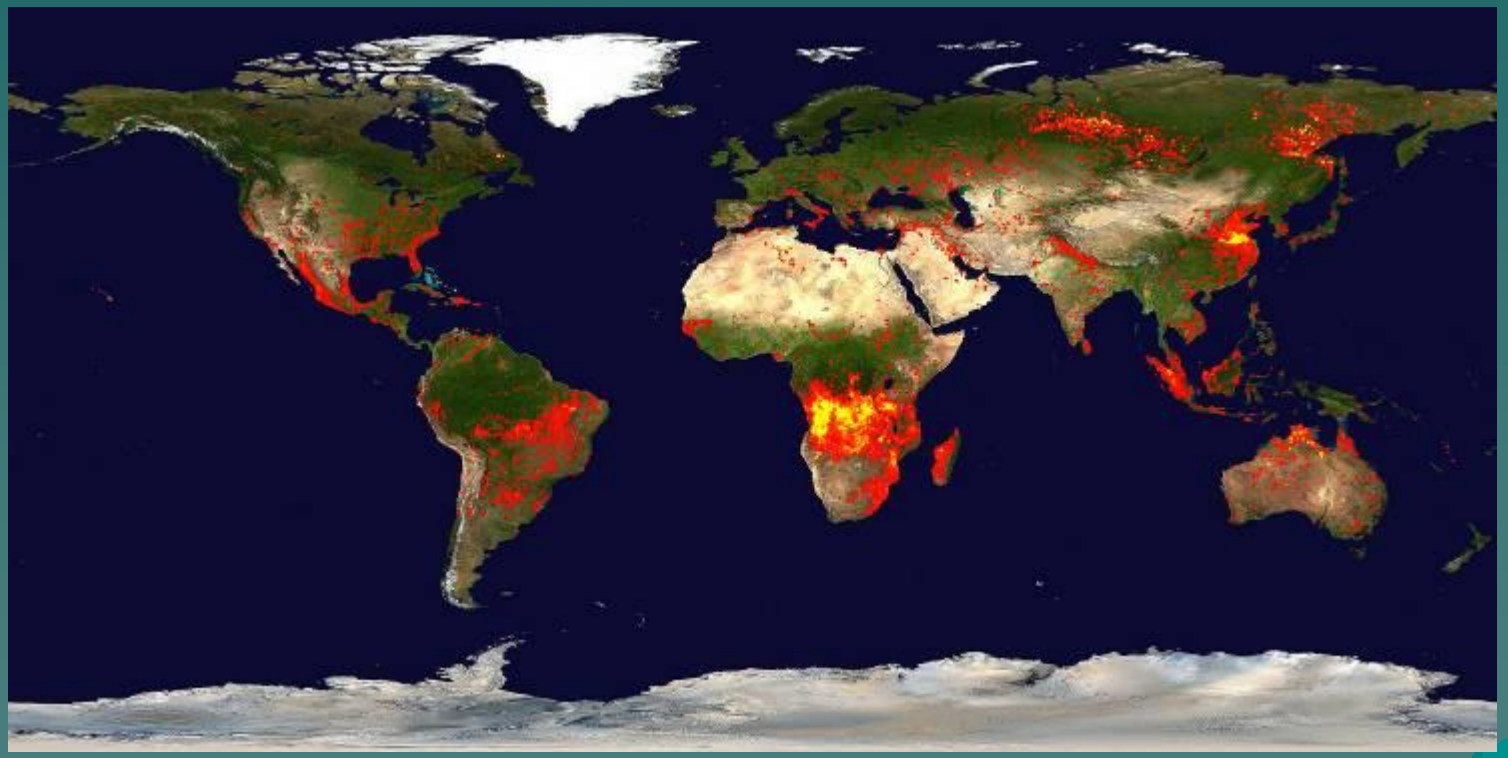
Fire & California Naturalists



Max A. Moritz

ESPM, UC Berkeley; UC Cooperative Extension

Themes of Talk

- How does fire fit into current thinking and curriculum (including my participation)?
- How could fire play a more integrated role?

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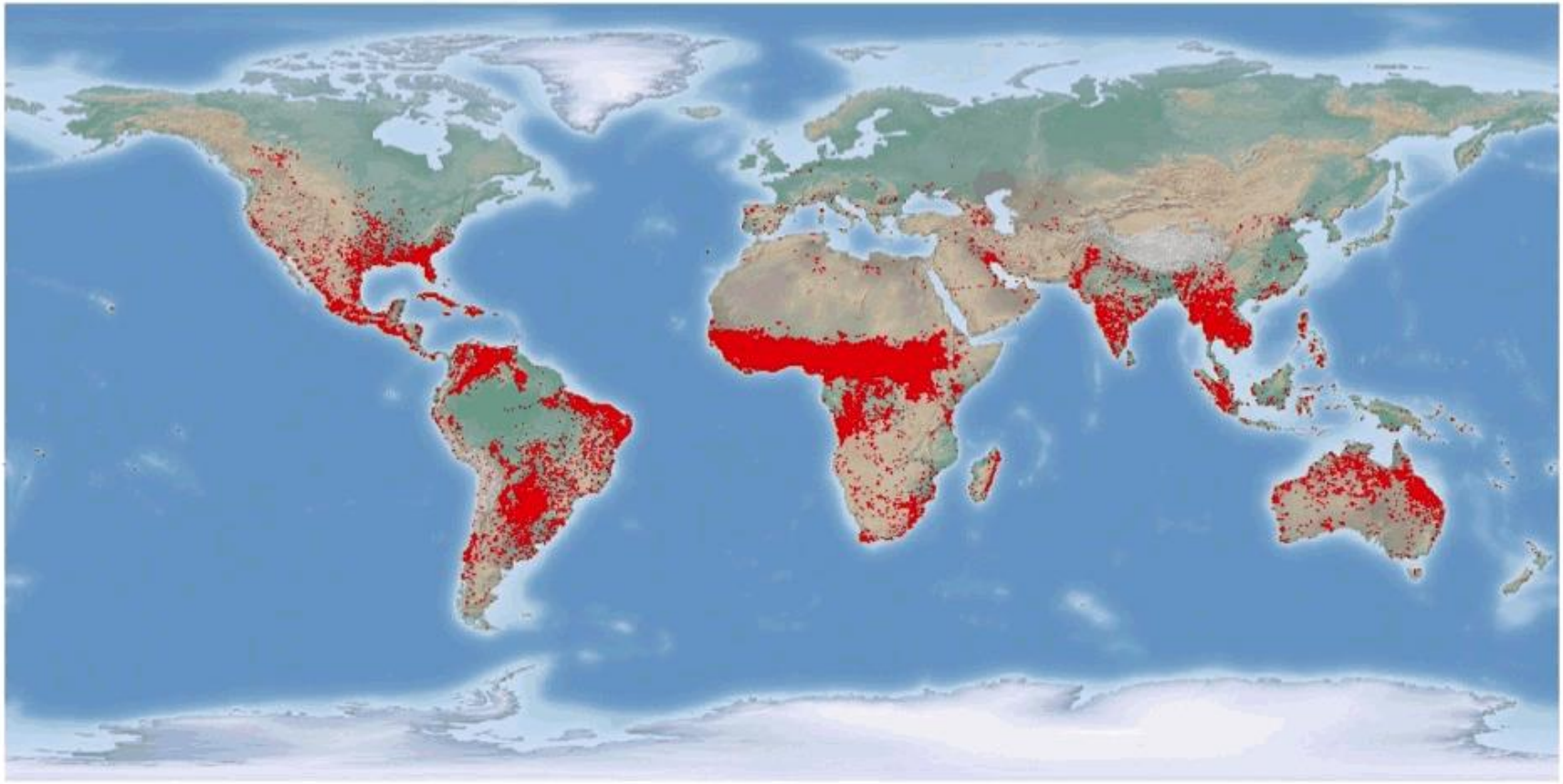
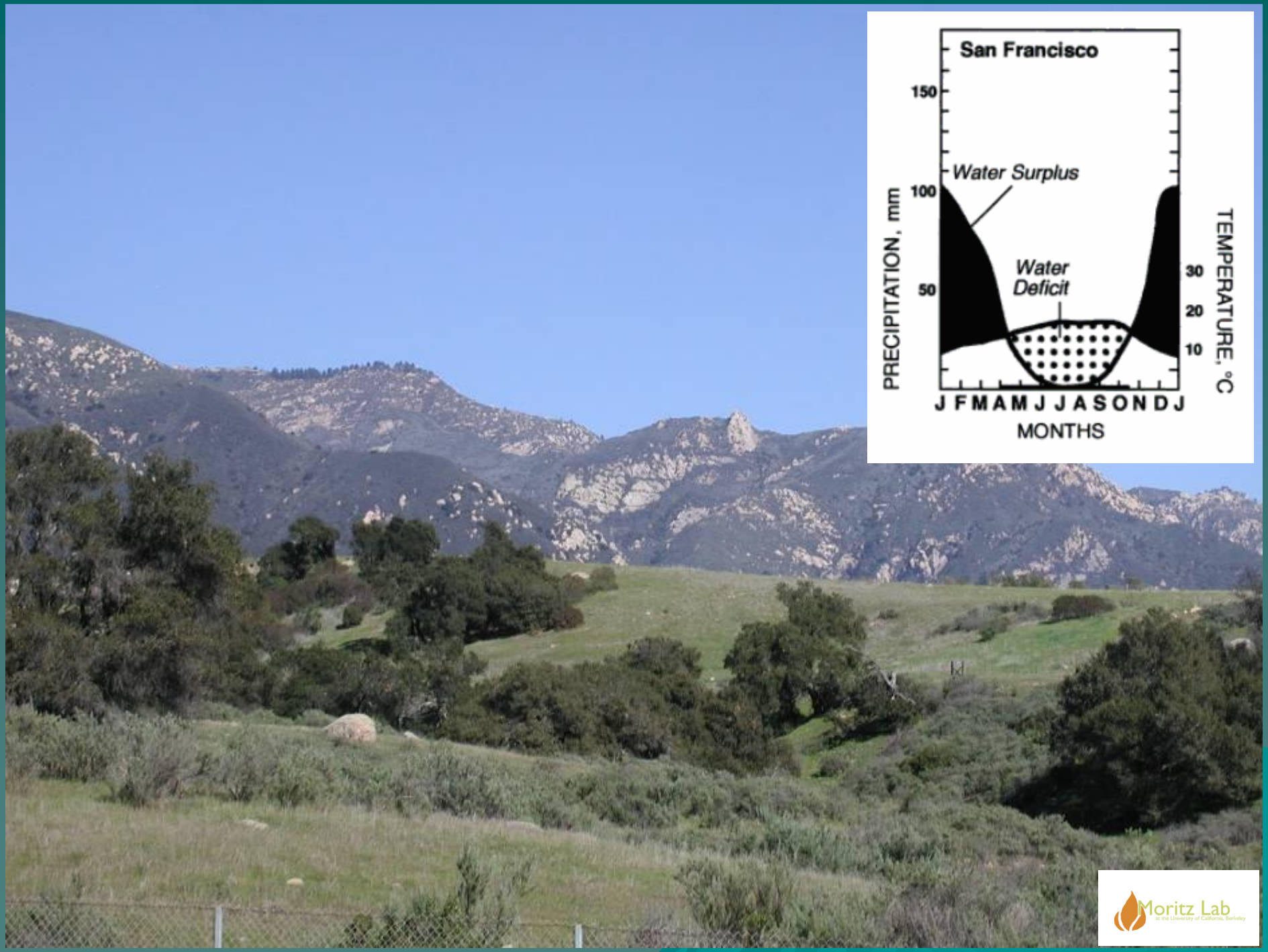
2012 MODIS Active Fire Detections from the Aqua and Terra Satellites

