The Role of Fire and Fuels Management in Chaparral Restoration

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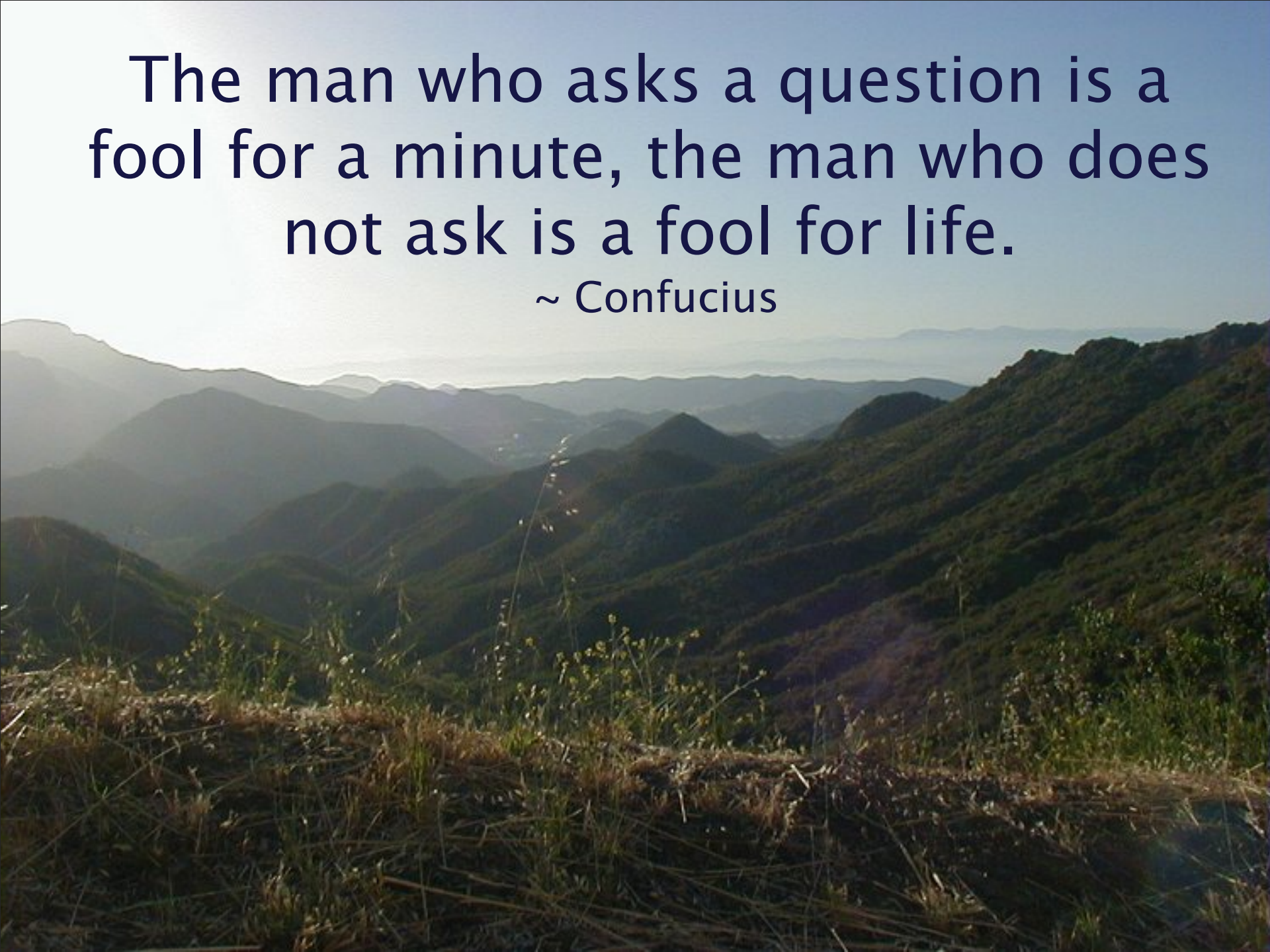
USFS Chaparral Restoration Workshop,18 June 2013


The man who asks a question is a fool for a minute, the man who does not ask is a fool for life.
~ Confucius

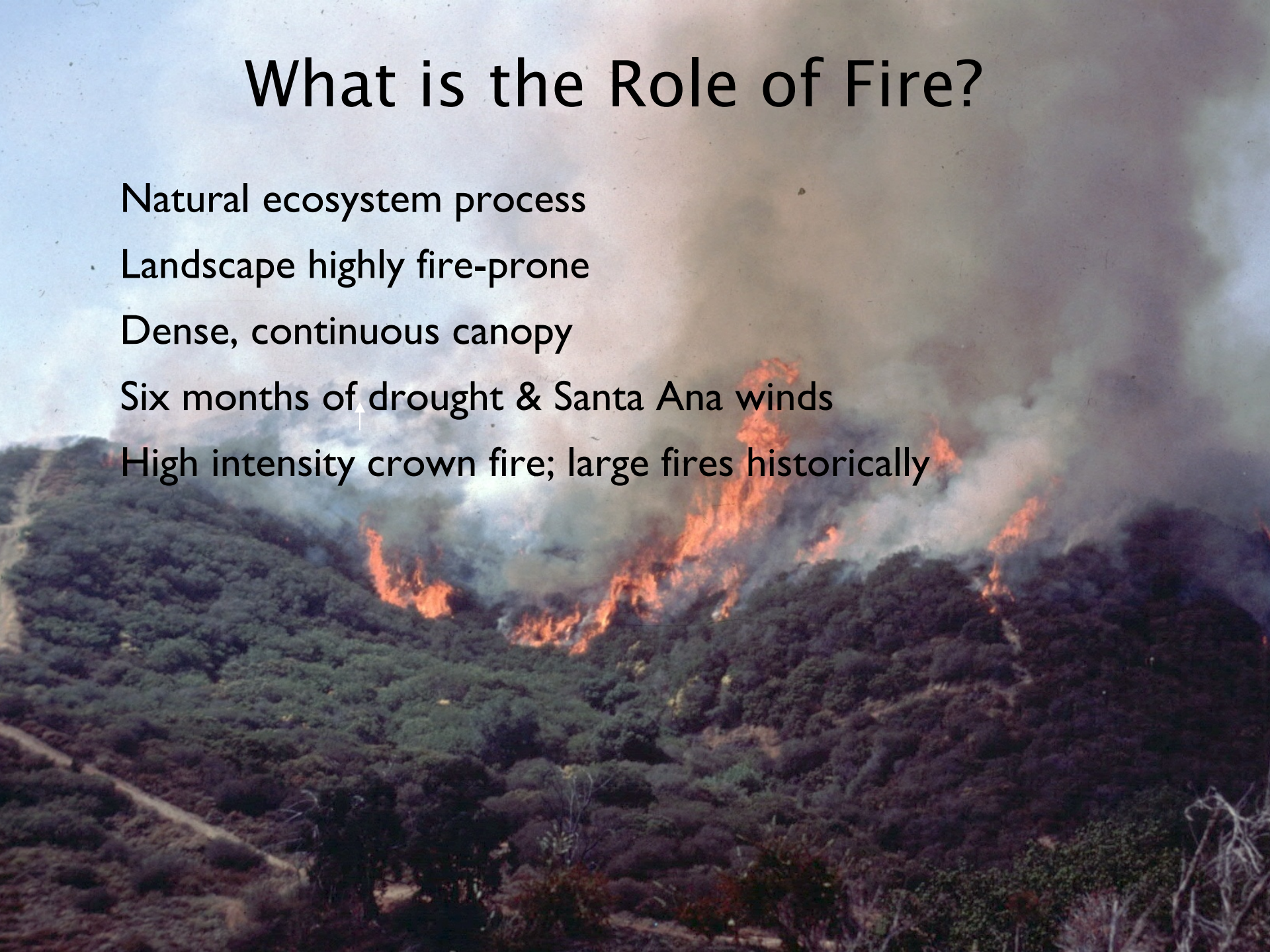
Is there a role for fuels management in chaparral restoration?

1. What is the role of fire in chaparral?
2. What ways could fuels management aid restoration?
3. How effectively could fuels management serve these roles?
4. ????

"Oh, do not ask, 'What is it?' Let us go and make our visit."

TS Eliot

What is the Role of Fire?



Natural ecosystem process

Landscape highly fire-prone

Dense, continuous canopy

Six months of drought & Santa Ana winds

High intensity crown fire; large fires historically

Resilience to Periodic Fire

- Post-fire recovery
  - Obligate seeders
  - Obligate resprouters
  - Facultative seeders
- Historic FRI
  - 30 – 200 + years
- Species adapted to *fire regime*
  - Sensitive to short intervals
  - Extirpation & replacement

