



# Human Dimensions of Wildfire Research in Colorado

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# Background



- Colorado State University, Colorado State Forest Service (CSFS), U.S. Forest Service collaborating on HD of wildfire research since 2001
- Understand views on forest mgmt practices & home protection (e.g., defensible space) activities
- Identify ways managers can encourage homeowner participation in defensible space



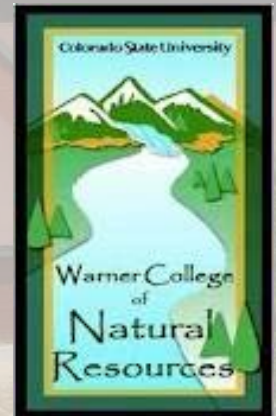
# Presentation Overview



- Present selected findings across study years (e.g., perceived responsibility, legal issues)
- Examine beliefs and attitudes toward forest management practices
- Predict homeowners defensible space activities
- Identify barriers to adopting defensible space
- Translate findings into on the ground practices



# Beliefs about Wildfire and Home Protection





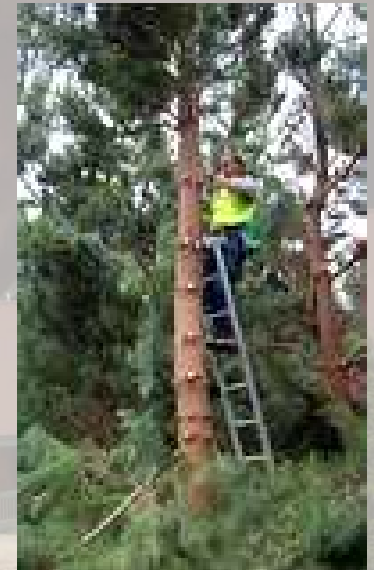
# Survey Goals & Study Years



Year	Location	Funded by:	Goal
2001	Arapaho–Roosevelt NF	U.S. Forest Service	Fire management
2004	North Central CO (WUI)	U.S. Forest Service	Home protection
2005	Front Range CO	U.S. Forest Service	Fire management
2011	North Central CO	CSFS/U.S. Forest Service	Fire management
2012	Southern CO	JFSP	Home protection
2013	Statewide	CSFS	Forest management

# Basic Beliefs

- Perceived Responsibility
- Legal Issues
  - Building in WUI
  - Home Protection
- Defensible Space
- Insurance
- Neighbors





# Responsibility



	Arapaho NF 2001	Front Range 2004	North Central 2005	North Central 2011	S. CO 2012
Homeowners are responsible for protecting homes near forest	--	91%	--	--	93%
Homeowners are <i>most responsible</i> for protecting homes near forest	67%	--	97%	86%	89%
Government agency managing forest <i>most responsible</i> for protecting homes	33%	20%	15%	26%	21%
Community fire department <i>most responsible</i> for protecting homes	42%	--	--	--	25%
% Agree with statement					



# Responsibility



	Arapaho NF 2001	Front Range 2004	North Central 2005	North Central 2011	S. CO 2012
Homeowners own fault if homes are damaged by wildfire	56%	32%	75%	63%	--
Homeowners have right to expect home protected by firefighters	29%	--	19%	--	--
When fire, agency first priority to protect private property	31%	25%	27%	--	51%
When fire, agency first priority to ensure public safety.	--	--	--	--	91%

% Agree with statement





# Freedom to Build / Protect



	Arapaho NF 2001	Front Range 2004	North Central 2005	North Central 2011	S. CO 2012
People should be allowed to build homes where they want, even if it is in a high fire zone.	24%	83%	39%	71%	52%
Laws should prohibit building homes near forests where they can be burned by fires.	34%	11%	29%	16%	17%
Homeowners should be required by law to protect their home from fire.	71%	41%	72%	--	52%
Taking steps to protect one's residence should be voluntary	38%	--	54%	--	--

