

# Pyrosilviculture—Building a Partnership and Practice for Advancing Fire Management and Forestry in California



# Fire in the past . . .

Prehistoric fire and emissions in CA forests, woodlands, shrublands, grasslands (Stephens et al. 2007)

“The idea that US wildfire area of approximately two million ha annually is extreme is certainly a 20<sup>th</sup> or 21<sup>st</sup> century perspective.”

“Approximately 1.8 million ha (4.45 million acres) burned annually in California prehistorically (pre 1800).” Half was lightning and half Native American burning.

Much of California has changed since 1850 but our forestlands are still forestlands.

**Burning Question:** What are the implications of our efforts to exclude fire in strongly fire-associated forests in the Sierra Nevada?

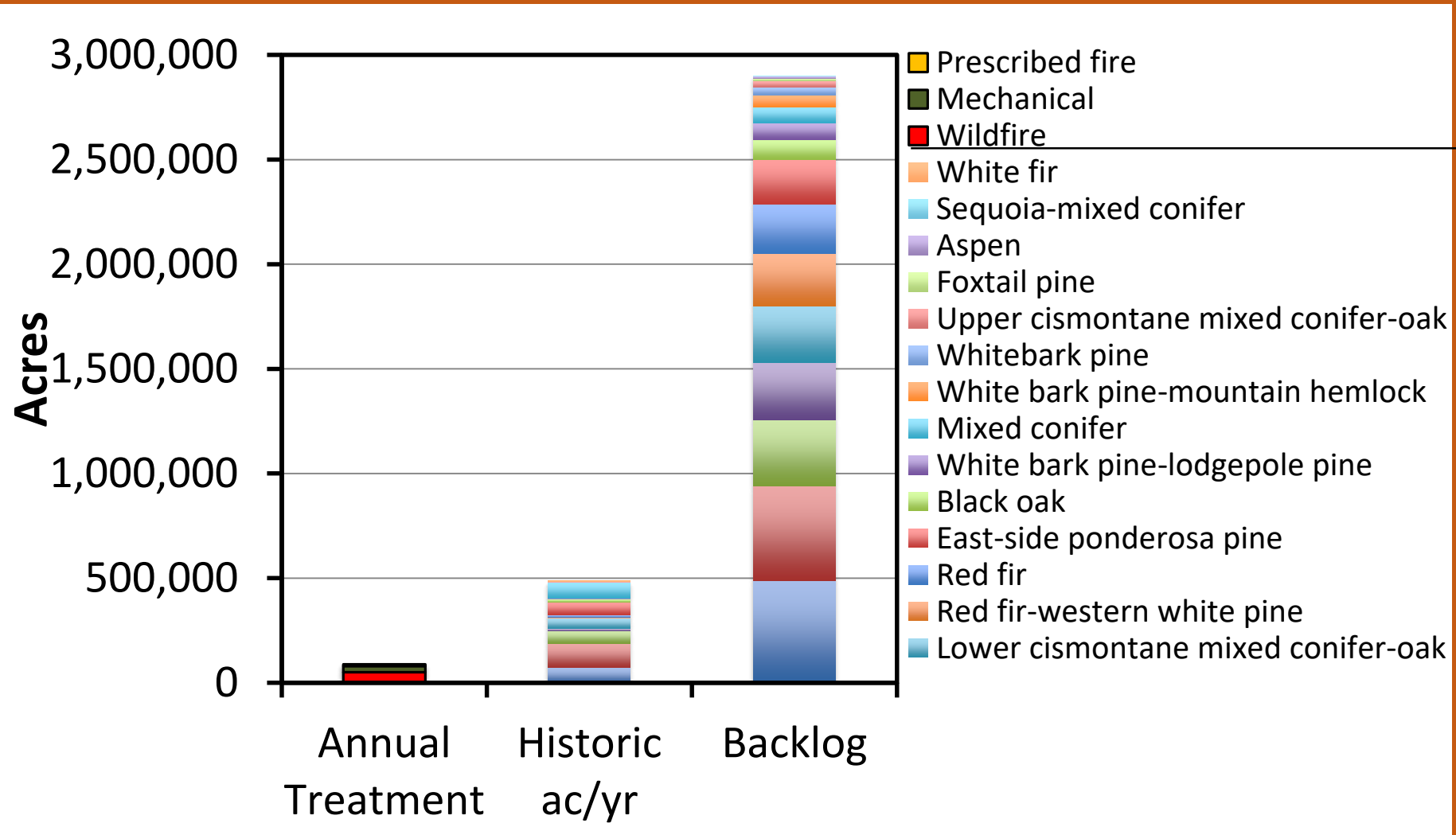
**Based on vegetation need for fire, roughly 550,000 ac burned annually in the Sierra Nevada . . . (North et al. 2012) on federal lands.**

Current Pace and Scale: One measure is against historic rates:  
 How much of the Sierra Nevada burned/yr? About 1/2 million ac

