiles
- Obtain and scan topographic map
- Geo-register topo map and tiles
- Trace the vegetation polygons
- Attribute the species information

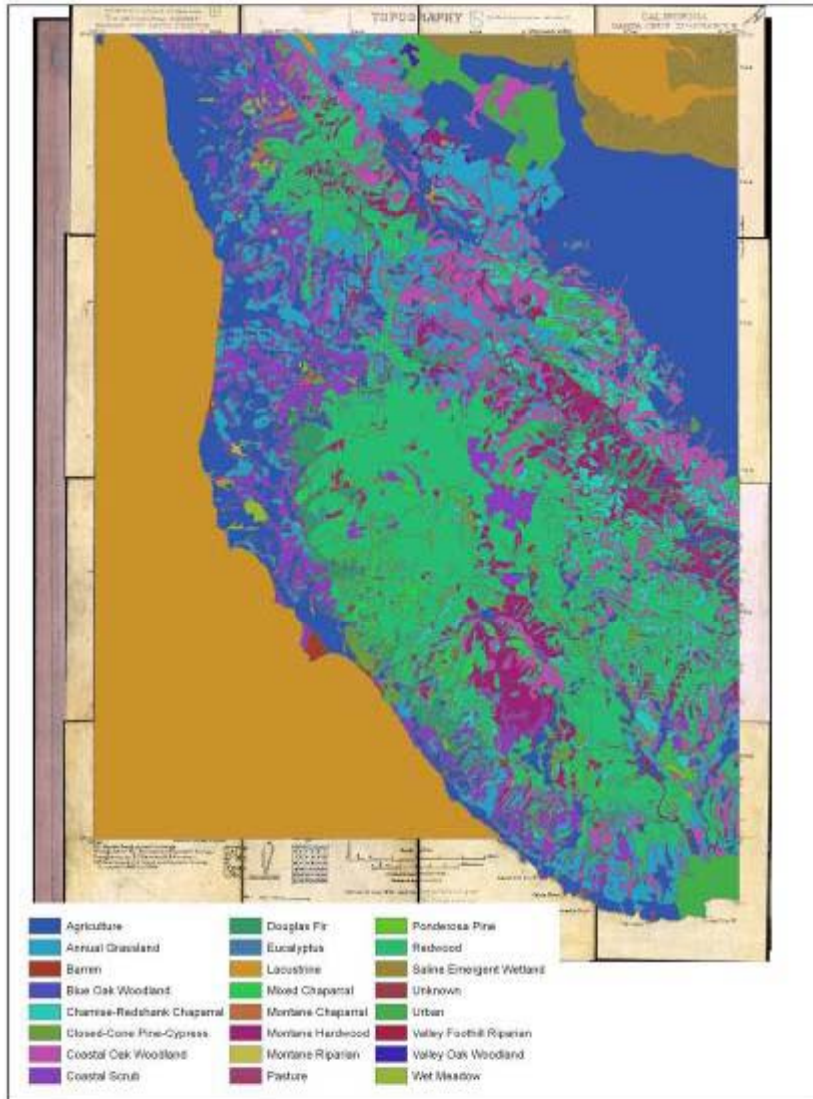




**Work  
Work  
Work**





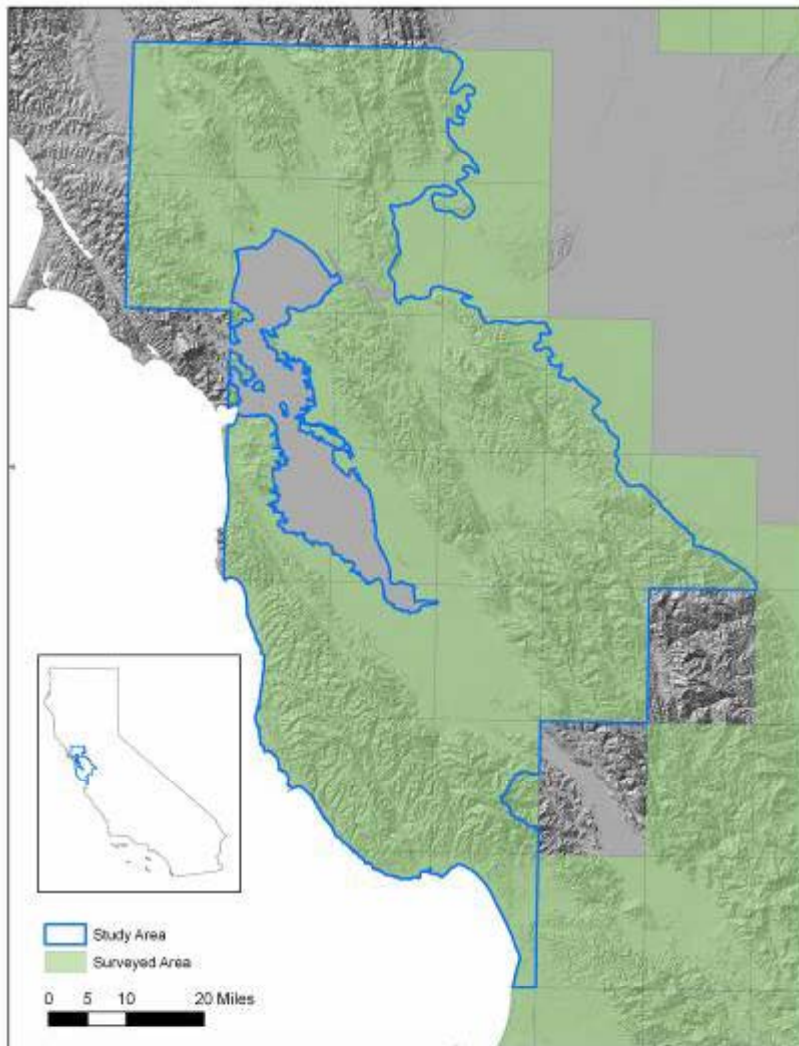


Santa Cruz Quad

Post-GIS

Attributed and Cross-walked  
for WHR Types

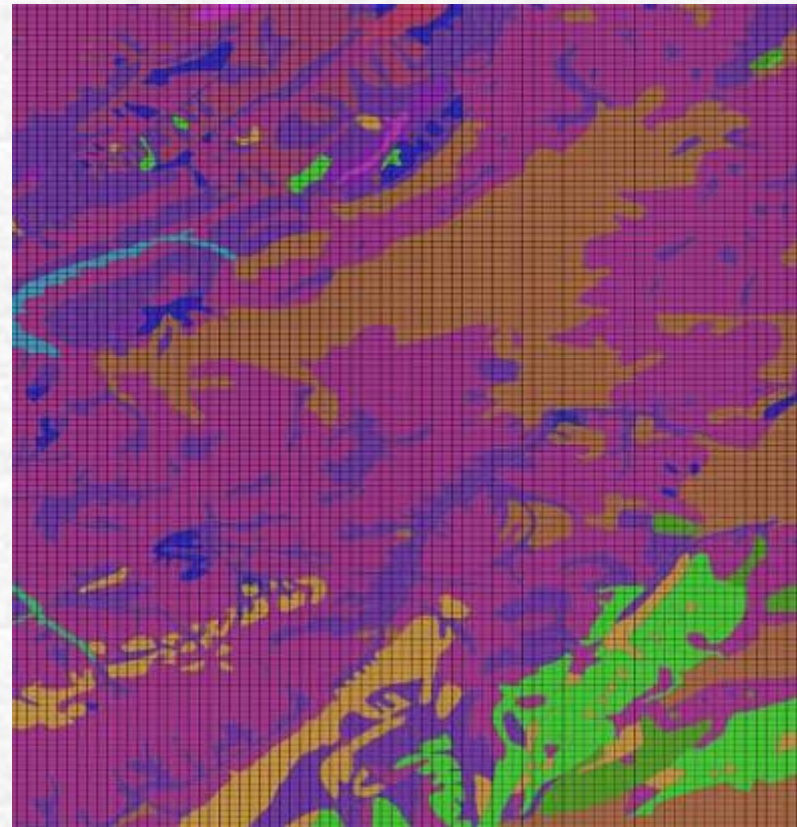
# Study Area

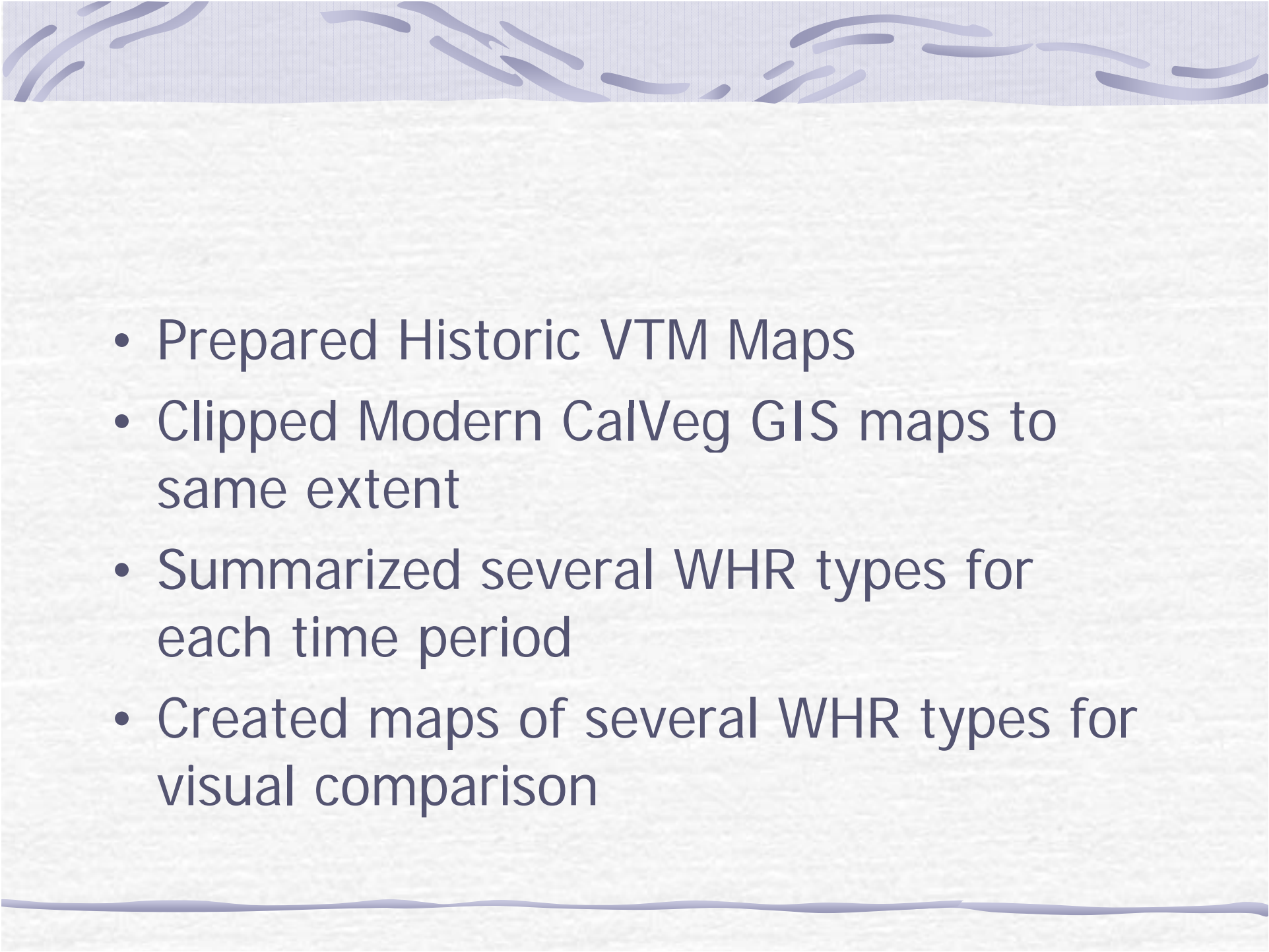


- Roughly 2,750,900 acres
- Includes sections of Sonoma, Napa, Solano, Marin, Contra Costa, San Francisco, Alameda, San Joaquin, Stanislaus, San Mateo, Santa Clara and Santa Cruz counties

## Quality of the VTM Vegetation Maps

- Taxonomic detail is high, better than most modern maps, strings of dominant species are provided.
- Spatial precision is moderate, non-systematic registration errors of up to 100 meters.
- Landscape-level detail is on the order of 3,500 polygons/30' quad.
- CalVeg's functional equivalent is 35,000 polygons/30' quad, but the species info in CalVeg is much lower.



- 
- Prepared Historic VTM Maps
  - Clipped Modern CalVeg GIS maps to same extent
  - Summarized several WHR types for each time period
  - Created maps of several WHR types for visual comparison

