Fire Management Treatments Leading to Non-Native Plant Invasions

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Fire Management

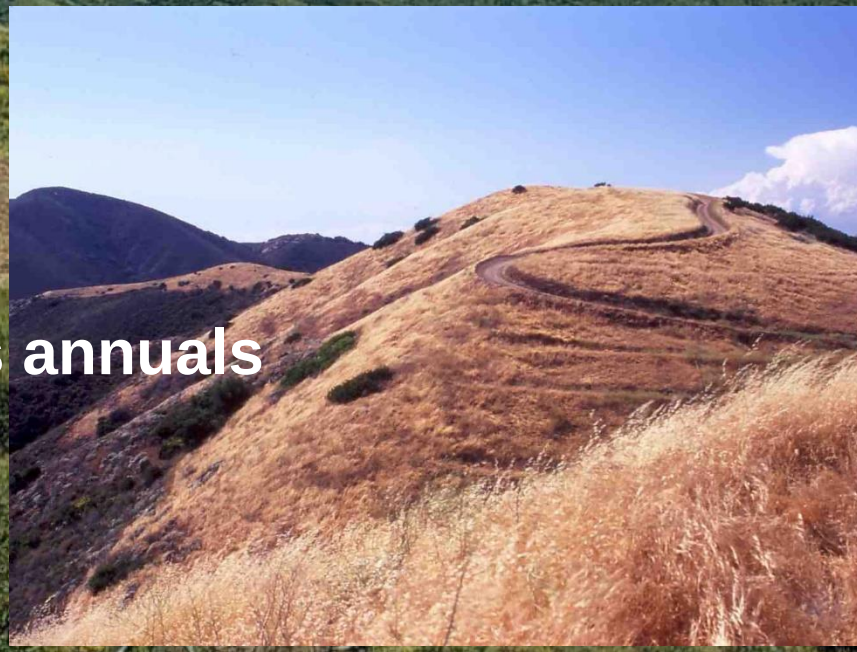
Pre-fire treatments: Fuel breaks & prescription burning

Wildfire attack: Fire breaks

Post-fire response:

Fuel breaks:

Goal is to limit fire spread thus enhancing fire protection

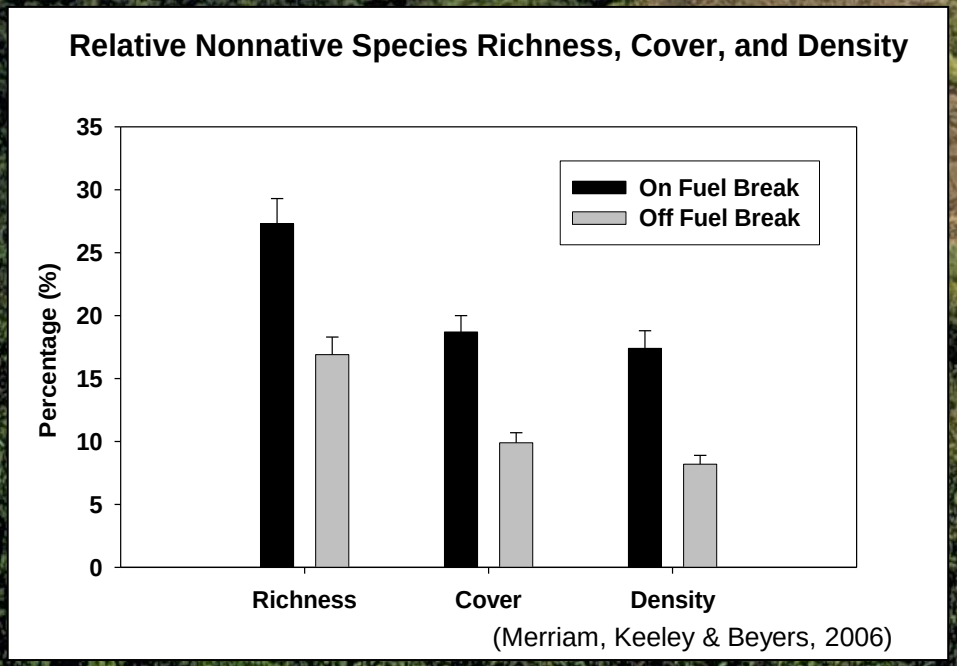


Reduction of shrub cover favors annuals

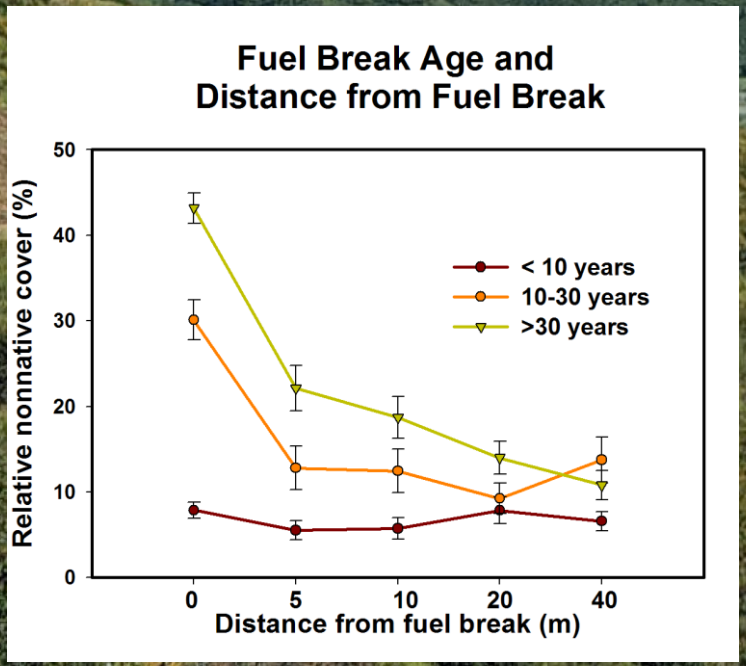
Typically the best colonizers are non-native grasses & forbs