Beyond the Threshold of Resilience

Exotic grasses replace shrubs; promote more fire

Photo by J.E. Keeley

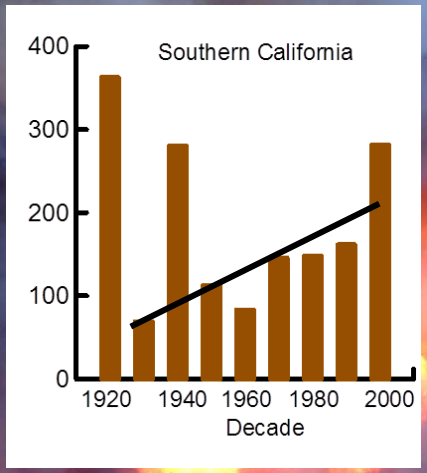
Burning in Water
Drowning in Flame

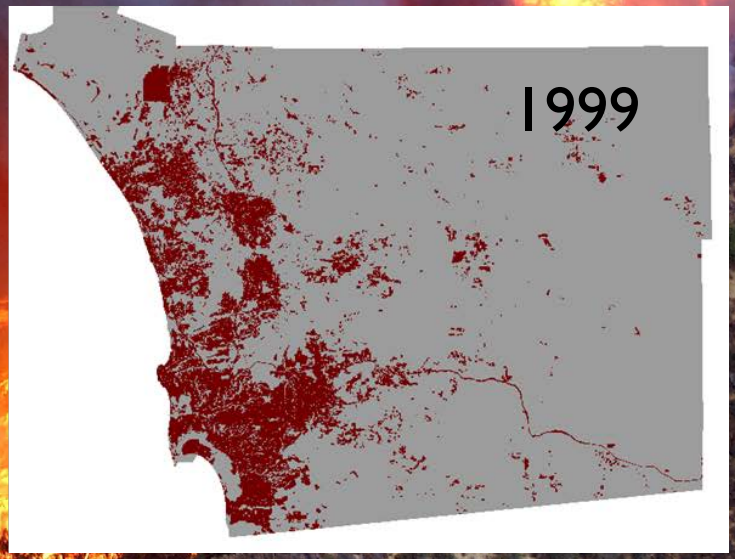
- Charles Bukowski

When a natural ecosystem process
Becomes a threat

Too Much of a Good Thing

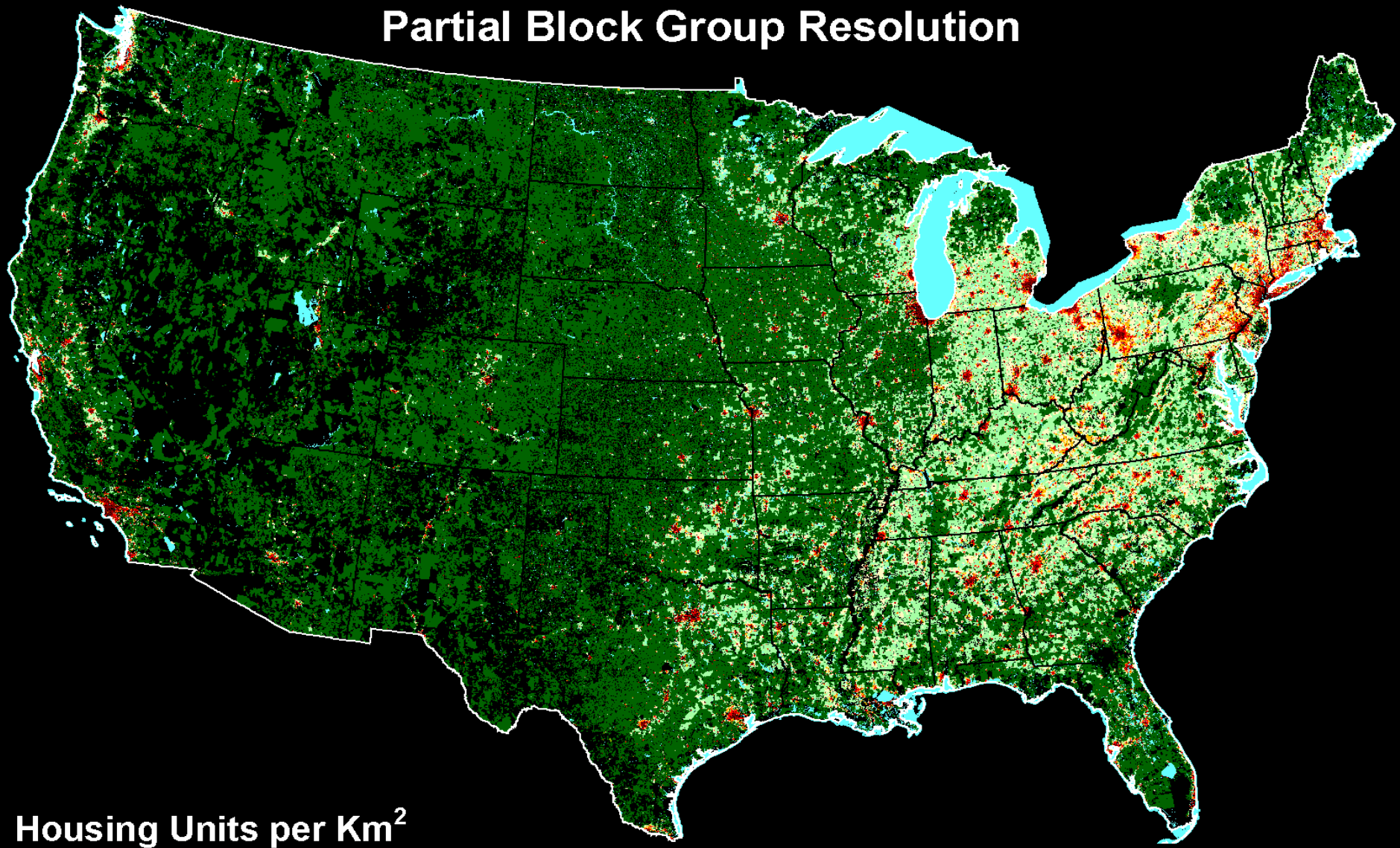
- Fire increasing
- > 95% are human-caused
- Population growth & urban expansion
- Projected future increases





