

Environmental Correlates With Type Conversion

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Vegetation Type Conversion (VTC) is the change of one vegetation type to another

However, it is different from vegetation succession in that VTC represents a significant change in community composition, resilience and ecosystem services

Cooper 1922

Wells 1962

} Indian use of fire

Zedler et al 1981 'new type of vegetation'
Haidinger & Keeley 1993 'vegetation conversion'
Keeley 2002 'type conversion'



Laguna Fire 1970

**Laguna 1970
Viejas Fire 2001**

**Laguna 1970
Viejas 2001
Cedar Fire 2003**



Photo: RW Halsey





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CALIFORNIA CHAPARRAL

MANZANITAS

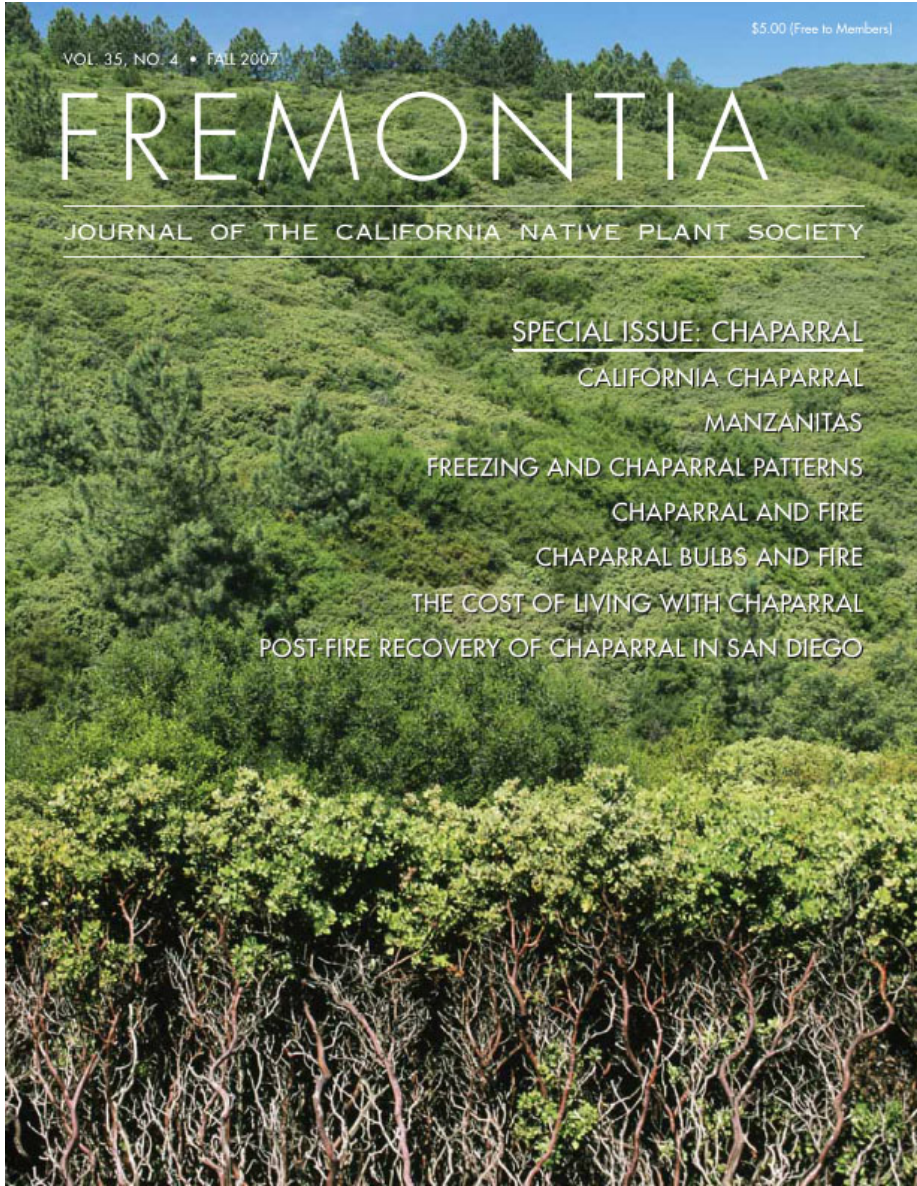
FREEZING AND CHAPARRAL PATTERNS

CHAPARRAL AND FIRE

CHAPARRAL BULBS AND FIRE

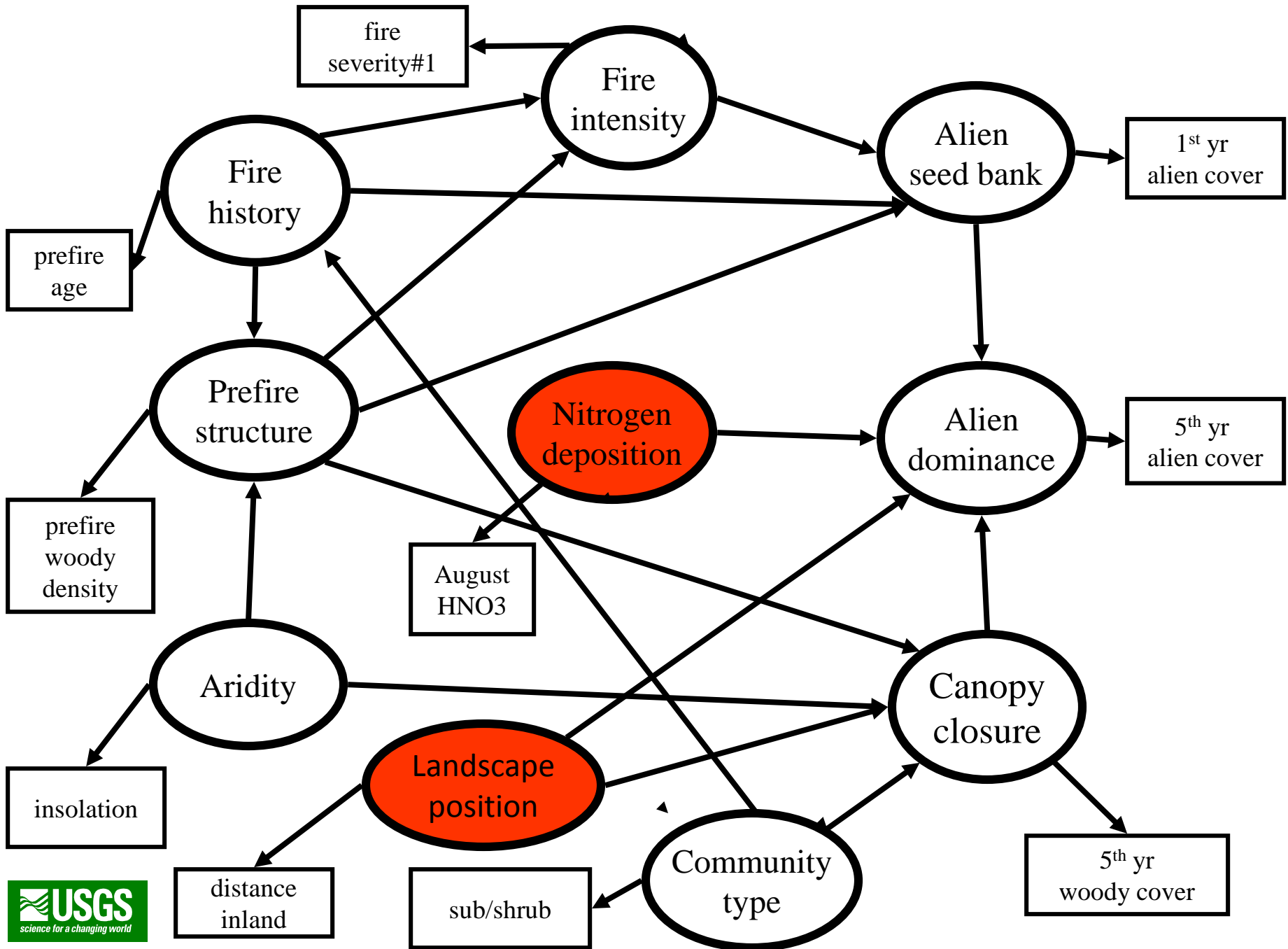
THE COST OF LIVING WITH CHAPARRAL

POST-FIRE RECOVERY OF CHAPARRAL IN SAN DIEGO



(Photos: Richard Halsey)









New
Phytologist

Review



Tansley insight

Extensive drought-associated plant mortality as an agent of type-conversion in chaparral shrublands

