

Fire Management Impacts on Alien Invasions at the Wildland- Urban Interface

Jon E. Keeley

U.S. Geological Survey

Sequoia-Kings Canyon Field Station

&

Department of Ecology and Evolutionary Biology

University of California, Los Angeles

Fire Management Activities at the Interface

1 Fire Suppression

2 Fuel reduction

Mechanical thinning (logging)

Prescription burning

3 Prescription burning to target noxious aliens

4 Fuel breaks

5 Postfire rehabilitation



Forest Fires vs Shrubland Fires

Mixed conifer
surface-fire regime



Fire Suppression
= Fire Exclusion

Fire Suppression
≠ Fire Exclusion

Chaparral crown-fire regime















Former ponderosa pine forest in Eldorado County after 1991 fire that removed the forest, then cheatgrass invasion that carried a repeat fire in 8 years

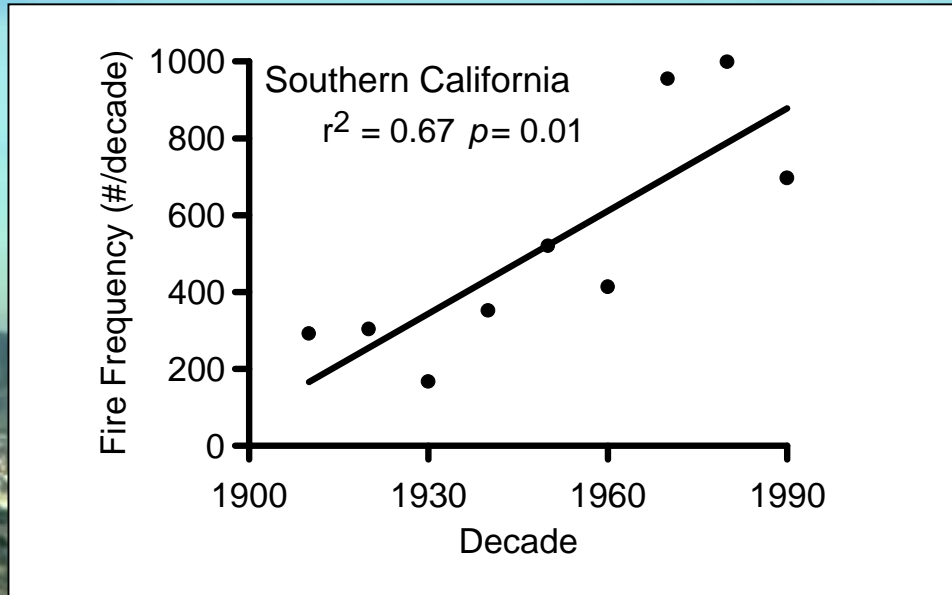
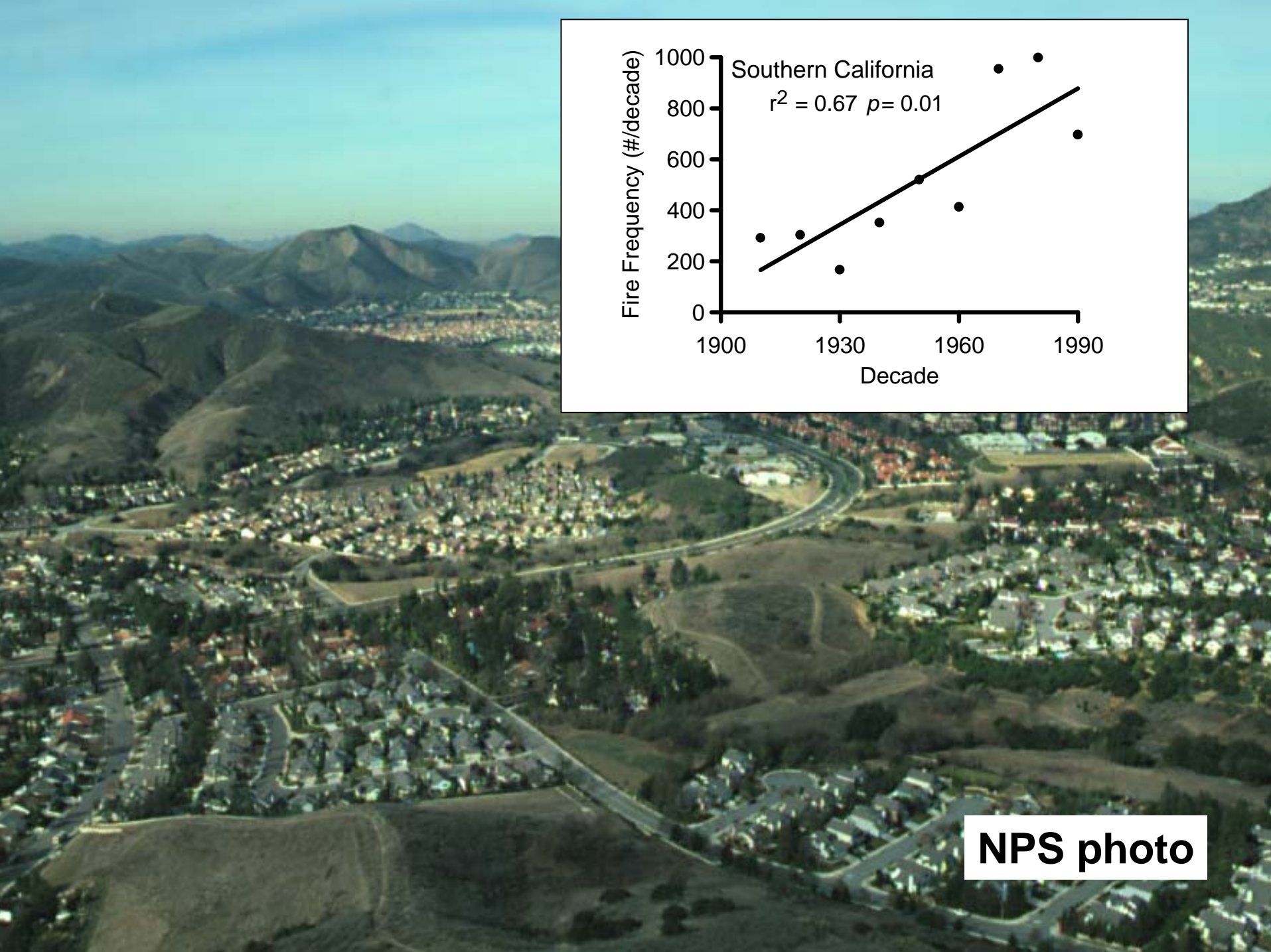


Forest restoration goals include returning natural fire regimes.