% Agree with statement



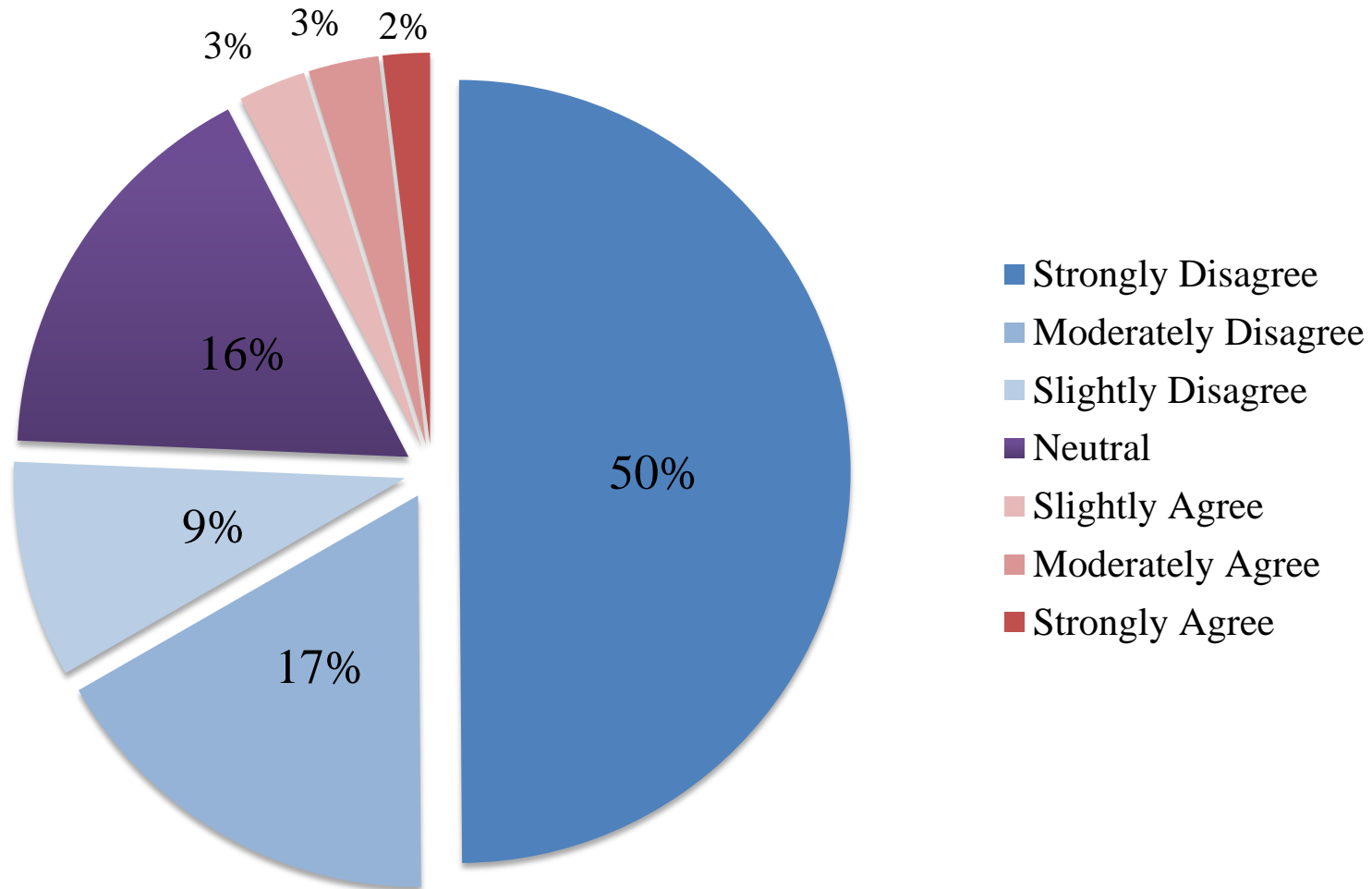
# Legal Issues



	North Central 2004	Southern CO 2012
New home construction should be required by law to use fire resistant materials.	73%	60%
Using fire resistant materials in construction should be voluntary.	41%	51%
Creating defensible space around homes should be voluntary.	62%	55%
Creating defensible space around homes should be required by law.	35%	--
% Agree with statement		

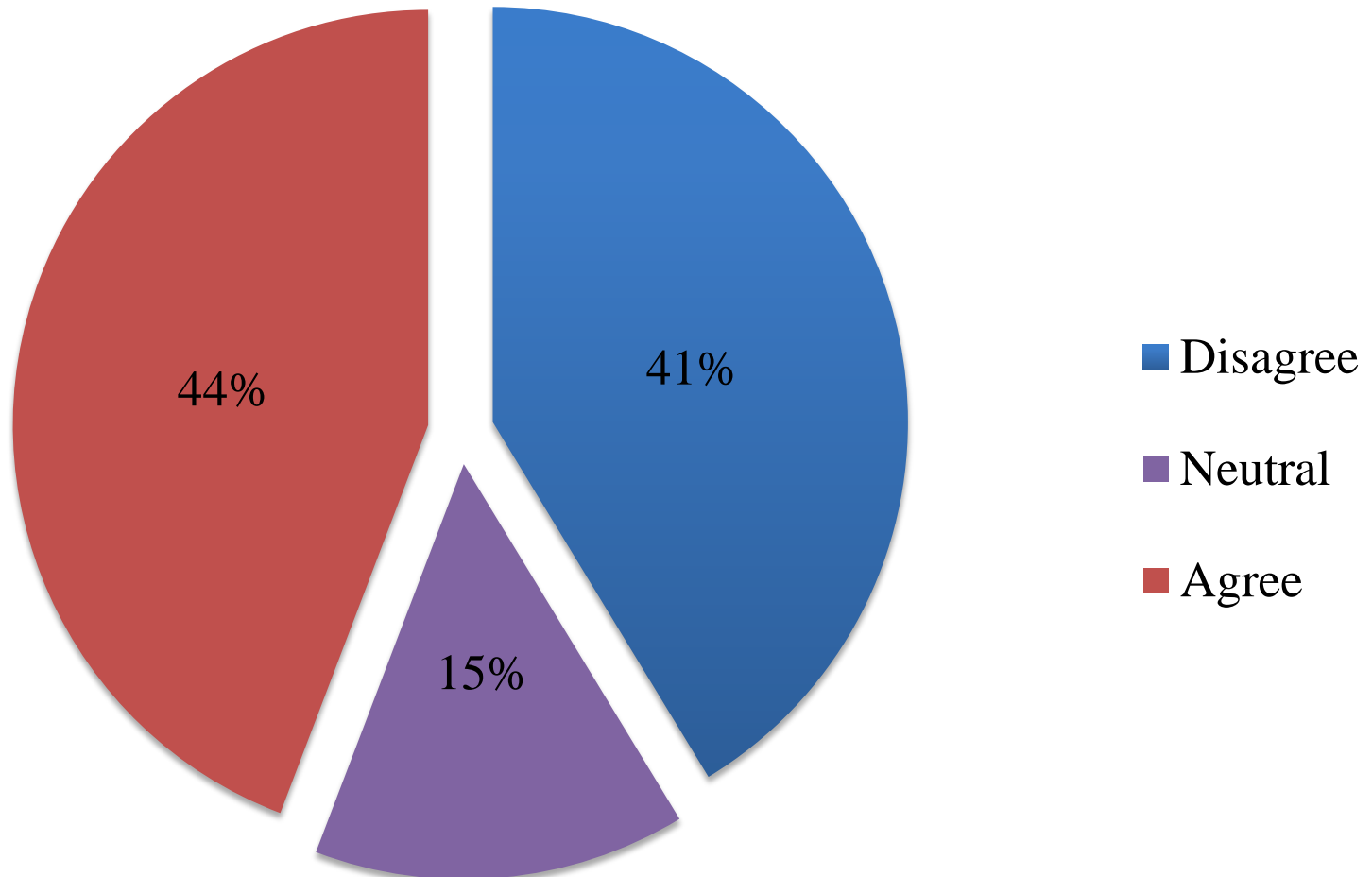
# Beliefs - Insurance

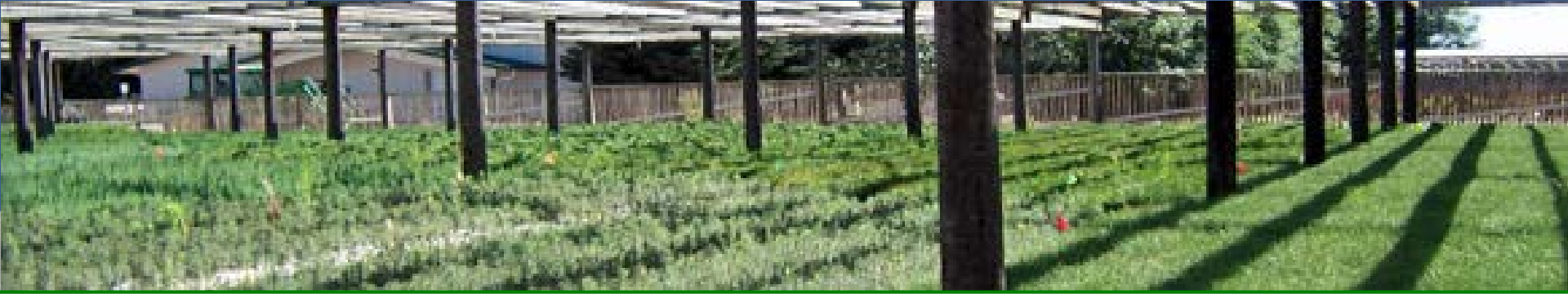
Defensible space activities are not necessary because my insurance company will cover any losses due to wildfire



