

# Ranch-Level Economics: What We've Learned

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# Look Back and Look Forward

Economic Theory  
Benefits and Costs

Seed Mixes & Non-Use

Economic Impact of Fire

Ranch-Level

Others





# Economic Theory and Benefit-Cost Analysis: An Application to Wildfires



# Economic Analysis

- Stream of benefits and costs over time
  - Upfront costs for suppression and rehab
  - Market and Non-Market benefits and costs
  - Ranch-level (revenue, expenses, profits)
  - Others: Social Structure, Open Space, etc.
- The necessity to discount future dollars
- Are Benefits  $>$  Costs? (NPV)

# Discounting Future Benefits and Costs

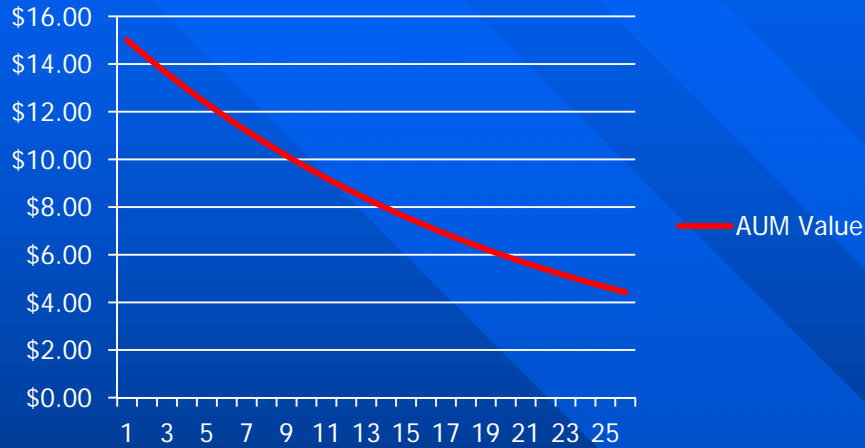
- $PV = C_0 + C_1/(1+r)^1 + C_2/(1+r)^2 + \dots + C_n/(1+r)^n$
- $r$  = discount rate (%)
- $C_n$  = cost in Year  $n$
- NPV = Net Present Value (difference between benefit and cost streams)



# Forage Values

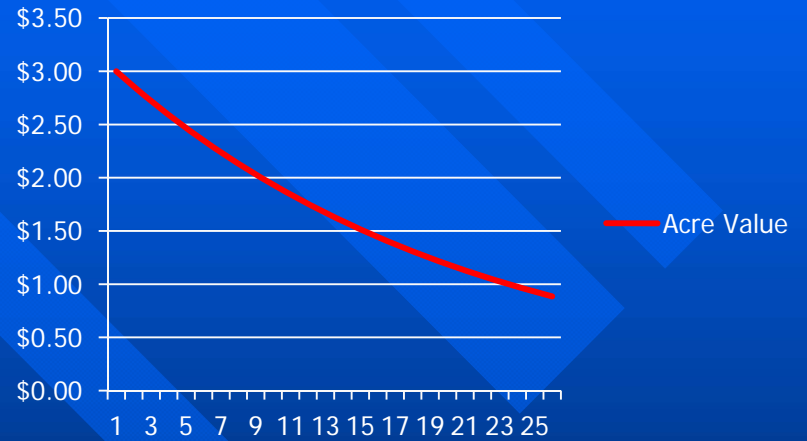
\$/AUM

## AUM Value



\$/ac

## Acre Value



Year

# Net Present Value

- Present Value of the Stream of Livestock Grazing Values amounts to about \$36.70/acre (\$15/AUM, 5 acres/AUM and 5% discount rate with 2 years of non-use)

# Seeding

<i>Thurbers Site</i>				
<b><u>Species</u></b>		<b><u>Rate (lbs/ac)</u></b>	<b><u>Cost/Unit</u></b>	<b><u>Cost/Acre</u></b>
Sandbergs				
Bluegrass		1.1	\$ 7.88	\$ 8.67
Bottlebrush				
Squirreltail		3	\$ 24.99	\$ 74.97
Bluebunch				
Wheatgrass		2.5	\$ 7.79	\$ 19.48
Lewis Flax		0.1	\$ 14.44	\$ 1.44
Alfalfa		0.5	\$ 2.18	\$ 1.09
Sainfoin		1.36	\$ 2.01	\$ 2.73
Total		8.56	\$ -	\$ 108.38

Seed Prices: BLM Consolidate Seed Buy (Great Basin), 2006.  
 Seed Mix: Murphy Complex Fire Emer. Stab. Plan, BLM, 2007



