

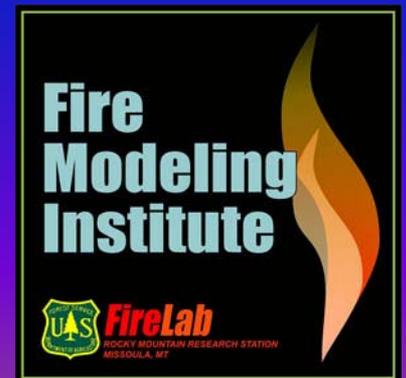
Fire and Invasive Plants

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FEIS writers, managers nation-wide

USDA FS, Rocky Mountain Research Station,
Missoula Fire Sciences Lab





Objectives

1. Recognize limits to knowledge about fire & weeds
2. Understand relationships among fire, site, weed invasions, & fire regime
3. Understand how prescribed fire can increase weeds
4. Understand strategies for using fire to reduce weeds
5. Recognize need to apply experience & monitoring to improve management

Fire Effects Information System (FEIS)

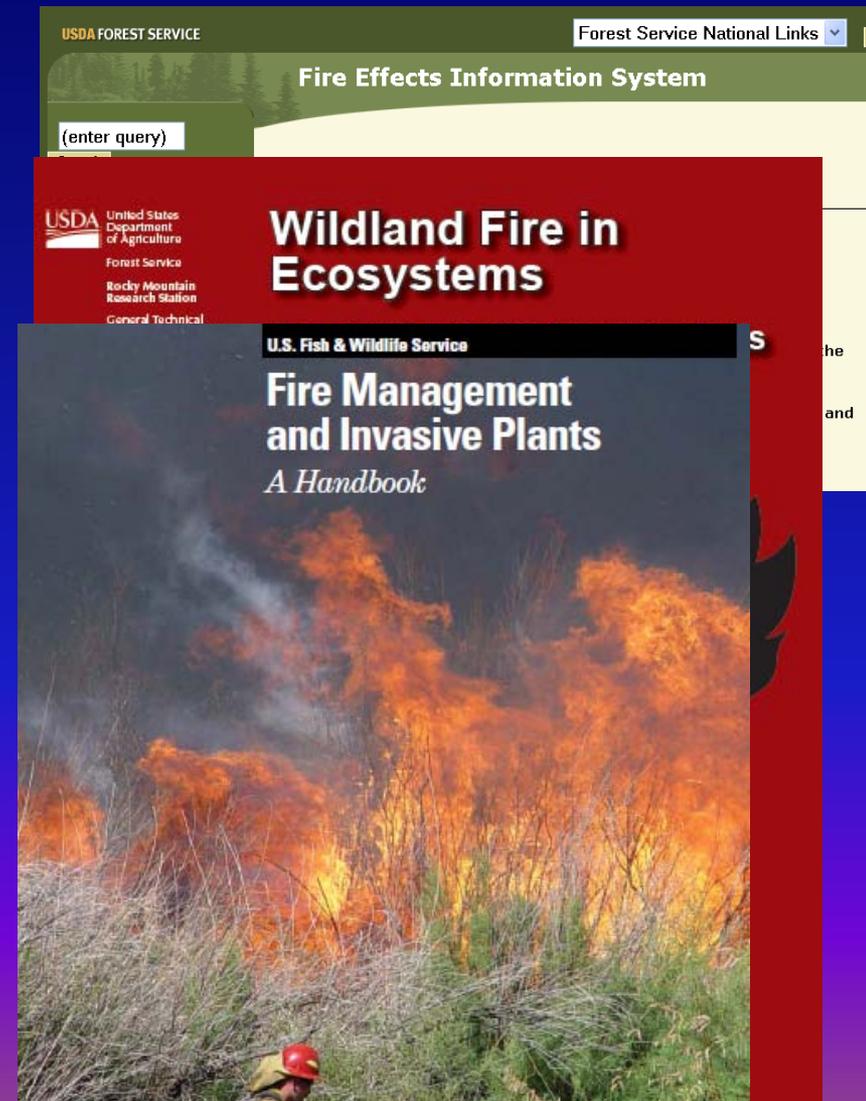
www.fs.fed.us/database/feis

Wildland Fire in Ecosystems ("Rainbow") Series

vol. 6— *Fire and Nonnative
Invasive Plants* (2008)

The Use of Fire as a Tool for Controlling Invasive Plants (2006)

DiTomaso & Johnson, eds.

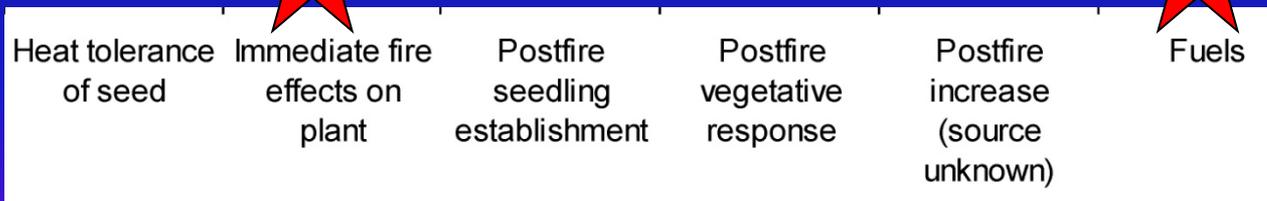




1. Recognize limits to our knowledge

Topics covered in lit as of ~2003

Purple loosestrife

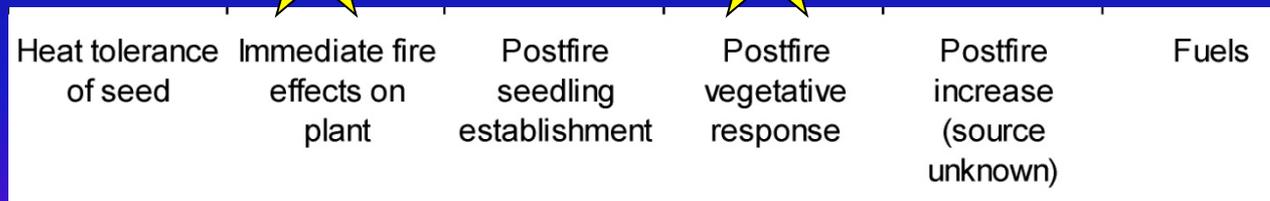


Varying fire severities Varying burn seasons Varying burn intervals Multiple postfire years
|-----Fire Regime or Succession Information-----|

Zero!