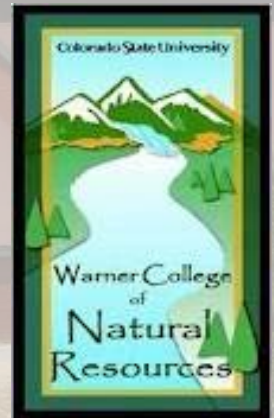
# Beliefs – Neighbors

My defensible space activities will be ineffective if my neighbors do not take similar actions.





# Approval of Forest Management Practices





# Public Perceptions of the CSFS



- Survey part of the CSFS Strategic Plan
- Agency interested in Colorado residents:
  - Familiarity with the CSFS
  - Approval or disapproval of forest management practices
  - Perceptions of the CSFS

# Attitudes and Beliefs

- Survey concerned with attitudes and beliefs about forest management practices
- Attitudes – positive or negative evaluations
  - Approval vs. disapproval
  - Aesthetic impacts
- Beliefs – perceived knowledge
  - Perceived familiarity with management practices



# Management Practices

- Forest management
- Windbreaks
- Defensible space
- Forest thinning
- Patch cuts
- Clearcuts
- Prescribed fire
- Fuel breaks
- Reducing surface fuels





# Hypotheses

Approval of forest management practices increases as:

– $H_1$  familiarity increases

– $H_2$  negative aesthetic impacts are reduced

$H_3$  aesthetic impacts will have more influence on approval than familiarity

- Random sample of Colorado residents
- Mail / Internet survey
  - Mail-out cover letter with url
  - Postcard reminder
  - Mail-out questionnaire
- $n = 405$



- Dependent variable
  - Approval of forest management practice
  - 7-point scale (strongly disapprove to strongly approve)
- Independent variables
  - Perceived familiarity of management practice
  - 7-point scale (not at all familiar to extremely familiar)
  - Attitudes of aesthetic impacts
  - 7-point scale (management practice makes property look substantially worse to substantially better)



# Results

*Predicting approval for nine forest management practices in Colorado*



**Dependent Variable**  
**Approval of:**

**Familiarity**

**Aesthetics**

**$R^2$**

Clearcuts

.05

.83\*\*

.69





# Results

*Predicting approval for nine forest management practices in Colorado*



Colorado  
State  
University

**Dependent Variable**  
**Approval of:**

**Familiarity**

**Aesthetics**

**$R^2$**

Clearcuts

.05

.83\*\*

.69

Patch cuts

.25\*\*

.71\*\*

.62





# Results

*Predicting approval for nine forest management practices in Colorado*



<b>Dependent Variable Approval of:</b>	<b>Familiarity</b>	<b>Aesthetics</b>	<b>R<sup>2</sup></b>
Clearcuts	.05	.83**	.69
Patch cuts	.25**	.71**	.62
Reducing Surface Fuels	.26**	.64**	.52
Forest Thinning	.12	.63**	.46
Forest Restoration	.13	.51**	.30
Prescribed Fire	.16*	.48**	.27
Windbreaks	.34**	.34**	.27
Fuelbreaks	.40*	.28*	.25
Defensible Space	.33**	.21*	.17



# Results

*Predicting approval for nine forest management practices in Colorado*



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Fuelbreaks	.40*	.28*	.25
Defensible Space	.33**	.21*	.17



# Summary



- $H_1$ : As familiarity with forest management practices increased, approval increased
- $H_2$ : As positive evaluations of aesthetic impacts increased, approval increased
- $H_3$ : Aesthetics of forest management practices had a larger influence on approval of forest management practices than familiarity

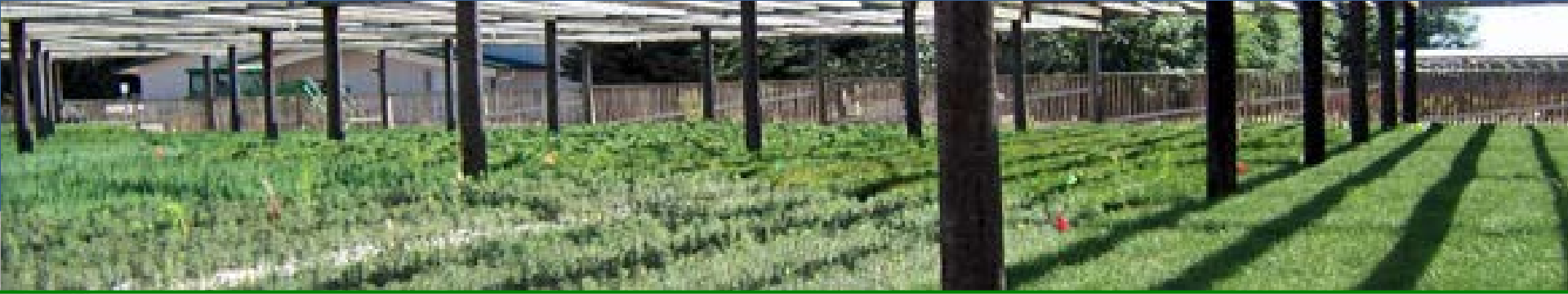




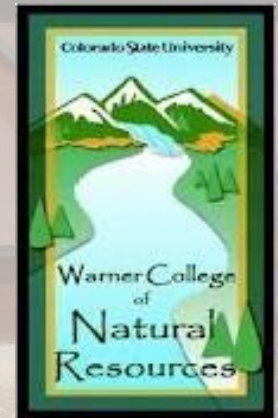
# Discussion



- Aesthetics had a larger impact on approval than familiarity
- Current CSFS outreach messages focus on increasing Colorado residents' awareness
- The CSFS should focus outreach messages on the aesthetic benefits of using different forest management practices



# Predicting Defensible Space Activities



# Defensible Space

**Defensible space** creates an area around homes where vegetation is cleared or reduced to help protect from fire



Examples include:

- Reducing the density of trees within 100 feet of the home
- Cleaning roof surfaces & gutters
- Removing overhanging branches within 10 feet of roof
- Ensuring that trees & shrubs are at least 15 feet apart

What influences homeowners' intentions to do specific defensible space activities?

