Central and North Coast Range Fire Ecology

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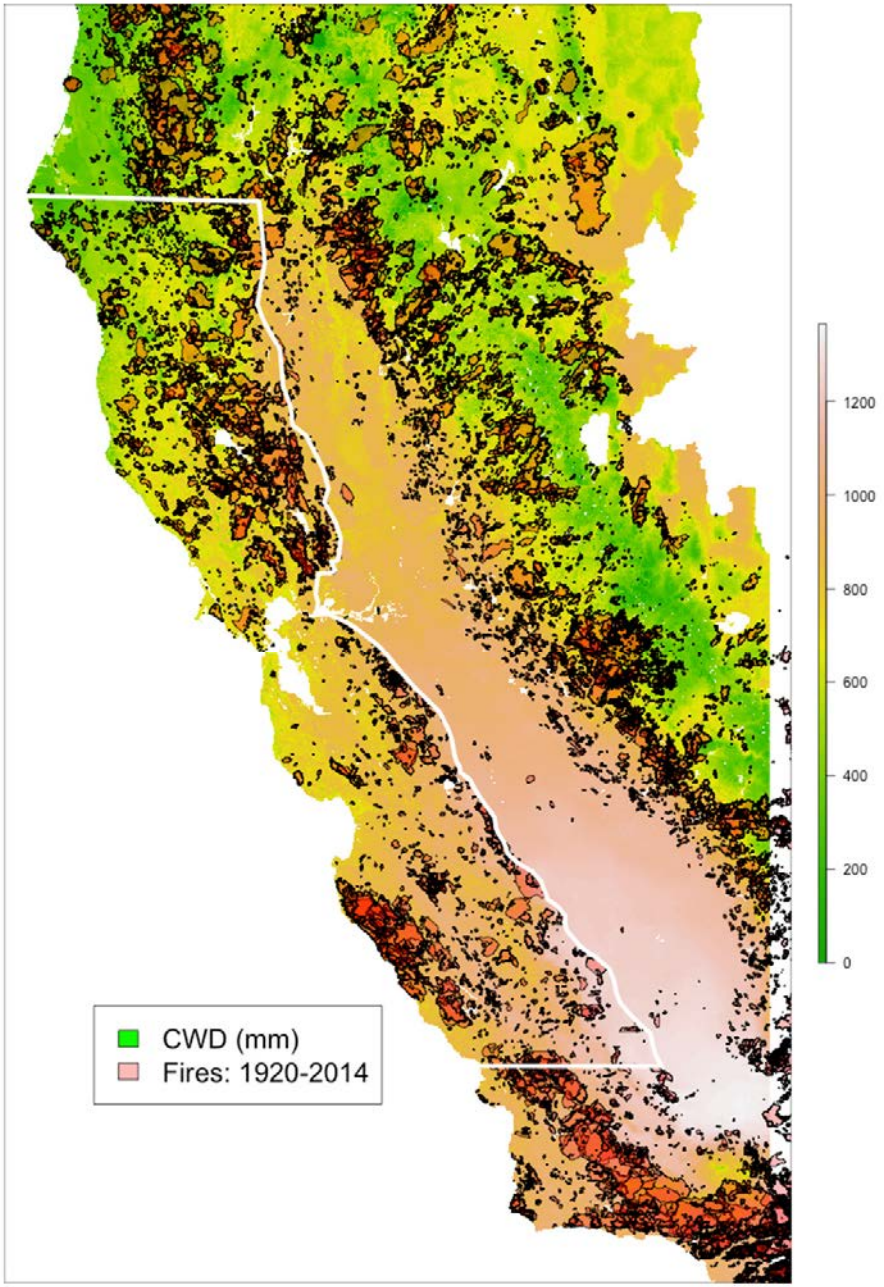


Area of interest for conference

Large area of coastal California and interior (Scotia to Morro Bay)

Very diverse vegetation types in this area, from mixed conifer to prairie

Fire regimes just as diverse as vegetation

First, some history

Harold Weaver, Herbert Stoddard, Harold Biswell at 1967 Tall Timbers Conference, Hoberg, Lake County, CA.