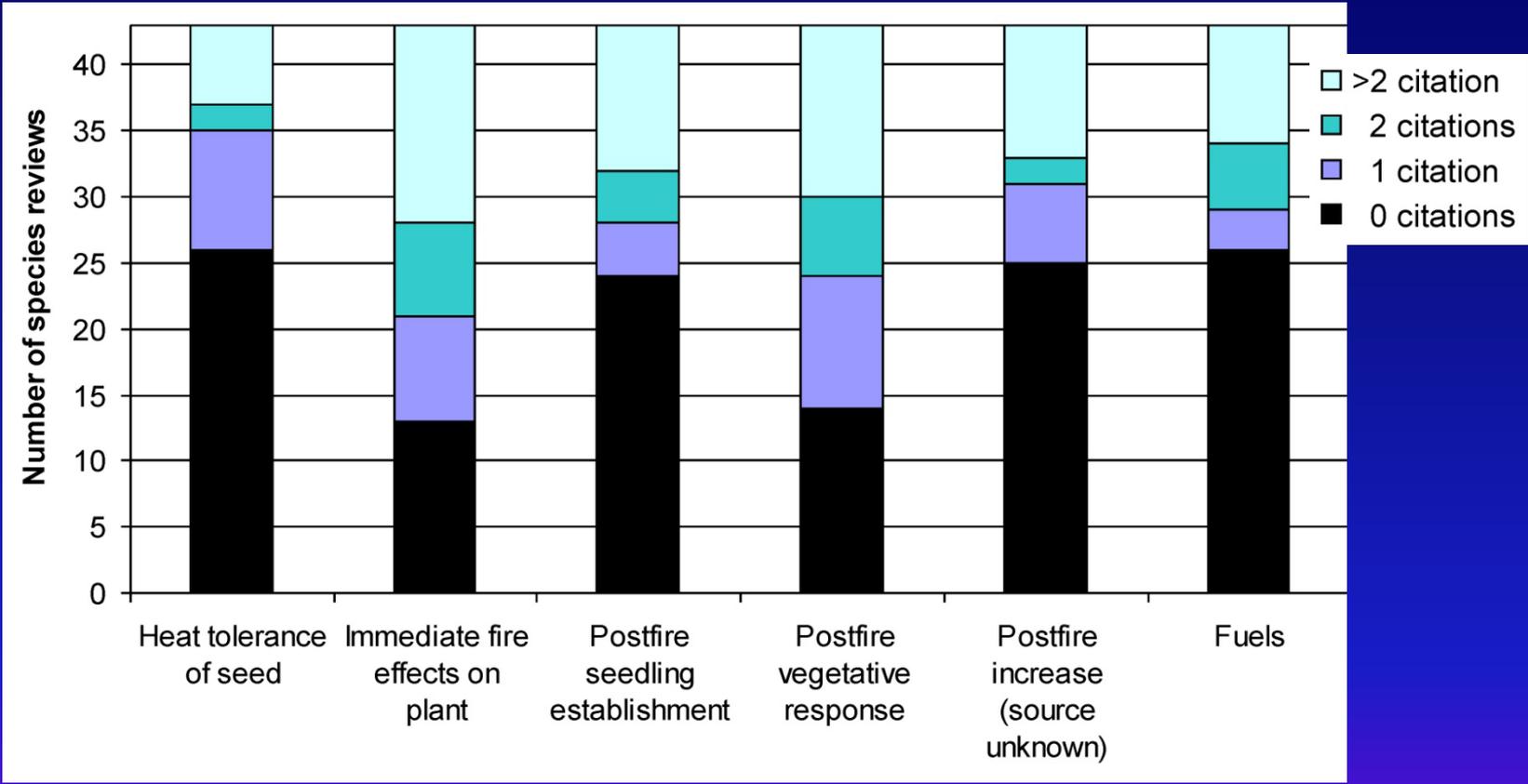
Topics covered in lit as of ~2003

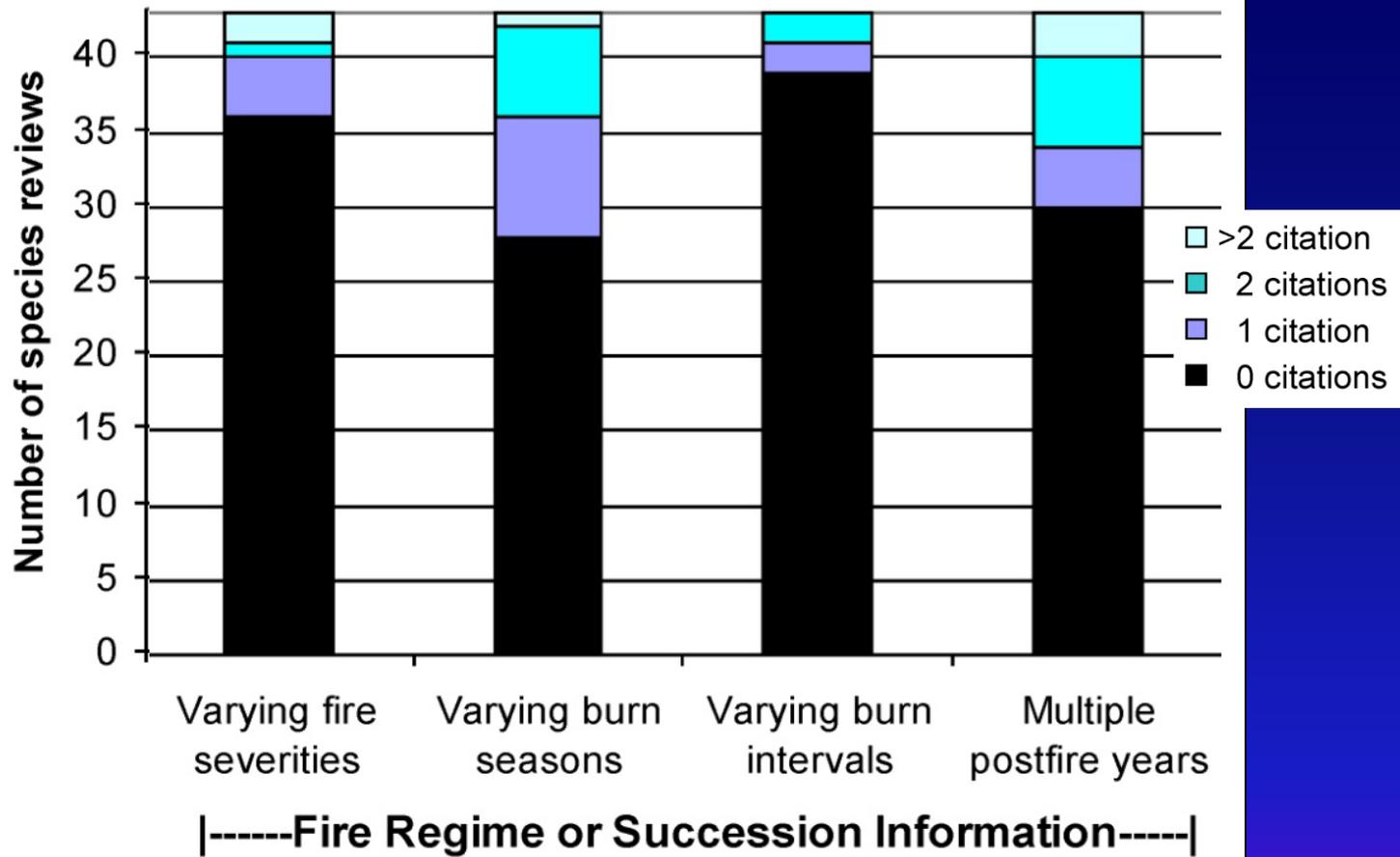
Privet spp.



Varying fire severities Varying burn seasons Varying burn intervals Multiple postfire years
|-----Fire Regime or Succession Information-----|

Zero!





Using sparse science appropriately for your management problem:

- Based on observations?
- Relevant to your plant community?
- Details about treatments, conditions?
- How many years' followup?



UGA0023013

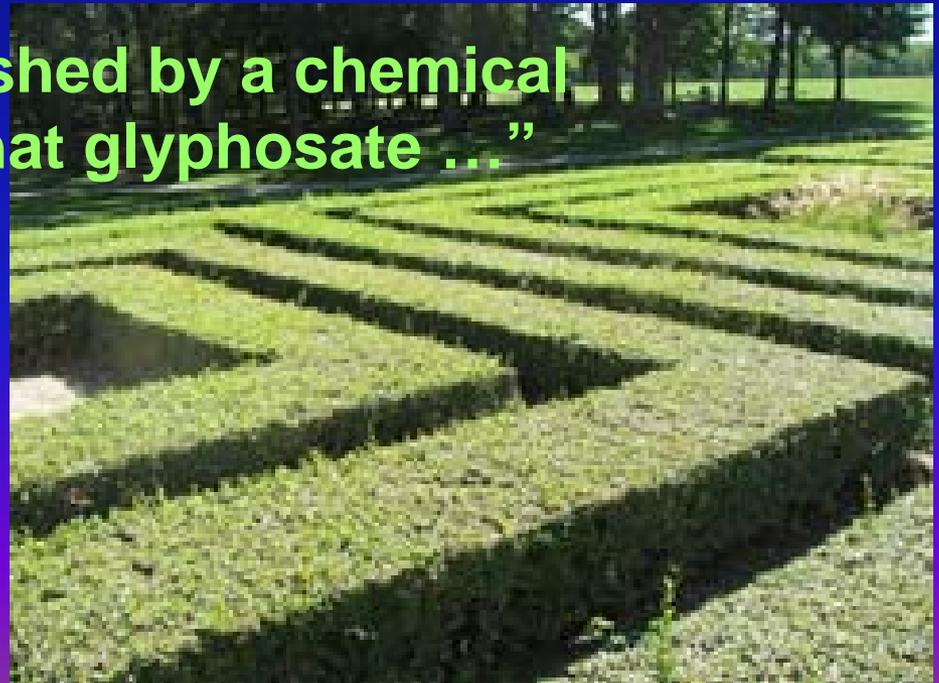
Using sparse science appropriately for your management problem:

“A 12-year study comparing burned with unburned plots reported that survival was consistently less than 5% after spring burns in Pennsylvania beech-maple forest ...”