How **LIKELY** are you to do [activity] in the future?

## Site activities

Reduce trees within 100' of house

Prune branches within 75' of house 10' above ground

Plant trees / shrubs 15' apart

Plant fire resistant plants

## House activities

Clean gutters

Stack firewood 30 feet from house

Use non-flammable building material



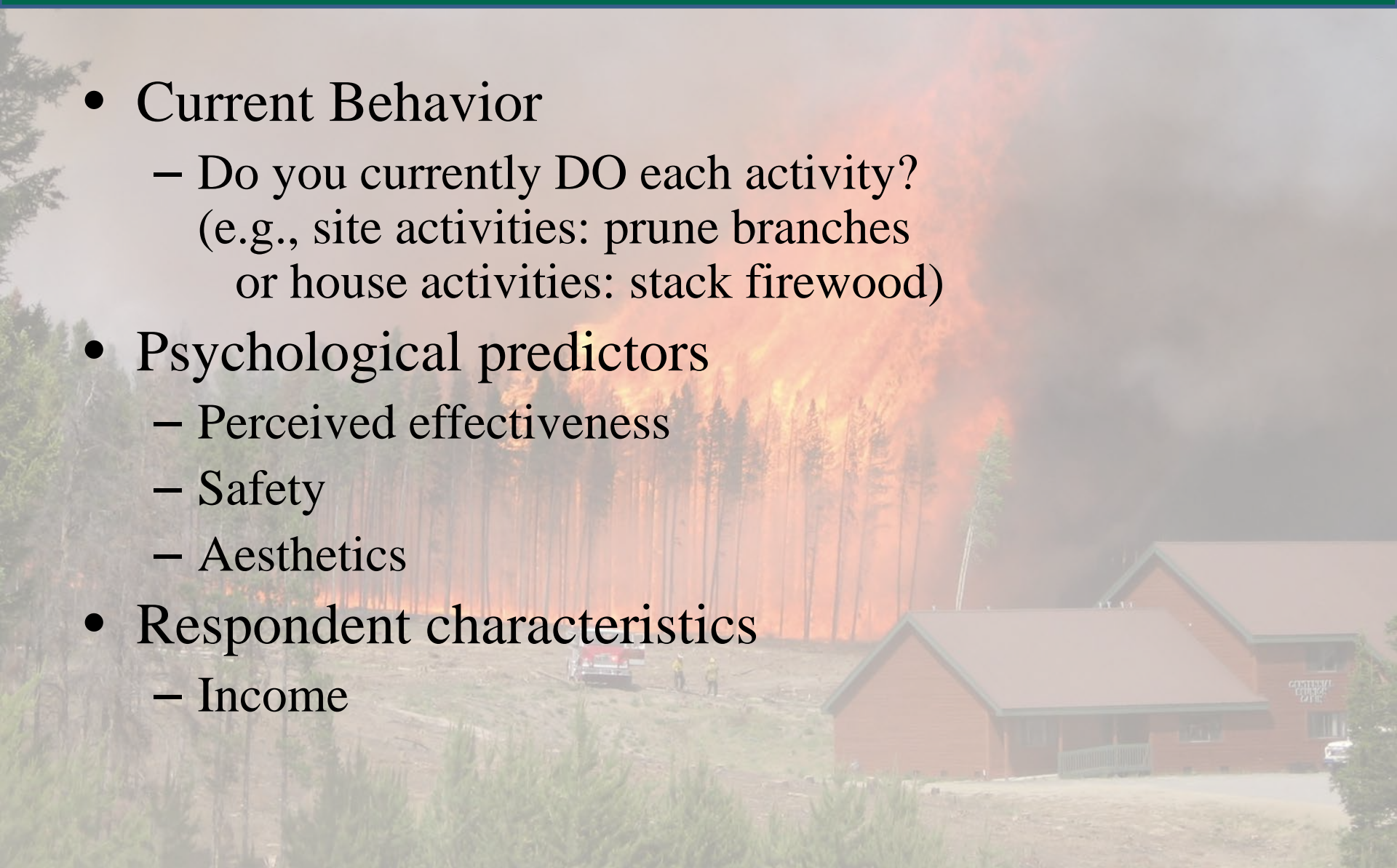
- 2004 – mail survey
- 2012 – mail / internet survey
  - Homeowners living in the Wildland-Urban Interface
  - Range of Colorado counties
  - Large samples ( $n > 400$ )
  - Response rates (50%, 23%)



# Predictor variables:



- Current Behavior
  - Do you currently DO each activity?  
(e.g., site activities: prune branches  
or house activities: stack firewood)
- Psychological predictors
  - Perceived effectiveness
  - Safety
  - Aesthetics
- Respondent characteristics
  - Income