Stoddard - Longleaf pine in southeast. Weaver BIA Forester, Biswell came to CA in 1947

Hoberg Fire Capital of world in 1967

Jameson Karns found picture

Hoberg's Resort after the Valley Fire.
After Biswell retired in early 70's, prescribed Fire program in ponderosa pine ended

Proceedings of the 1967 Tall Timbers Conference

Biswell, Weaver, Vogl, Hartesvelt, Stoddard all discussed ecological importance of fire

Raymond (CDF), Zivnuska (UCB) did not support

Brush 'control' big

Ignitions in Conference Area

- In higher mountains lightning ignitions occur - come in waves (June 2008)
- Low elevation or coastal areas, human ignitions dominated
  - Lightning ignitions rare, lightning occurs but normally with rain
  - Current record of fires in the coastal area of California document few lightning fires

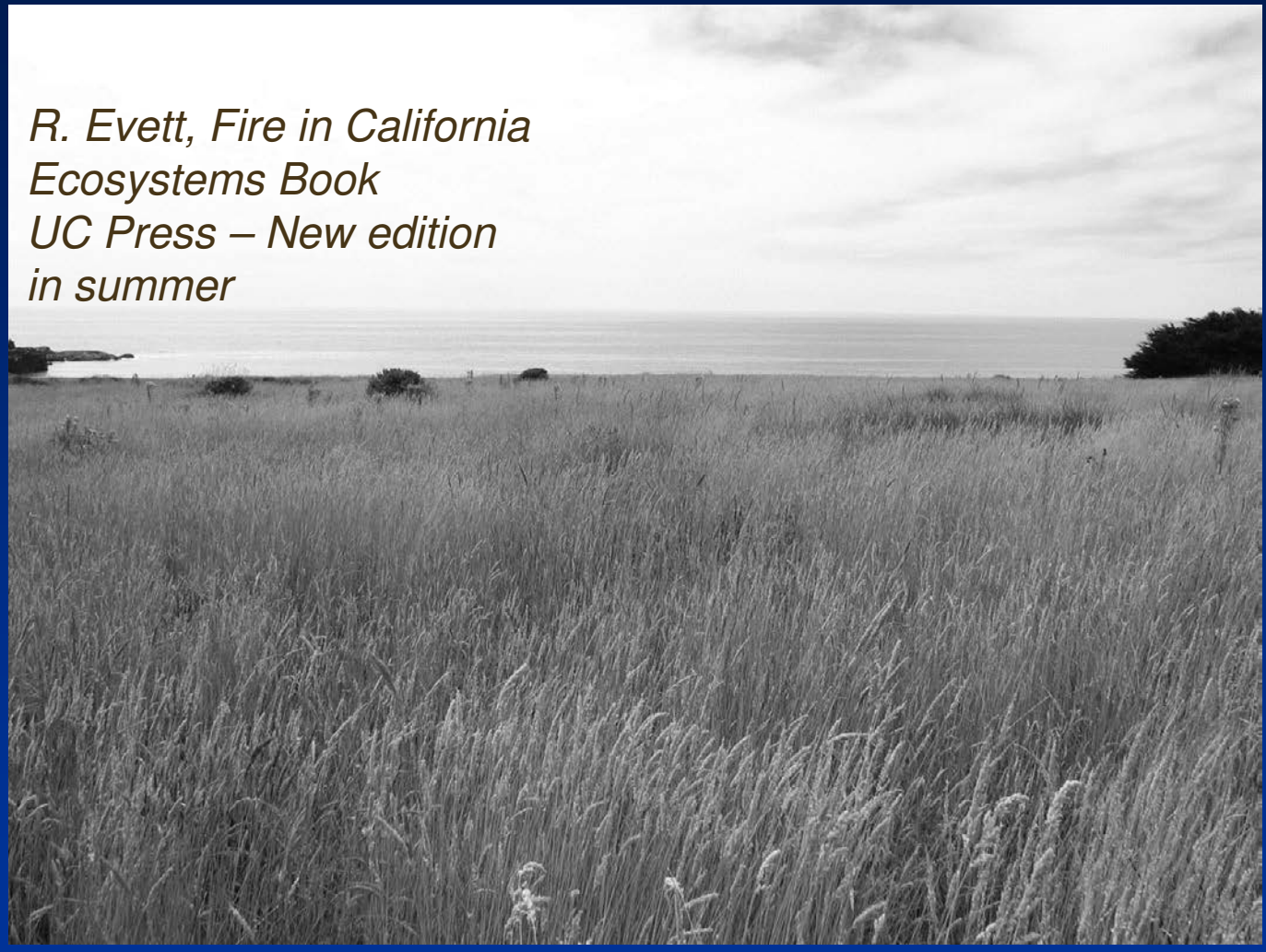
Native American Burning