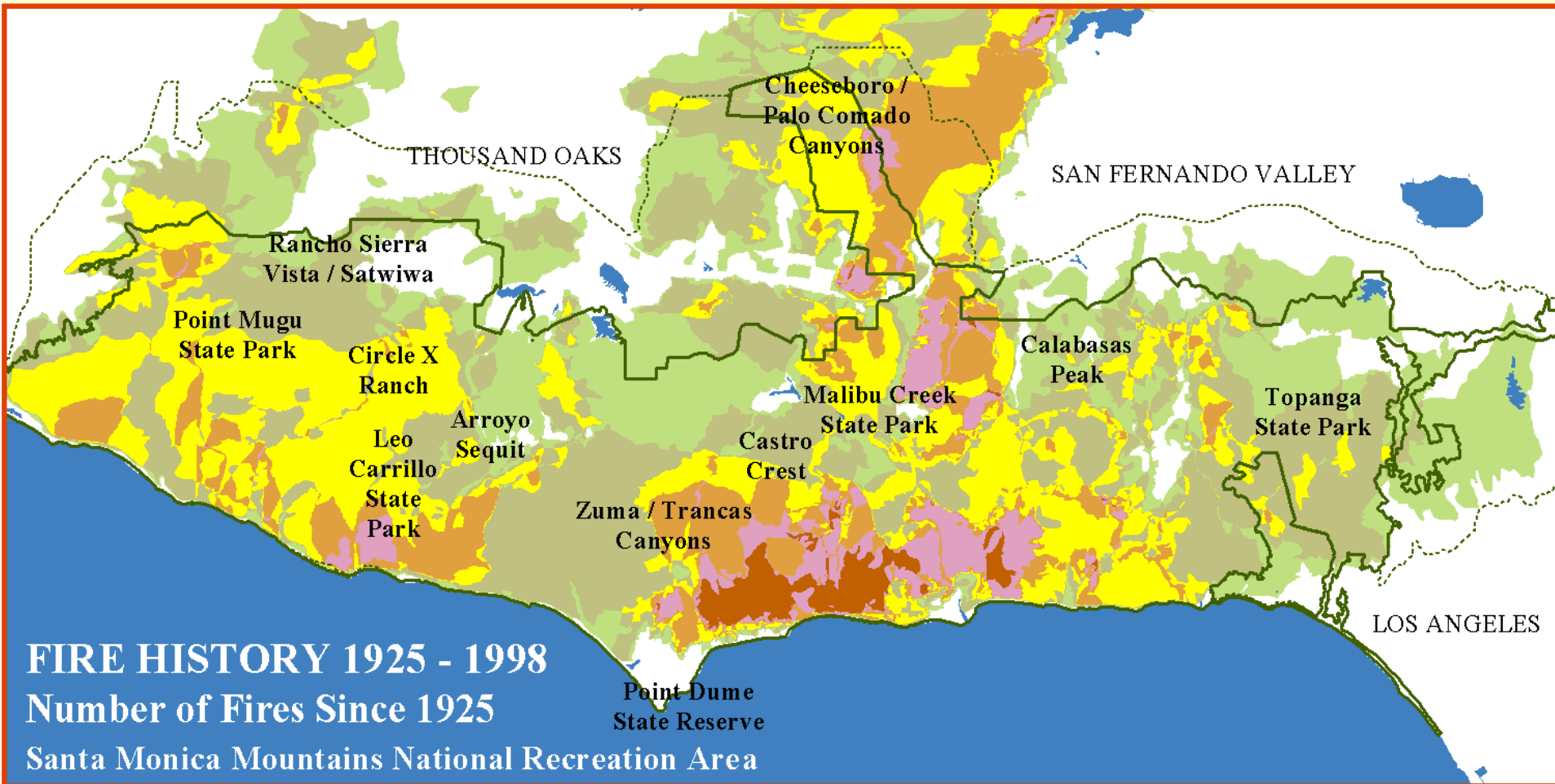
However, historical fires occurred on a landscape that lacked a diverse alien flora posed to take advantage of such disturbance regimes.

We may ultimately be forced to choose between restoring “natural” fire regimes or altering those regimes to favor communities of native species.











NPS photo





FIRE HISTORY 1925 - 1998
Number of Fires Since 1925
 Santa Monica Mountains National Recreation Area

Number of Times Burned

| | | | |
|-------------------------------------------------------------------------------------|-------|-------------------------------------------------------------------------------------|-------------|
|  | one |  | four |
|  | two |  | five |
|  | three |  | six or more |



-  Santa Monica Mountains NRA Boundary
-  Santa Monica Mountains Ecological Zone

| # of Times Burned | Hectares Burned | Percent of Study Area |
|-------------------|-----------------|-----------------------|
| 0 | 2031 | 2.39 % |
| 1 | 21956 | 25.8 % |
| 2 | 26769 | 31.4 % |
| 3 | 19784 | 23.2 % |
| 4 | 9398 | 11.0 % |
| 5 | 3438 | 4.04 % |
| 6 or more | 1680 | 1.98 % |



