# Fire And Non-native Invasive Plants In The Southwest Coastal Region: Patterns, Perceptions, Misperceptions, And Recommendations

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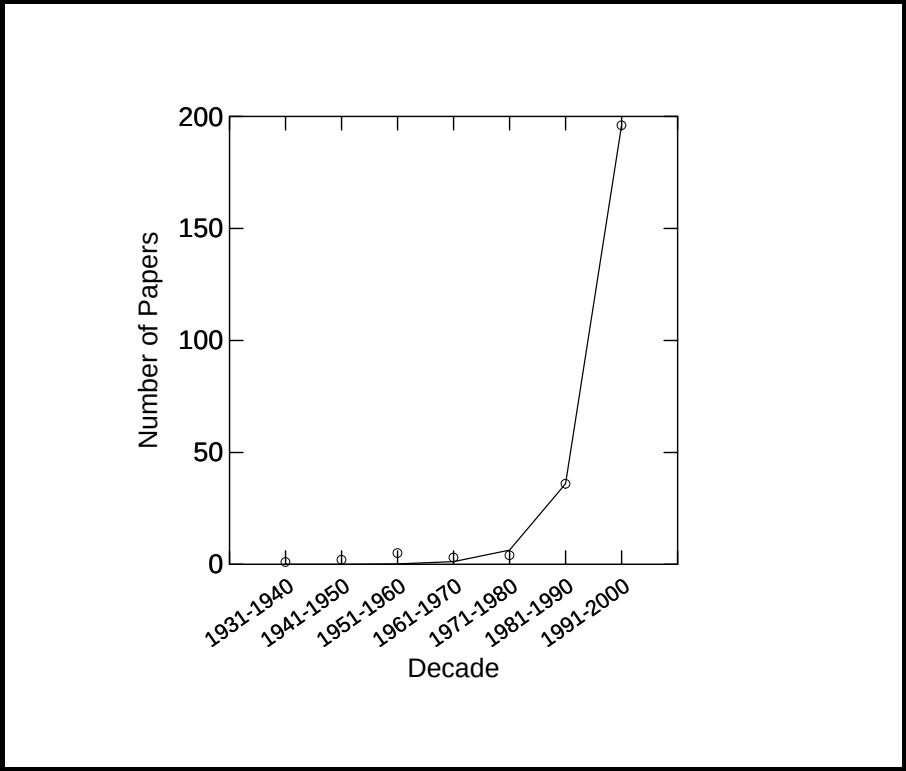
# Approach

- Minimize redundancy
- Emphasize interactions with other factors facilitating invasions

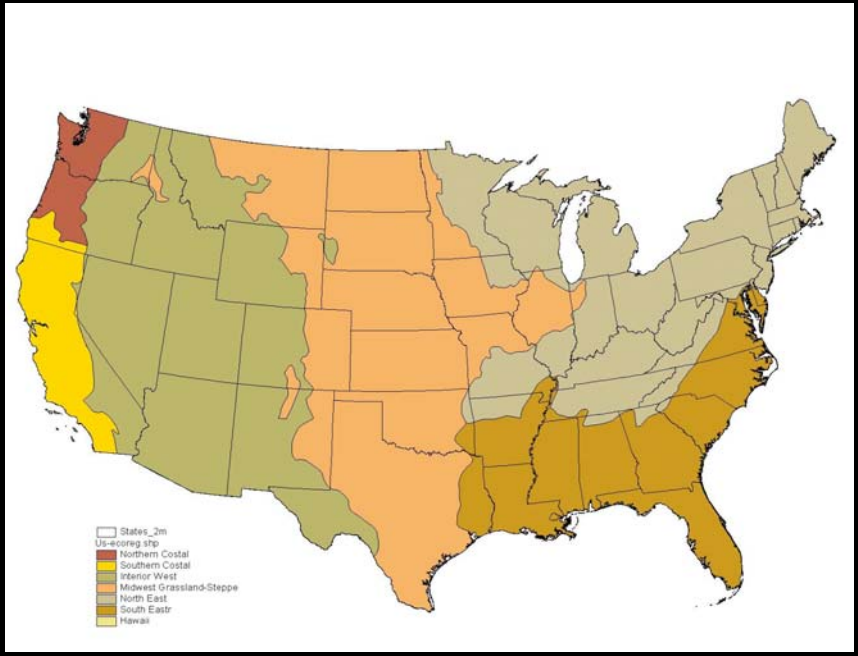


# Two Perspectives

- Invasive Plants ⟷ Fire Regimes
- Use of fire as a control method
- Vegetation types
  - Grassland/Oak Savanna/Oak Woodland
  - Chaparral/Coastal Scrub
  - Mixed evergreen
  - Conifer forest