Fuel breaks act as corridors transporting non-natives into wildlands

Due to the high perimeter to area ratio they provide numerous opportunities for invasion into native shrublands



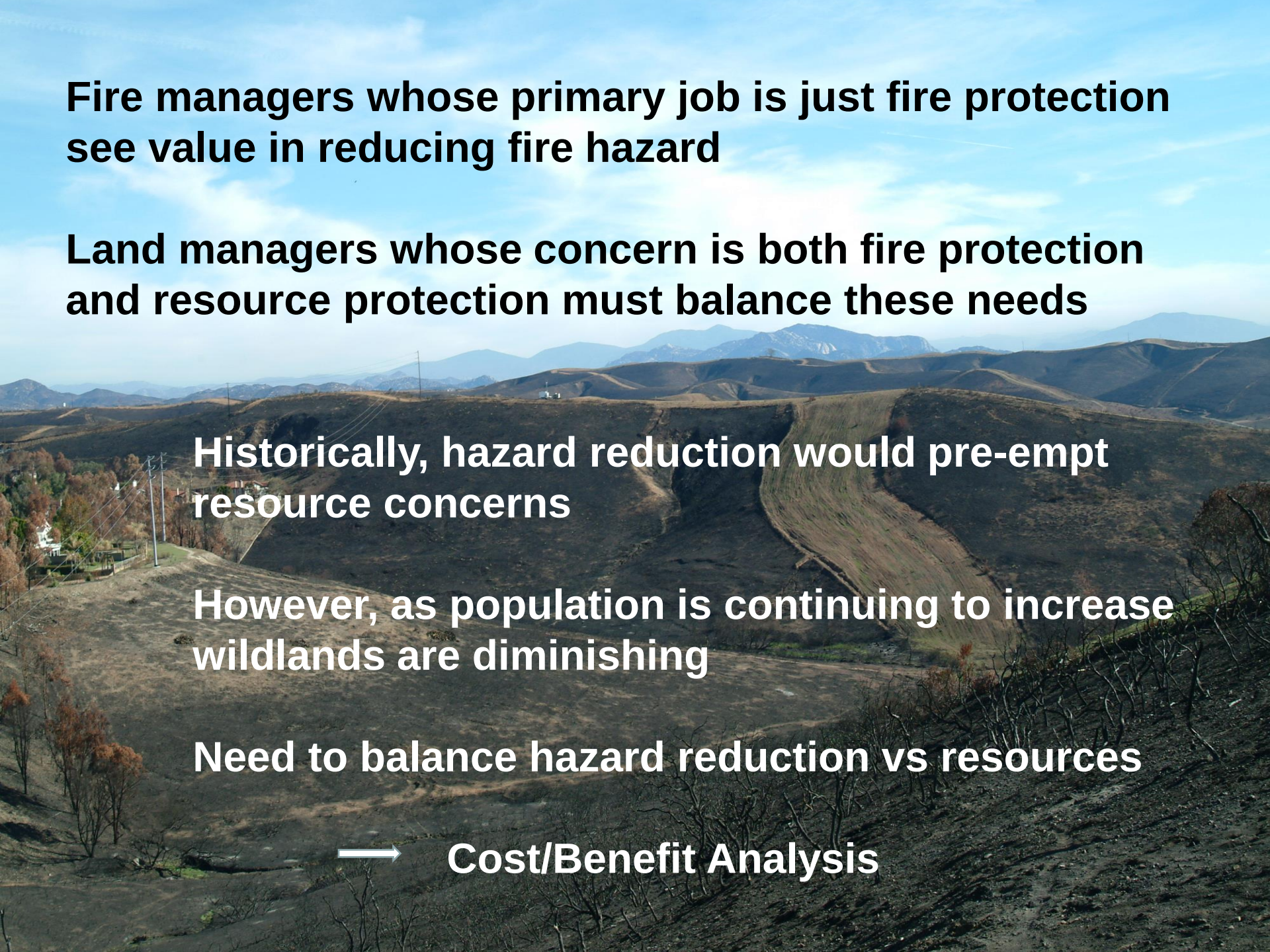
(Merriam, Keeley & Beyers, 2006)



Evaluating these changes

+ Fire managers see fuel breaks as fire hazard reduction
+ Rangeland managers see it as enhancing grazing
- Conservationist see it detracting from natural landscapes

And given the size of some fuel breaks this is a major resource issue



Fire managers whose primary job is just fire protection see value in reducing fire hazard

Land managers whose concern is both fire protection and resource protection must balance these needs

