Wildfires in Southern California:

Ecological Impacts and Human Losses

Jon E. Keeley

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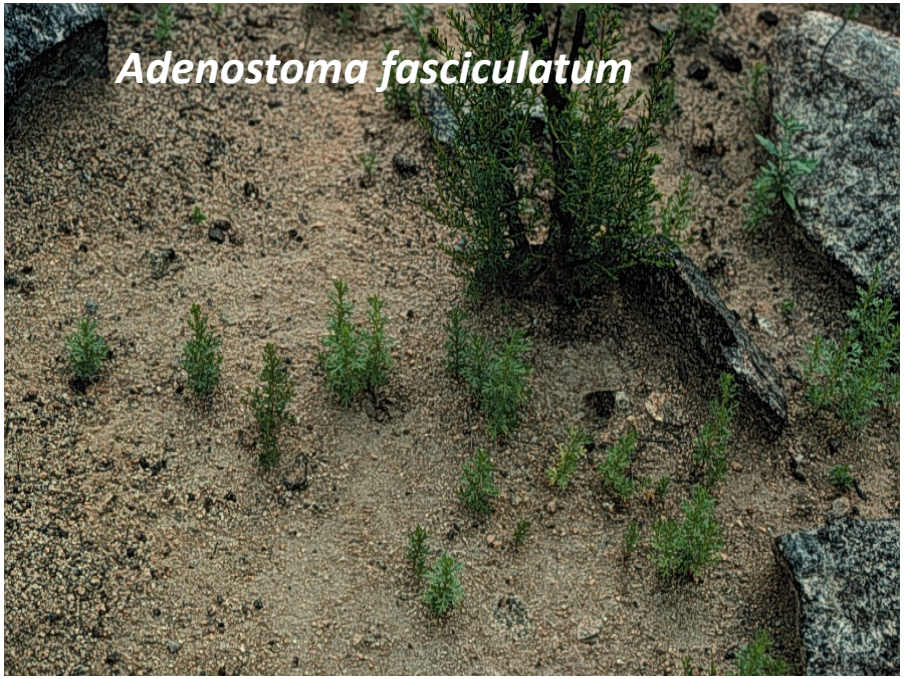
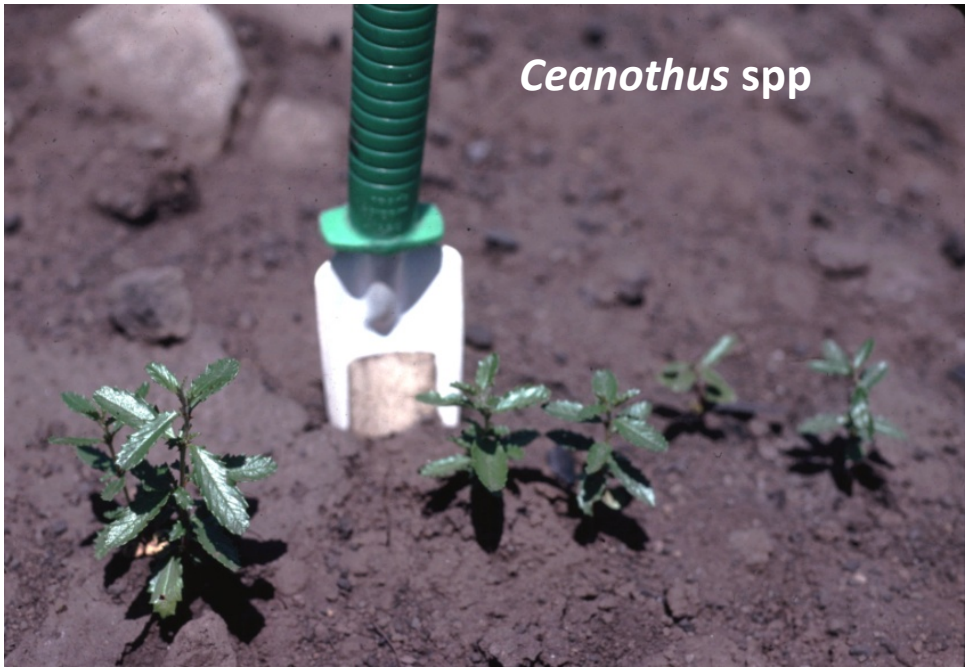
UCLA

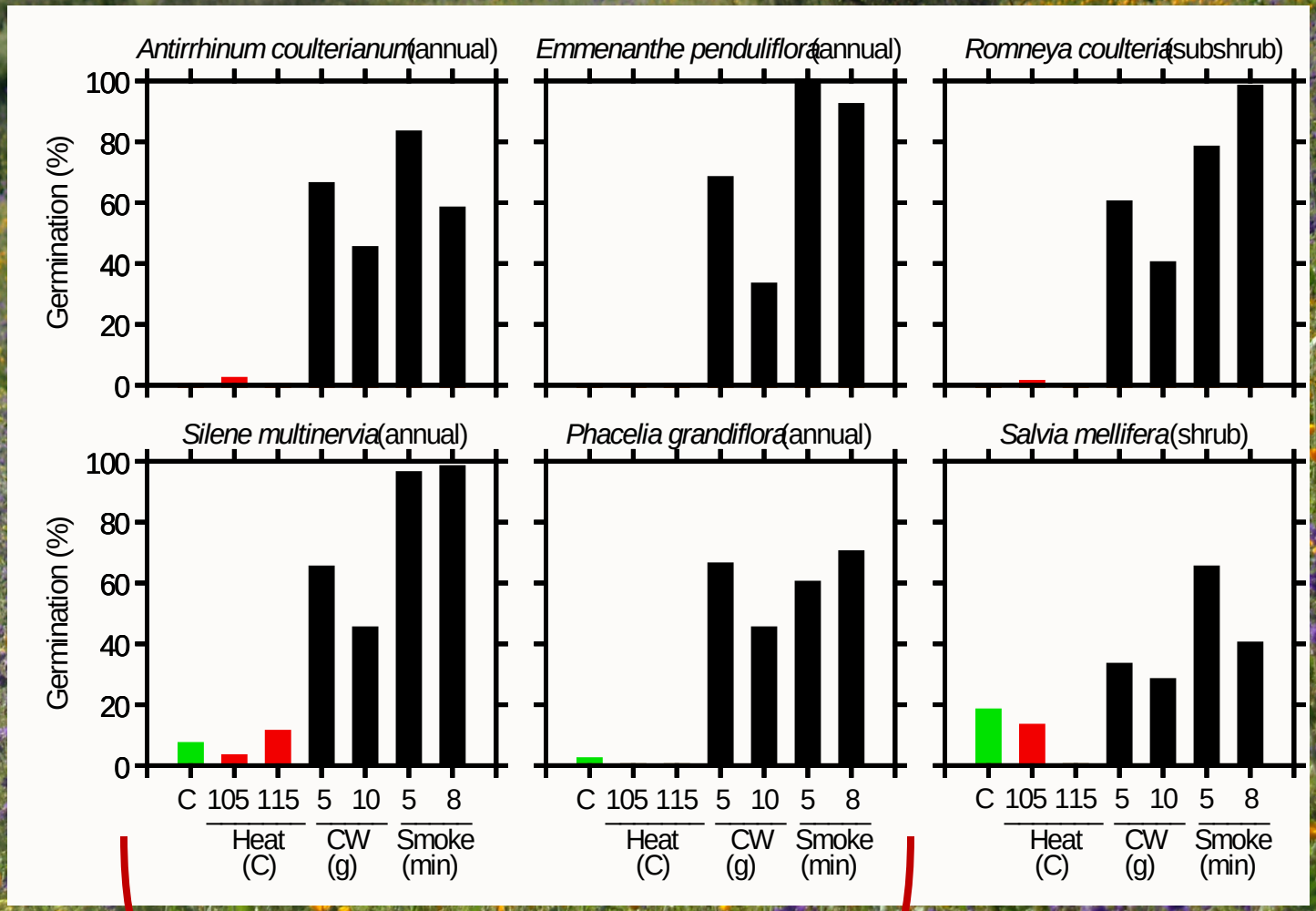
Rancho Santa Ana Botanic Garden

Photo: Chris Doolittle


Adenostoma fasciculatum


Arctostaphylos spp


Ceanothus spp



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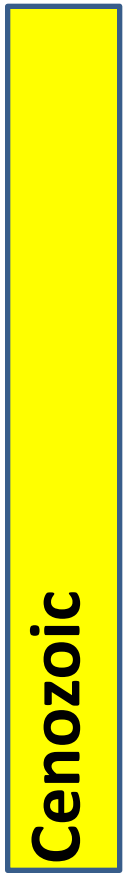