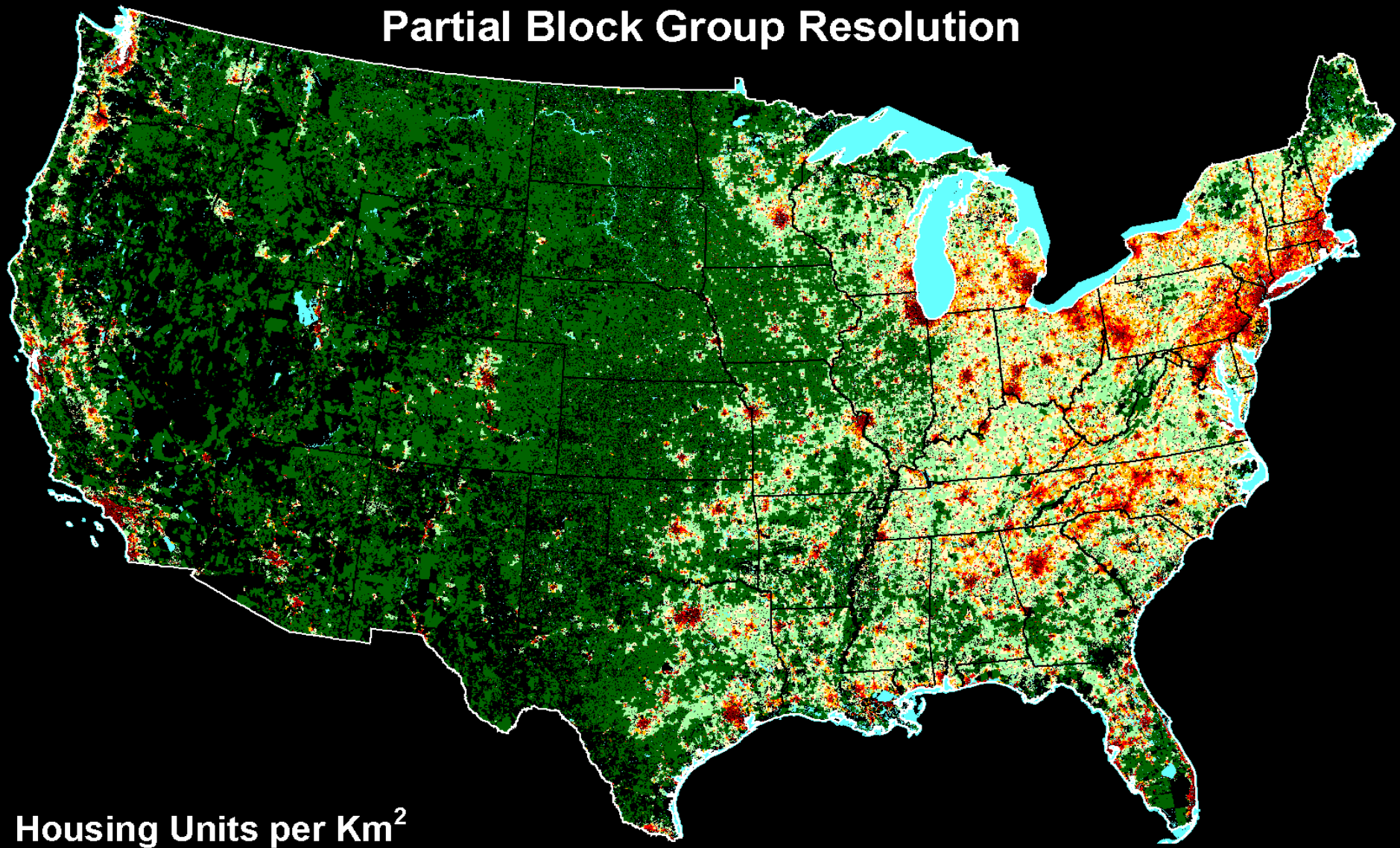
Housing Density 1940

Partial Block Group Resolution



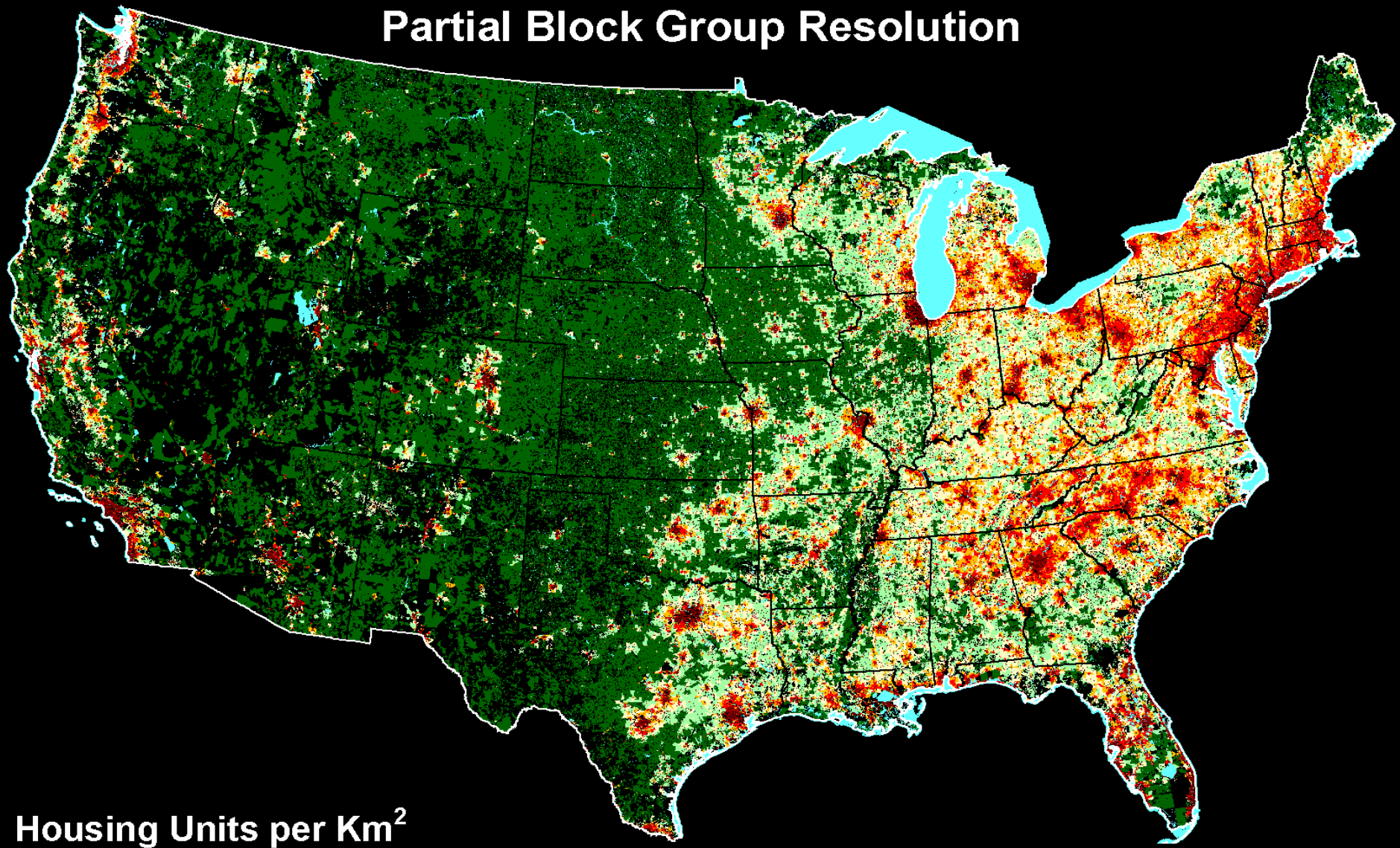
Housing Density 1980

Partial Block Group Resolution



Housing Density 2000

Partial Block Group Resolution

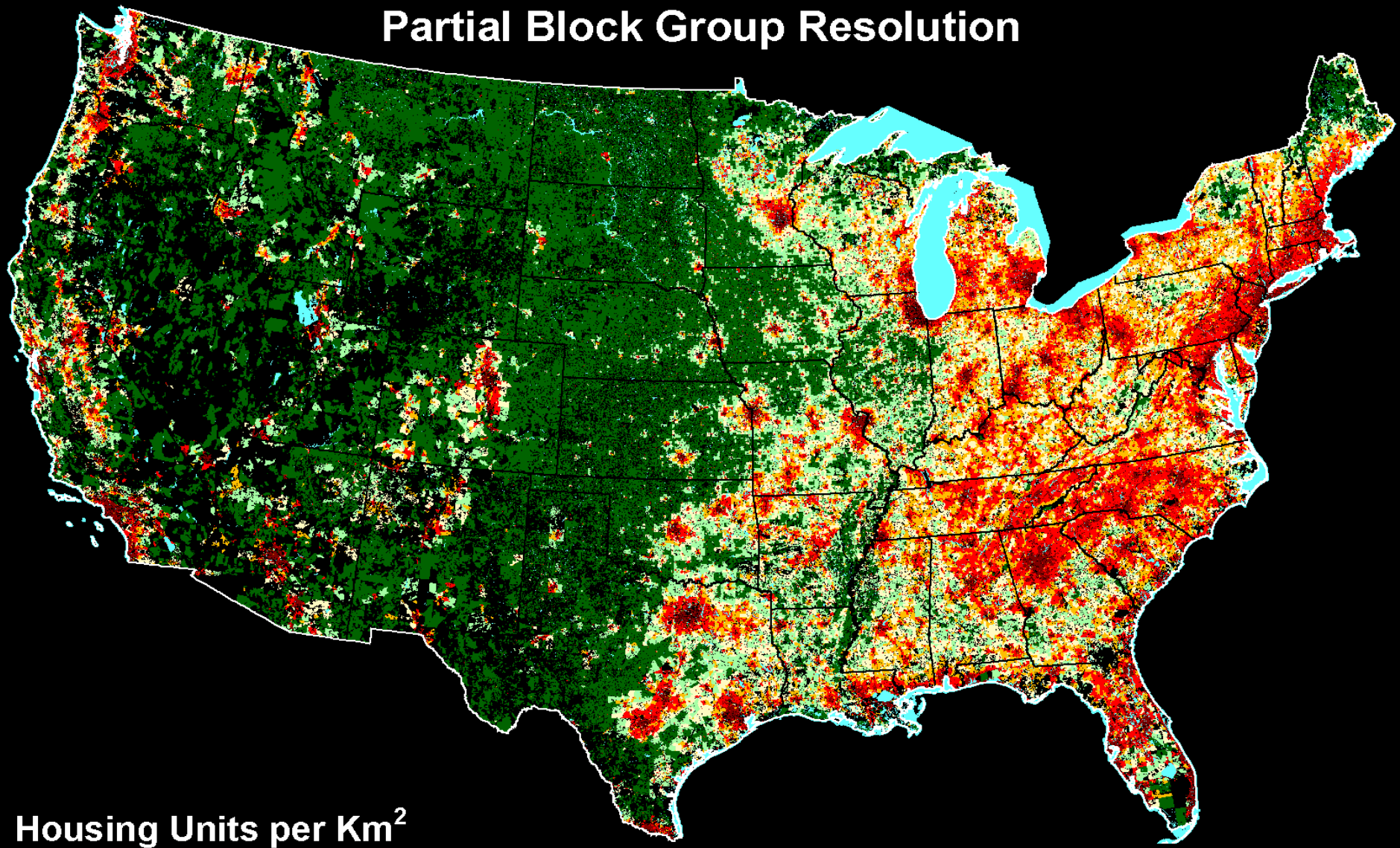


Housing Units per Km^2

0	2 - 4	8 - 16	>128	water
0 - 2	4 - 8	16 - 128		

Projected Housing Density 2030

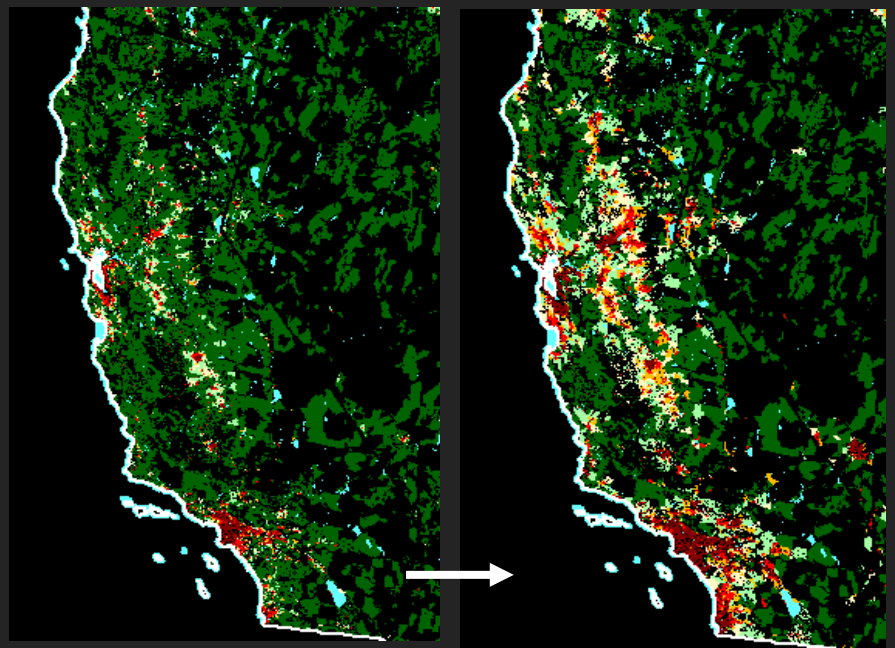
Partial Block Group Resolution



"If you do not change direction,

you may end up where you are heading."

Lao Tzu



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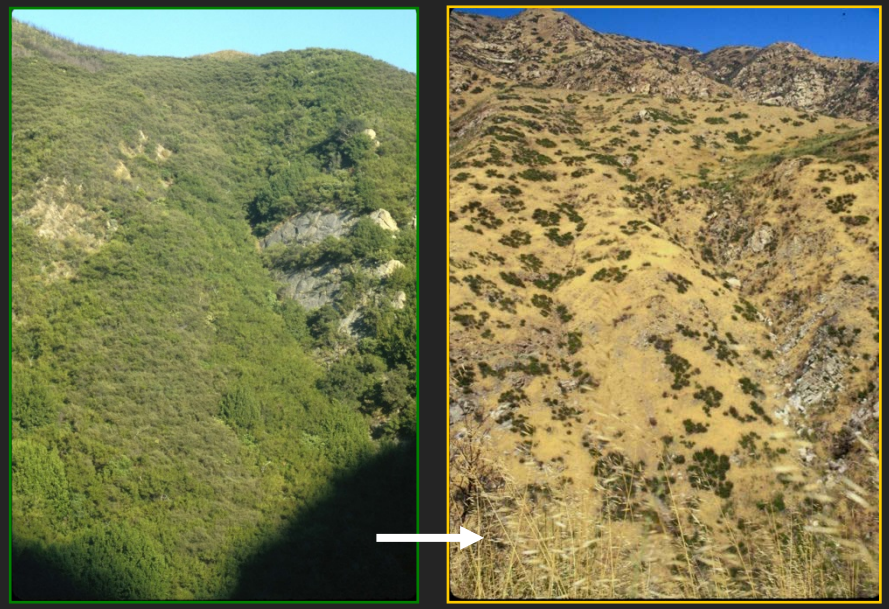

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What Can Fuels Management Do?

Direct benefits?

1). Prescription burning

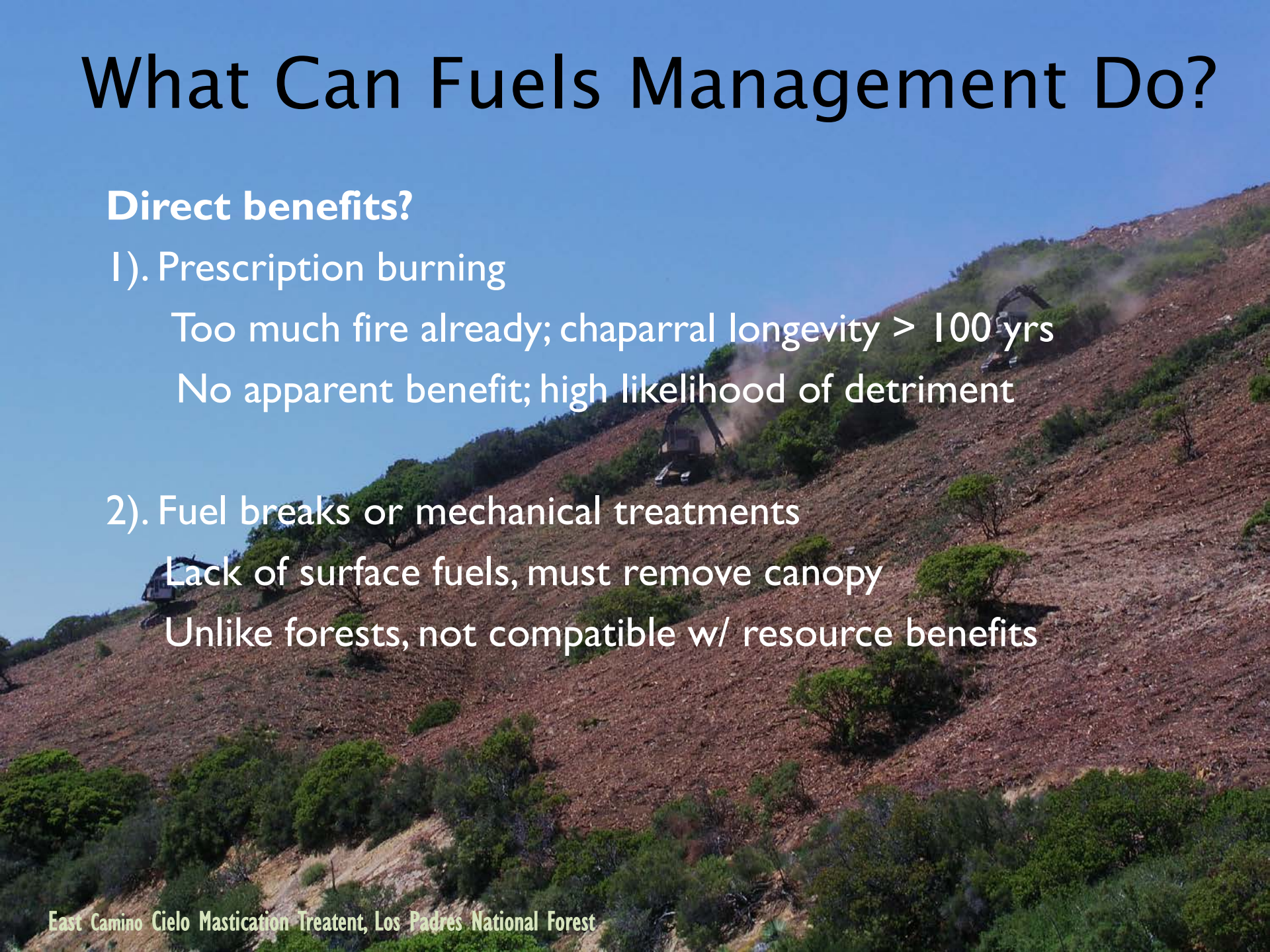
Too much fire already; chaparral longevity > 100 yrs