Fire Type Ecosystems

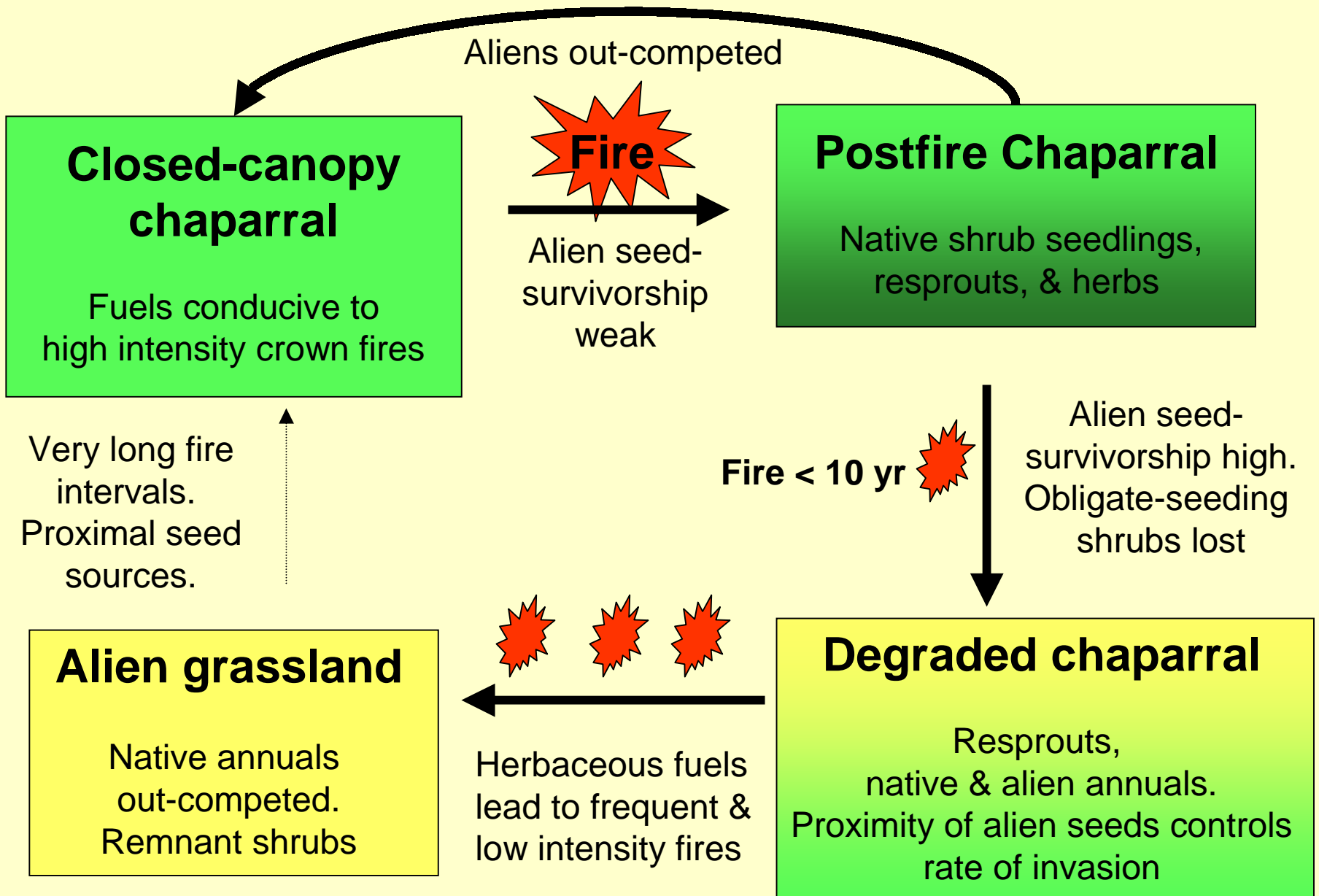
**Resilience
Dependence**

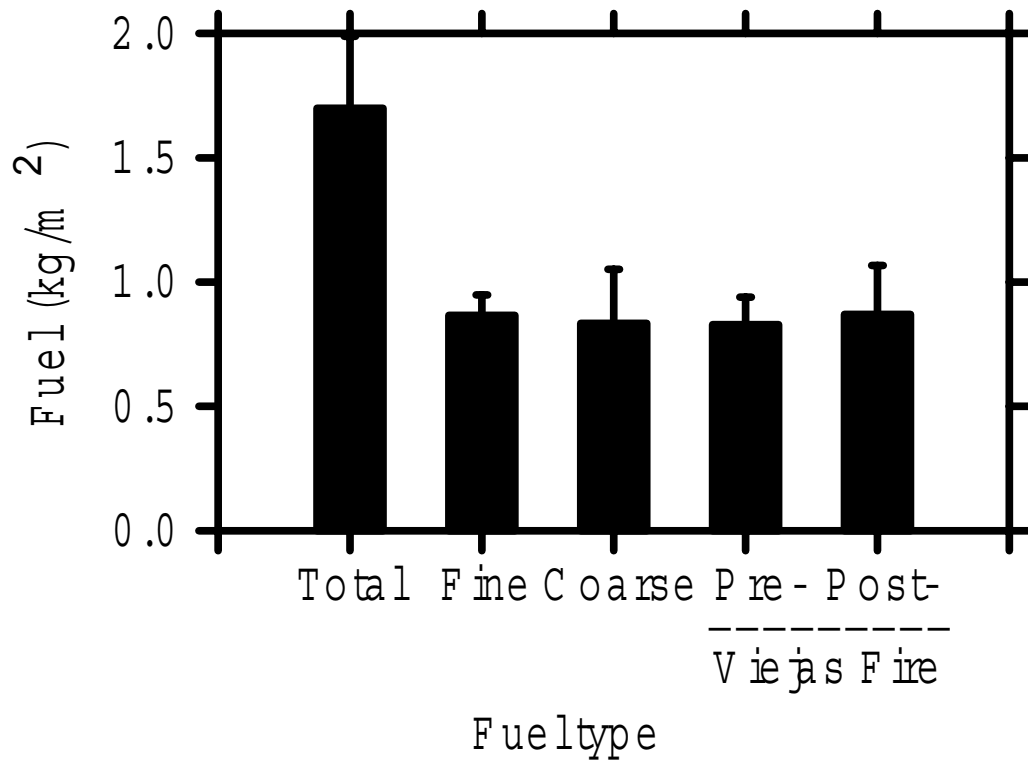
**But, fire-adapted species is a
misleading concept**