Historically, hazard reduction would pre-empt resource concerns

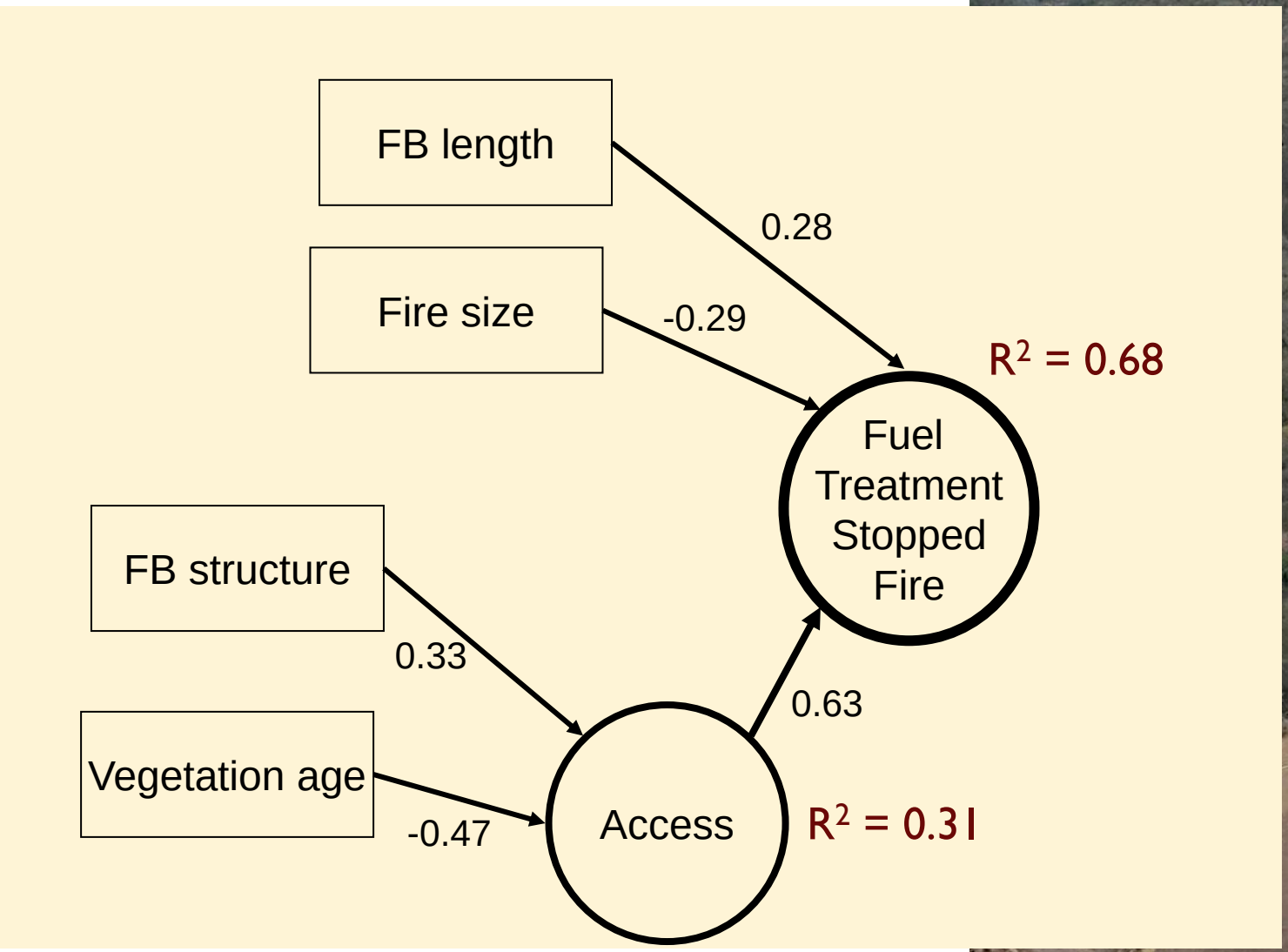
However, as population is continuing to increase wildlands are diminishing