No apparent benefit; high likelihood of detriment

2). Fuel breaks or mechanical treatments

Lack of surface fuels, must remove canopy

Unlike forests, not compatible w/ resource benefits

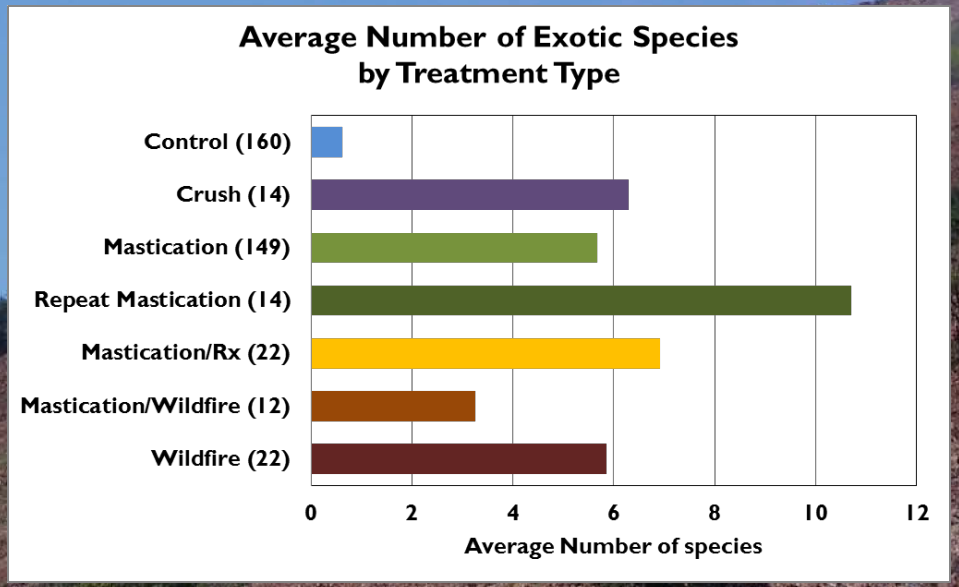


East Camino Cielo Mastication Treatent, Los Padres National Forest

What Can Fuels Management Do?

Primary concerns of resource managers

- Increase in exotic species
- Type conversion
- Soil compaction
- Soil erosion & rilling
- Habitat loss
- Equipment disturbance
- OHV use/disturbance



East Camino Cielo Mastication Treatent, Los Padres National Forest

What Can Fuels Management Do?

Indirect effects

Direct effects likely negative impact

But potential resource sacrifice for fire control

1). Maintain existing fuel breaks – no ecological cost

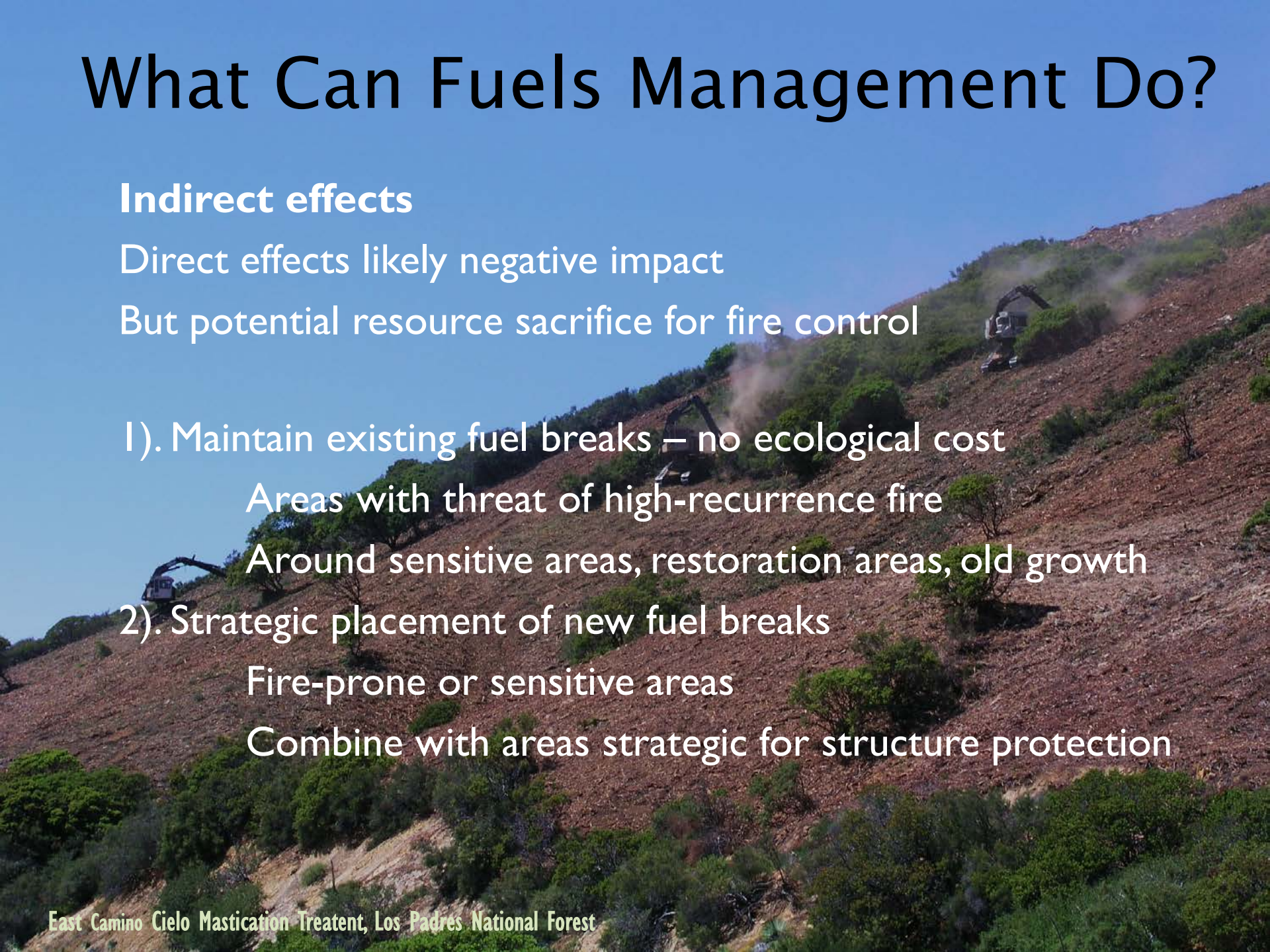
Areas with threat of high-recurrence fire

Around sensitive areas, restoration areas, old growth

2). Strategic placement of new fuel breaks

Fire-prone or sensitive areas

Combine with areas strategic for structure protection

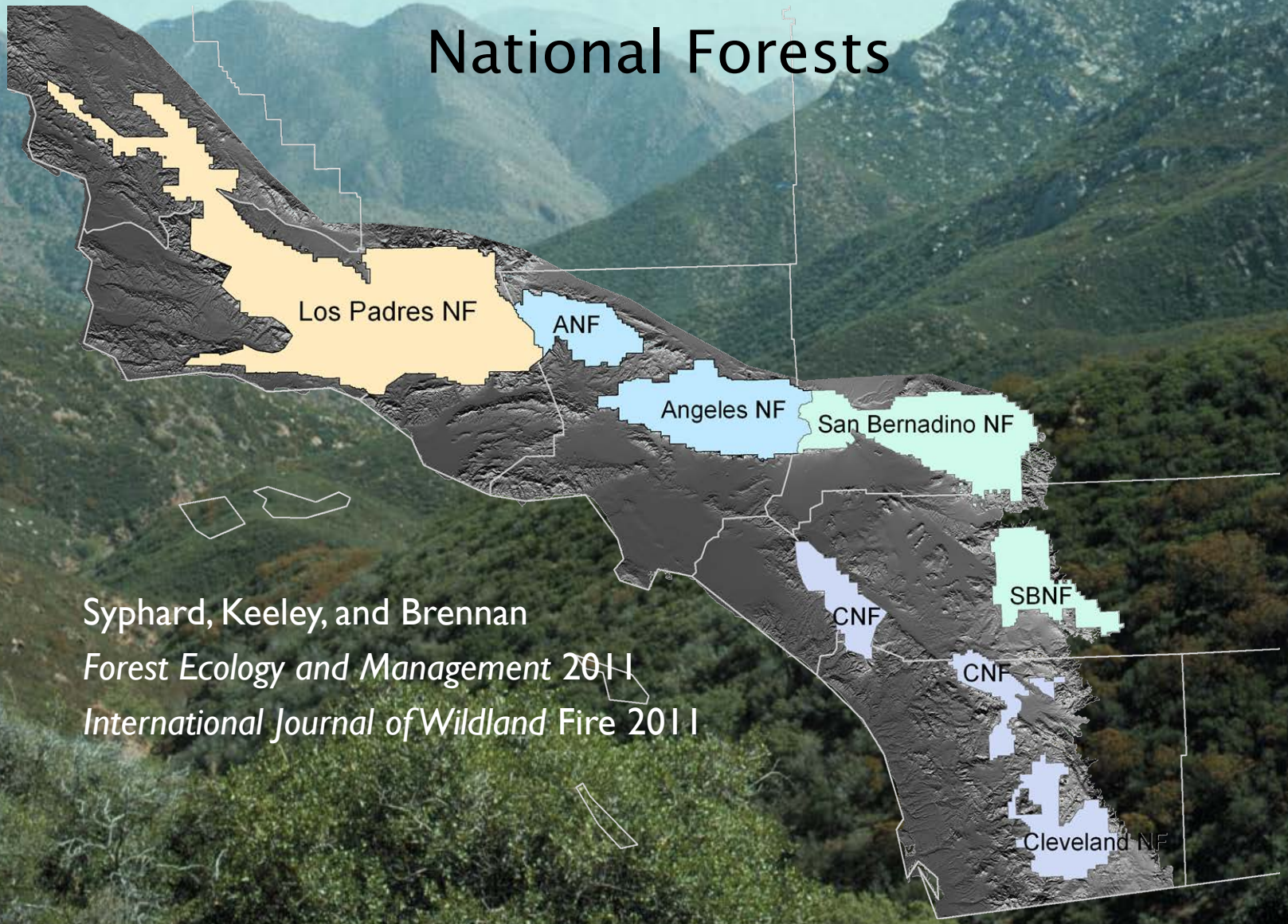


East Camino Cielo Mastication Treatent, Los Padres National Forest

How effectively could it serve this role?

