

Restoration, Invasive Species, and Conservation Challenges in a Region with Extraordinarily Rapid Changes

Arlee M. Montalvo
Cal-IPC Symposium, Riverside October 16, 2019



RIVERSIDE-CORONA RESOURCE CONSERVATION DISTRICT

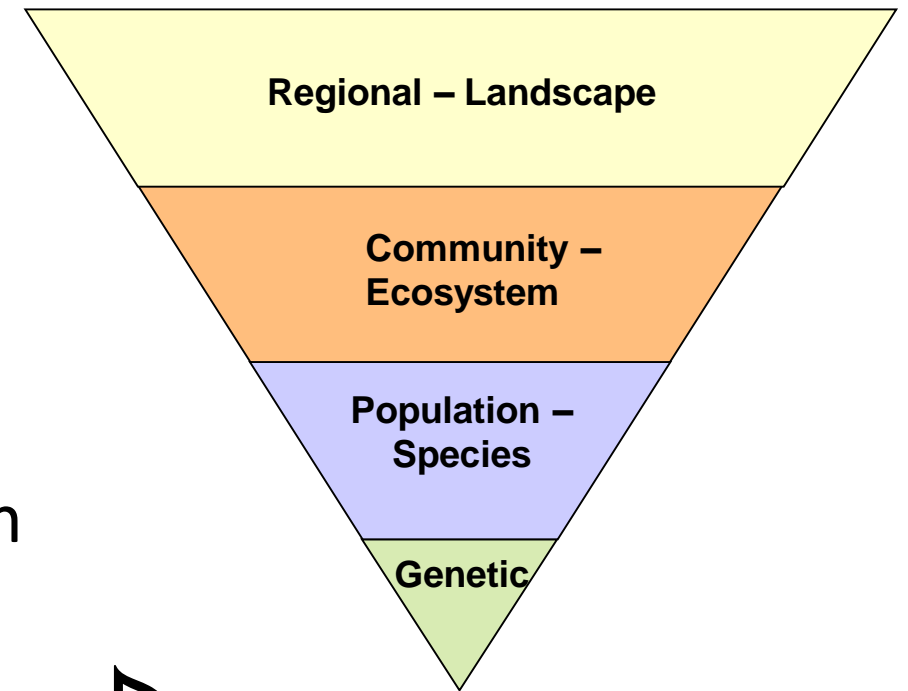
UNIVERSITY of
CALIFORNIA

Riverside

Managing native biodiversity emphasizes:

- Protecting native biodiversity at all levels of organization
- Controlling invasive species that homogenize biotic communities
- Finding solutions to multiple threats
- Building capacity through collaboration
- Hard work, passion

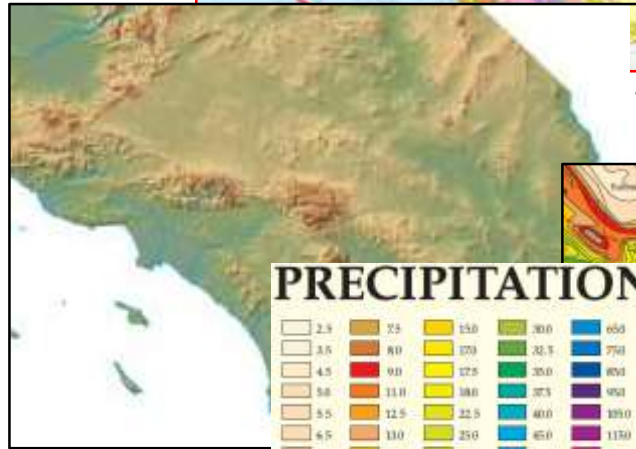
Structures and Processes



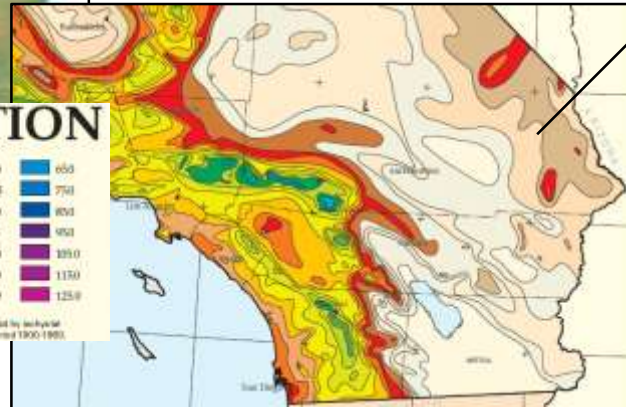
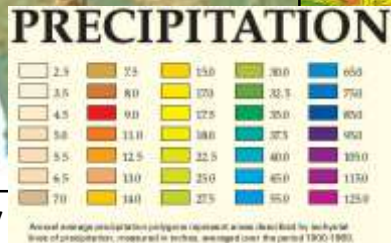
Biodiversity

California's biotic communities occupy a diverse landscape across California, including within southern California

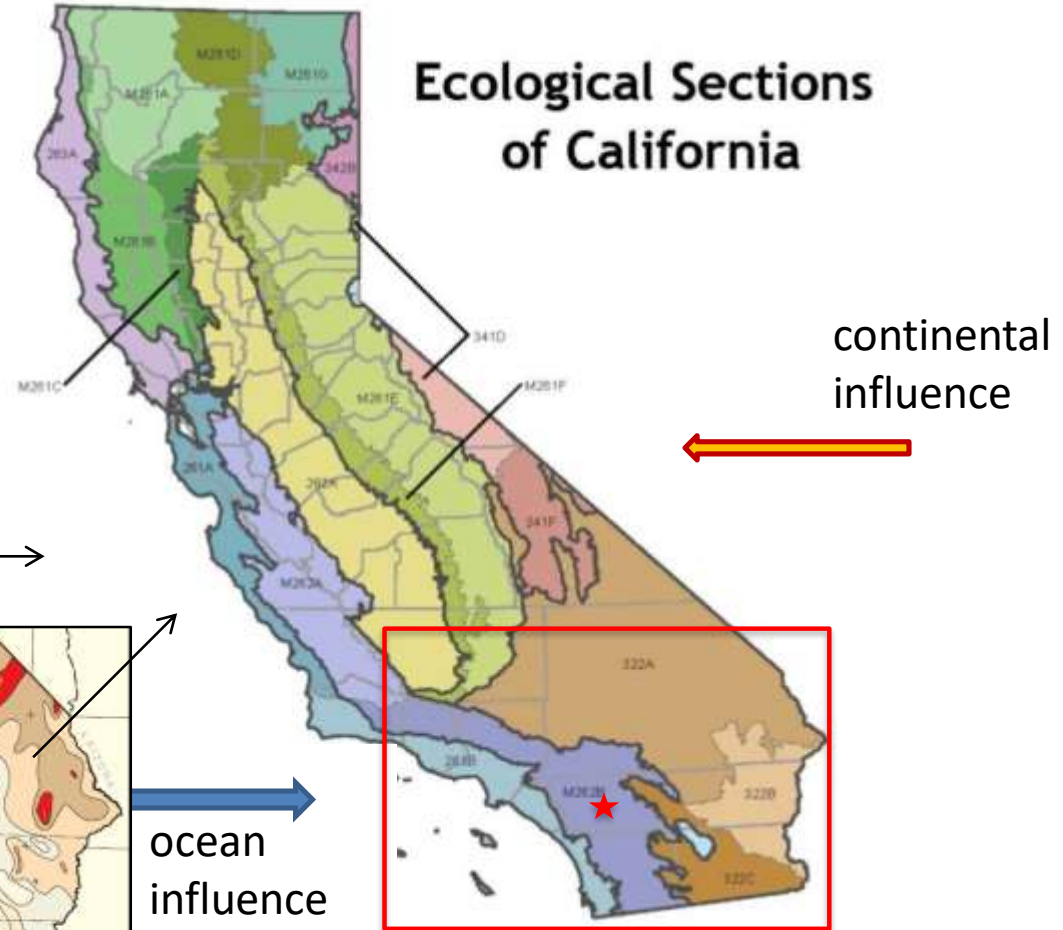
Faults & land movement → complex parent geology