Need to balance hazard reduction vs resources

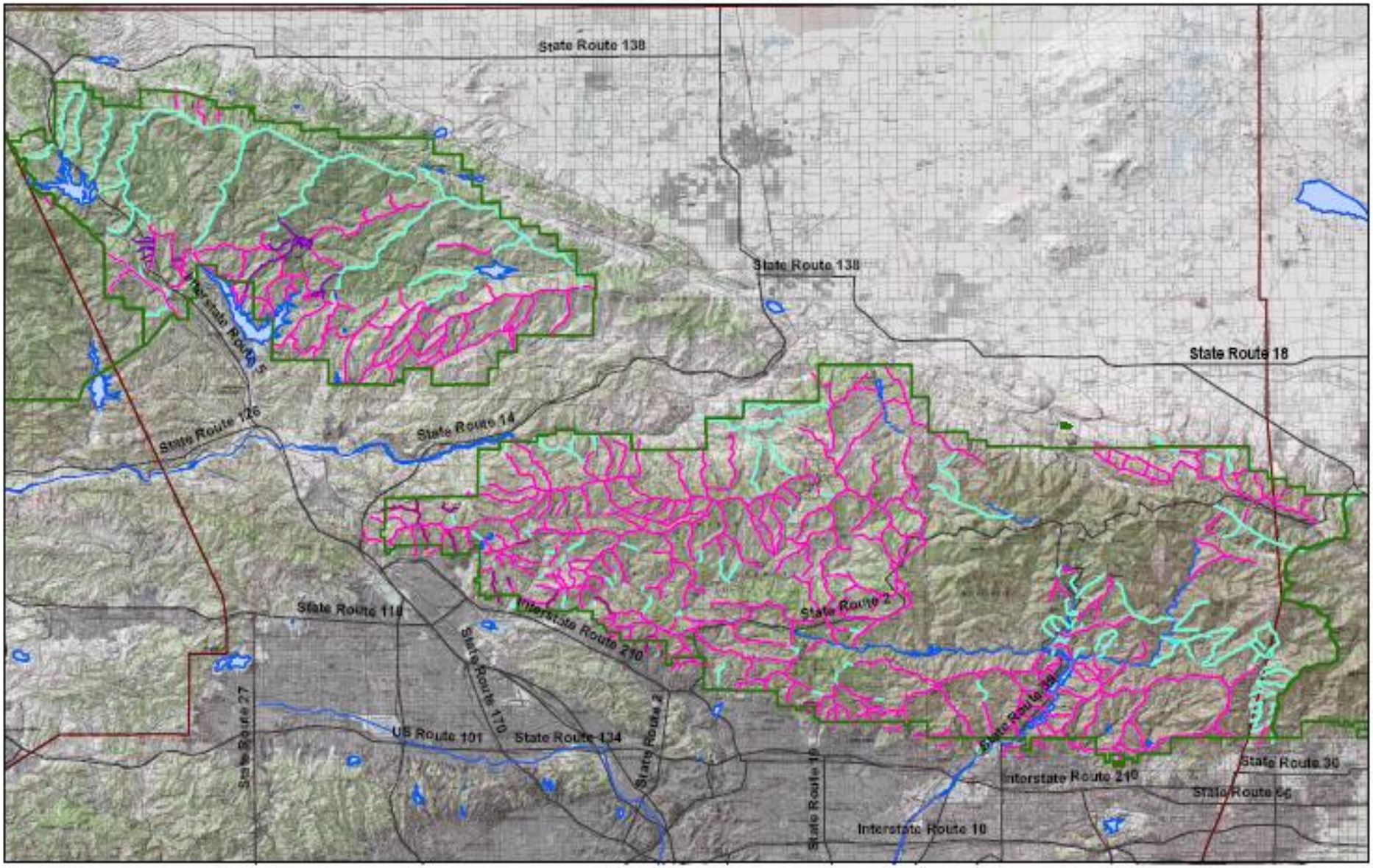
→ **Cost/Benefit Analysis**

Fuel break impacts on wildfires

(Syphard, Brennan, Keeley 2011)



Angeles National Forest Fuelbreaks



Prescription burning and invasives ?

Outcome is dependent on plant community

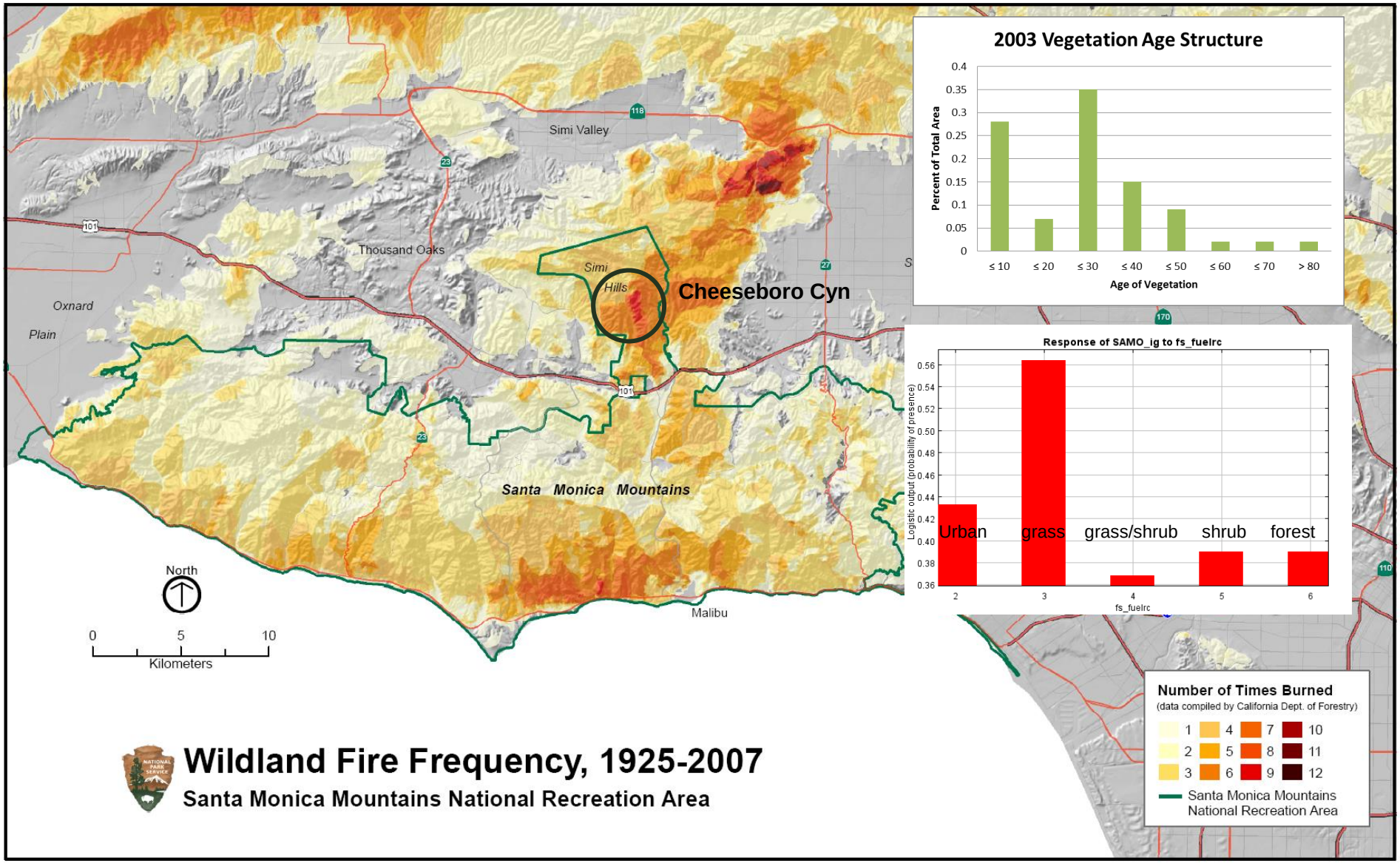
Mixed conifer forests are adapted to a natural fire cycle of 10 – 30 yrs,

Reducing fire hazard requires burning at 10 – 20 yr intervals, thus hazard reduction and resource protection are compatible

Chaparral is adapted to a natural fire cycle of 30 – 130 yrs

Reducing fire hazard requires burning at 10 – 20 yr intervals, thus hazard reduction and resource protection are NOT compatible


Laguna Fire 1970
Laguna 1970
Viejas Fire 2001
Laguna 1970
Viejas 2001
Cedar Fire 2003