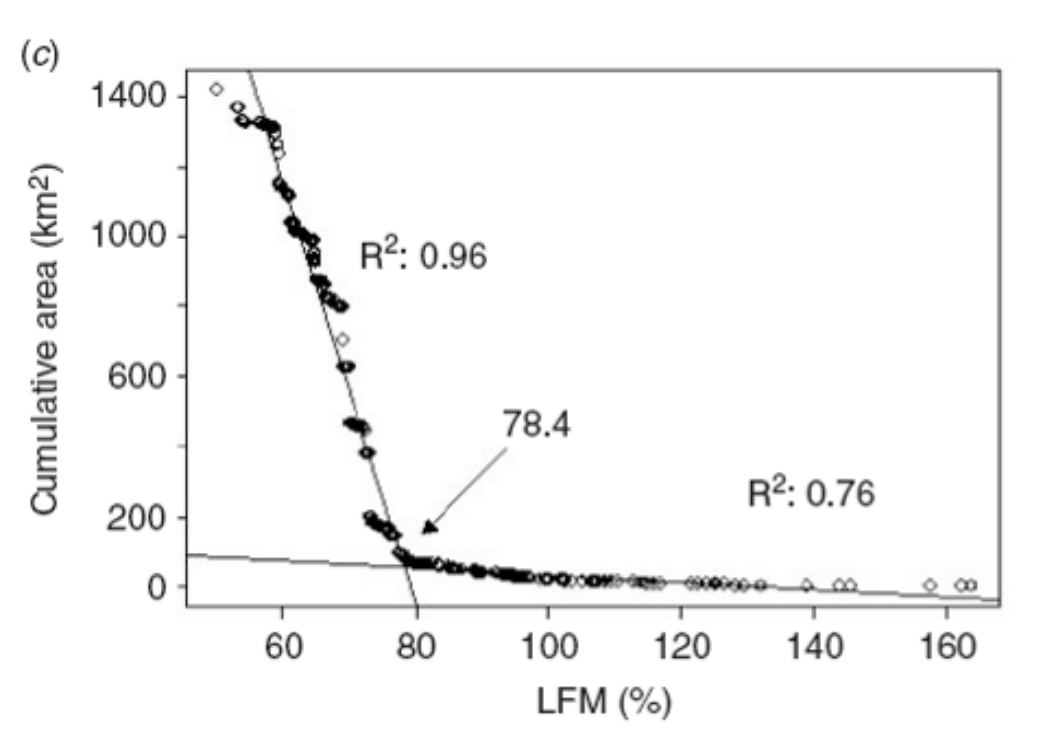


January February March April May June July August September October November December

Active fires, shown in red, are detected using MODIS data from the Aqua and Terra satellites
Source: NASA Fire Information for Resource Management System (FIRMS) https://earthdata.nasa.gov/firms

