Economic and Social Impacts of Desert Fires and Invasives

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Wildfire and Invasive Plants in American Deserts conference

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Economic and social research: An idiosyncratic review

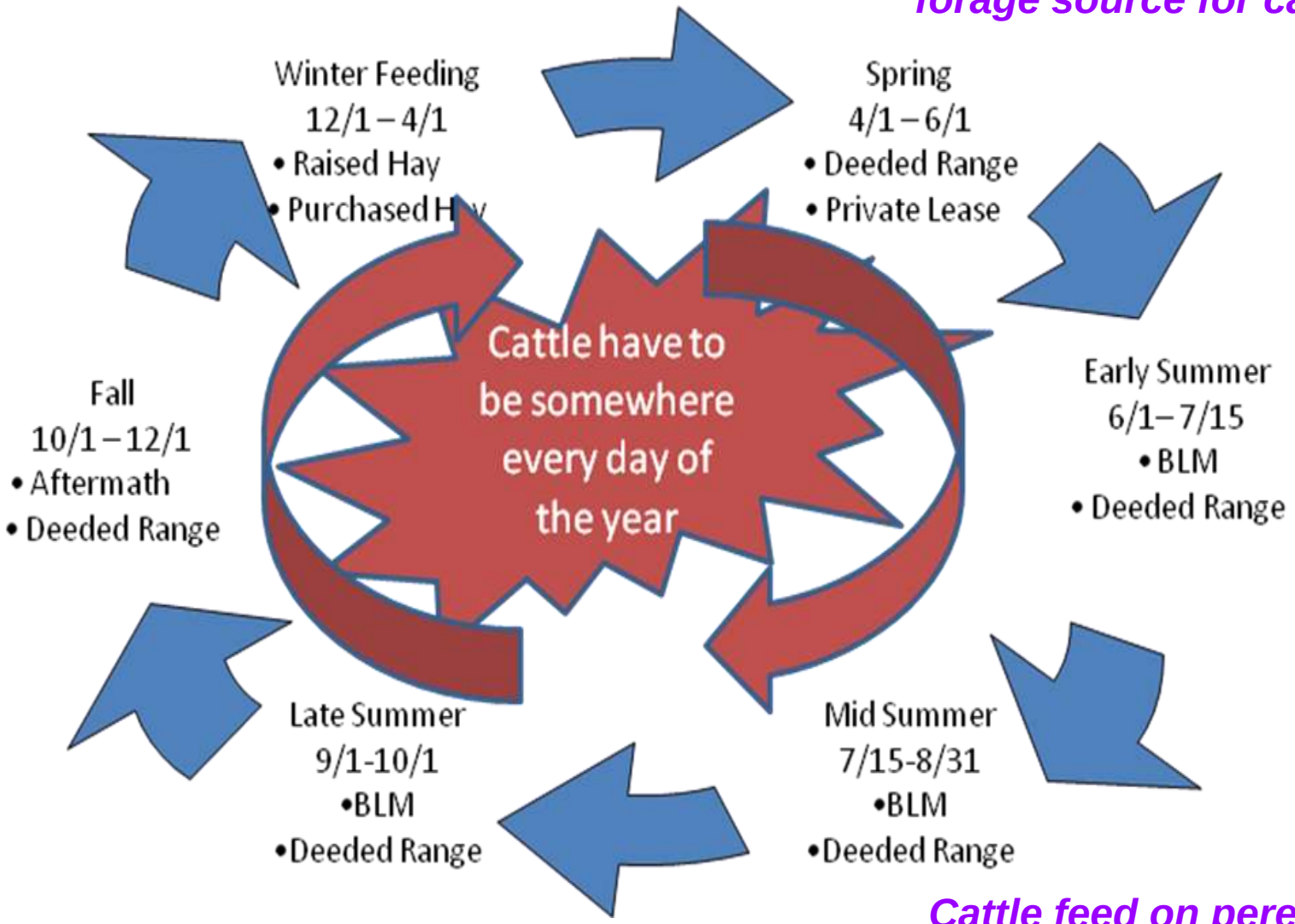
- Lots of research, but not in desert systems
- Today's presentation: Scaling up
  - Ranch level: Economic impacts of cheatgrass and wildfire
  - Community level: Unifying and fragmenting effects of wildfire
  - Landscape/regional level: Contextual influences on perceived impacts & preferred actions

Ranch-level impacts: Some basic assumptions

- Economic impacts differ depending on
  - Timing of impact
  - Intended use of property
- Feedbacks between cheatgrass, fire
- Livestock production by typical Great Basin ranch hinges on within-year forage availability from multiple sources