Era	Period	Epoch	Began (Ma)	Chaparral genera	(# CA species)	Postfire seeding
		Holocene	.01	humans		
	Quaternary	Pleistocene	1.8			
	Neogene	Pliocene	5.3			
		Miocene	23	*Arctostaphylos*	(62)	Seeder
				Ceanothus	(46)	Seeder
	Paleogene	Oligocene	34	(*Adenostoma*	(2)	Seeder)
		Eocene	54	*Cercocarpus*	(4)	OR
	Tertiary	Paleocene	65	*Frangula*	(1)	OR
				Fremontodendron	(3)	OR ±
				Garrya	(6)	OR ±
				Heteromeles	(1)	OR
				Malosma	(1)	OR ±
				Prunus	(8)	OR
				Quercus	(13)	OR
				Rhamnus	(4)	OR
				Rhus	(3)	OR ±
				Ribes	(31)	OR
				Torreya	(1)	OR
Mesozoic	Cretaceous		145			

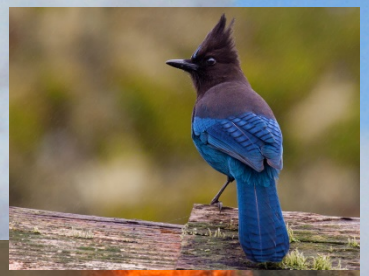
Postfire recovery of chaparral vegetation:

Almost entirely ‘endogenous recovery’
ie recovers from parts already on site
resprouts from mature plant
seedling recruitment from dormant seed banks

Over the first decade colonists may add a few new species, but minor component of communities

Because recovery is endogenous , and high fire intensity does not impact recovery, fire regime characteristics such as fire size are not important determinants of recovery

Postfire recovery of other ecosystem components.



Endogenous recovery **Shelter in place** **Flee and recolonize**

Postfire Management

1) Short-term emergency response

Property at risk due to erosion
(*Active management may be advised*)

Wildlands at risk of not recovering
(*Passive management may be preferred*)

