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PRBO Conservation Science



Creeks, Critters and Climate: Watershed Restoration for a Secure Future

North Bay Watershed Association
Ellie M. Cohen and PRBO Staff

April 13, 2012

PRIORITY: Reduce Impacts of Environmental Change on Ecosystems & Enhance Capacity to Adapt



Left: Photodisc. Right: Corbis

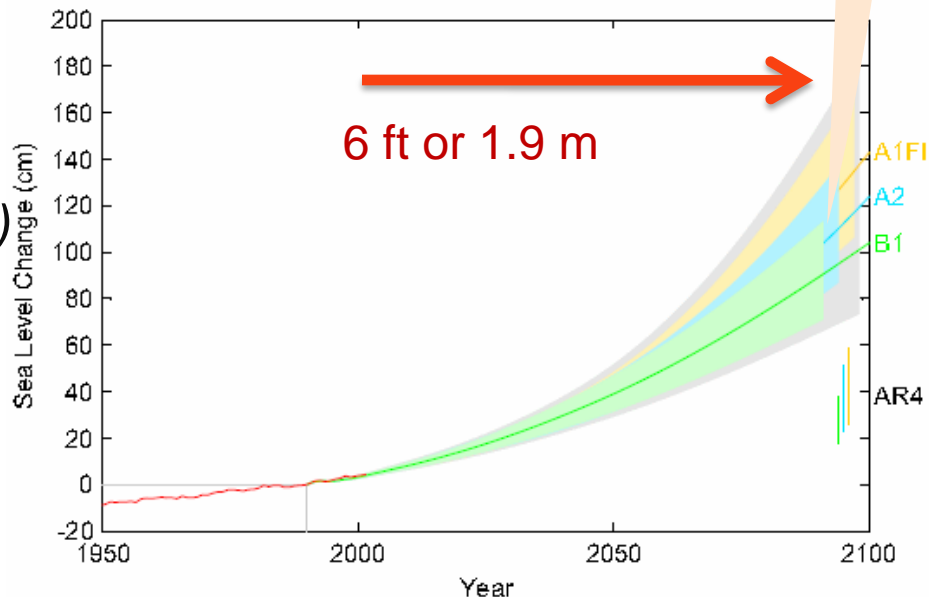


Sea Level Rise— 6 ft or more by 2100

16.4 ft or 5 m?

-Rate of global SLR already >2x faster than IPCC 2007 predictions (www.climateinstitute.org.au)

-Higher with high tides, storm surges, El Nino

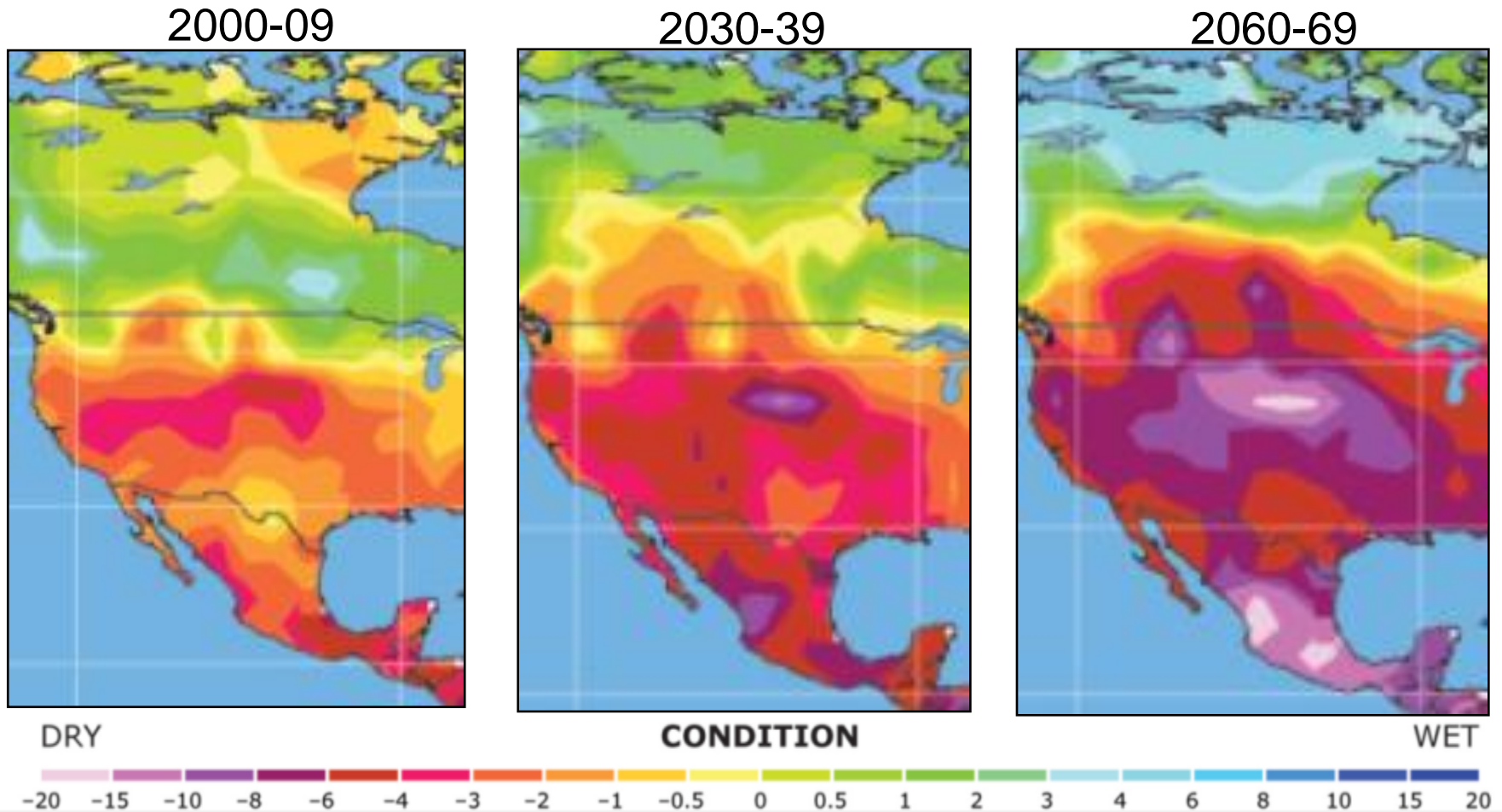


Vermeer, M., Rahmstorf, S. *Global sea level linked to global temperature. Proceedings of the National Academy of Sciences, December 2009*