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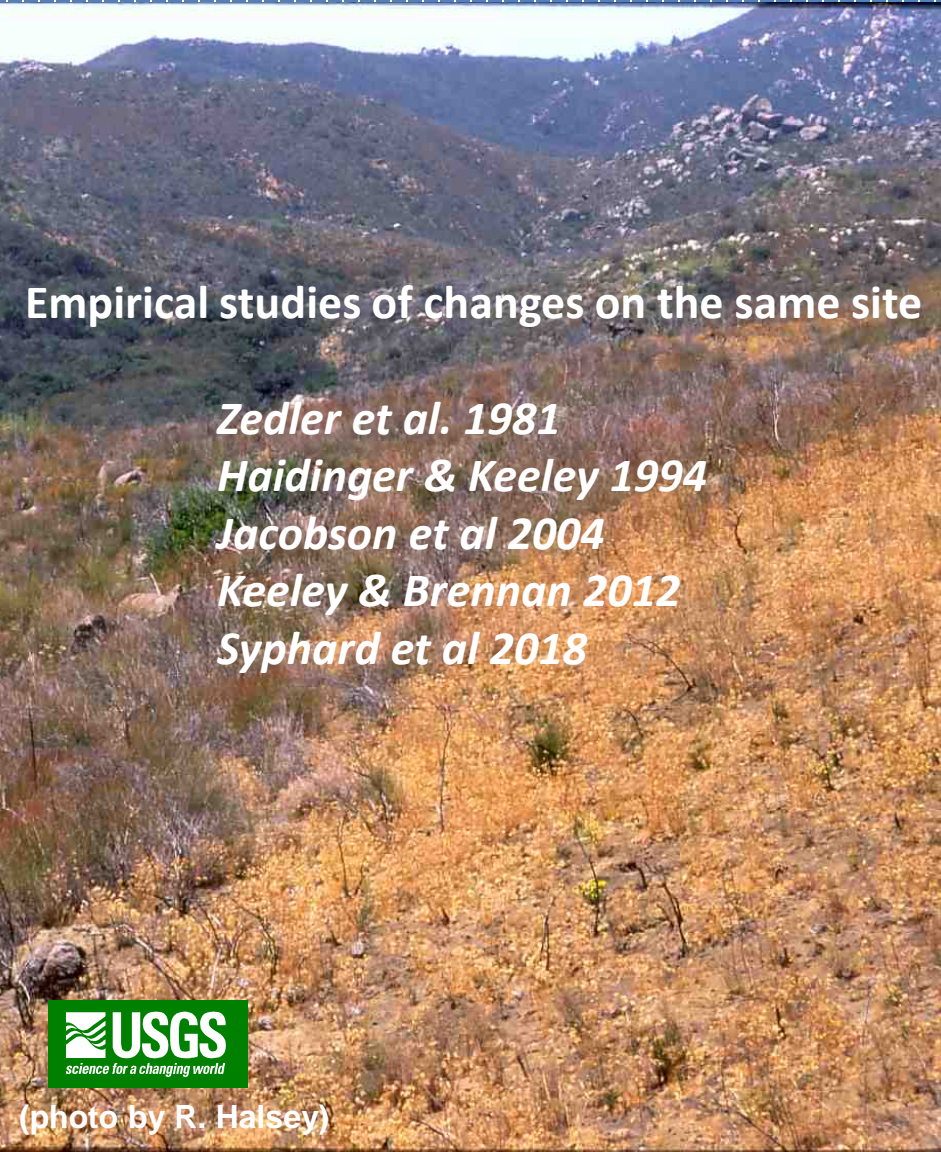
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Two Types of Studies