Forest Type <sup>2</sup>	Area (ac)	HFRI <sup>1</sup>			Forest Service			Own er- ship	National Park Service		
		Me an (yr)	High (yr)	Own er- ship	Area (ac)	Mean HFRI (ac/yr)	High HFRI (ac/yr)		Area (ac)	Mean HFRI (ac/yr)	High HFRI (ac/yr)
Mix. conifer West-side	1,466,539	12	25	0.62	909,254	75,771	36,370	0.05	73,327	6,111	2,933
ponderosa Lwr cison.	1,087,734	5	12	0.53	576,499	115,300	48,042	0.08	87,019	17,404	7,252
mix. con-oak	1,046,221	10	30	0.46	481,262	48,126	16,042	0.04	41,849	4,185	1,395
Jeff. pine-fir	730,428	8	25	0.8	584,342	73,043	23,374	0.09	65,738	8,217	2,630
Jeffrey pine East-side	484,563	6	20	0.75	363,422	60,570	18,171	0.13	62,993	10,499	3,150
ponderosa	398,819	5	15	0.76	303,103	60,621	20,207	0	0	0	0
Black oak	268,598	10	25	0.6	161,159	16,116	6,446	0.03	8,058	806	322
White fir	133,434	25	45	0.7	93,404	3,736	2,076	0.06	8,006	320	178
Aspen	24,463	30	90	0.89	21,772	726	242	0.02	489	16	5
Sequoia-mix con.	17,544	15	20	0.31	5,439	363	272	0.52	9,123	608	456
<b>Active Man. Total</b>	<b>5,658,343</b>				<b>3,499,655</b>	<b>454,371</b>	<b>171,241</b>		<b>356,602</b>	<b>48,166</b>	<b>18,321</b>
Red fir	838,905	45	90	0.61	511,732	11,372	5,686	0.3	251,671	5,593	2,796
Lodge. pine	532,748	30	110	0.6	319,649	10,655	2,906	0.42	223,754	7,458	2,034
Red fir-west. white p.	393,877	50	135	0.75	295,408	5,908	2,188	0.18	70,898	1,418	525
Whitebark p. mtn hemlock	93,404	85	180	0.62	57,910	681	322	0.37	34,559	407	192
Whitebark & lodge. pine	92,168	40	165	0.86	79,265	1,982	480	0.12	11,060	277	67
Up cison. mix. con-oak	64,493	15	45	0.48	30,957	2,064	688	0.14	9,029	602	201
Foxtail pine	58,810	50	150	0.21	12,350	247	82	0.77	45,284	906	302
Whitebark p.	54,115	65	200	0.68	36,798	566	184	0.31	16,776	258	84
<b>Passive Man. Total</b>	<b>2,128,519</b>				<b>1,344,068</b>	<b>33,475</b>	<b>12,536</b>		<b>663,031</b>	<b>16,918</b>	<b>6,201</b>
<b>All Man. Total</b>	<b>7,786,862</b>				<b>4,843,723</b>	<b>487,846</b>	<b>183,778</b>		<b>1,019,633</b>	<b>65,084</b>	<b>24,522</b>

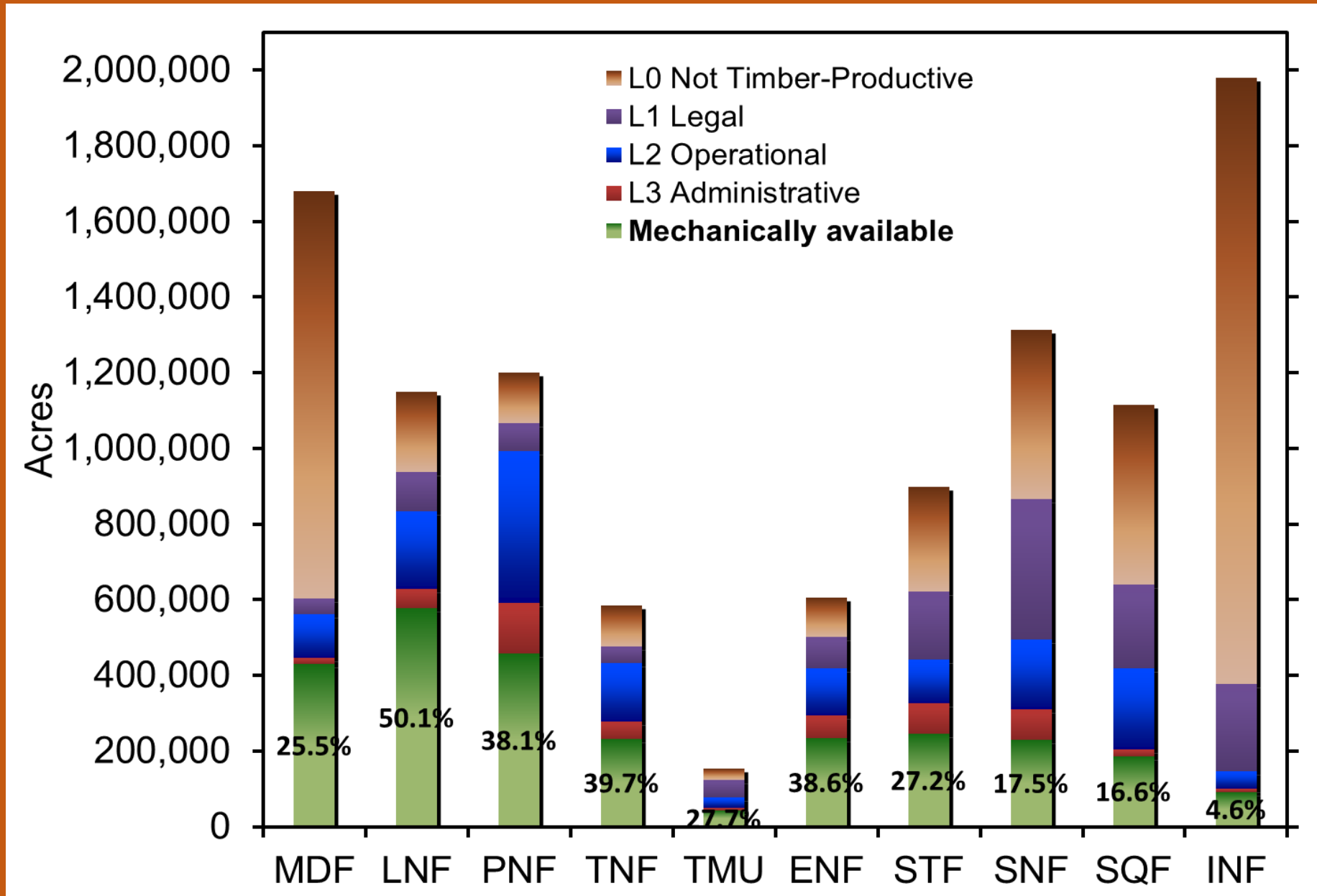
North, M.P., B.M. Collins, and S.L. Stephens. 2012. Using fire to increase the scale, benefits and future maintenance of fuels treatments. Journal of Forestry 110: 392-401.