To Seed or Not to Seed

By Jon E. Keeley

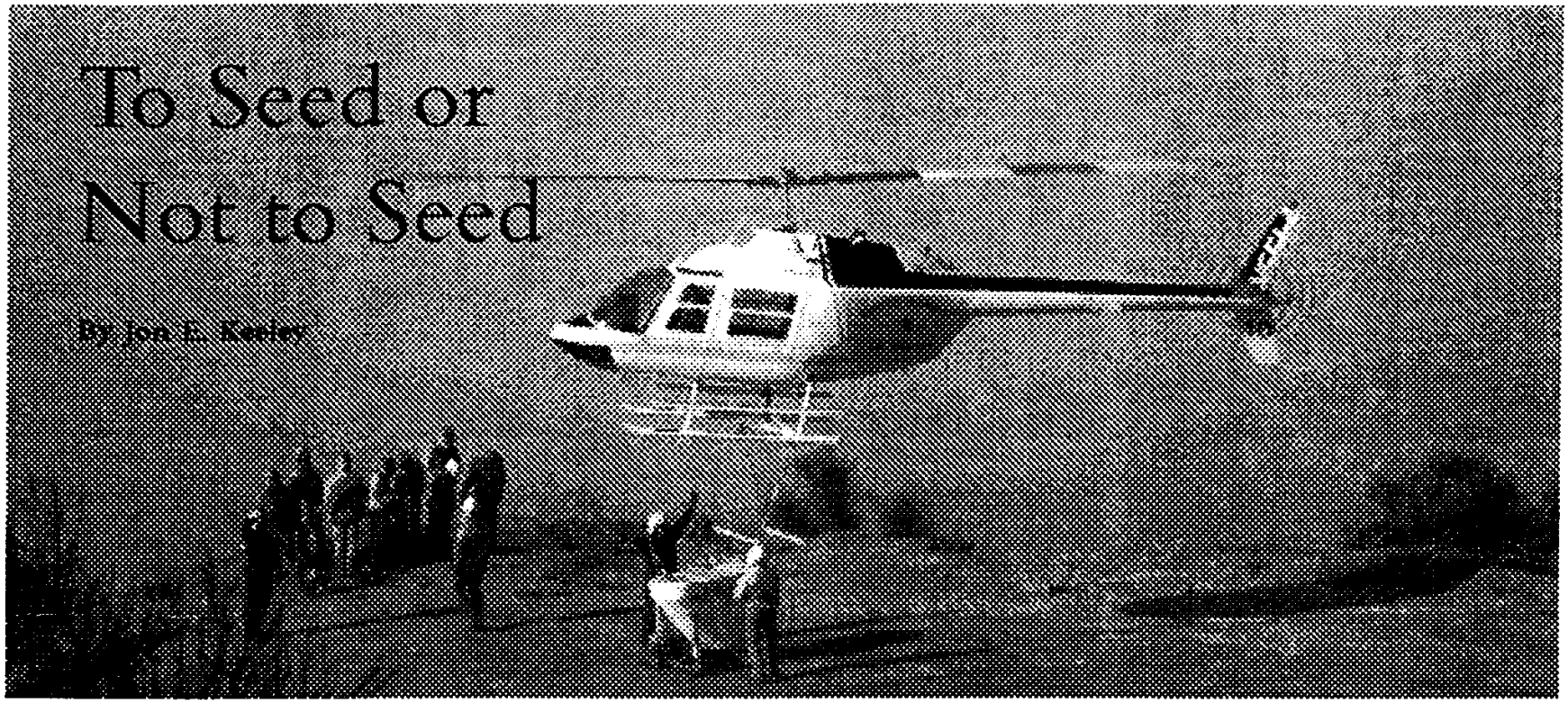


Photo courtesy of County of Los Angeles Fire Department

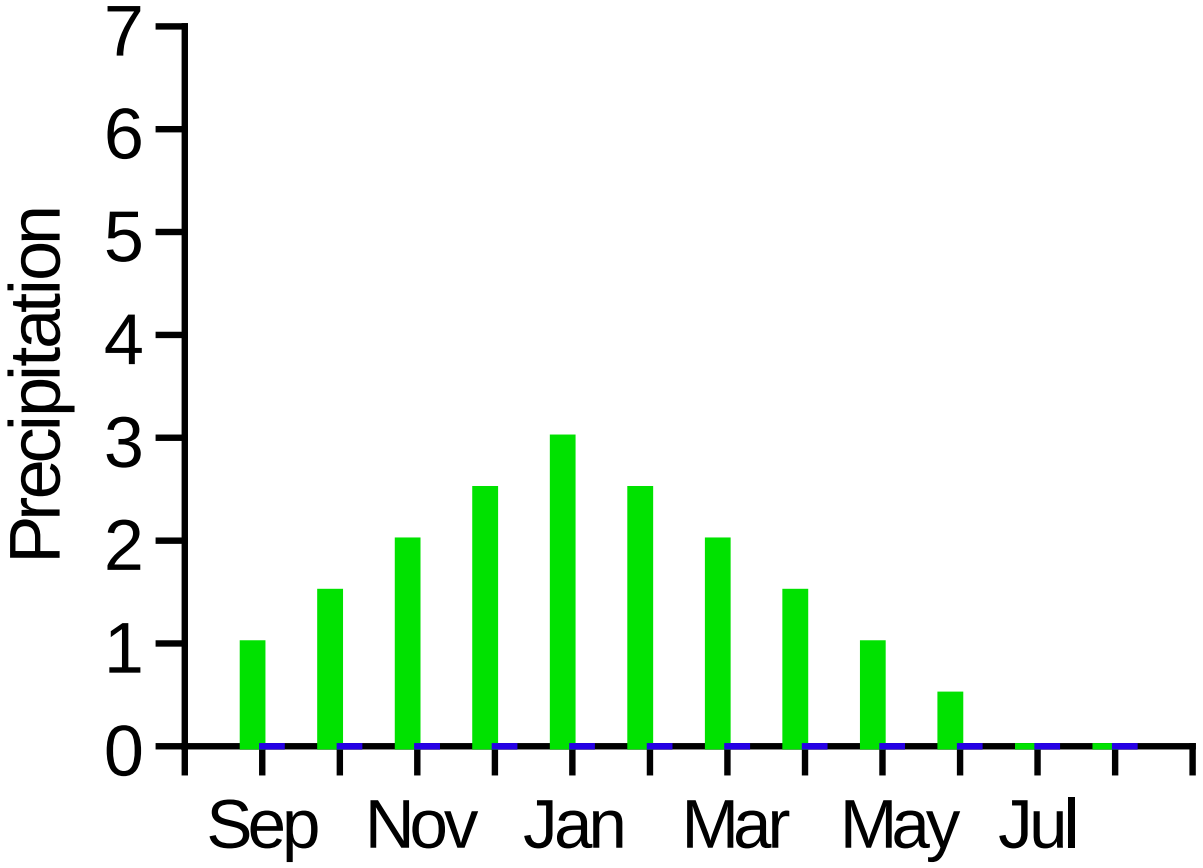
Over a period of less than ten days this past autumn, the Southern California landscape exploded in massive wildfires that burned more than 200,000 acres. Within weeks of this spectacular ecological event, the botanical, ecological and forestry communities throughout the state exploded in a flurry of meetings, press releases and newspaper interviews on the subject of emergency revegetation.

Emergency revegetation is the practice

species produce a massive growth in the first season after fire.

Proponents for emergency seeding argue that such management is required because the natural regeneration is not completely reliable and does not produce uniform cover on most slopes. While there is some truth in this statement, extensive research over the past couple of decades have accumulated an impressive array of arguments against meddling with the natural process.