topography

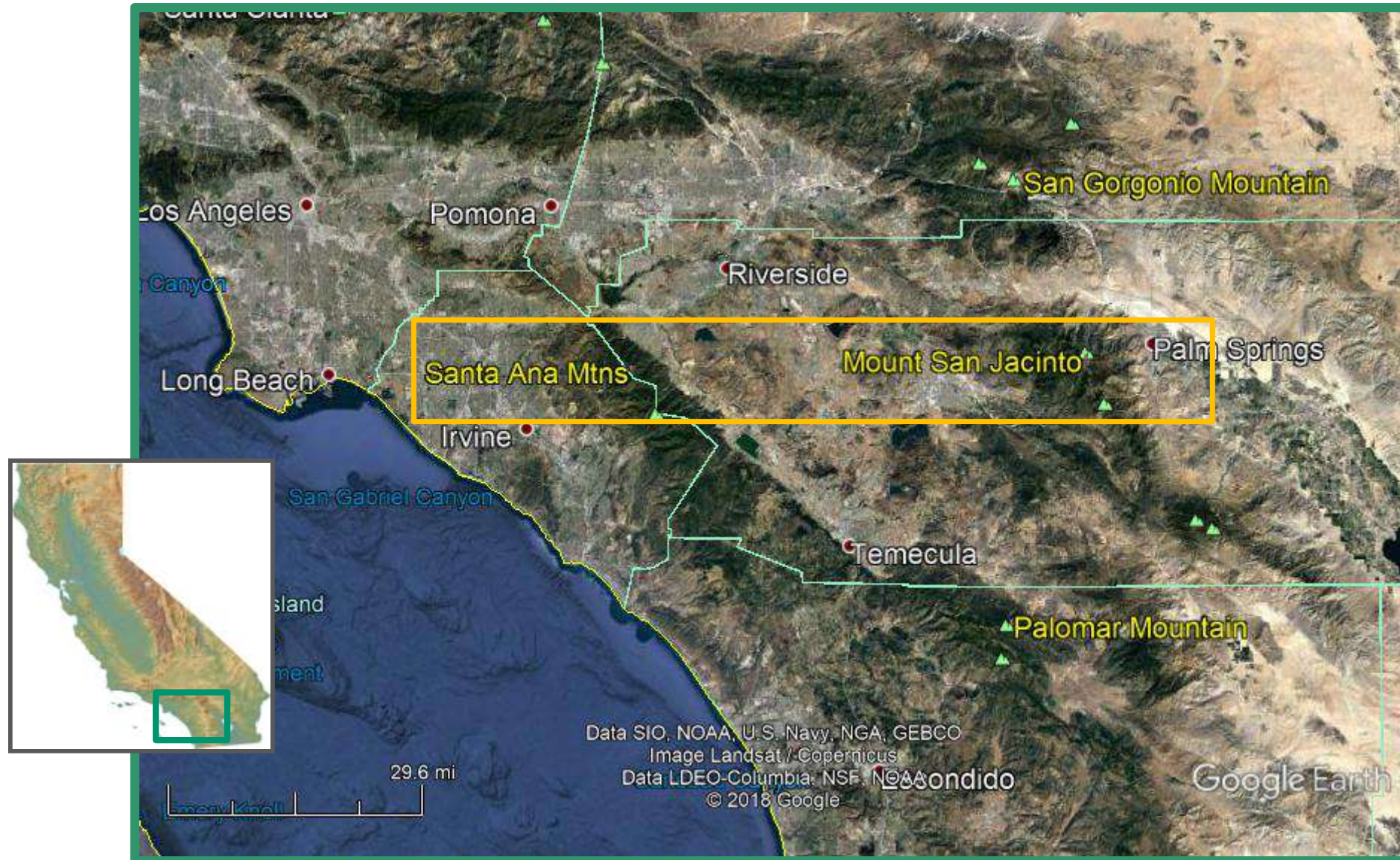


precipitation and temperature

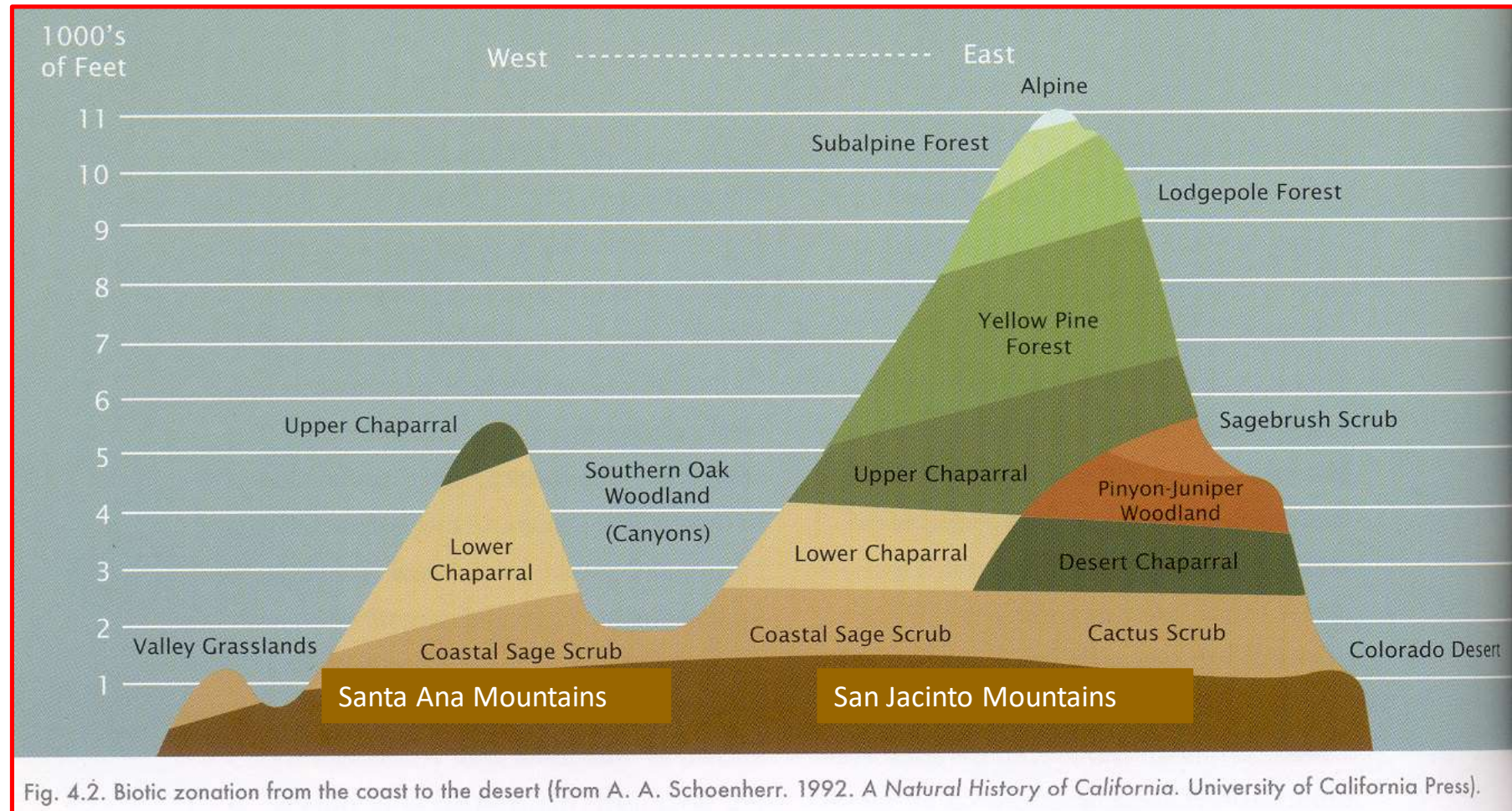


Goudey and Smith
(1994) updated with
ECOMAP (2007)

Cross section from desert, west to near coast



Diverse Major Plant Communities (Biotic Zonation)



Interaction of topography, geology, and climate results in many different plant and animal communities.

Transition from desert vegetation to conifer forests → west



San Jacinto Mountains west to valley and hills below



California mountain
coniferous forest



California black oak
forest



chamise chaparral and
red-shank chaparral



coastal sage scrub

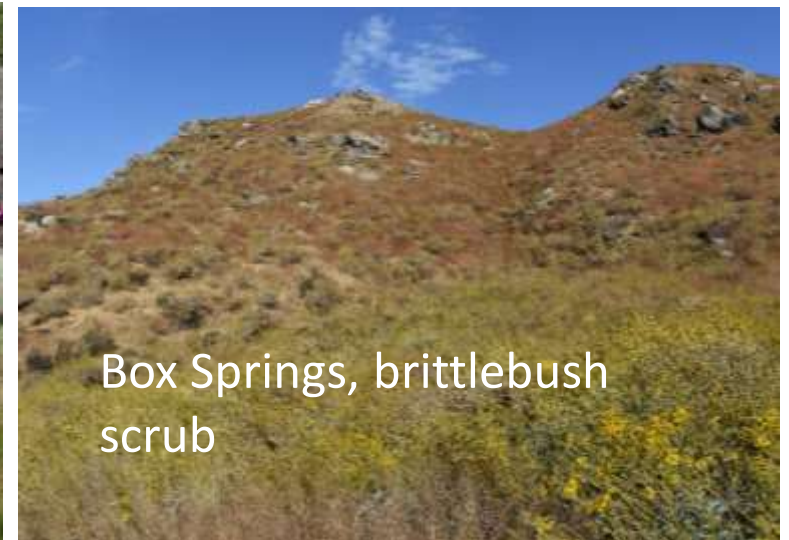
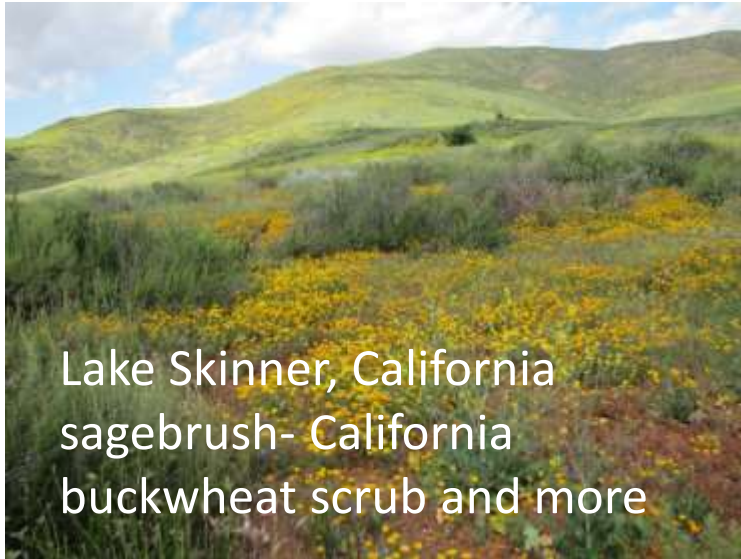


vernal alkali plains



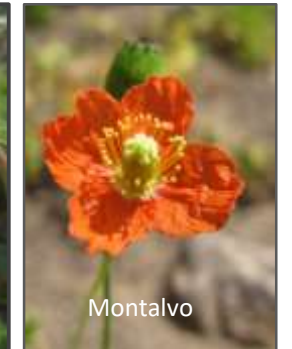
alluvial scrub

diversity between San Jacinto and Temescal Valleys



A sample of amazing local diversity:

Some local wildflowers in coastal sage scrub communities



Special status wildlife in sage scrub