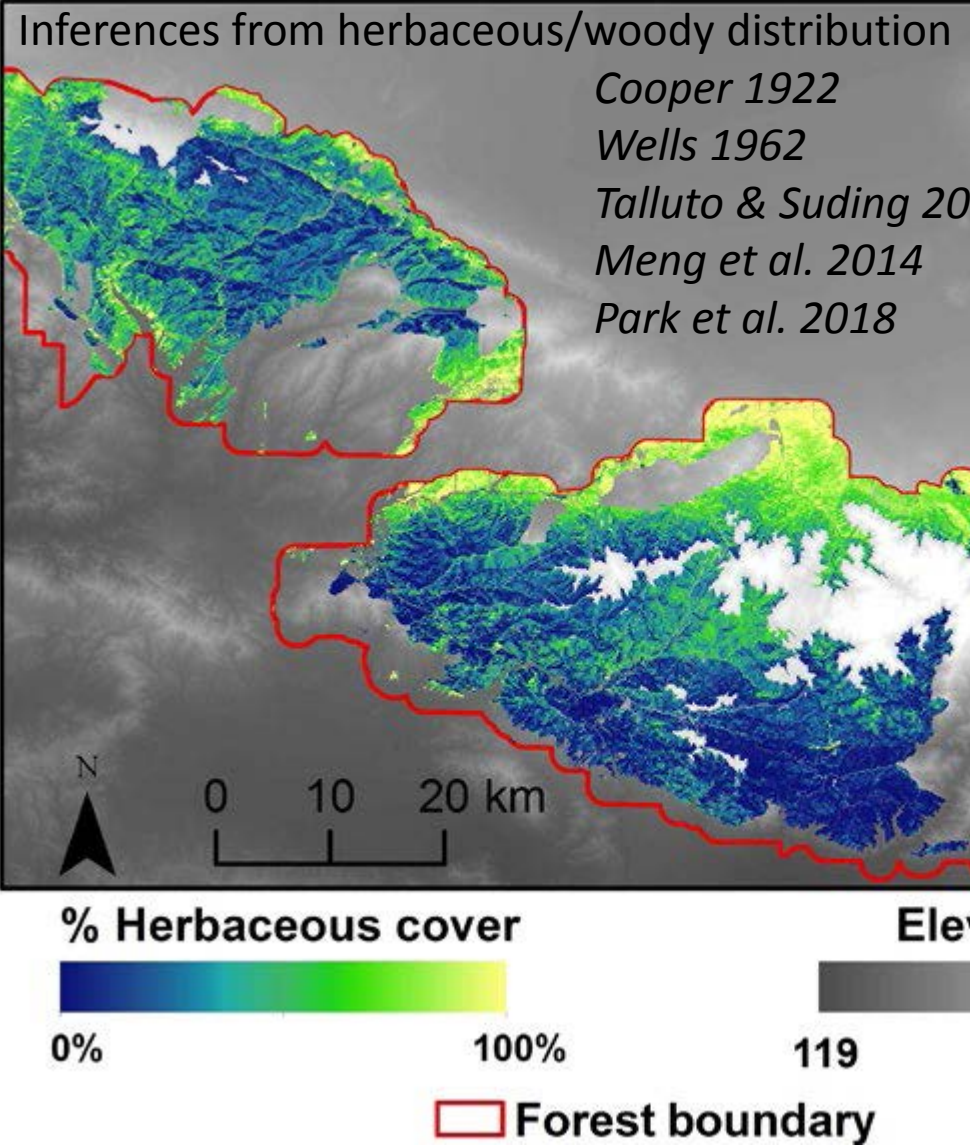


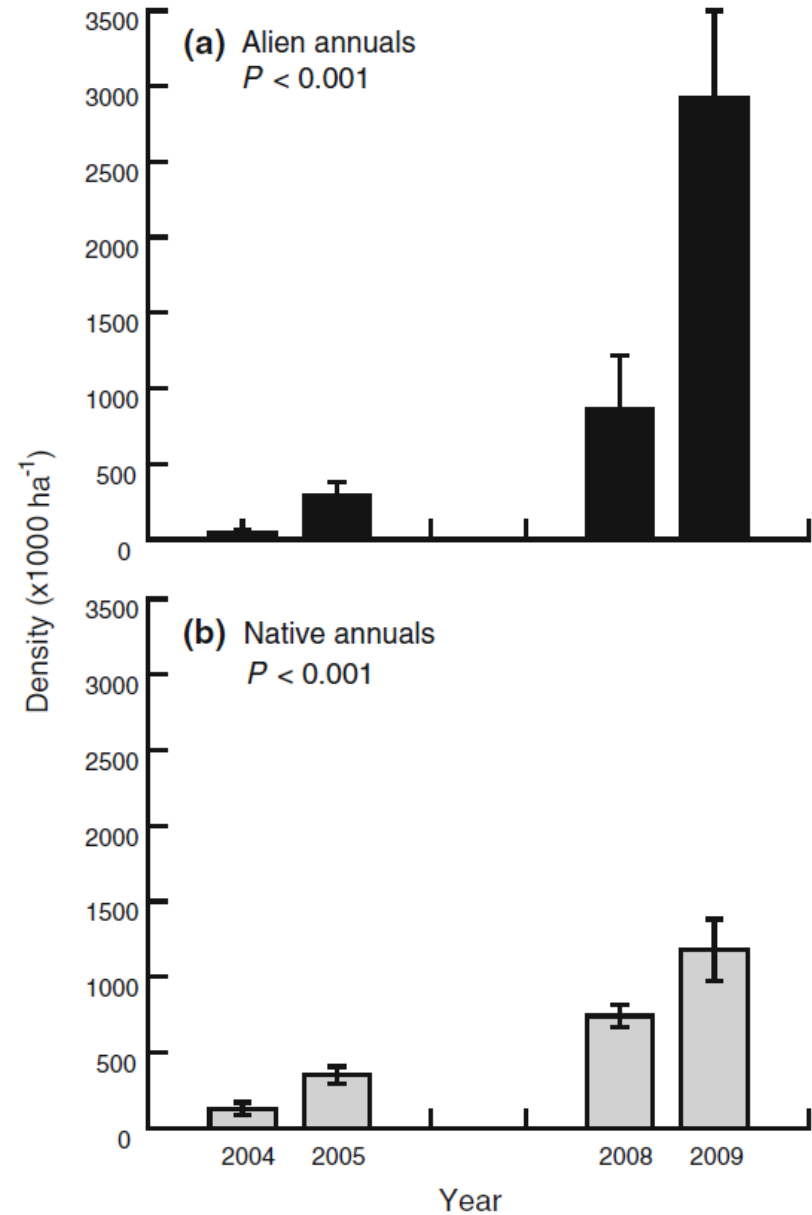
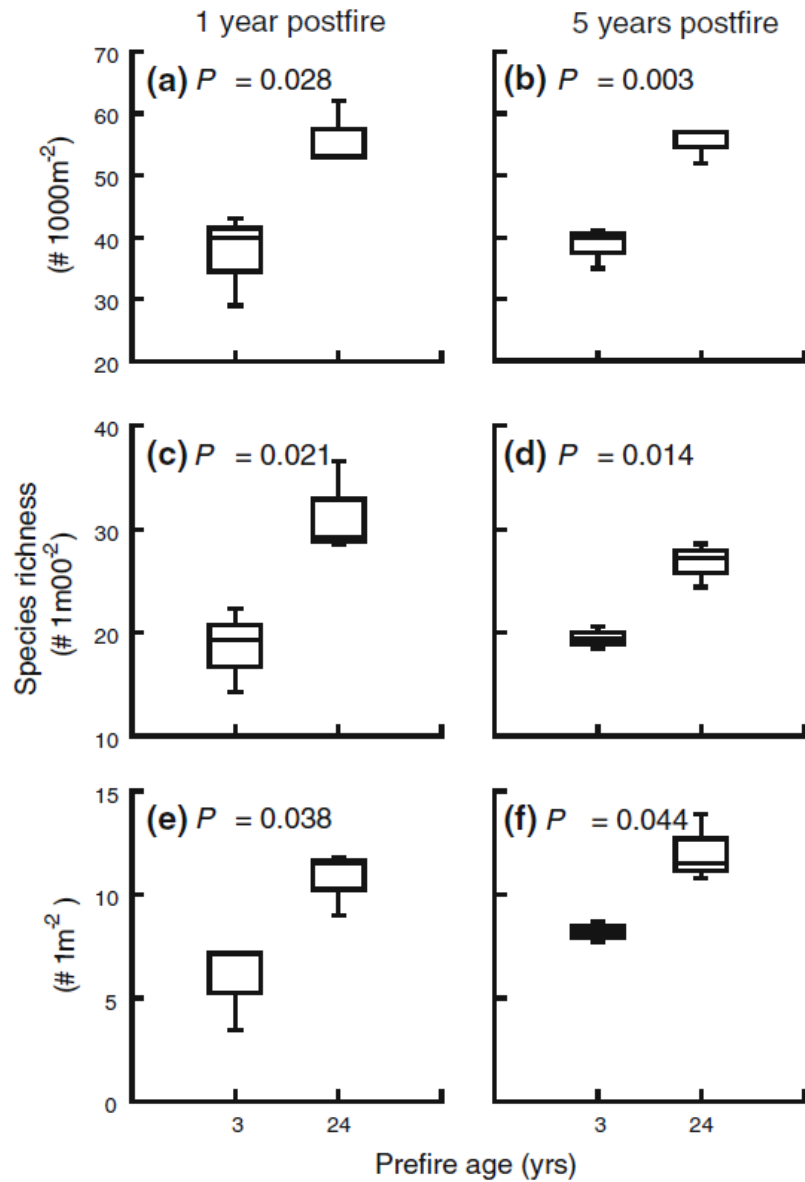
Empirical studies of changes on the same site

- Zedler et al. 1981*
- Haidinger & Keeley 1994*
- Jacobson et al 2004*
- Keeley & Brennan 2012*
- Syphard et al 2018*