“A handbook published by a chemical company reports that glyphosate ...”

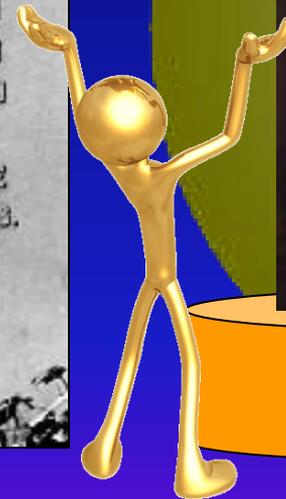
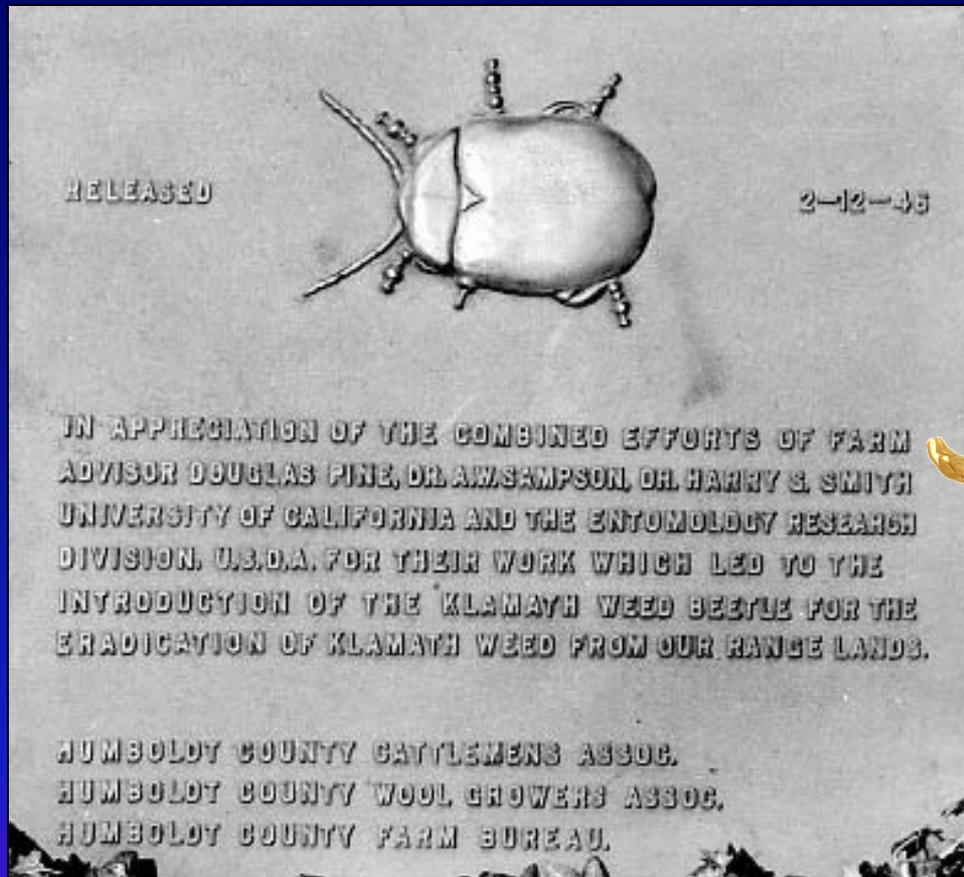
“Two plants survived and one died...”

“The authors suggest that...”



The Mystery of the Giant Bronze Beetle—

Kris Zouhar, FEIS editor



Online bio text: "... commemorative plaque at the Agricultural Center Building in **Eureka**, California."



DIY:

- Network!
- Learn local weeds & disturbance history
- Are there maps, GIS layers? Models of weed spread?
- Are invasives in proposed burns?
Nearby?
- Use pilot projects, test plots, pay attention (monitor), adapt.



2. Understand relationships among fire, site, weed invasions, & fire regime



Invasive: A species that establishes, persists, spreads, and *causes ecological harm* (Westbrooks 1998, Randall 1997)

Examples of *ecological harm*:

- Reduced abundance and/or diversity of native plants & animals
- Reduced wildlife forage or habitat
- Altered processes (soil, hydrology), possibly including...
- Altered disturbance regime

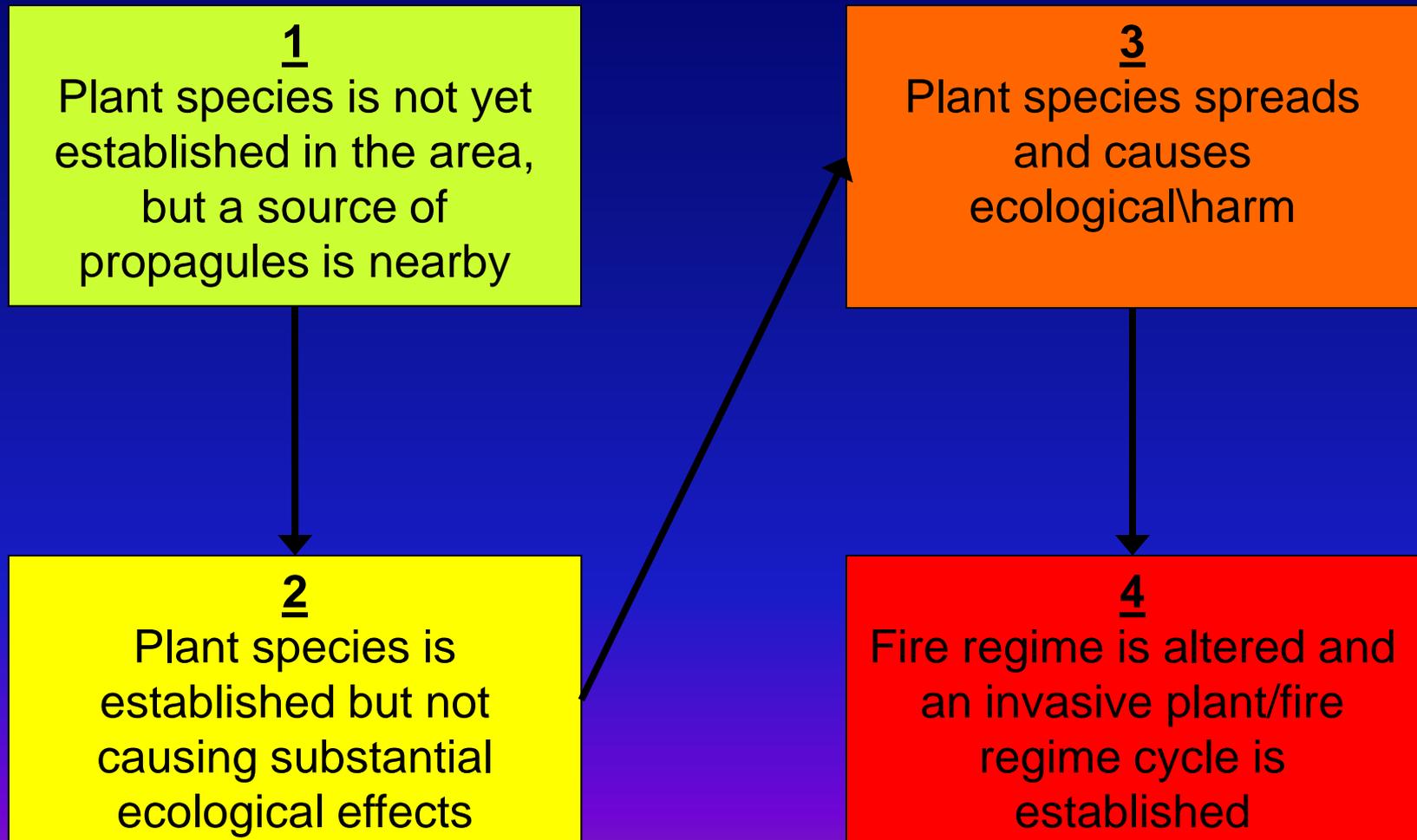


Ruderal: growing where vegetation cover has been disturbed... Watch for massive seed production, rapid growth.