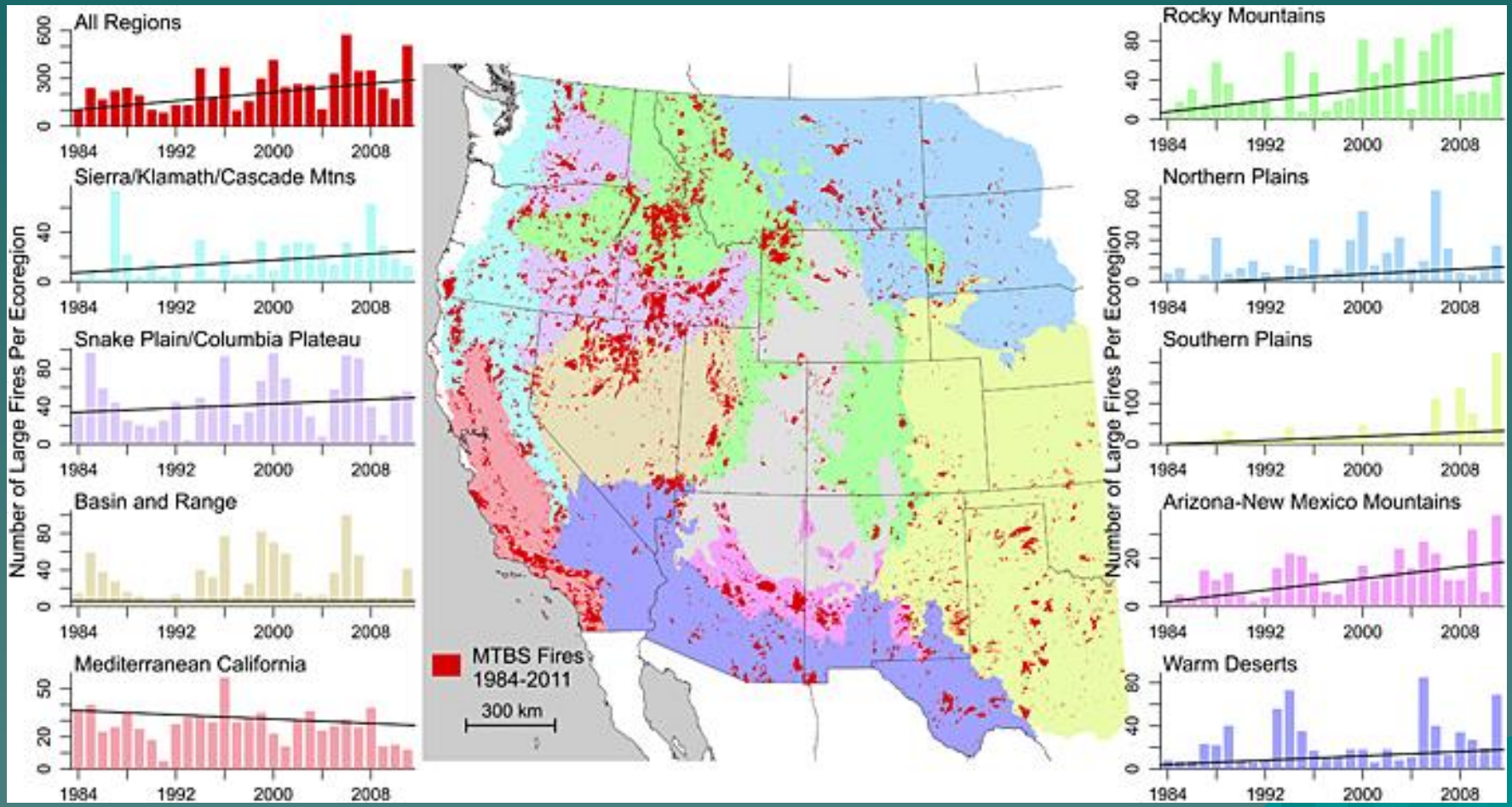

San Francisco
150
100
50
Water Surplus
Water Deficit
PRECIPITATION, mm
TEMPERATURE, °C
30
20
10
J F M A M J J A S O N D J
MONTHS

Annual Drought & Foliar Moisture



Dennison & Moritz 2009

Long-term Drought…



Dennison et al. 2014

Plants are Adapted to Fire…

Obligate seeders: Adult plants die in fire. Seeds require a fire cue to germinate (ceanothus).

Photo by Rick Halsey

Ceanothus seedlings following the Cedar fire

(Source: San Diego Wildfires Education Project)

Endemic fire followers: Annuals. Seeds require a fire cue to germinate (whispering bells).

Photo by Rick Halsey

Whispering bells

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We are Not Adapted to Fire…

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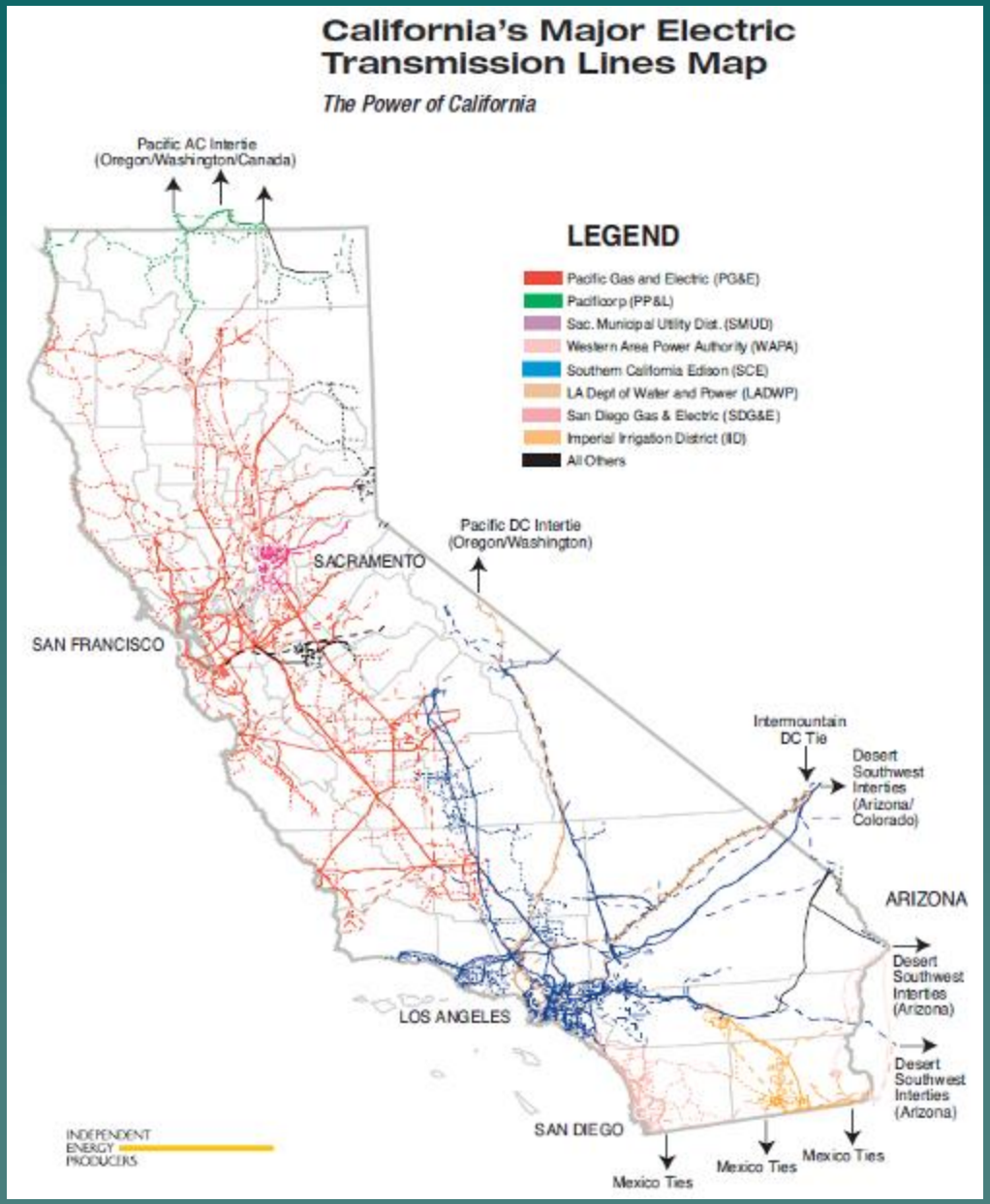
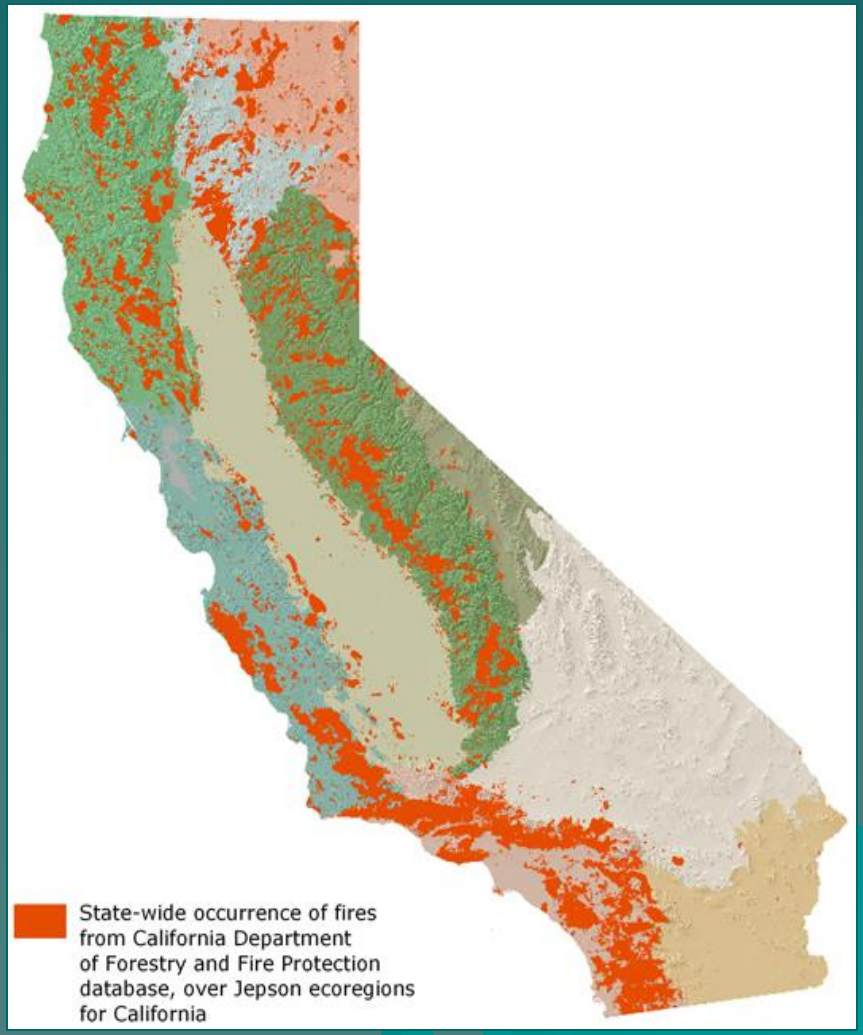
Infrastructure?