Cutting cost of purchased hay is often best pathway to profitability

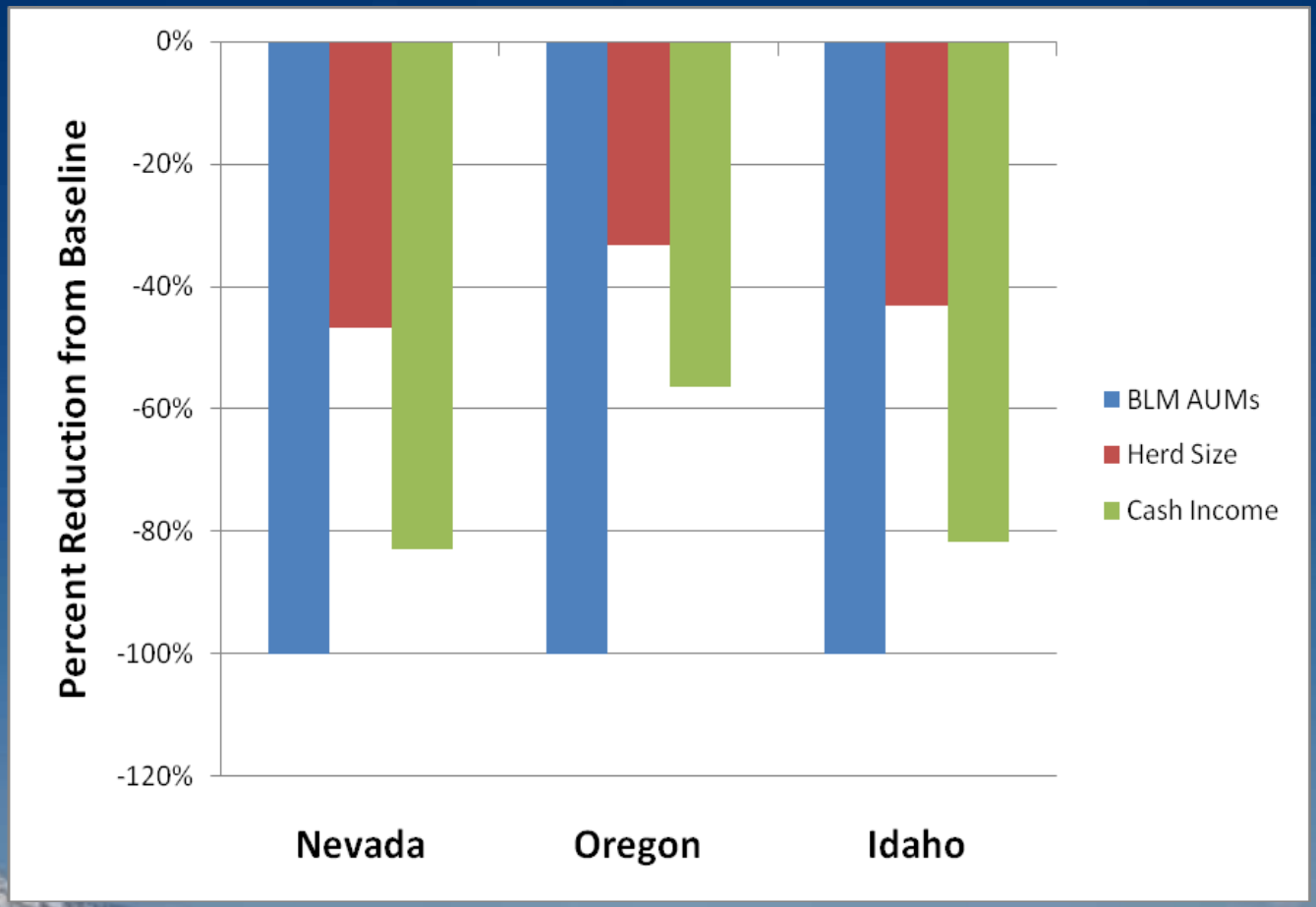
Period of high cheatgrass production – can be chief forage source for cattle



Increasing wildfire susceptibility – burned areas off limits next 2 yrs

Cattle feed on perennials – senescing cheatgrass can cut forage availability

What if BLM forage is unavailable?



Source:

Torell *et al.* (2002)

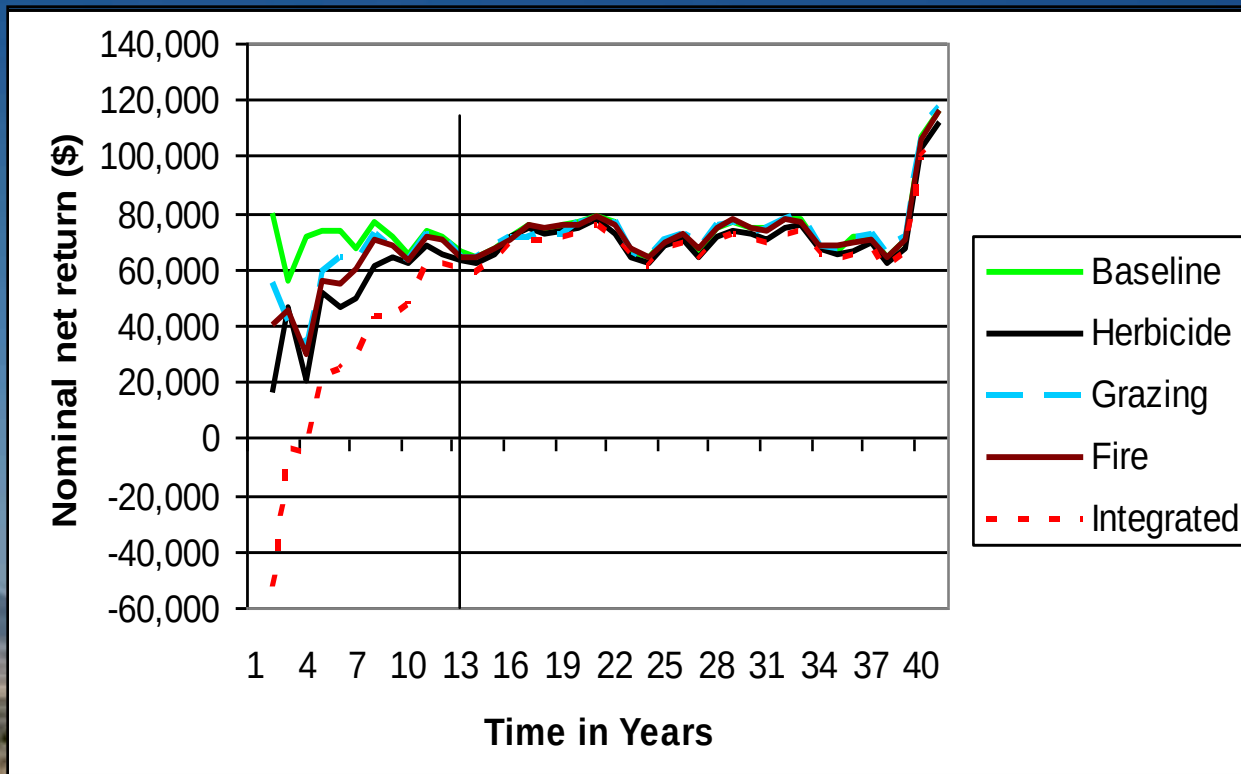
What about treating cheatgrass?