disrupts the natural biodiversity of chaparral ecosystems. Many species in these systems restrict their entire life cycle to the post-fire environment. Studies have shown that not only can ryegrass displace these species but also reduce their seed output which threatens their success after future fires. Another critical problem lies in the fact that ryegrass has been shown to out-compete and eliminate seeding reproduction by the native shrubs. This has potential long-term effects because it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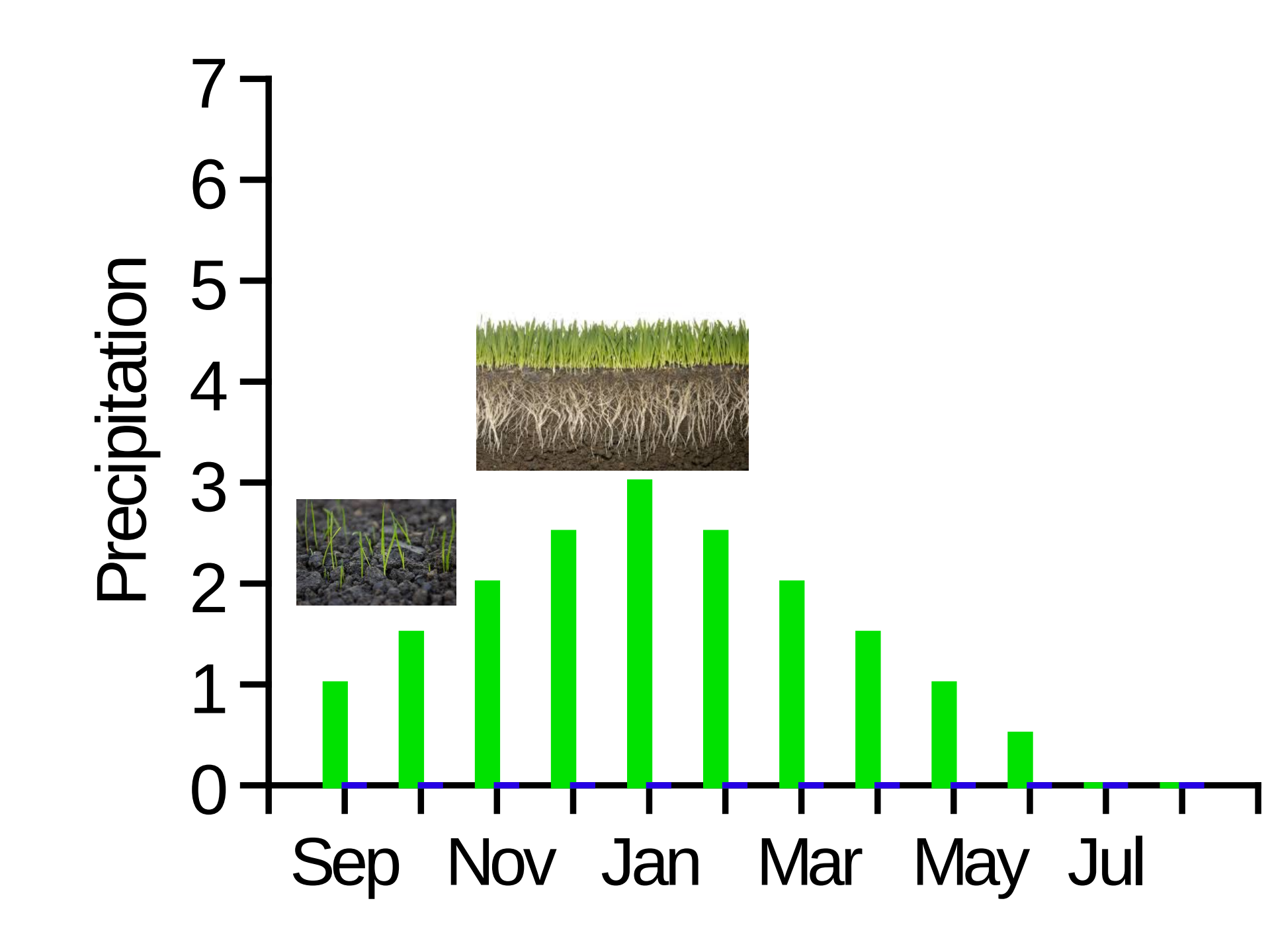
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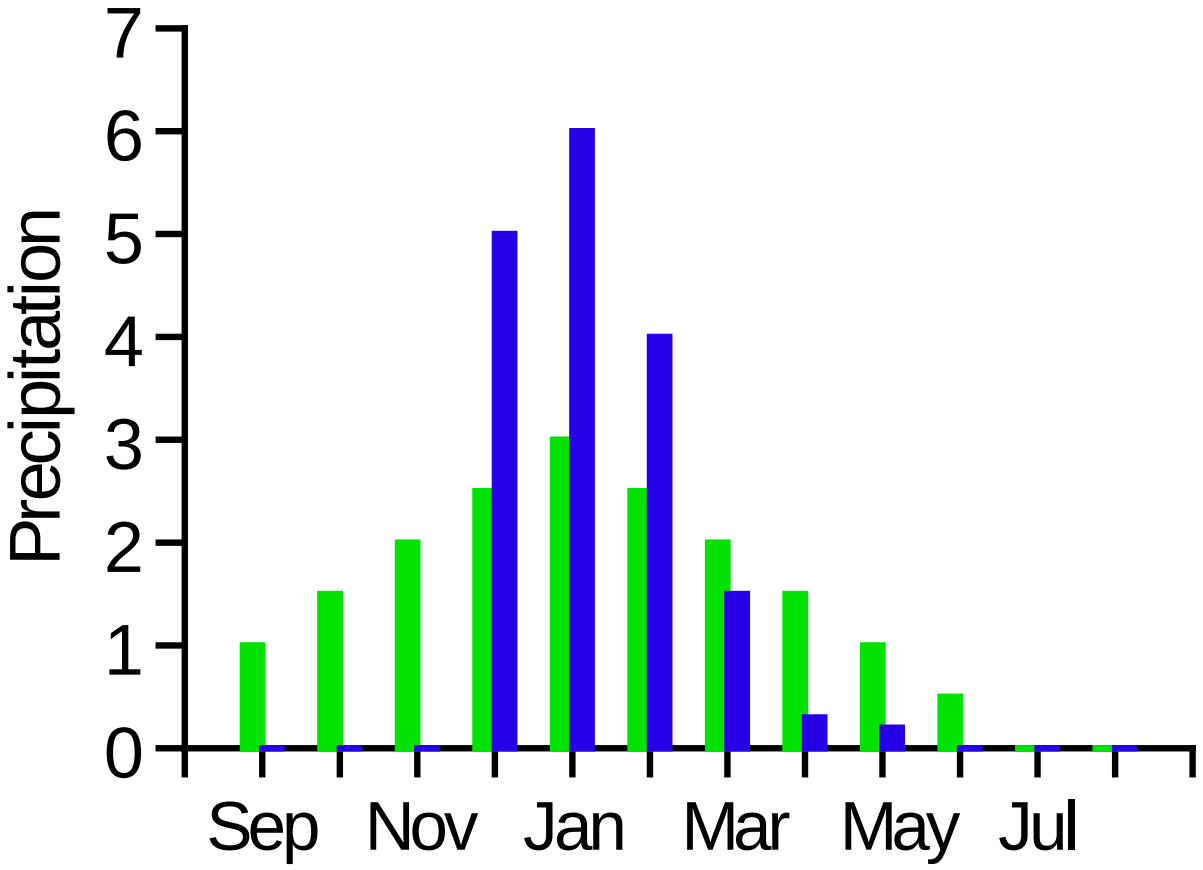
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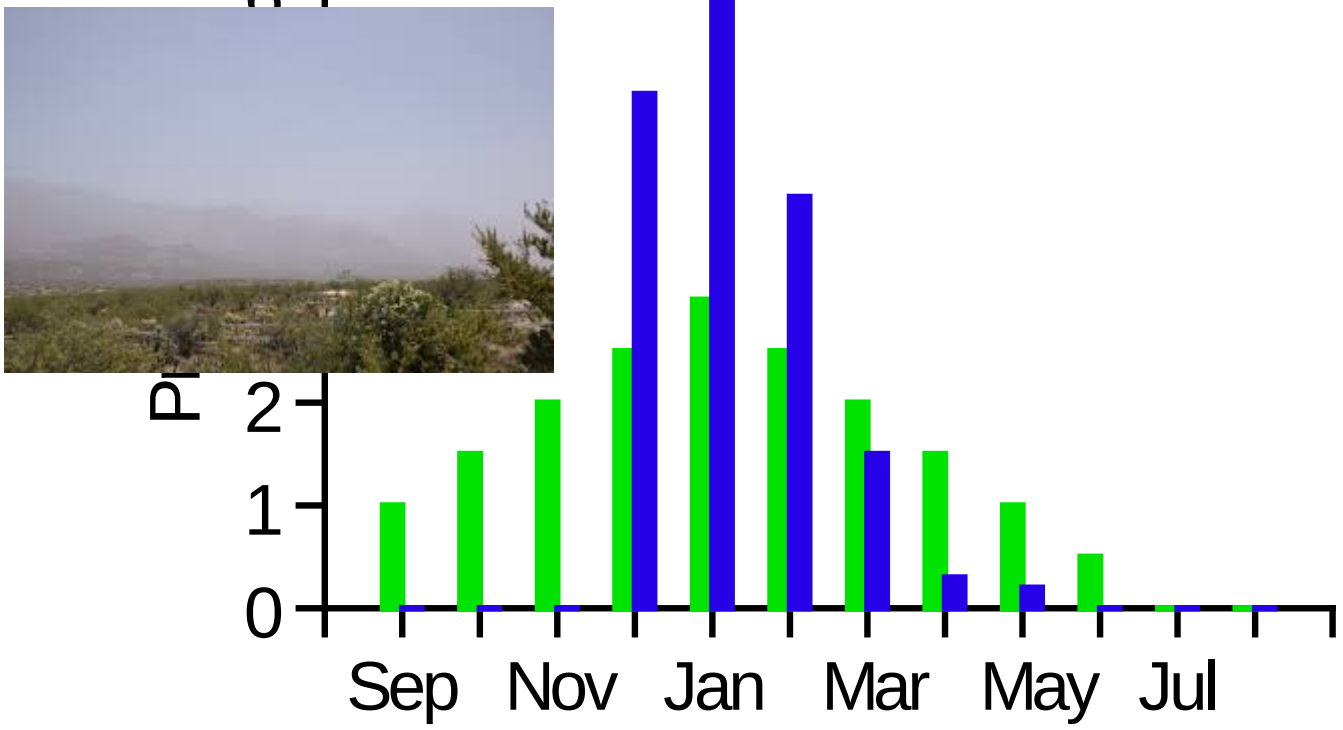
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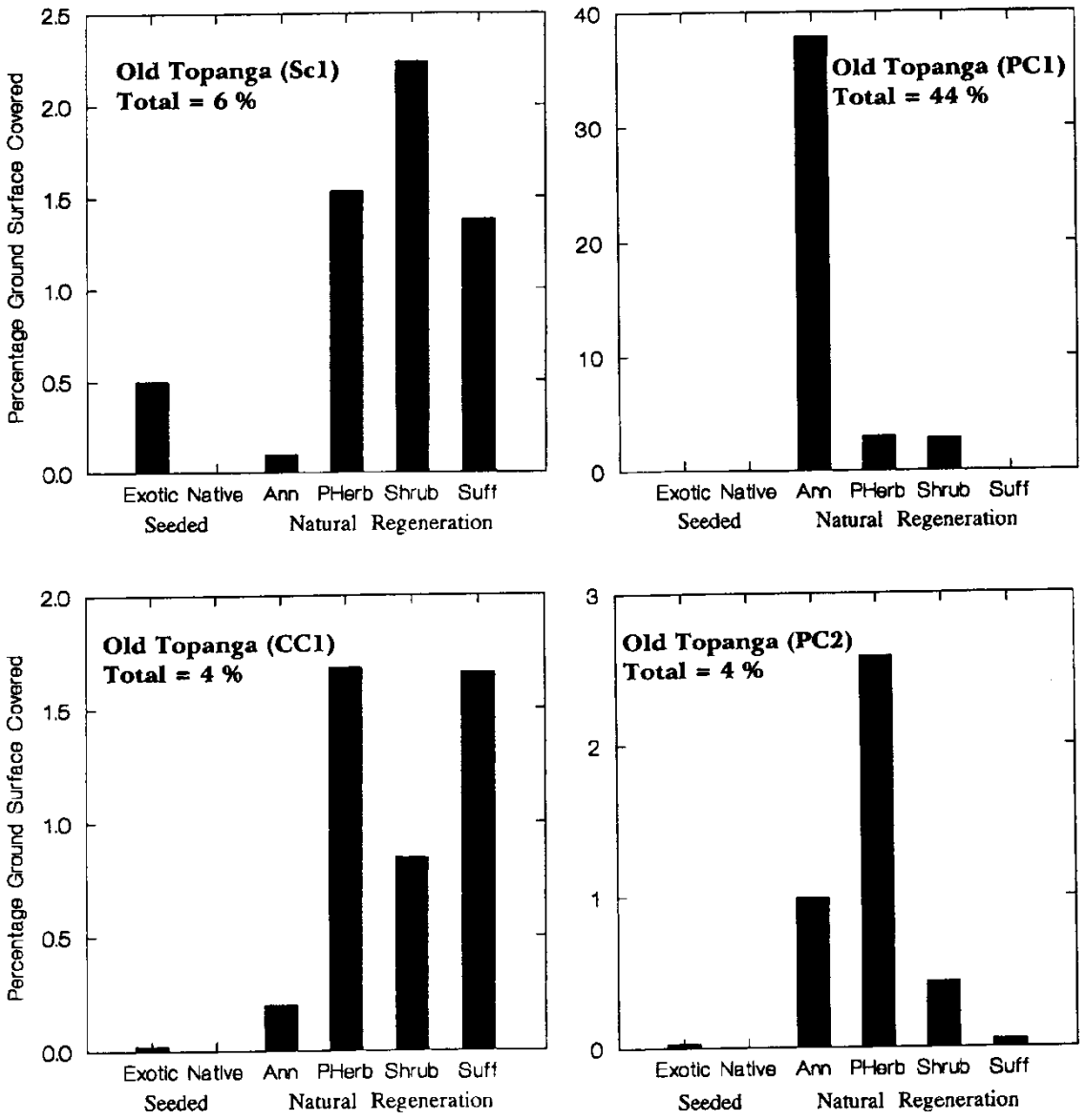

