

Fuel-treatment at the wildland-urban interface: No shortcuts to predicting social acceptance

presented to

Joint Fire Science Program PI Workshop

11 March 2003

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Objectives

- ◆ Design and test survey of knowledge, understanding and acceptance of fuel treatments at wildland-urban interface
 - ❖ Three treatment approaches
 - Prescribed burning, mechanical treatment, defensible space
 - ❖ National scope, three survey sites
 - California, Florida, Michigan
- ◆ Explore factors upon which acceptance depends
- ◆ Assess spatial dependence of acceptance and its antecedents
- ◆ Construct demographic and geographic models of fuel treatment acceptance

Study Sites

Marin, CA

- Grass, chaparral, oak,
- Conifer
- High valued homes
- Federal, state lands
- Rare wildfire, non-existent Rx fire, intense suppression

Tuolumne, Placer, El Dorado, CA

- Oak woodland, pine, mixed conifer
- Federal forest
- Frequent wildfire, rare Rx fire

Yellow = Focus Group

Red = Survey

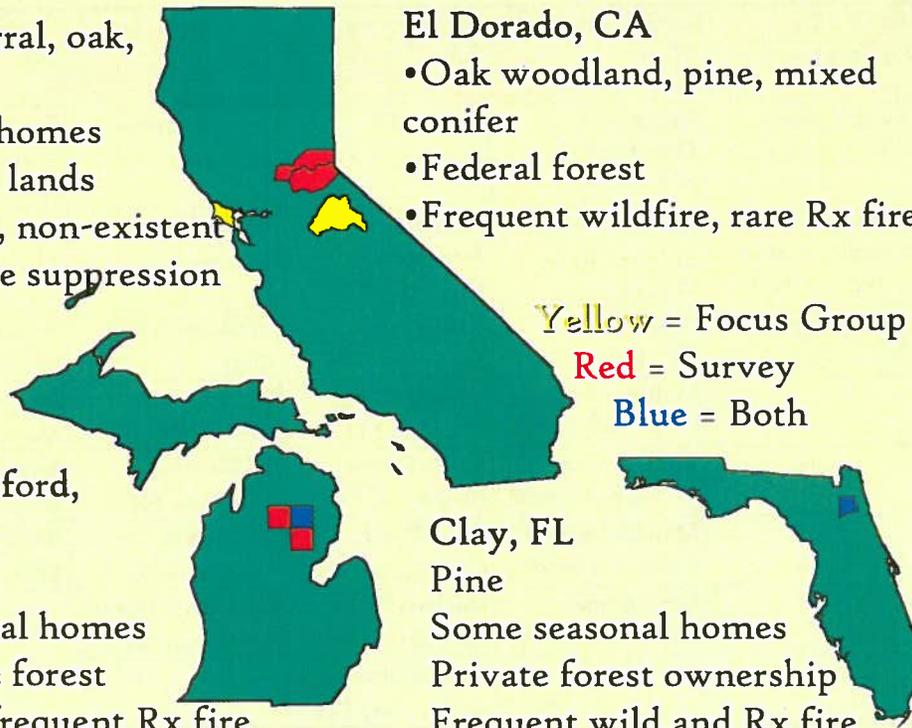
Blue = Both

Oscoda, Crawford, Ogemaw, MI

- Jack pine
- Many seasonal homes
- Federal, state forest
- Moderately frequent Rx fire and wildfire

Clay, FL

- Pine
- Some seasonal homes
- Private forest ownership
- Frequent wild and Rx fire



Sample distribution and structure

County, State	Sampling rate, percent of households	Sampling scheme	Response rate (%)
Clay, FLORIDA	32	Clustered sampling, based on stochastic point pattern analysis	32
El Dorado, Placer, CALIFORNIA	Site 1: 74, Site 4: 49 Site 2: 46, Site 5: 43 Site 3: 29, Site 6: 19 Overall: 36	Random sampling of natural clusters	47
Crawford, Oscoda, Ogemaw, MICHIGAN	100	Sampling of all eligible parcels	53

