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The 2020 fire season in context: Disaster or opportunity?

Crystal A. Kolden
Management of Complex Systems
University of California, Merced
March 10, 2021

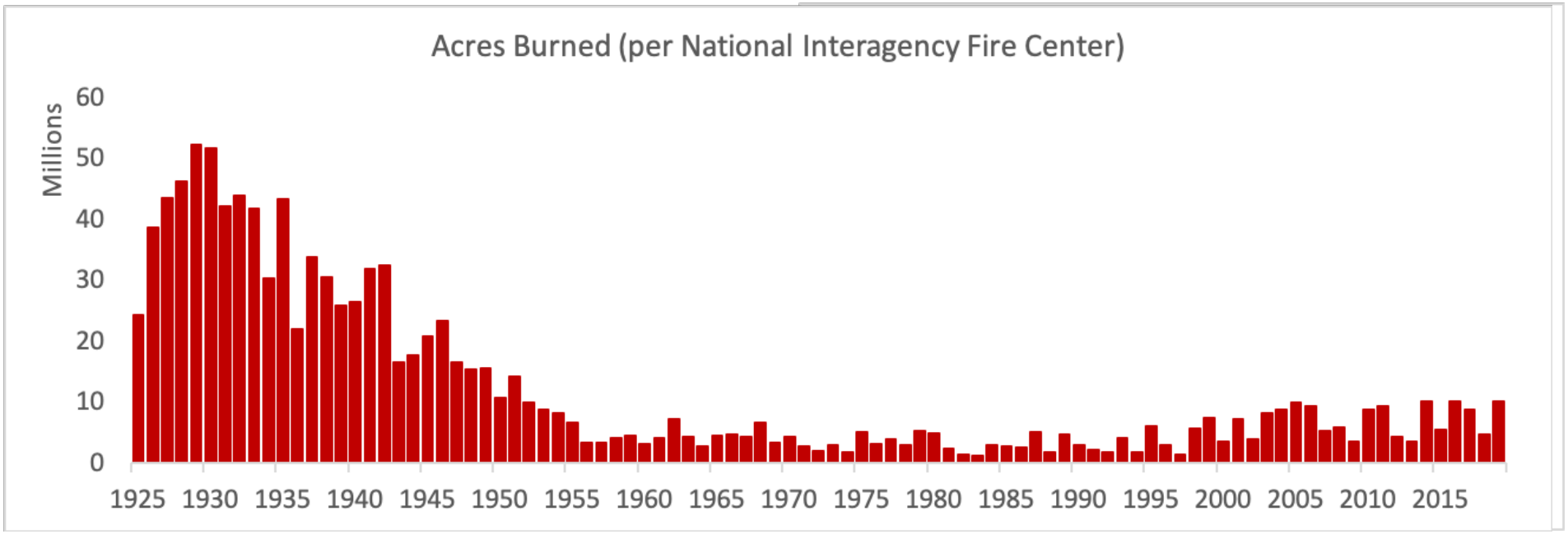
Some US statistics…

- Record area burned in California, Colorado, Oregon
- Record wildfire in CA: August Complex (418K ha)
- Top 3 largest fires in CO: Cameron Peak (83k ha), East Troublesome (77k ha), Pine Gulch (56k ha)
- >4m ha burned
- At least 47 fatalities
- Over 18,000 structures destroyed
- Smoke, smoke, and more smoke…

Photo: Jessica Christian, SF Chronicle

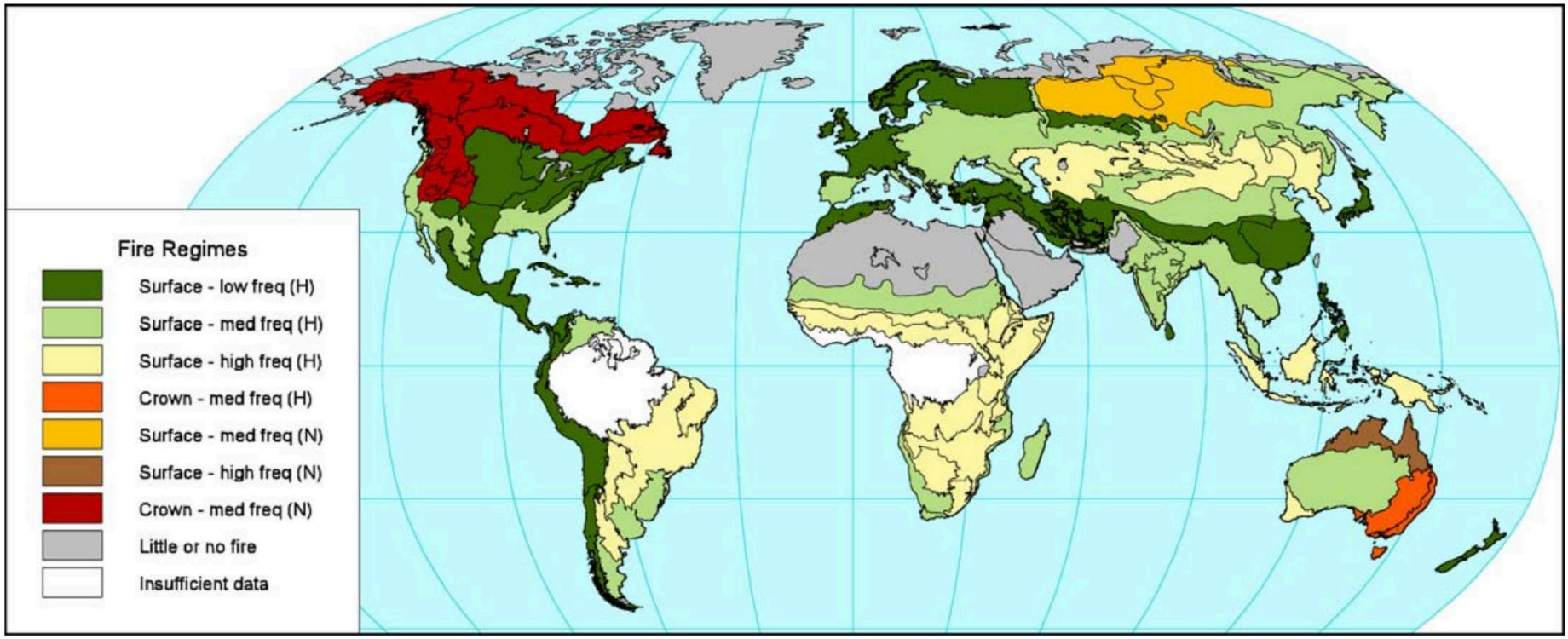
How do we measure fire disasters?