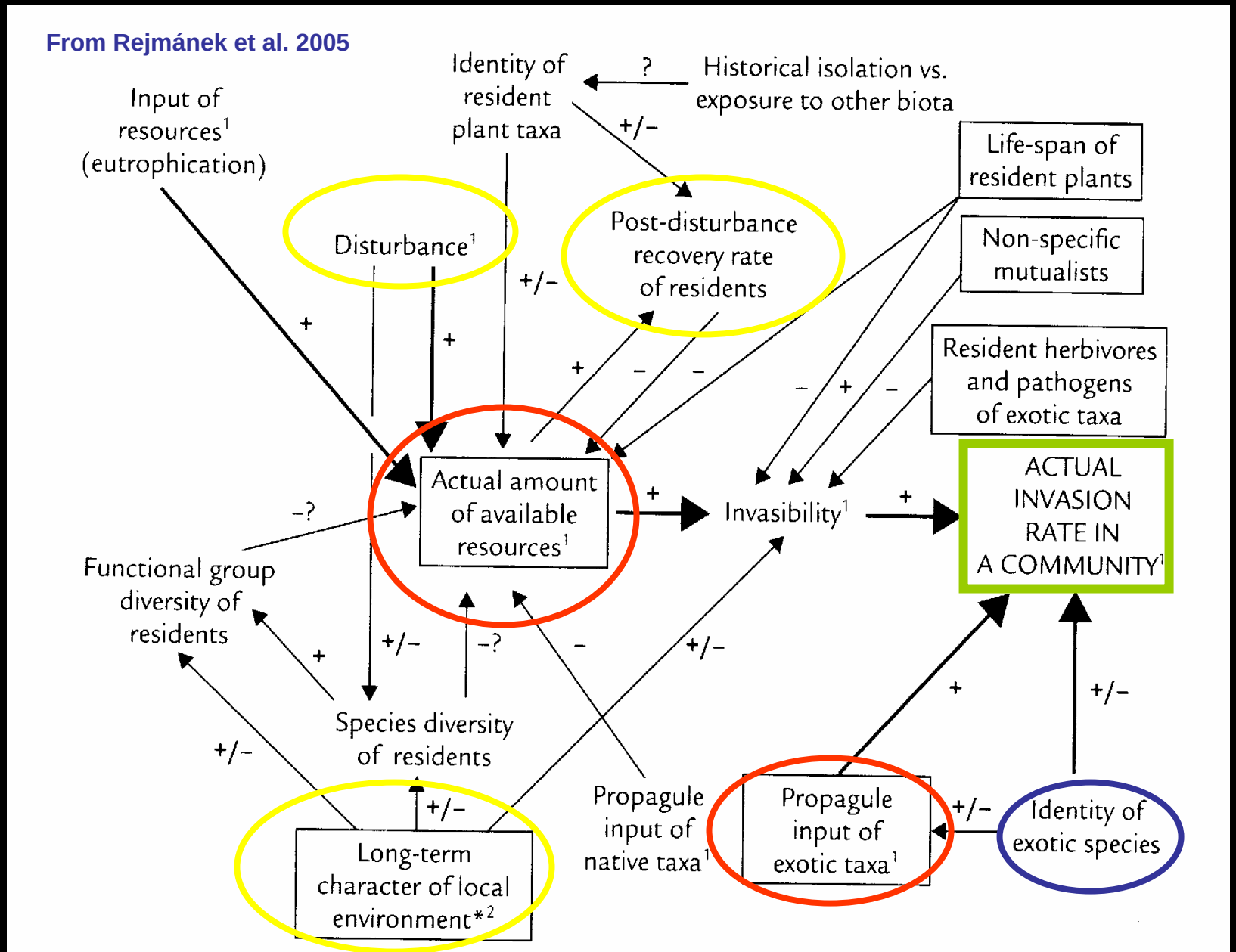
# Floristics Of The Southwest Bioregion

- California floristic province
  - ≈ 3500 native species (4693 in California)
  - 2125 endemics (61%)
  - ≈ 1020 non-native species (22.5%)

