Fire and Invasive Plants

Jane Kapler Smith, jsmith09@fs.fed.us

Kris Zouhar, kzouhar@fs.fed.us

FEIS writers

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

Objectives

1. Recognize limits to scientific knowledge about fire & weeds
2. Understand relationships among fire, site, weed invasions, & fire regime
3. Understand how 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 Nonnative Invasive Plants* (2008)

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

Fire Management & Invasive Plants, a handbook (2008)

USDA Guide to Noxious Weed Prevention Practices (2001)

Integrated Noxious Weed Management after Wildfires (2002)

1. ***Recognize limits*** ***to scientific knowledge***

Topics covered in lit as of ~2003

Sulfur cinquefoil

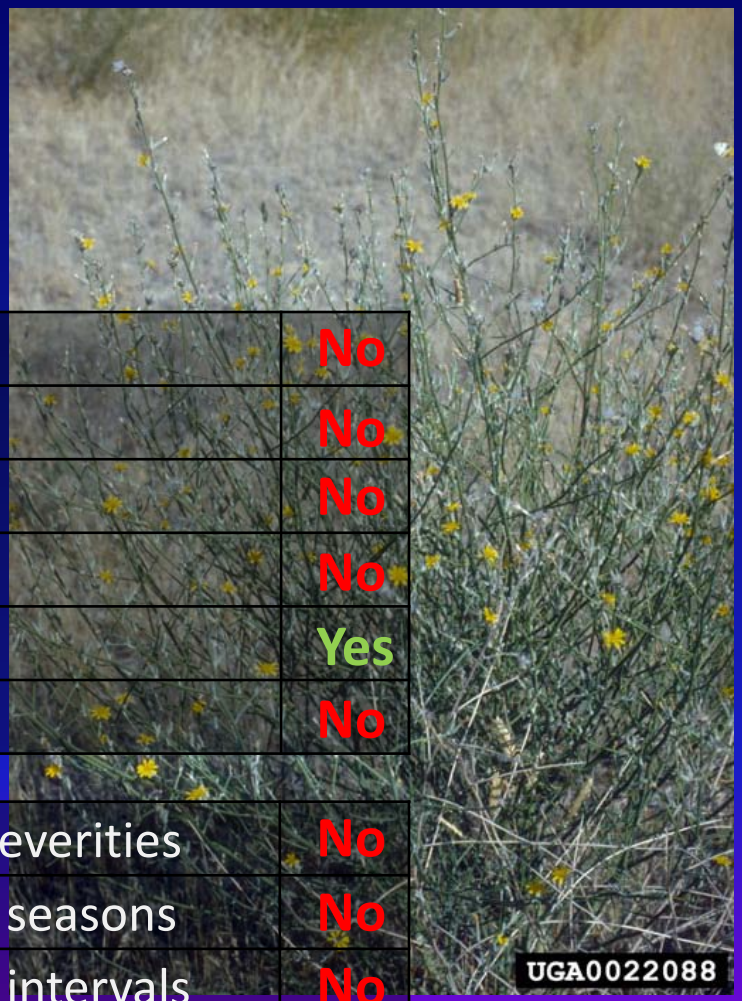
USDA ARS Archive, USDA Agricultural Research Service, Bugwood.org

Heat tolerance of seed	No
Immediate fire effects	Yes
Postfire seedling establishment	Yes
Postfire vegetative response	No
Postfire increase (seed or sprout)	No
Fuel properties, loads	No

Experimental info on fire regime characteristics	Varying fire severities	No
	Varying burn seasons	Yes
	Varying burn intervals	No
	Multiple postfire years	No

Topics covered in lit as of ~2003

Rush skeletonweed



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Using sparse science appropriately for <u>your</u> management problem:

Norman E. Rees, USDA Agricultural Research Service, Bugwood.org

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

Photo ©Barry A. Rice/The Nature Conservancy

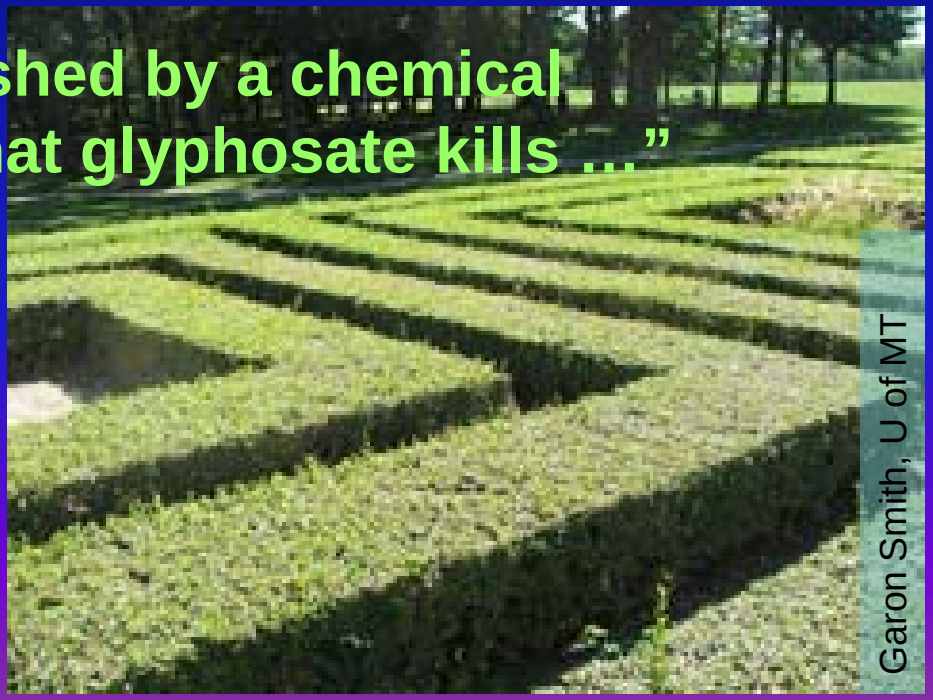
Using sparse science appropriately for <u>your</u> management problem:

"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 kills …"

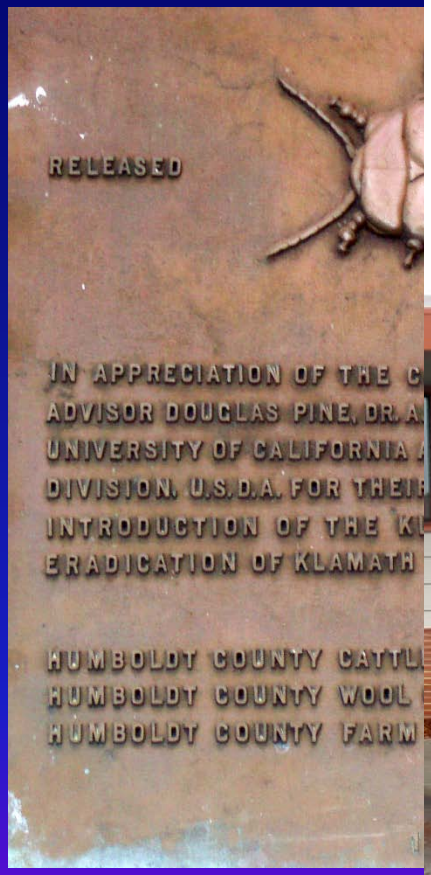
"Two plants survived and one died…"

"The authors suggest that…



The Mystery of the Giant Bronze Beetle—

Kris Zouhar, FEIS editor



Online biology textbook: "… commemorative plaque at the Agricultural Center Building in **Eureka**, California."

Do It Yourself:

- Find & read the science
- Network!
- Learn local weeds & disturbance history
- Are there maps, GIS layers? Models of weed spread? Weed Risk Assessments?
- Are invasives in old burned areas? proposed burns? Nearby?
- Use pilot projects, test plots, monitor, adapt.