# Non-Use Period and Impact on NPV

Years

Mix	0	1	2	5	8
Thurbers	-63.10	-66.10	-71.68	-79.09	-85.49
WSA	-24.45	-27.45	-33.03	-40.44	-46.84
Bluebunch	-23.80	-26.80	-32.38	-39.79	-46.19
Crested Wheat	16.27	13.27	7.69	0.28	-6.12
Forage Kochia	7.57	4.57	-1.01	-8.42	-14.82

# Economic Theory Summary

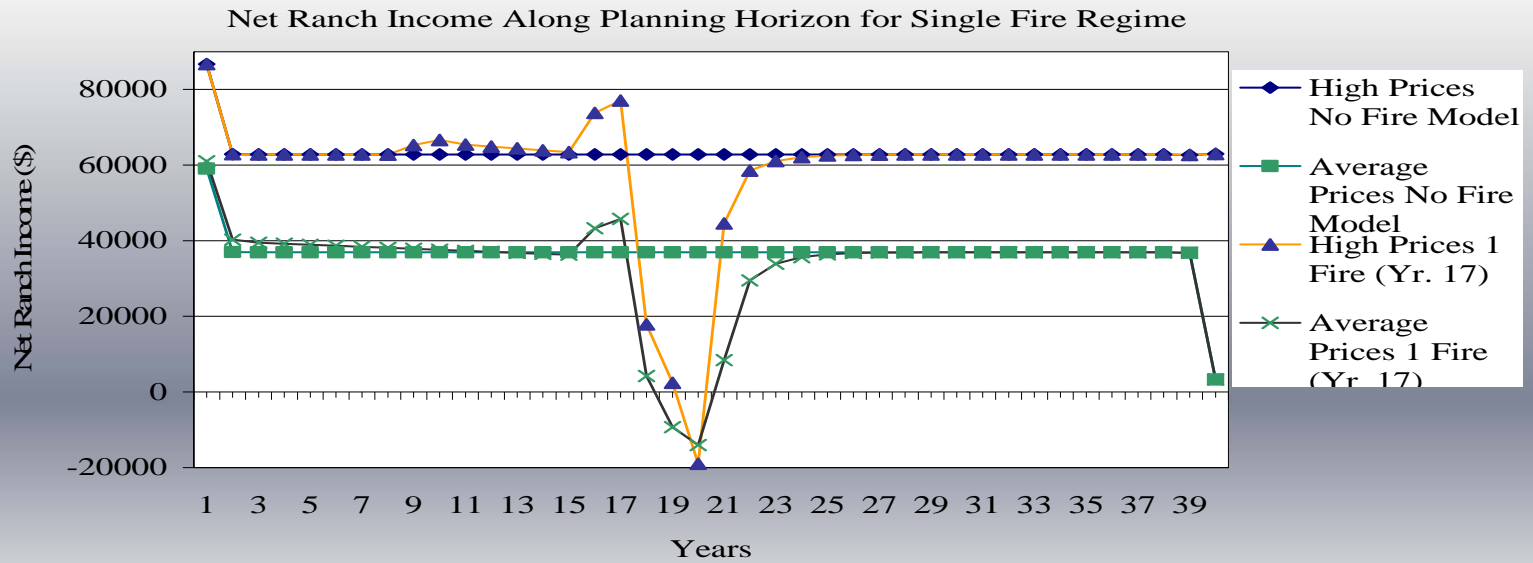
- Economics should be a critical part of the decision process
- Expensive up-front costs (seed) are not covered by livestock benefits over time
- Non-market benefits and costs must be developed and quantified (ecosystem services)
- Non-use period post-fire needs careful examination (case by case)

# Ranch Level Impacts

- Anna Maher: OSU MS Thesis:
  - The Economic Impacts of Sagebrush Steppe Wildfires on an Eastern Oregon Ranch
  - Multi-period Linear Programming Model used to estimate impacts on the NPV of income stream associated with a 300 head ranch (40 year planning horizon)
  - Alternative Fire Frequencies (Monte Carlo)
  - Cattle, income, expenses, forage used