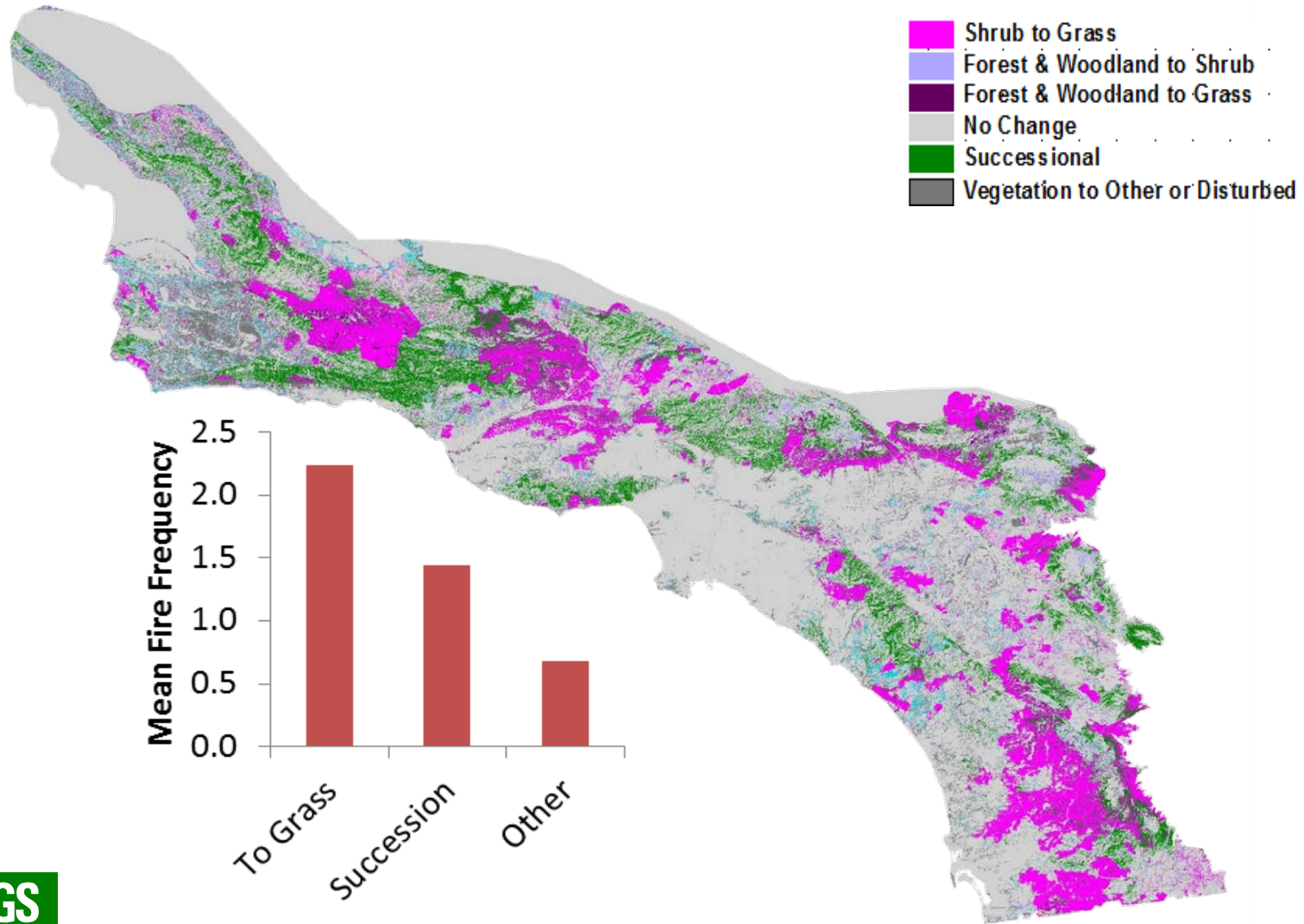


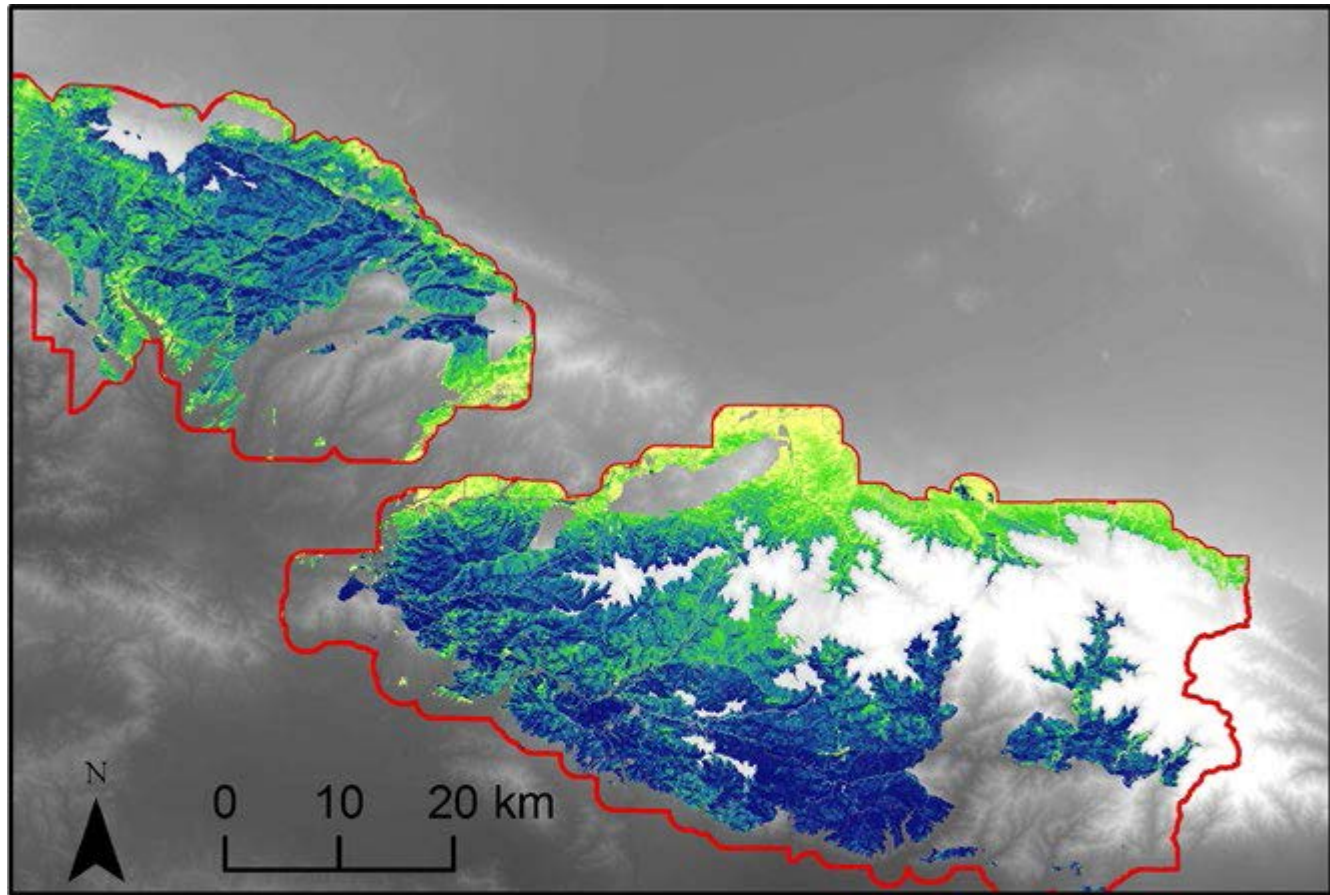
(photo by R. Halsey)





Highest historical fire frequency in those areas mapped as having changed from shrubland to grassland





% Herbaceous cover



0%

100%

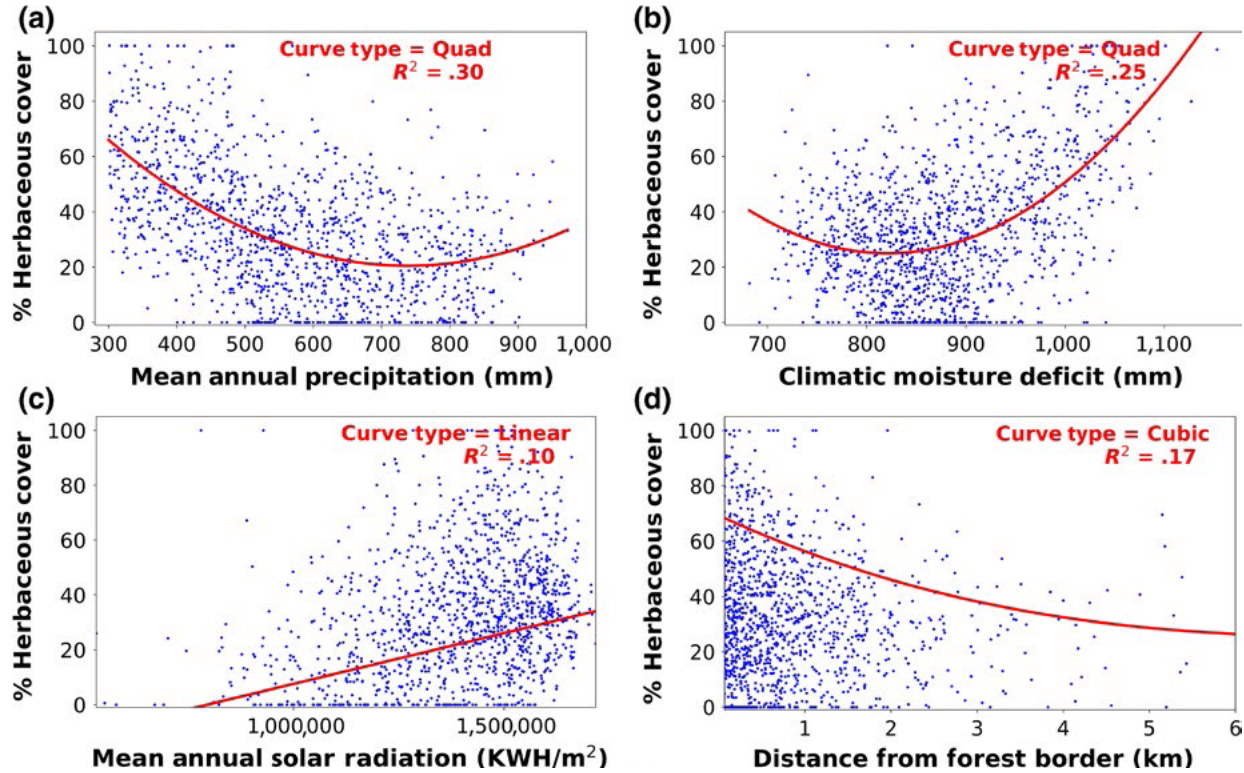
Elevation (m)