The Role of Fuel Breaks in SoCal NFs

National Forests



Syphard, Keeley, and Brennan

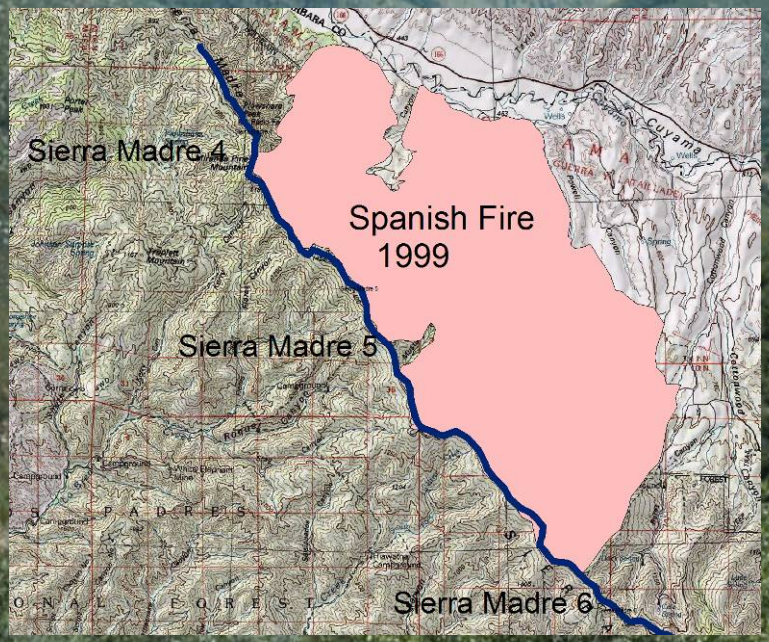
Forest Ecology and Management 2011

International Journal of Wildland Fire 2011

What is the role of fuel breaks in controlling large fires & what factors influence this role?

GIS overlay and analysis

Personal interviews

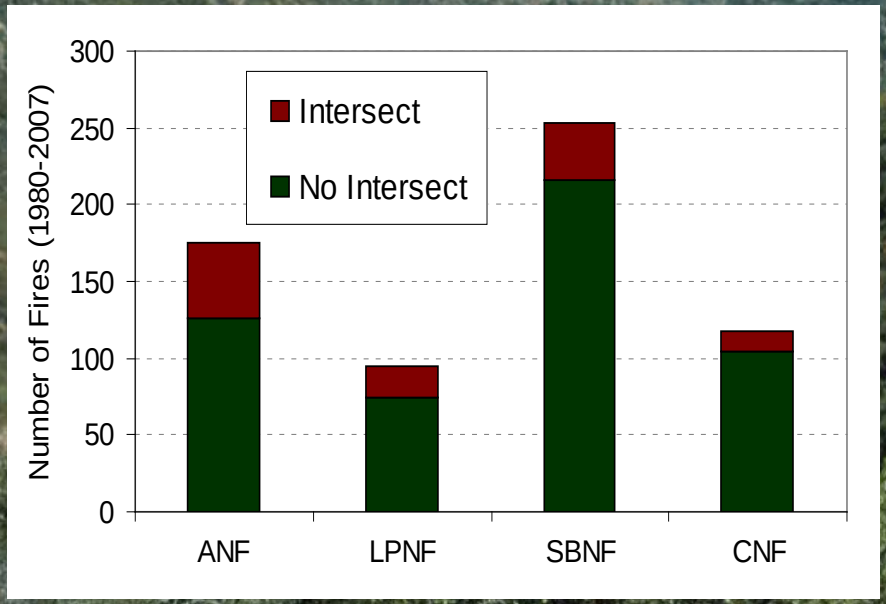


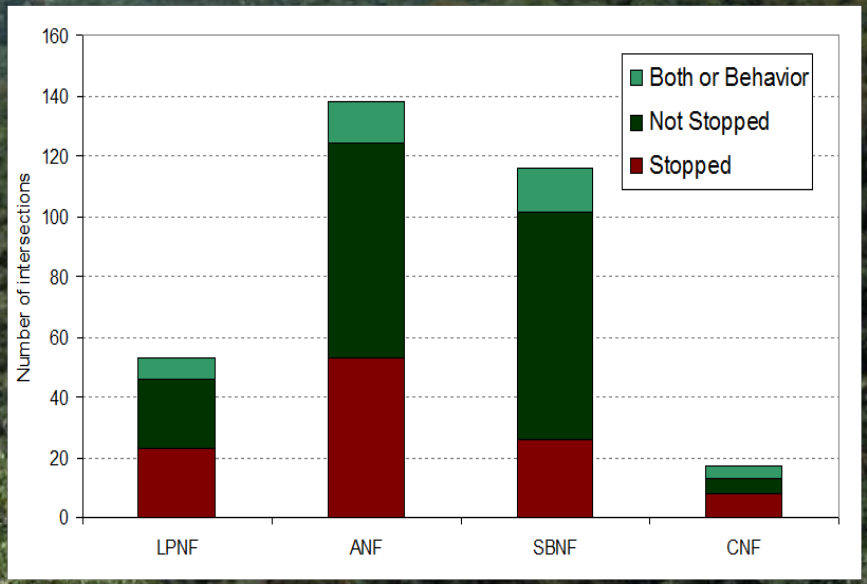
The Role of Fuel Breaks in Southern CA National Forests

Most fires don't encounter a fuel break

Fires either stopped or were controlled by firefighters

~ 50% of encounters



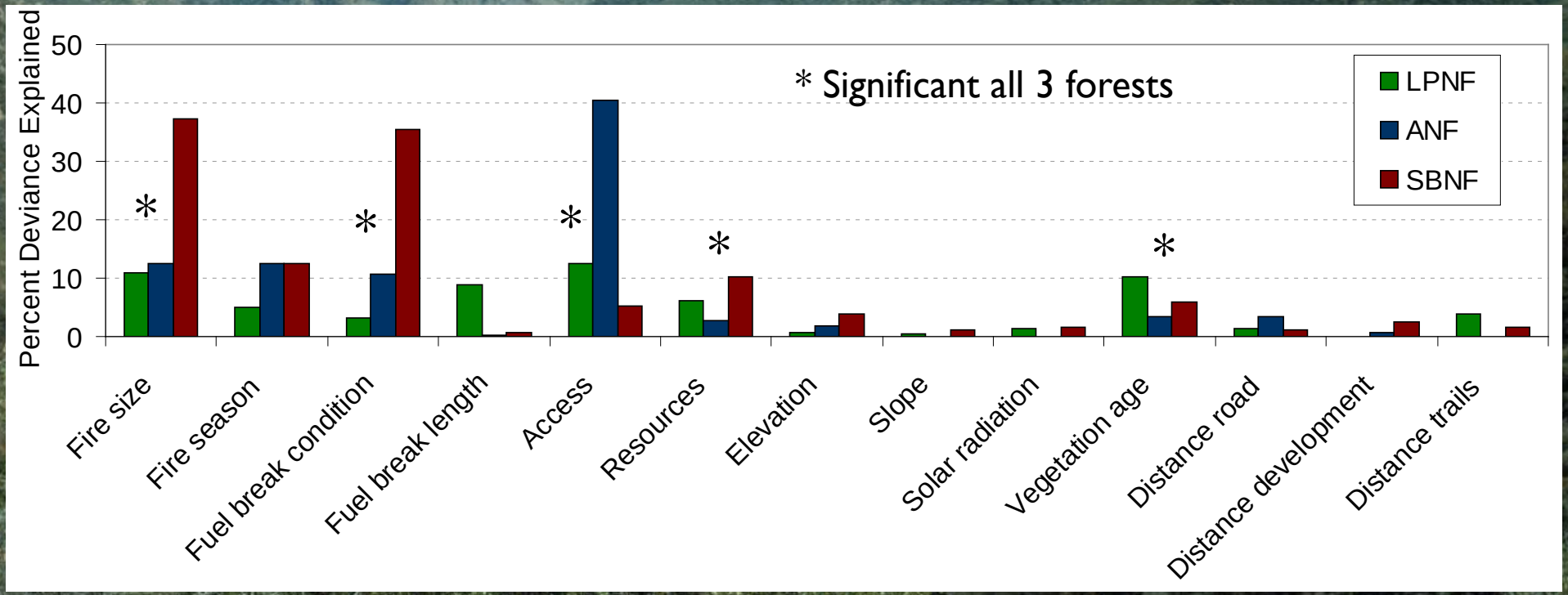


Outcome Results, 3 Forests

Most important: Access, Fire size, Condition of FB

> 95% were controlled due to firefighter; fires rarely stop on their ov

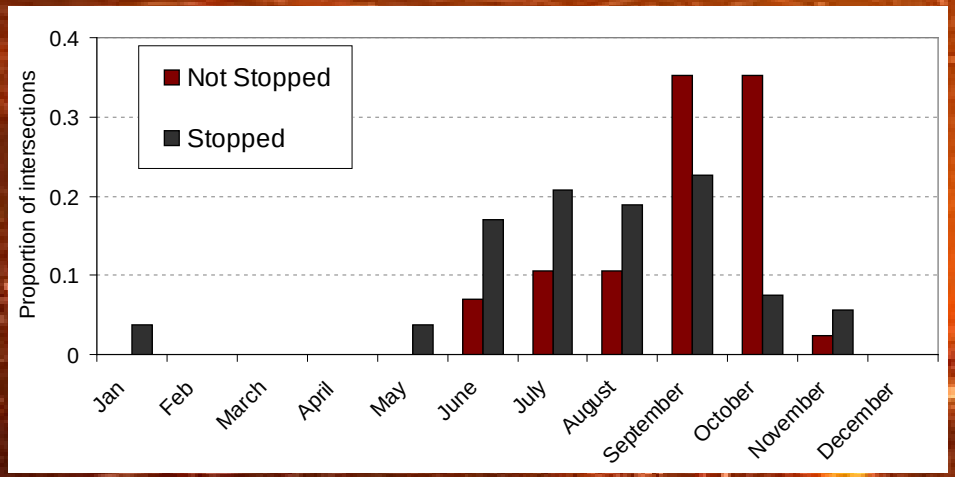
Variation among forests



Effective during normal weather or to control flanks

Unsafe and ineffective during most Santa Ana events

Embers can fly kilometers ahead of fire front



Comments from Interviews

Role of FBs: safe anchor for suppression – not to passively stop

Top reasons fires not constrained:

- No access
- Scarce resources & safety when fire big, fast, or multiple
- FB not maintained, difficult to maneuver

When FB change behavior

– Maneuver, suppress in vicinity, buy time for <u>structures</u>

Back to the question: Is there a role for fuels management in chaparral restoration?

What is the role of fire?

- Important ecosystem process
- *But* Fire regime change; too much fire

How could fuels management work?

- Direct effect (-)
- Resource sacrifice for fire control (?)

How effective is fuels management in that role?

- Normal weather *vs* Santa Ana winds

------→ How to weigh trade-offs?

------→ What else can we do?