# Winners....and Losers

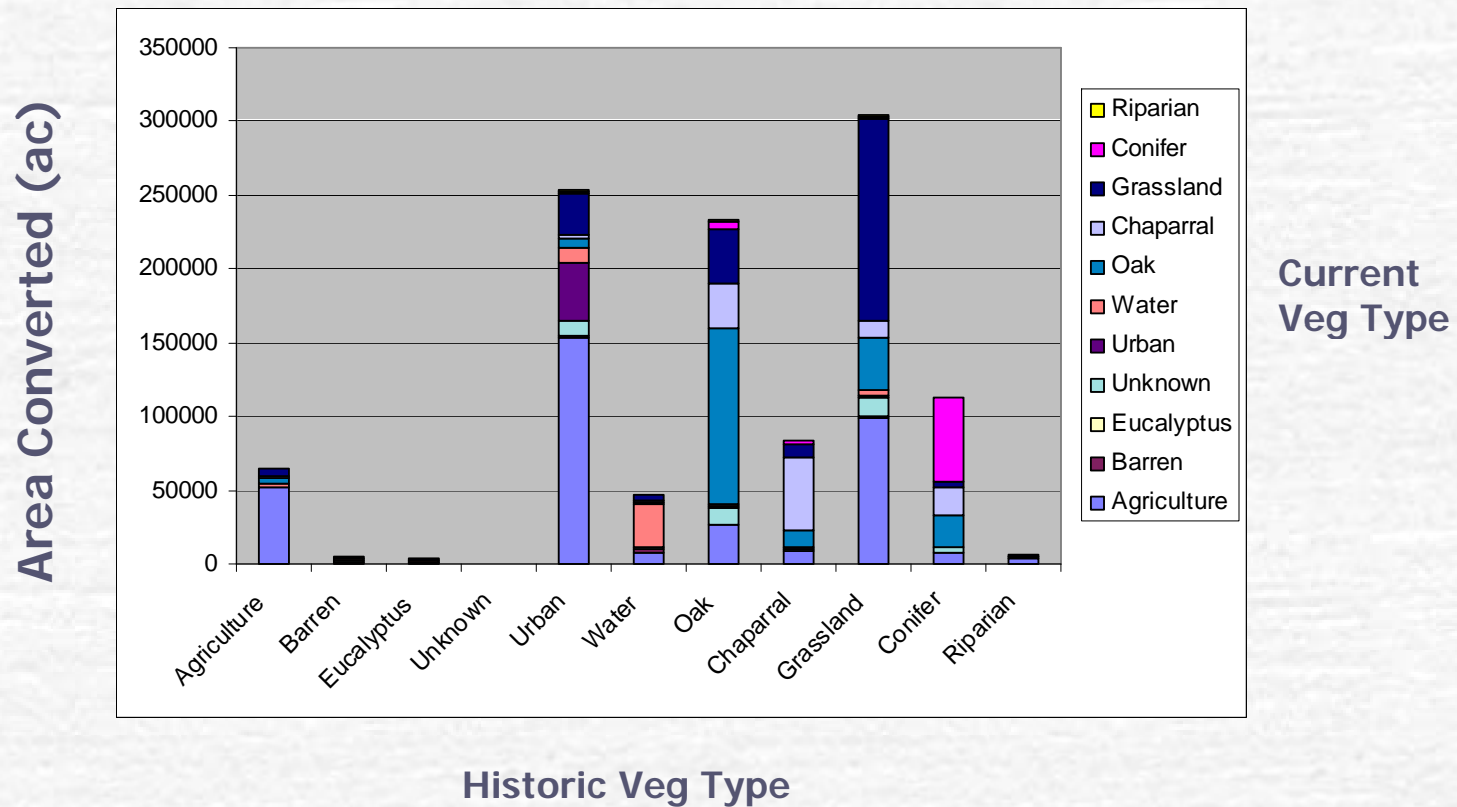
Veg Type	Historic Area (ac)	Current Area (ac)	Difference (ac)
Urban	106,018.7	625,199.6	519,180.9
Grass	556,693.7	750,260.7	193,567.0
Conifer	165,940.7	278,203.6	112,262.9
Oak	499,105.8	575,179.7	76,073.9
Riverine	4,968.7	15,842.2	10,873.5
Barren	10,401.7	13,433.6	3,031.9
Eucalyptus	6,783.7	9,613.9	2,830.3

Veg Type	Historic Area (ac)	Current Area (ac)	Difference (ac)
Agriculture	893,636.2	160,935.4	-732,700.8
Chaparral	285,935.0	207,067.4	-78,867.5
Water	124,099.1	115,180.6	-8,918.5

## Some combined groups

WHR Groups	Historic Area (km2)	Current Area (km2)	Difference (km2)
Agricultural Lands (AGR, CRP, AGS)	4771.15462	2981.897169	-1789.257451
Chaparral (CRC, MCH, CPC)	788.7489309	540.0407129	-248.708218
Blue Oak (BOW, BOP)	679.5707195	613.9465908	-65.62412864
Hardwoods (MHC, MHW)	649.358115	674.0762137	24.71809868
Other Oaks (COW, VOW)	755.7511393	998.6196699	242.8685306