**Species are adapted to particular
fire regimes, comprising**

**Severity
Seasonality
Frequency**

Natural fire cycle 30 – 100 yr

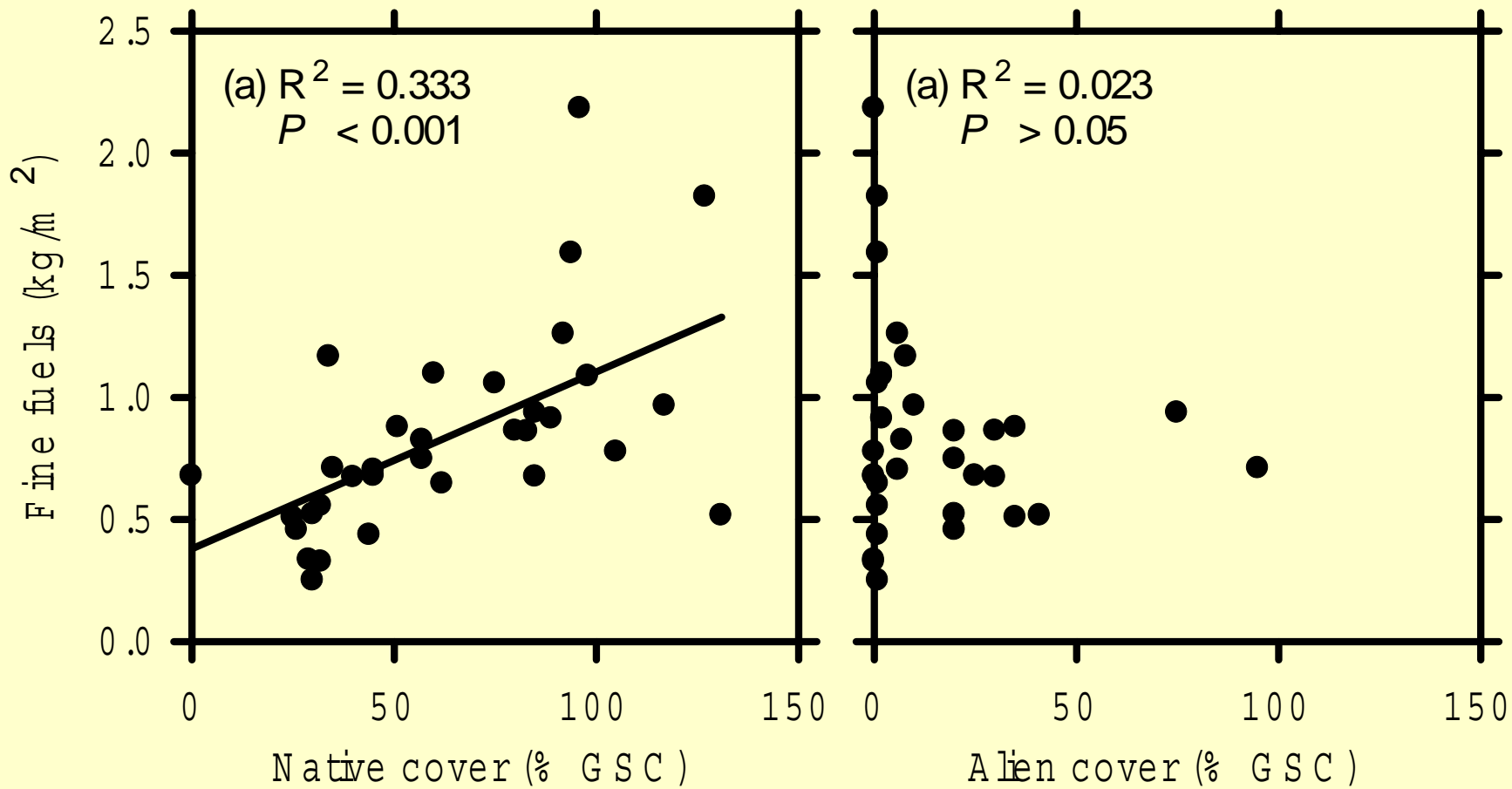