2. <u>Understand relationships</u> 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

Black locust

Native to middle Atlantic states

Invasive in pitch pine “bush”

Neil Gifford, Tom Dooley

ALBANY PINE BUSH PRESERVE COMMISSION

Native ≠ necessarily noninvasive

Black locust

USFWS, Digital Library System

Shades out wild lupine

Only food for larvae of endangered Karner blue butterfly

Catherine Herms, Ohio State Univ.

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

Stages of invasion

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 harm

3
Plant species spreads and causes ecological harm

4
Fire regime is altered and an invasive plant/fire regime cycle is established

Nonnative Grass / Fire Cycle

Mike Pellant, BLM

Mike Pellant, BLM

J.R. Matchett, USGS, Wetlands Ecol. Res. Ctr.

Mike Pellant, BLM

Larry Allain

Mick Harrington, RMRS

Bureau of Land Management

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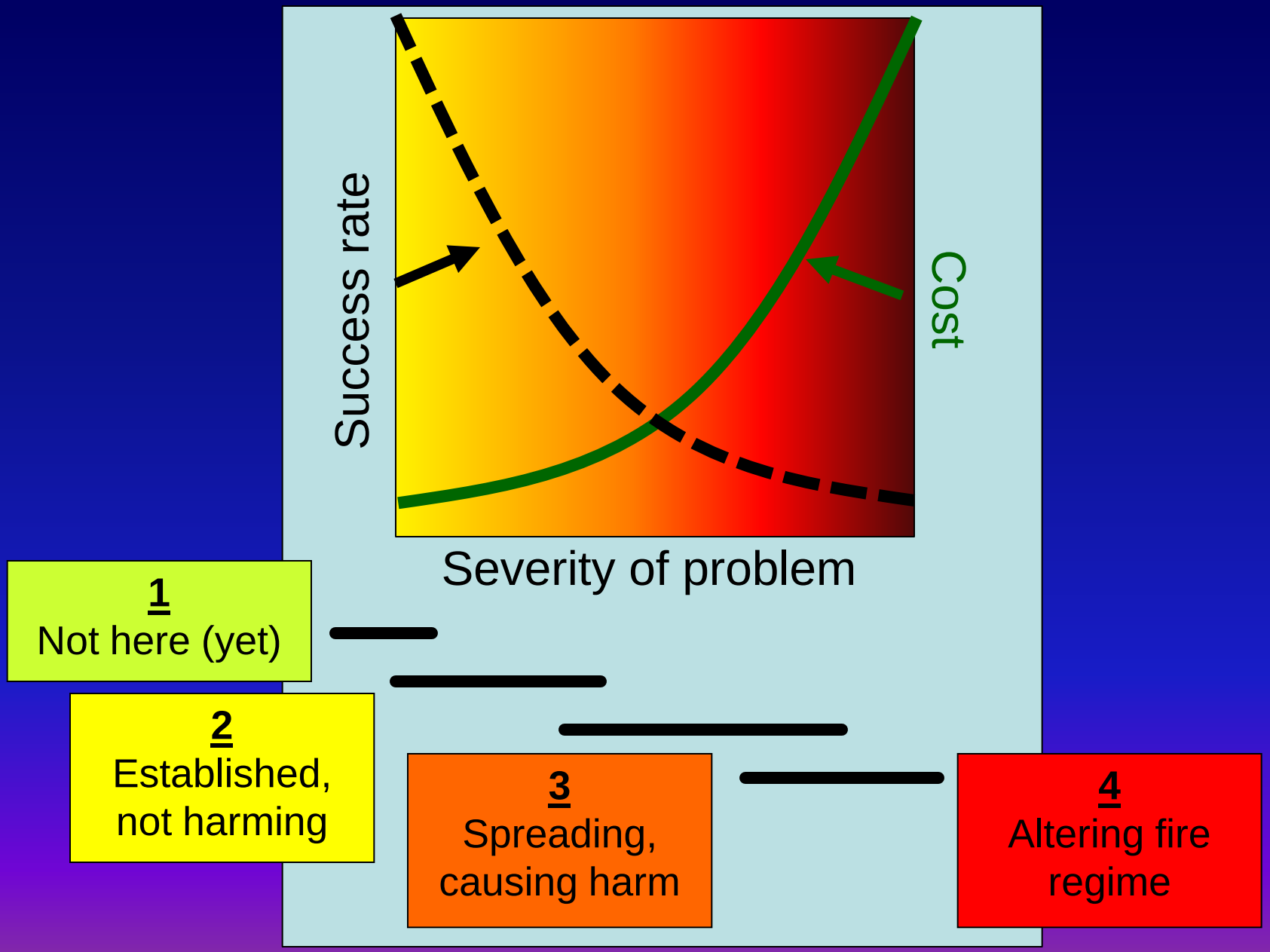