Wildfire science has historically focused on size



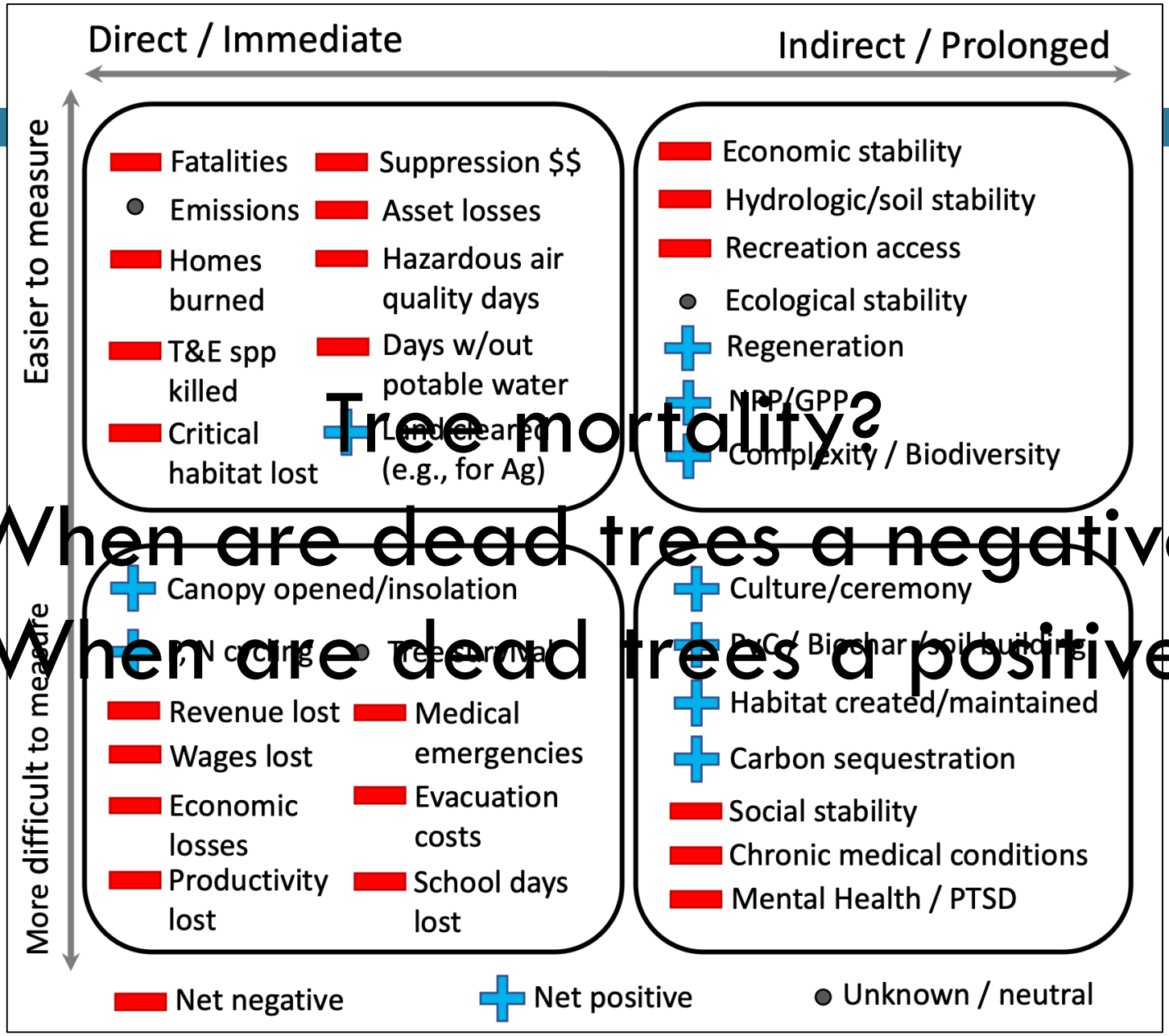
Is size a good indicator of disasters?

Fire-evolved biomes cover ~80% terrestrial surface: they need fire



Lavorel, S., Flannigan, M. D., Lambin, E. F., & Scholes, M. C. (2007). Mitigation and Adaptation Strategies for Global Change, 12(1), 33-53.

What else can/should we measure?



Tree mortality?

When are dead trees a negative?

When are dead trees a positive?