Fig. 1. Continued.

Keeley 1996)

Postfire seeding illustrates the Sevareid Principle

Postfire Management

1) Short-term emergency response

Property at risk due to erosion

Seeding has limited effectiveness

Physical barriers are proven

Preventing soil erosion

Diverting soil erosion

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Postfire Management

1) Short-term emergency response

2) Long-term sustainable management

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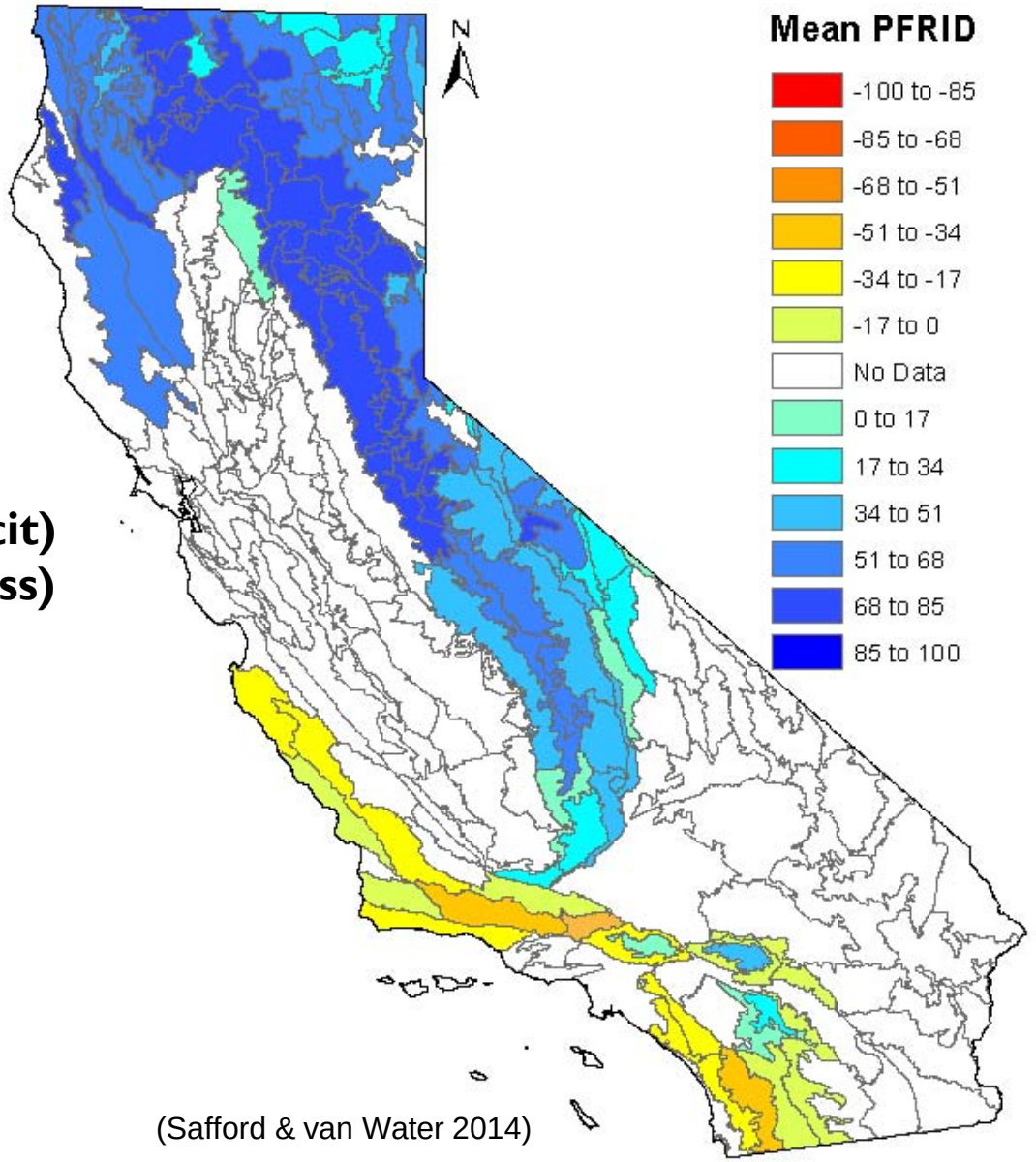
Extent to which 20th & 21st century fires have burned at frequencies similar to pre-Euroamerican settlement

Northern CA (deficit)
Southern CA (excess)



(Safford & van Water 2014)