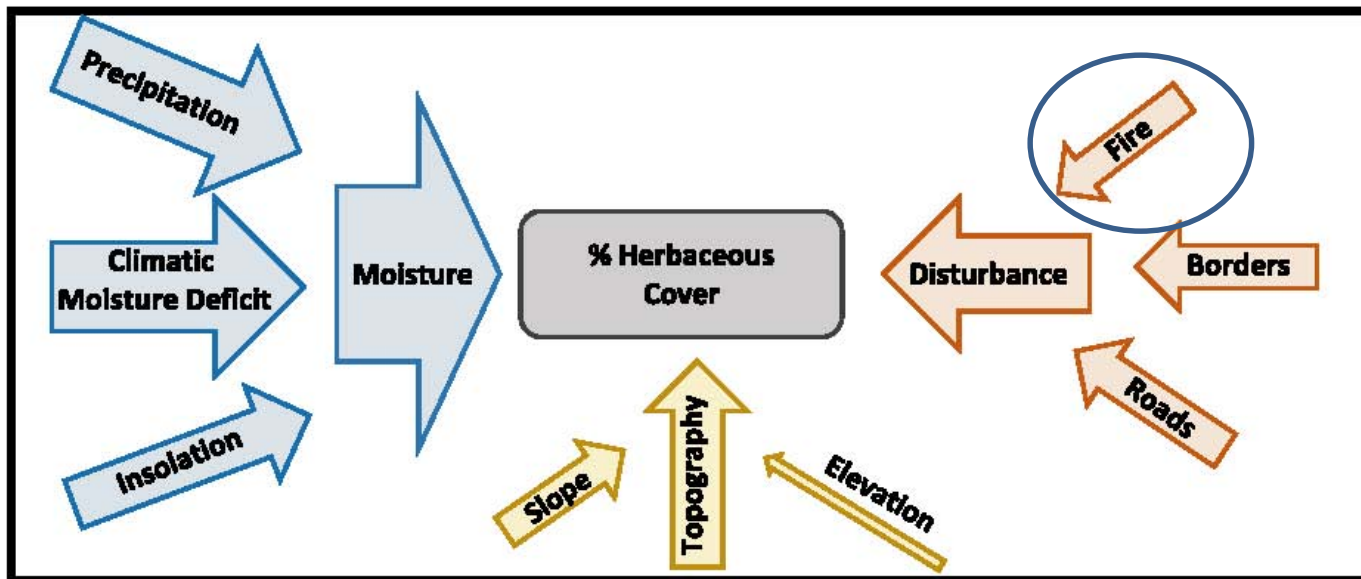
119

3,067

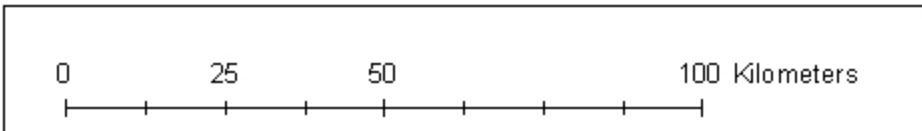
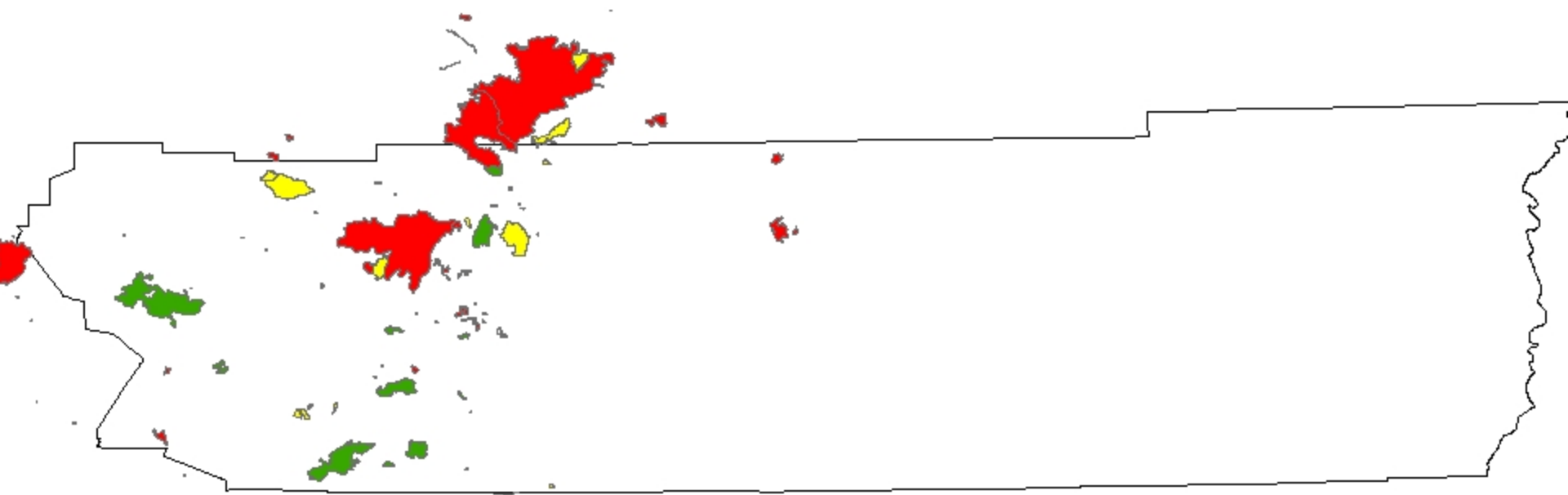
 **Forest boundary**



(Park et al 2018)




Fires in Riverside County
2004-2006





Legend


Prescribed and Wildland Fires

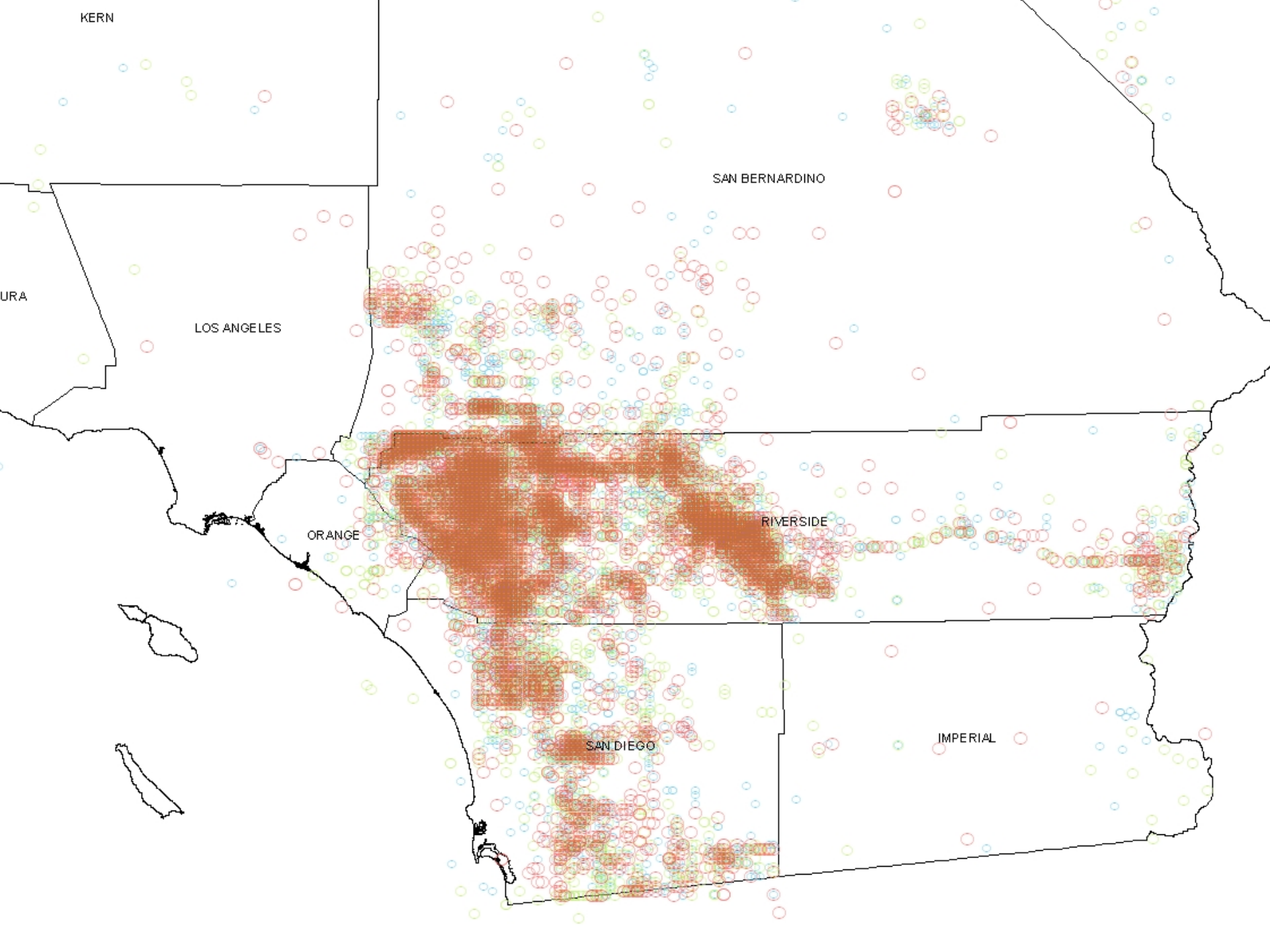
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YEAR_