# The Fire “Debt” or Backlog is Much Greater



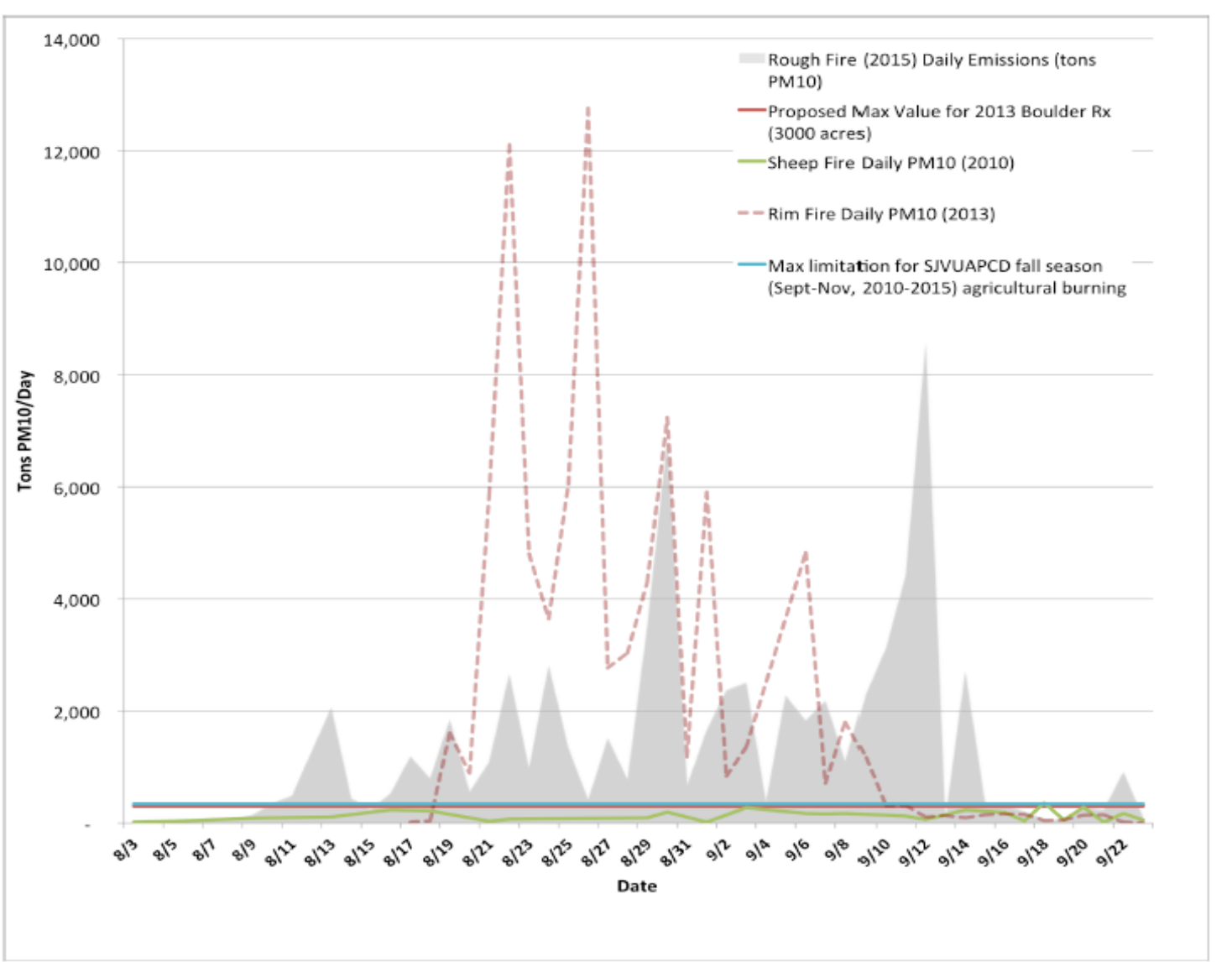
At current rates, 66% of National Forest Lands will never get treated