Treatment	Cheatgrass	Natives
Herbicide	**(60%)**	**20%**
Fire	**(20%)**	**10%**
Grazing	**(25%)**	**10%**
Integrated	**(70%)**	**30%**

Source: **Satyal (2006)**

All treatments result in net loss to ranch:

- **treatment costs**
- **loss of spring forage**

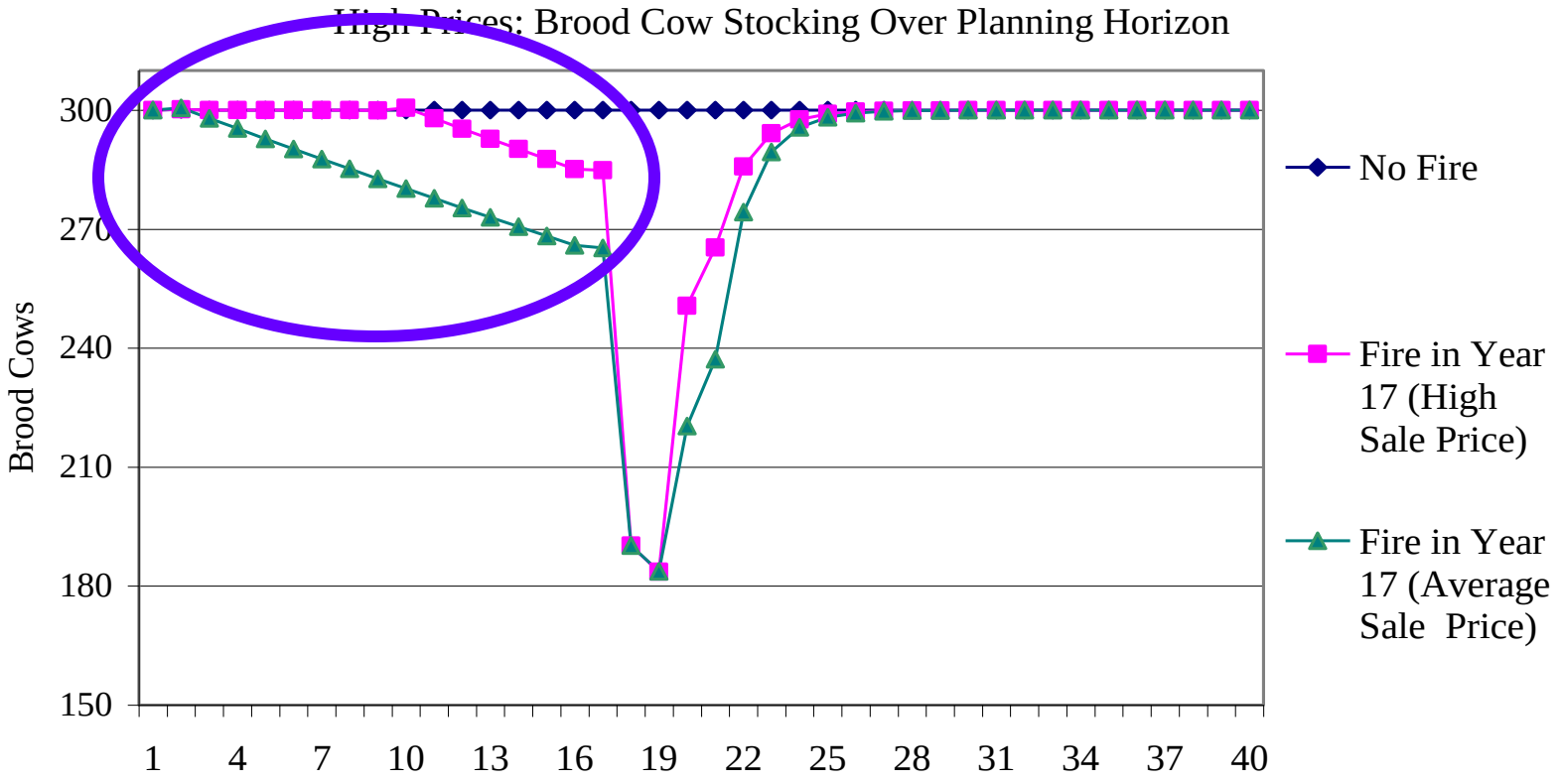


How do random fire events change ranch profitability?