Success rate
Cost
Severity of problem
1
Not here (yet)
2
Established, not harming
3
Spreading, causing harm
4
Altering fire regime

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 harm

Nonnative ≠ necessarily Invasive

3. <u>Understand how</u> fire can increase weeds

1. Don’t invite the dragon home

Where are the weedy areas?

Which weeds?

How do they spread “naturally”?

AVOID INVADED AREAS IF POSSIBLE

CLEAN UP

PREVENTION IS BEST

2. Don’t wake the sleeping dragon

Fire creates a seed bed for wind-dispersed seed:

2. Don’t wake the sleeping dragon

May survive fire in soil seed bank

&

Germination may be stimulated by fire

2. Don’t wake the sleeping dragon

May sprout following top-kill by fire

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

5 ways to increase invasibility:

1. Remove litter
2. Remove canopy
3. Reduce cover of native vegetation
4. Increase resource availability
5. Disturb soil

1. Don’t invite the dragon home:

Presence & proximity of propagules

2. Don’t wake the sleeping dragon:

Invasive plant properties relating to fire

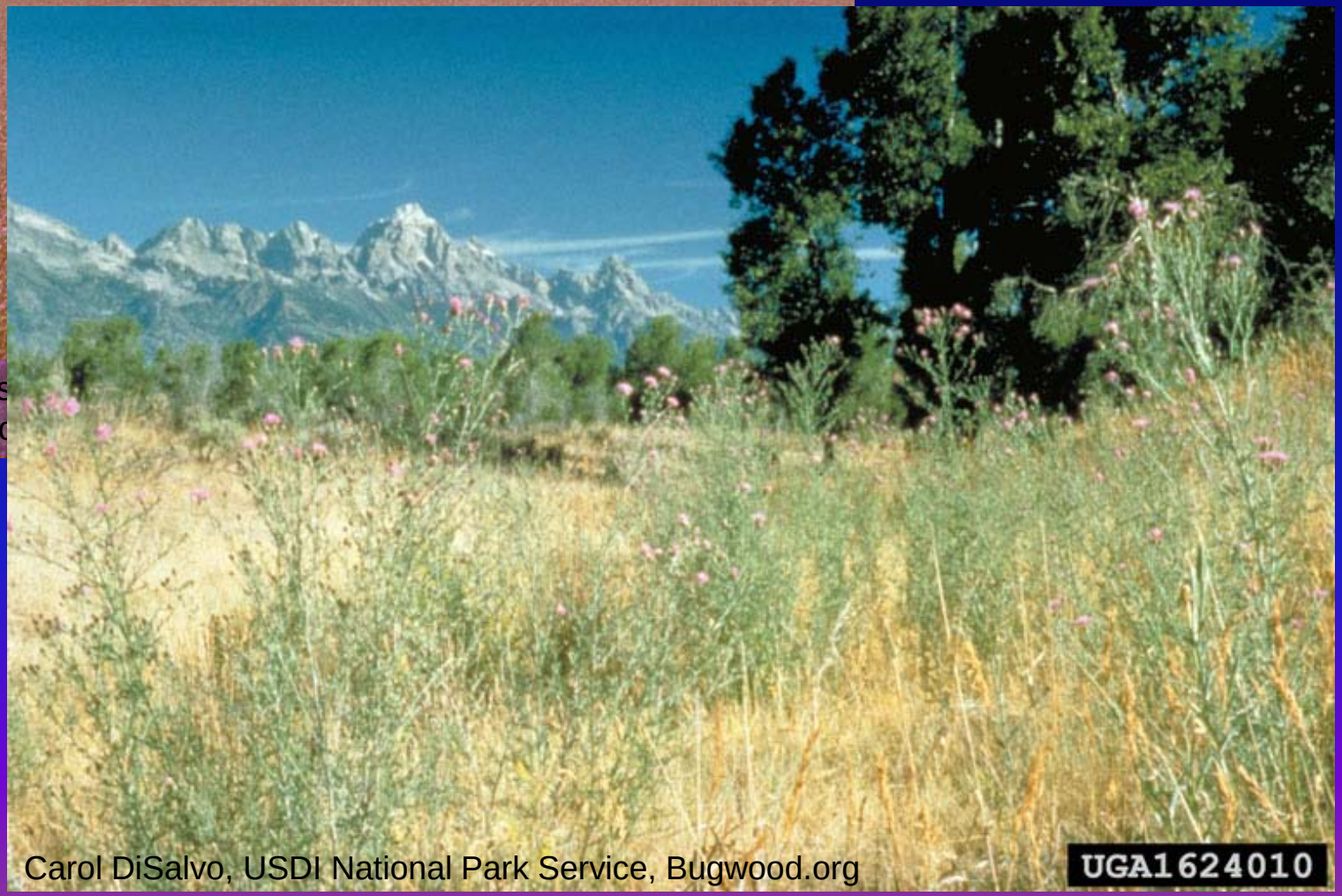
3. If 1 & 2 have already happened, at least avoid giving the dragon a warm welcome:

Ecosystem properties

Invasibility

4. <u>Understand strategies</u> for using fire to reduce weeds

Norman E. Rees
Service, Bugwoo



Carol DiSalvo, USDI National Park Service, Bugwood.org

If the invasive responds to fire as well as or better than the desired species, you can't control it with fire alone.

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

Integrated Management--biocontrol

Burning before herbicide invasive:

Macartney ros

Lehmann s

tamarisk

Ripgut brome

gorse

pepper-weed

medu nd

French br

nel

tall fescue

Sahara tard

apanese noneysuckle

kudzu

Scotch broom

... but failed in W. MT for:

Dalmatian toadflax

eafy spurge

St. Johnswort

spotted knapweed

Fire type
Severity
Frequency

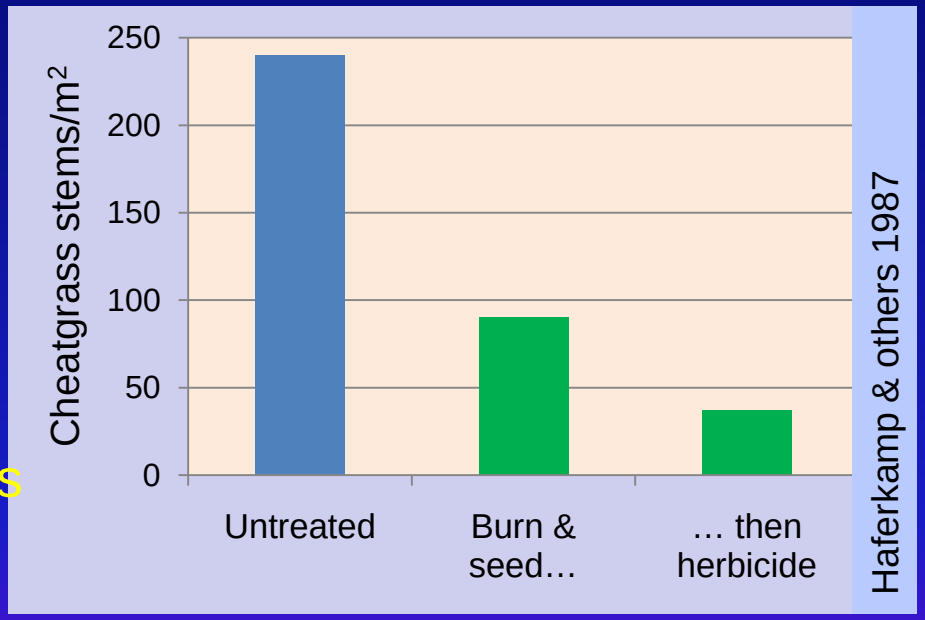
Intensity
Seasonality
Size & uniformity

Burning before planting

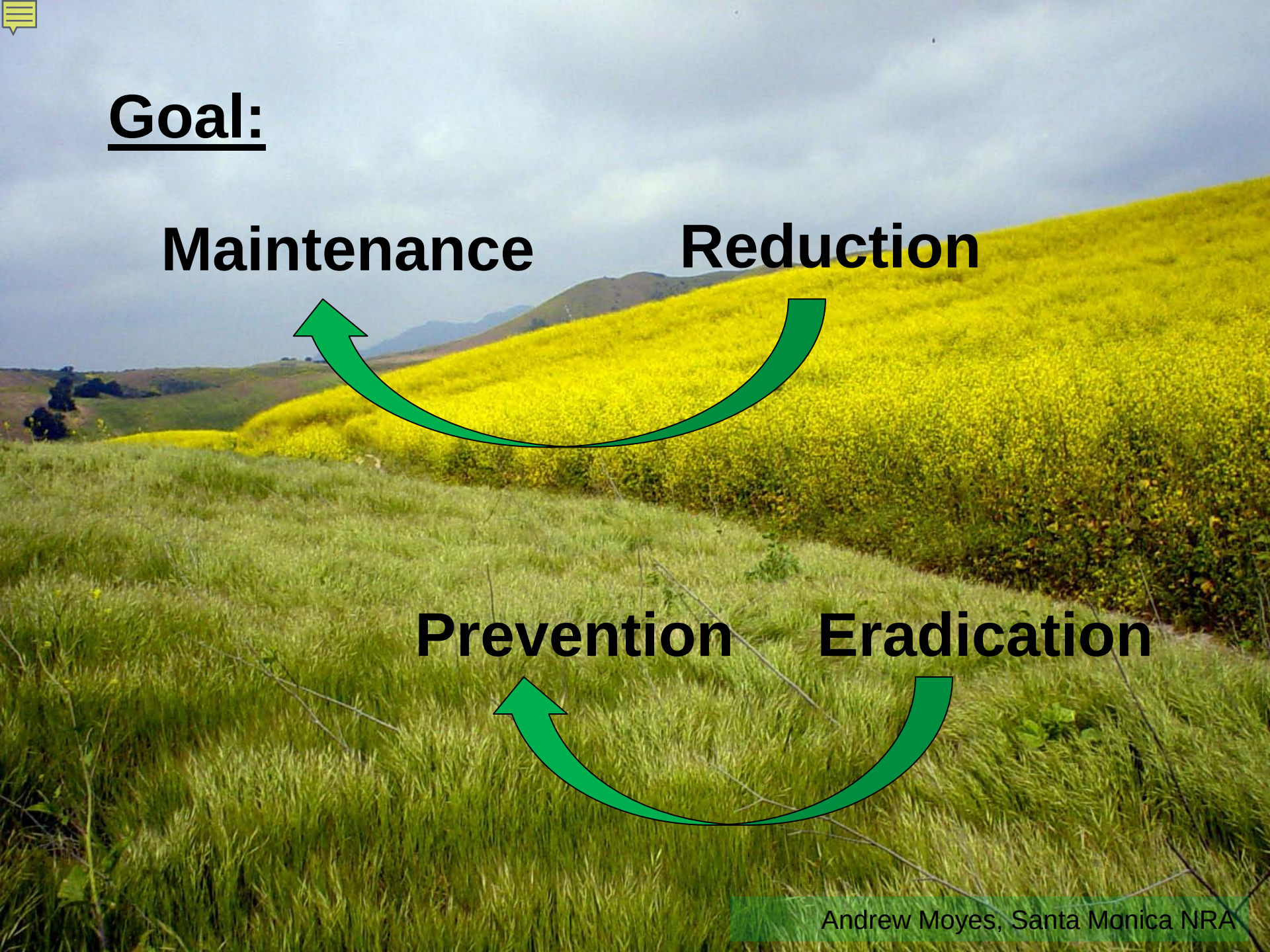
↓ cheatgrass seed

↑ contact of planted seed with soil

↑ establishment of planted grasses



Later herbicide further ↓ cheatgrass


Goal:
Maintenance
Reduction
Prevention
Eradication
Andrew Moyes, Santa Monica NRA

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Thanks!