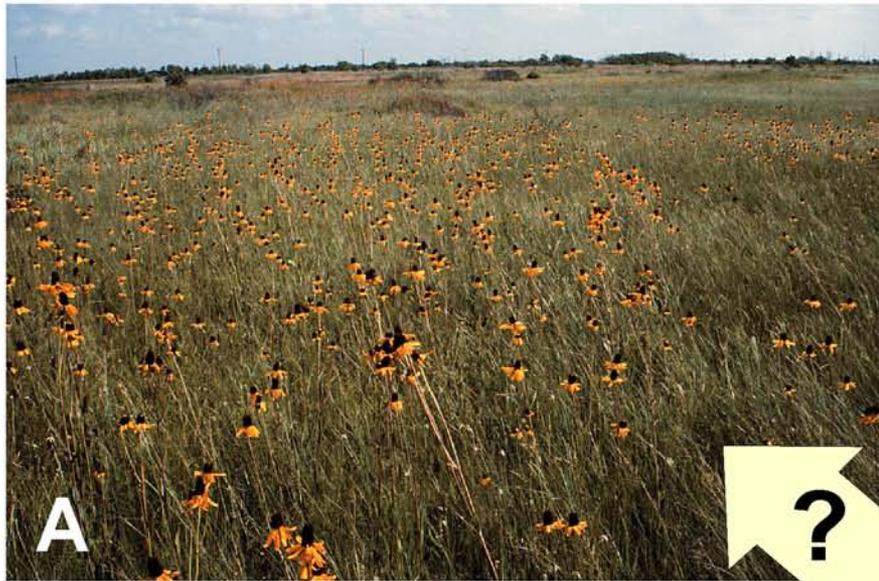
Ruderal \neq necessarily Invasive

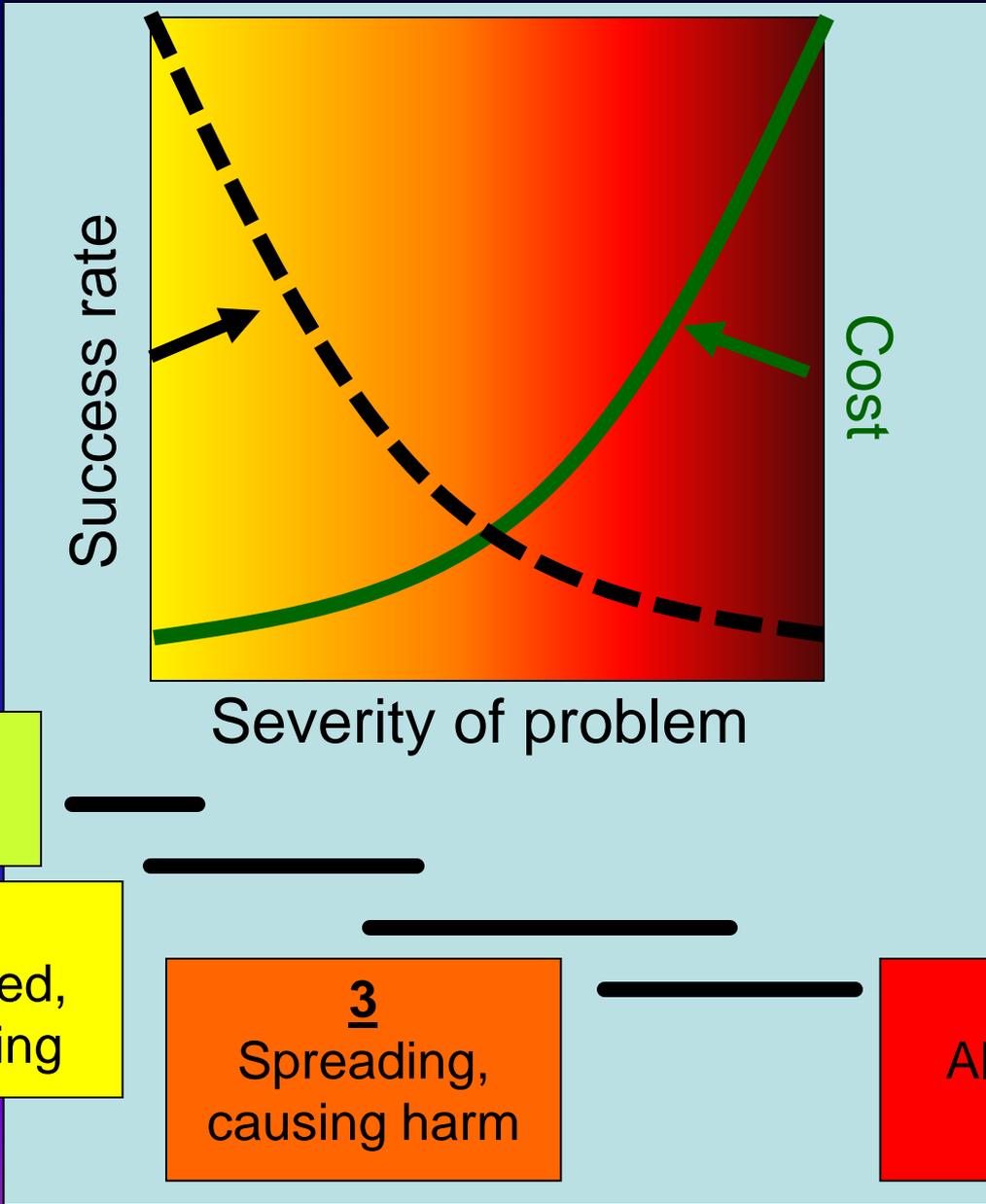
Stages of invasion



Nonnative Grass / Fire Cycle







Success rate

Cost

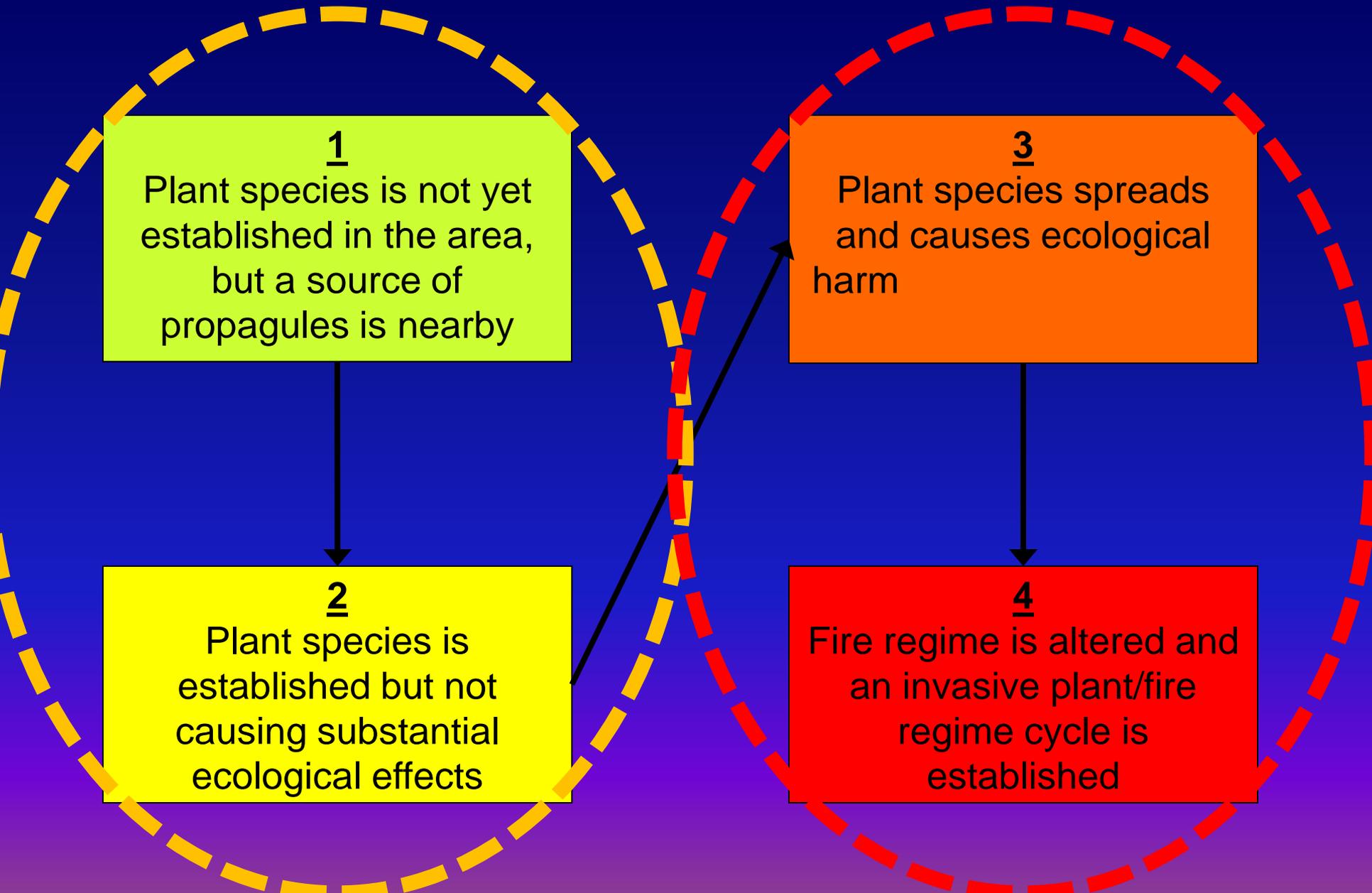
Severity of problem

1
Not here (yet)

2
Established,
not harming

3
Spreading,
causing harm

4
Altering fire
regime



1

Plant species is not yet established in the area, but a source of propagules is nearby

2

Plant species is established but not causing substantial ecological effects

3

Plant species spreads and causes ecological harm

4

Fire regime is altered and an invasive plant/fire regime cycle is established



© Charles T. Bryson

Lar

Present & Neutral?

or Ecological Benefit?

1

Plant species is not yet established in the area, but a source of propagules is nearby

2

Plant species is established but not causing substantial ecological effects





**3. Understand how prescribed fire
can increase weeds**

1. Don't invite the dragon home

Where are the weedy areas?

Which weeds?

How do they spread “naturally”?