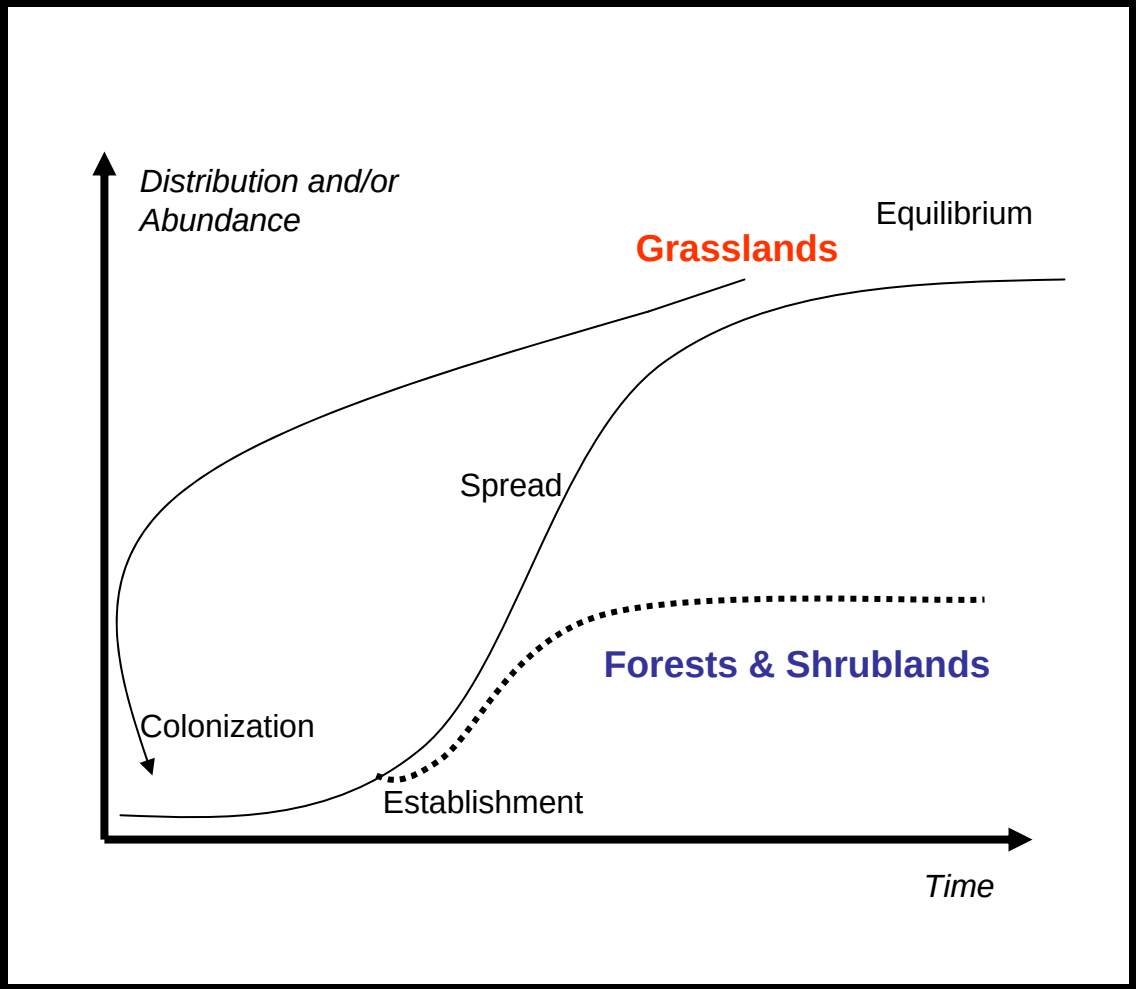


# Fire Alone Does Not Lead To Invasion!

**(but it helps)**



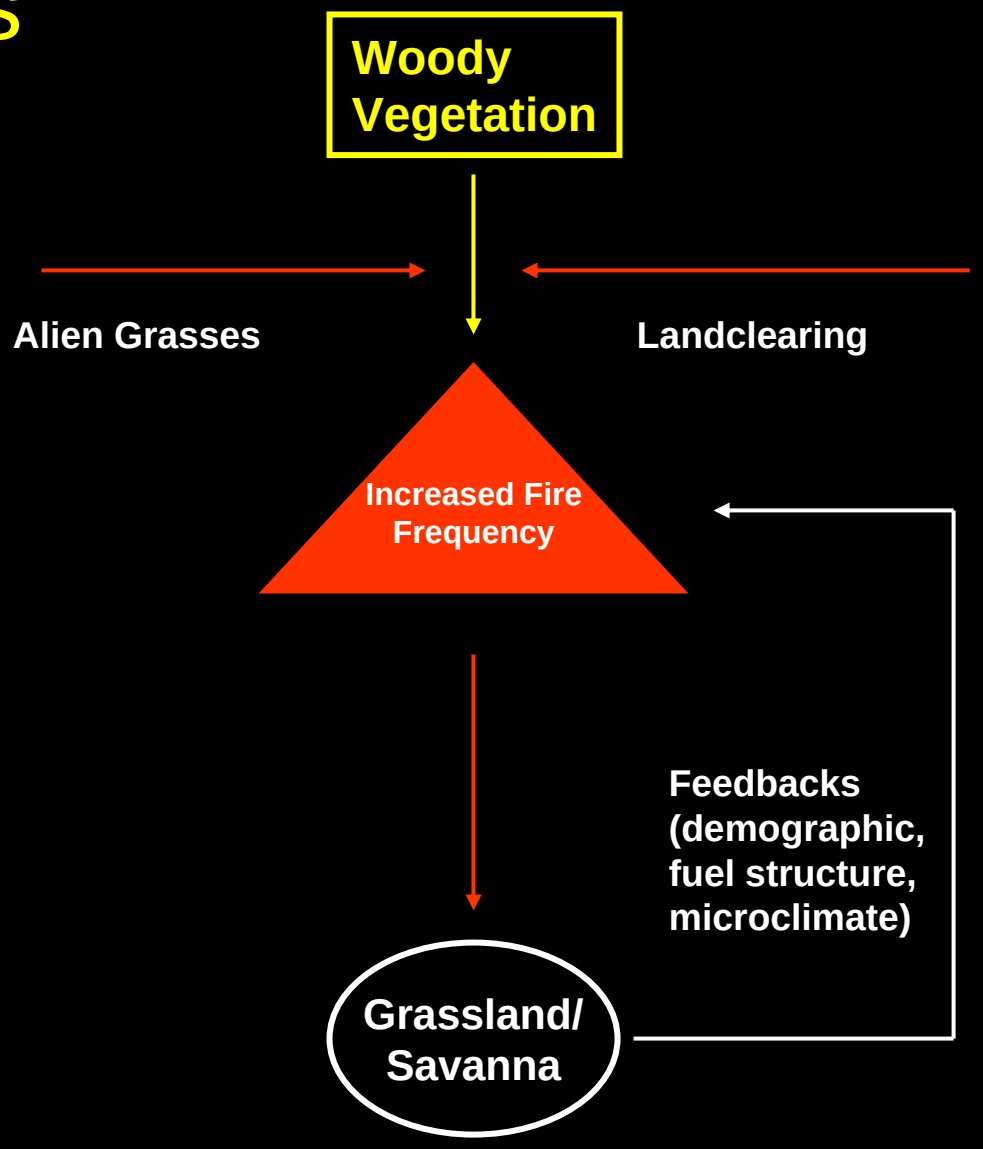
# Invasion Is Not A State. It Is A Process



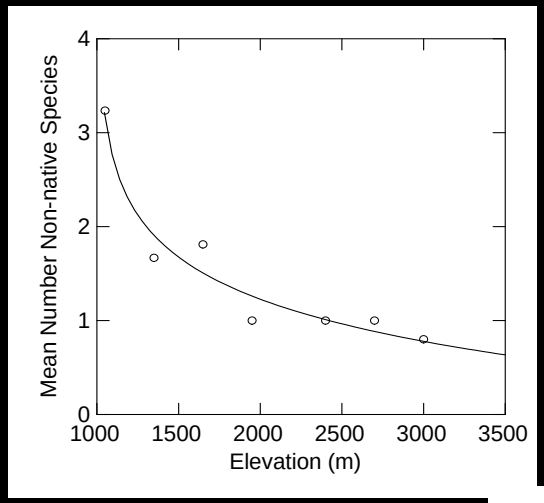

- Grasslands
  - Dynamic equilibrium for > century
- Forests & Shrublands
  - Intact stands not heavily invaded

# Disturbance & Recovery Rates

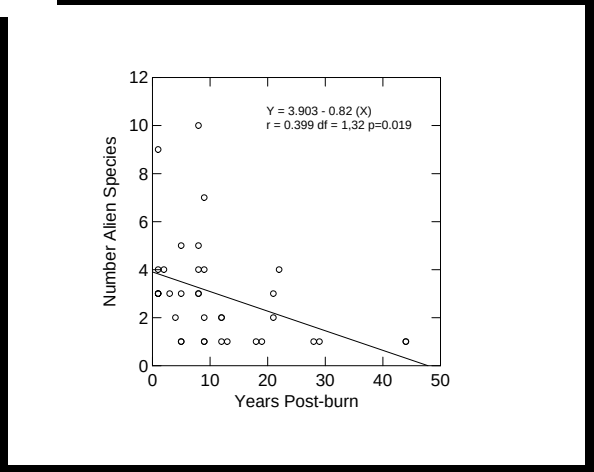
- Alteration of *disturbance regime*
- Shorter generation time of invasive plants
- Example
  - Chaparral & coastal scrub