- Basic assumptions:
  - Fires more likely with vs. without cheatgrass
  - Shortened fire return interval
  - Fire leads to loss of allotment for 2 years, but fire occurs late in season, not affecting current year grazing

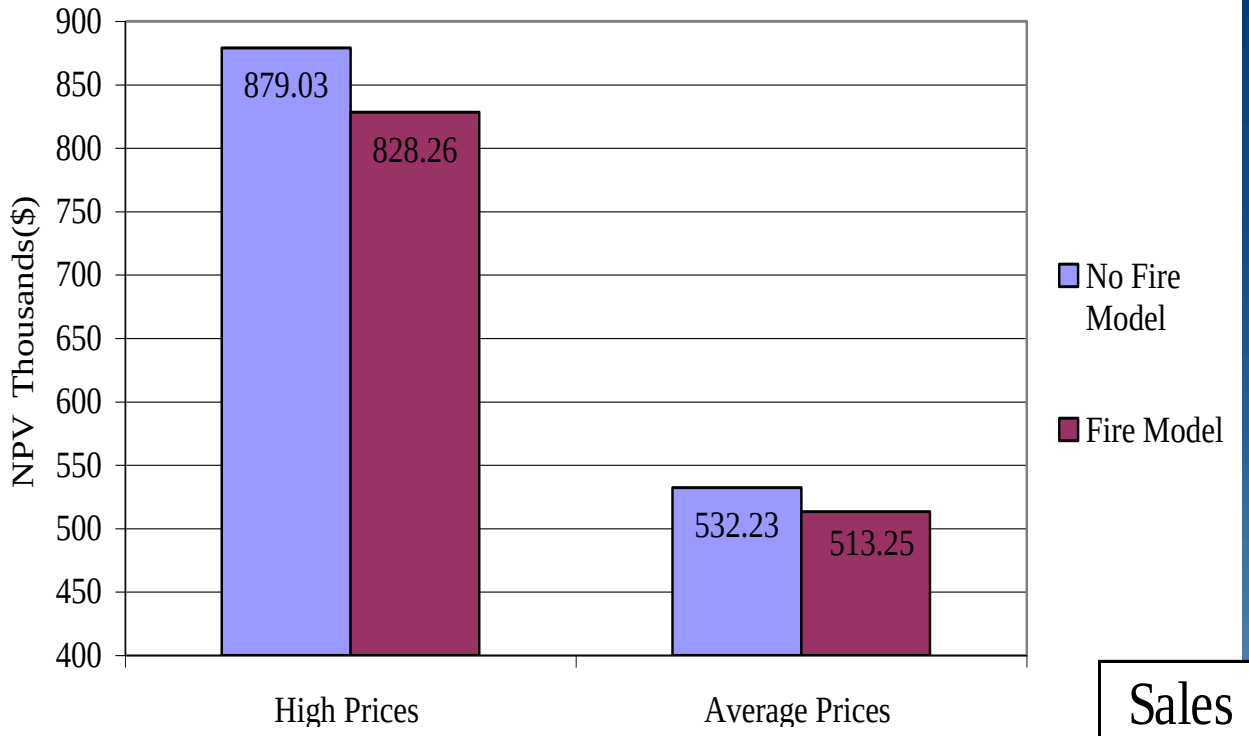
Source: **Maher (2007)**

Impact depends on cattle prices



Optimal solution is to reduce stocking rates ahead of fire … but how can you do that in real life??

Long-term impact also depends on cattle prices



Income over 40-year planning horizon

Source: **Maher (2007)**

Probability of survival depends on cost of alternative forage – typically these are much higher

Sales Price	Stay in Business	**Bankruptcy**
High	89%	**11%**
Avg.	68%	**32%**

Community-level economic impacts

- Riggs et al. (2001): economic impact of >1.6 MM ac fire in 5 Nevada counties
- Costs:
  - Lost AUMs, fencing, firefighting, structure losses, livestock losses, rehab
- Costs exist but weren't calculable:
  - Recreation, wildlife, roads, environment, lives
- **Quantifiable part of loss > $13,000,000**

Community-level social impacts

- Research on natural hazards suggests:
  - Natural disasters don't always hurt economies
  - People living in hazardous areas tend to be over-optimistic about risk
  - Information alone doesn't increase risk awareness or preparedness
  - Disasters affect a community's quality of life

Source: **Kumagai *et al.* (2004)**

Community-level social impacts

- Research on natural hazards suggests:
  - Recovery after wildfire depends on pre-fire social and physical conditions
  - Natural disasters have different impacts from technological disasters – wildfires appear to be somewhere in between
  - Disasters often spark “blaming behaviors” against govt., other institutions