# Reduction in FS acres from constraint levels



North, M., A. Brough, J. Long, B. Collins, P. Bowden, D. Yasuda, J. Miller and N. Suighara. 2015. Constraints on mechanized treatment significantly limit mechanical fuels reduction extent in the Sierra Nevada. *Journal of Forestry* 113: 40-48.

# Rim Fire MEGA Emissions



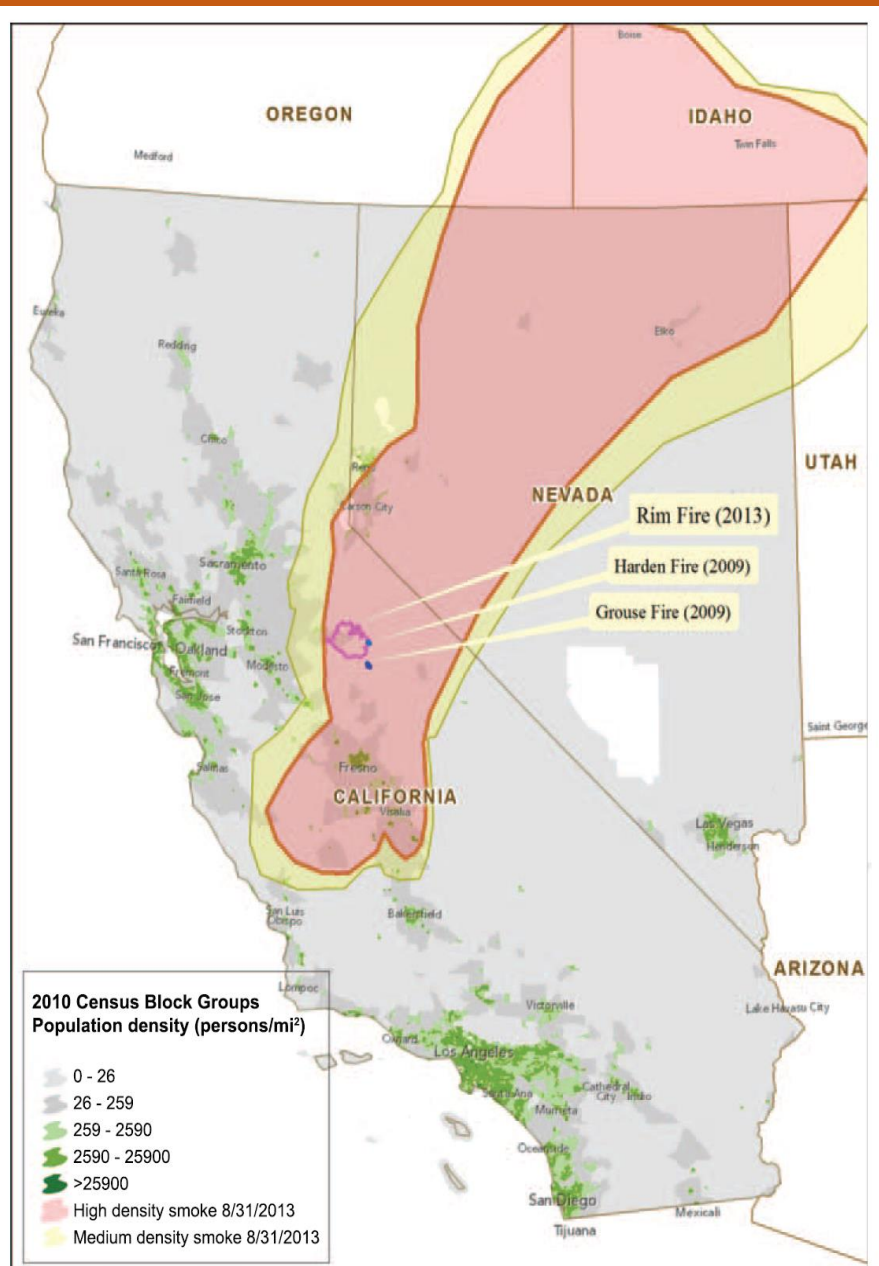


Figure 5. HMS smoke plumes from the Rim Fire on Aug. 31, 2013, a day of extensive heavy smoke impact, overlying population density of census tracts in California and Nevada.