# Landscape Transition

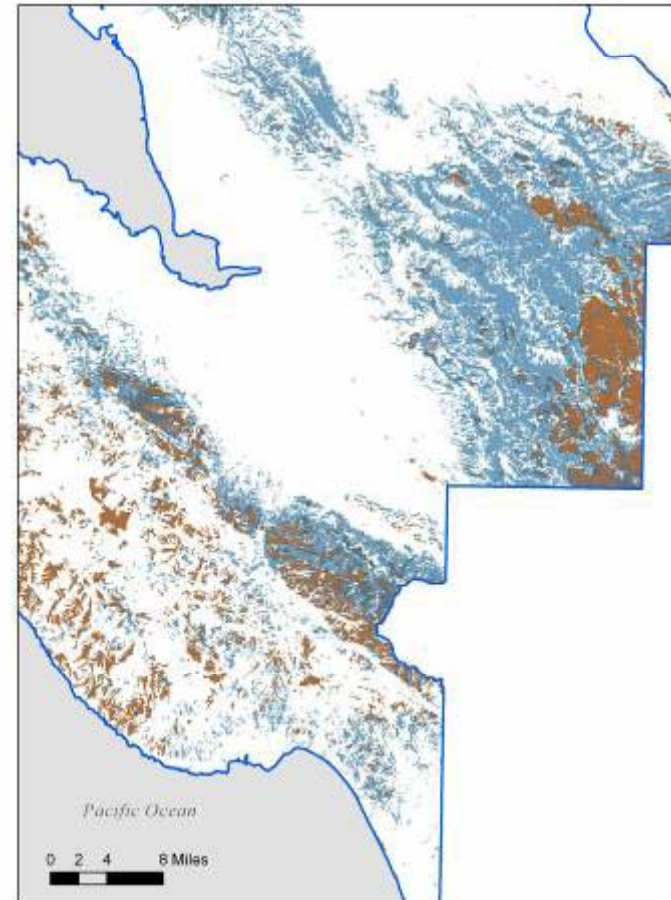
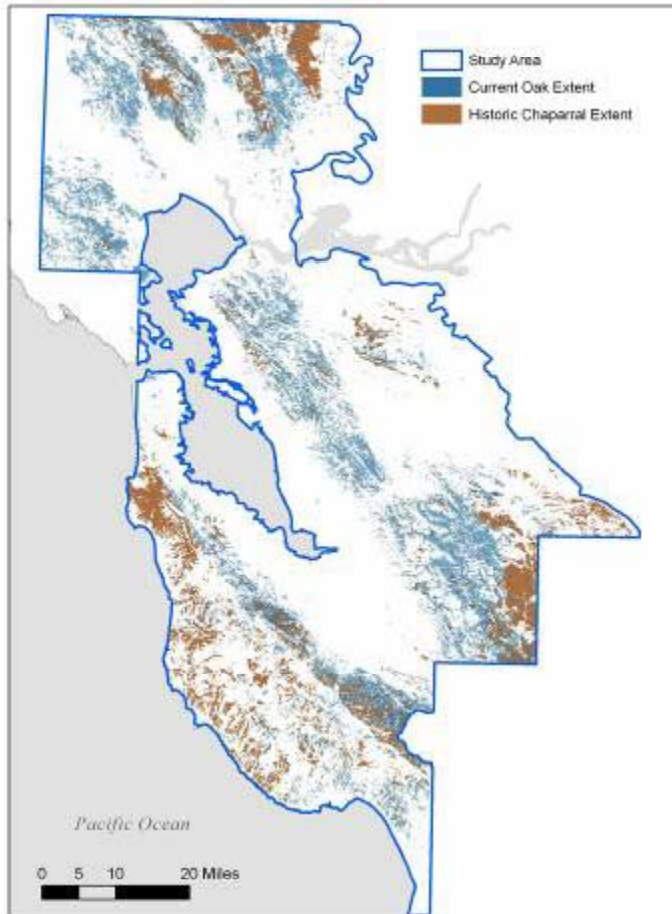