# Resource Availability




**Can facilitate or decouple invasion rates**




- Environmental Conditions (indirect)
  - Physiographic
  - Land Use
  - Climatic
- Resource availability (direct)
  - Light
  - Moisture
  - Nutrients
  - Space
- Examples
  - Chaparral soils (Safford & Harrison 2003)
  - Montane forest & shrubland canopies (Keeley et al 2003, Klinger et al 2006)

# Propagule Pressure & Species Pool

- Possibly the most important factor
- Example
  - Merriam et al. 2006

# Fire As A Control Method

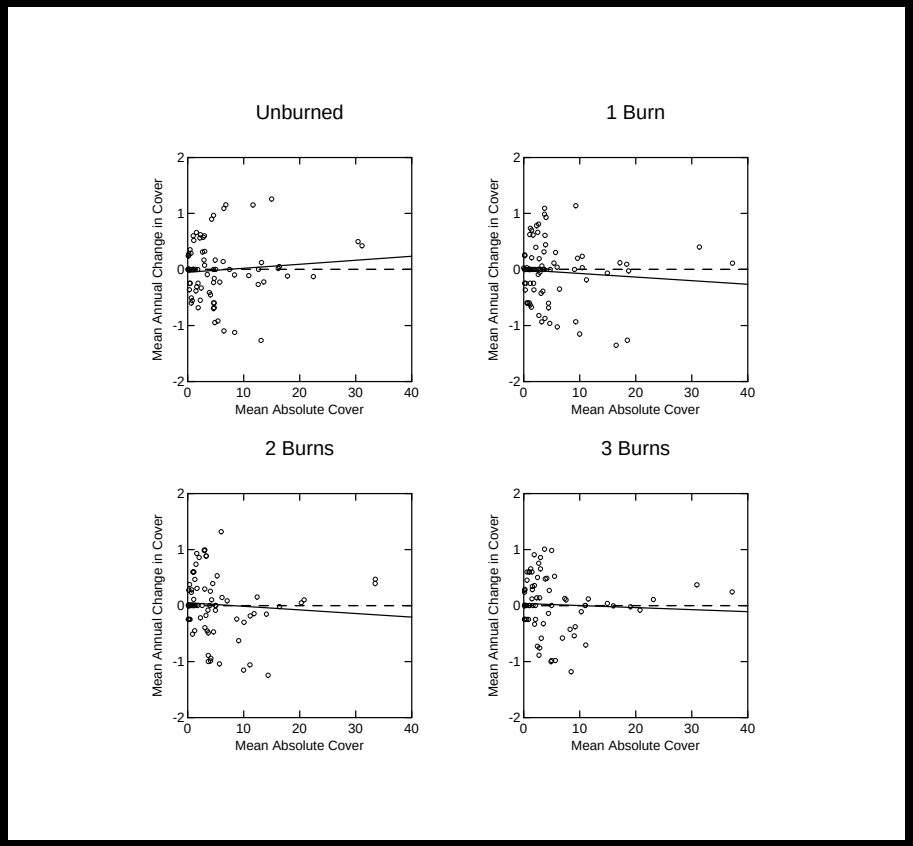
- Vast majority of effort has been in grasslands
- Single species targets
- Community targets

# Success?...

- Well…
  - Single species studies
    - Timing (season) and frequency important
    - Short-term decrease
  - Community studies
    - Short-term decrease in non-natives
    - Communities still dominated by non-natives