Hansen, Sato:/ NASA: July 2011 *Paleoclimate Implications for Human-Made Climate Change . Milutin Milankovitch 130th Anniversary Symposium.* <http://arxiv.org/abs/1105.0968v3> - doubling ice loss every decade = meters SLR by 2100;

www.energybulletin.net/stories/2012-01-03/hansen-still-argues-5m-21st-c-sea-level-rise-possible

Extreme Drought - Permanent Dust Bowls Predicted in Southwest over Decades Ahead

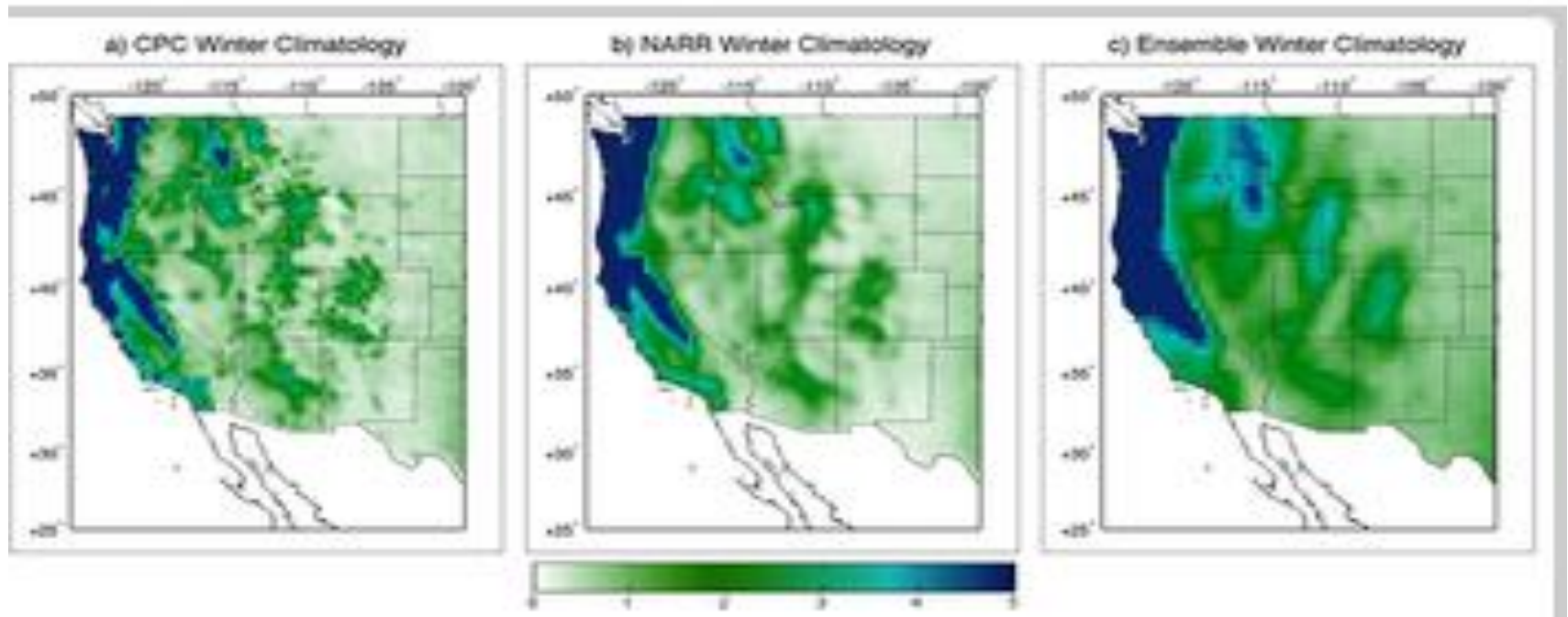


Palmer Drought Severity Index of -4 or lower considered extreme drought; UCAR graphics; not forecasts
Drought under global warming: a review, Aiguo Dai, National Center for Atmospheric Research, 19 Oct 2010

<http://onlinelibrary.wiley.com/doi/10.1002/wcc.81/full>

↑ Intensity of extreme winter precipitation in West projected over next 50 yrs

...but a decrease in mean precipitation in Southwest



US: 2011- record # of extreme events; 2012- 80 tornadoes March 2nd

“It’s not the right question to ask if this storm or that storm is due to global warming, or is it natural variability. Nowadays, there’s always an element of both.”

- Kevin Trenberth, National Center for Atmospheric Research, Aug 15, 2010



rain, snow and flooding in Midwest spring 2011; tornadoes in April 2011; drought and fire in AZ, TX and NM spring 2011
..a record 14 weather and climate disasters in 2011 each caused \$1 billion or more in damages &....loss of human lives --NOAA