Vulnerability

- Lives, buildings, infrastructure...
- Habitat, water, air, food security…

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Russian Fires of 2010

Vulnerability

- Lives, buildings, infrastructure...
- Habitat, water, air, food security…
- Nearly all ecosystem services.

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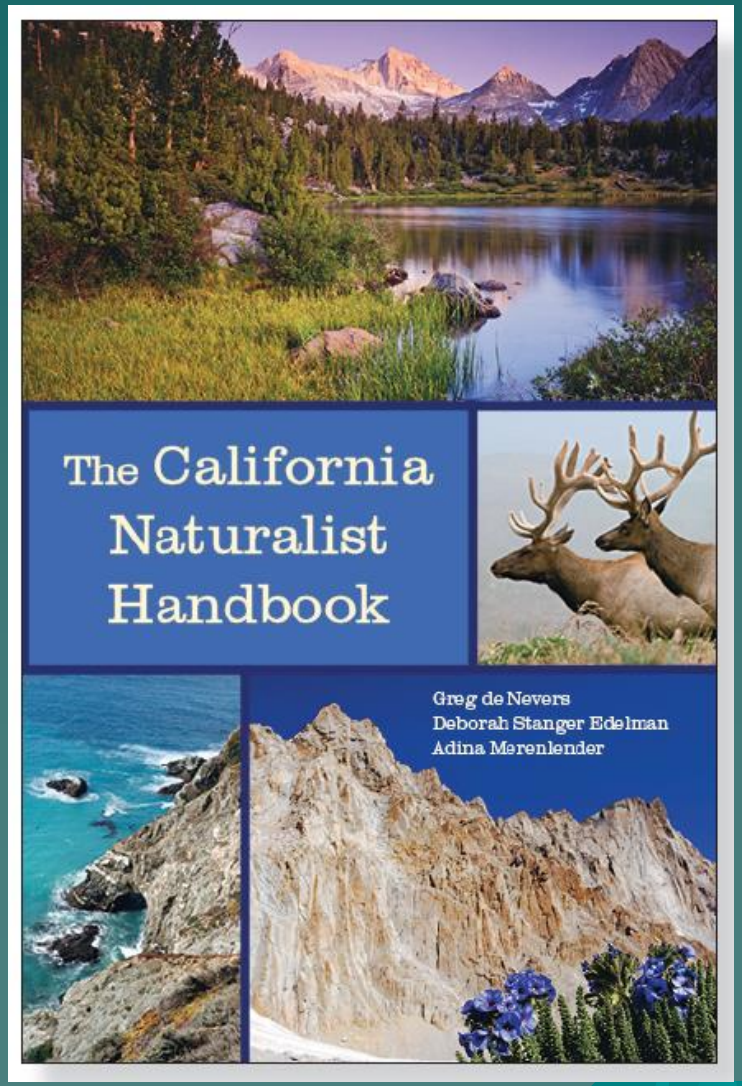
Current Role of Fire…



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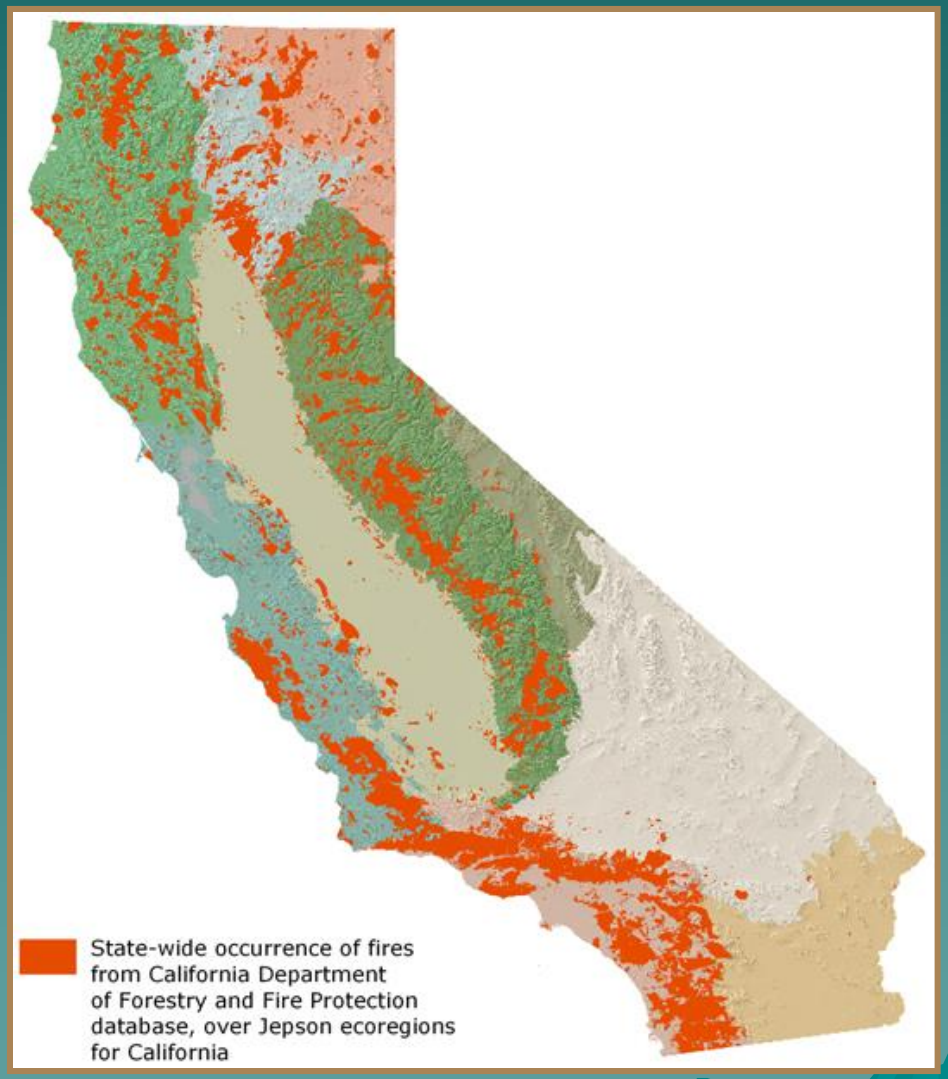
!!!

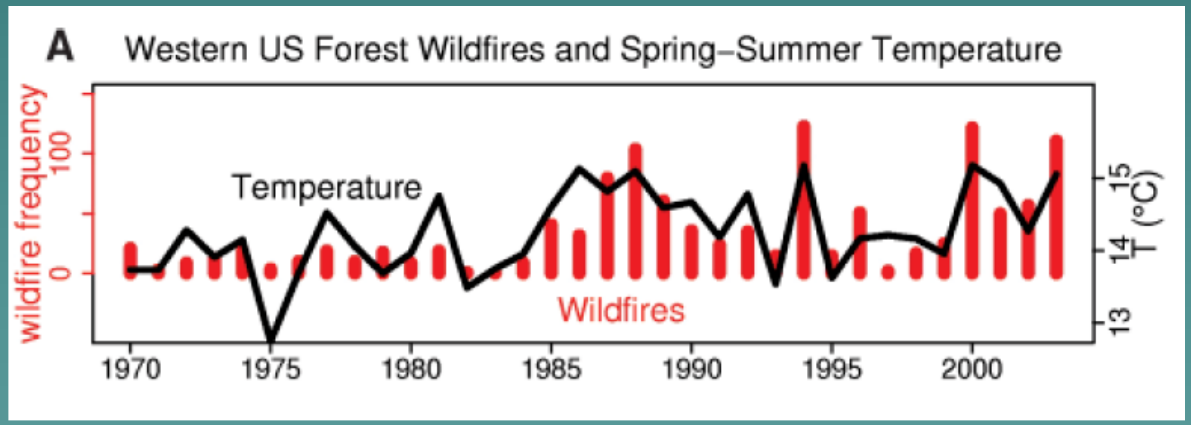
Controls on Fire Vary



Conventional Wisdom: Climate Change = ?