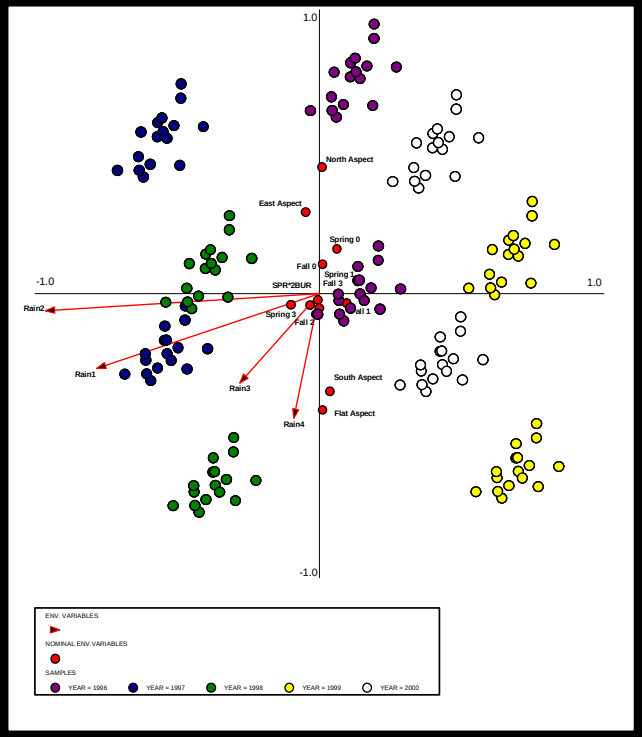
# Why?

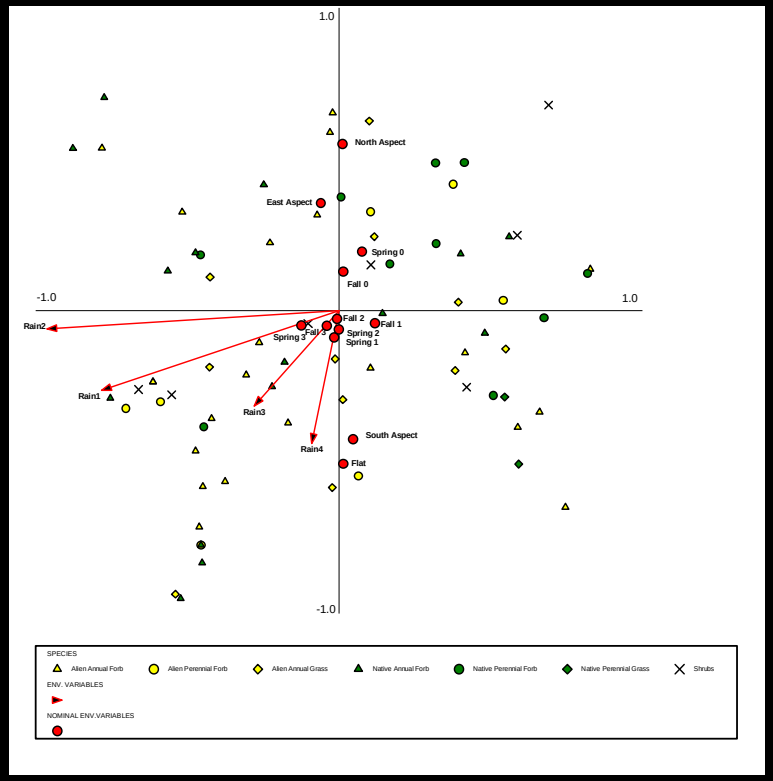
- Multiple invaders
- Individualistic species responses
  - Demography
  - Seed bank
  - Dispersal
  - Phenology