Stephen's kangaroo rat,
Endangered



California gnatcatcher,
Threatened



Burrowing owls, SC



Orange-throated whiptail, SC



San Diego coast
horned lizard, SC



Western spadefoot toad, SC



Quino checkerspot butterfly,
Endangered



Red-diamond rattlesnake, Special Concern



Granite spiny lizard, SC

Riparian plant communities & wetlands crisscross region



Prenda Arroyo, Riverside



Sycamore Creek, Riverside



Santa Ana River bank



Tequesquite alkali meadow



Santa Ana River and *Arundo*

Photo: Shani Pynn, RCRC

Westward across the Temescal Valley to Santa Ana Mtns



2019 ©Ron Vanderhoff, CC NC-4





Shortpod mustard



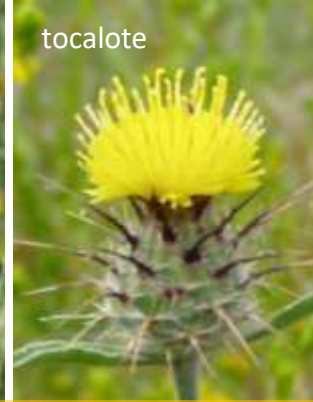
stinknet



Sahara mustard



Yellow star thistle



tocalote

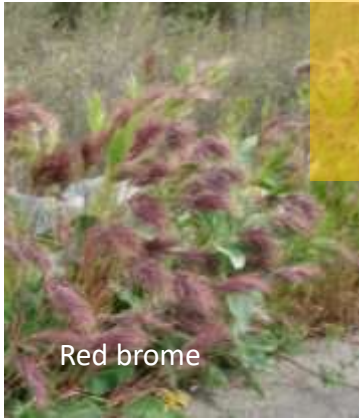


Russian thistle

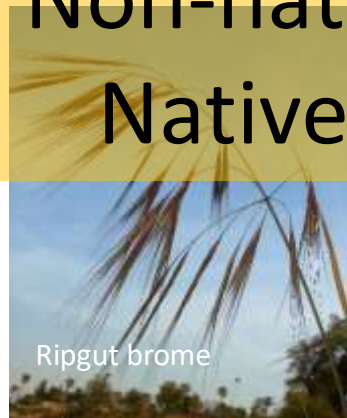


Prickly lettuce

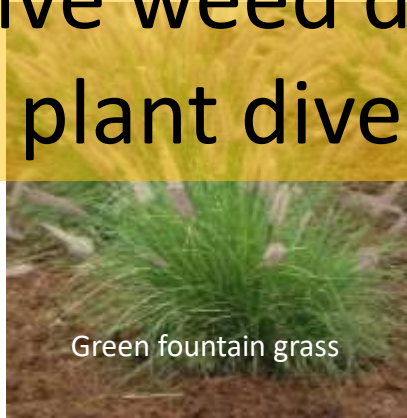
Non-native weed diversity is growing.
Native plant diversity is shrinking!