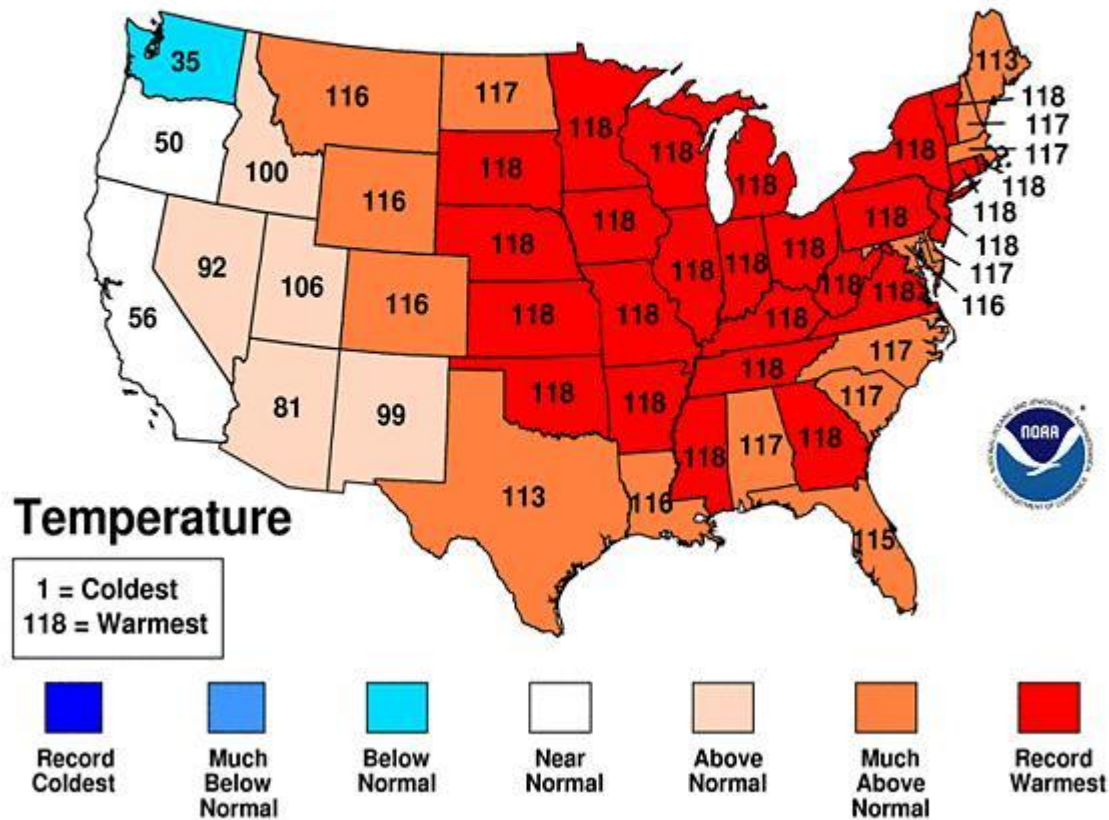
<http://www.noaa.gov/extreme2011/drought.html>; [January was USA's 4th-warmest on record – USATODAY.com](http://www.usatoday.com/story/news/nation/2011/01/05/usa-4th-warmest-on-record/20110105)

[http://www.torontosun.com/2012/03/05/scientists-see-rise-in-tornado-creating-conditions:](http://www.torontosun.com/2012/03/05/scientists-see-rise-in-tornado-creating-conditions)

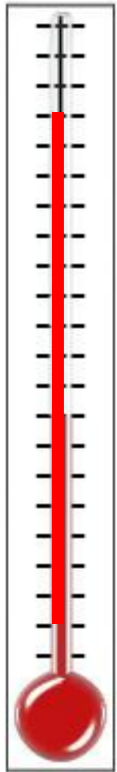
March 2012- warmest on record with >15,000 warm temperature records broken; 1st qtr 2012- warmest

March 2012 Statewide Ranks

National Climatic Data Center/NESDIS/NOAA

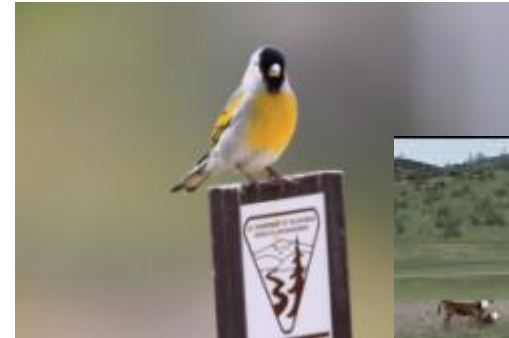


How Might We Provide Time for Wildlife and People to Adapt? *(adaptive capacity)*