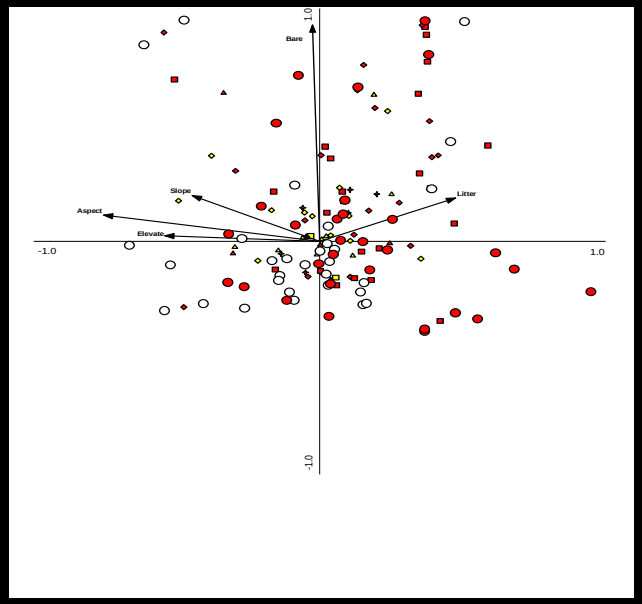


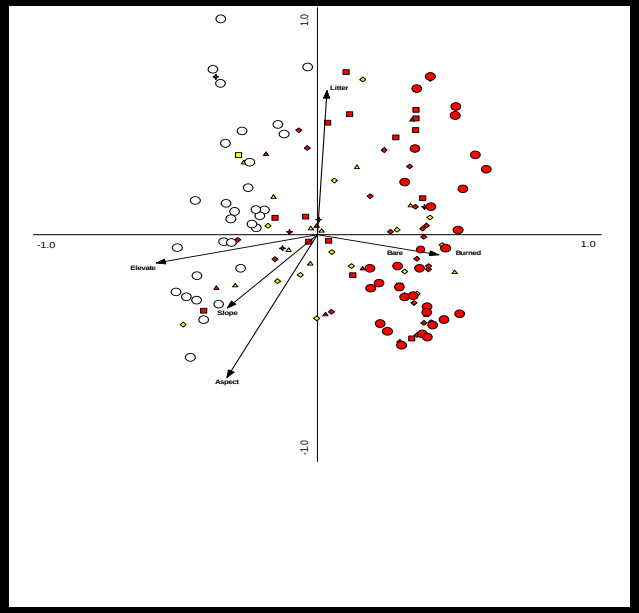
# Why?