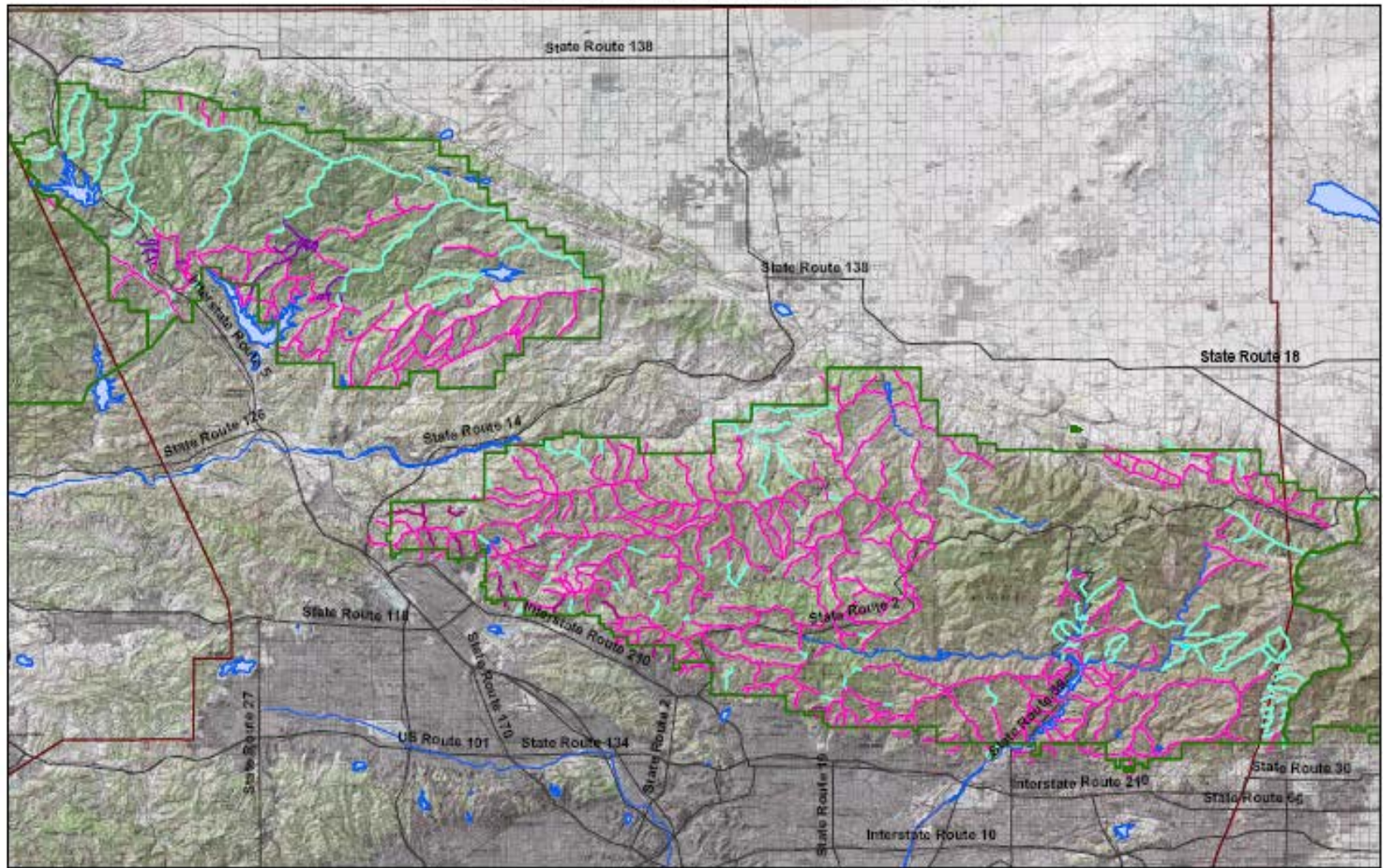
 2004

 2005

 2006



Angeles National Forest Fuelbreaks



- Existing Firebreak
- Existing Fuelbreak
- Historic Fuelbreak
- Proposed Fuelbreak
- County Boundary
- Angeles National Forest

(Brennan, Keeley and Pfaff, unpublished)



Photo: RW Halsey

Santa Monica Mtns Type Conversion (Syphard, Brennan and Keeley in review)

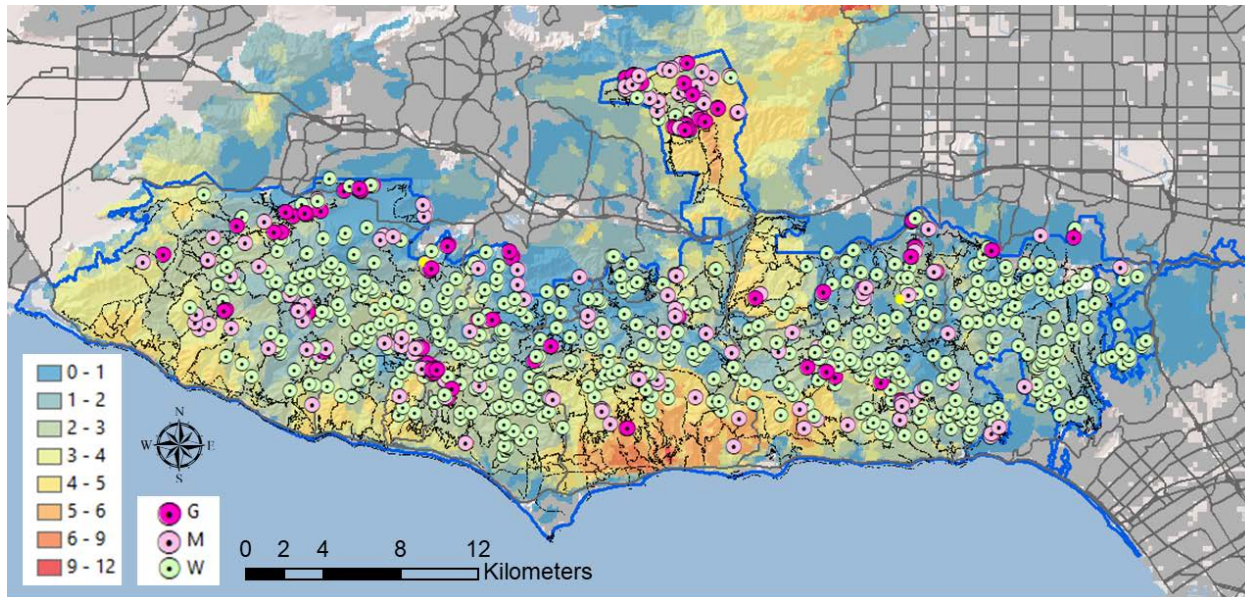


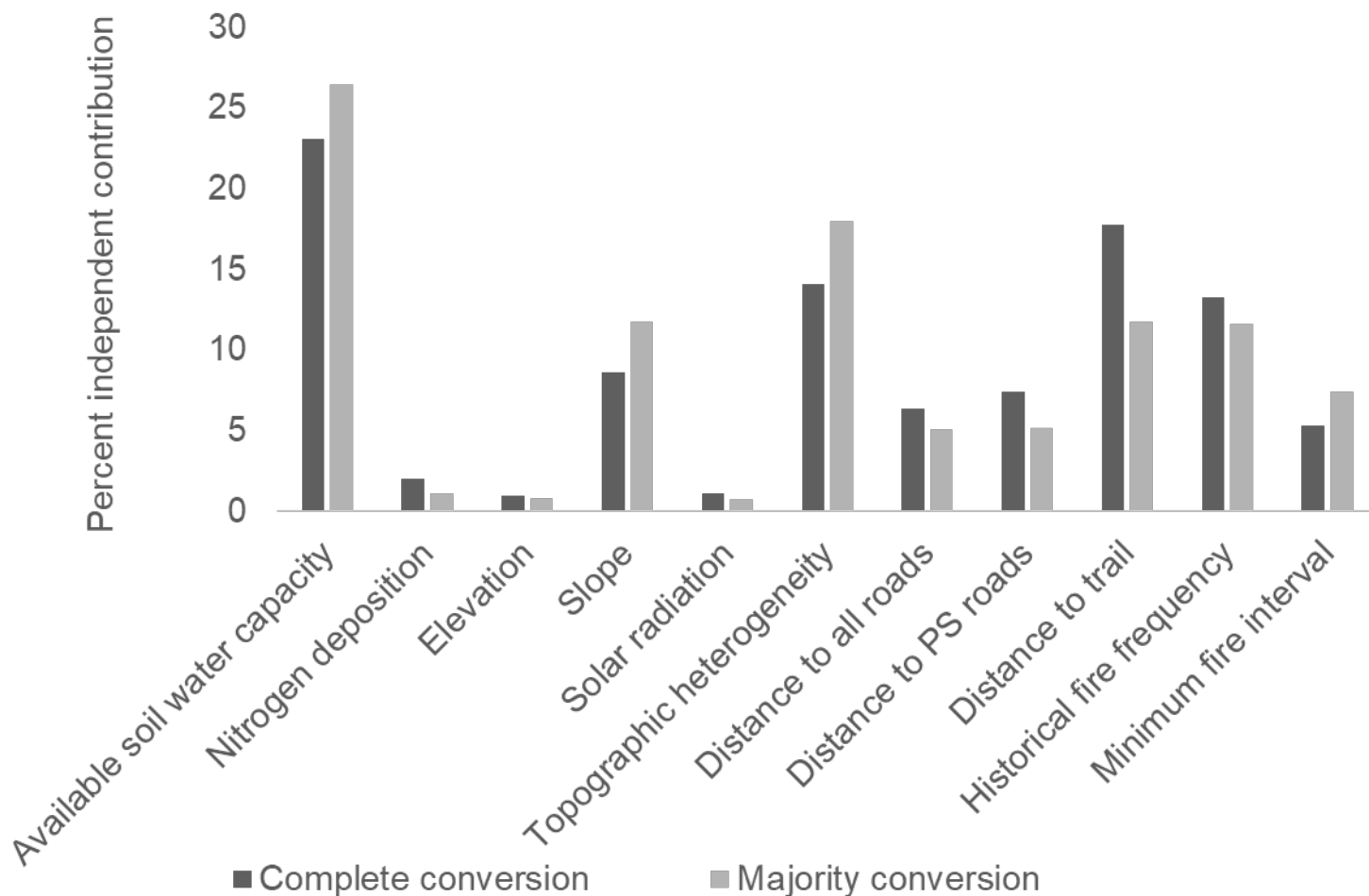
Figure 1. Vegetation type (G = grass; M = mixed; W = woody) in 2014 overlaid on historical fire count in the Santa Monica Mountains National Recreation Area, CA study area. Small black lines within the study area show locations of trails, and thick gray lines show the distribution of primary and secondary roads.