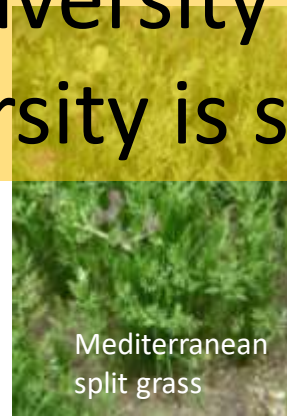
Red brome



Ripgut brome



Green fountain grass



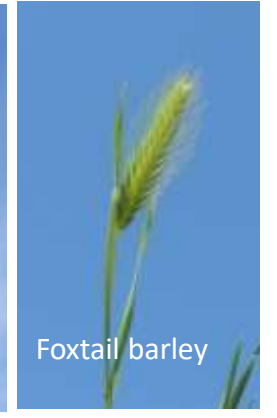
Mediterranean
split grass



Wild oats
Wild oats



Soft chess



Foxtail barley



tree tobacco,



Salt cedar



Castor bean



Mexican fan palm



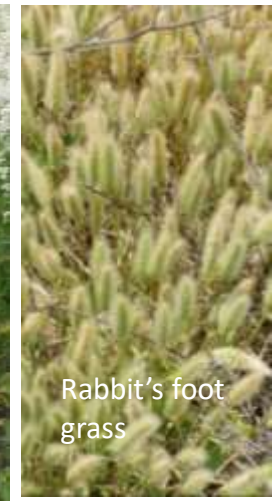
Tree of heaven



Arundo



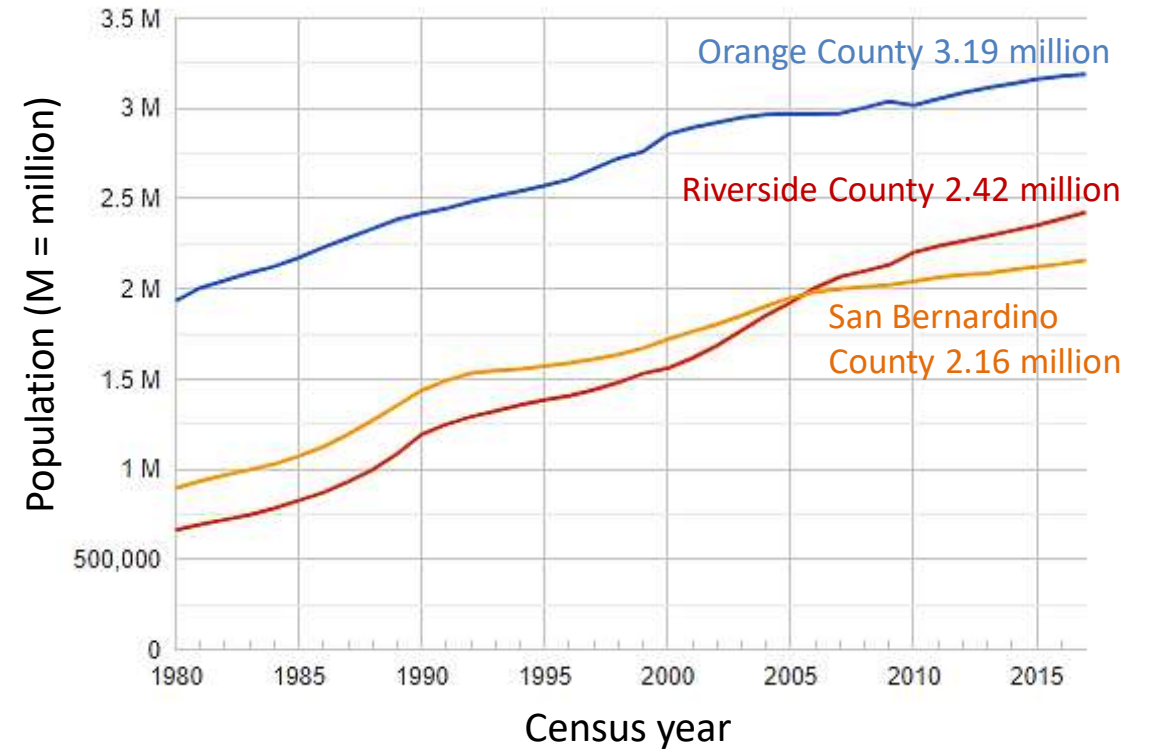
Perennial
pepperweed



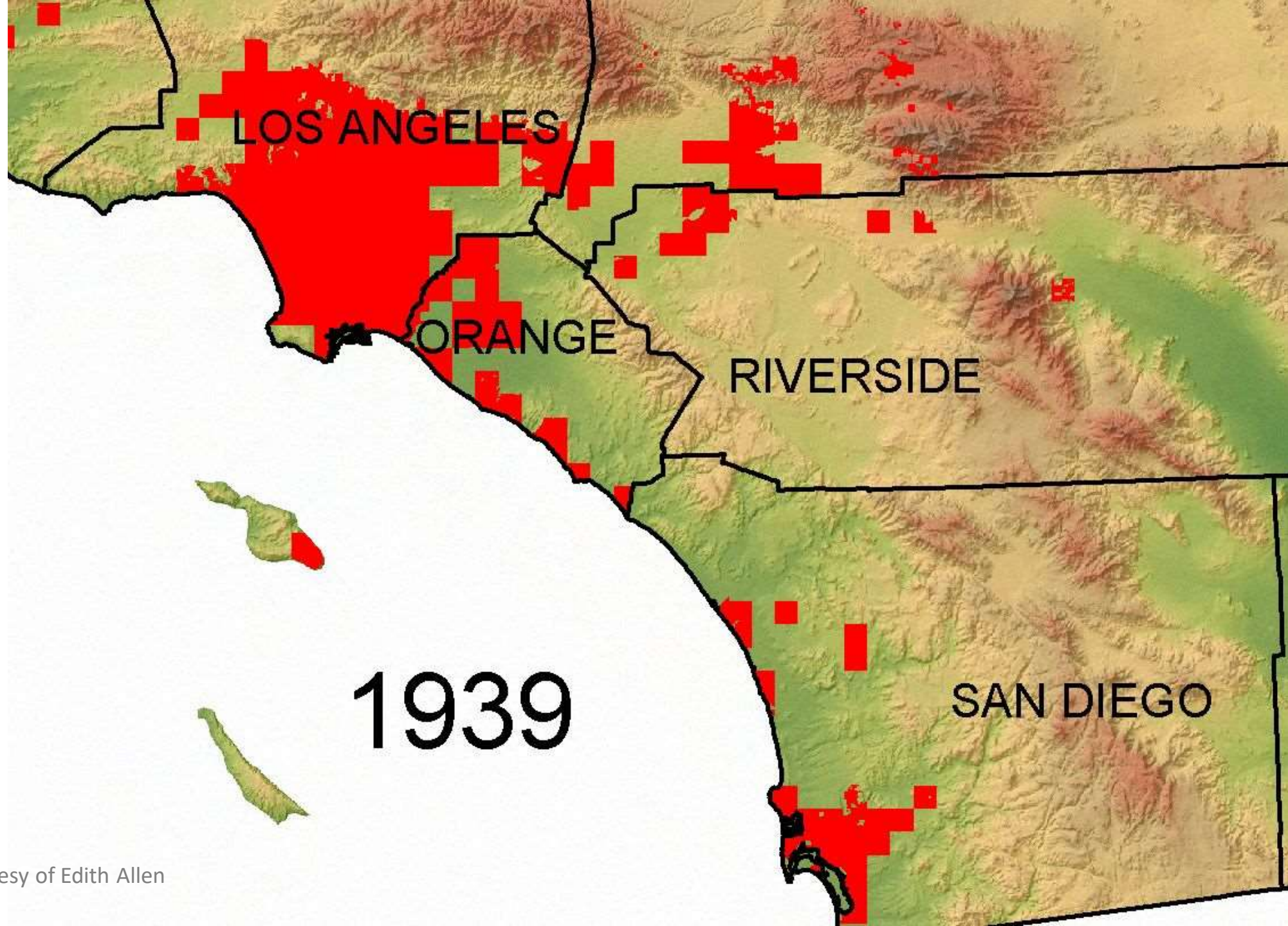
Rabbit's foot
grass

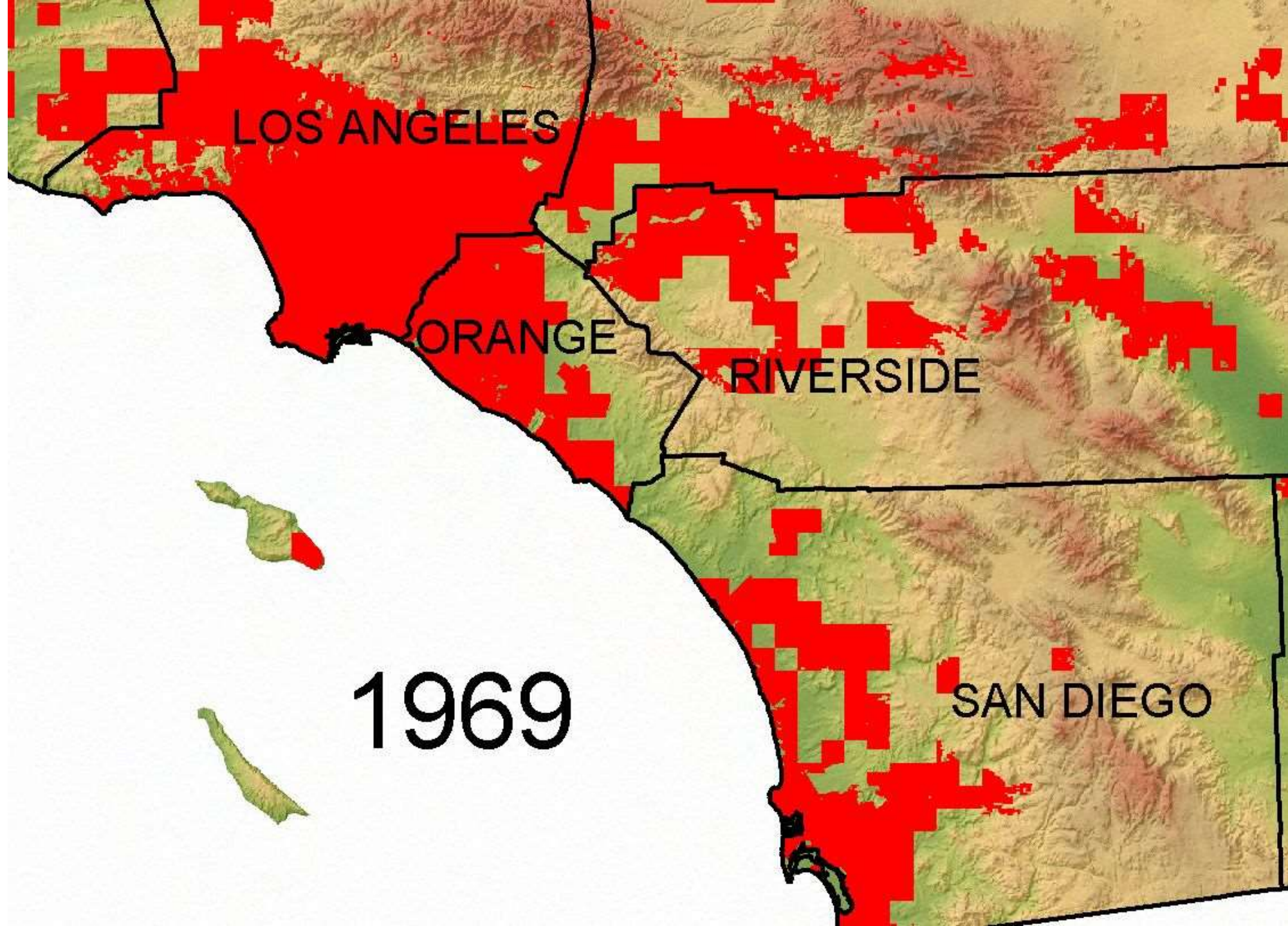
Threats to southern California's biodiversity