Source: **Kumagai *et al.* (2004)**

Unification and fragmentation
A Rodeo-Chediski case study

- Carroll *et al.* (2005) studied 3 communities:
  - Community cohesion was evident as residents "pulled together" to rebuild their communities
    - Businesses providing for firefighters
    - Reaching out to assist burned-out neighbors
    - Emergence of locally based assistance groups
  - Fragmenting effect of conflicts over resource distribution, cultural issues, blaming behaviors

Trust and acceptability: Social impact of an escaped prescribed burn

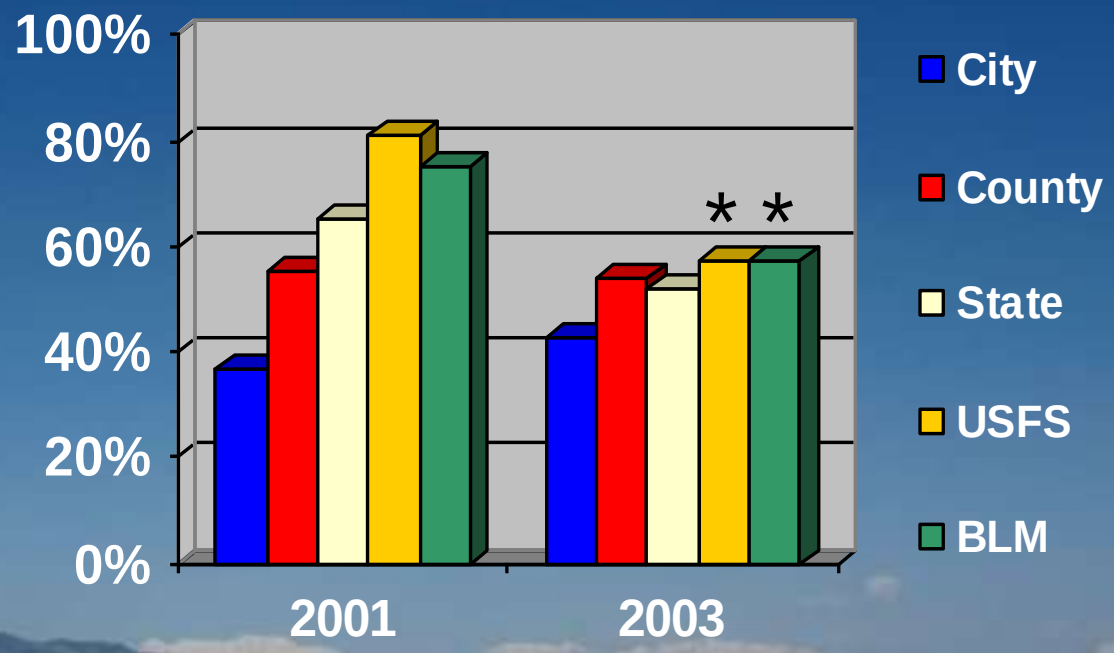
Acceptability of prescribed burning, measured before & after Cascade II escape

	2001	2003
Use wherever it can be effective	**33%**	**31%**
Only in carefully selected areas	**53%**	**50%**
Do not use due to negative impacts	**2%**	**9%**
Do not use – unnecessary	**2%**	**2%**
Don't know	**10%**	**9%**