- Native Americans burning common in this region (Forgotten Fires – Omer Stewart University of Oklahoma Press 2002)
  - This book first sent to a New York publisher in the early 1950's
  - Then Viking Fund Publications in Anthropology
  - Then Tall Timbers Research – held it for 25 yr
  - Finally to Univ Oklahoma Press in 1992, six months before he died. Published in 2002
- Systematic suppression of his work – Julian Steward and others Why?

Native Americans Burned for Specific Objectives

- Evidence
  - Footnotes of early explorers
  - Interviews of elders for their traditions
  - Fire scar study later
- Strong cultural history of fire use for diverse objectives
  - Interest in restoring fire as a cultural process
- Vegetation Types Now
- Coast to Interior

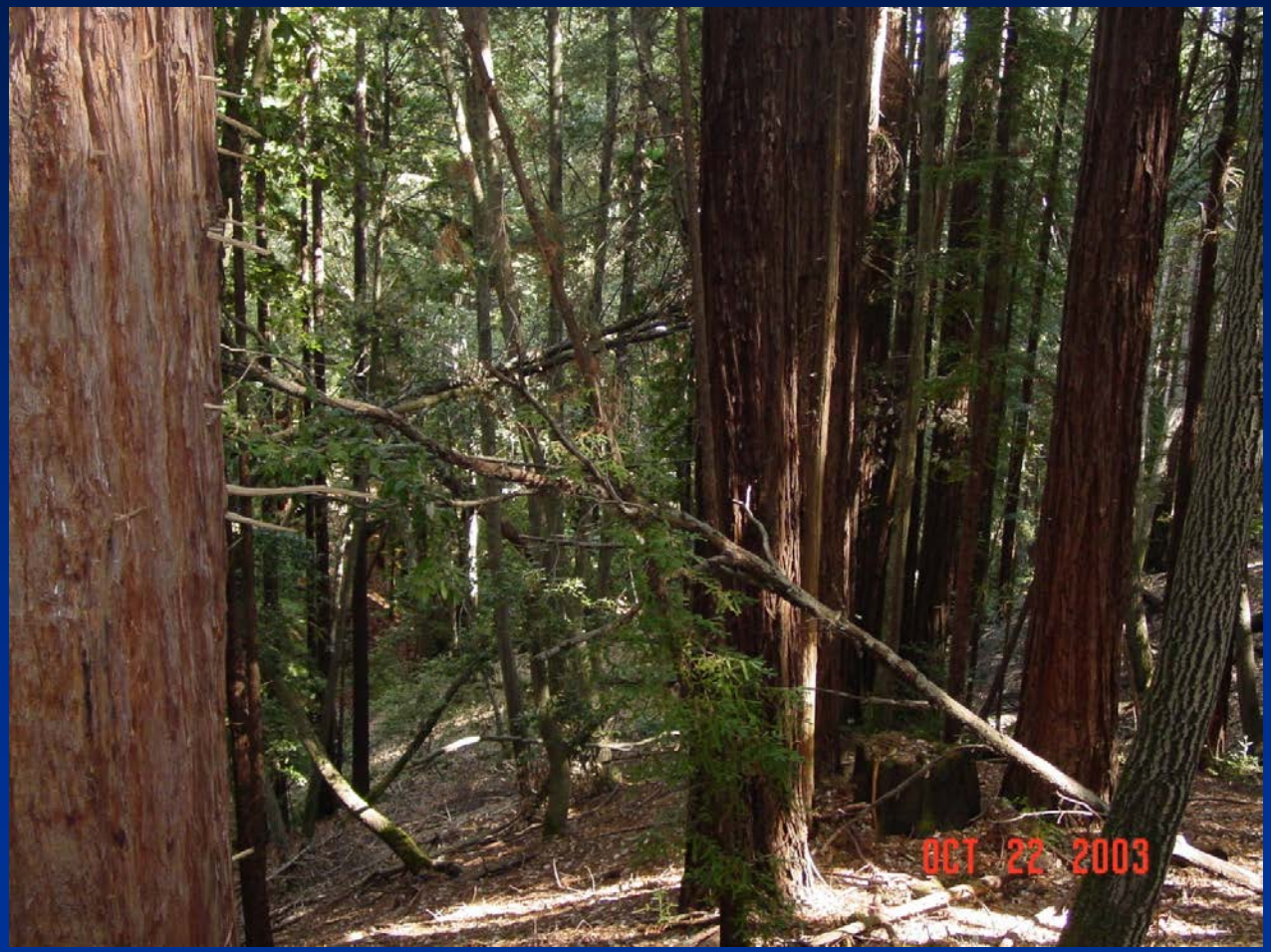
Coastal Prairie
Dominated by Perennial Grasses