**7 Million total person-days of exposure to higher than normal levels of PM 2.5 from the Rim Fire between August 22<sup>nd</sup> and September 10<sup>th</sup>.**

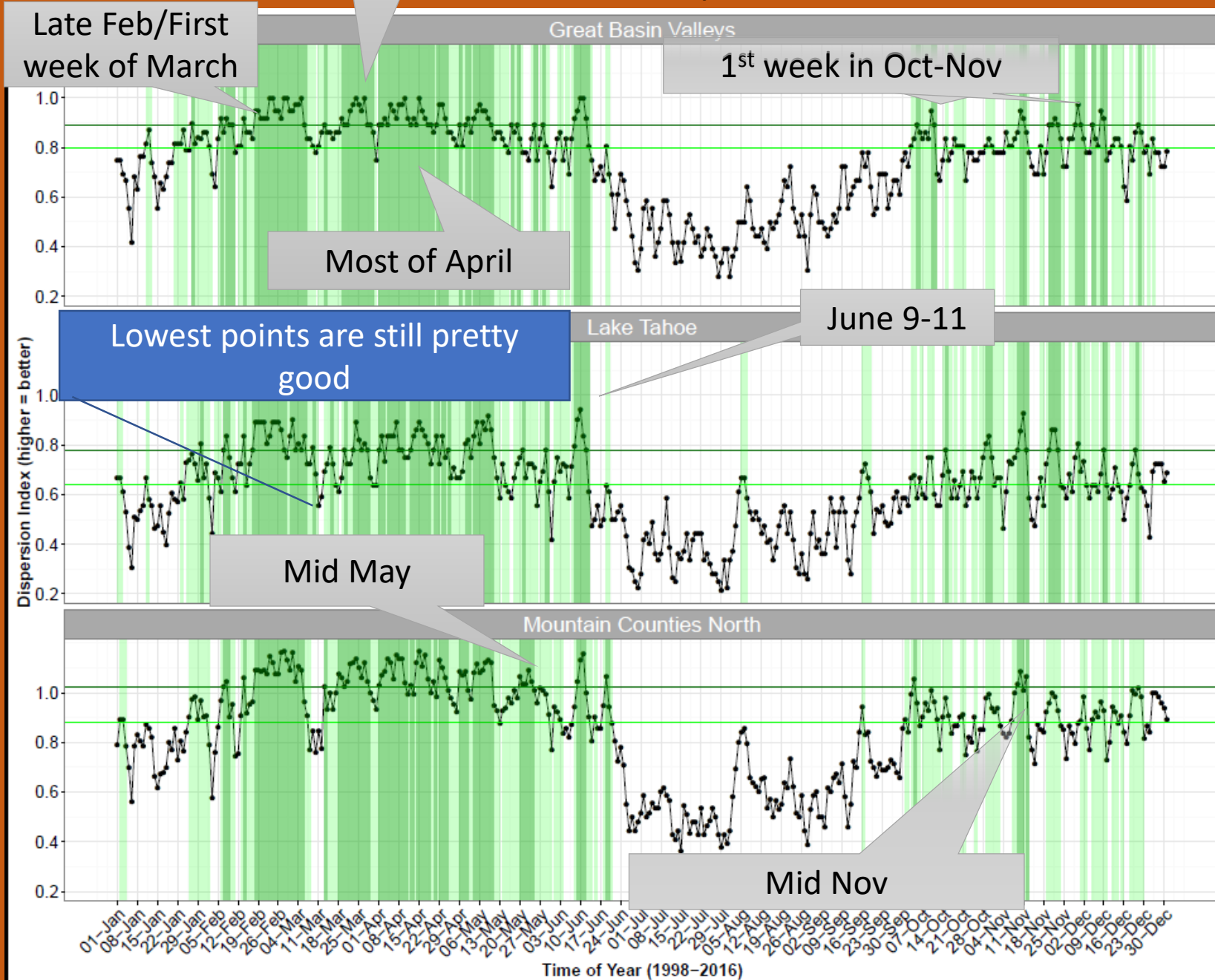
**Values that exceed 35  $\mu\text{g}/\text{m}^3$  are considered unhealthy for sensitive groups.**

**Large smoke plumes occurring on August 23-25 and August 28-29 when PM values exceeded 55.5  $\mu\text{g}/\text{m}^3$  which is unhealthy for all populations.**