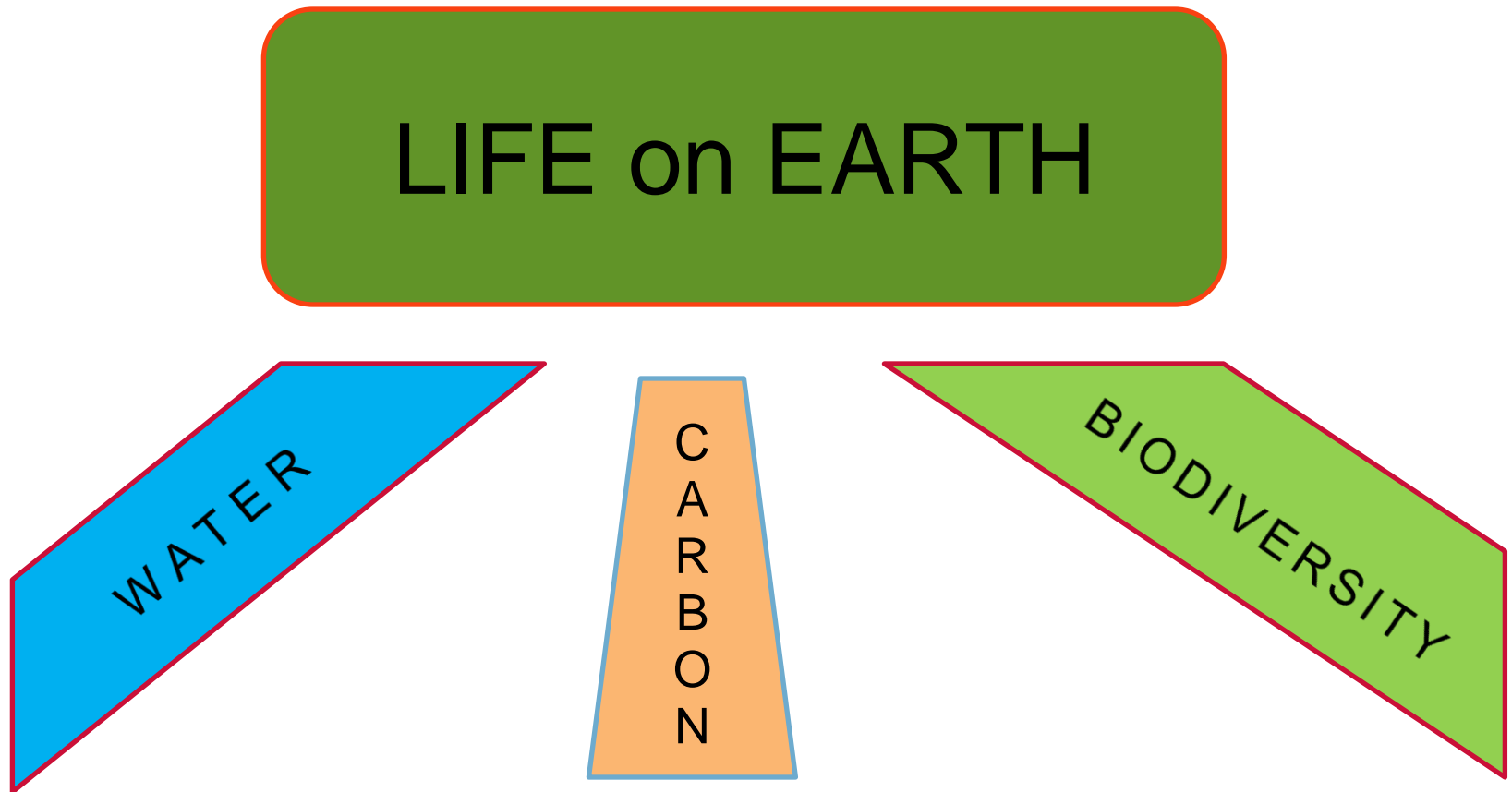
Employ Climate Smart Conservation Principles

- Watershed-scale approach
- Focus on future possible conditions- not past
- Take into account range of possibilities— extremes
- Benefits wildlife & people
- Promotes collaboration, open sharing of information
- Minimizes carbon footprint



Must Manage for Multiple Benefits Simultaneously

move from single spp. to multi-spp., whole watershed approach



Climate Smart: Prioritize riparian restoration

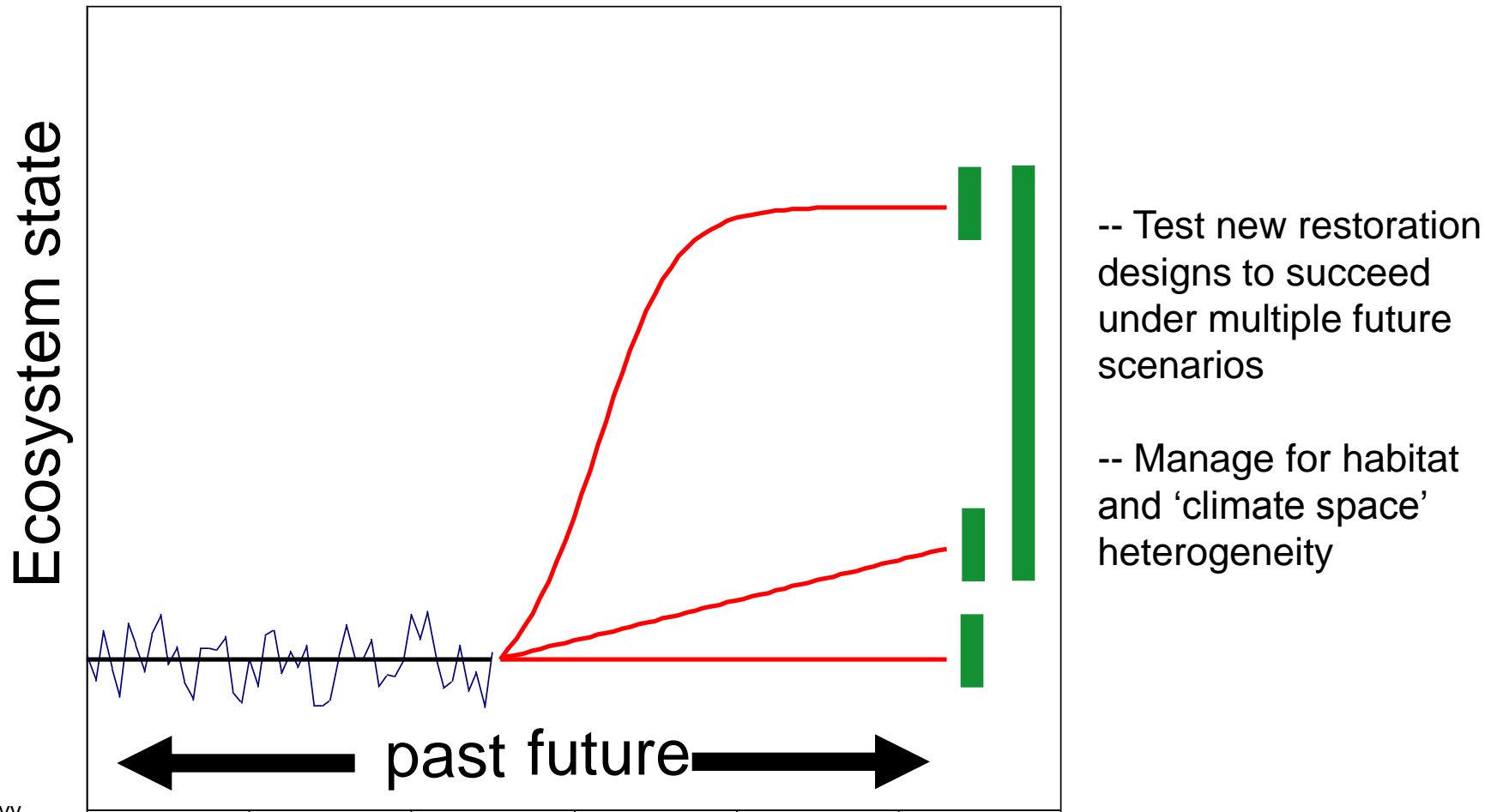
.....multiple benefits for wildlife and people