Fire intervals – short from Native American burning; Fire severity - high;
Fire sizes – low to moderate

Coast Redwood Forests

Fire Scars From Human Ignitions



Majority of studies found short fire return intervals; low severity fires; size probably small to moderate

Fire Scar Collection in Redwood

Santa Cruz Mountains

Fire scars cut from old stump

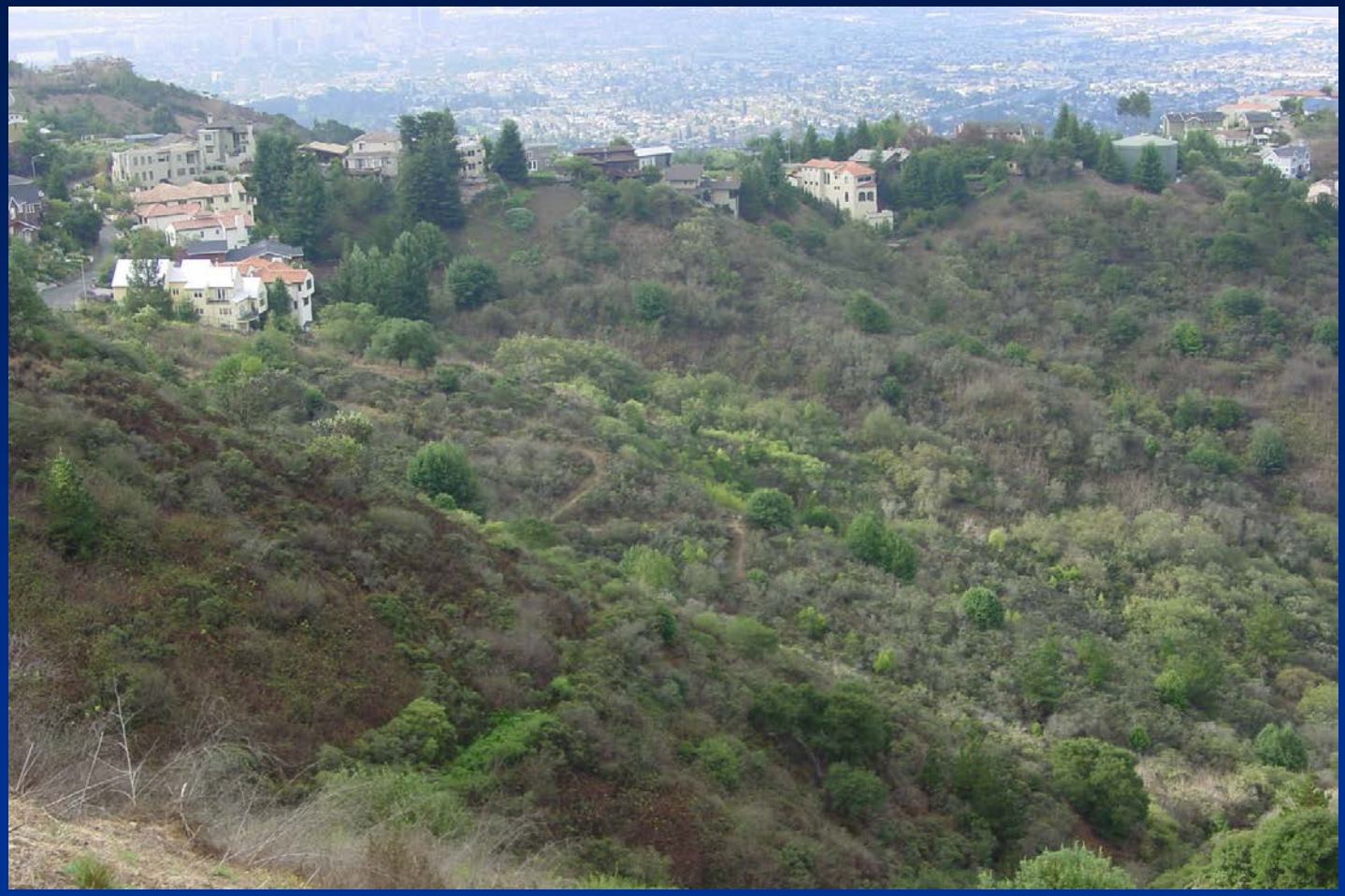
Evidence of Native American burning

California Annual Grasslands

Jasper Ridge Prescribed Fire Study

Fire intervals – short from Native American burning; Fire severity - high; Fire sizes – moderate to large

Coastal Scrub – Coyote Bush
Oakland Hills



Fire intervals – moderate; Fire severity - high; Fire sizes - moderate

Oak Woodlands, Mixed Oak Woodland

Prescribed Fire Hopland Field Station

Frequent, low intensity fires once common in oak woodlands from Native American burning

Oak woodlands, Mixed Oak Woodland

2017 Nuns Fire in Bouverie Preserve near Glen Ellen

Very little tree mortality from fire, reduced mistletoe?

Prescribed fire in Oregon Oak Woodland

(photo by John McClelland)

Burning retards Douglas-fir invasion

Mixed Evergreen Forest, Chaparral

2017 Nuns Fire in Bouverie Preserve near Glen Ellen

Fire patterns largely follow vegetation types
Mixed evergreen forest, moderate fire severity

Sudden Oak Death in Tanoak Forest

Marin County

Interactions of fire regime with an invasive species
Most studies found increased severity with SOD

Chaparral at BLM Cow Mountain

Infrequent, high severity fire regime

Chaparral Prescribed Fire in Hopland

Fire Behavior in Mild Conditions – Wildfire?