# Likelihood of Adopting Site Actions

Current  
Site Actions

Perceived  
Effectiveness

Aesthetics

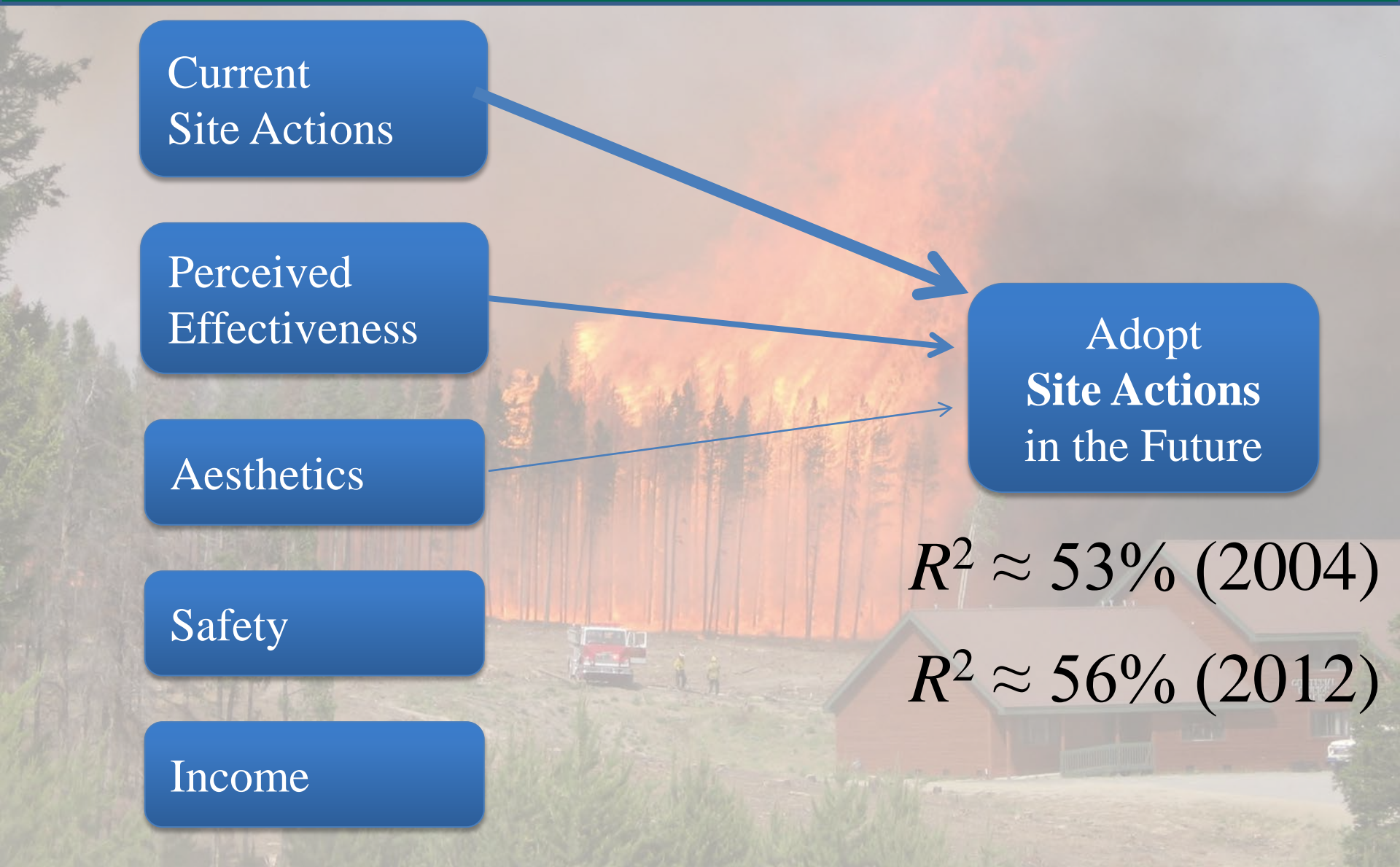
Safety

Income

Adopt  
Site Actions  
in the Future

$R^2 \approx 53\%$  (2004)

$R^2 \approx 56\%$  (2012)



# Likelihood of Adopting House Actions

Current  
House Actions

Perceived  
Effectiveness

Aesthetics

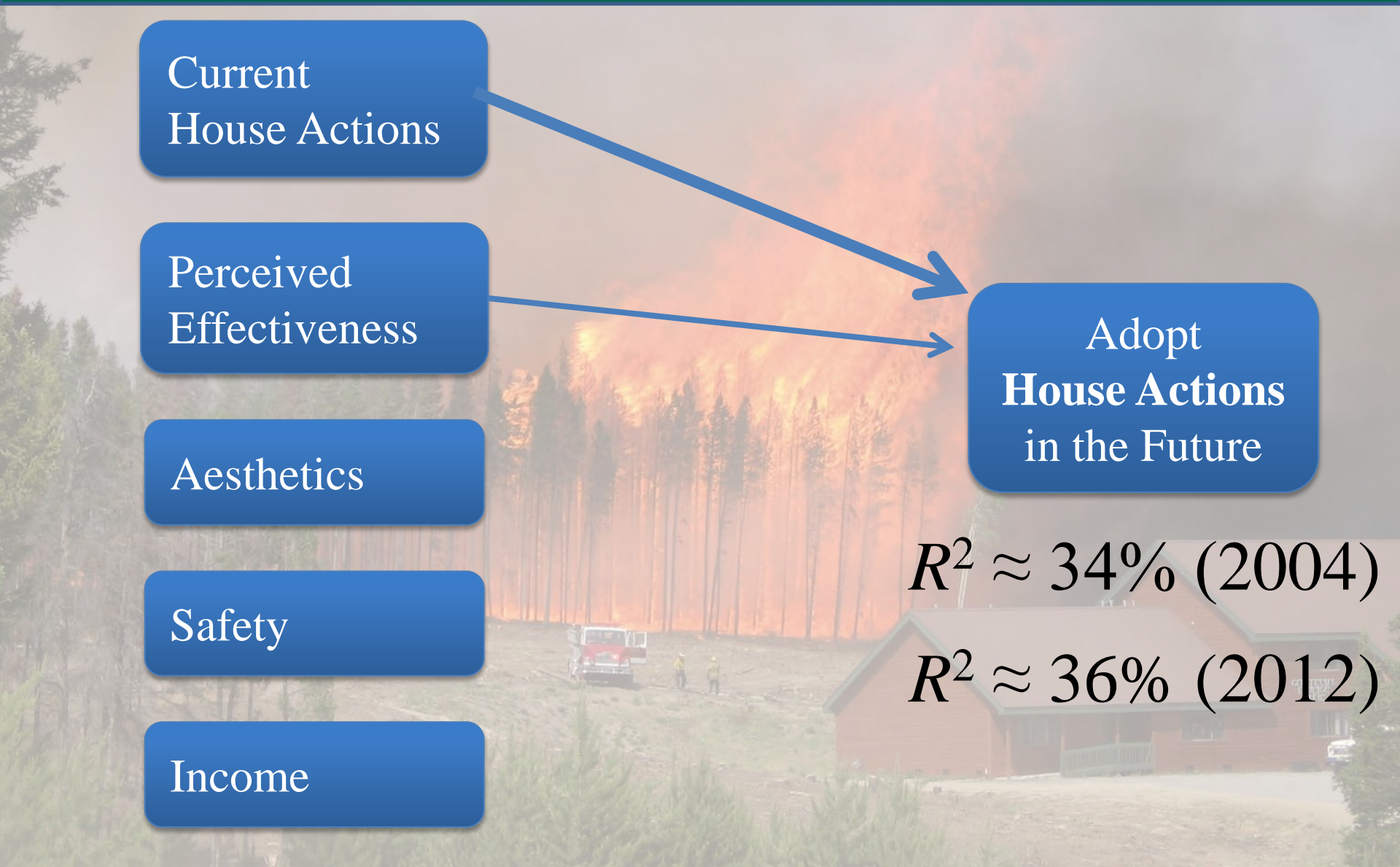
Safety

Income

Adopt  
House Actions  
in the Future

$R^2 \approx 34\%$  (2004)