AVOID INVADDED AREAS IF POSSIBLE

CLEAN UP



2. Don't wake the sleeping dragon

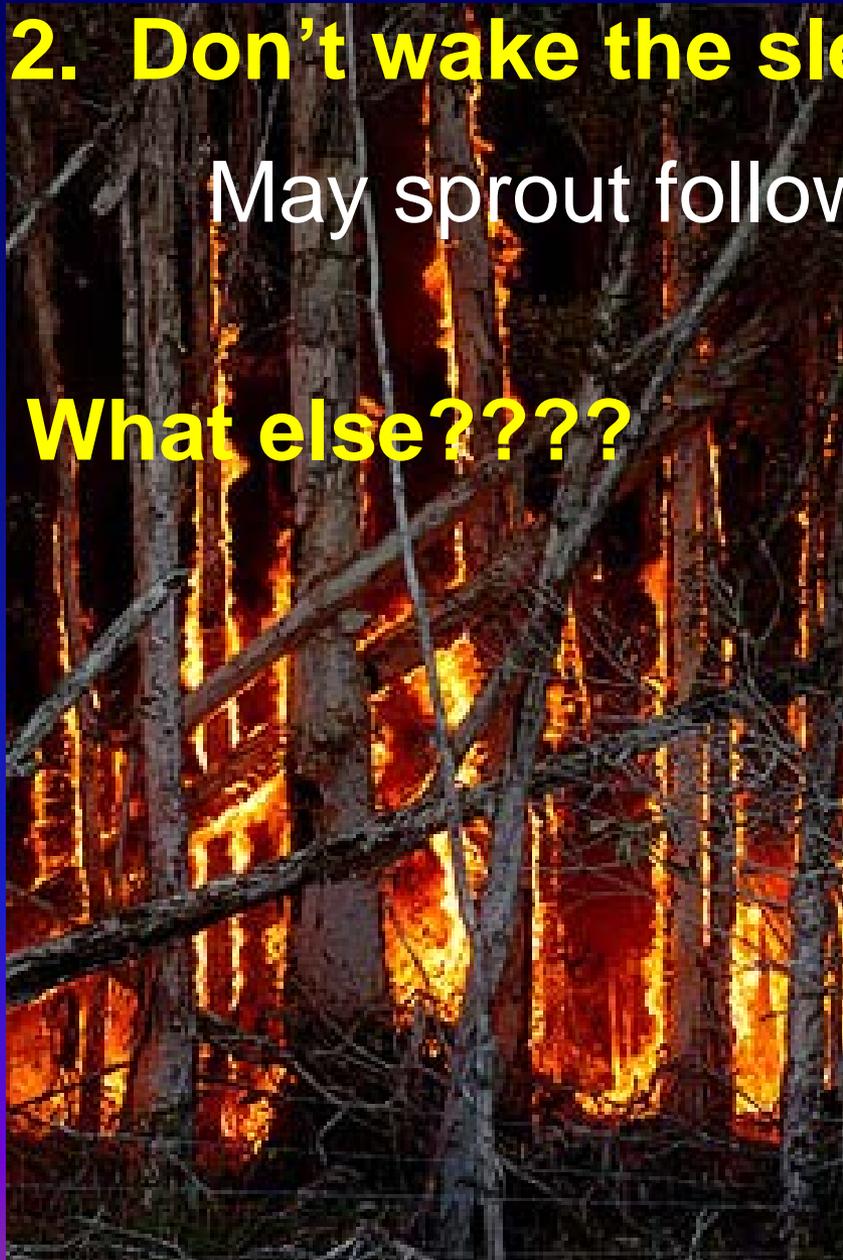
May survive fire in soil seed bank



2. Don't wake the sleeping dragon

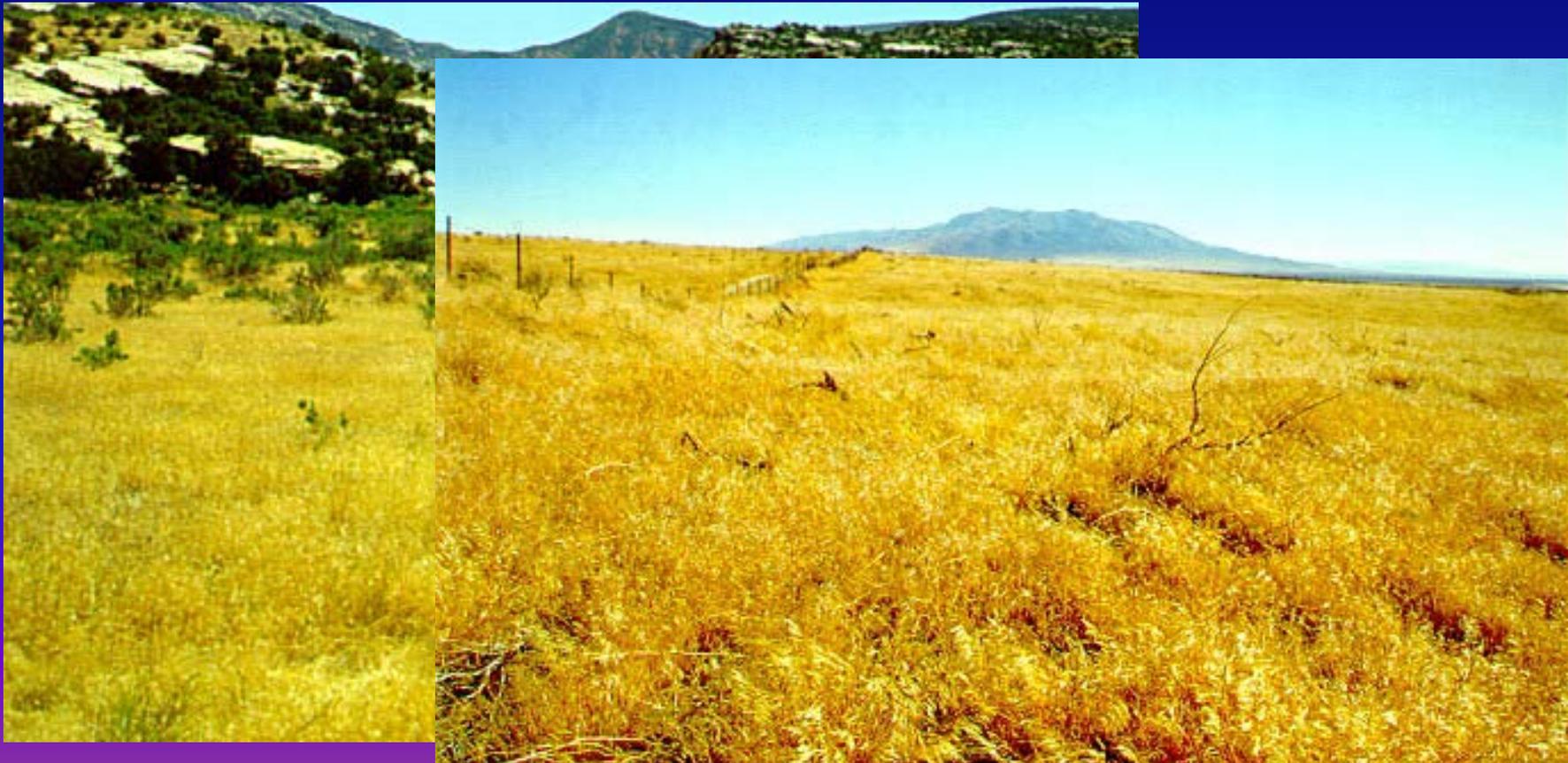
May sprout following top-kill by fire

What else????