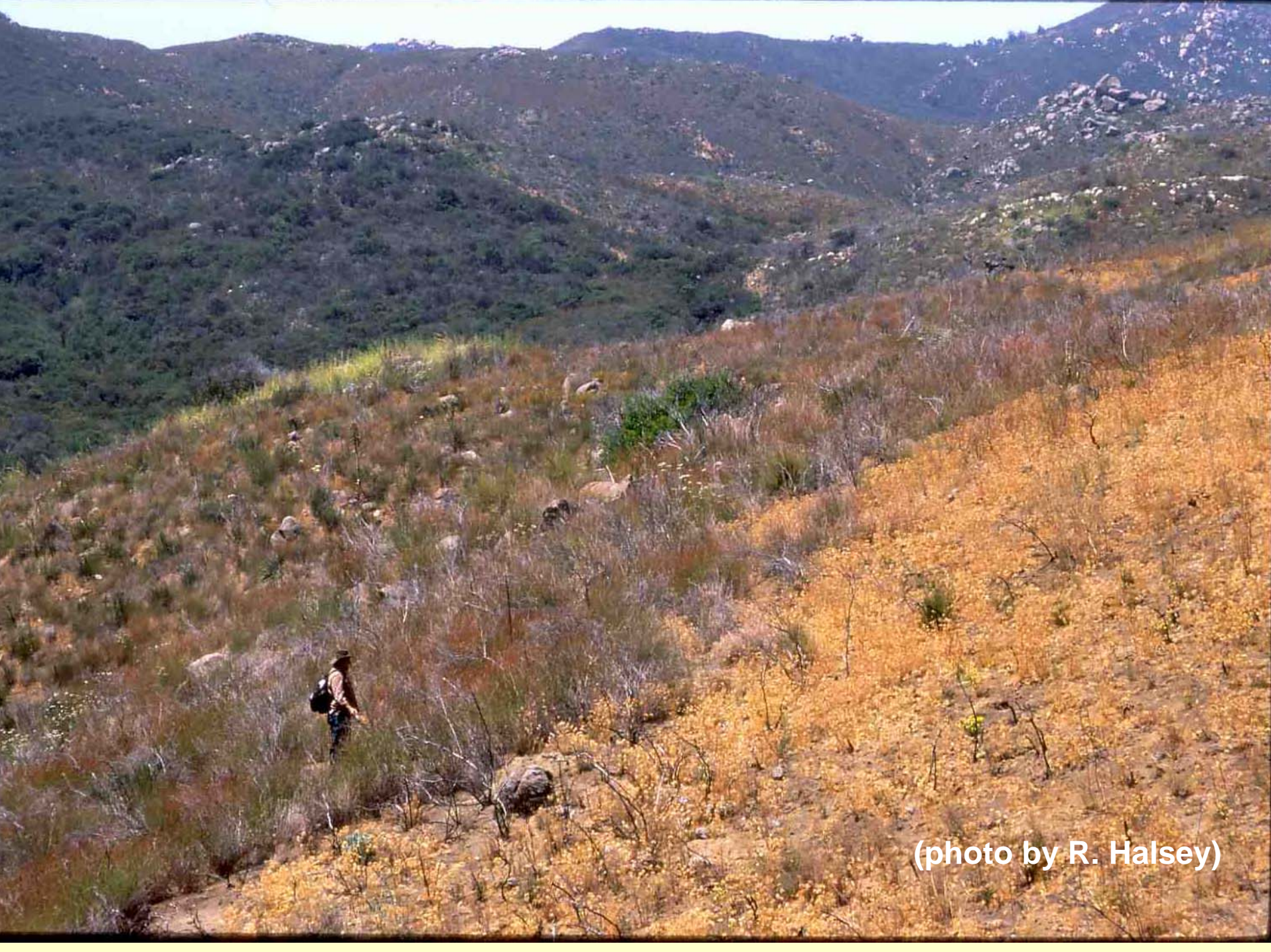
(Keeley & Halsey, unpublished)



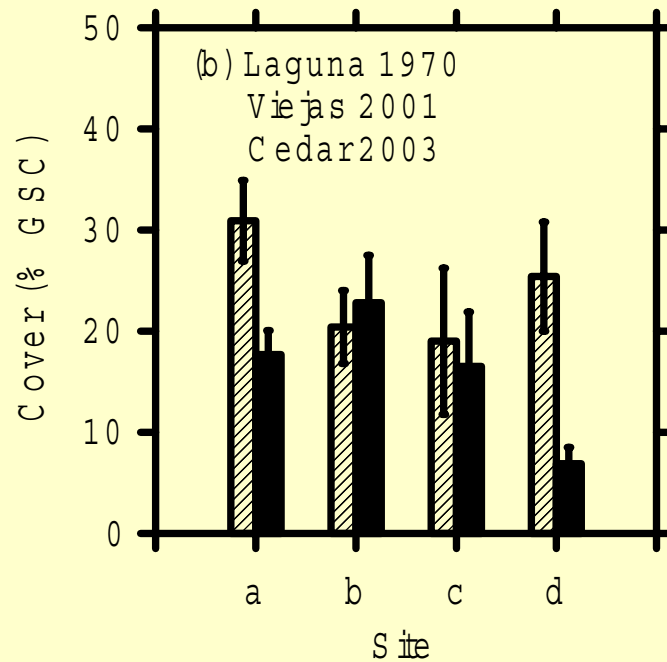
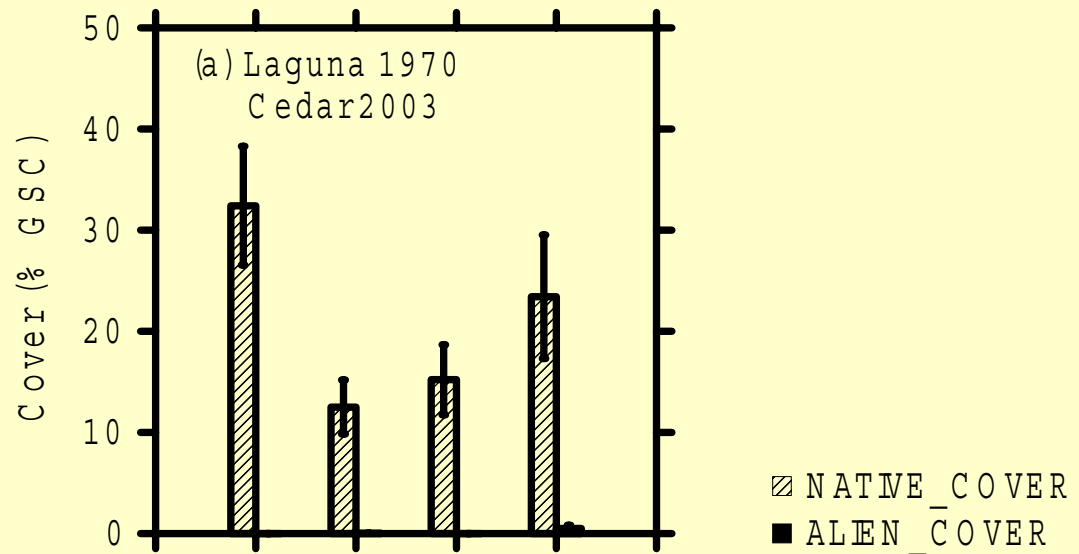
(photo by R. Halsey)