$R^2 \approx 36\%$  (2012)



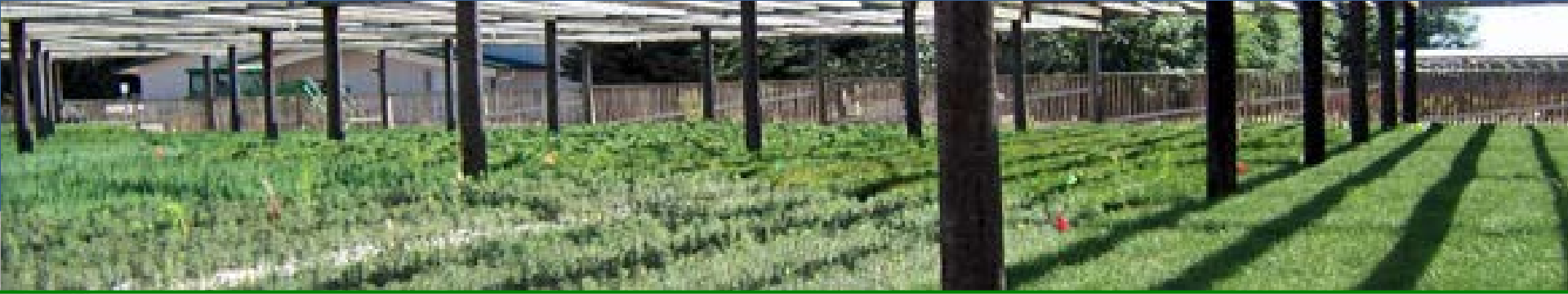




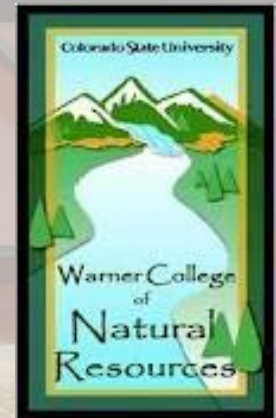
# Summary



- Pattern of findings consistent between 2004, 2012
- Results revealed moderate explanatory power:
  - 53% - 56% (site behaviors) of variation in intentions
  - 34% - 36% (house behaviors) of variation in intentions
- Current behavior primary predictor in both models
- Perceived effectiveness second best predictor
- Perception of looks significant predictor for site but not house behaviors
- Safety and income not major influences for either



# Barriers to Defensible Space



Barrier

% Moderate-Extreme  
Barrier

---

**Barrier**

**% Moderate-Extreme**

**Barrier**

---

Cost of firewise construction activities

62

Cost of doing defensible space activities

43

% Moderate-Extreme

<u>Barrier</u>	<u>Barrier</u>
Cost of firewise construction activities	62
Cost of doing defensible space activities	43
Time it takes to implement actions	40
Requires remodeling my home	37
Amount of work to make recommended changes	30
Physical difficulty of doing the work	27

% Moderate-Extreme

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Availability of expert advice	22
Neighbors do not do defensible space	23
Personal priorities	21
Would decrease my privacy	20

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Would decrease my privacy	20
Lack of equipment (e.g., chain saw)	17
Lack of knowledge about firewise construction	16
Lack of knowledge about defensible space	15
Would decrease the natural look of my property	14
Aesthetic impact on my property	13
The terrain on my property	13
Nowhere to dispose of plant/tree material	11
Disagreement with recommended actions	11
Not enough space on property to make changes	8
Lack of authority to make changes to property	7
Not at this residence enough to worry	7



# Summary



- Major Barriers
  - Cost
  - Time and Amount of Work
  - Personal Priorities – Availability of Expert Advice
- Minor Barriers
  - Lack of Knowledge / Equipment
  - Aesthetics
  - Disagreement with recommended actions
  - Authority to make changes