Source: **Brunson & Evans (2005)**

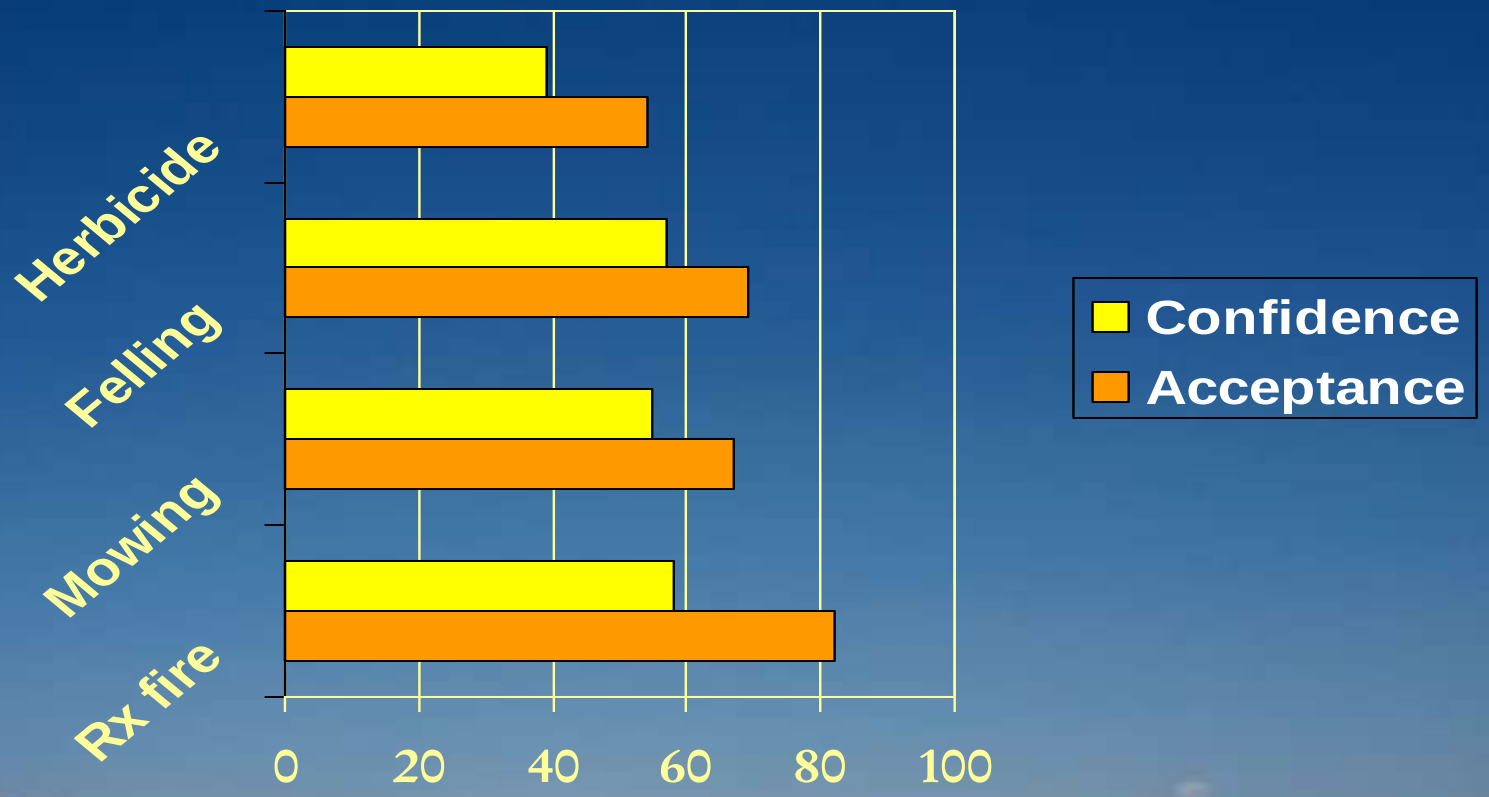
Trust and acceptability: Social impact of an escaped prescribed burn

Confidence in agencies' ability to use prescribed fire effectively, before and after Cascade II escape



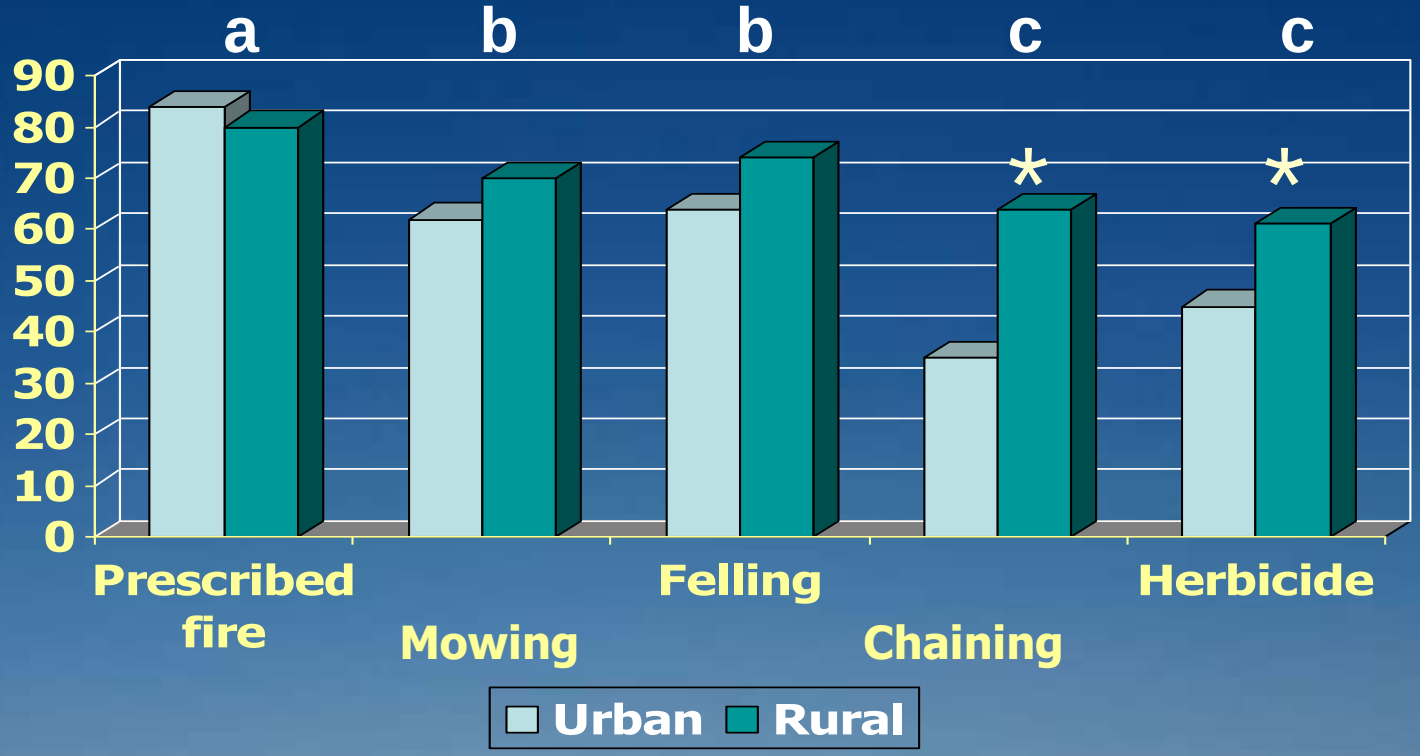
Source: Brunson & Evans (2005)

Blaming behavior, or an overall crisis of confidence?