# Ranch Level

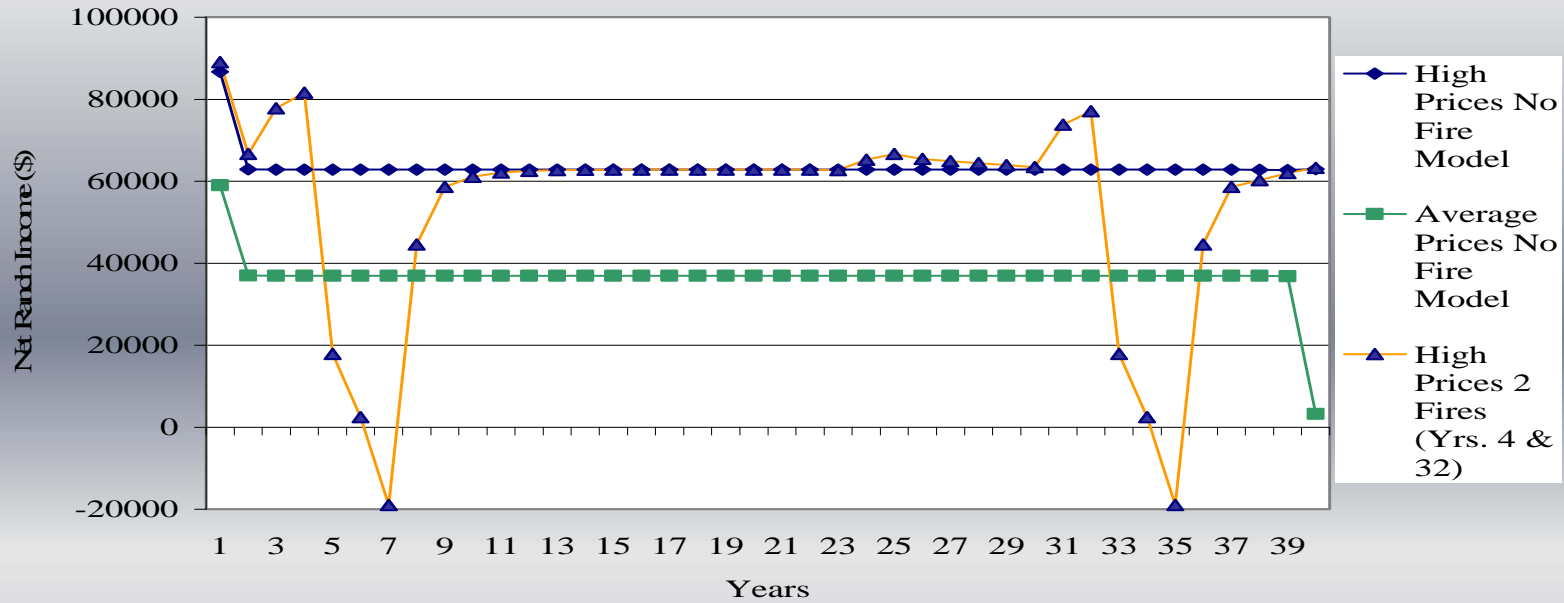
- Constant Prices and Precipitation
  - No variation from year to year
    - » High, Average, Low scenarios
  - Goal was to isolate the economic impact of alternative fire frequencies
  - Base Model (no fires)
  - Fire Model (varied based upon the Monte Carlo simulation—1-2 fires/40 years)
  - Comparisons of NPV, bankruptcy (infeasible)



Fire occurs in Year 17  
 Impact on Net Income continues to Year 20  
 tied to 2 years of non-use after the fire