Chamise Sprouting Six Weeks After Fire

Diverse Annual and Bi-Annuals After Fire in Chaparral

Fires too often can lead to grassland dominance

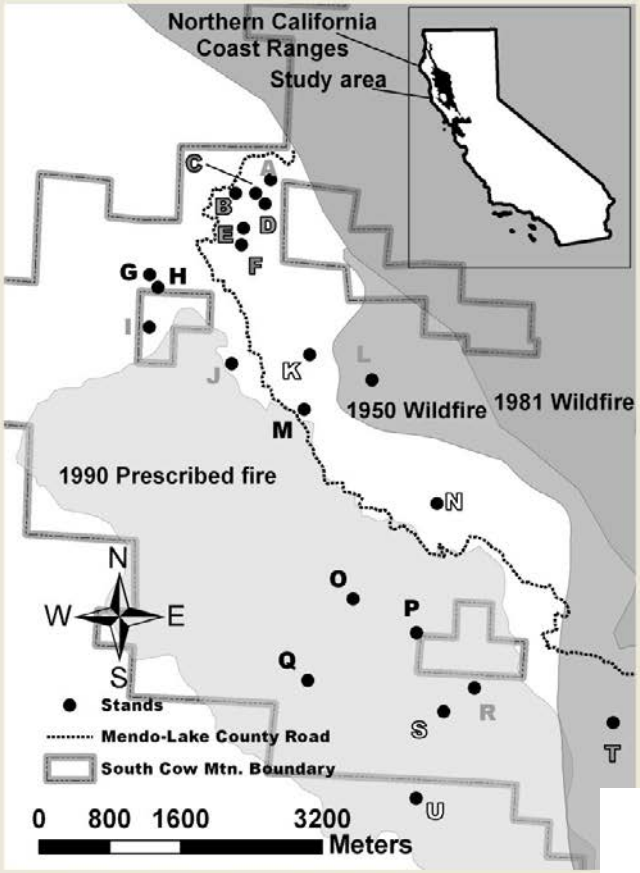