**Studies suggest the costs of the Rim smoke impacts approximate \$600 million dollars.**

**Long et al. 2017. Aligning Smoke Management with Ecological and Public Health Goals.**

# Tahoe/Central Sierra Rx "best bets"



**LEGEND**

- More likely than not
- Pretty good bet

Credit:  
Lee Tarnay,  
USFS  
Dar Mims,  
CARB



# Caples Ecological Restoration Project 8,800 ac Rx Fire, meadow restoration

Spring 2019



Early October 2019

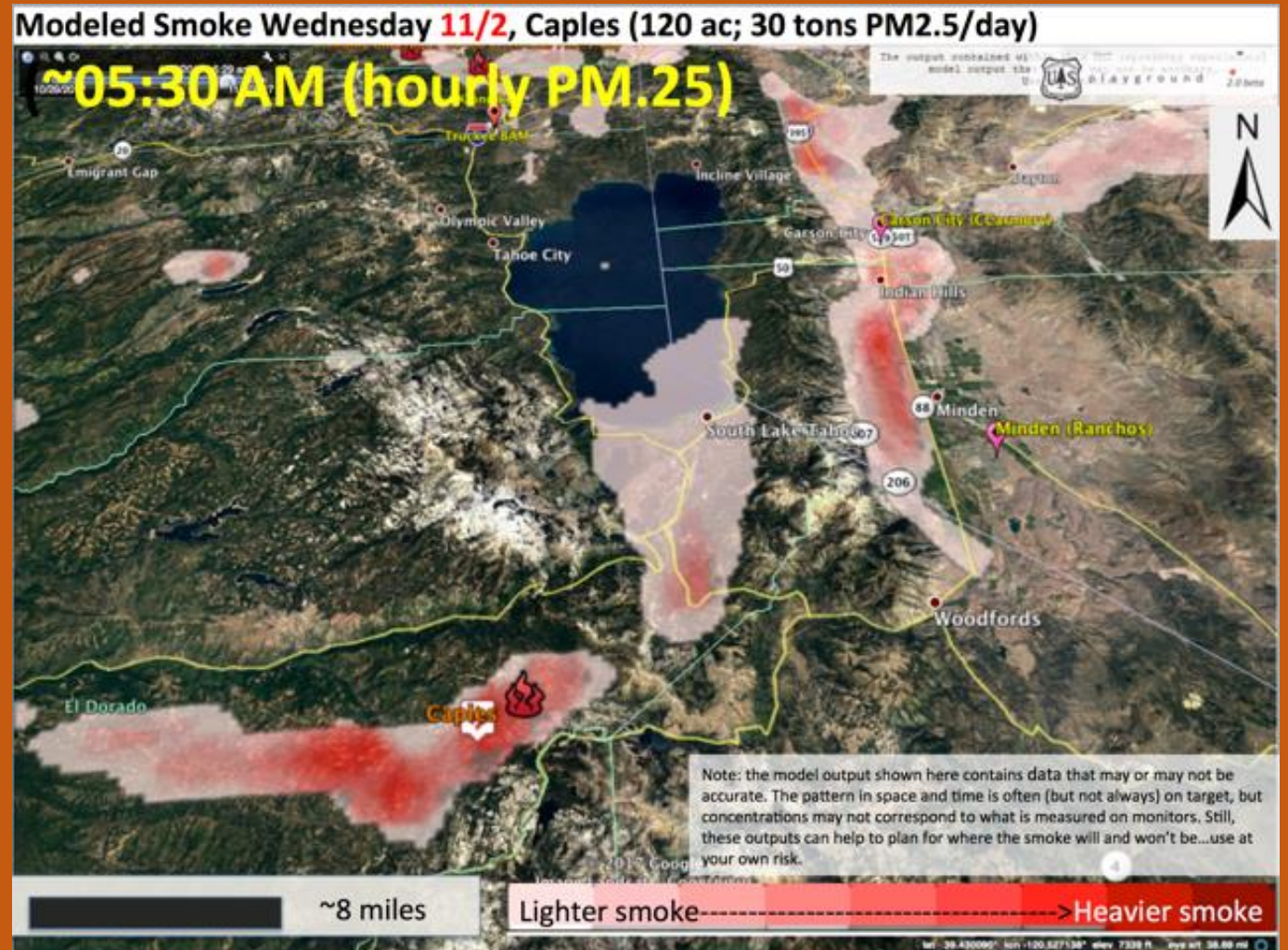


# The fire crew with tools of the trade

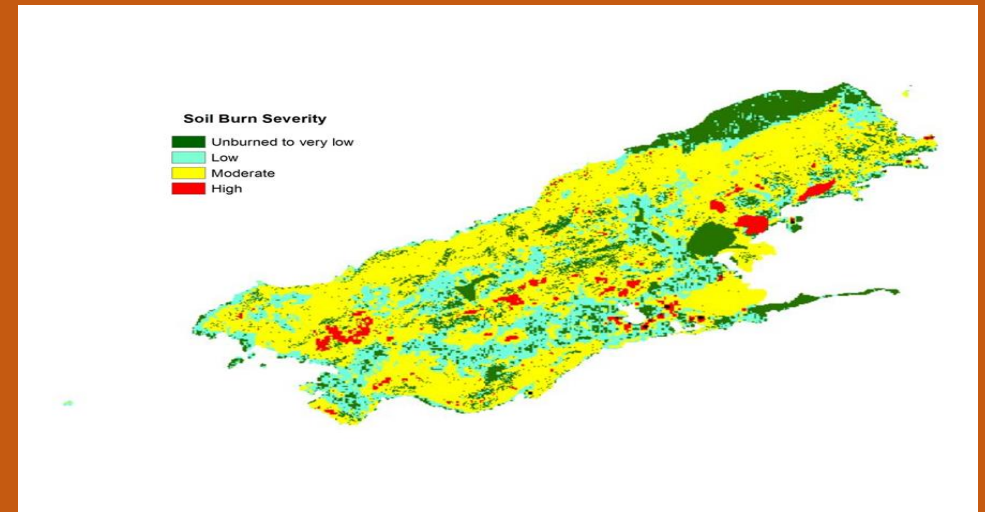
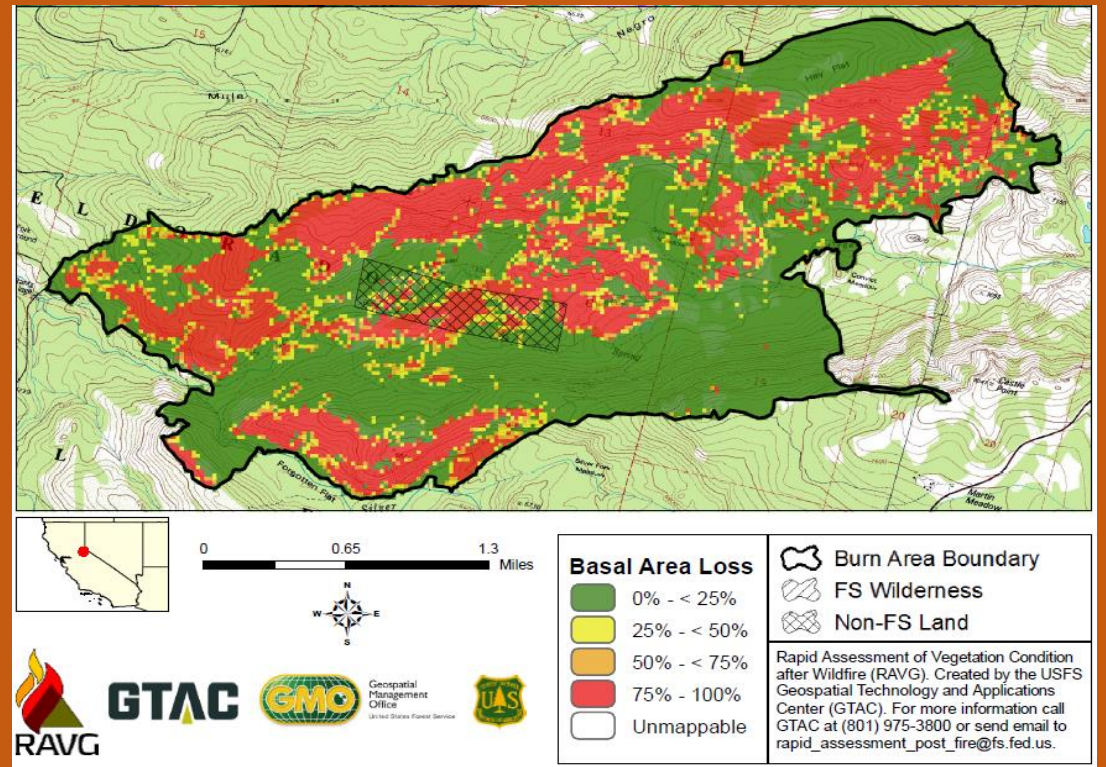




# Smoke Monitoring of Caples Prescribed Fire Nov. 1<sup>st</sup> 4:00 PM and Nov 2<sup>nd</sup> 5:30 AM (Blue Sky Modeled Smoke output, hourly PM2.5)









If we are going to burn longer duration, larger landscapes (like we say we need to do) we will need a management system that supports burning in remote areas, on steep ground and operating outside the predictive capacity of our meteorology resources.

# The Fire MOU Partnership





# FIRE MOU Partners have a Steering Committee and 3 primary work groups

- **Capacity Work Group**---increasing training and staff capacity to do more fire work; cross jurisdictional work that gets to larger acreage resilience.
- **Policy Work Group**---defining the barriers to increased fire use; remove or limit impact of barriers (and keep support of stakeholders)
  - air quality issues such as limits on burn duration
  - burn day availability and staff/logistical capacity to use those days