The 2020 fires: Green Ridge Fire, OR

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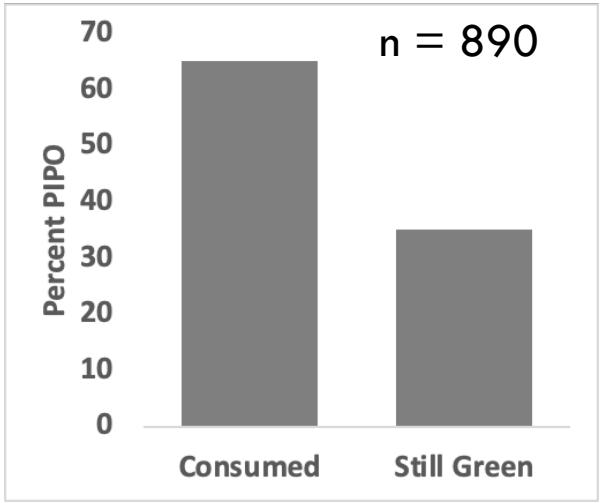
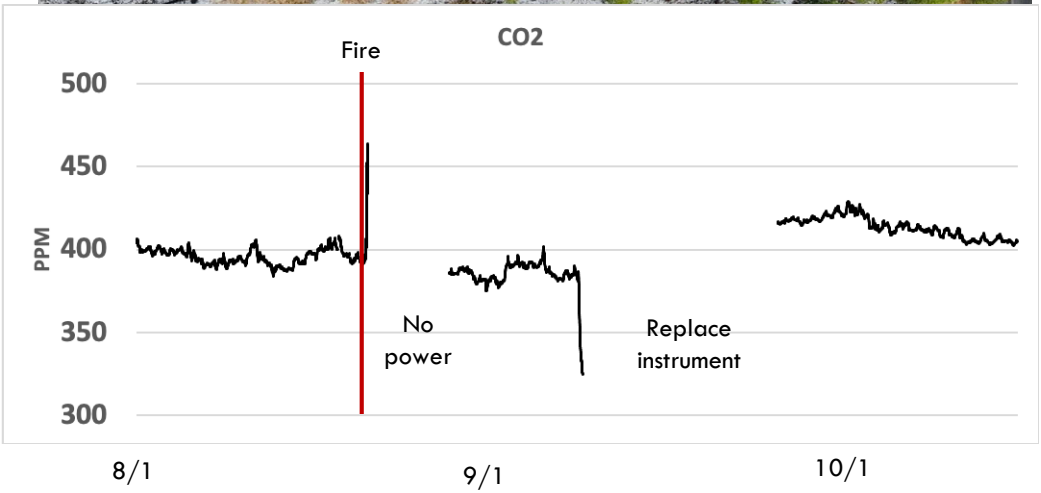




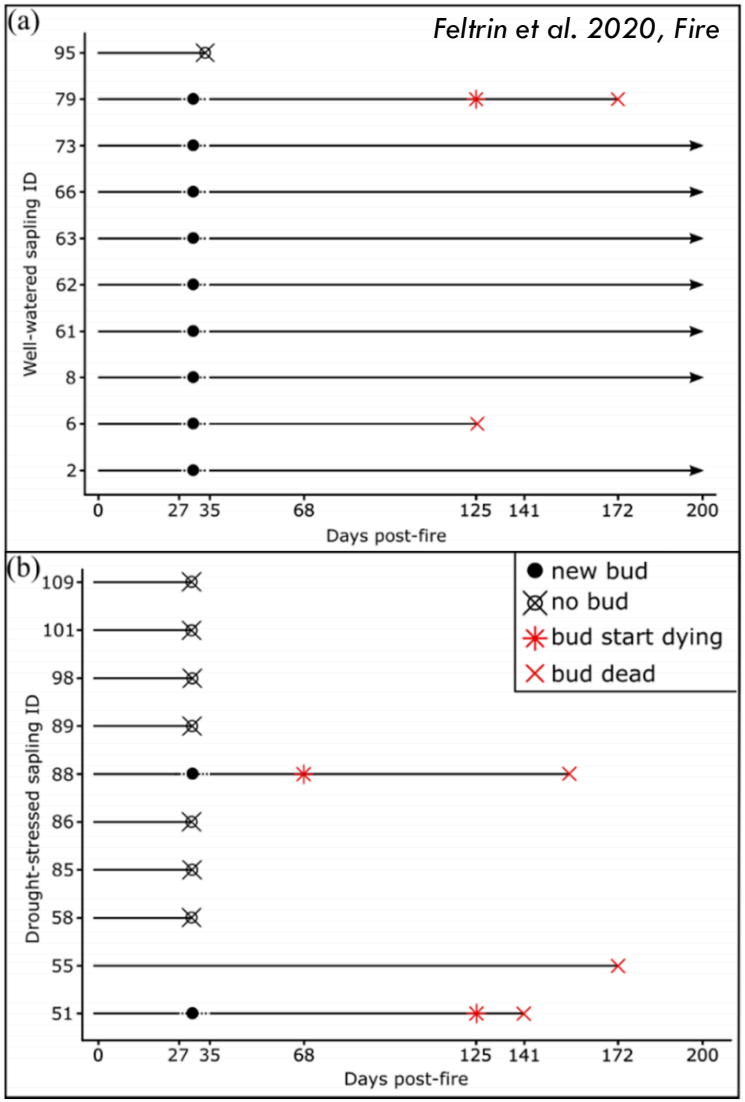
Private landowner
80 yo PIPO dominated
No fatalities or structures consumed
Some evacuations
$10m suppression costs
Over time, measure △NPP/C
Sap flow to measure tree mortality

National Science Foundation
WHERE DISCOVERIES BEGIN

NSF Award 2052571

Why am I bringing up an OR fire?