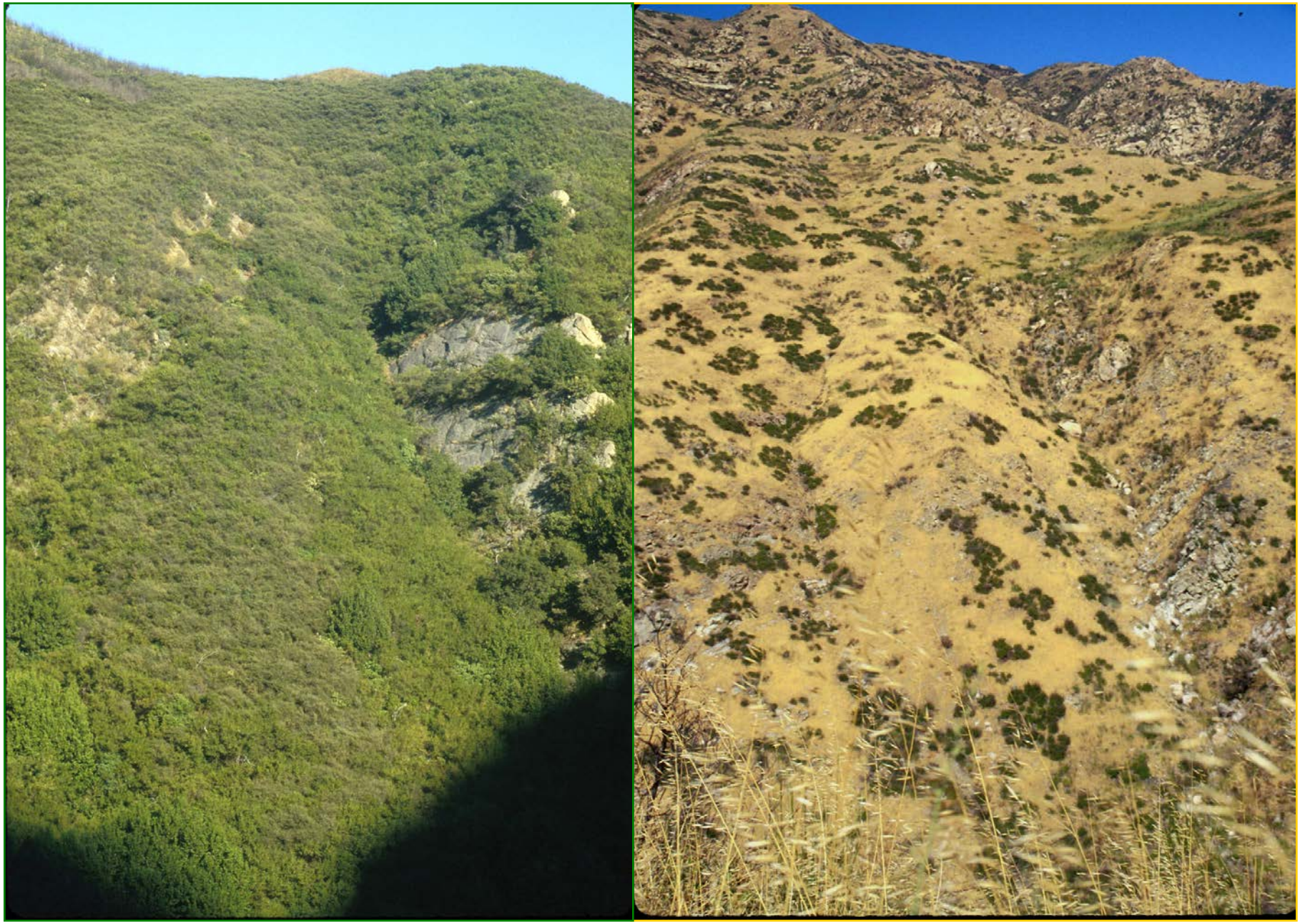


Photo by Anna Jacobsen, Pepperdine University


Buck Fire
Redwood Complex
Lobo Fire
McCourtney Fire
Sulphur Fire
Tubbs Fire
Nuns Fire
Partrick Fire
Atlas Fire
37 Fire
California
Lion Fire

Why were California's wine country fires so destructive?