Airphoto image interpretation of change from 1943 to 2014

800 randomly located plots

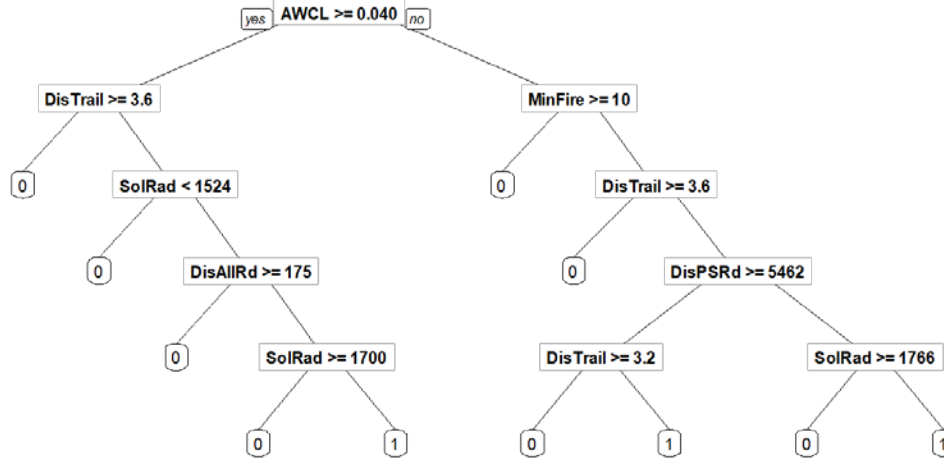
Of those pure chaparral in 1943 converted to herbaceous cover in 2014

34% either complete or majority conversion



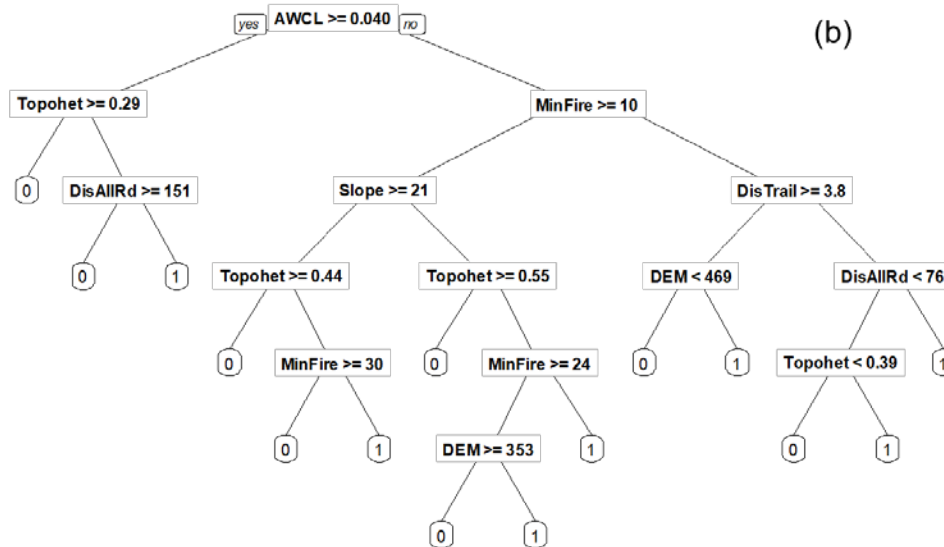
Full Type Conversion

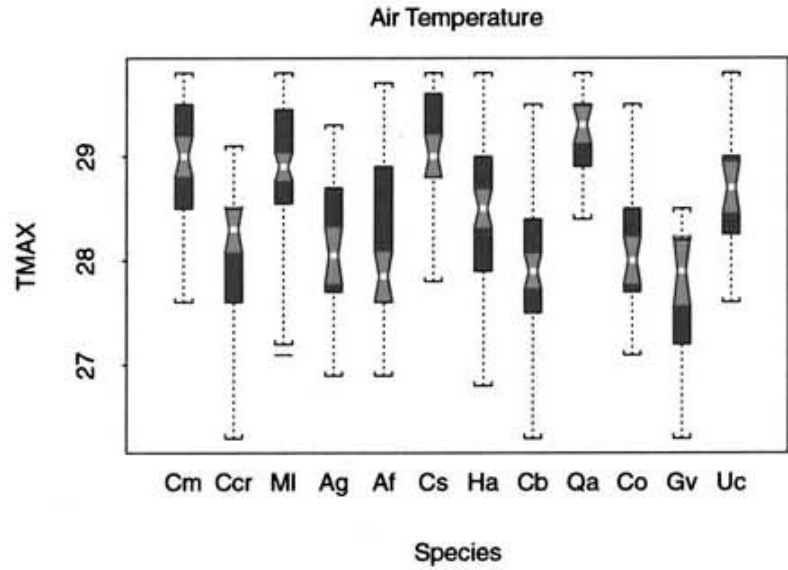
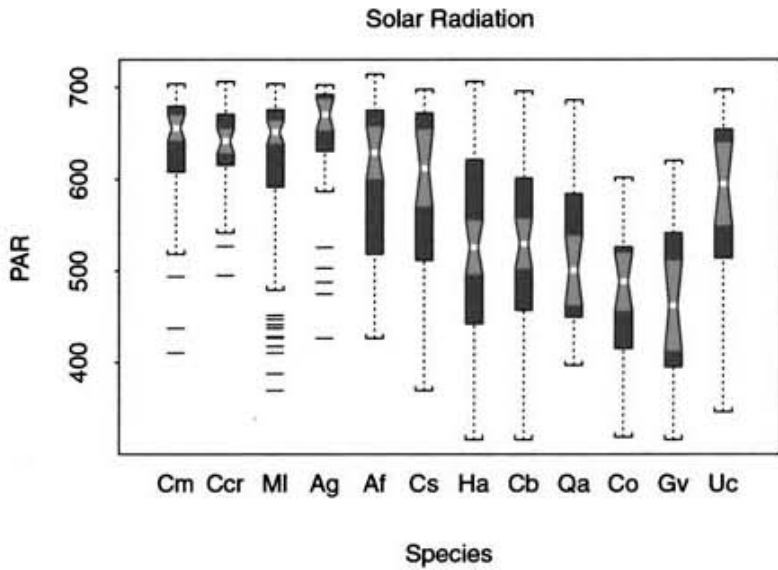
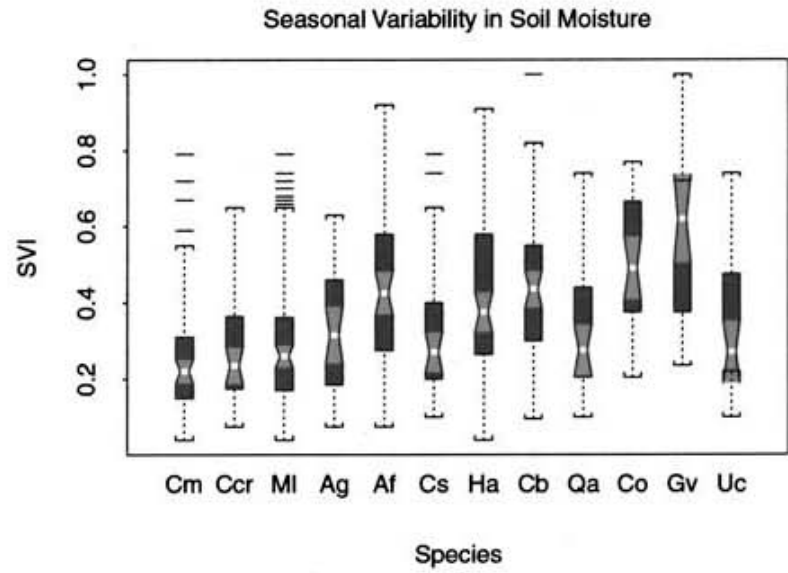
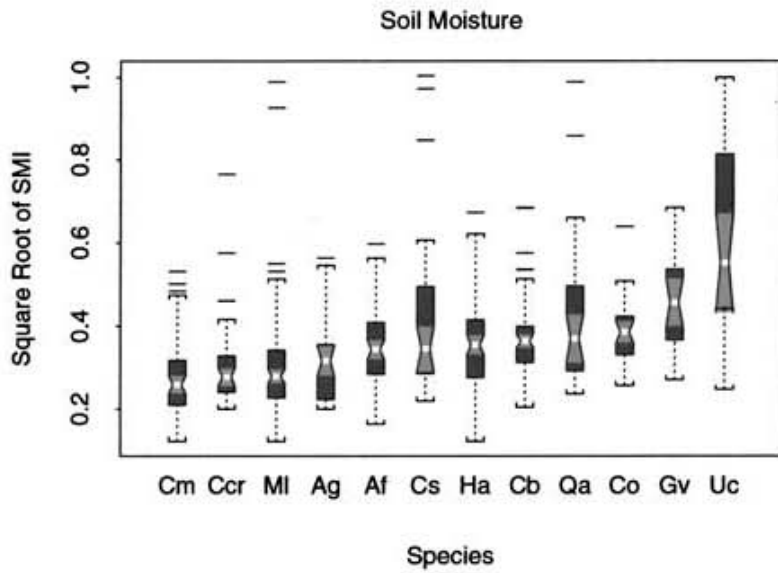
(a)