Knobcone Pine Prescribed Fire

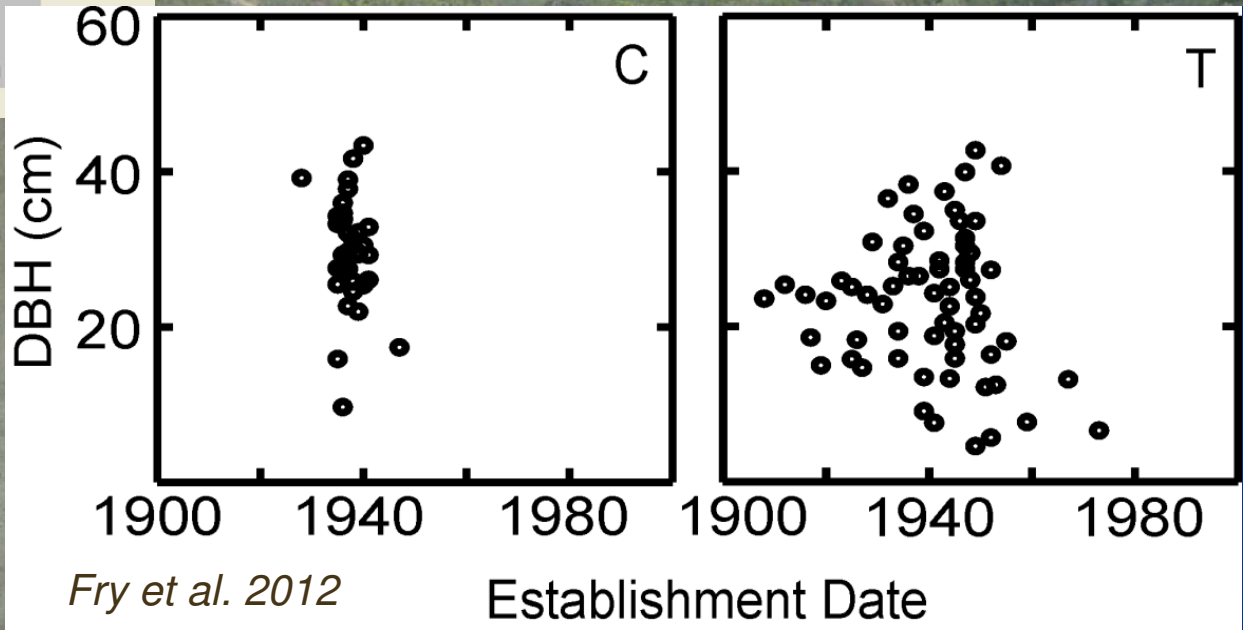
Closed Cone Species

High severity fire; Moderate to long interval; fire size moderate to large

Post High Severity Conditions