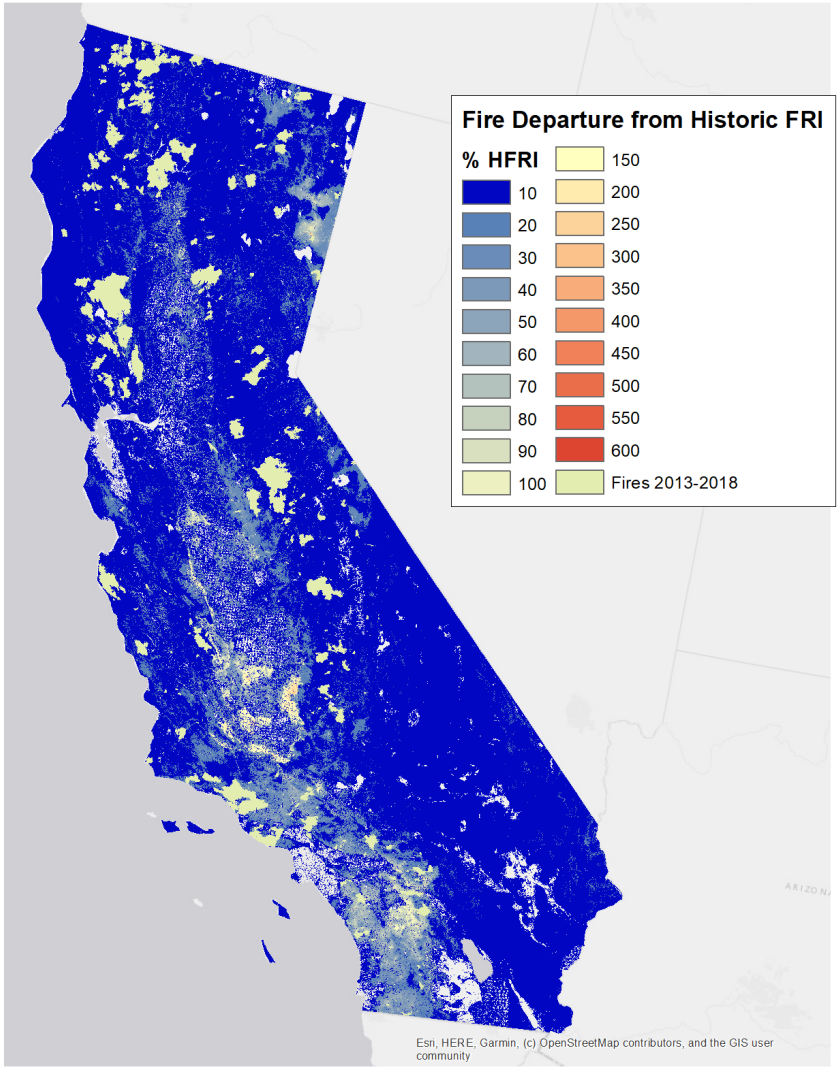
- We don't know HOW fire kills trees
  - What physiological mechanism fails?
  - When does it fail?
  - How do post-fire environmental conditions contribute?
- We don't monitor very many trees long term