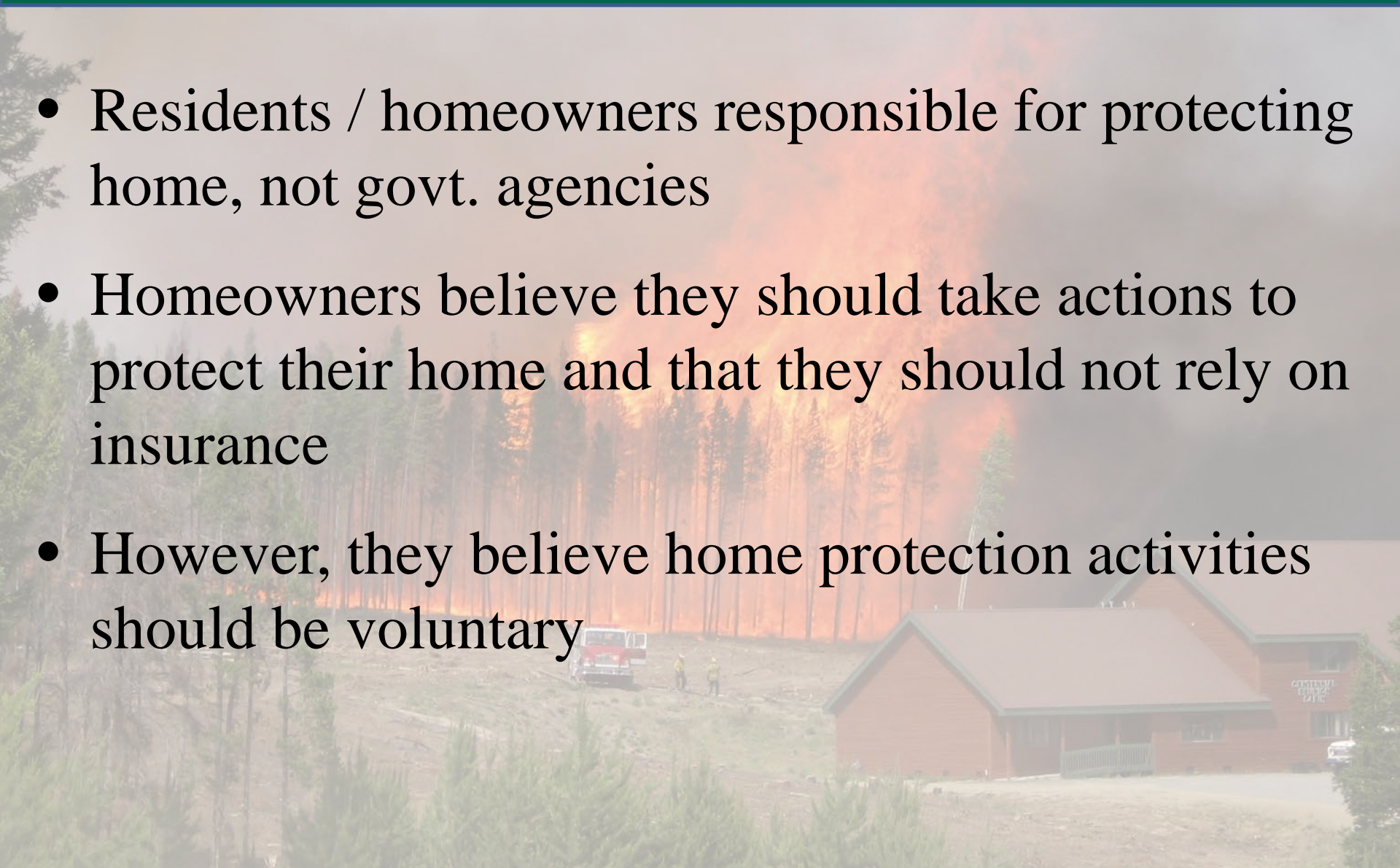




# Overall Conclusions



- Residents / homeowners responsible for protecting home, not govt. agencies
- Homeowners believe they should take actions to protect their home and that they should not rely on insurance
- However, they believe home protection activities should be voluntary





# Overall Conclusions



- Getting residents started with any action increases the likelihood of adopting other firewise actions
- Convincing homeowners of effectiveness is important
- Aesthetics an important consideration for both forest management and home protection
- Cost and ability to perform certain actions may be a factor for some segments of the population



# Colorado State Forest Service



- The mission of the Colorado State Forest Service is to achieve stewardship of Colorado's diverse forest environments for the benefit of present and future generations.





# Wildland-Urban Interface (WUI)



- Any area where structures and other human developments meet or intermingle with wildland vegetative fuels
- The WUI in Colorado is expected to increase by 300 percent – to almost 2.2M acres by 2030
- Parcels owned are becoming smaller and smaller
- 100 years of fire suppression has created very dense forests



# CSFS Messages to Landowners



- The CSFS provides landowners and homeowners with technical assistance on how to help protect their property from wildfire
- It is a shared responsibility
- There is never a guarantee your home will be protected
- Firefighters will do their best, but they can't always protect your home
- Protecting your home from wildfire is not a one-time effort, it is a process and requires on-going maintenance



# Applying Research



- The Goal:
  - Working with researchers to deliver effective, scientifically sound messages to our audiences and constituents and bring them from ***awareness to action.***
  - How can we affect positive behavior change?
- Research strives to provide information that will inform technical assistance to landowners



# How Do We Develop the Message?

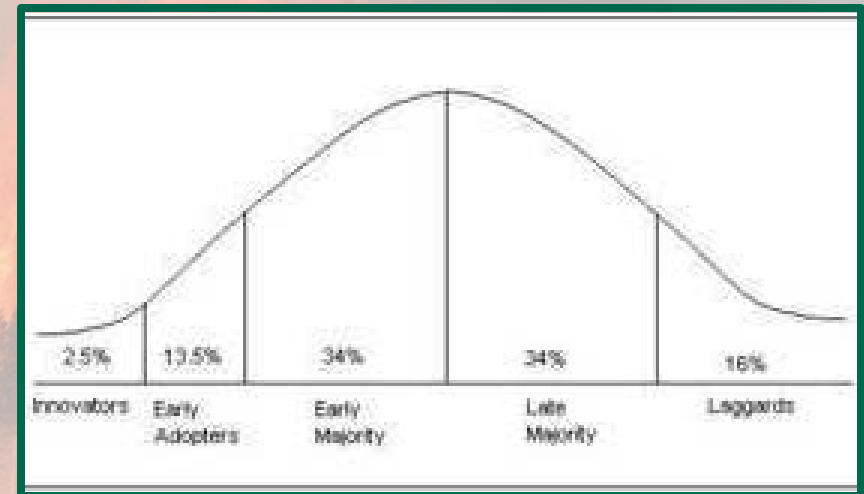


- Why should our audiences care? We need to **FRAME** our message to:
  - Appeal to core values
  - Describe the situation clearly and simply
  - Provide solutions/alternatives
  - Describe action that can be taken



# How Do We Deliver the Message?

- Knowledge transfer takes time
- Frame the message – different approaches for different audiences
  - Aesthetics, a healthy forest, wildlife habitat
  - Workshops, brochures, websites, hands-on examples
- Understand how people internalize new knowledge
- It is a PROCESS, not a product – it will take time for our messages to become known and embraced







# Fire Adapted Communities (FAC)



- FAC is an umbrella concept
- A variety of tools to help a community become fire-adapted
  - Colorado’s “Are You Firewise?” and “Are You Plains Firewise?”
  - Community Wildfire Protection Plans
  - NFPA’s Firewise Communities/USA
  - Ready, Set, Go!
  - CSFS Publications
  - Other local/county resources
- [www.fireadapted.org](http://www.fireadapted.org)





# Colorado's "Are You Firewise?" and "Are You Plains Firewise?"



- Workshop-based program that began in 1999
- Participants receive a reference notebook
- Covered a variety of topics:
  - Defensible space
  - Access to property
  - Water supply
  - FireWise landscaping
  - Fire safety in the home
  - Evacuation
- Started the conversation between the forester and the homeowner
- The CSFS is available for technical assistance