Regeneration From Canopy Stored Seed



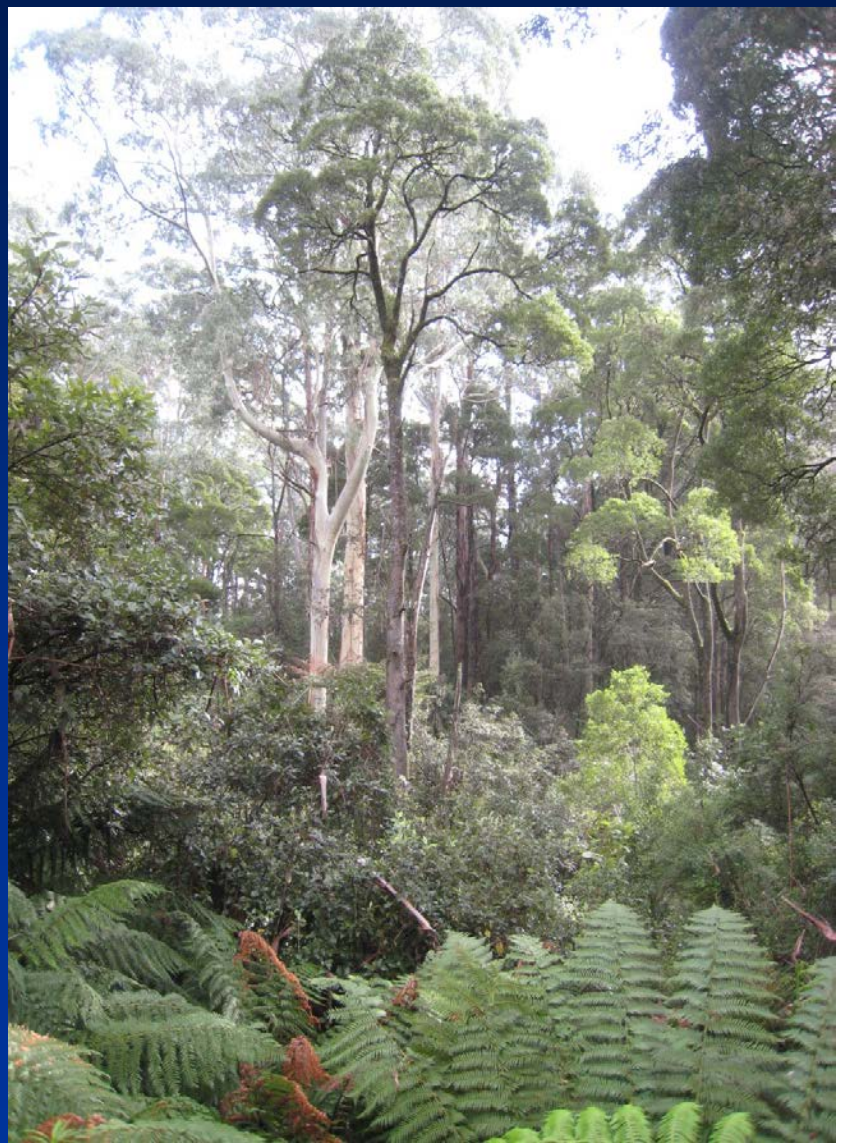


Fry et al. 2012

Blue Gum Eucalyptus Forests

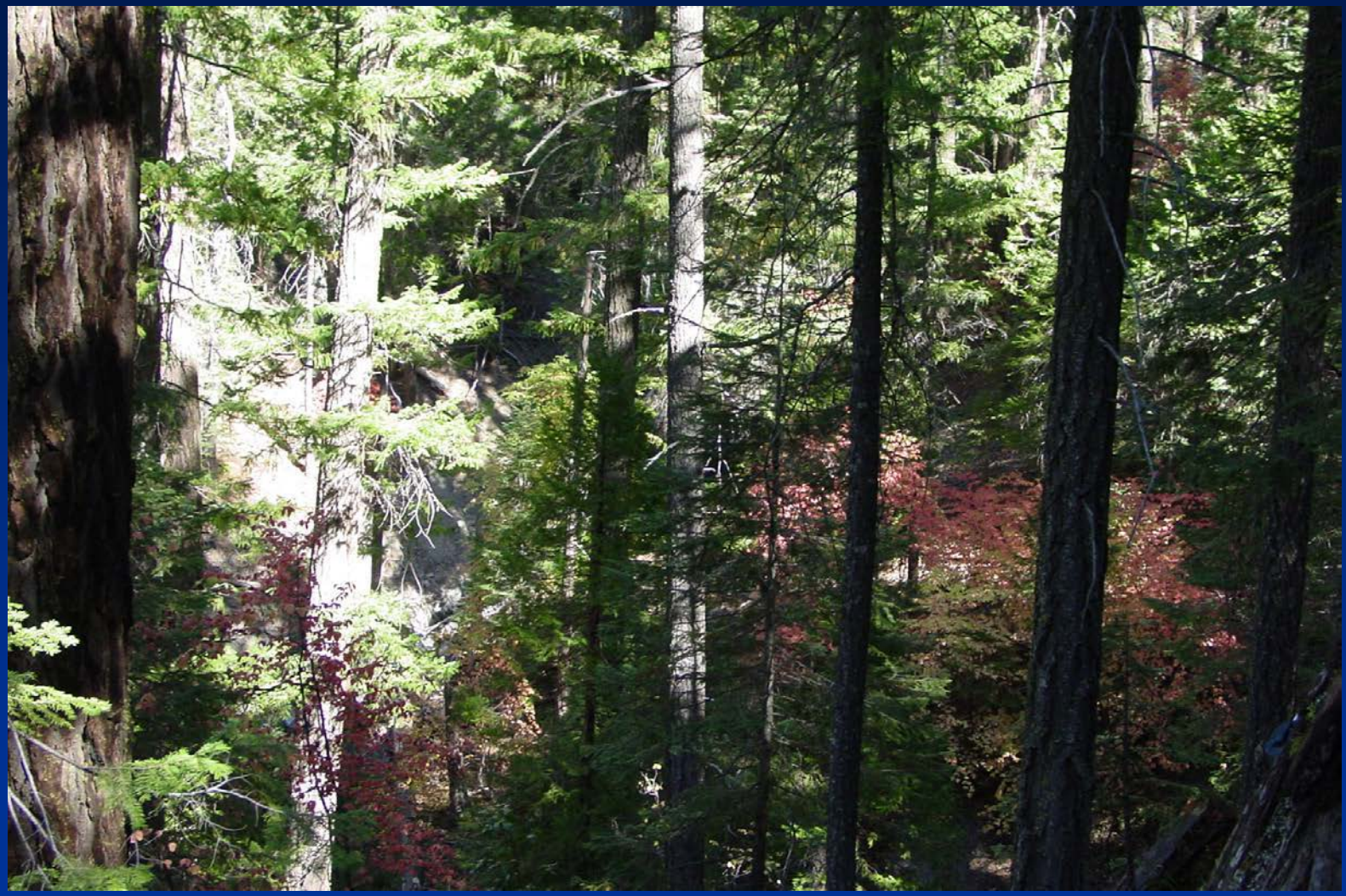
Australia High to Moderate Fire Severity