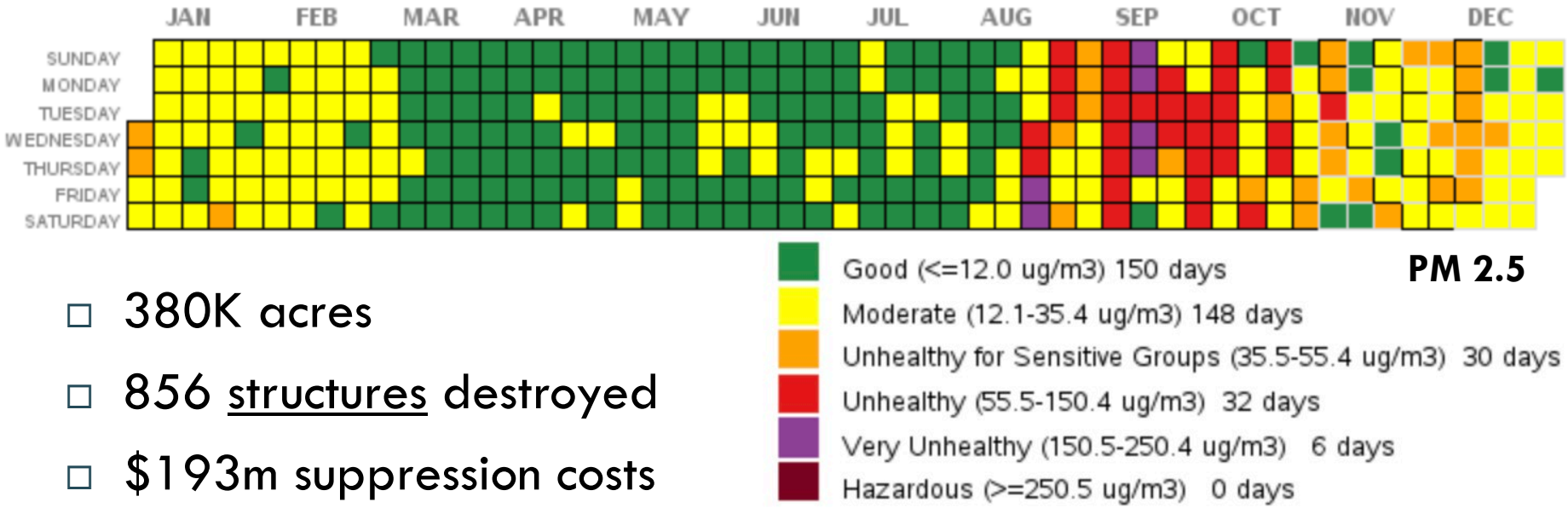
Key 2020 Fires

- August Complex
- Bear Fire
- Creek Fire
- SQF Complex

- Tree mortality
- FRI
- Departure from FRI prior to 2020

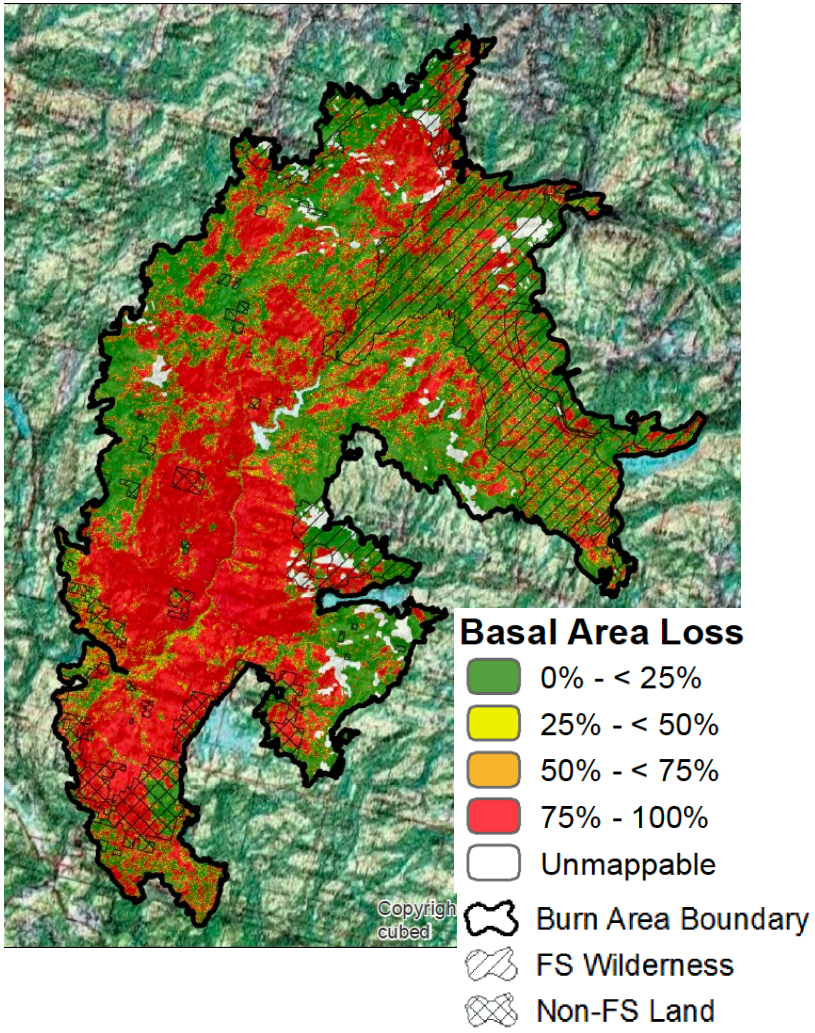


Creek Fire, Sierra NF



- 380K acres
- 856 structures destroyed
- $193m suppression costs
- 0 fatalities
- 38 days Unhealthy+ air in Fresno (>1m pop)
- Potential for permanent conifer forest loss (drought +fire combo)

Creek Fire, Sierra NF



LANDFIRE Veg Type	% fire
Grassland/shrubland/non veg	17
Evrgrn clsd canopy (late stage conifer) <50% Basal area loss	13
Evrgrn clsd canopy (late stage conifer) >50% BAL	12
Evrgrn open canopy (midstage conifer) <50% BAL	24
Evrgrn open canopy (midstage conifer) >50% BAL	28
Any kind of deciduous	4

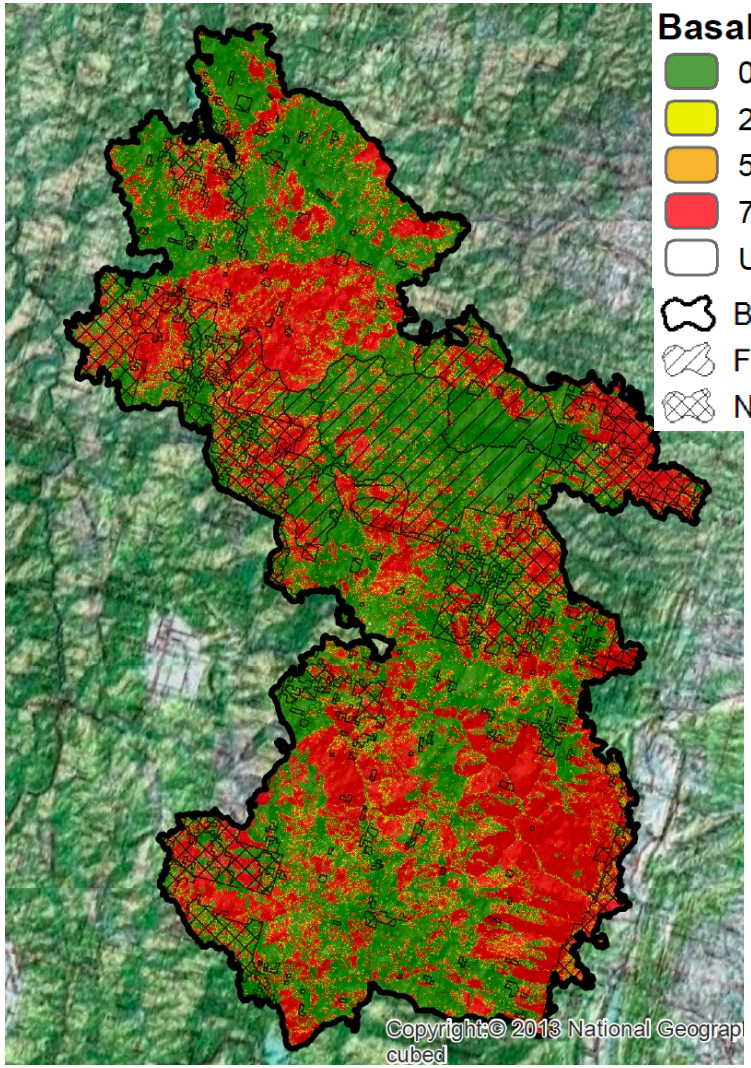
42% of fire will be early succession

Creek Fire, Sierra NF

Beneficial fire??