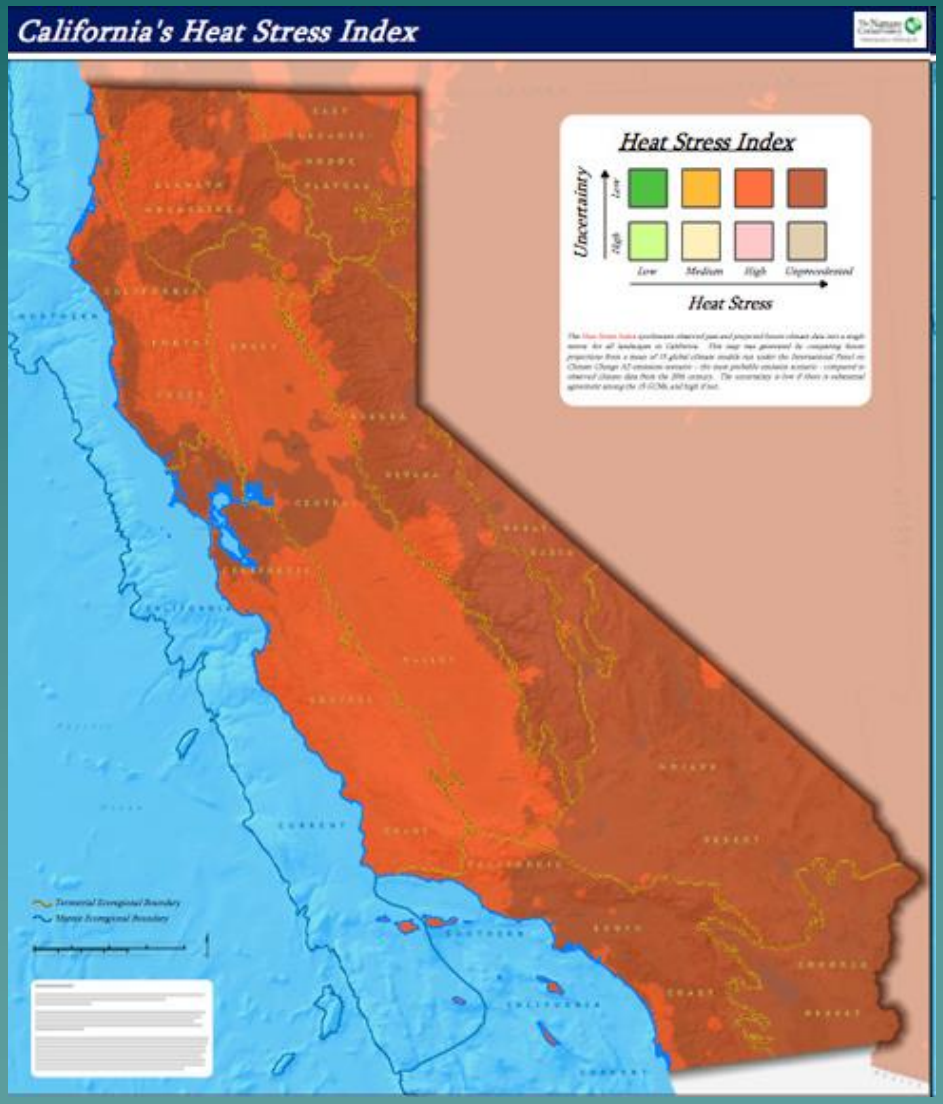
Warming and Earlier Spring Increase Western U.S. Forest Wildfire Activity

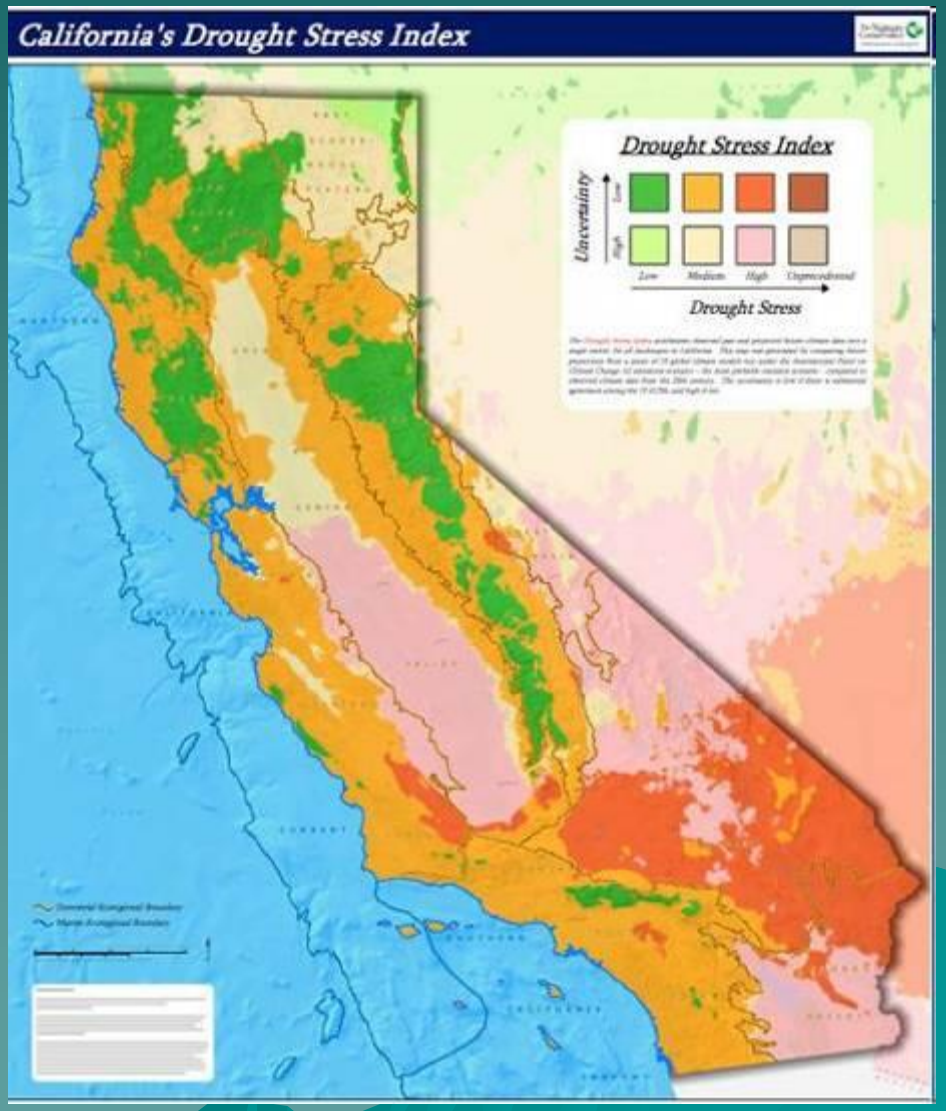
A. L. Westerling,[1,2*] H. G. Hidalgo,[1] D. R. Cayan,[1,3] T. W. Swetnam[4]



There is a prevailing view of climate change causing more/worse fires… but will this be a consistent trend?