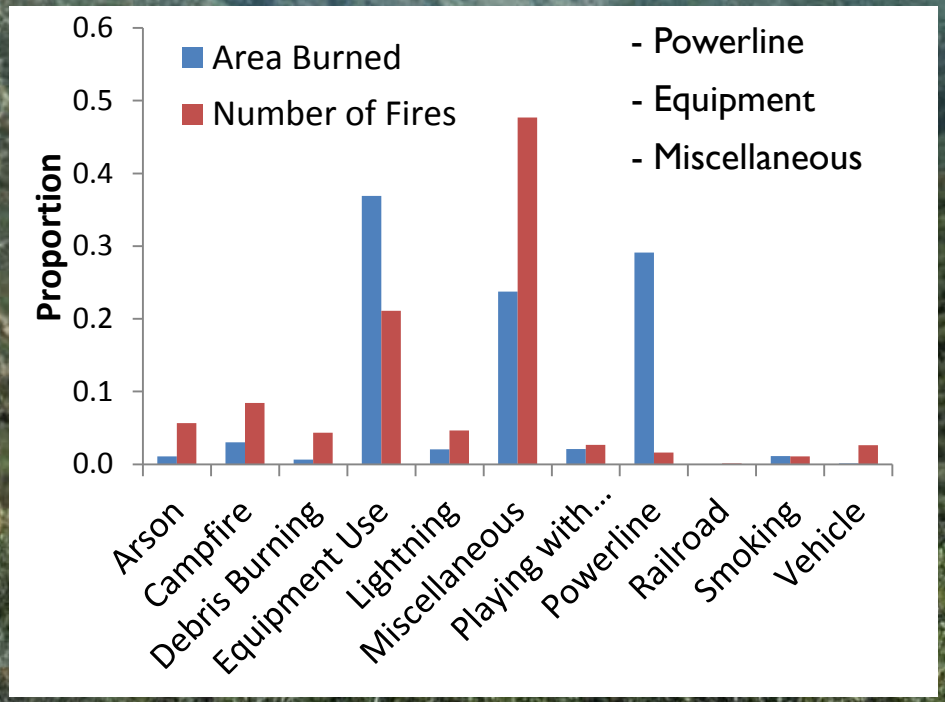
Alternatives for reducing fire

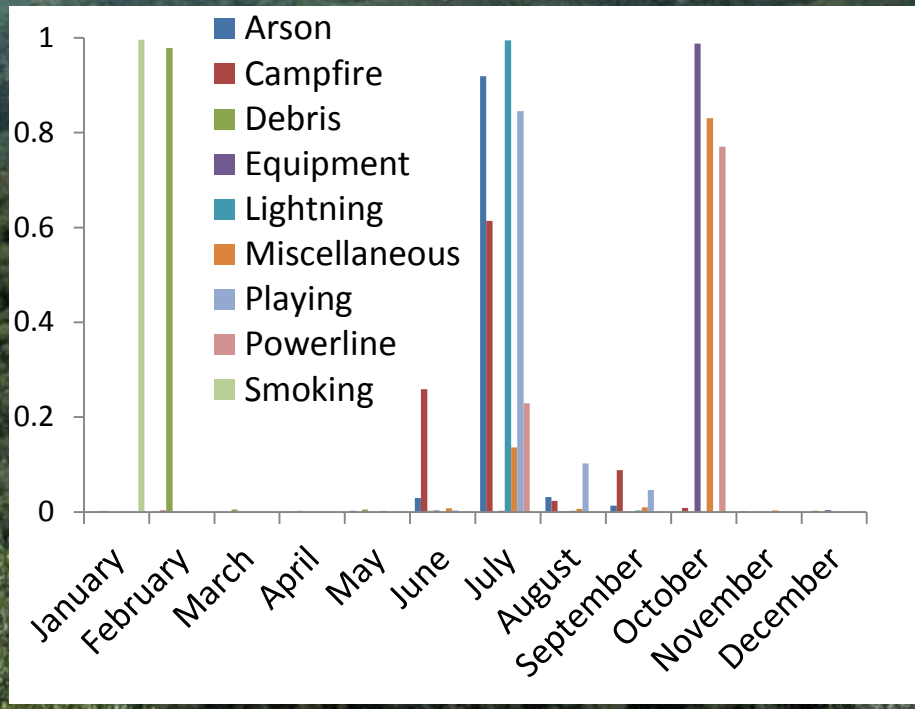
Move beyond control toward prevention

95% caused by humans

Direct efforts at prevention: need to know why, when, where

Indirect through land use planning



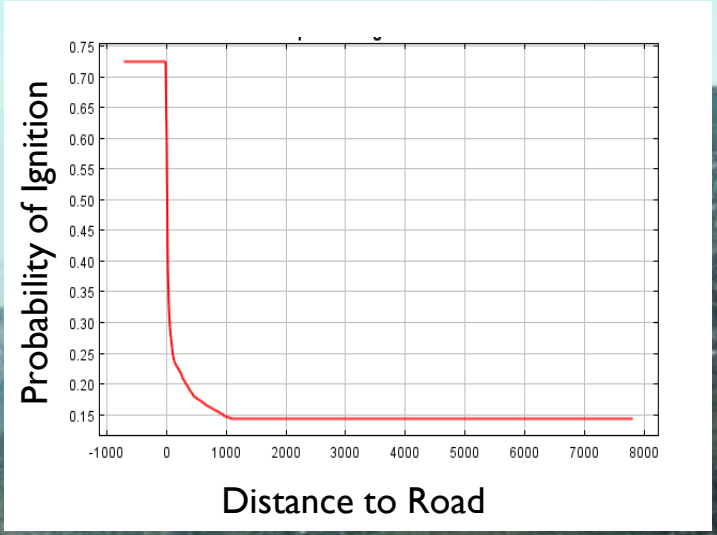


4179 Ignitions 2000-2010 in SD County

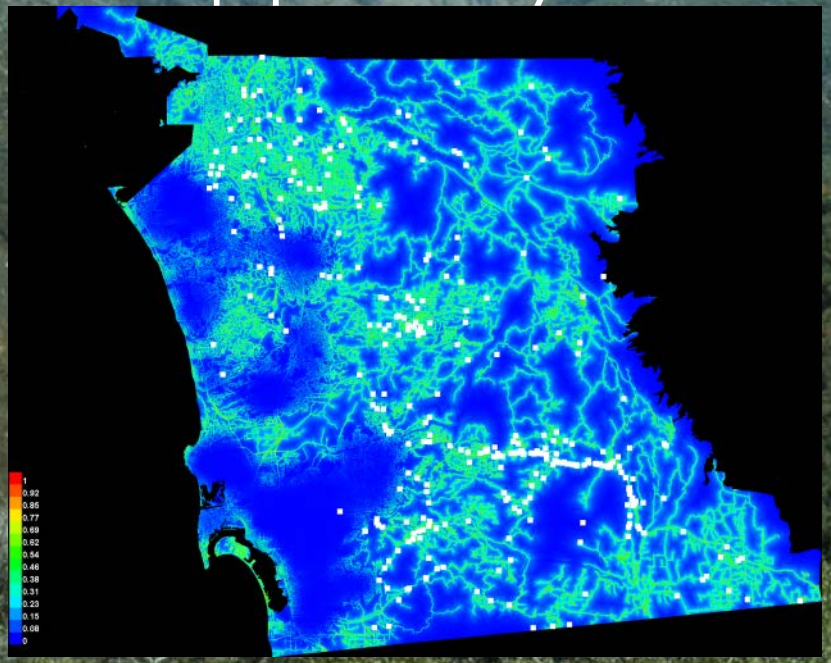
Ignition Prevention

Predictive maps:

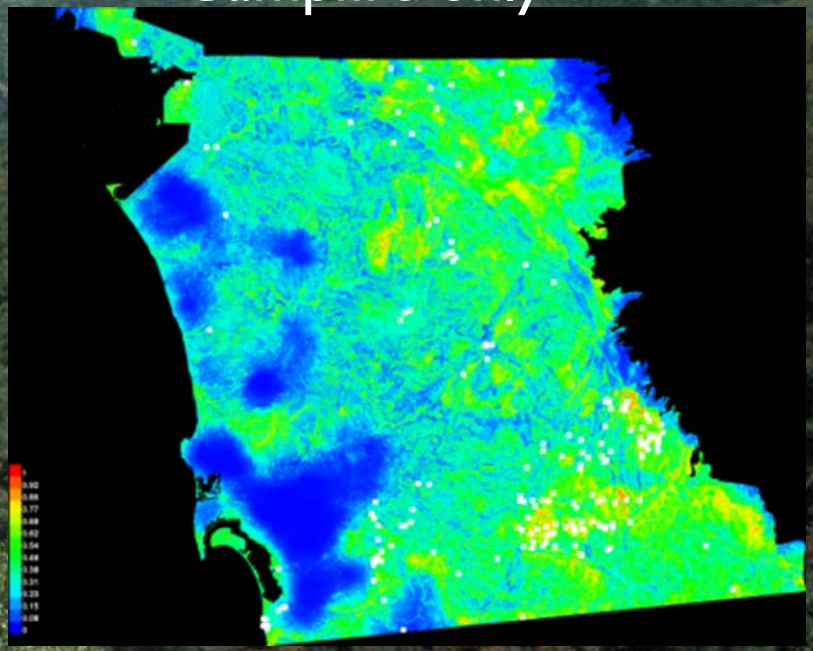
prioritize where to focus efforts



Equipment only

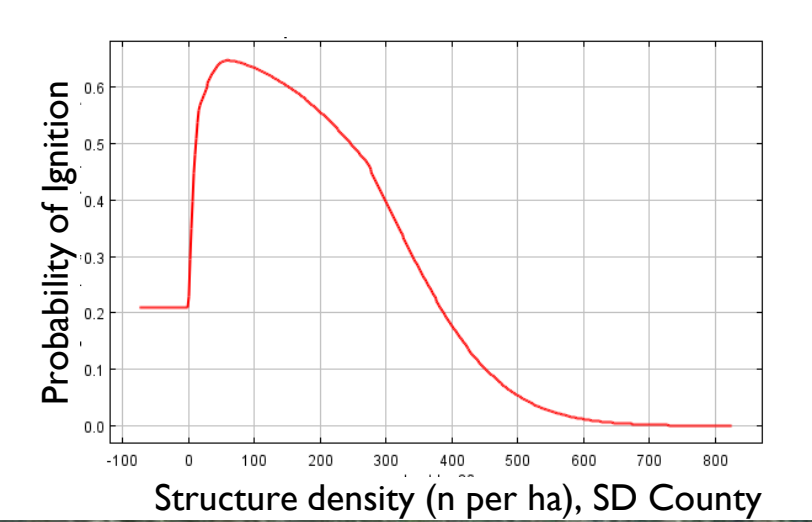


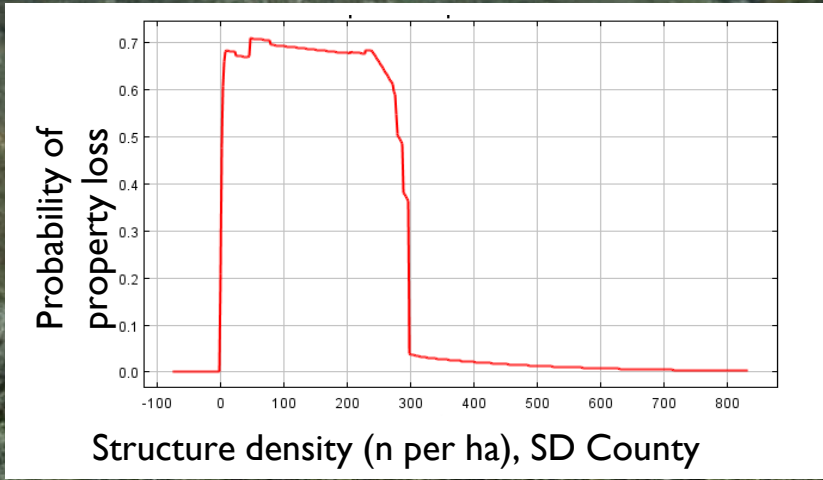
Campfire only



e.g., Education about campfires in July or road barriers in hotspots

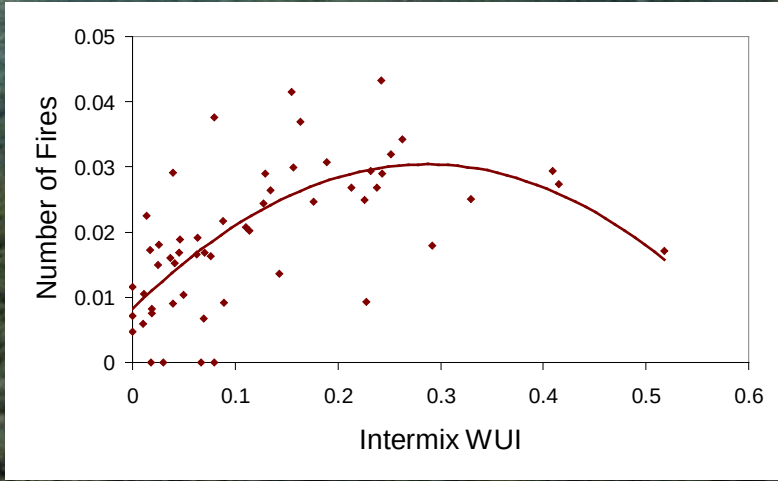
Land Use Planning





Highest frequency low to intermediate housing density

Planning for infill development also saves structures, habitat

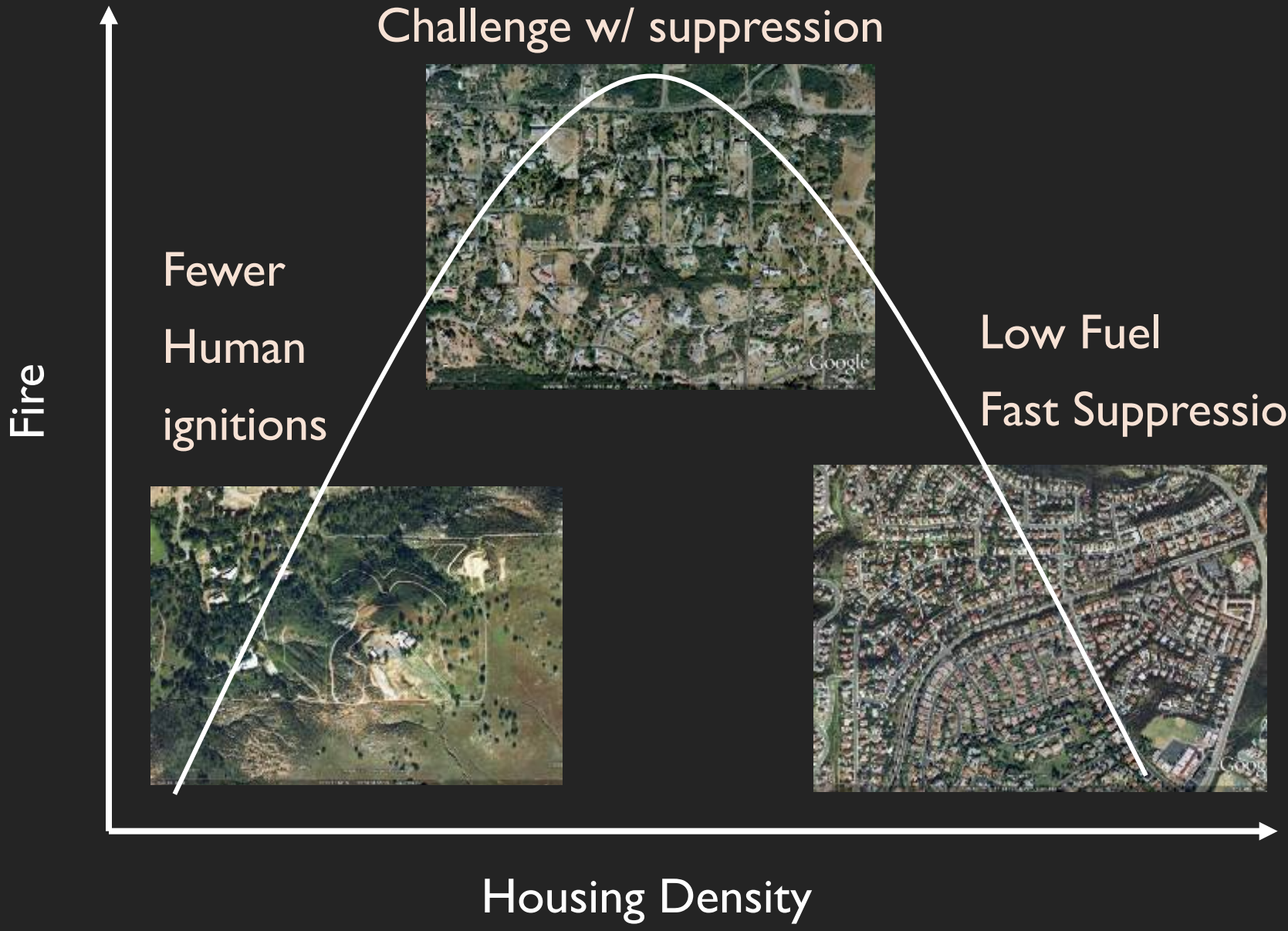


Syphard et al. 2012, PLoS ONE

Syphard et al. 2007, Ecological Applications

Syphard et al. 2009, Conservation Biology

Why Intermediate?



Conclusion

Chaparral restoration / conservation likely most effective with less fire

Fuels management no direct benefit

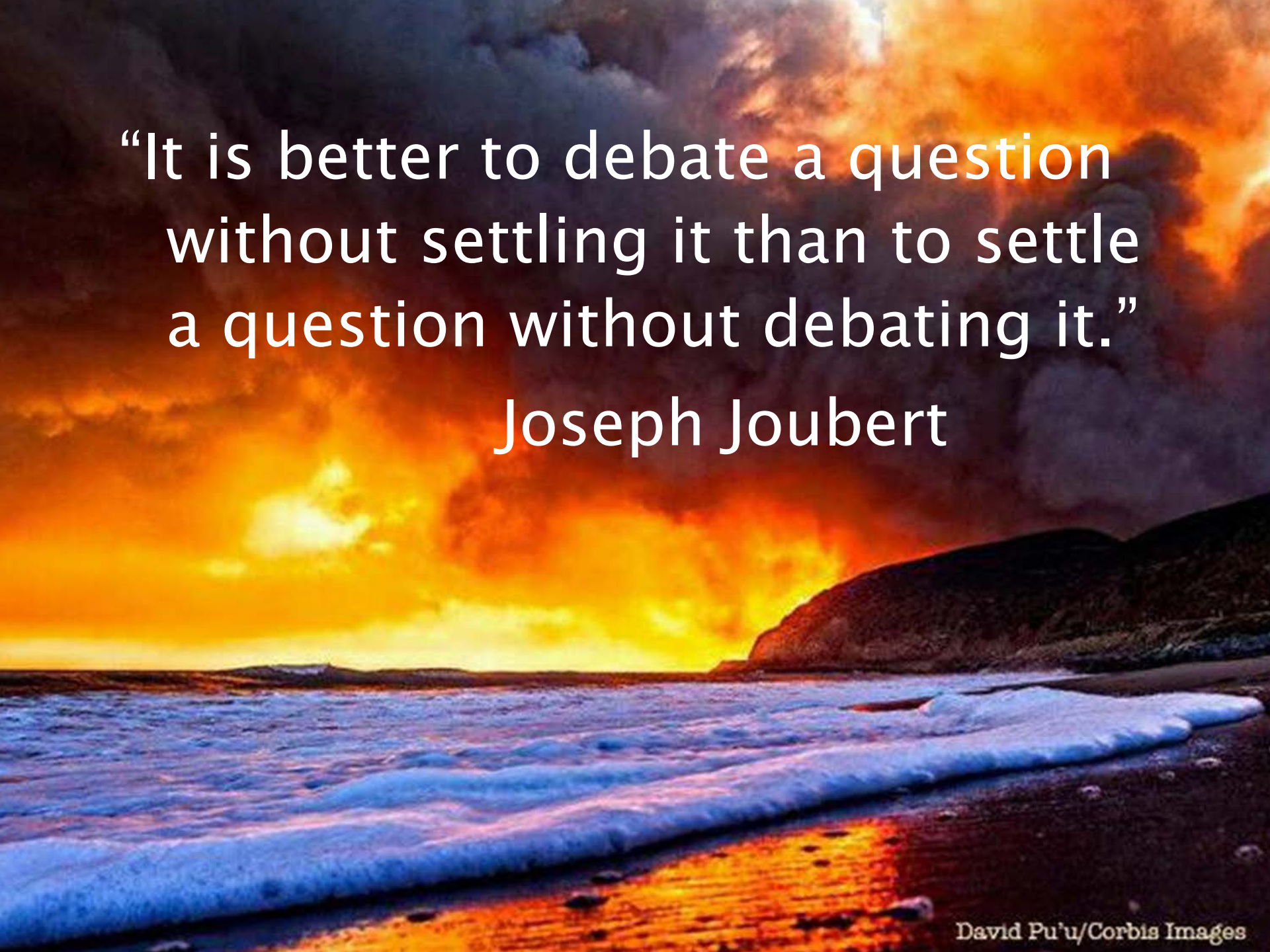
Potential indirect benefit of reducing fire

Focus on existing fuel breaks; strategic placement

Resource sacrifice worth the trade-off?