# Chaparral





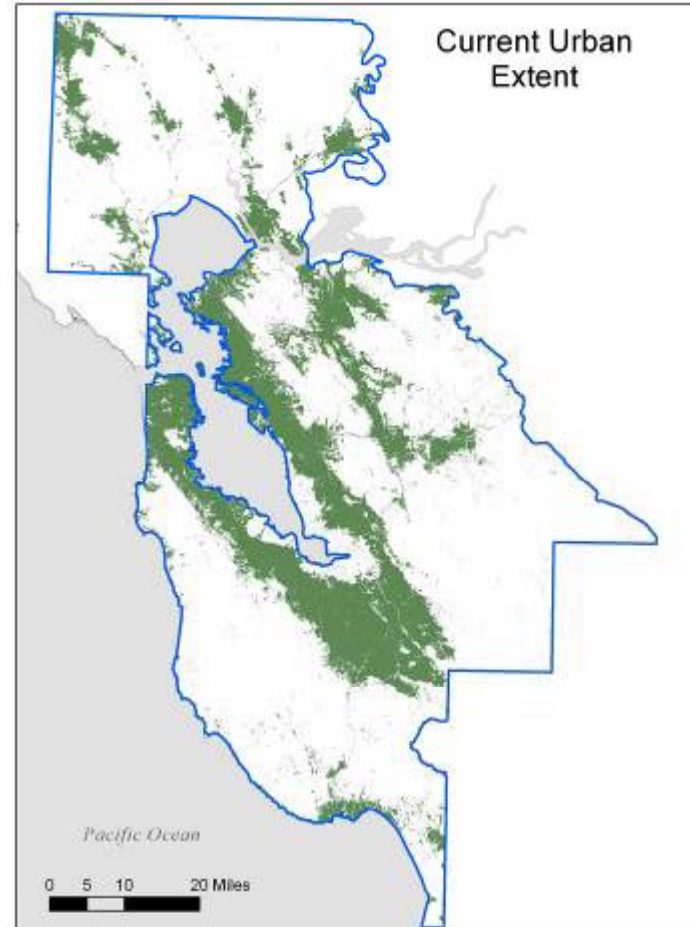
# Historic Chaparral Change



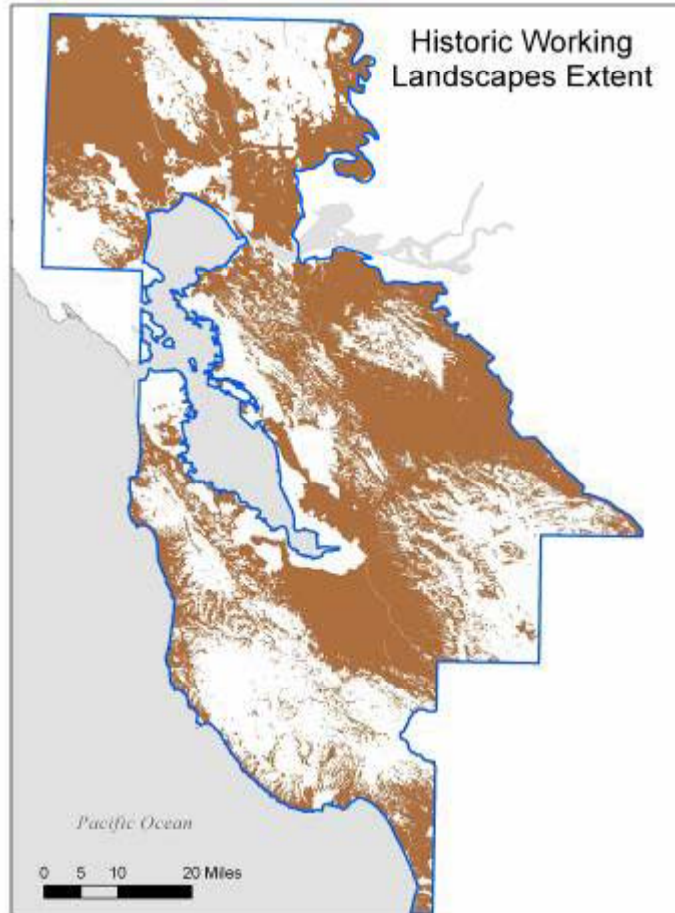
# Redwood

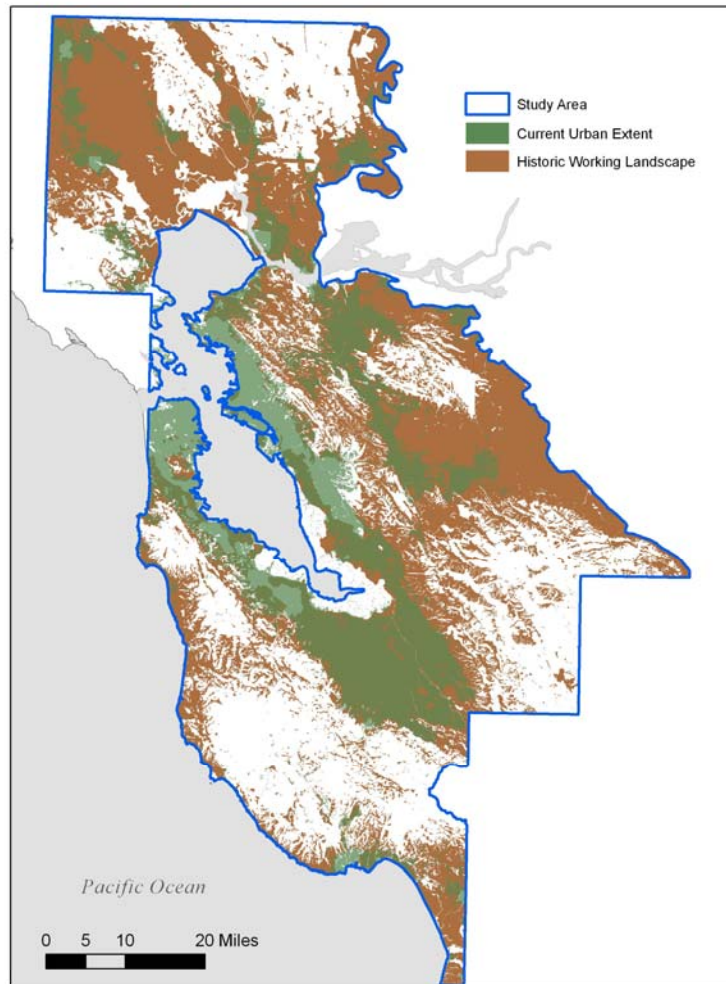


# Urban



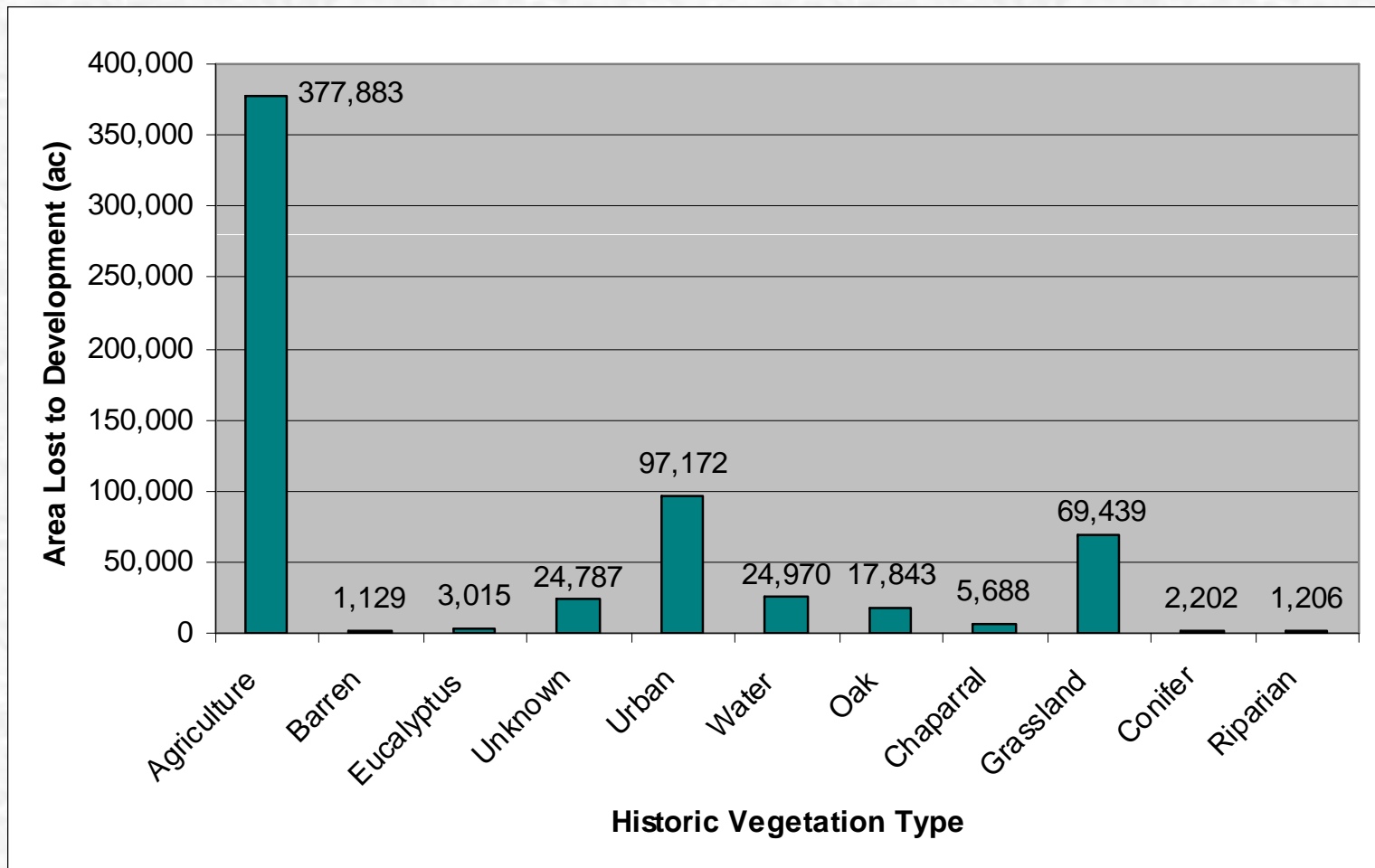
# Agricultural/Working Landscapes






- Historic Agricultural Land
- Modern Urban Land

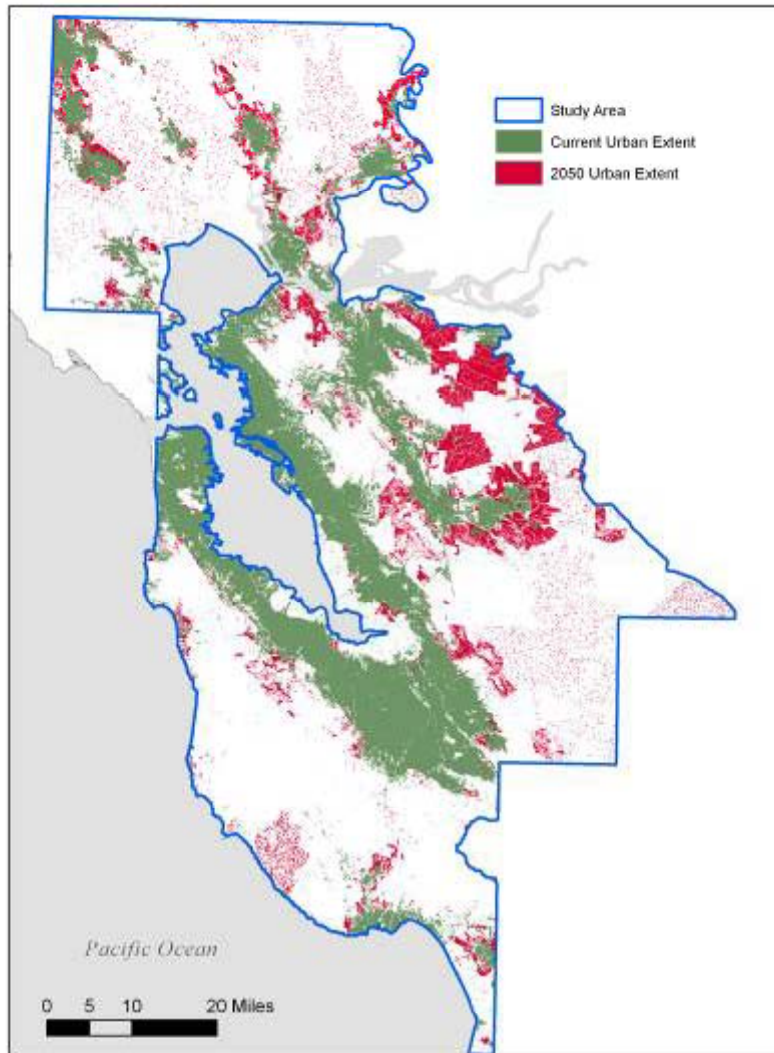