Future Temps and Precip will Vary





Agreed decrease 2010-2039

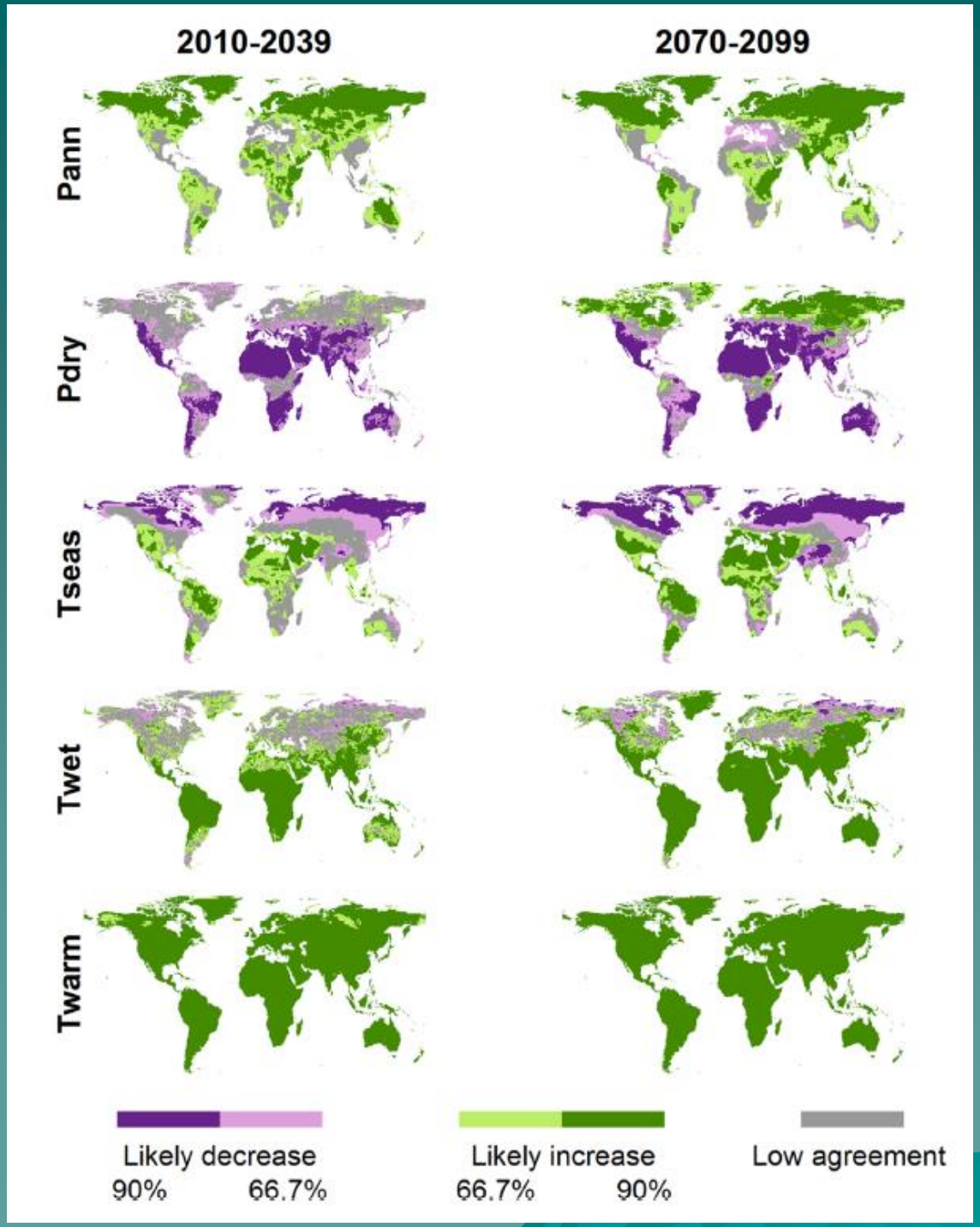
Agreed increases 2010-2039

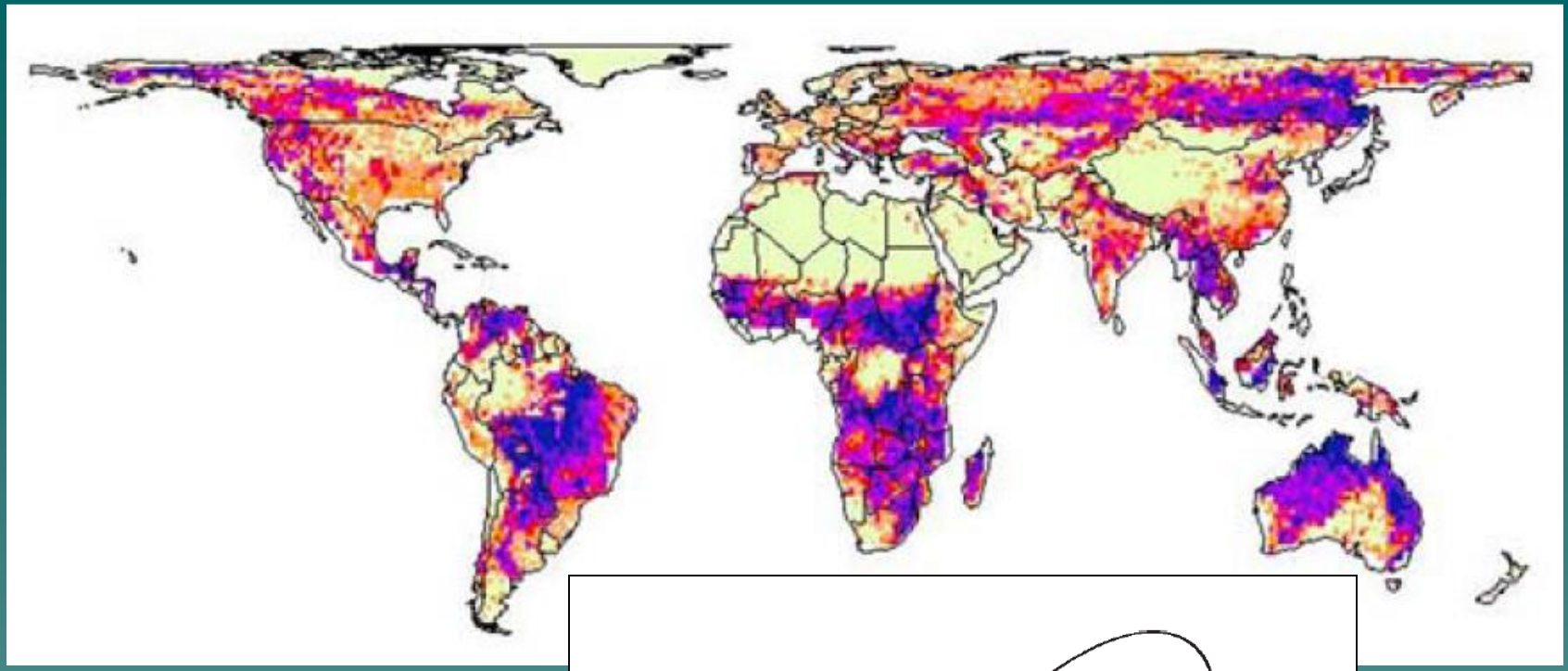
Disagreement 2010-2039

Agreed decrease 2070-2099

Agreed increases 2070-2099

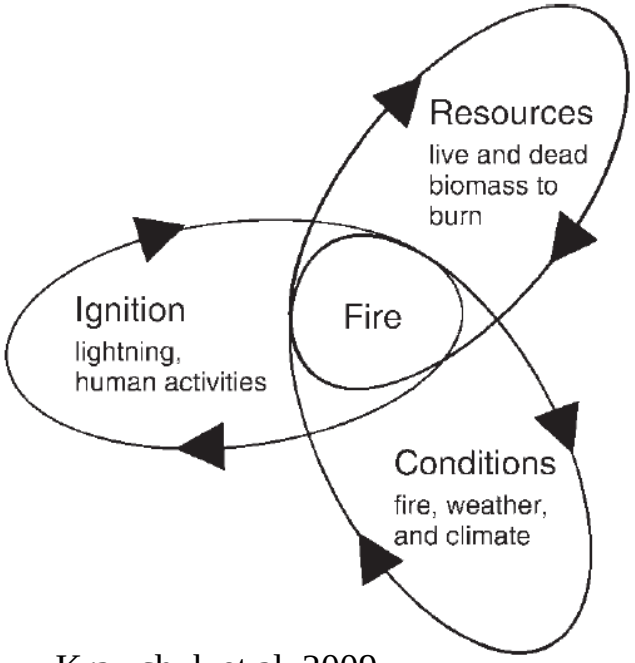
Disagreement 2070-2099


2010-2039
2070-2099
Pann
Pdry
Tseas
Twet
Twarm
Likely decrease
90%
66.7%
Likely increase
66.7%
90%
Low agreement