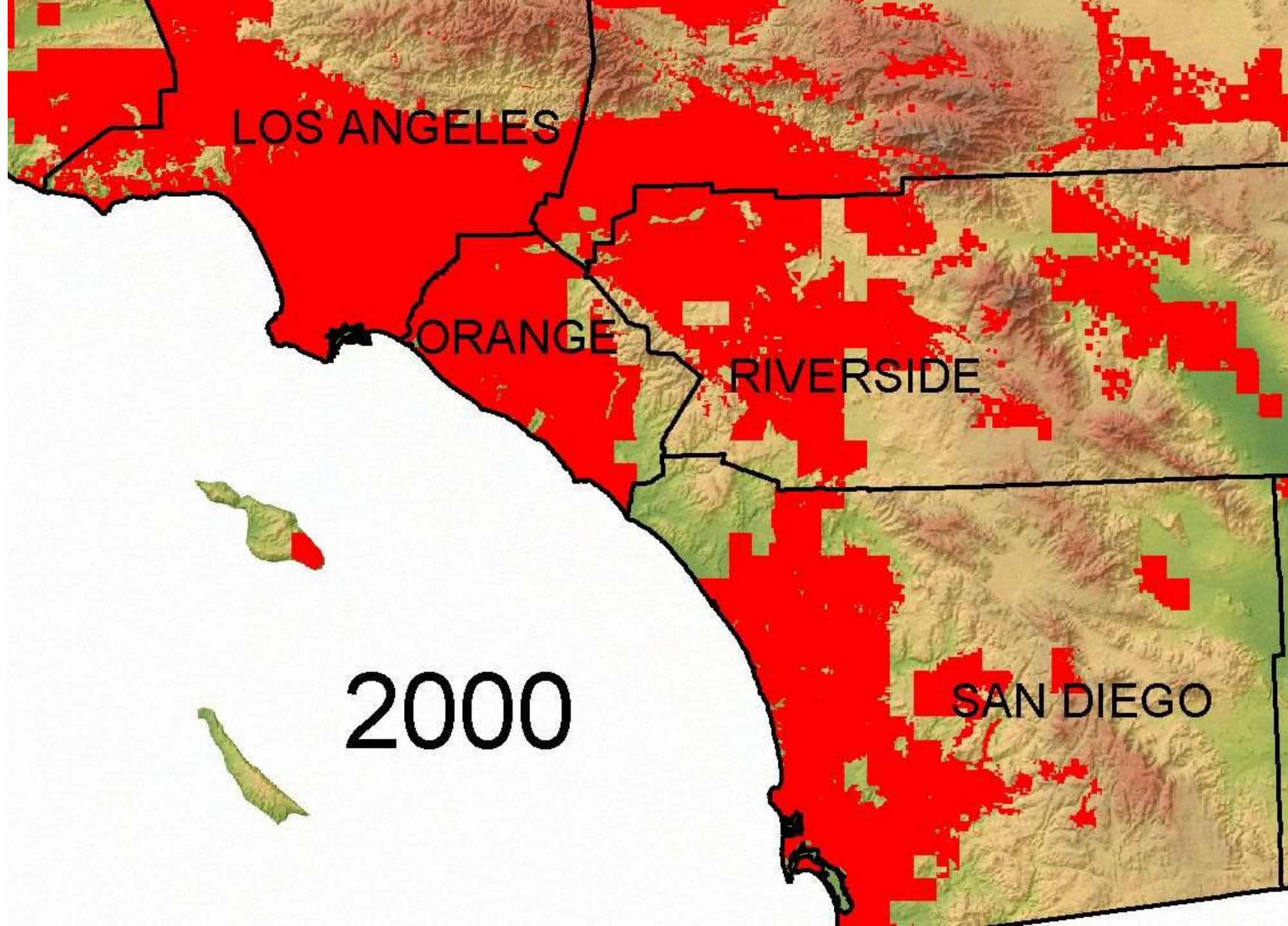
- Conversion of wildland to agriculture
- Development of all kinds
- Invasive plant species
- Increased ignitions, fire frequency
- Air pollution, especially nitrogen deposition
- Invasive insects and diseases
- Rapid climate change



U.S. Census Bureau, updated
September 19, 2019. Data to 2017.







Homelessness Is a Problem in California

AND WE NEED URGENT ACTION.



129,972

CALIFORNIANS EXPERIENCED
HOMELESSNESS IN 2018.

↑ 14%
SINCE 2014

- Apr. 2019 Riverside Co: 747 volunteers counted 2,811 homeless, a 21% rise in a year.
- Elaborate encampments occur along the Santa Ana River and its tributaries.
- Clean Camp Coalition aims to alleviate issues through education and trash pickup.
- On field trip, hear about how local groups are participating in this program.

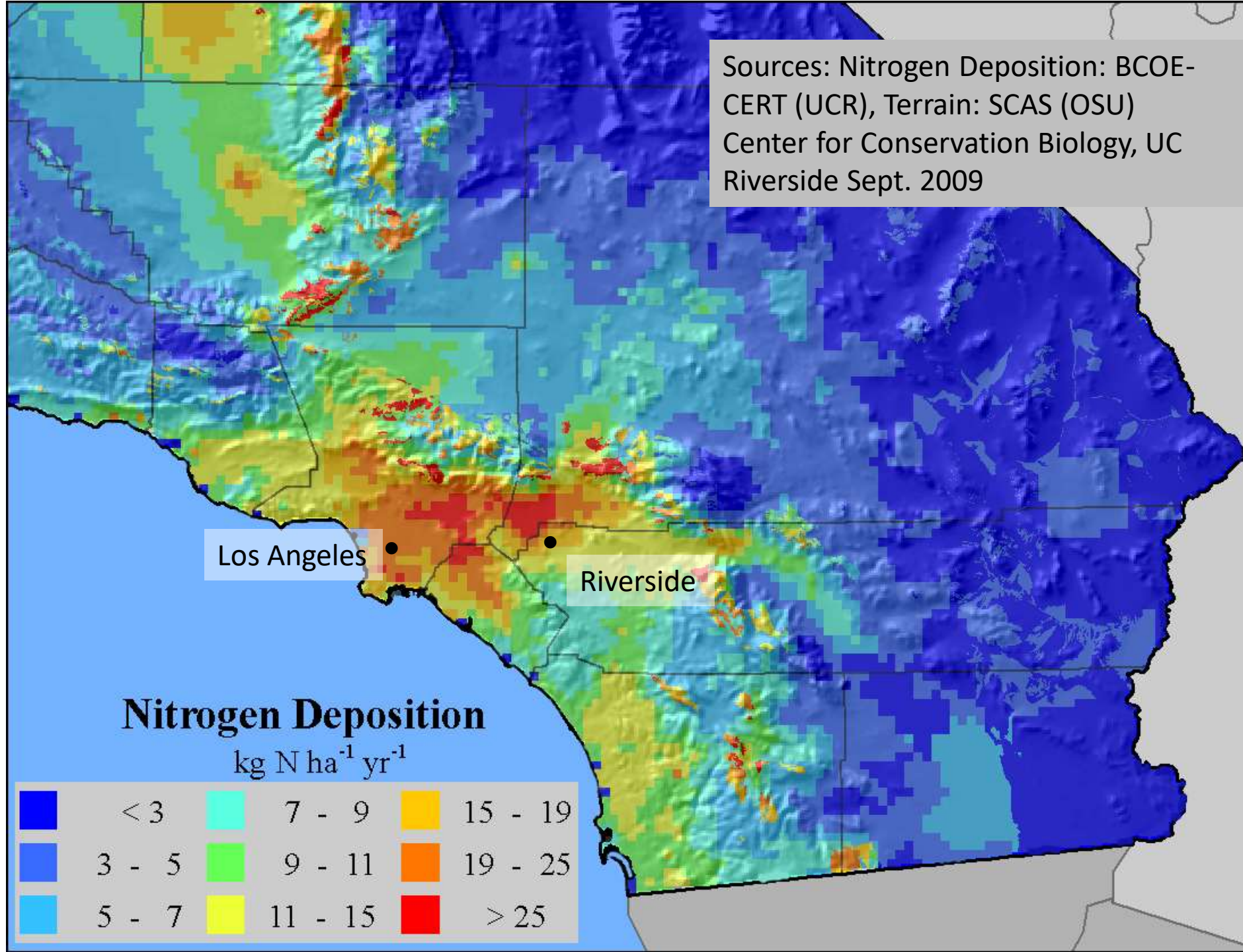


Air pollution and nitrogen deposition

An aerial photograph of a city valley, likely Los Angeles, showing a dense urban area with a prominent grid of freeways. The air is hazy, and the surrounding mountains are visible in the distance under a blue sky.

- Oxidized nitrogen is in vehicle emissions.
- Oxidized nitrogen is also a plant fertilizer (nitrate).
- When deposited on the soil, invasive grasses take up the nitrogen more rapidly than native plants and become dominant.