Wildland Fire Frequency, 1925-2007

Santa Monica Mountains National Recreation Area

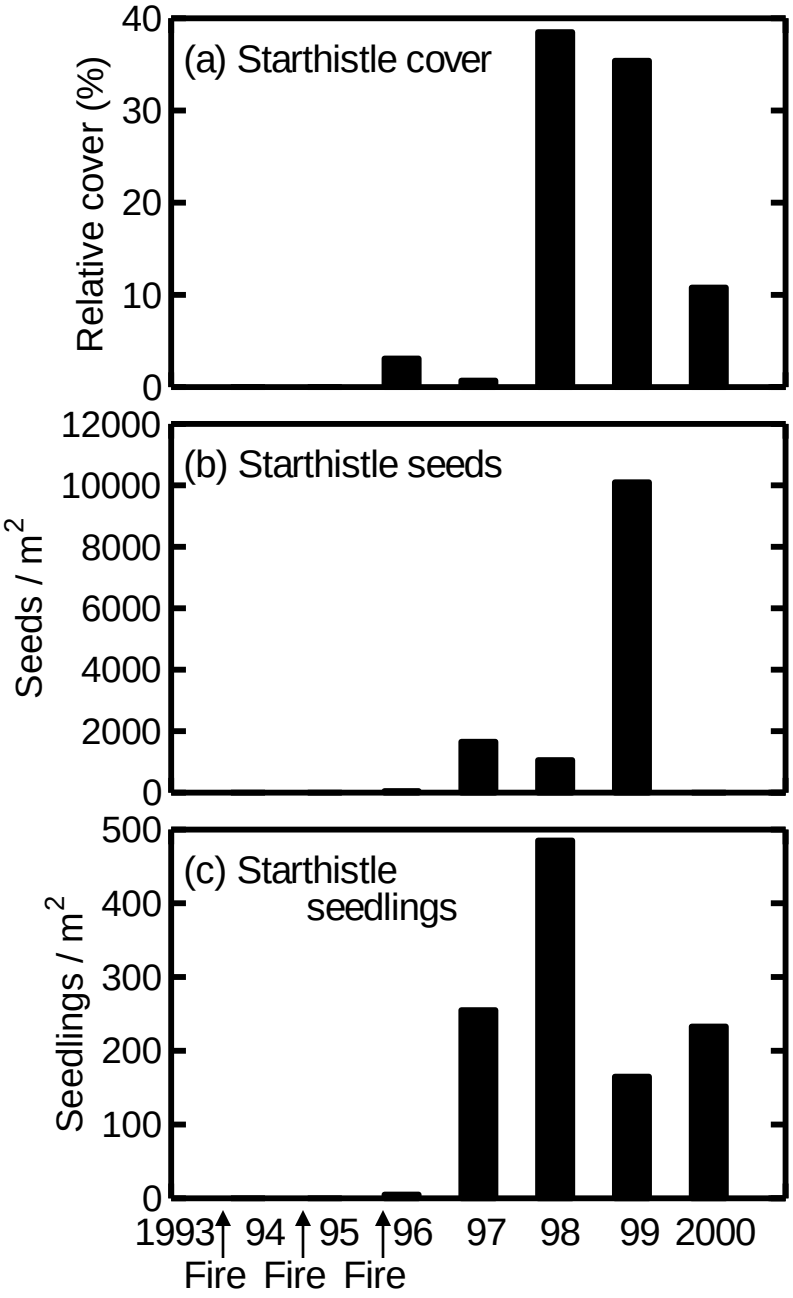
(Witter 2012)

Prescription burning to target invasive species

(Moyles et al. 2006)

Prescribed burn plans are often justified as a means of controlling noxious alien species

Ecological principles suggest it is unlikely one can control disturbance-dependent species by adding more disturbance into the system



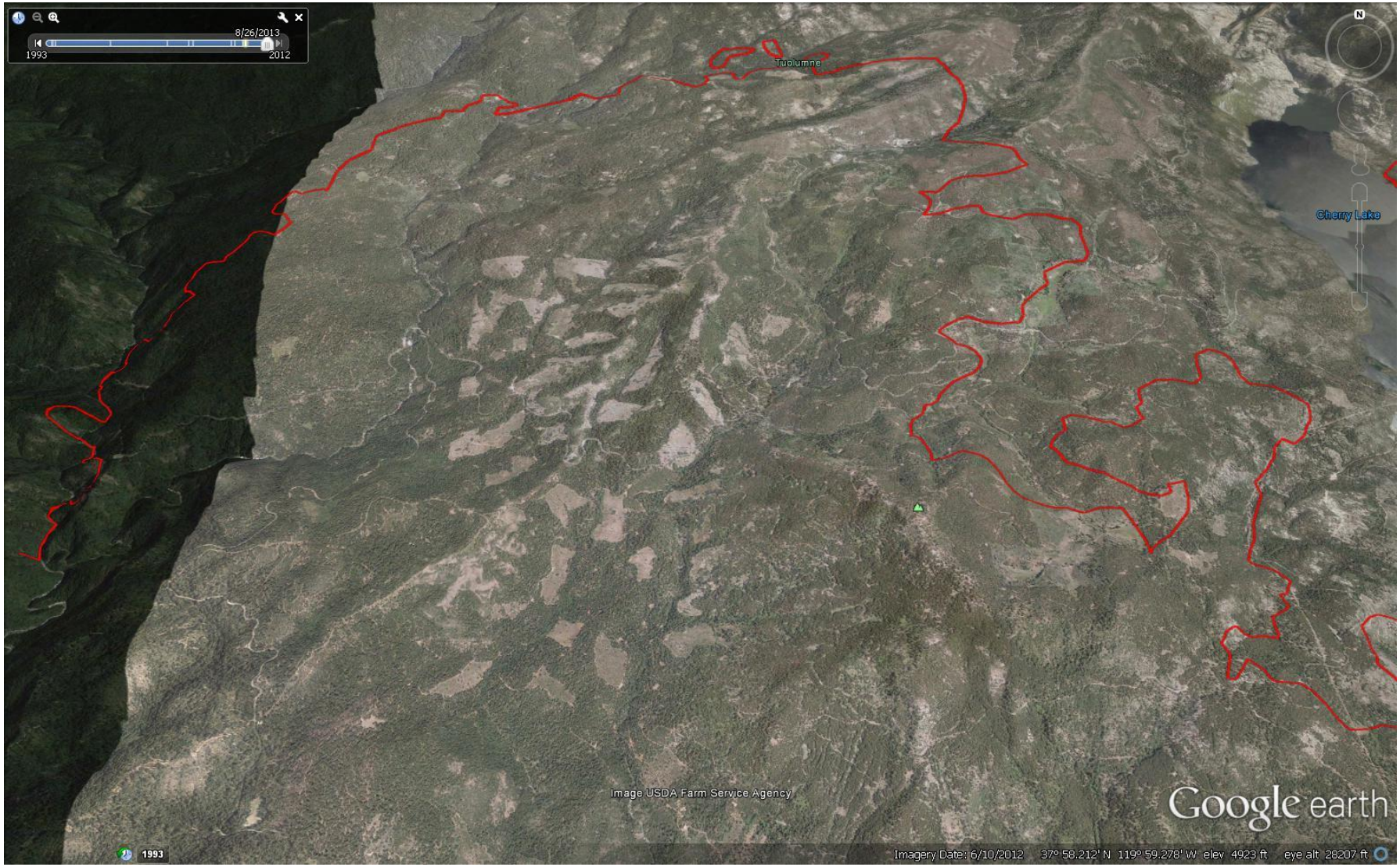
(DiTomaso et al. 2002)