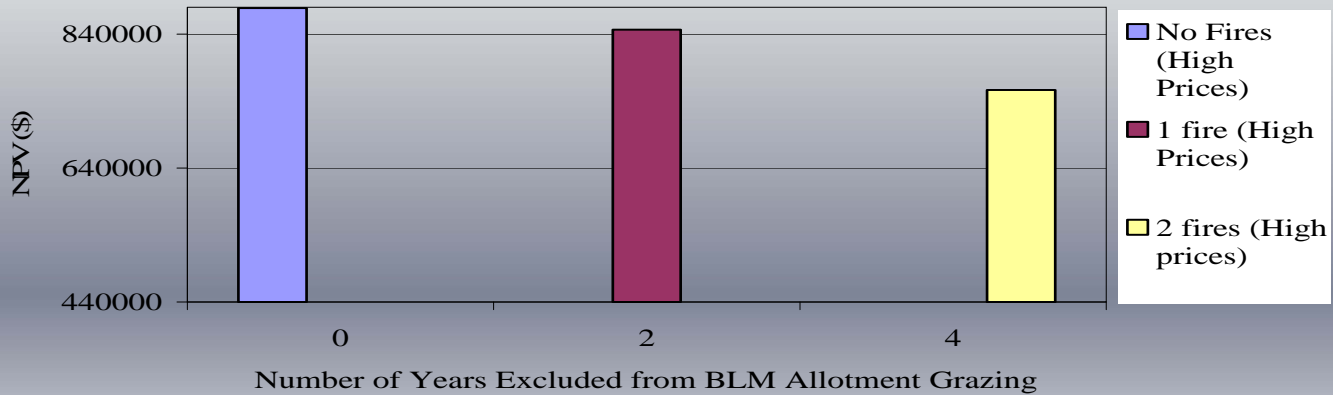


Net Ranch Income Along Planning Horizon for Two-fire Regime



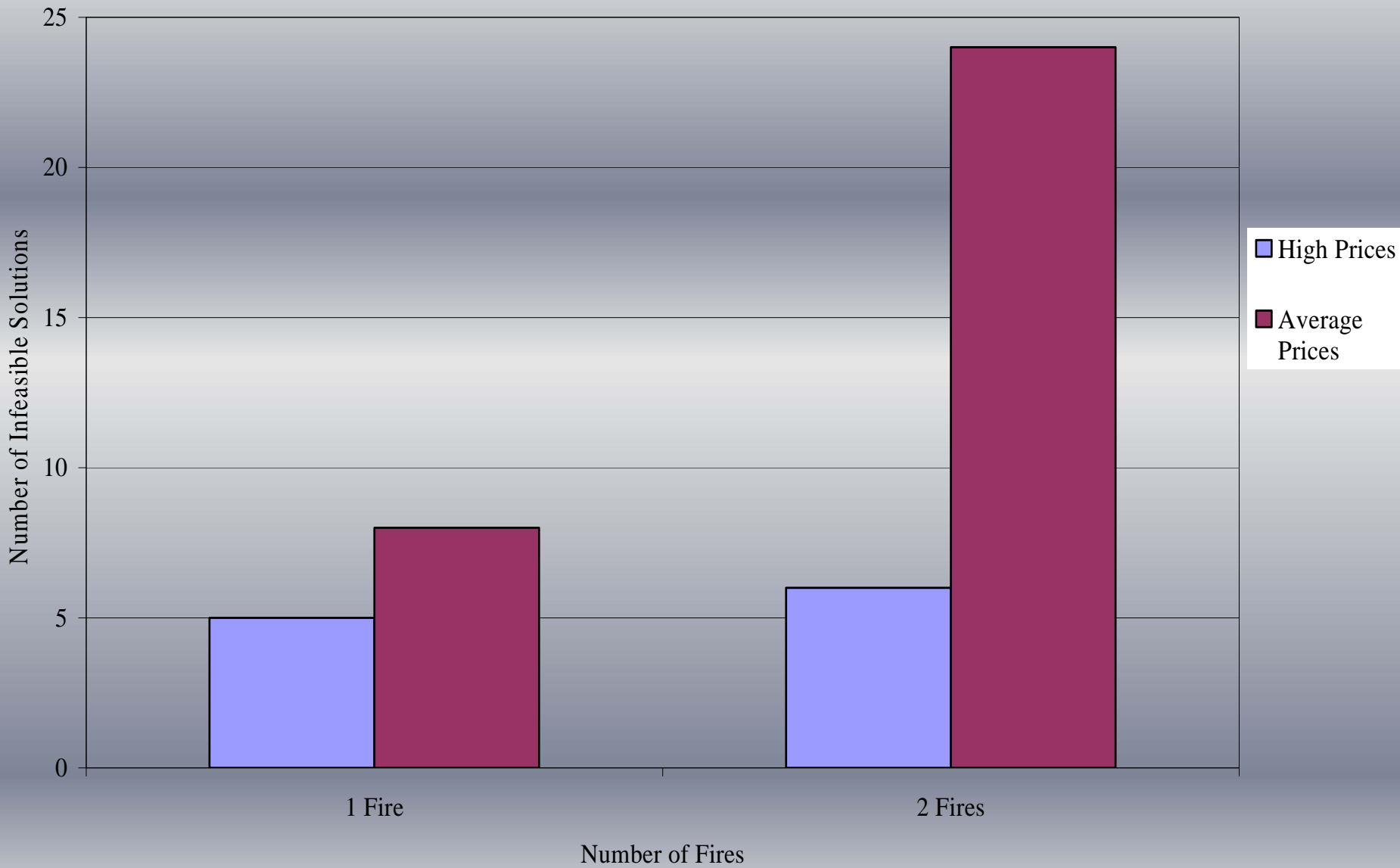
Two fires in planning horizon also negatively impacts net ranch income

High Sale Prices: NPV Vs. Number of Fires and Associated Years of No Access to BLM Allotment