- Reduces drought and flood impacts
- Recharges groundwater
- Enhances connectivity
- Creates thermal refugia for wildlife
- Supports fish, birds, other wildlife

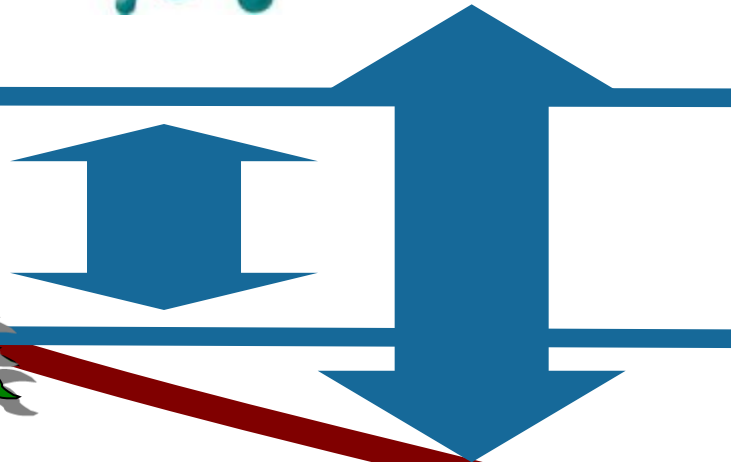
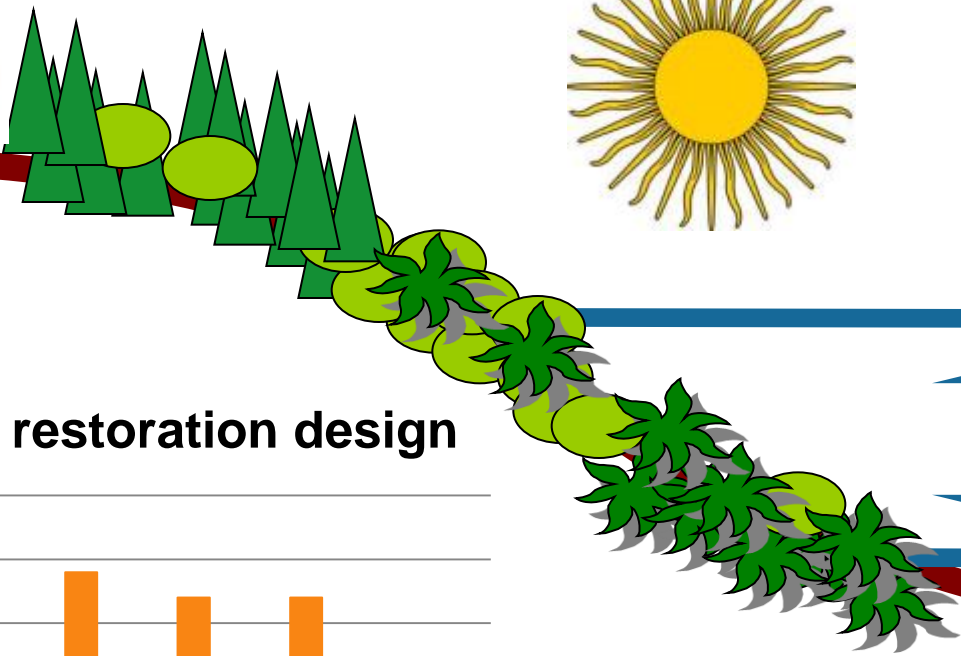
www.PRBO.org Seavy et al., **Why climate change makes riparian restoration more important than ever.** 2009. *Ecological Restoration* Ecol. Rest. v27



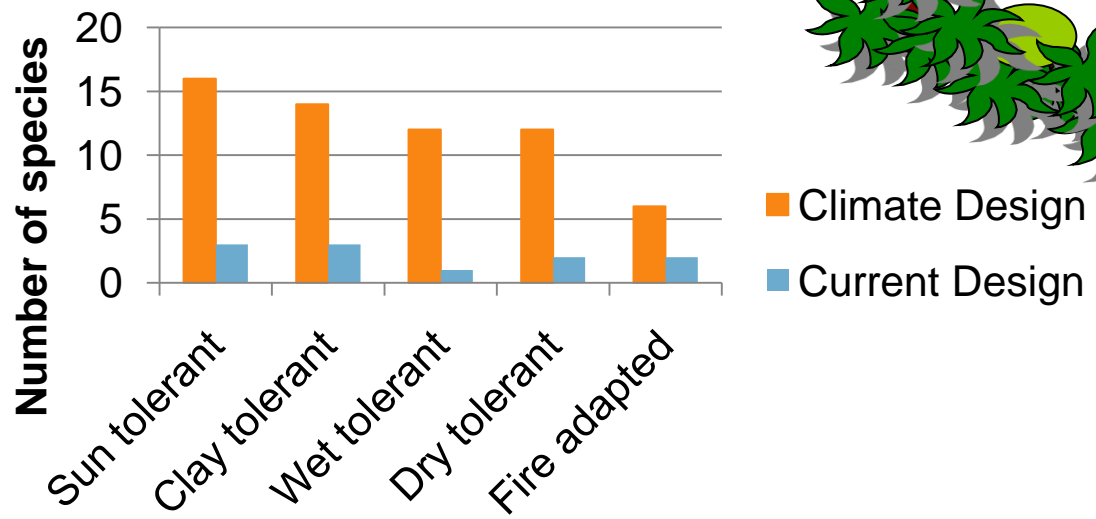
Climate Smart: plan for extremes, wider range of variability to increase adaptive capacity



Climate Smart: Plant More Species Tolerant of Extremes.....