# Urban Conversion





# Future Growth: UPlan

- A land use model that projects urban growth
  - Uses a combination of demographic inputs and geographic layers that are thought to influence where building occurs
  - Developed at UC Davis in 2001
  - Currently used by 24 counties for urban planning, general plan updates or blueprint planning processes
- 



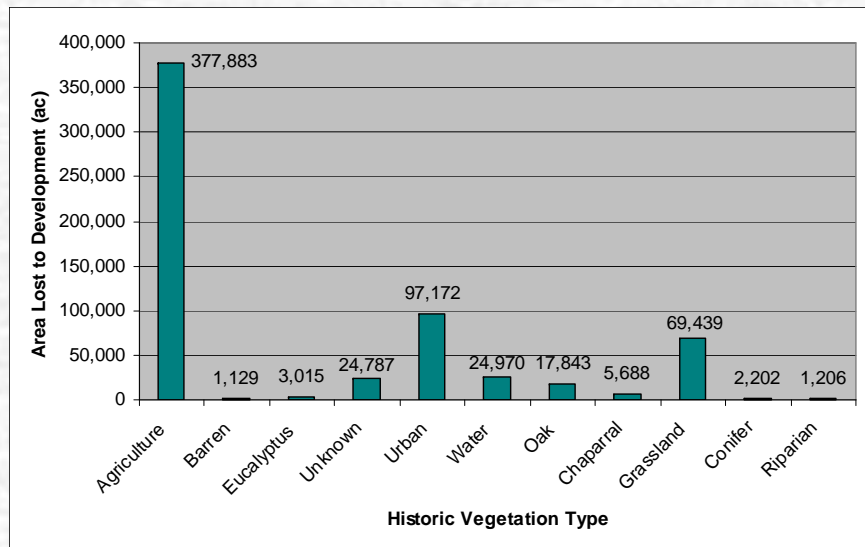