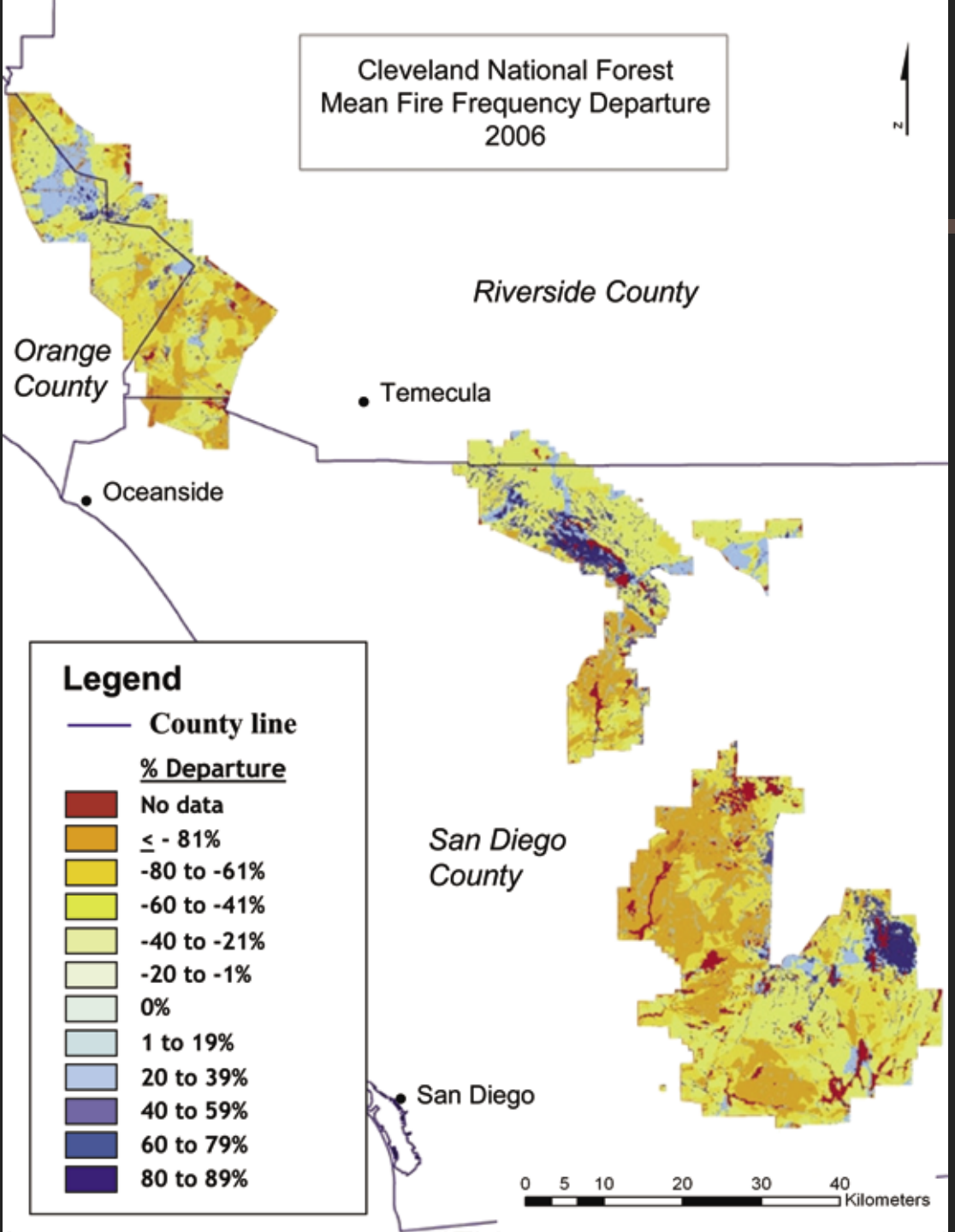
Depends on fire weather conditions

Other alternatives – ignitions and planning – deserve more thought


"It is better to debate a question without settling it than to settle a question without debating it."
Joseph Joubert
David Pu'u/Corbis Images

Thank You

Altered Fire Regimes



Unlike forests

Shrublands experiencing more frequent fire

Percentage departure of current FRI from presettlement period

By H. Safford & M. Borchert

Fire Management in Southern CA

Suppression response to active fires

Pre-fire fuel manipulation (Rx & fuel breaks)

No systematic exploration of what role FBs play

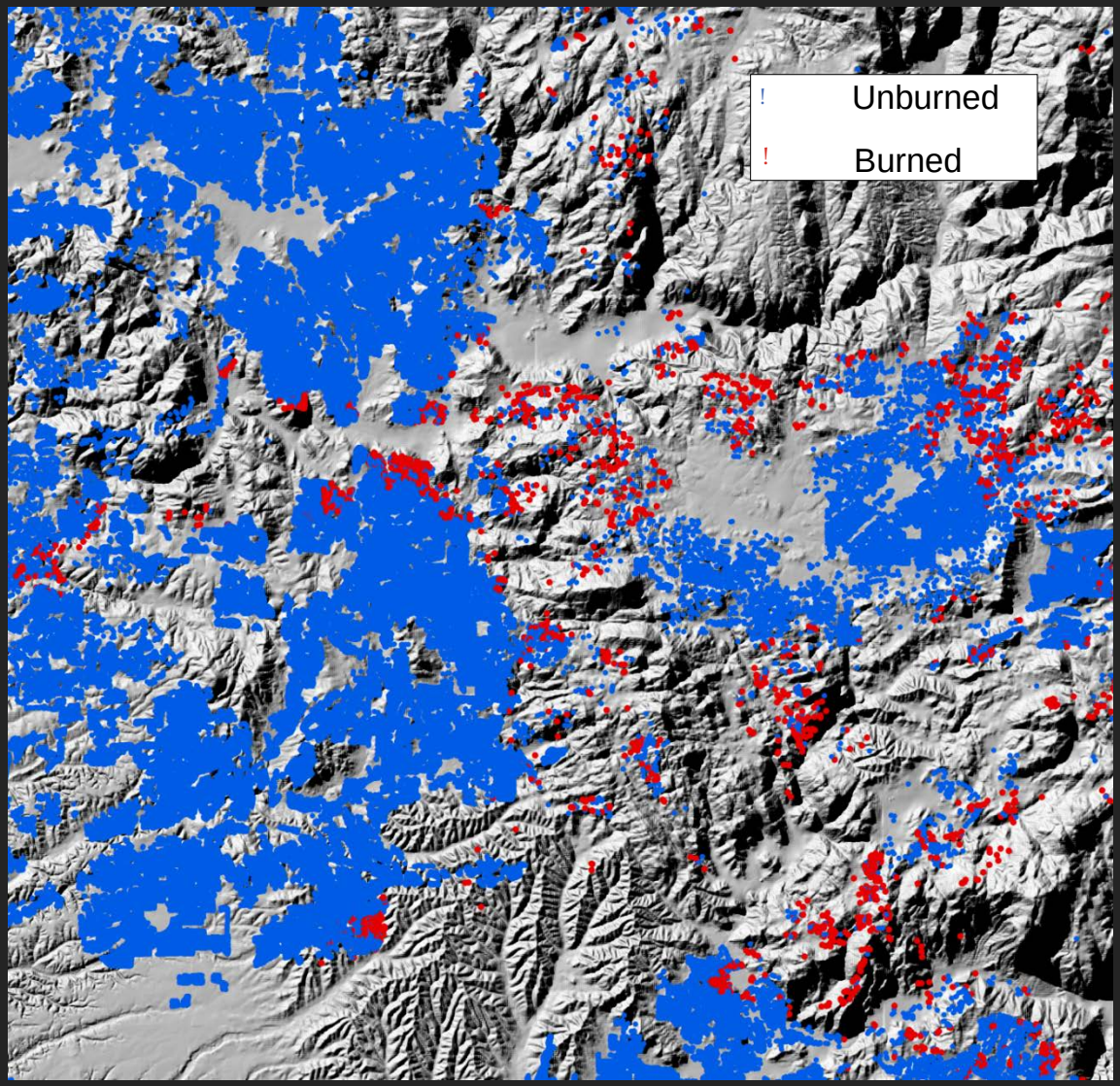
Housing Arrangement & Location – Past Loss

Most likely to burn:

- Low-intermediate density
- Small, isolated cluster
- Close to edge of cluster
- Steep slope
- Fewer roads

Syphard et al. 2011

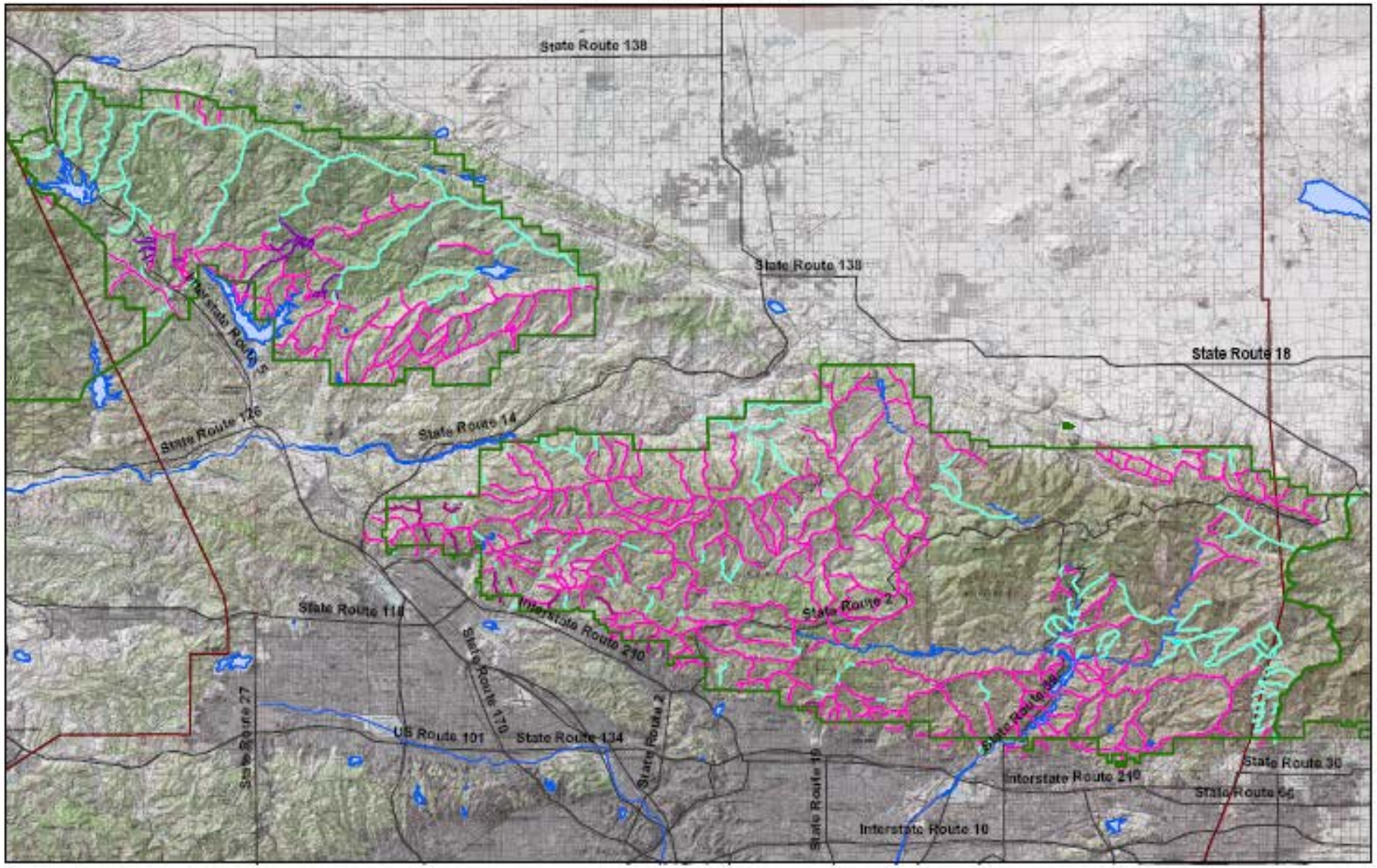
PLoS ONE




USFS


Photo: RW Halsey

Angeles National Forest Fuelbreaks



(Brennan, Keeley and Pfaff, unpubli

if used for restoration (& otherwise), where and how??