Sources: Nitrogen Deposition: BCOE-CERT (UCR), Terrain: SCAS (OSU)
Center for Conservation Biology, UC
Riverside Sept. 2009



In areas where air pollution is low, we see the most extensive displays of wildflowers.

long drought and *infrequent*
fire knock back invasive
grasses



Frequent fire, invasive species, and type conversion



Some weeds ignite quickly and carry fire: annual Mediterranean grasses (e.g., red brome, split grass), shortpod mustard, tocalote, rockets (*Sisymbrium*).

Threats to alkali habitats along the San Jacinto River



Water diversions and channelization → changes in hydrology.

Sahara mustard (hills), non-native grass, and stinknet invasions



Compost and manure spreading favors weeds over rare plants



Coulter's goldfields, *Lasthenia glabrata* subsp. *coulteri*, 1B.1



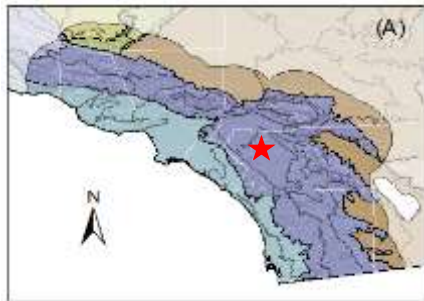
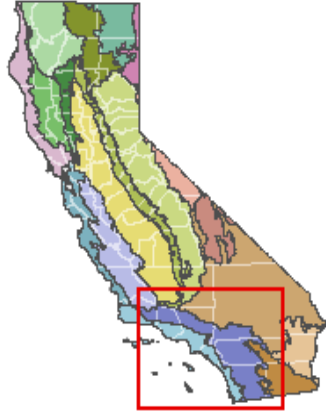
stinknet



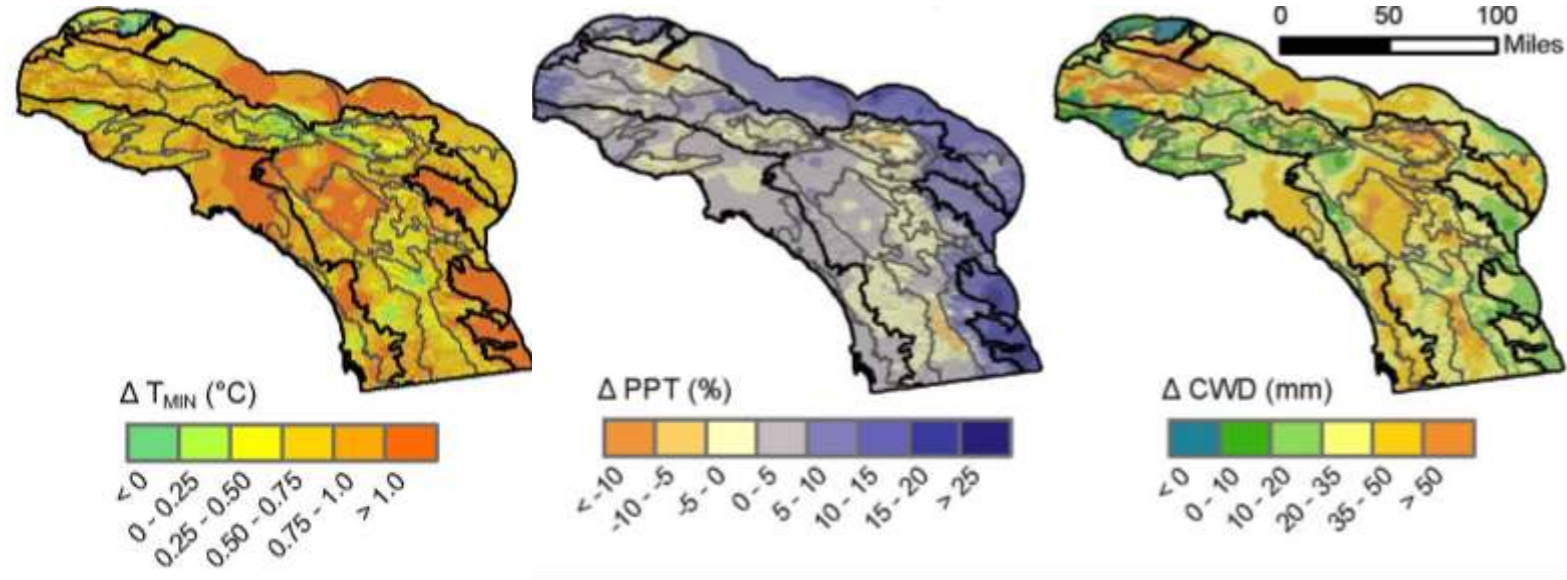
Warehouse and urban development love flat land

We need to factor in rapid climate change

Observed shifts in climate for 1981-2010 relative to 1951-1980



using CA-BCM downscaled
climate data
(270 m resolution)



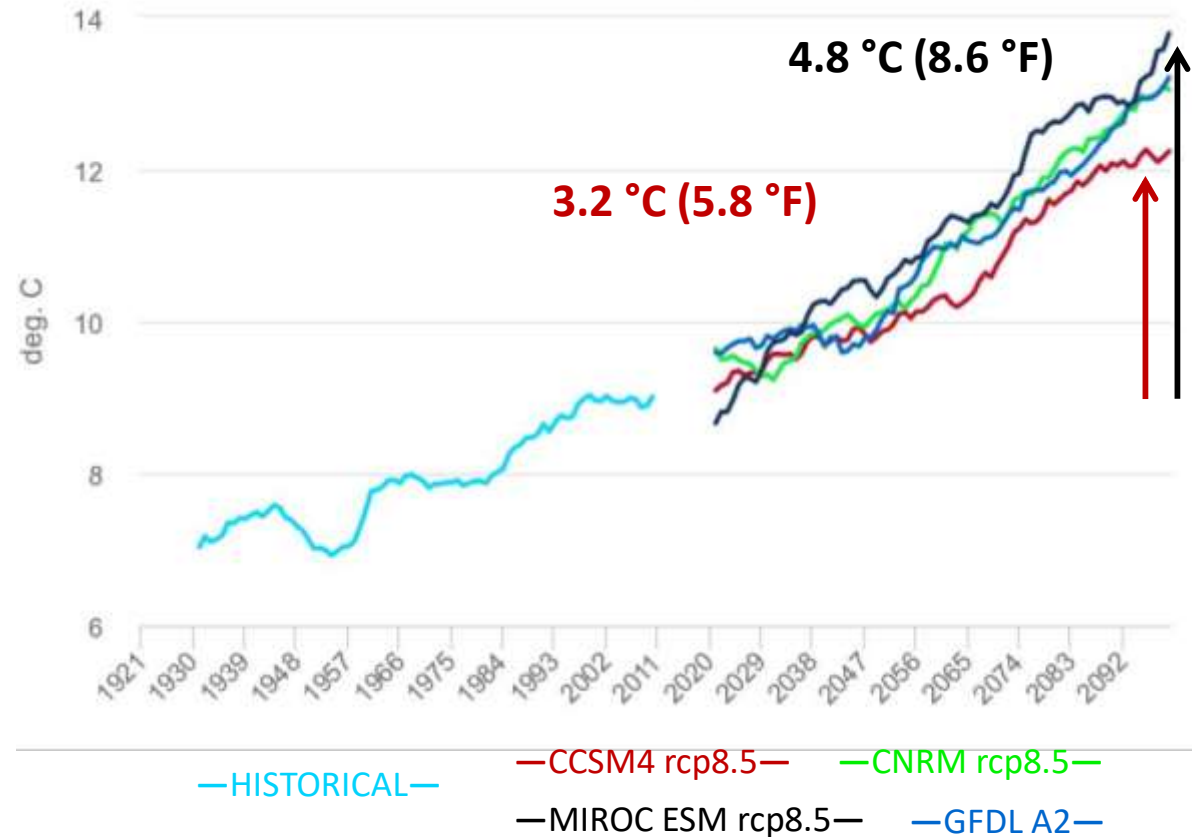
Future climate in the Santa Ana Basin

Santa Ana Basin



Minimum Monthly Temperature

BCM climate data 10-yr averages



Climate change interacts with other threats in complex feedbacks



Examples of collaborative problem solving: e.g., Delhi Sands flower-loving fly and associated dune habitat