  - public understanding of the need for fire in the ecosystem
  - risks of burning and not burning
  - public health and emissions trade-offs
  - Overcoming a century plus of fire exclusion
- **Communication and Outreach Work Group**—media framing of fire and fire effects, using language that builds understanding and support v. fear and insecurity.

# Burn Day Utilization Tracking

## Factors other than weather and fuel moistures

- Staffing and hiring policies
- Budgets supporting an ecologically significant level of burning
- Training schedules in Winter and Spring (during burn seasons)
- Use-or-lose employee annual leave requirements
- Flexible, mobile fire crews to take advantage of opportunities
- Larger strategic burns
- Fatigue - fire fighter health concerns (fighting wildfire all summer)
- Separating prescribed fire crews from wildland fire fighters
- Meeting targets v. recognizing the fire regime sets the targets
- Collaborative burning with multiple partners

In the likely available (80%) burn windows of April 6<sup>th</sup> and 7<sup>th</sup> 2017, the area of El Dorado County at 2500 feet elevation was experiencing a major spring storm with 2” plus rainfall and at higher elevations in the Sierra Nevada snow levels dropped to 4000’ elevation. Several April 2017 weather events placed the available burn window in the **not utilized** category and outside of the fire manager’s control for broadcast burning for much, though not all, of California.