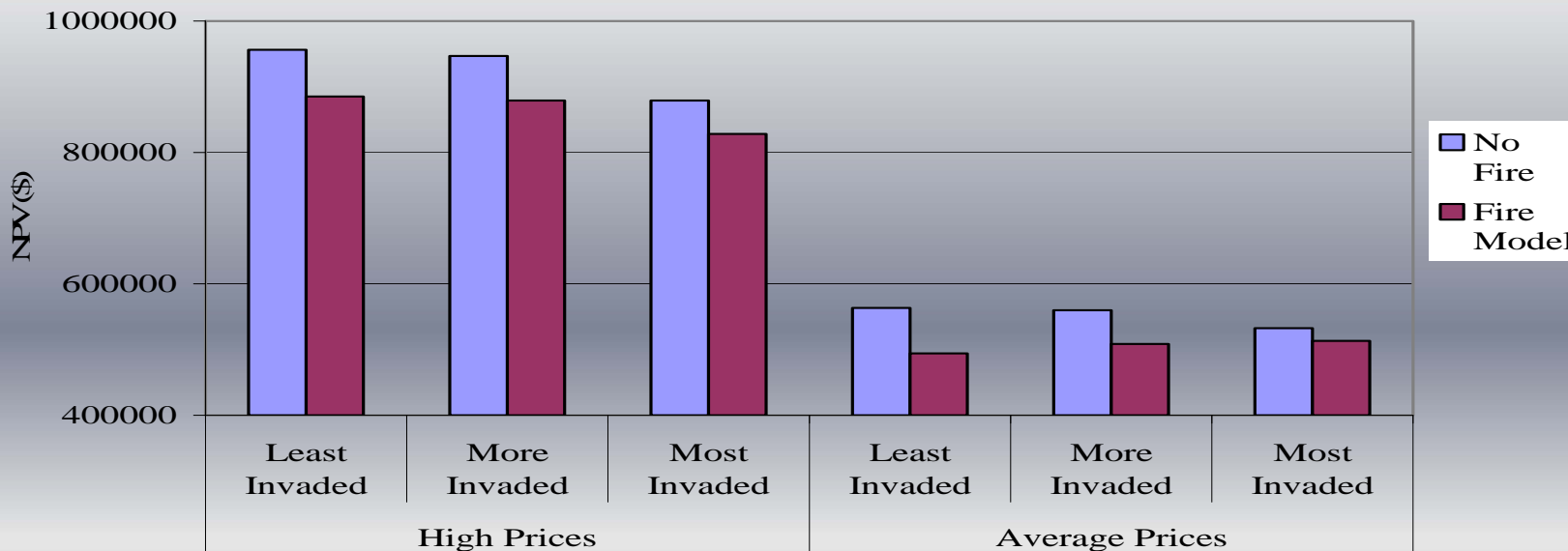


NPV of the income stream of ranch is negatively impacted by fires and non-use period, post-fire

Number of Infeasible (Bankruptcy) Solutions by Number of Fires



Sensitivity Analysis of Amount of Cheatgrass and Native Grasses: NPV  
(Discount Rate 7% )



In both average and high price scenarios:  
Rangelands most dominated by cheatgrass result in less ranch  
income: tied to fires and frequency

# Ranch-level Conclusions

- Models indicate that fire has negative impact on ranch income
- Models also indicate that increased fire frequency increases the chance of bankruptcy (infeasible solutions)
- Alternative forage sources are limited and expensive
- Non-use period following fire needs careful consideration



- “If you lose your federal grazing, you gotta try to survive or you’re gonna hammer your private ground for awhile until you just can’t make it work. So then, somebody with a small place like mine is going to think – ‘now, this is stupid, I could make big bucks selling out to a developer,’ and there goes the wildlife habitat and everything else.”

Anon. IRRC Focus Groups. 2007

- “Well, from our perspective, I think we’ve got to educate the public too and fires aren’t all bad. There’s the right place and right time, and I’d like to see that addressed. [Fire] is a great tool if used correctly. We do get flack about the smoke in some areas... But this is the key to educate people: rangeland’s for everybody, cattlemen, hunters, rock hounds, whatever. It’s a good resource and we need to protect it.”

**Anon. IRRC Focus Groups. 2007**

# Summary

- B/C Analysis—need to develop estimates of benefits and costs of fires
  - Probability
  - Non-use period
  - Non-Market Values
  - Community Social Structure & Open Space
- Ranch-level impacts
  - Cheatgrass and fires reduce ranch income



Questions?