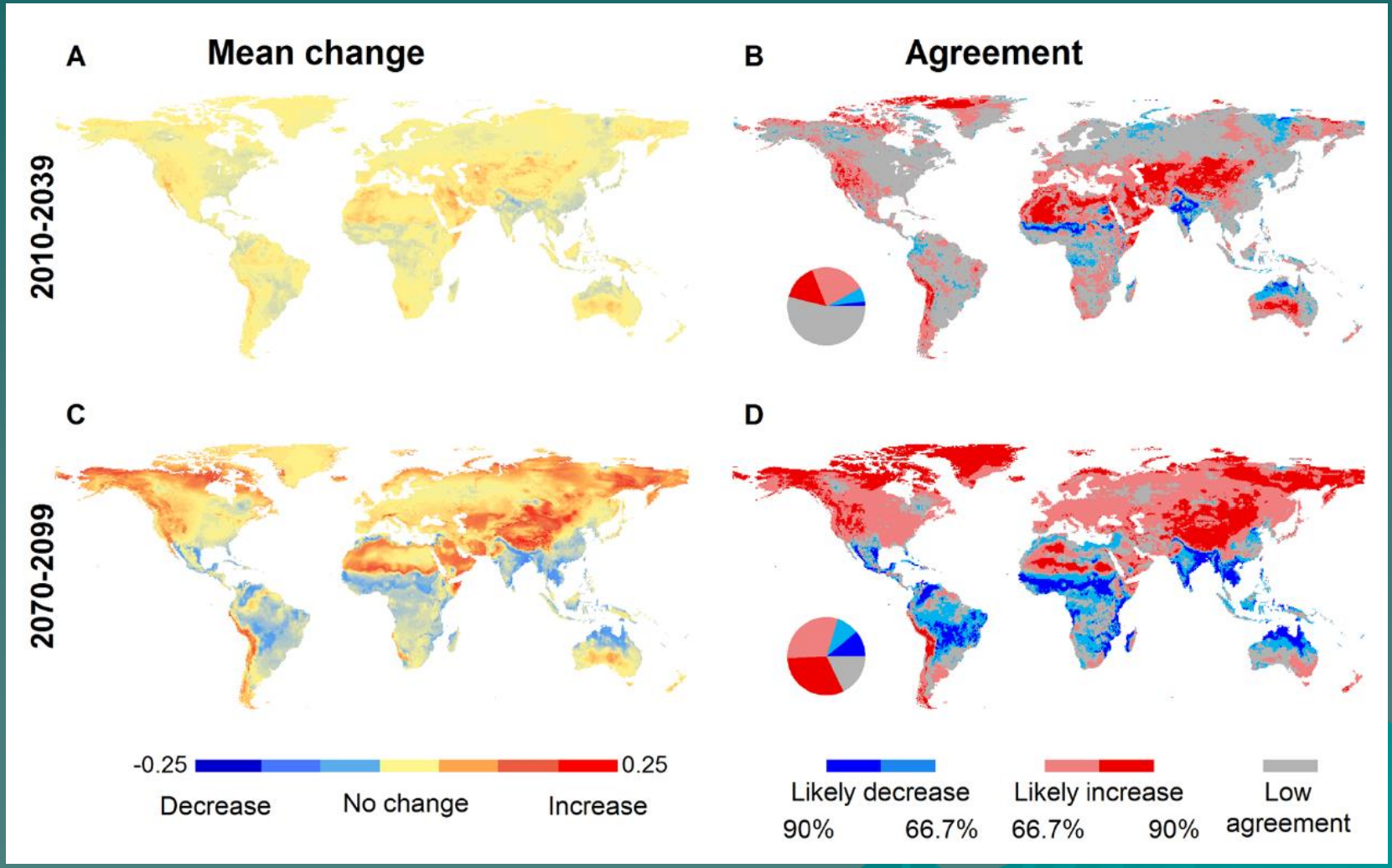
Fire counts

- 0
- 1
- 2-10
- 11-25
- 26-50
- 51-100
- 101-200
- 201-500
- 501-4555



Krawchuk et al. 2009

Multi-model Ensemble Projections



(Moritz et al. 2012)

Fire Linkages

- Ecology, biogeography, physical geography, & atmospheric circulation.
- Quantitative modeling & uncertainty
- Human impacts & global change.

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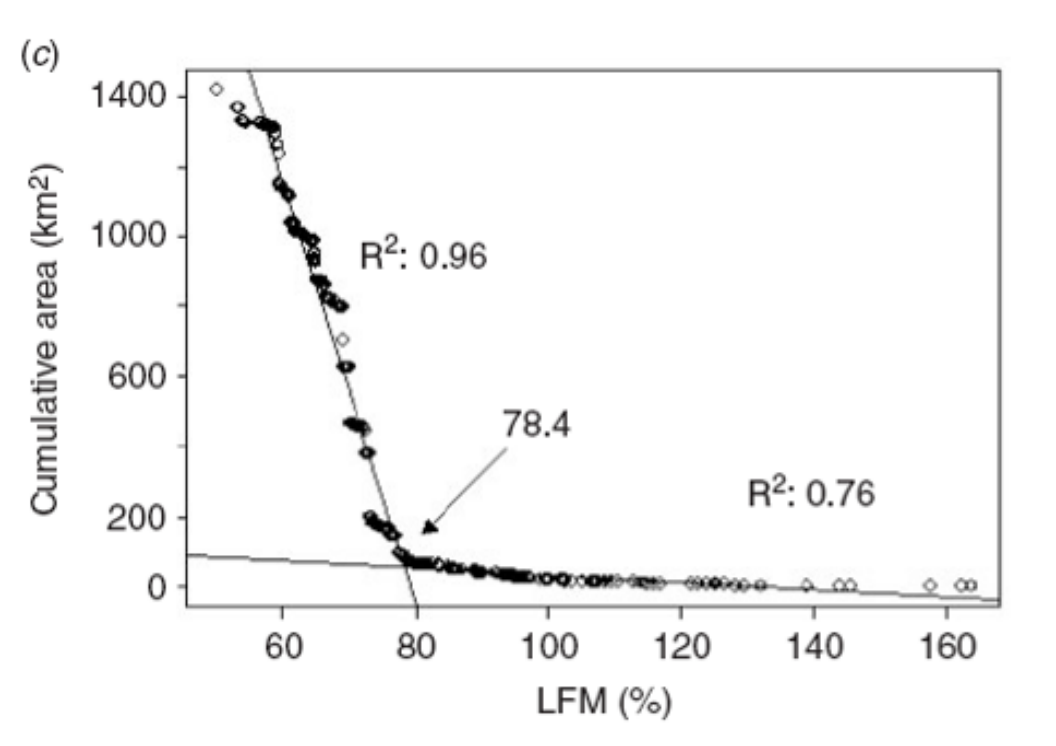
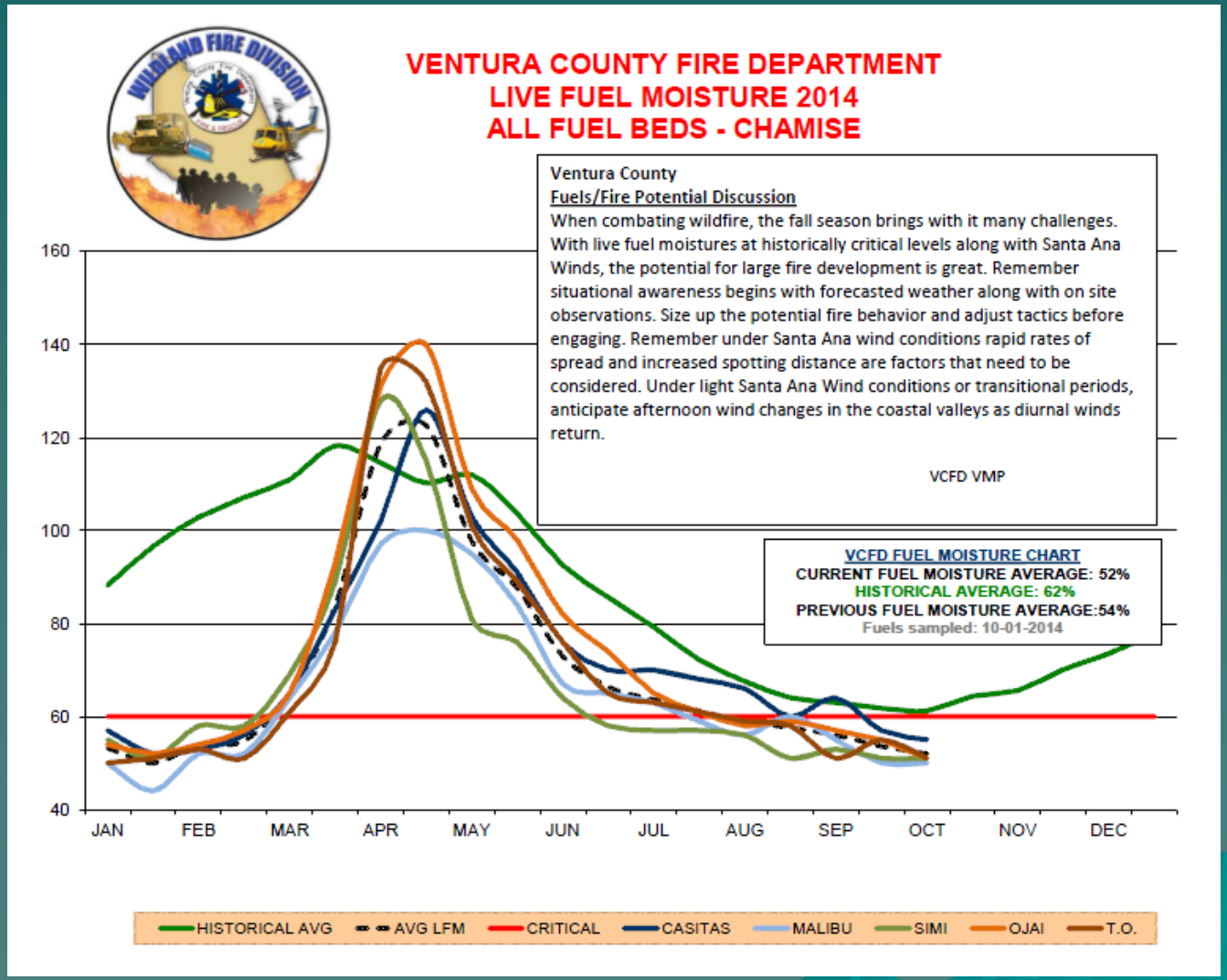
Annual Drought & Foliar Moisture