Let FEIS know what you learn:

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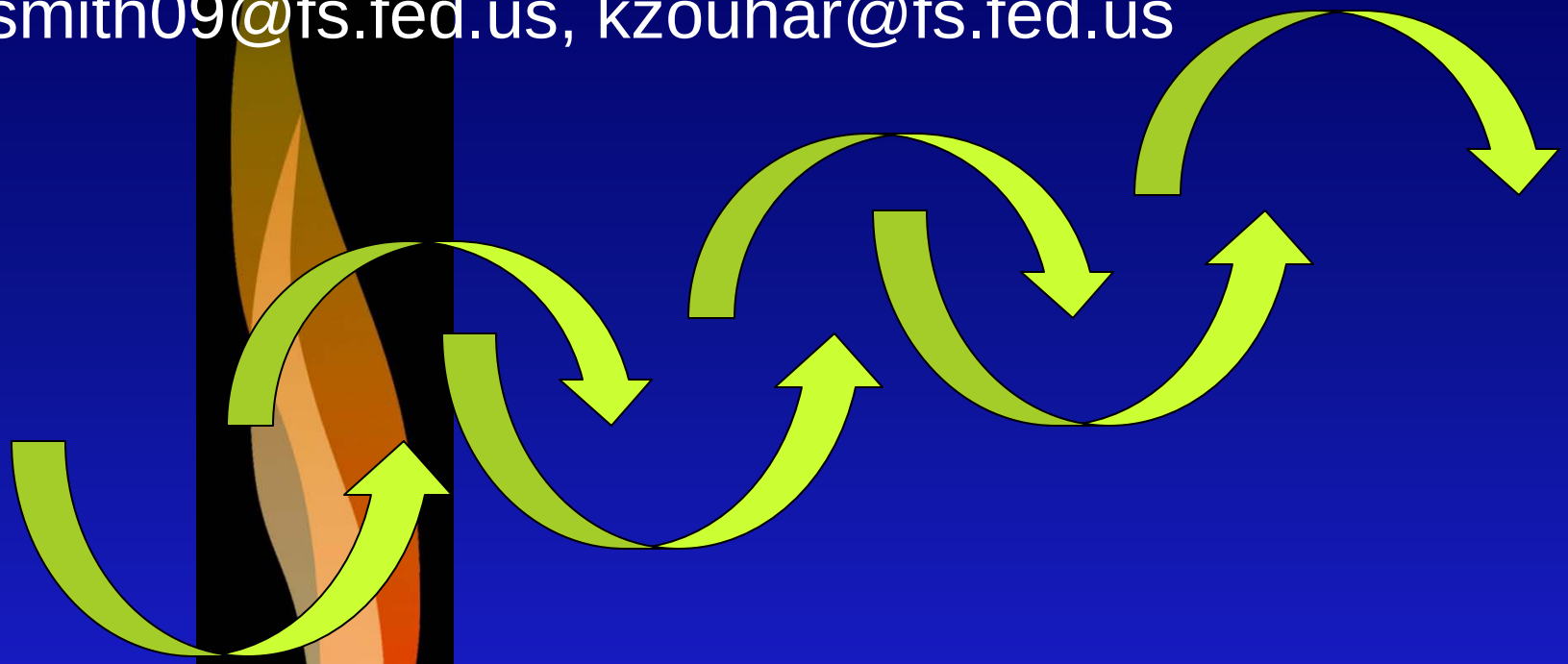

Try.

Monitor.

Adapt.