Ecological principles suggest it is unlikely one will control disturbance-dependent invasive species by adding disturbance into the system

Eradication works best on new localized infestations

Sustainable control of well established invasives will in most instances require eradication coupled with restoration of the natural ecosystem

Silvicultural issues and invasives



Fire management tactics during wildfires:

have potential for spreading non-native plants

e.g., 2007 Zaca Fire
>400 miles of bulldozed fire breaks

Precautions

Weed-free bulldozers
Postfire monitoring

Postfire management:

BAER --- Burned Area Emergency Response

To Seed or Not to Seed

By Jon E. Keeley

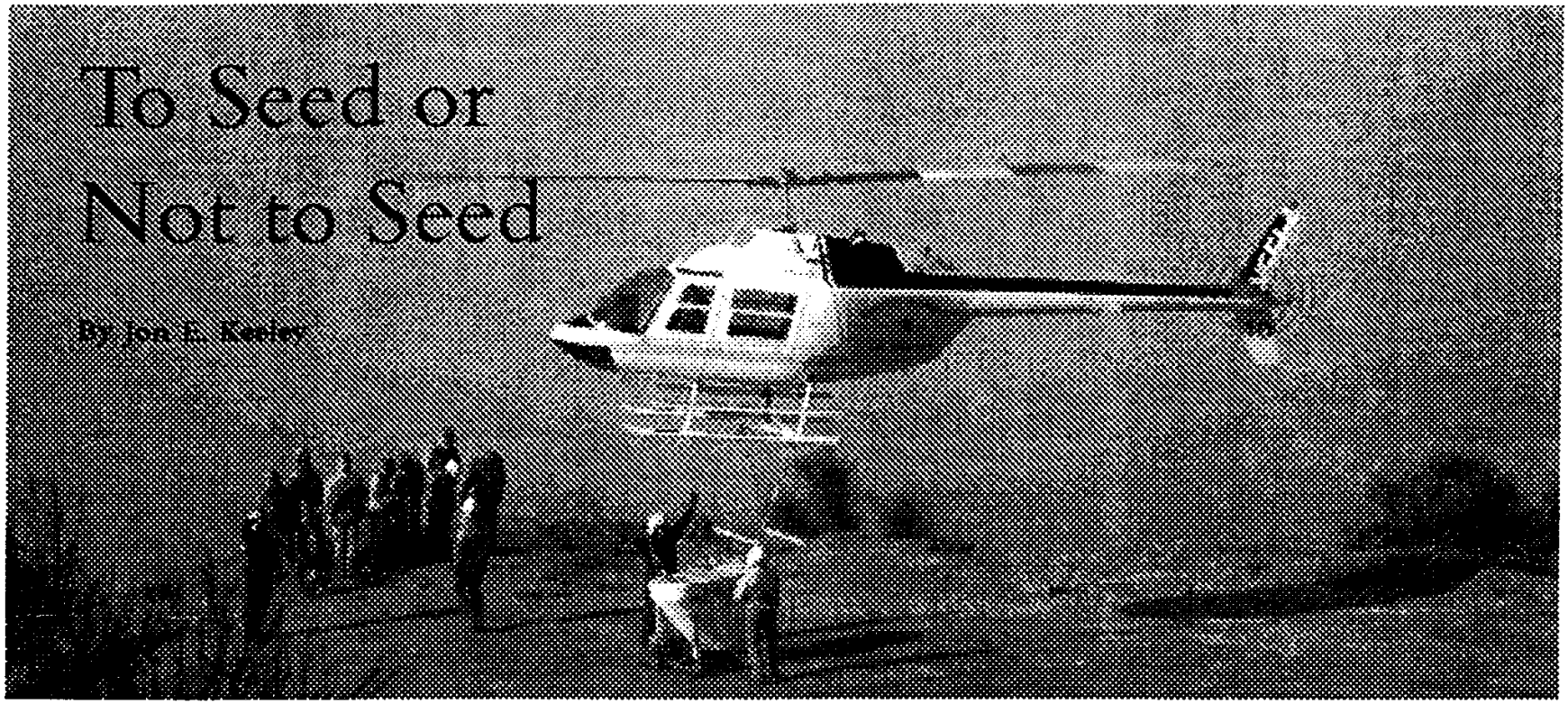


Photo courtesy of County of Los Angeles Fire Department

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

Annual rye (*Lolium multiflorum*)