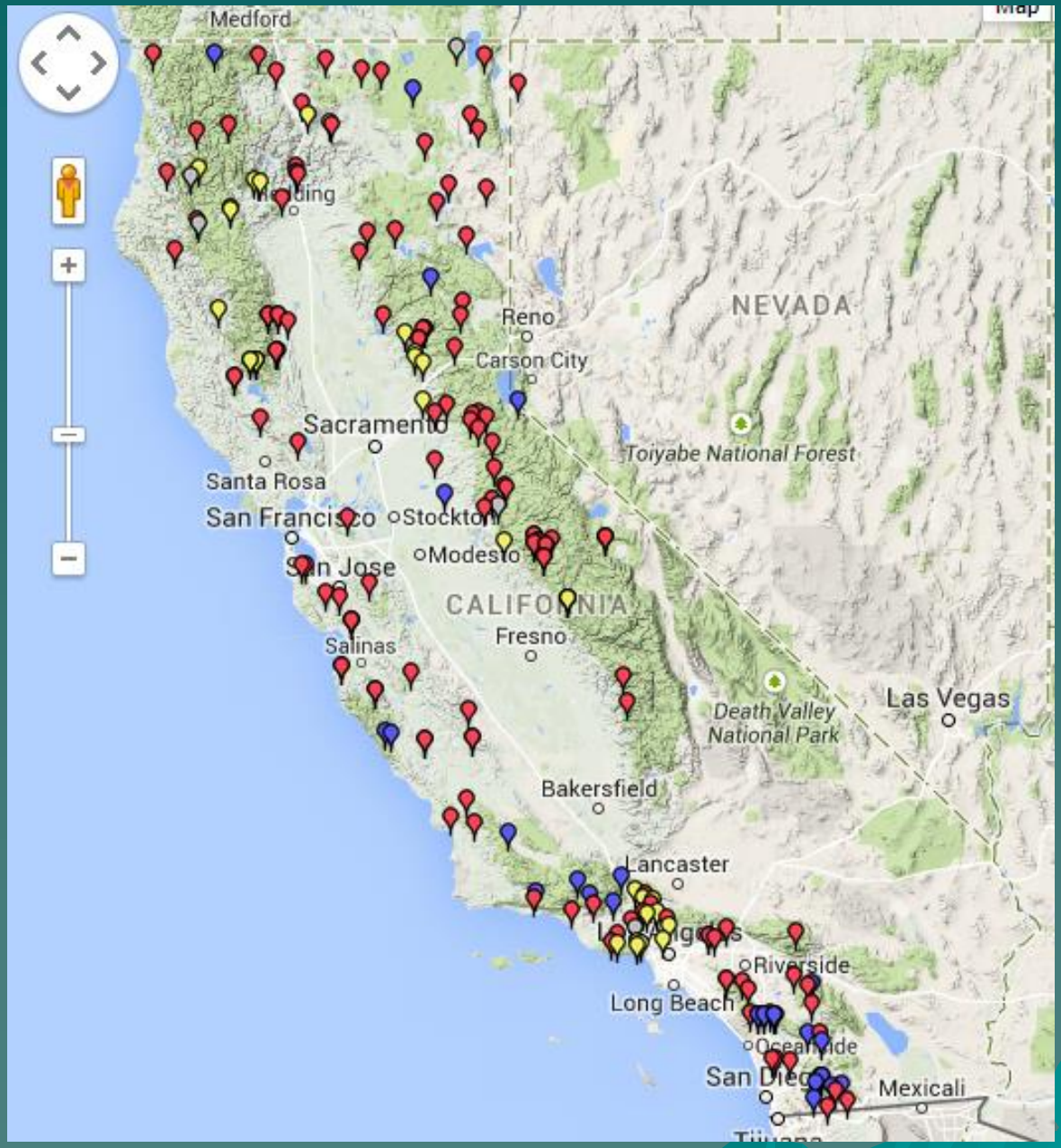


Dennison & Moritz 2009

Making It Local

Making It Local

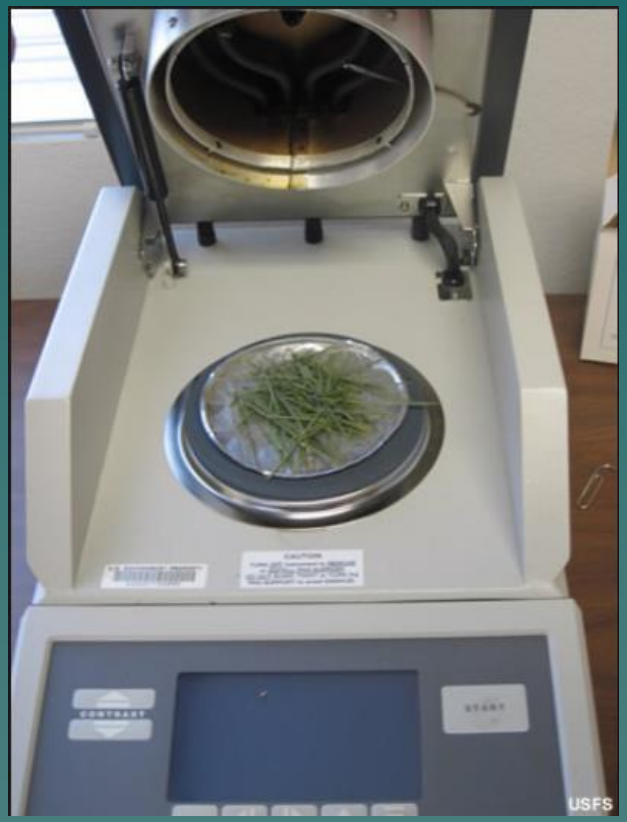



Medford
Reno
NEVADA
Carson City
Sacramento
Toiyabe National Forest
Santa Rosa
San Francisco
Stockton
Modesto
San Jose
CALIFORNIA
Fresno
Salinas
Death Valley
National Park
Las Vegas
Bakersfield
Lancaster
Riverside
Long Beach
San Diego
Mexicali

Making It Local

J. Broughton, SBBG.org

Making It Local



FIRE

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PLANS FOR THE FUTURE
RAWS AND LFM

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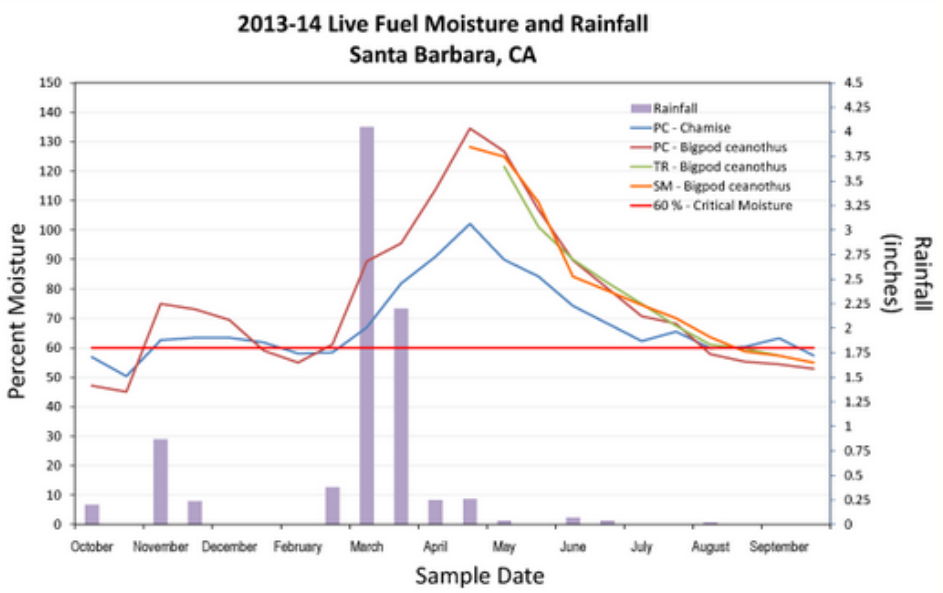
Live Fuel Moisture Sampling:

Live Fuel Moisture (LFM) is one measure of fire risk that agencies use in planning how to allocate their resources. LFM is simply the amount of moisture contained in fine fuels (living foliage and twigs less than 1/8 inch diameter) expressed as a percent of the dry weight of that fuel. Fire agencies typically consider 60% to be a critical moisture level where fires can become catastrophic.

The Santa Barbara Botanic Garden has been collaborating with the University of California Cooperative Extension to measure LFM in Vegetation at Painted Cave, at the top of Tunnel Road, and at St Mary's Seminary on Las Canoas Road.

These results are presented in the graph below and are also distributed to the **National Fuel Moisture Database** ▸



Future Steps?

- A “fire module” in curriculum (including photo series?)…
- LFM citizen science network…
- Thanks!

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