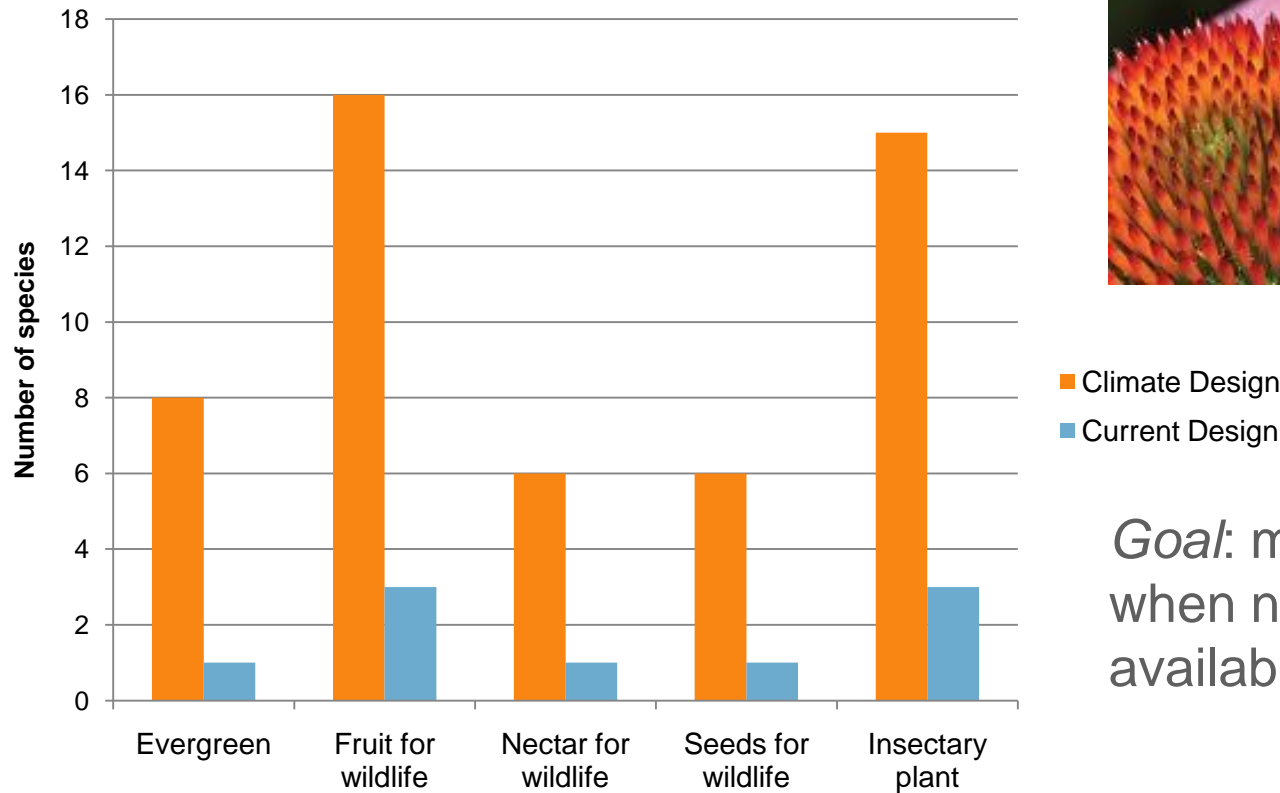


Shrubs in restoration design



Climate Smart: Provide More Food Resources over Longer Period for Disrupted Phenologies

Shrubs in restoration design



Goal: maximize # of months when nectar or seeds are available

Climate-Smart: Restore Private Lands

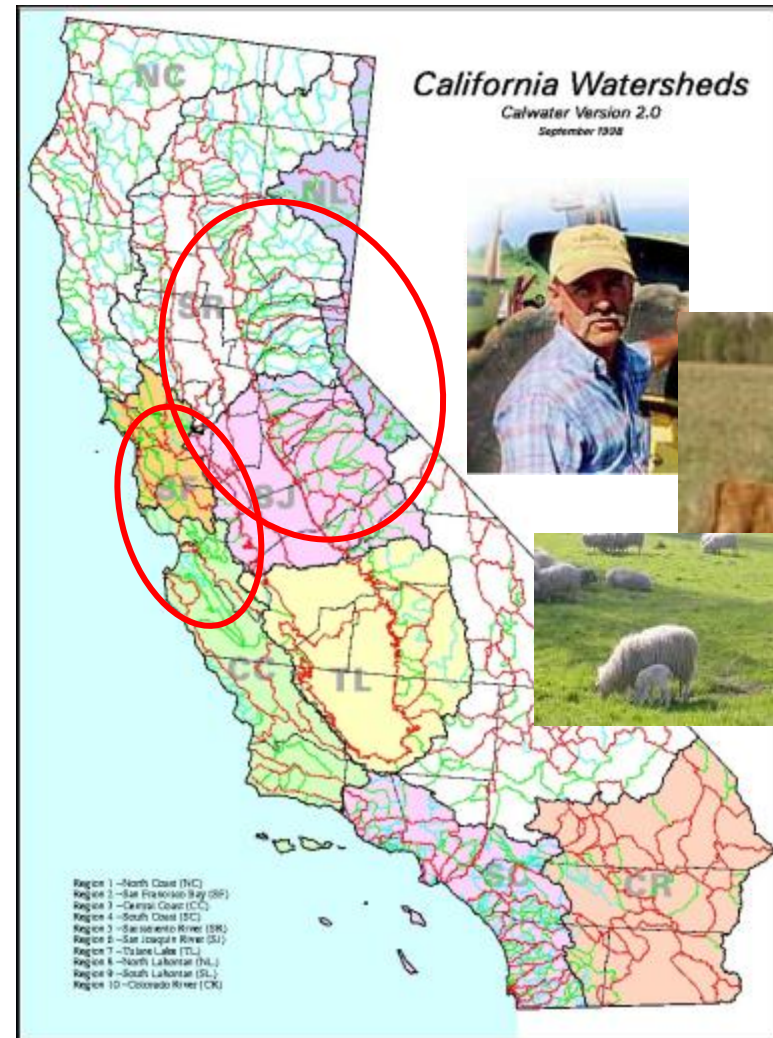
Actively link to adjacent landowners - public and private