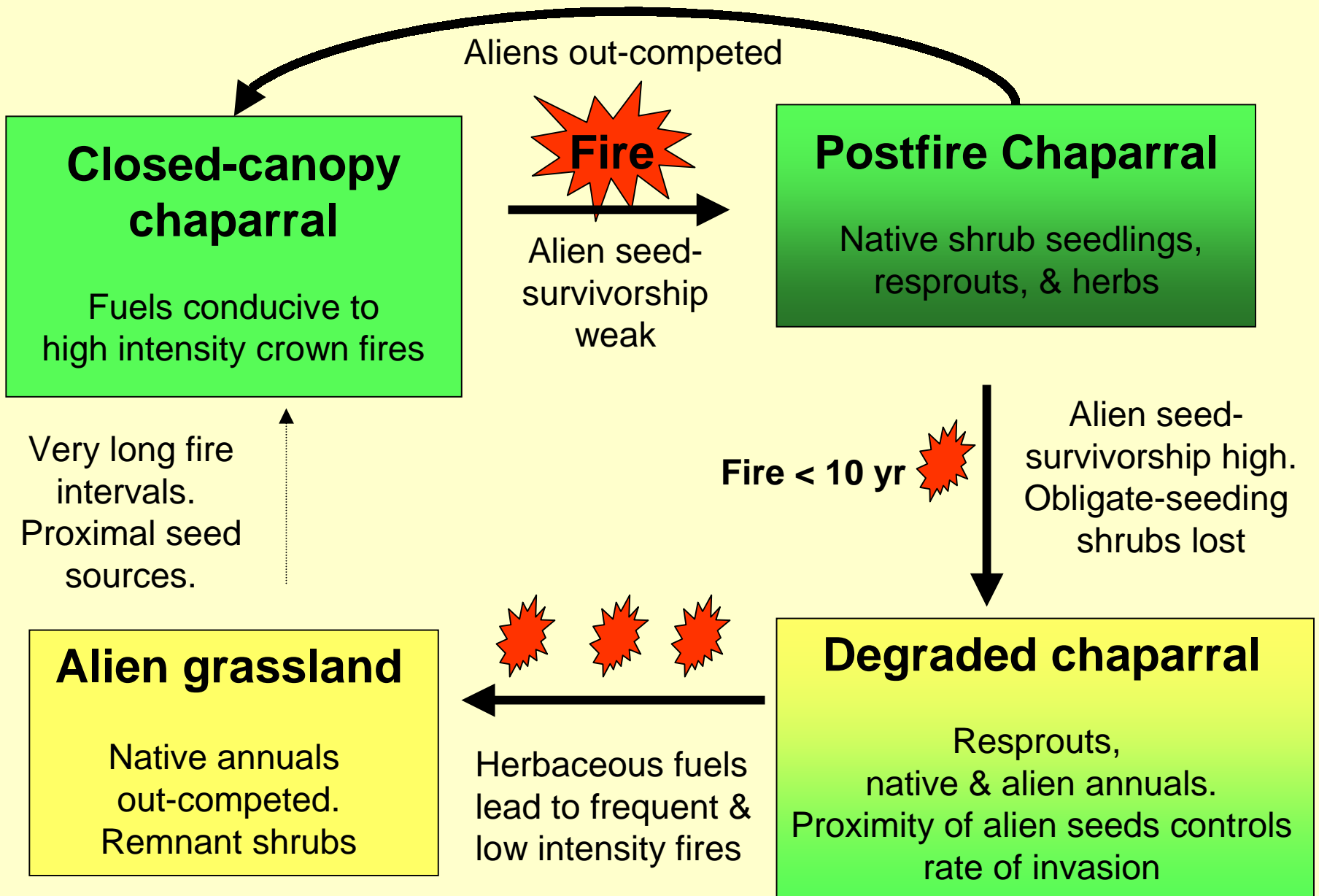
(Keeley & Halsey, unpublished)



(photo by R. Halsey)



Natural fire cycle 30 – 100 yr



Malibu Canyon



Photo by Anna Jacobsen, Pepperdine University

Fire Management Activities at the Interface

1 Fire Suppression

**2 Fuel reduction
Prescription burning**

3 Prescription burning to target noxious aliens

4 Fuel breaks

5 Postfire rehabilitation



**Prescription burning in crown-fire ecosystems
is highly problematic**

**High intensity contiguous fuels often force prescriptions into
cool season burns, & potentially catastrophic resource impacts**