Delhi Sands habitat threatened by
invasive plant species and development.



Restoring this habitat requires testing to
be sure chemicals and shallow soil
disturbance do not threaten pupae.

Delhi Sands Dune Restoration, collaboration:

Rivers & Lands Conservancy, UC Cooperative Extension, entomologists, agencies



Sand Pro at work

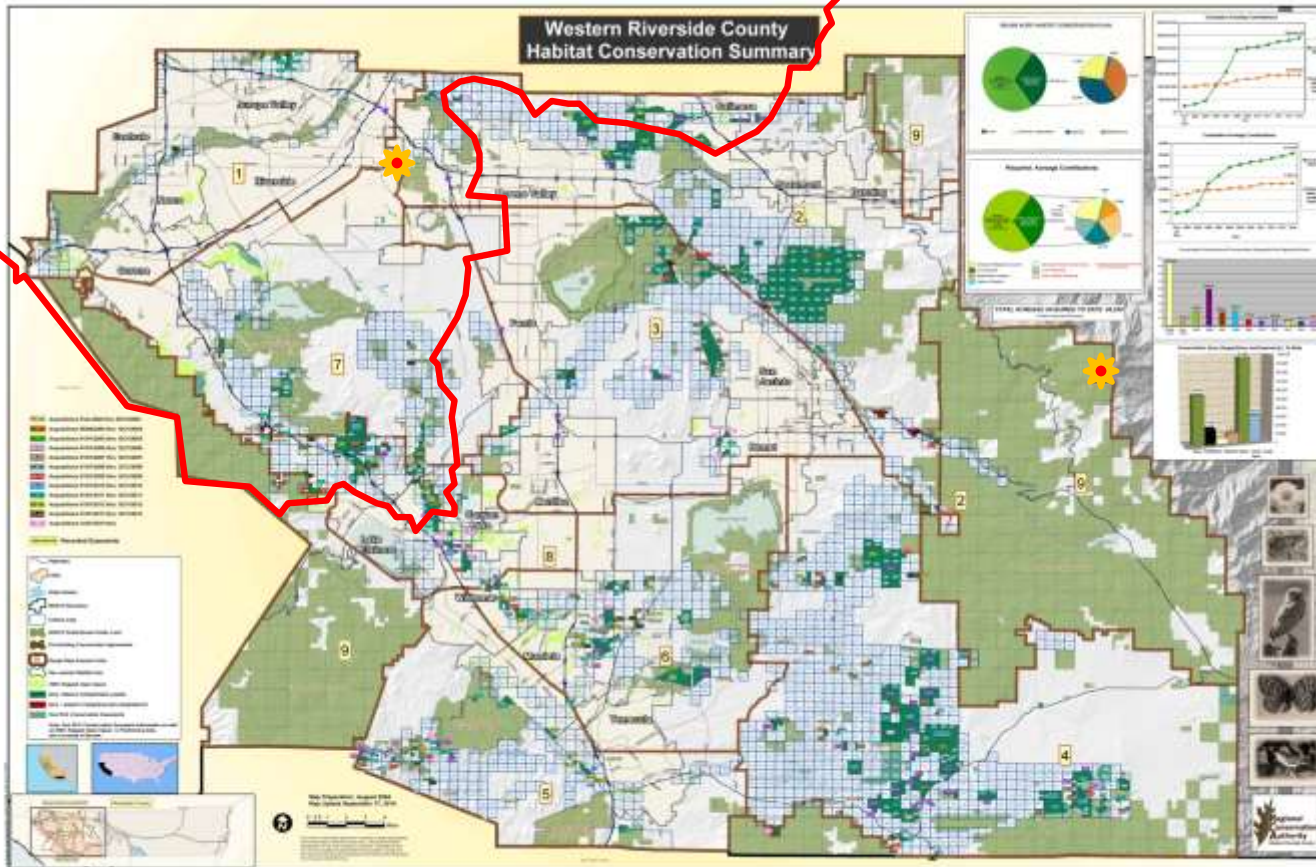
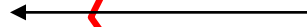
Friday field trip: Michael Viramontes, Nicole Padron (Rivers & Lands Conservancy), and Chris McDonald (UC Cooperative Extension)



Photos curtesy of Rivers & Lands Conservancy

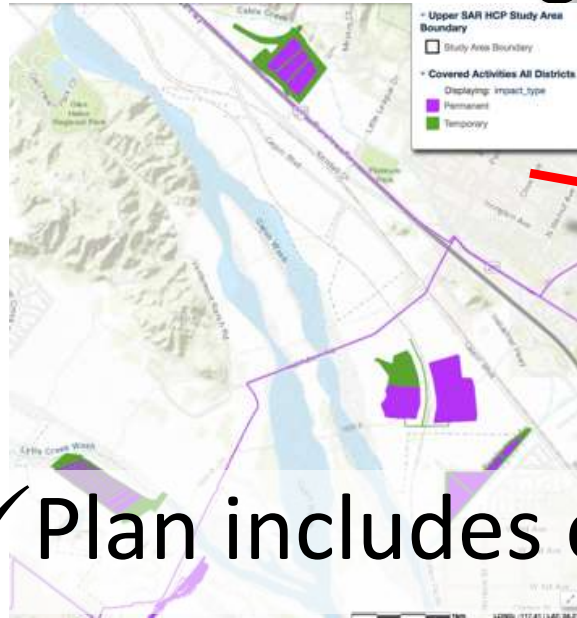
Western Riverside County Multiple Species Habitat Conservation Plan (HCP)- 2004

New Upper Santa Ana River
HCP under development



- New HCPs trying to avoid funding and implementation pitfalls.
- Requires collaboration among many agencies, NGOs, stakeholders, and researchers.

Acquiring suitable habitat to mitigate loss: Los Angeles Pocket Mouse Model



✓ Plan includes extensive restoration of degraded areas

- Overlay permanent and temporary impact footprints
- Calculate acres of impact to estimate “take” of species



A scenic landscape photograph featuring a vibrant sky with soft, pastel-colored clouds in shades of pink, orange, and blue. The foreground is filled with dark, silhouetted trees and bushes, creating a sense of depth. In the distance, a range of mountains is visible under the colorful sky. The overall mood is peaceful and serene.

Thank you for all that you do to help!