Before and after restoration -- Gale Ranch, Marin County

Climate Smart: “Re-water” Rangelands thru Eco-Friendly Grazing and Other Practices

- Leverage Farm Bill funds
- Hire, train 21 partner biologists with NRCS
- Enhance 1 million+ acres on grazing lands in Sac and SJ Valley foothills, and Coastal Watersheds over next 5 years
- Restore water storage & flow = double Hetch-Hetchy
- Ecological, economic benefits



NRCS Upper Stony Creek Model: Ephemeral creek



84 ranchers
~240,000 acres

Same creek, re-watered - 8 years later



Climate Smart: Link Riparian Restorations to Baylands Transition Zone & Ocean— e.g., San Pablo Bay

- Constructing hundreds of small islands to create wind breaks ; filter out sediment from incoming tides
- Breaching levees to allow tidal waters into marsh area
- Building sloped levees
- Building new levee to protect railroad, Hwy 37, adjacent private property



<http://www.sonomalandtrust.org/>

John Burgess / Santa Rosa Press Democrat: Sears Point Ranch Restoration Site

<http://www.pressdemocrat.com/article/20120216/ARTICLES/120219645/1042/opinion?p=2&tc=pg&tc=ar>

Climate Smart: Engage youth & community in local, hands-on restoration efforts!



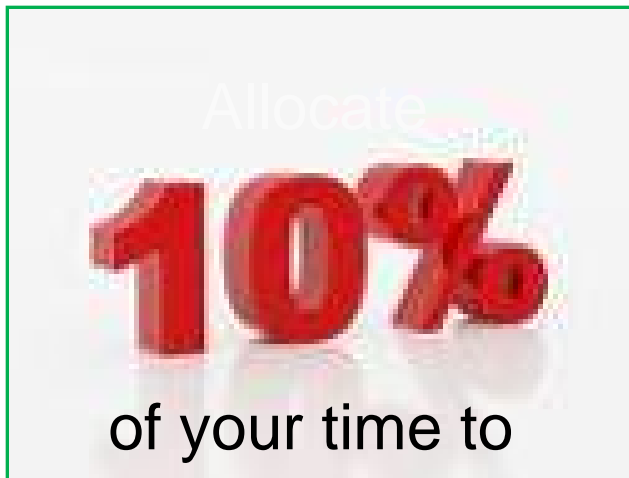
Climate-Smart: Communicate the Science and Inspire Hope

- **Inspire:** I think I can, I think I can
- **Solution oriented:** confident, hopeful, belief in human ingenuity – people more likely to accept the science than if focus is only on dire consequences, inevitable, catastrophic
- **We have CHOICES** --talk about choices we have!

Climate Smart: Communicate Science Terms Clearly

Terms that have different meanings for scientists and the public		
Scientific term	Public meaning	Better choice
enhance	improve	intensify, increase
aerosol	spray can	tiny atmospheric particle
positive trend	good trend	upward trend
positive feedback	good response, praise	vicious cycle, self-reinforcing cycle
theory	hunch, speculation	scientific understanding
uncertainty	ignorance	range
error	mistake, wrong, incorrect	difference from exact true number
bias	distortion, political motive	offset from an observation
sign	indication, astrological sign	plus or minus sign
values	ethics, monetary value	numbers, quantity
manipulation	illicit tampering	scientific data processing
scheme	devious plot	systematic plan
anomaly	abnormal occurrence	change from long-term average

Climate Smart: Apply the 10% Rule Every Day



T = Test &

E = Experiment

N = Now

No More “Business as Usual”

**Stop greenhouse gas emissions
and
make ecosystem conservation- *on watershed-
scale*- an equal priority now**



In Summary:



1. Climate change impacts are accelerating; exacerbates other stressors
2. Plan for extremes: drought, fires, floods, heat, changes in phenology
3. Prioritize riparian restoration on watershed scale- *water, carbon, biodiversity*
4. Actively apply climate smart conservation strategies

Our future?



Courtesy Tom Suchanek, USGS

Our future?



NO SWIMMING
ANY TIME
← →

ALL DOGS MUST
BE ON A LEASH
PLEASE PICK UP
AFTER YOUR DOG

LEASH & MOUTH
NO
TELEVISION
RECORDING

Signs of Silver Lake Reservoir by deadeybart a.k.a Brett

OR...restored watersheds to sustain nature and our communities....





.... healthy tidal habitats to protect wildlife and people from sea level rise & extremes...

VISION (adapted from PRBO):

Because of our work, in 100 years the North Bay's diverse habitats will still support resilient ecosystems, thriving wildlife populations and vital ecosystem services for California's residents.

The North Bay will still be a premier center for nature on Earth— providing unparalleled economic, cultural, and conservation values.