3. If you bring the dragon home or wake it up, don't give it a warm welcome

Why doesn't cheatgrass take over the world?



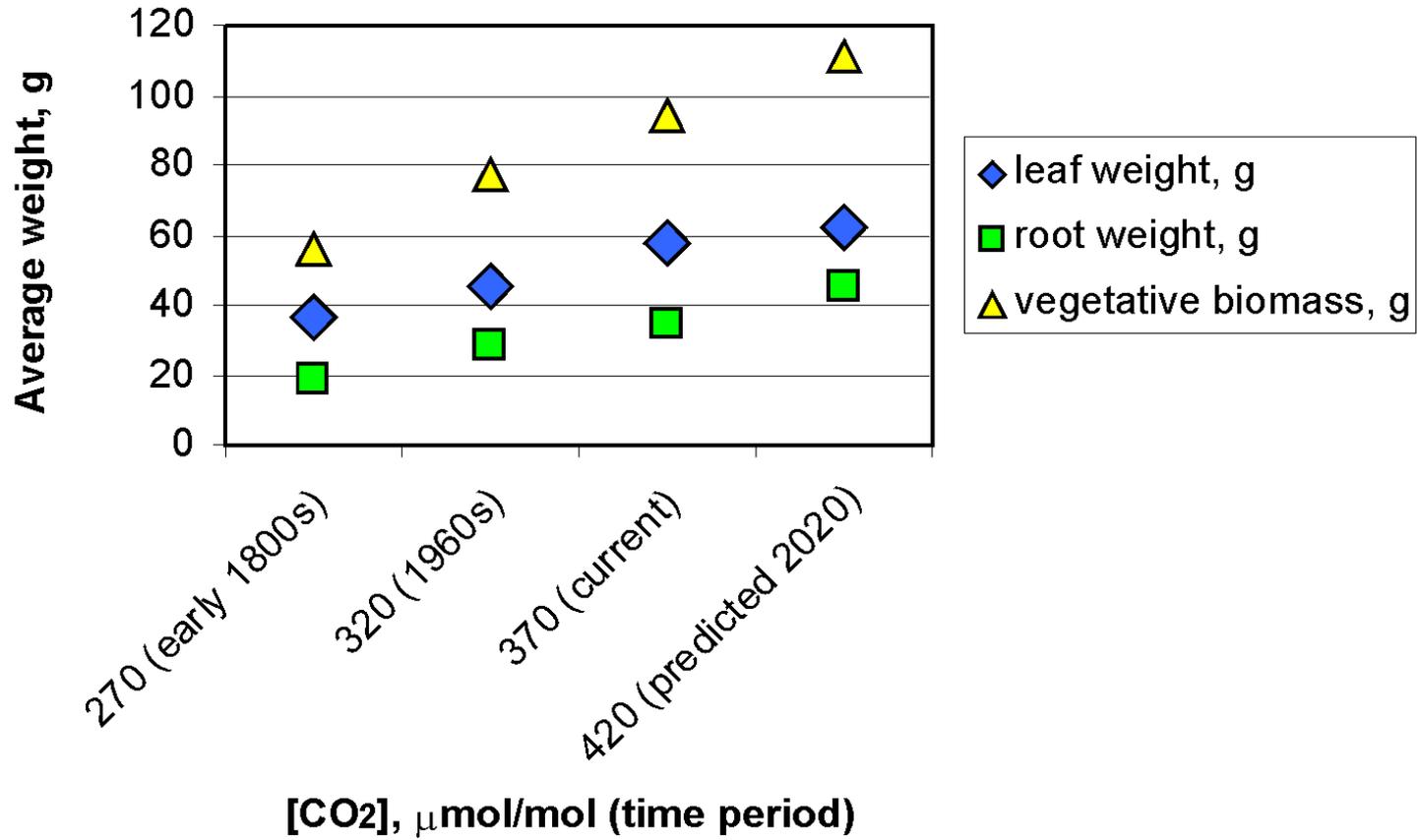
3. If you bring the dragon home or wake it up, don't give it a warm welcome

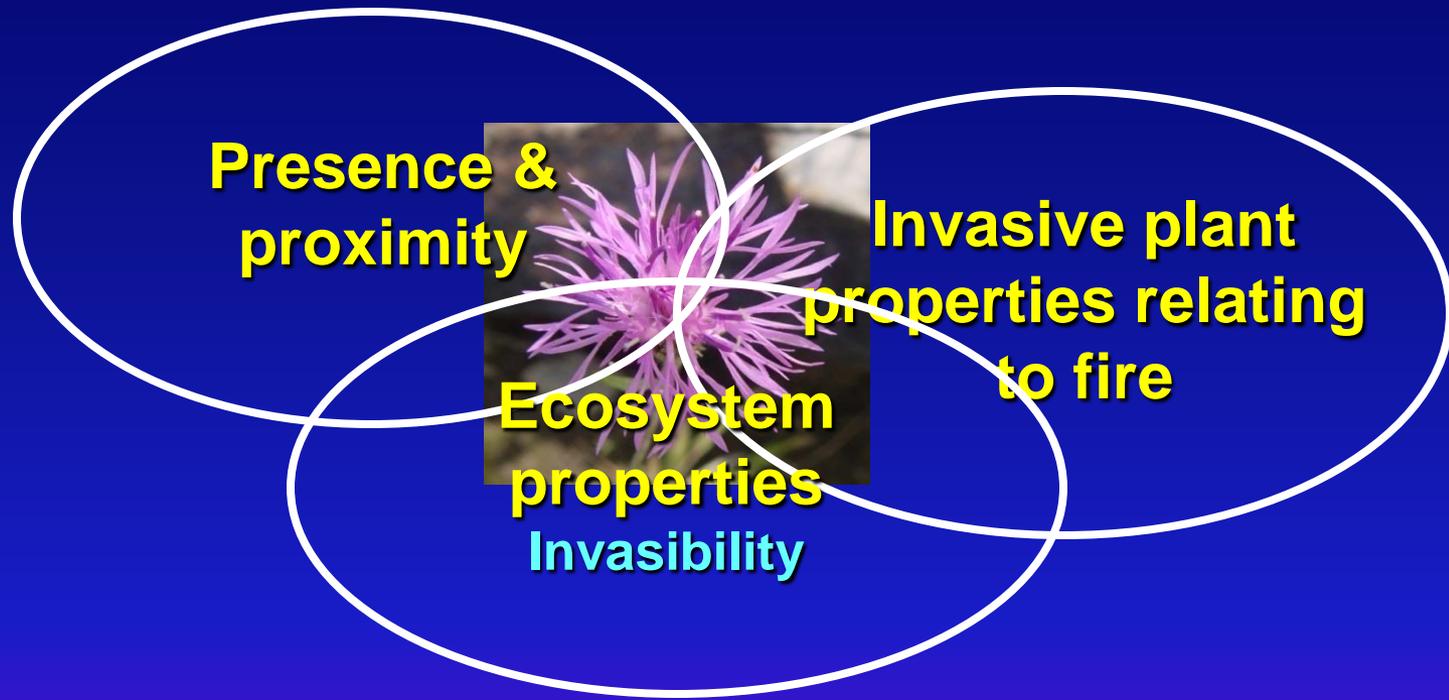
4 ways to increase invasibility:

1. Remove litter
2. Remove canopy
3. Reduce cover of native vegetation
4. Disturb soil



Cheatgrass response to CO₂

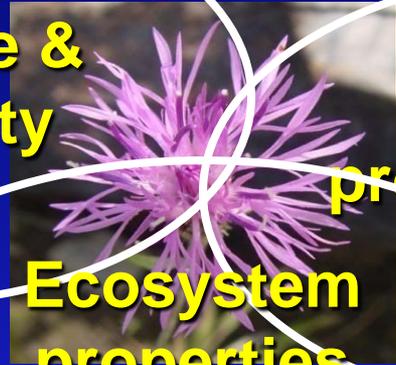




**Presence &
proximity**

**Invasive plant
properties relating
to fire**

**Ecosystem
properties**
Invasibility





**4. Understand strategies for using fire
to reduce weeds**



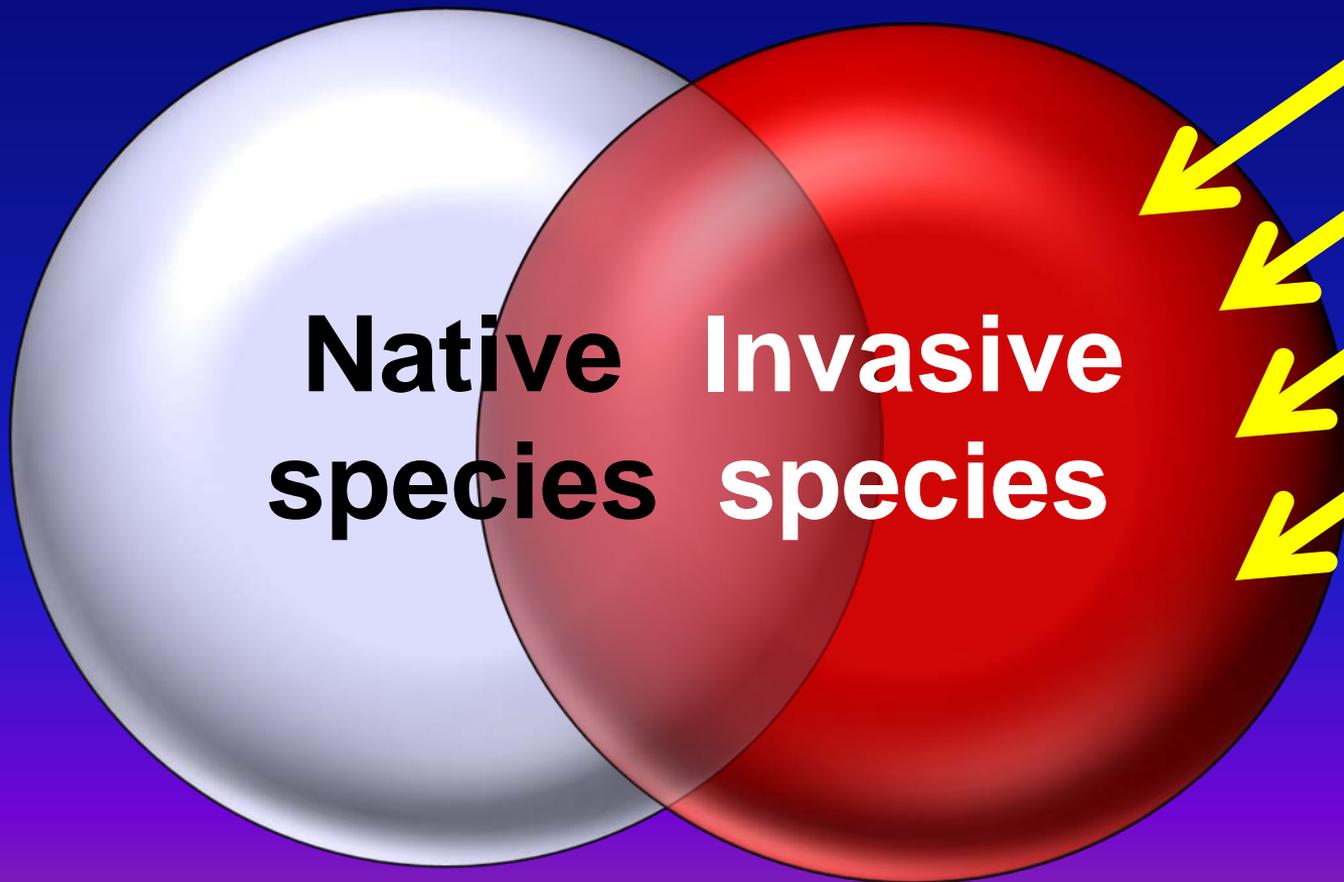
**Native
species**



**Invasive
species**

Fire type
Severity
Frequency

Intensity
Seasonality
Size & uniformity



More sensitive than native spp in some way

Fire type
Severity
Frequency

Intensity
Seasonality
Size & uniformity



**Invasive
species**
Native
species

If wanted &
unwanted respond
similarly to all
aspects of fire,
then control with
fire unlikely...
by itself.