October 27, 2017 6.19am EDT

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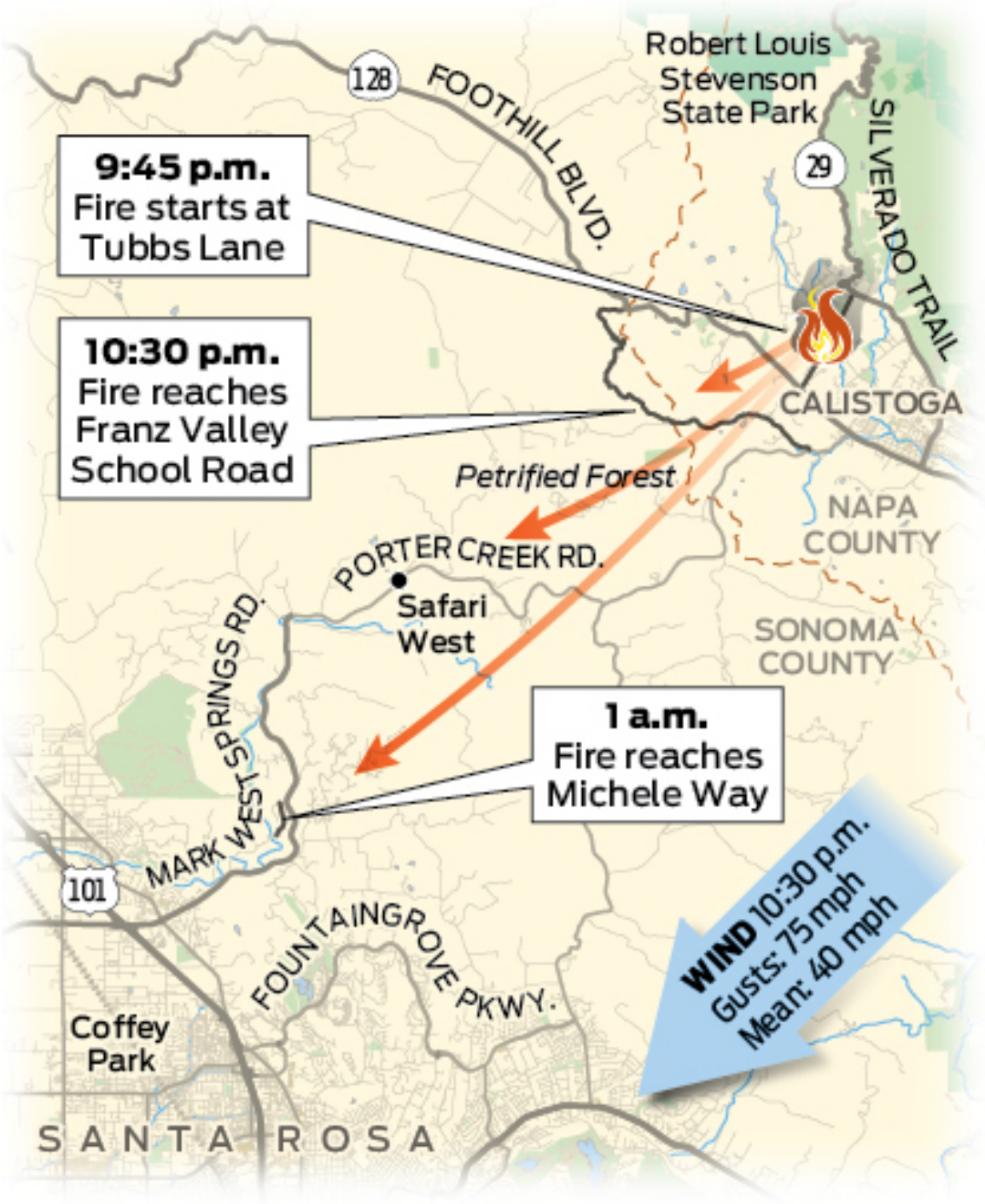
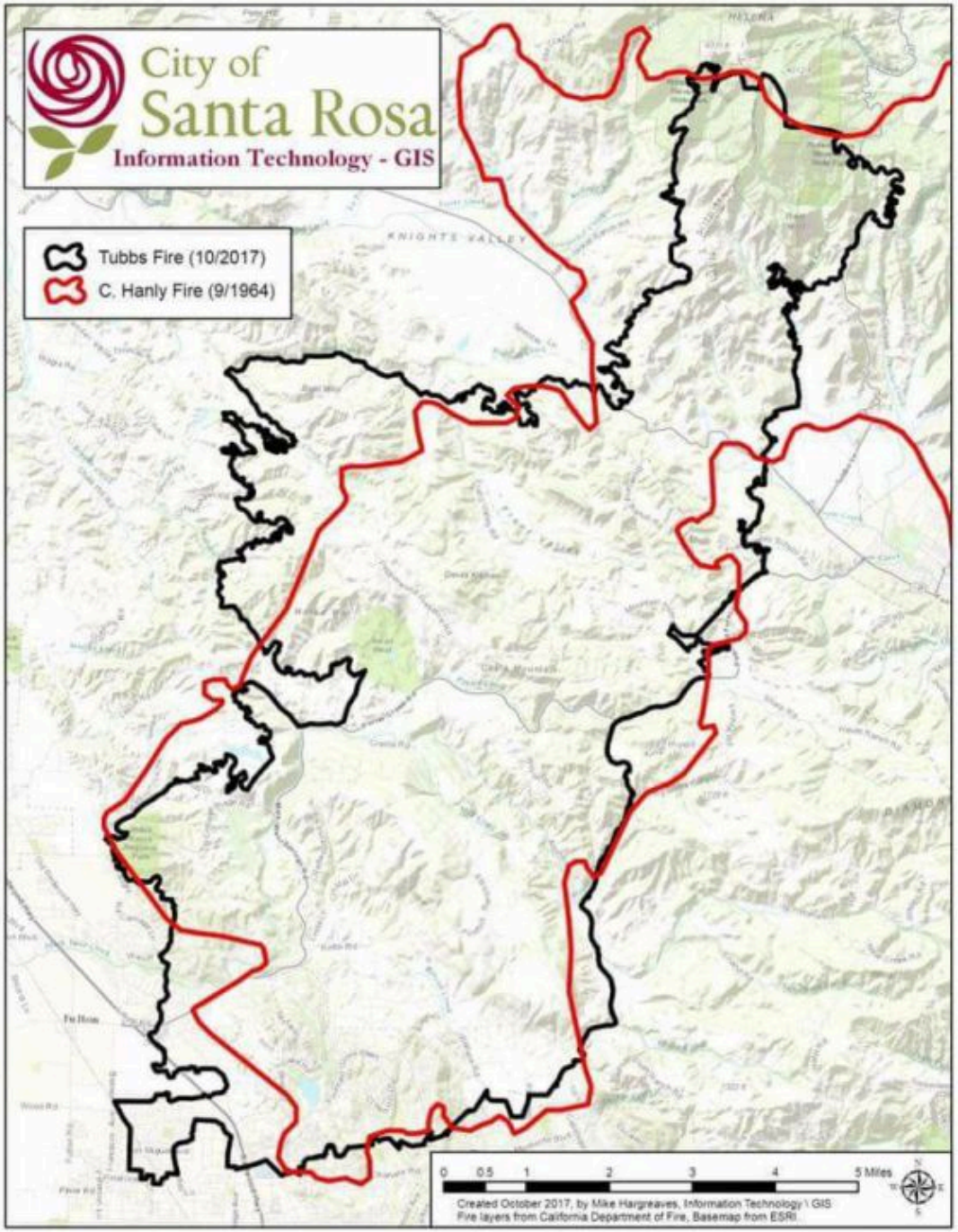

Robert Louis Stevenson State Park
128
FOOTHILL BLVD.
29
SILVERADO TRAIL
9:45 p.m.
Fire starts at Tubbs Lane
10:30 p.m.
Fire reaches Franz Valley School Road
CALISTOGA
Petrified Forest
NAPA COUNTY
PORTER CREEK RD.
Safari West
SONOMA COUNTY
MARK WEST SPRINGS RD.
1 a.m.
Fire reaches Michele Way
101
FOUNTAINGROVE PKWY.
WIND 10:30 p.m.
Gusts: 75 mph
Mean: 40 mph
Coffey Park
SANTA ROSA



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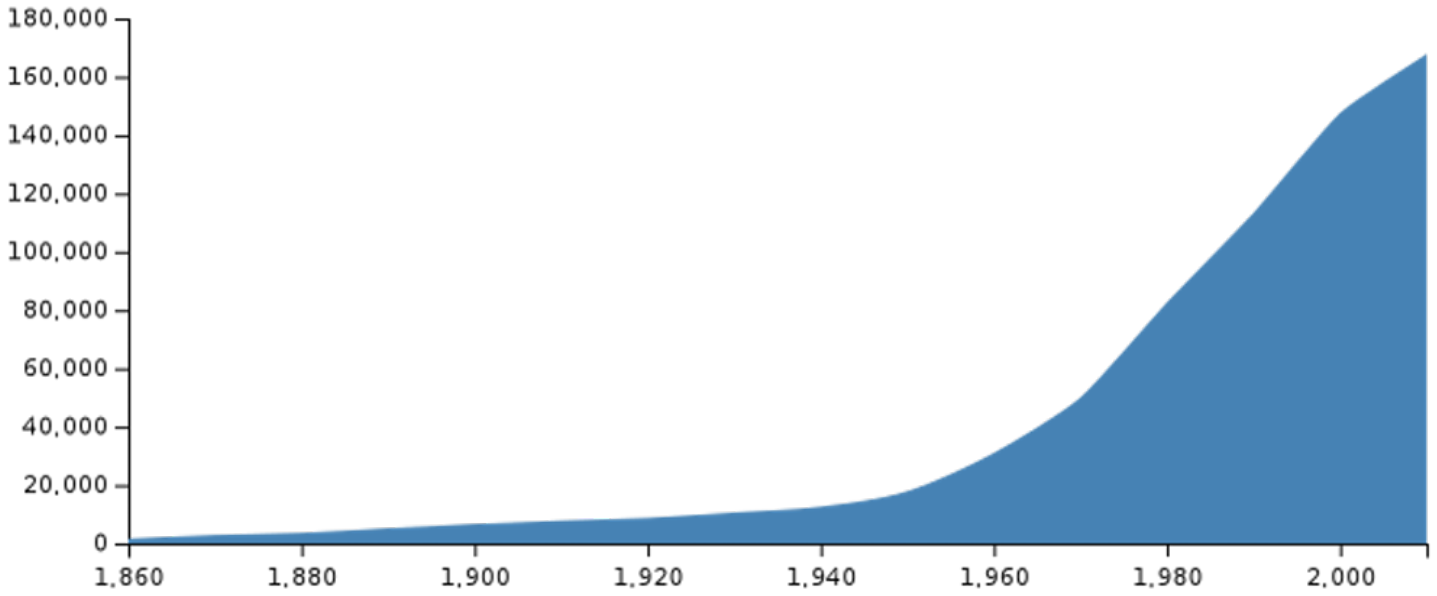