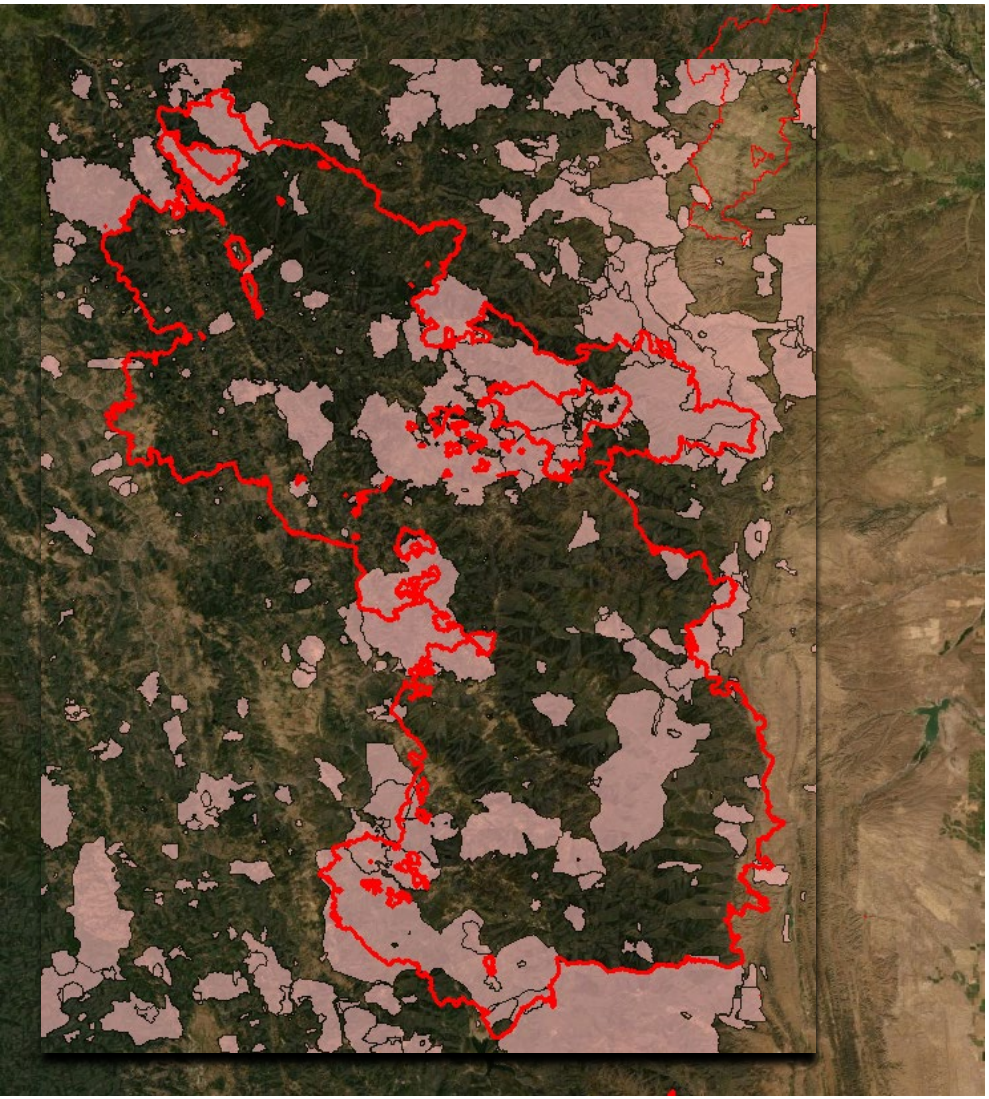
- ~195k acres unb/low severity fire (51%) per BAER SBS maps
- SoCal Edison/USFS forest management and Rxfire mitigated around Shaver Lake
- 96% outside the WUI
- "First fire" after a century of suppression 89% of fire
  - How can management capitalize?
  - Potential for more Rxfire?

August Complex, Mendocino NF



LANDFIRE Veg Type	% fire
Grassland/shrubland/non veg	33
Evrgrn clsd canopy (late stage) <50% Basal area loss	20
Evrgrn clsd canopy (late stage) >50% BAL	13
Evrgrn open canopy (midstage) <50% BAL	18
Evrgrn open canopy (midstage) >50% BAL	12
Any kind of deciduous	4

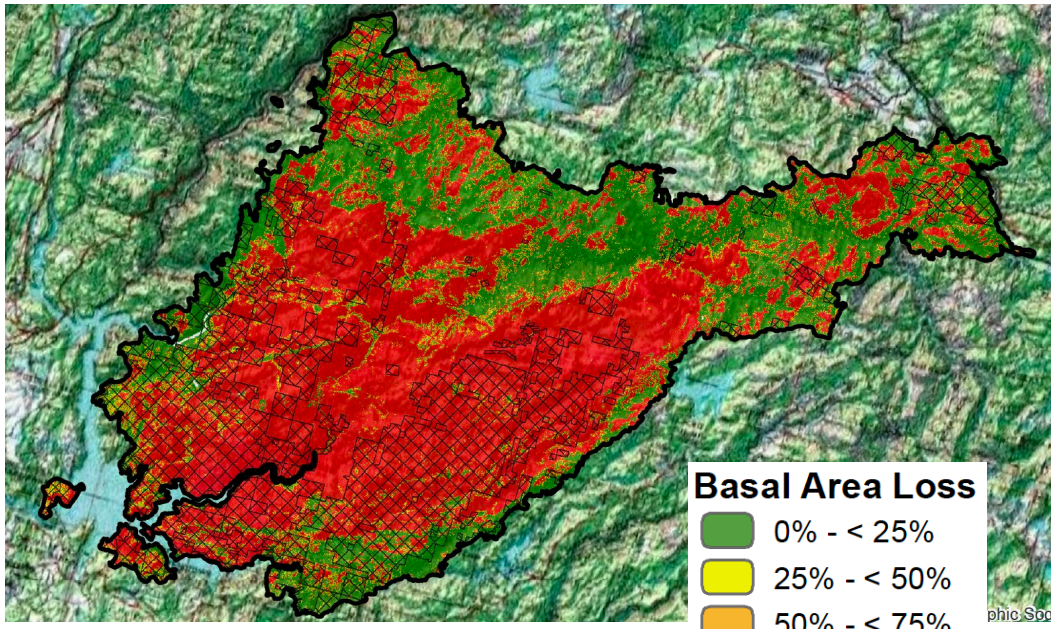
August Complex, Mendocino NF



August Complex (gigafire?)