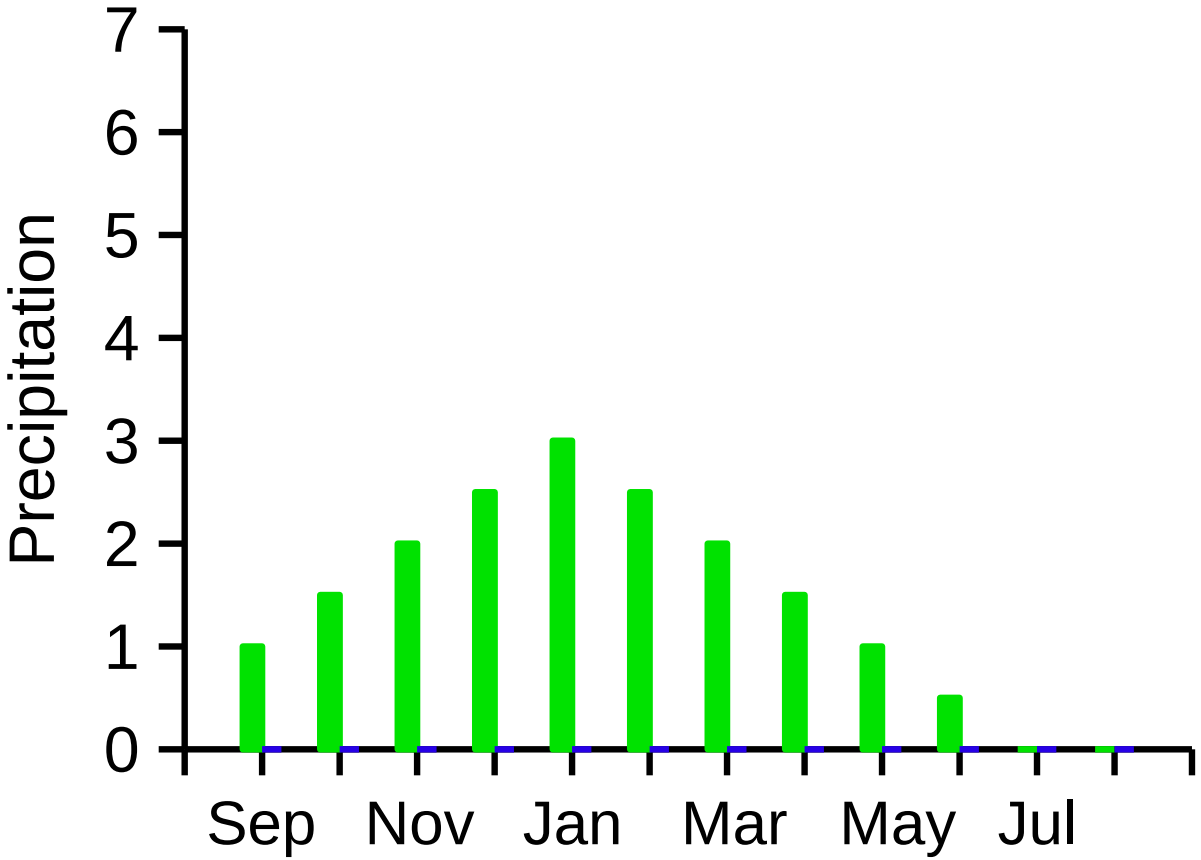
Zorro fescue (*Vulpia myuros*)

Potential Problems Seeding With Natives:

Seed source often not available after fire in sufficient quantity

Genetic contamination

Disrupts plant community structure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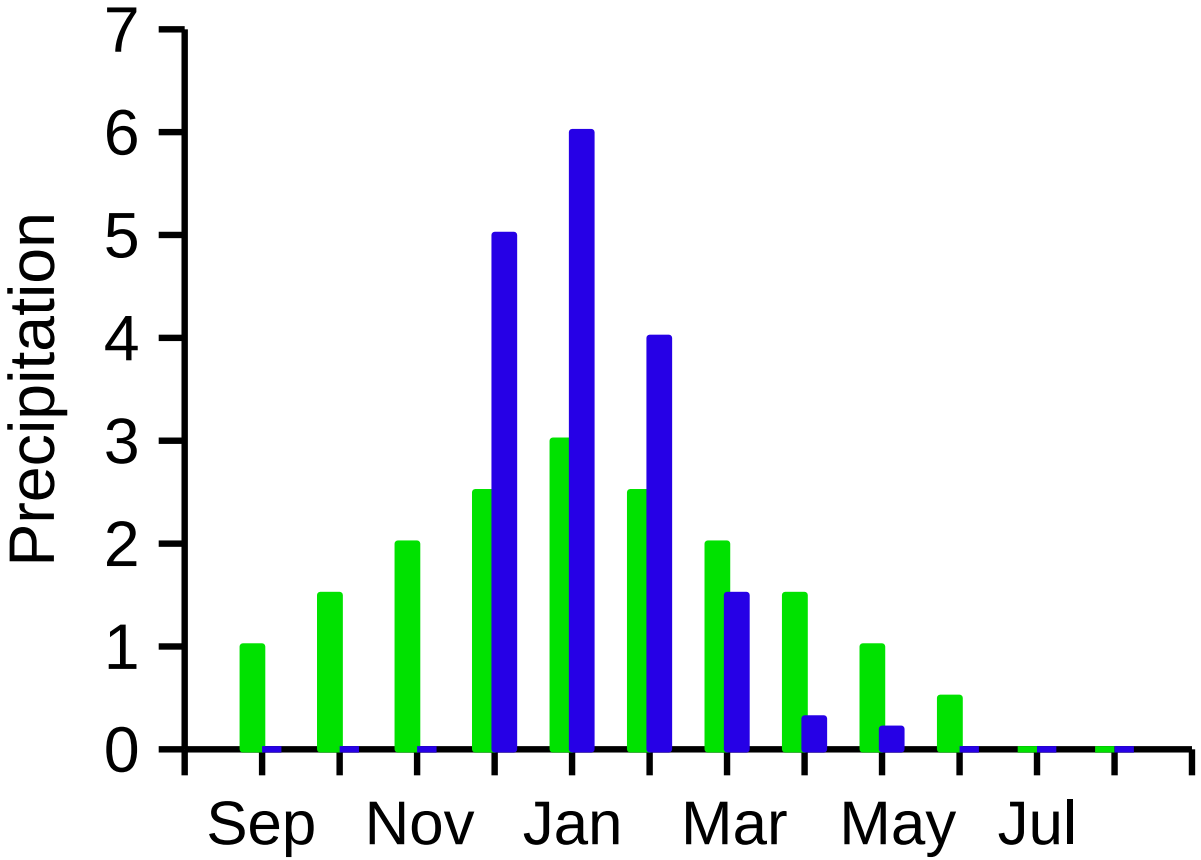
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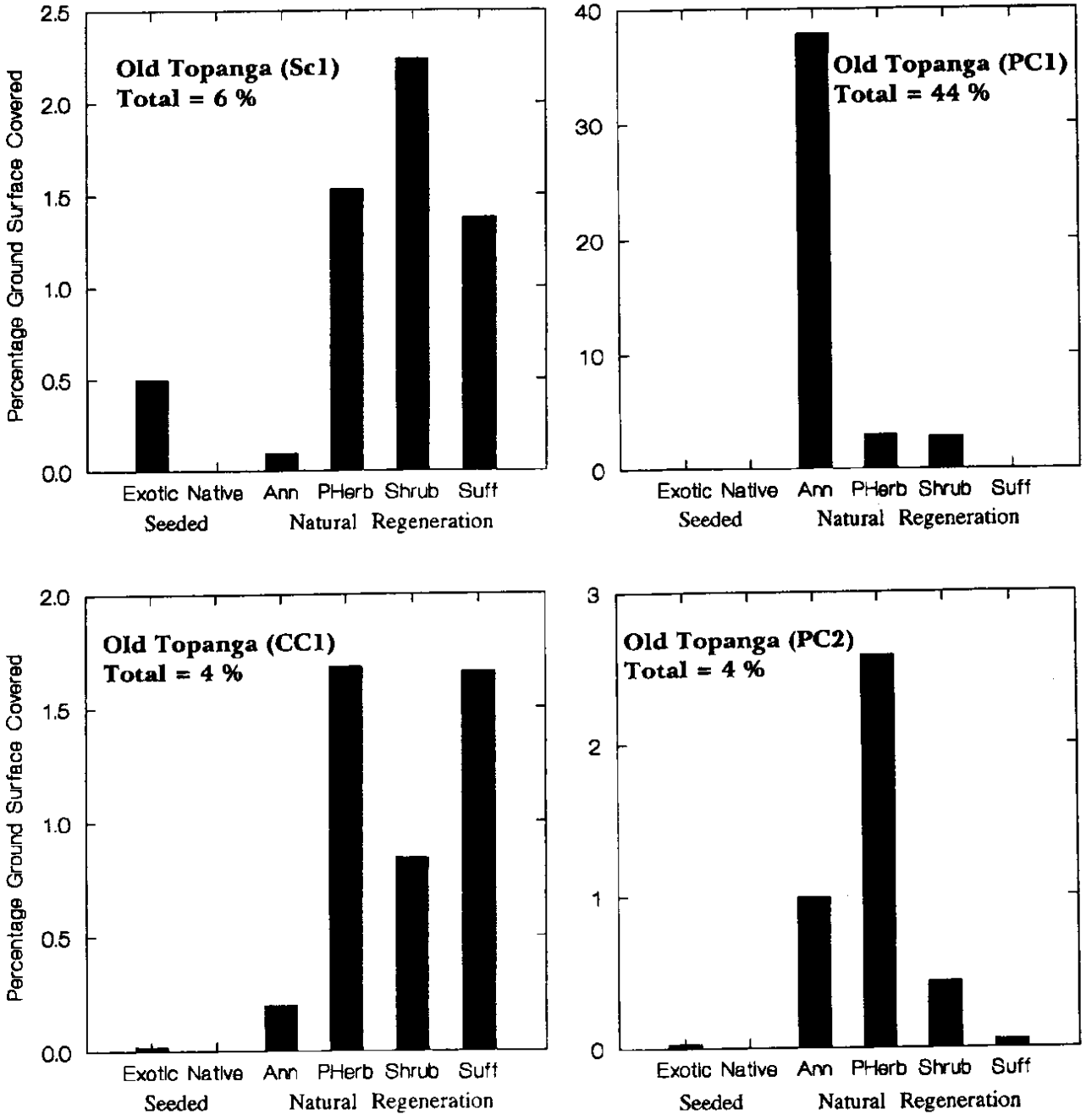

Fig. 1. Continued.

(Keeley 1996)

Acknowledgments

USGS science for a changing world

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Joint Fire Science Program

CALIFORNIA DEPARTMENT OF FORESTRY & FIRE PROTECTION
CAL FIRE
SINCE 1885

FIRE
ORANGE COUNTY
CALIFORNIA
AUTHORITY

MHDP
USGS Hazards Project

Photo: JE Keeley