Fire Management Activities at the Interface

1 Fire Suppression

2 Fuel reduction

 Prescription burning

3 Prescription burning to target noxious aliens

4 Fuel breaks

5 Postfire rehabilitation

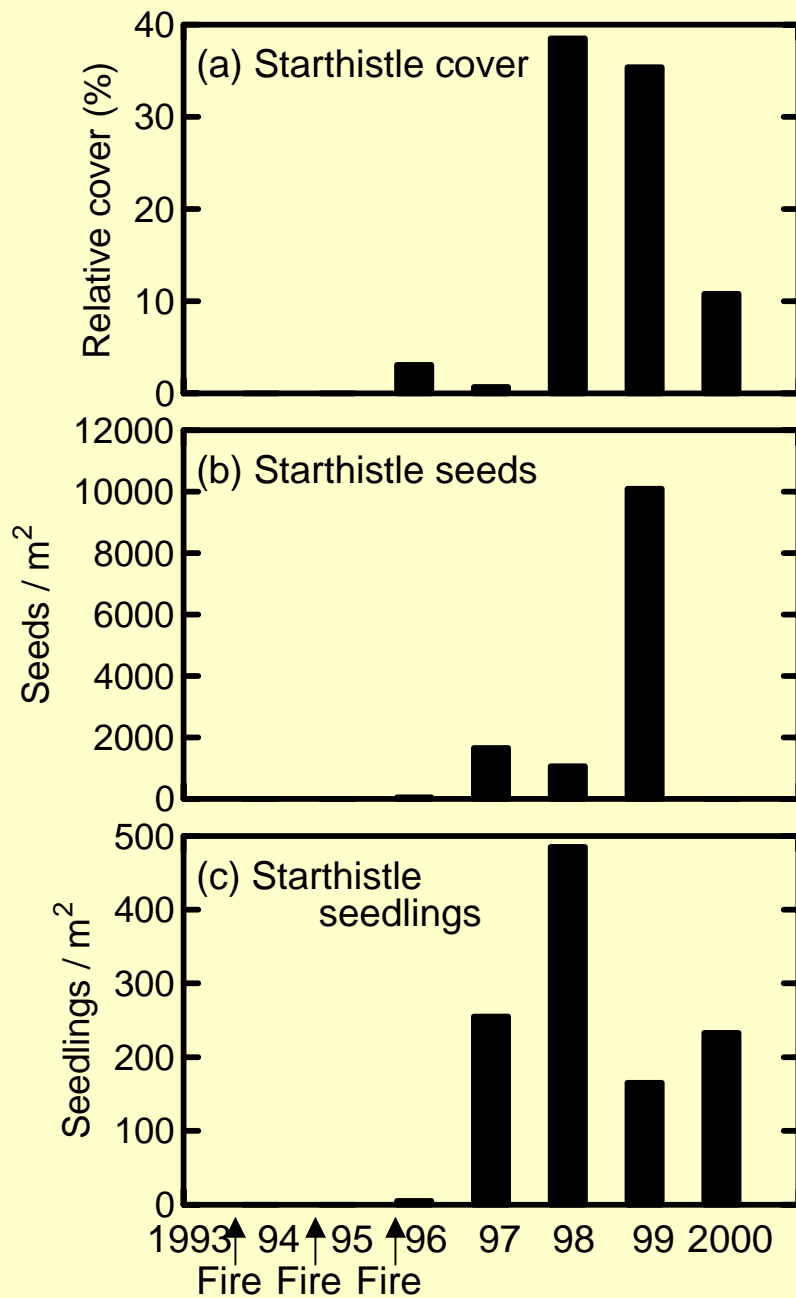
Prescribed burn plans are often justified as a means of controlling noxious alien species

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

Yellow starthistle
Centaurea solstitialis L.



Centaurea solstitialis



(Kyser & DiTomaso 2002)

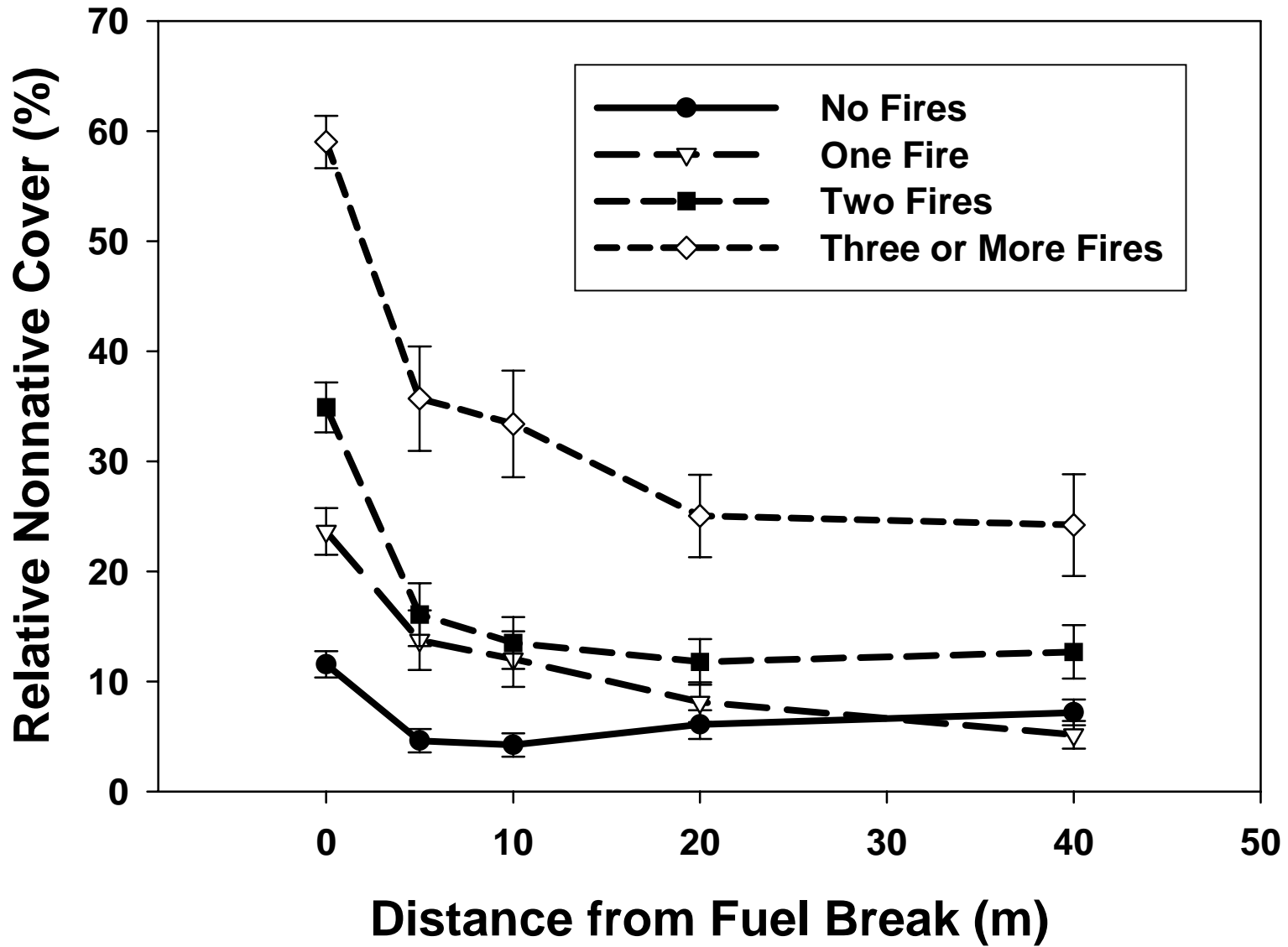
Fire Management Activities at the Interface