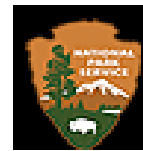
Additional Resources

- www.baeccc.org list serve- receive weekly biodiversity and climate change news updates
- www.nwf.org/Global-Warming/Climate-Smart-Conservation.aspx *Climate Smart Conservation*
- www.skepticalscience.com *Explaining climate change science & rebutting global warming misinformation*
- www.realclimate.org *Climate science from climate scientists*
- www.climatechangecommunication.org *Center for Climate Communication*
- www.merchantsofdoubt.org/ *how handful of scientists obscured truth from tobacco smoke to global warming*

Acknowledgements



- Anonymous (2)
- Audubon California
- Bay Area Ecosystems Climate Change Consortium
- S.D. Bechtel, Jr. Foundation
- Bernice Barbour Foundation
- Bureau of Reclamation
- Bureau of Land Management
- California Coastal Conservancy
- California Department of Fish and Game
- California Department of Water Resources
- California Bay Delta Authority
- California Landscape Conservation Cooperative
- Central Valley Joint Venture
- Faucett Family Foundation
- Richard Grand Foundation
- Marin Community Foundation
- Giles Mead Foundation
- Moore Family Foundation
- David and Lucile Packard Foundation
- National Park Service
- National Science Foundation
- NOAA National Marine Sanctuaries
- Natural Resource Conservation Service
- Resources Legacy Fund Foundation
- San Francisco Foundation
- San Francisco Bay Joint Venture
- The Nature Conservancy
- U.S. Fish and Wildlife Service
- USDA Forest Service
- USDA Natural Resources Conservation Service
- US Geological Survey
- and PRBO Board, Members and Staff



WATER: key driver

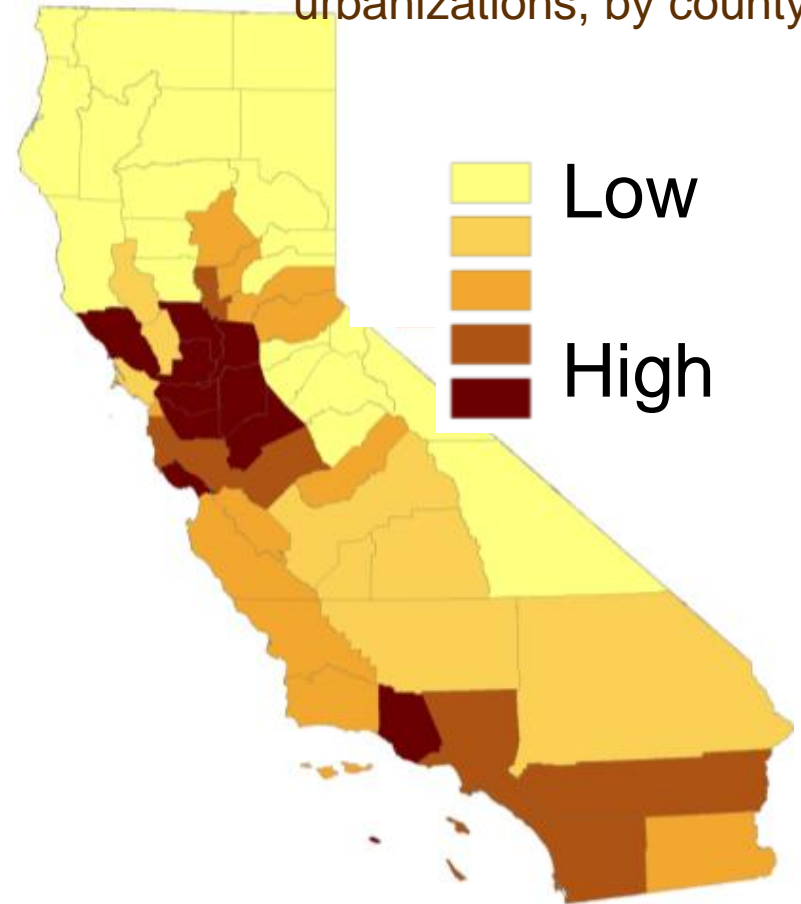
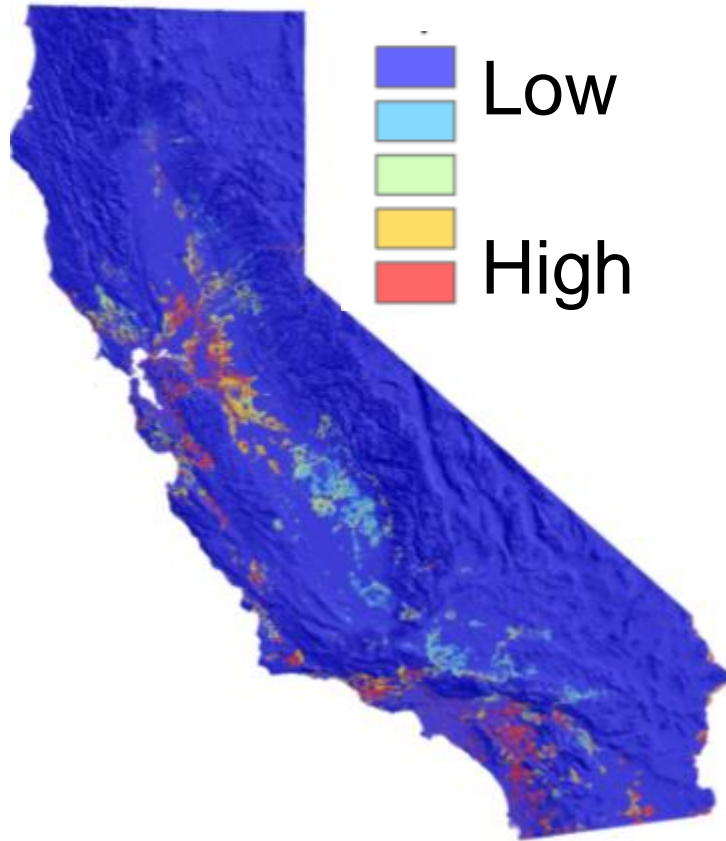


Climate Smart: Incorporate development; Climate alone

underestimates impacts -e.g., *Climate, housing density & oak woodland birds*

Red = high conservation value & threat from future urbanization

Brown = high conservation value & threat from future urbanizations, by county



Climate-Smart: Managing for Biodiversity