Source: **Shindler et al. (2007)**

Contextual influences on acceptability of proactive fuels/weed management



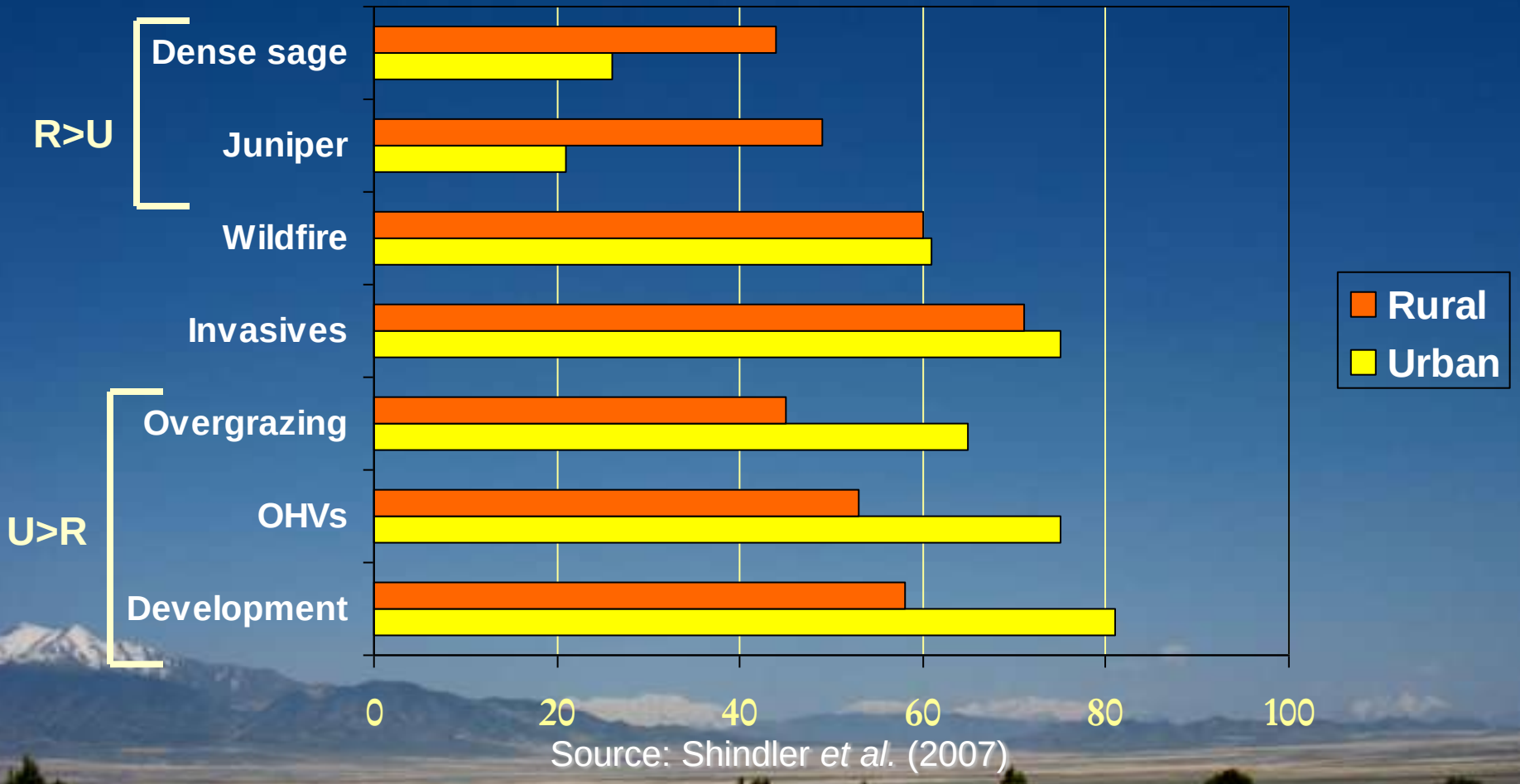
[a,b,c] Frequency distributions significantly different (χ^2, $p<.05$)

*Rural and urban responses significantly different ($\chi 2$, $p<.05$)

Source: **Shindler et al. (2007)**

Differences in acceptance linked to beliefs about ecosystem health

Perceived threats to healthy rangelands



Source: Shindler *et al.* (2007)

Fire-wise management by Utah small-acreage landowners

Have you done any of the following to reduce wildlife hazards on your property? (Spring 2008)

	Mtn1	Mtn2	Des1	Des2
Made home less flammable	25%	29%	11%	16%
Conducted a controlled burn	31%	20%	17%	14%
Removed flammable vegetation	46%	46%	61%	43%
No actions taken	*20%*	*25%*	*25%*	*35%*