- 1 Fire Suppression
- 2 Fuel reduction
 Prescription burning
- 3 Prescription burning to target noxious aliens
- 4 Fuel breaks
- 5 Postfire rehabilitation





Fuel breaks provide ideal sites for alien invasion
They act as corridors and transport aliens into wildlands
Lower fuels enhance alien seed survivorship from fire
High perimeter to area ratio enhances colonization following fire



Fire Management Activities at the Interface

- 1 Fire Suppression
- 2 Fuel reduction
 Prescription burning
- 3 Prescription burning to target noxious aliens
- 4 Fuel breaks
- 5 Postfire rehabilitation**

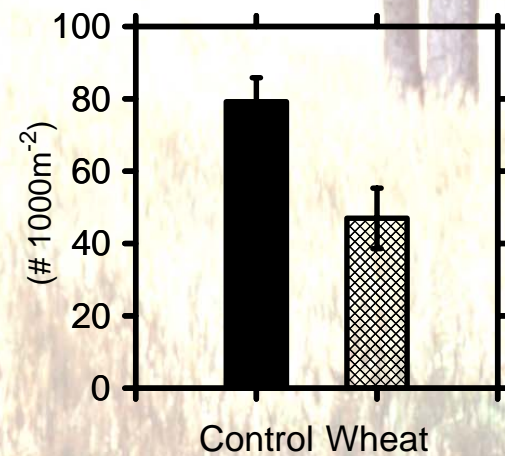
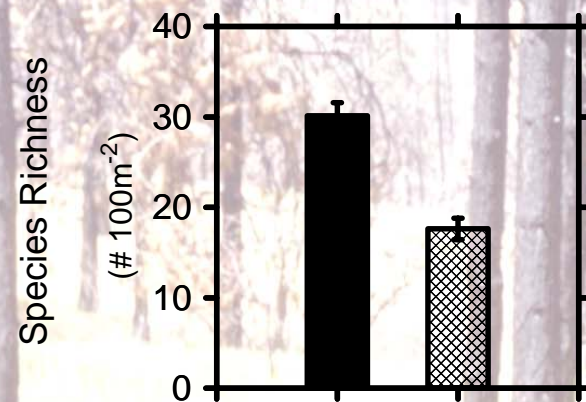
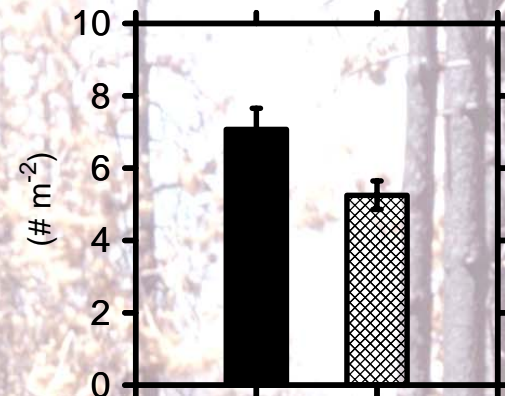
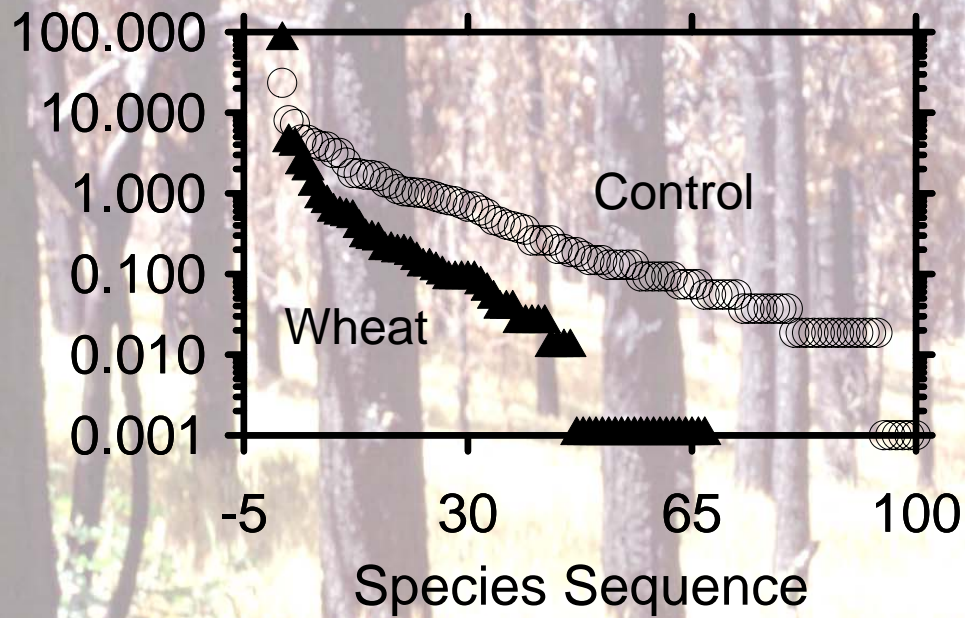


A photograph of a forest with charred tree trunks and regrowing vegetation, serving as a background for the text. The scene shows a mix of dark, blackened tree trunks and some trees with sparse, brownish leaves. The ground is covered in tall, yellowish-green grass. In the background, there are rolling hills and a clear blue sky.

BAER

**Burned Area Emergency
Rehabilitation**

Relative Cover



Control Wheat