- 1 fatality, 935 structures
- 0.3% WUI
- Large tract of unburned forest on Mendocino NF
- 82% “First fire”
- 500k acres “treated” for $640/ac?

Bear Fire, Plumas NF

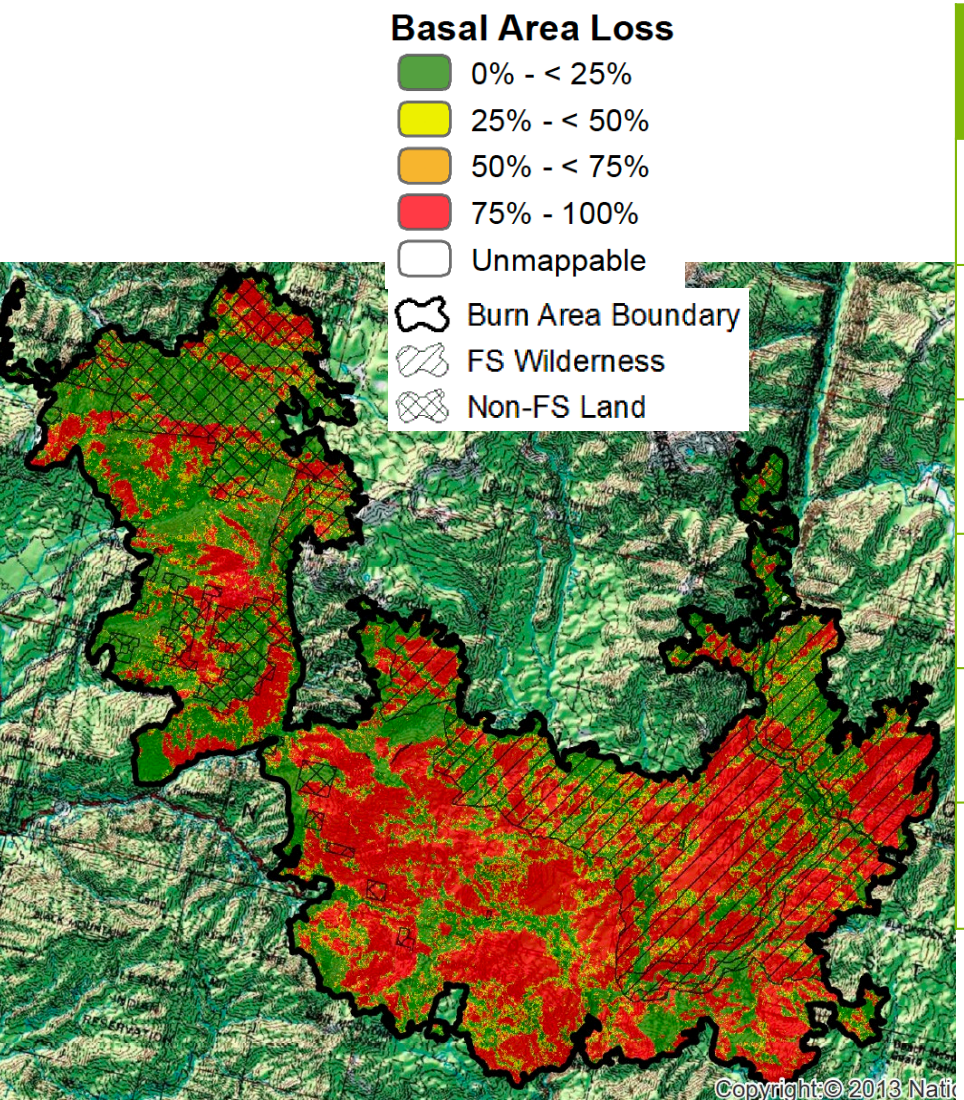


Impacts:

- 319k acres
- 16 fatalities
- 2,455 structures
- Potential for impacts to Lake Oroville and dam

LANDFIRE Veg Type	% fire
Grassland/shrubland/non veg	3
Evrgrn clsd canopy (late stage conifer) <50% Basal area loss	20
Evrgrn clsd canopy (late stage conifer) >50% BAL	30
Evrgrn open canopy (midstage conifer) <50% BAL	14
Evrgrn open canopy (midstage conifer) >50% BAL	29
Any kind of deciduous	4