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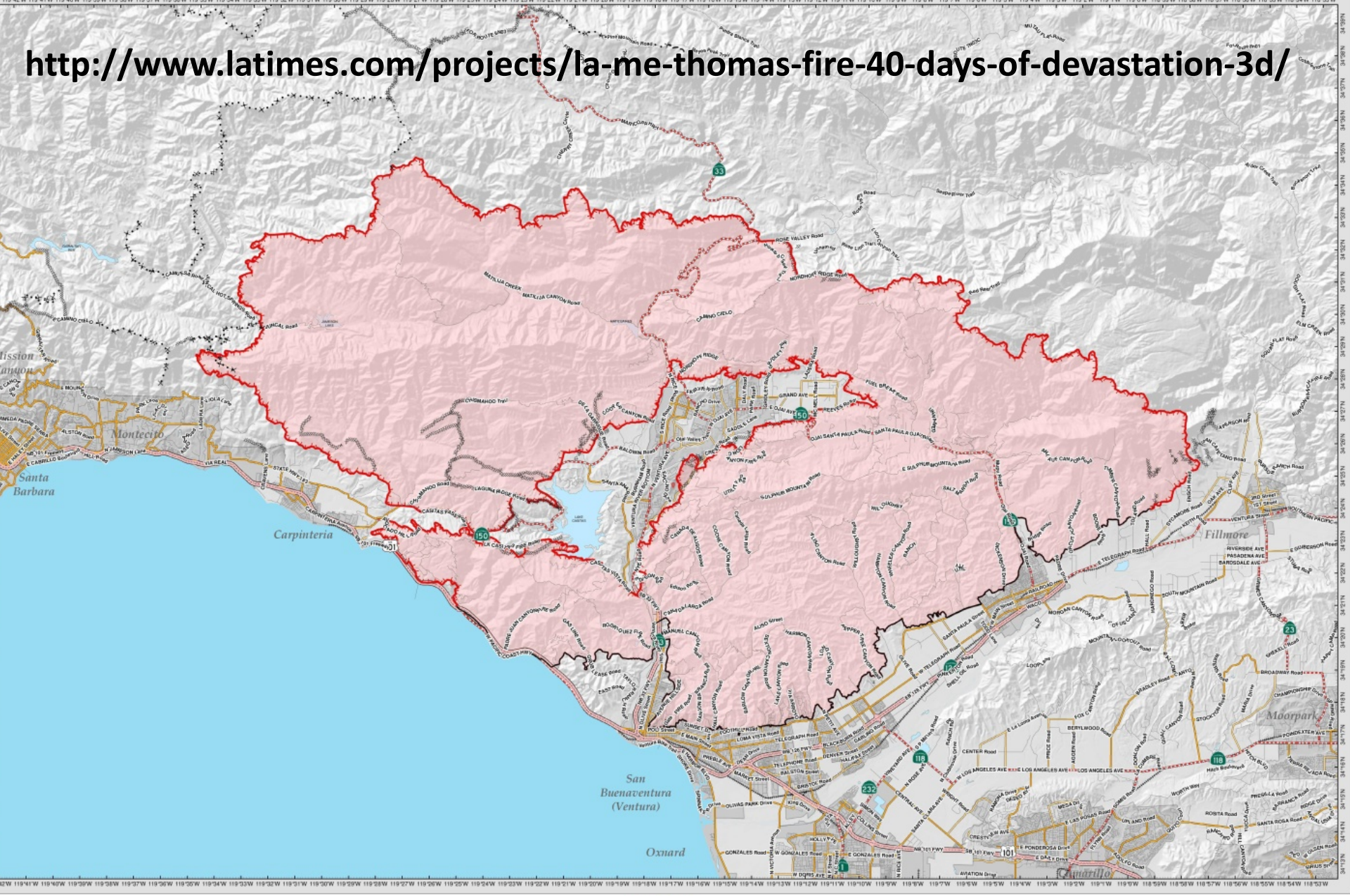
Santa Maria
Santa Barbara
Palmdale
Los Angeles
Riverside
Oceanside

http://www.latimes.com/projects/la-me-thomas-fire-40-days-of-devastation-3d/



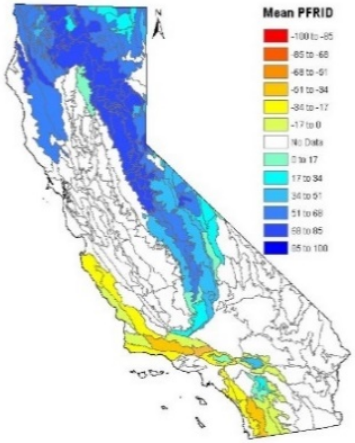
PIO MAP
Thomas Incident
CA VNC 103156
December 12, 2017

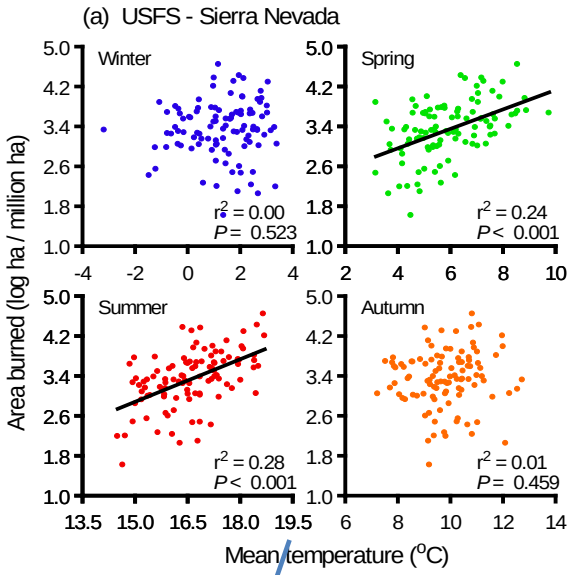
Fire Perimeter
Uncontrolled Line
Controlled Line

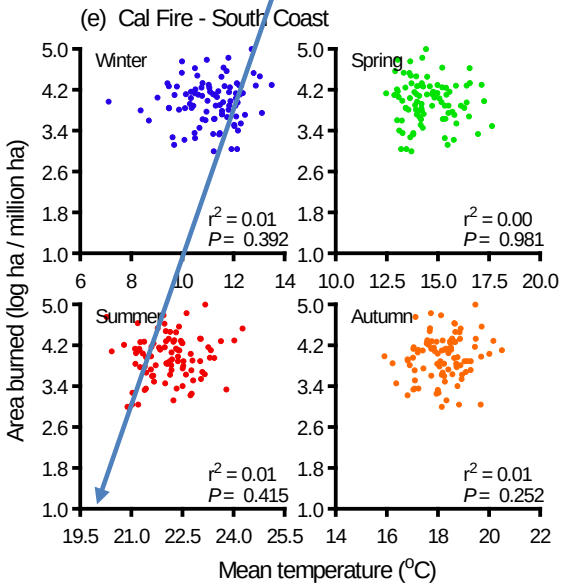
PUBLIC INFORMATION MAP
Thomas Incident
CA VNC 103156
December 12, 2017

PIO MAP
Thomas Incident
CA VNC 103156
December 12, 2017

How will global warming impact fires in the future?







Multiple regression models

Sierra Nevada (USFS)	**r2**	
1910 - 2013	0.39	Temp spr+Temp sum-Ppt spr
1910 – 1959	0.42	- Ppt spr - Ppt win
1960 - 2013	0.52	Temp spr + Temp sum

South coast (Cal Fire)	**r2**	
1919 - 2013	0.00	
1919 - 1959	0.00	
1960 - 2013	0.25	Prior ppt