# Community Wildfire Protection Plans (CWPP)



- Over 200 completed in Colorado!
- “Are You FireWise?” lead to the success of CWPPs
- Various levels of specificity
  - Subdivision level versus county level
- Community-based, not a shelf document
- Minimum standards
- <http://csfs.colostate.edu/pages/CommunityWildfireProtectionPlans.html>



# NFPA's Firewise Communities/USA



- A National Fire Protection Association (NFPA) program
- Another tool to educate your neighbors about Firewise
- National recognition program
- Provides the community with metal Firewise signs, and other resources
- Benefits including grant eligibility, community-building, long-term planning, publicity, etc.
- [www.firewise.org](http://www.firewise.org)





# NFPA's Firewise Communities/USA



- Four requirements to become recognized:
  - 1.) Start at Firewise Board (or tag onto an already developed HOA board)
  - 2.) Spend \$2 per capita on Firewise (homeowner's work hours count!)
  - 3.) Hold a Firewise event (a community picnic, annual HOA meeting, etc.)
  - 4.) Complete a wildfire risk assessment and action plan (the CSFS can help with this)
  - Fill out an application at [www.firewise.org](http://www.firewise.org)



# CSFS Publications



- Visit the CSFS website for great materials!
  - [www.csfs.colostate.edu](http://www.csfs.colostate.edu)
- Recently Updated
  - Defensible Space Quick Guide
  - Firewise Construction
- Others include: Wildfire and Insurance, Firewise Landscaping, Ips Beetle Factsheet, Piñon- Juniper Management Factsheet
- Wildfire Publications: <http://csfs.colostate.edu/pages/wf-publications.html>



# Ready, Set, Go!



- Developed specifically for fire departments (FD)
- Managed by the International Association of Fire Chiefs (IAFC)
- Improve dialogue between FDs and residents
- **Ready:** Practice Firewise, be prepared
- **Set:** Situational awareness, pack emergency items, keep up-to-date with the news, etc.
- **Go:** Follow your personal wildland fire action plan, evacuate
- <http://www.wildlandfirersg.org/>

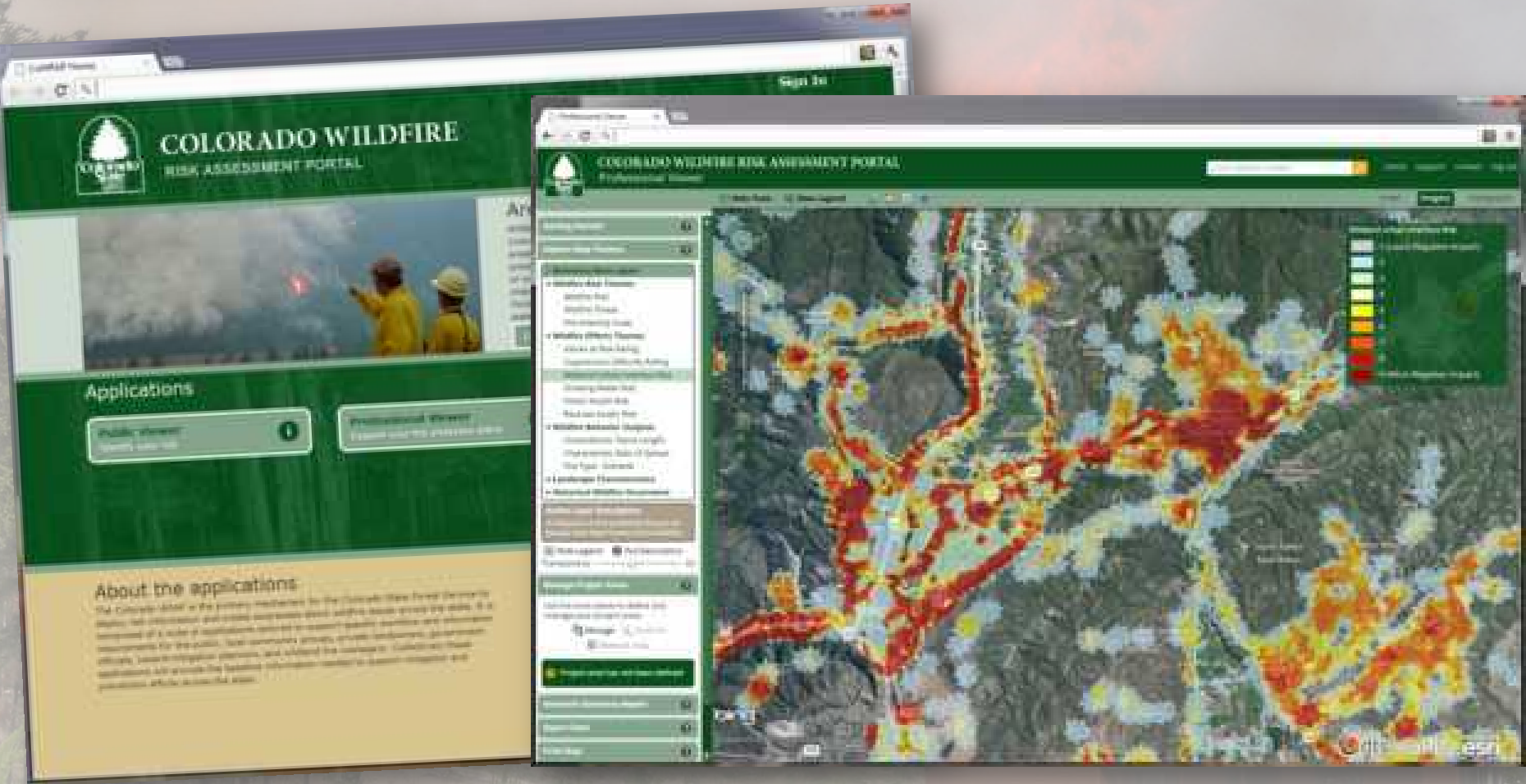




# Colorado Wildfire Risk Assessment Portal (CO-WRAP)



Colorado State University





- Reinforcing messages after 2012
  - Surface fuels
  - Ongoing maintenance
  - EMBERS!!
  - Firewise in different forest types
  - Evacuation preparation
  - There a tools out there to help you and your community



# Thank you for listening!

## Next Steps, Discussion, Questions?



CITY OF  
GLENWOOD  
COLORADO