SQF Complex, Sequoia NF

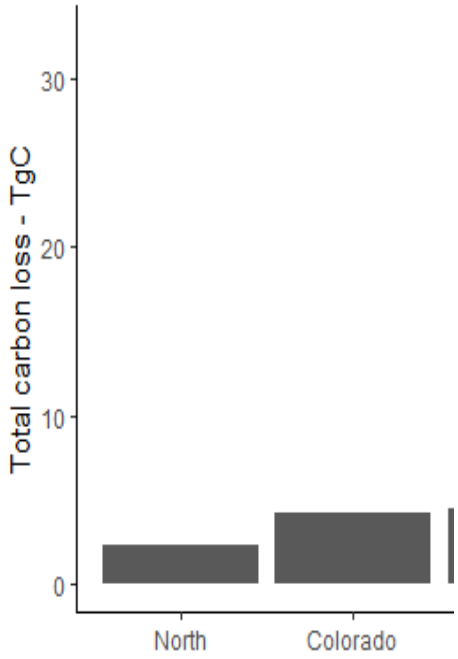


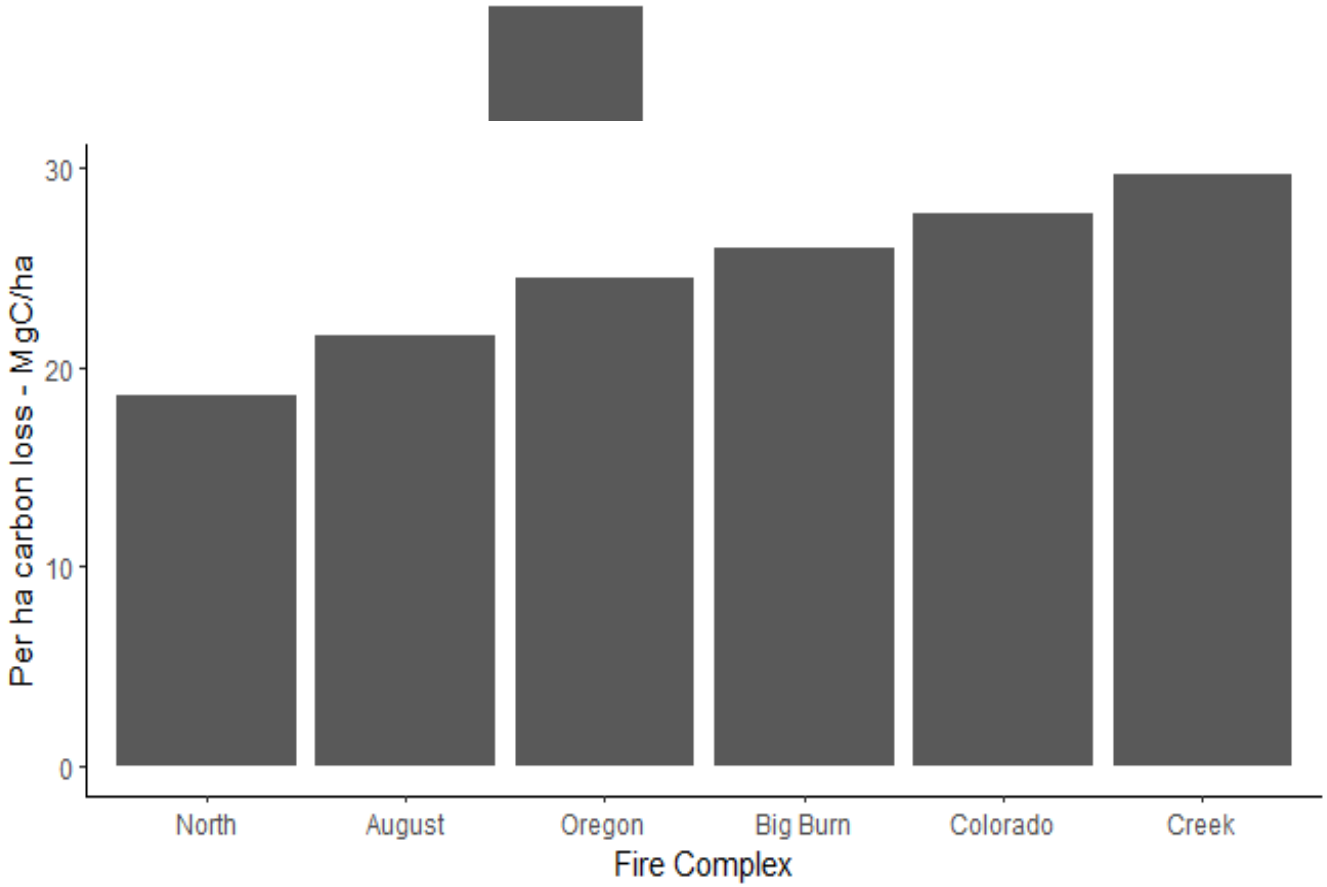
LANDFIRE Veg Type	% fire
Grassland/shrubland/non veg	12
Evrgrn clsd canopy (late stage conifer) <50% Basal area loss	16
Evrgrn clsd canopy (late stage conifer) >50% BAL	17
Evrgrn open canopy (midstage conifer) <50% BAL	27
Evrgrn open canopy (midstage conifer) >50% BAL	26
Any kind of deciduous	1

SCU Complex – Coast Redwoods

Redwoods (*Sequoia sempervirens*) are fire-adapted resprouters

Carbon emissions





Bartowitz et al. in prep

Were the 2020 fires a disaster?

- Wrong question
- Correct questions:

  What elements of the 2020 fire season were net positive that we can act, learn from, and build on to support/amplify resilience?

  What elements of the 2020 fire season were net negative that we can seek to mitigate to increase resilience?

2020 fires included BOTH disastrous outcomes AND beneficial outcomes

What was net positive in 2020?

- Short term:
  - First fire or good fire cleaned up big areas of forest
  - Forest mgmt. and rx fire allowed for “living with fire” in Shaver Lake
  - Wilderness areas, certain policies and management strategies worked

- Long-term/ to watch: Redwoods, Sequoias, ecosystems that are fire evolved

What was net negative in 2020?

- Short term:
  - Live and homes lost
  - Economic losses
  - Irreplaceables lost (incl Indigenous sacred items)
  - Problems with power structures
  - COVID in fire camps
- Long-term/ to watch:
  - Economic impacts
  - Vulnerable communities/refugees,
  - Chronic medical
  - Forest transition to a new state in southern Sierra?

Take home message…

- Much of burned forest was late succession
- Not enough deciduous, early succession pre-fire
- >2m acres of forest burned for 1st time in a century
- How can we leverage this going forward?
  - More Rx fire?
  - Reforestation?
  - Protect critical refugia?
- How would public perception about fires change if we described forest impacts differently?
  - Renew, Rejuvinate, Replenish

Crystal A. Kolden, Ph.D.
www.pyrogeographer.com
Twitter: @pyrogeog
ckolden@ucmerced.edu