Source: **Brunson & Price (in prep.)**

Contextual effects on acceptability of weed control options

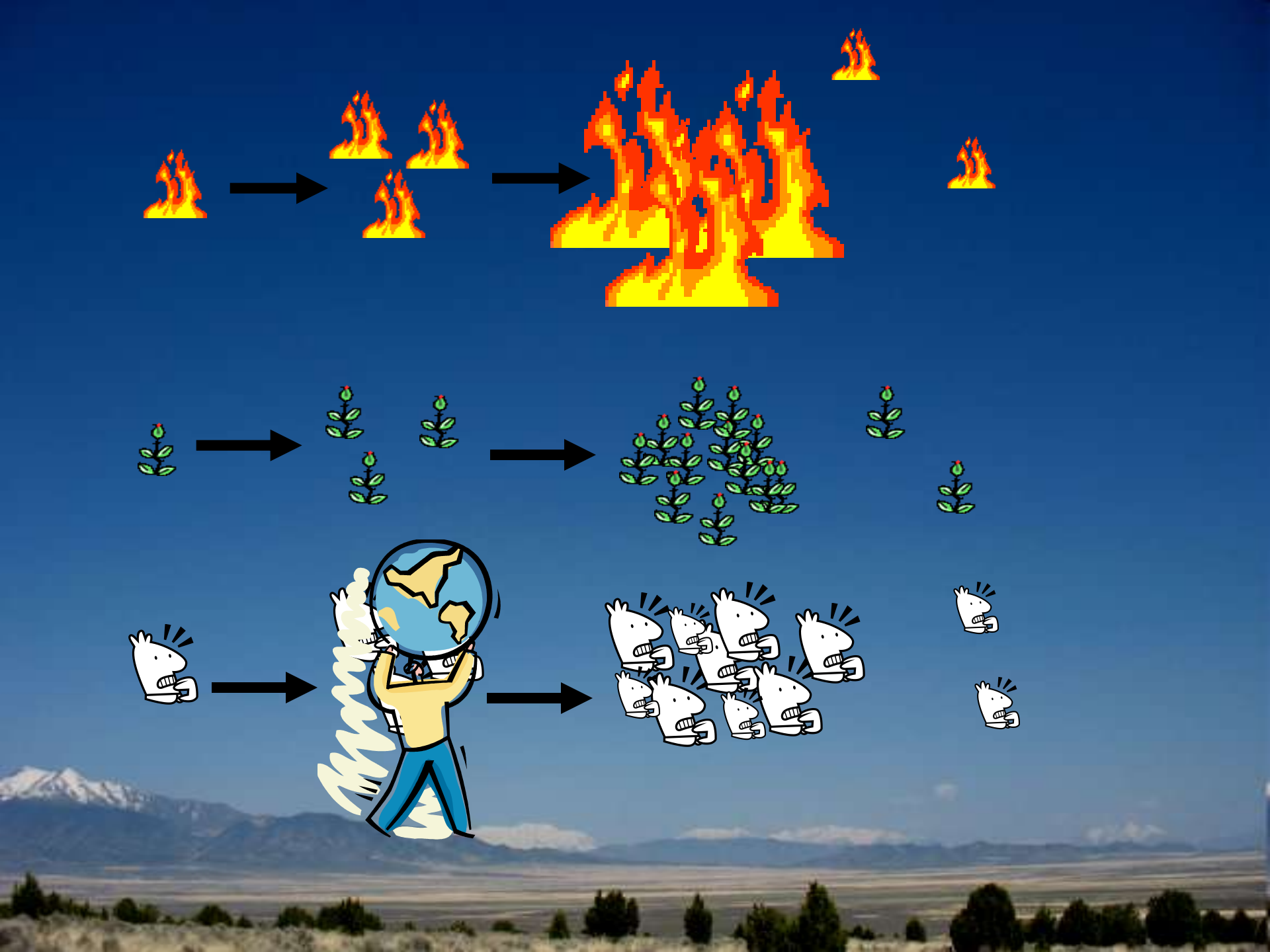
Where occurs	Control approach	Not OK	High
MULTIPLE-USE	*Chemical*	23%	6% *
	Biological	8%	38%
	Mechanical	5%	60%
PARK/REFUGE	*Chemical*	44%	5%
	Biological	10%	40%
	Mechanical	5%	58%
NEXT TO HOMES	*Chemical*	38%	5%
	Biological	11%	33%
	Mechanical	1%	62%

Source: **Tidwell (2005) – Survey in selected counties: AZ, CO, UT, NM**

Wildfire and invasives in human systems: The Barn Door Effect

- Effective response if public concern triggers expenditure of political and financial resources
- Public concern requires a noticeable “crisis” requiring action

- Crises typically occur when it’s prohibitively expensive to take action



Volunteers and management of desert invasive plants

	% yes
Ever participated in environmental volunteer work?	38%
Ever volunteered to work on invasive plant issues?	10%
Willing to volunteer on invasive plant issues?	43%
Which type of activity?	
Control	57%
Monitoring	55%
Education	39%
Restoration	38%

Source: **Tidwell & Brunson (2008)**