Fire type

Intensity

Severity

Seasonality

Frequency

Size & uniformity

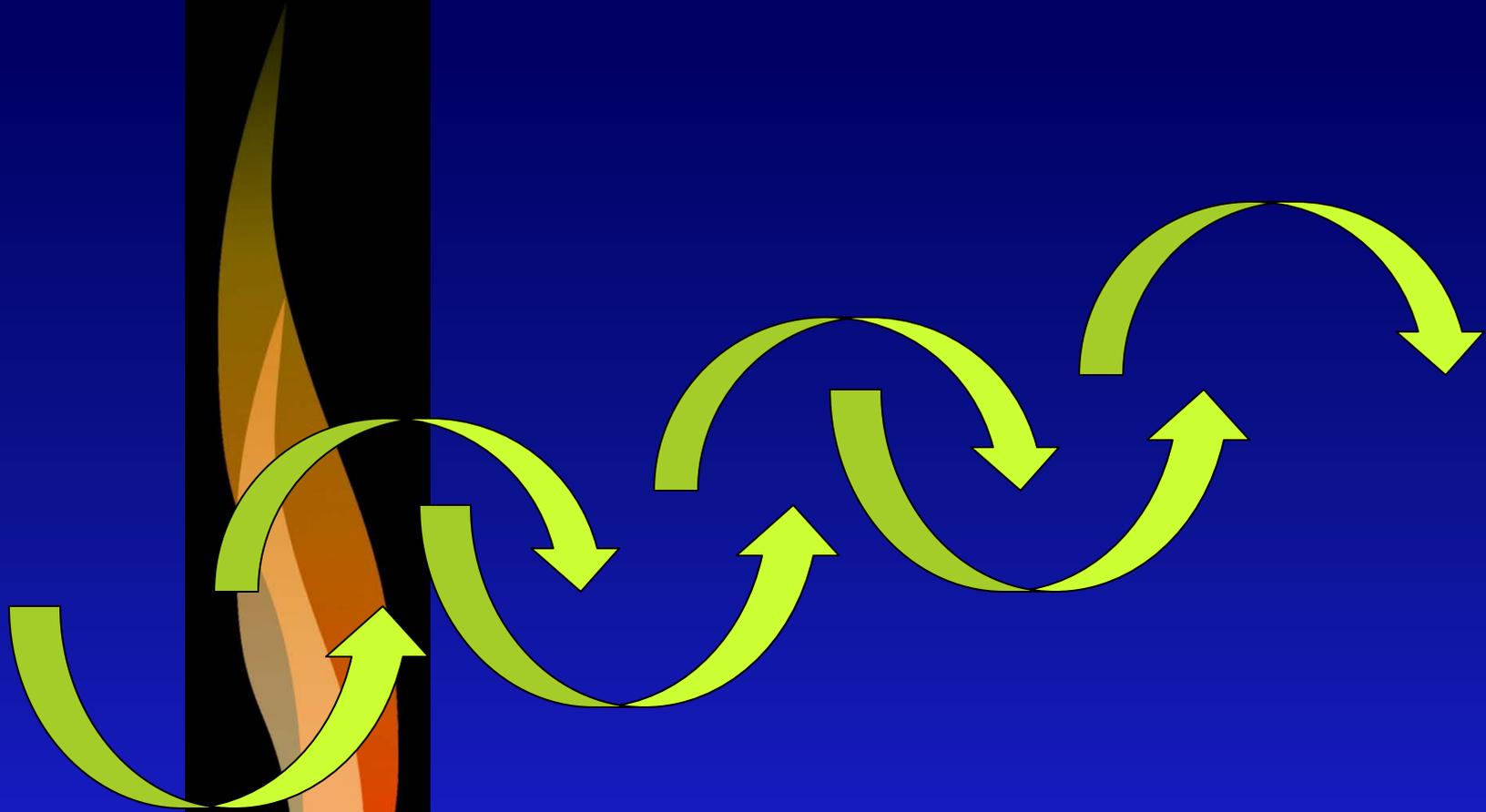
Kentucky bluegrass

Bluestems & others

Native ryegrasses

Smooth brome





Monitor.
Adapt.

Fire type

Severity

Frequency

Intensity

Seasonality

Size & uniformity

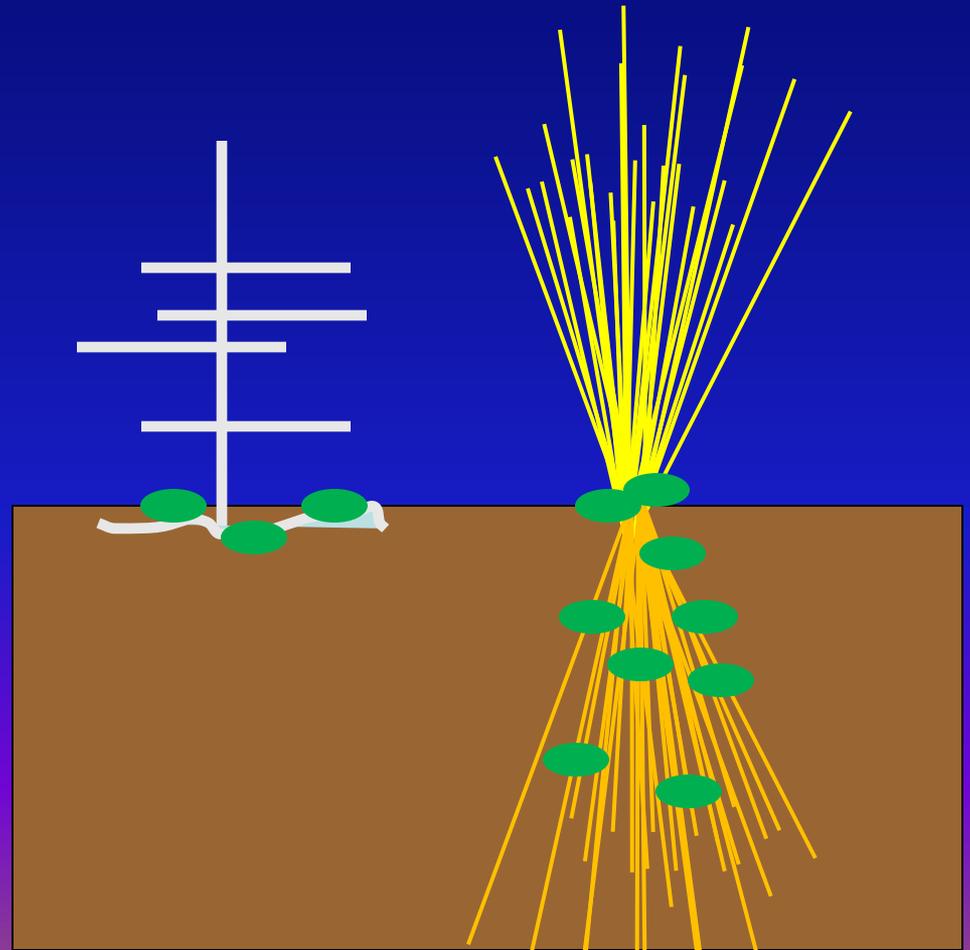
Desired annual grasses

Medusahead ... seed



Fire type
Severity
Frequency

Intensity
Seasonality
Size & uniformity

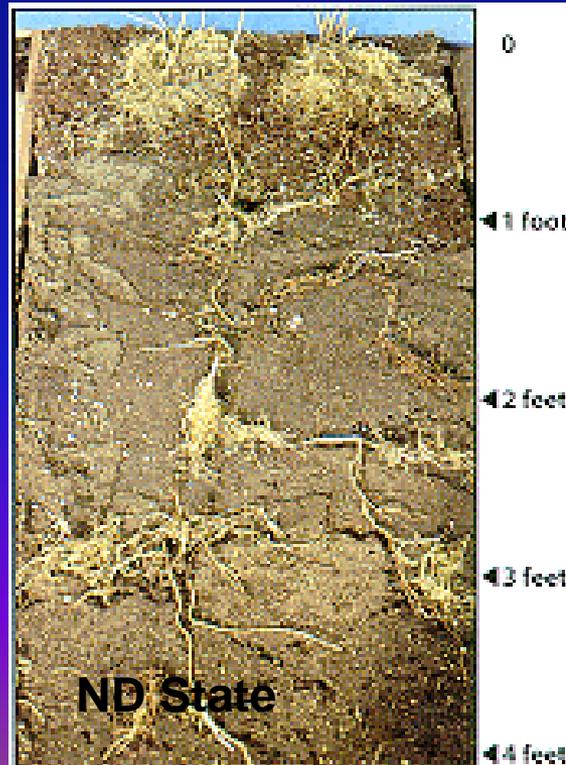


Fire type
Severity
Frequency

Intensity
Seasonality
Size & uniformity

USDA ARS

Integrated Management





Fire type
Severity
Frequency

Intensity
Seasonality
Size & uniformity

Integrated Management

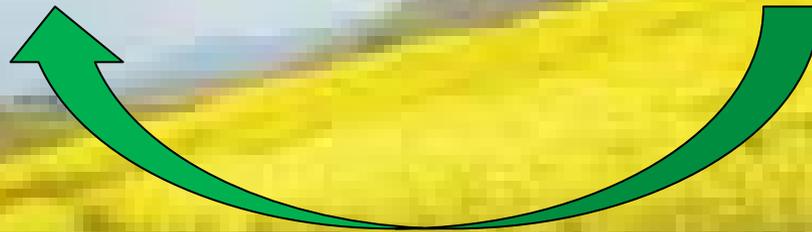
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Goal:

Maintenance

Reduction



Prevention

Eradication



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Thanks!

Let FEIS know what you learn:

jsmith09@fs.fed.us



Monitor.
Adapt.

Newsday