Majority Type Conversion

(b)





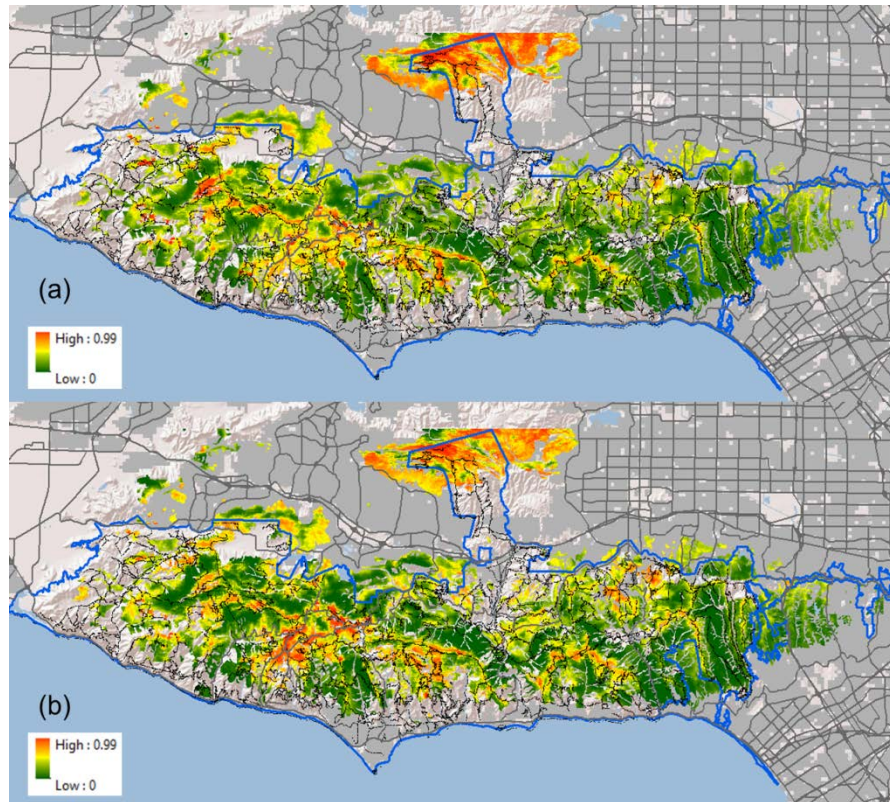
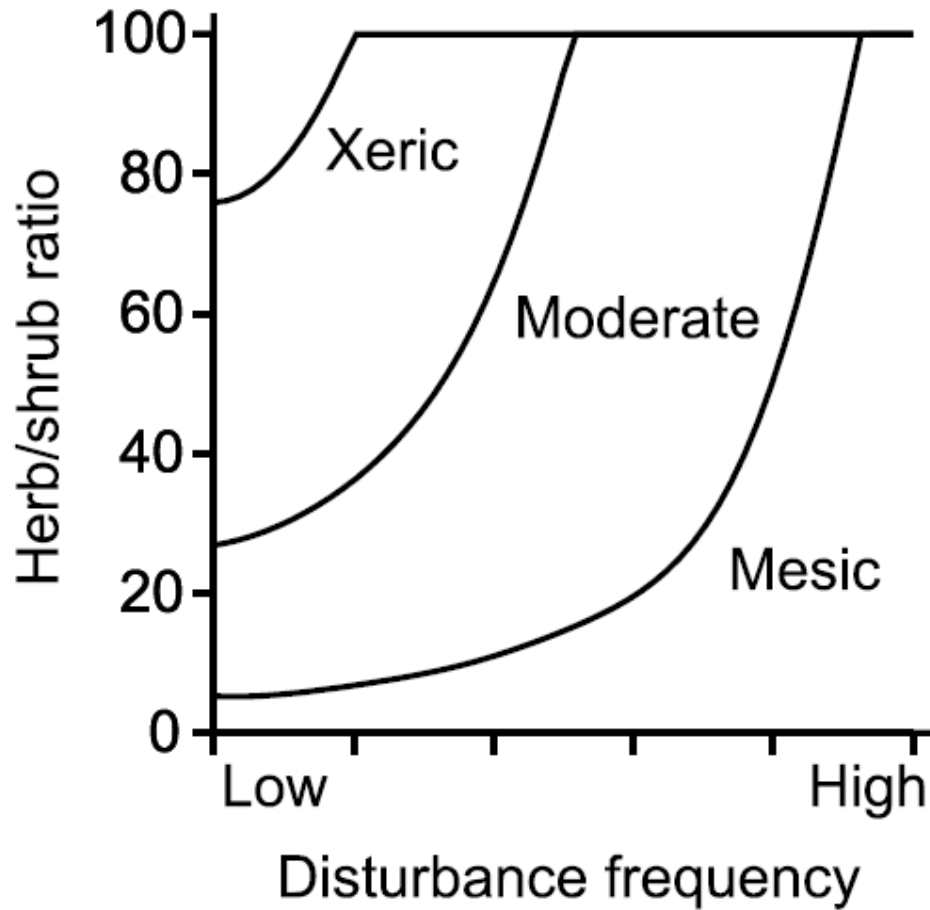


Figure 4. Probabilistic maps representing areas potentially suitable for vegetation type conversion using locations of (a) full and (b) majority conversion of chaparral to herbaceous vegetation. Map extent reflects areas with full data coverage for all variables. Small black lines within the study area show locations of trails, and thick gray lines show the distribution of primary and secondary roads.



(Keeley 2002)

Figure 7 Interaction between soil aridity and disturbance frequency on the balance of herbs and shrubs on upland landscapes in coastal California (see for example, Cooper, 1922; Wells, 1962; Keeley, 2000).

Short interval fires



Type conversion

Longer fire season
Increased fire frequency
Accelerated type conversion



Is this the future for southern California landscapes?

It depends on future fire regimes

f (population growth and dispersion)

Global warming may increase fire activity

Global warming will enhance type-conversion

by directly inhibiting native ecosystem recovery

But many other unknowns:

CO₂ increases WUI offsetting drought effects

New climates may favor a different suite of natives

Changes in land planning, fire management (ignitions)

(Keeley & Syphar: GeoSciences 2016)