- Fire secondary to other environmental factors



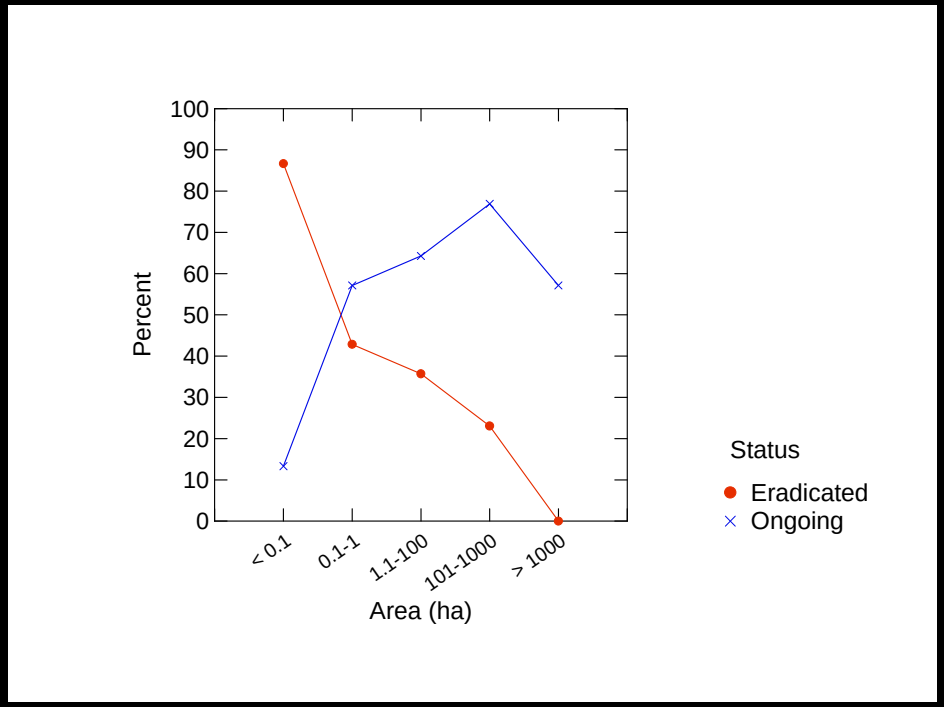






# Why?

- Temporal bias
- Spatial scale




From Rejmanek & Pitcairn 2002

# Some Important Exceptions

- Santa Rosa Plateau
- Vernal pools in northern Central Valley

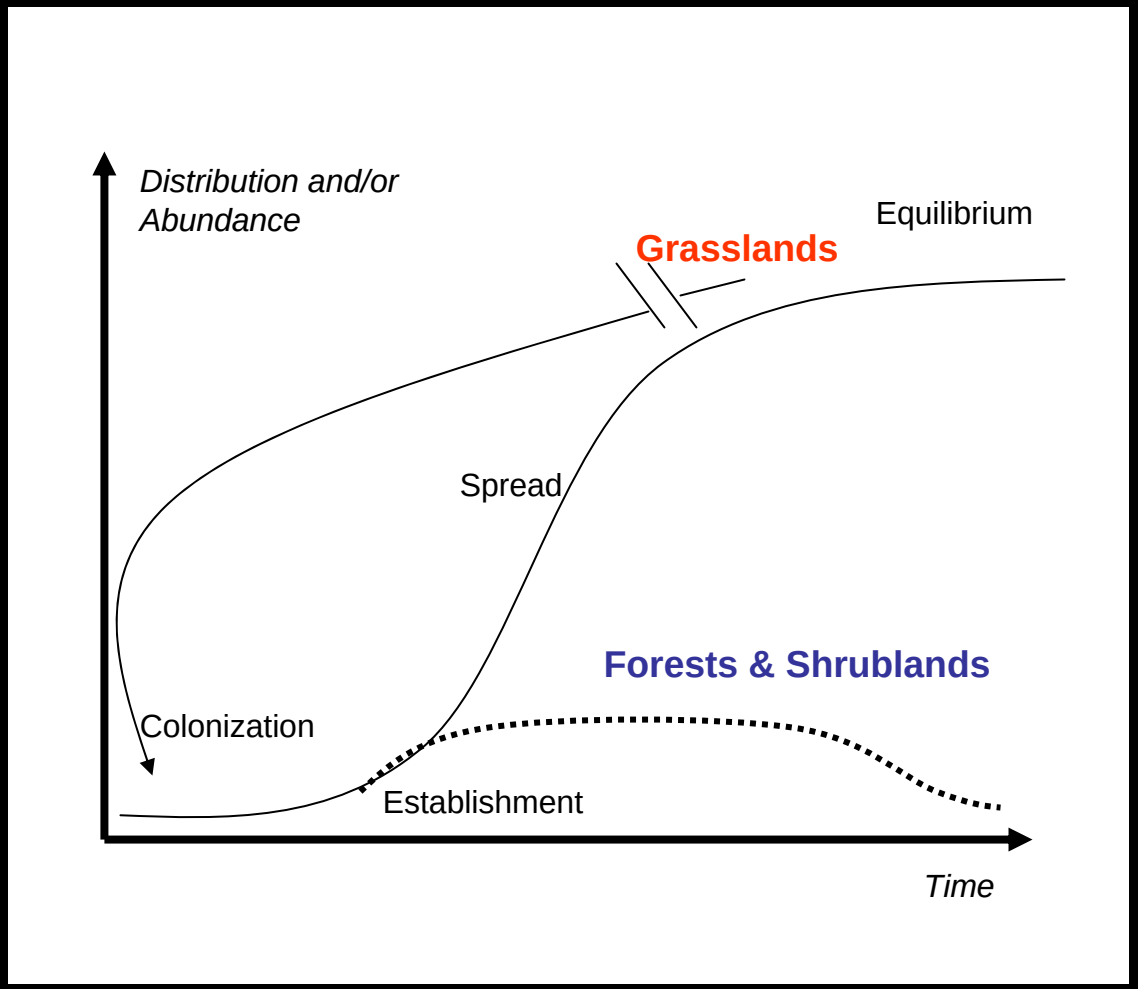
# Recommendations

Managing Invasive Plants With Fire

- Grasslands
  - Fire *ALONE* effective as way of *MAINTAINING BUT NOT ALTERING* community composition
  - Integrate fire with other methods
  - Farm them!
- Forests & shrublands
  - Not a desirable activity in most cases

# Recommendations

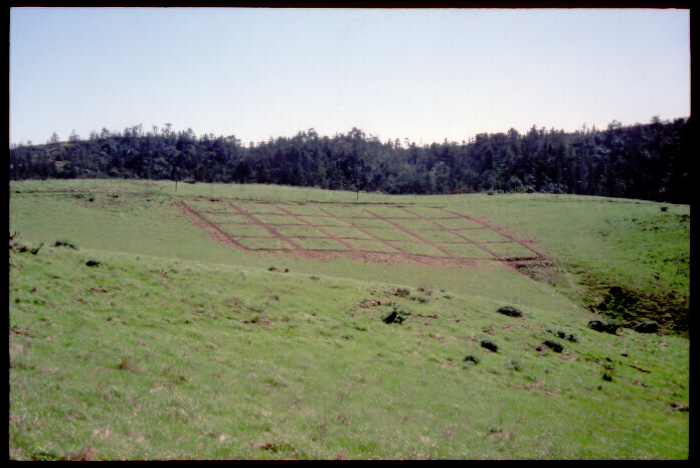
Invasive Plants ⟷ Fire Regimes




- Minimize vectors, pathways, and propagule pressure from heavily invaded areas to less invaded areas
- Maintain environmental conditions not favorable to non-native species

# General Recommendations

- Think beyond unhelpful concepts
  - “fire ecology”
  - “restoration”
- Focus on:
  - Interactions
  - States and transitions
  - Multiple stable states
  - Recruitment limitation



# Next Generation Of Studies?