California –
East Bay Hills



Victoria Australia
Native Coastal
Species

Douglas Fir Forest in North Coast



Moderate to High Severity; Interval Low-Moderate; Fire size moderate

Ponderosa Pine Forest

North Coast in Mendocino National Forest

Low Severity Fire; Short Fire Return Interval

Fire Scar Collection in Ponderosa Pine

Mendocino National Forest

Alan Taylor inspecting stump

Collected fire scar

Outcome from Ponderosa Fire History Study

- Scars from ridges adjacent to Sacto Valley
  - Unusually short fire return intervals compared to areas in northwestern California pre 1850
  - In northwest, most fire scars found at ring boundary, few in earlywood
  - In contrast, 35% of the fire scars in earlywood with few at the ring boundary before 1850
    - This changed after 1850 with scars in ring boundary
  - Change in season and intervals occurs when Native American burning ends in Sacto Valley
    - *Skinner et al. 2009 (Fire Ecology)*

Vegetation and Fire Summary

- Grassland, oak woodlands, prairie, redwood
  - Native American fires once very common
- Chaparral, closed cone pine forests
  - Wildfires most important disturbance today
    - If frequency within natural range – fine
    - Climate change could change these types
- Eucalyptus, high fire hazards and productive
  - Challenging in the wildland-urban interface
- Ponderosa pine and Douglas-fir forests
  - Increased fire hazards from fire suppression

Summary

- Fire will continue to be a major force in area
  - Climate change will impact regimes
  - High severity regimes most sensitive
- Human ignitions dominate coast, today and past
  - Lightning a factor in interior mountains
- Urban-interface fires growing challenge
  - More direct engagement home owners needed
- Native American use of fire could increase
- No ‘one size fits all’ for management alternatives in area – Fire Regimes Critical

Acknowledgements

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Papers available at:
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Community Fire Brigade in Canberra, Australia

Australia has done a much better job of engaging people who live in the WUI (*Stephens et al. 2009*)

In USA mostly done by volunteer groups, better led with extension/outreach employees

Prepare, stay, defend, or leave early – Australia

Catastrophic fire danger level with climate change

Ready, set, go - USA

Knobcone pine

Fire Regimes

- In a given area over long periods of time
  - Primary effects on plants
- Major attributes include…
  - Temporal attributes
    - Seasonality
    - Fire return interval
  - Spatial attributes
    - Fire size
  - Magnitude attributes
    - Fireline Intensity – heat
    - Fire severity – change in dominant vegetation
  - Interactions
    - Drought, insects, invasive species