## 2050 Base Case Scenario Footprint

- 261,452 acres
- 7 Land Use Types: Commercial High, Commercial Low, Industrial, Residential High, Medium, Low and Very Low

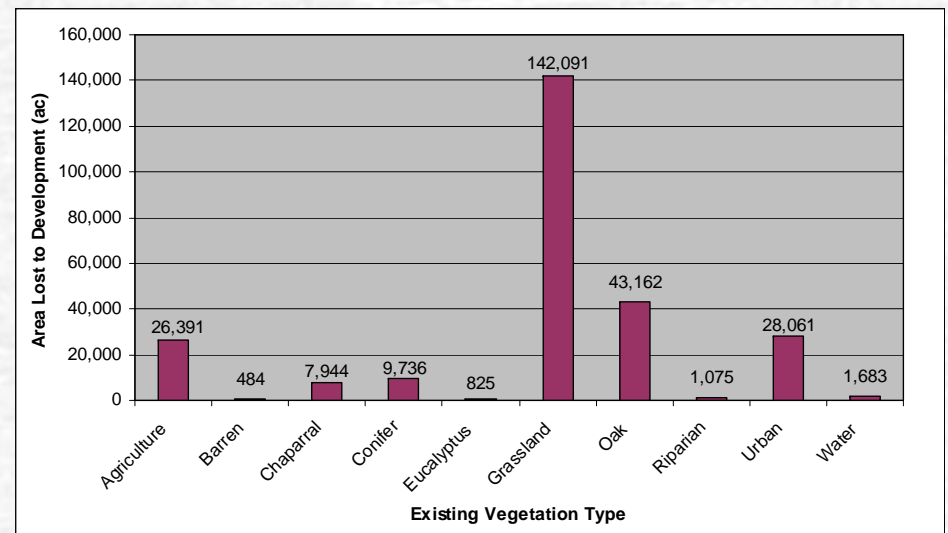


# Current Land at Risk

## Urban Conversion



## Urban Conversion 2050





**Thank you for your attention!**

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[jhthorne@ucdavis.edu](mailto:jhthorne@ucdavis.edu)