Friday, April 7, 2017
West Slope: Burn Day
Lake Tahoe: Burn Day
Thursday, April 6, 2017
West Slope: Burn Day
Lake Tahoe: Burn Day
Burn day information is also available by telephone and updated daily. Western El Dorado County (530) 621-5897 or (866) 621-5897 Lake Tahoe (888) 332-2876

**Schweizer and Cisneros 2016 -- Change conventional thinking on smoke management to prioritize long term air quality and public health.**

decisions. It is likely that long term air quality is inextricably linked to ecosystem health in the Sierra Nevada. We contend that landscape use of ecological fire is essential to forest and human health. Radical change is needed where beneficial wild-land fire smoke is treated as natural background and exempted from much of the regulation applied to anthropogenic sources. Tolerance of the measured release of routine smoke emissions from beneficial fire is needed. Using present air quality standards in the more remote areas will provide an opportunity to increase burning in many forests while protecting public health.

## PSW-GTR-183 The Kings River Administrative Study 2002

[https://www.fs.fed.us/psw/publications/documents/psw\\_gtr183/psw\\_gtr183\\_005\\_mccand.pdf](https://www.fs.fed.us/psw/publications/documents/psw_gtr183/psw_gtr183_005_mccand.pdf)



# Can't do first entry burns?

Patterson Mountain—Dinkey  
Creek Watershed in January  
1998

Same location January 1999 – Second Entry Burn Patterson Mountain



## Costs per acre over 4 years?

Our burns have cost about \$70 per acre. The few burns that escaped cost twice that amount. One project in January, involving a helicopter equipped with a chemical ignition device (CID) and five personnel, underburned 1,400 acres in 2 days and cost \$6.50 per acre. Ignition occurred 2 days before a predicted storm, which arrived on time. By burning during the moist seasons, little to no mop up is needed, resulting in a significant cost savings.



**When it comes to wildfires,  
California is “not on the  
side of nature”**

**“We’re fighting nature”**

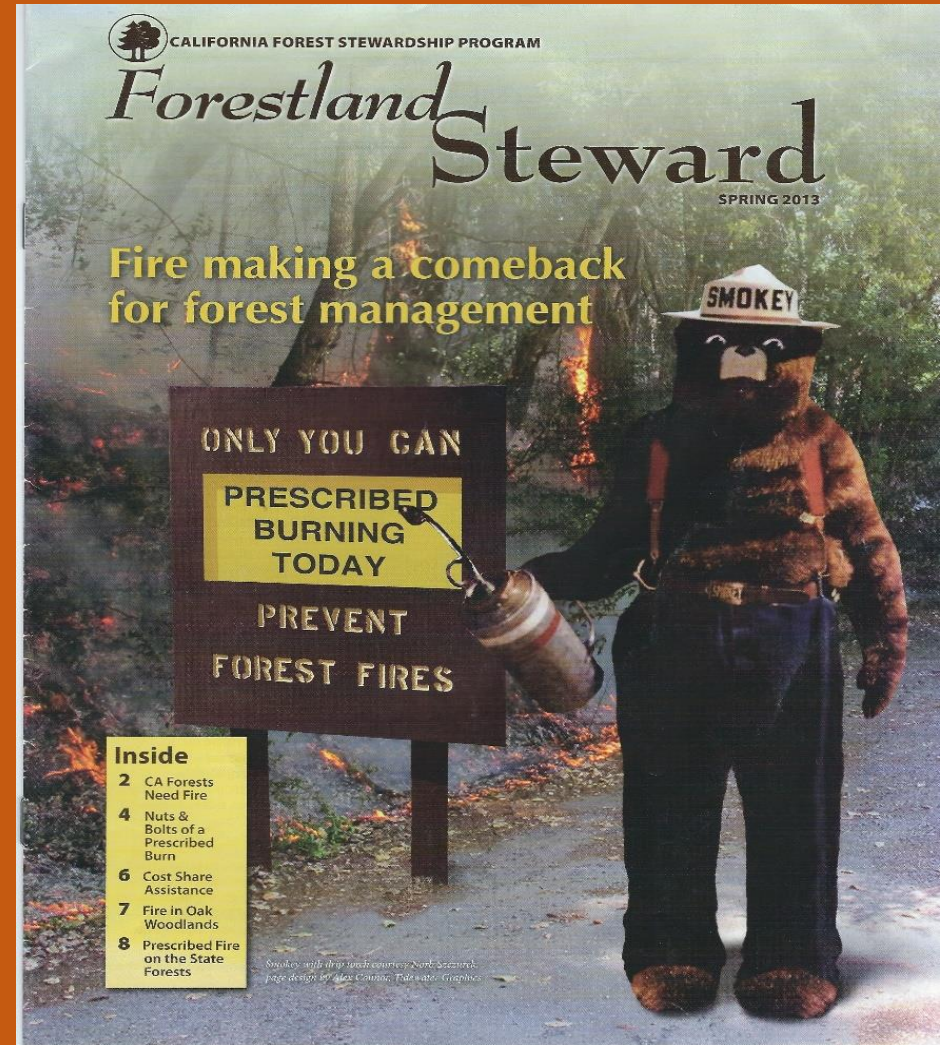
**Governor Jerry Brown**

McClatchy New Service 8/7/18





Ernest Coe Visitor Center –Everglades NP



Only you can help Smokey burn more acres!

Thank You!

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