Hypothesized predictors of approval

- ◆ Demographic (age, income, health, education ...)
- ◆ Spatial (relative to fuels, house & road density, past fires)
- ◆ Theory of Reasoned Action
 - ❖ Beliefs predicting attitude
 - ❖ Attitude predicting approval
- ◆ Other factors?
 - ❖ Personal experience with fire and fuel treatment
 - ❖ Trust in agency
 - ❖ Personal importance of fuel treatments
 - ❖ Concern that wildfire could change life
 - ❖ Test spatial continuity; assess opportunity for targeted message

Fuel treatment acceptance

- ◆ For 3 treatment approaches in 3 states
 - ❖ Attitude rated on 7-point scale
 - ❖ Approval rated on 7-point scale
 - ❖ Asked if they'd vote for treatment
 - ❖ Approval lagged attitude in all cases
 - ❖ Attitude and approval highly correlated
 - ❖ 6-40% of negative votes were by approvers

Percent with fuel treatment experience

Over lifetime	Clay, FL	El Dorado/Placer, CA	Oscoda/Ogemaw/Crawford, MI
Prescribed burning near my home	31	25	21
Smoke discomfort from wildfires	61	68	17
Mechanical fuel reduction near home	5	21	9
Required to remove flammable vegetation on property	2	32	2
Actually removed flammable vegetation on property	44	91	42

Attitudes towards fuel reduction

Fuel mgt. approach	Florida			California			Michigan		
	Pos.	Neut.	Neg.	Pos.	Neut.	Neg.	Pos.	Neut.	Neg.
Prescribed burning	78%	17	5	66	18	16	42	23	36
Mechanical reduction	64%	28	8	79	17	4	57	28	14
Defensible space	42%	30	28	79	13	8	42	27	32

Attitude scale: positive (5-7), neutral (4), negative (1-3).

Percent support, by treatment

Data from 2145 valid surveys

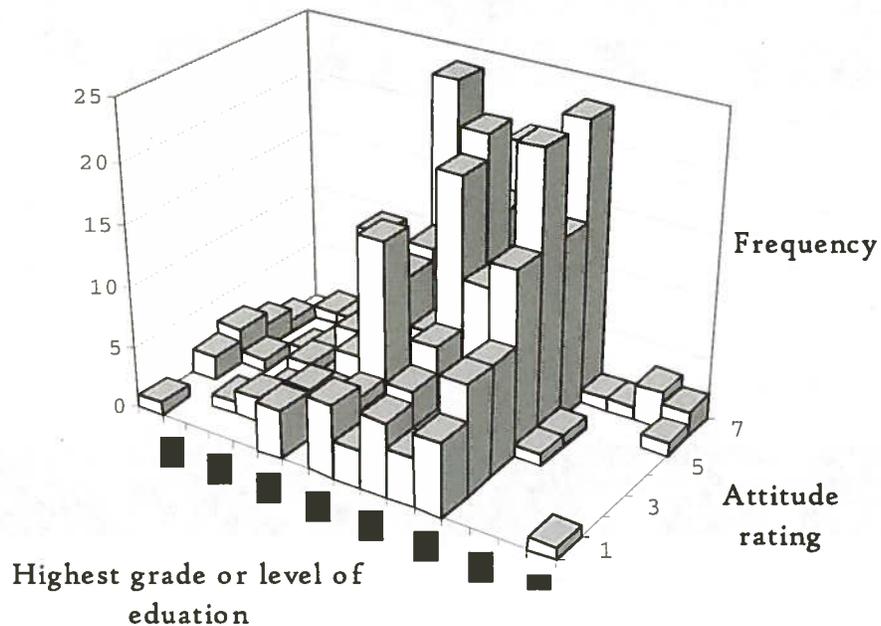
	Florida	California	Michigan
Rx Fire	87	71	47
Mechanical	79	88	73
Def. Space	42	75	43
All three	32	49	18
Any 1 or 2	96	99	86

Demographics don't predict acceptance

- ◆ Education
- ◆ Gender
- ◆ Household size
- ◆ Employment status
- ◆ Tenure
- ◆ Income
- ◆ Residential status
- ◆ Respiratory ailment status

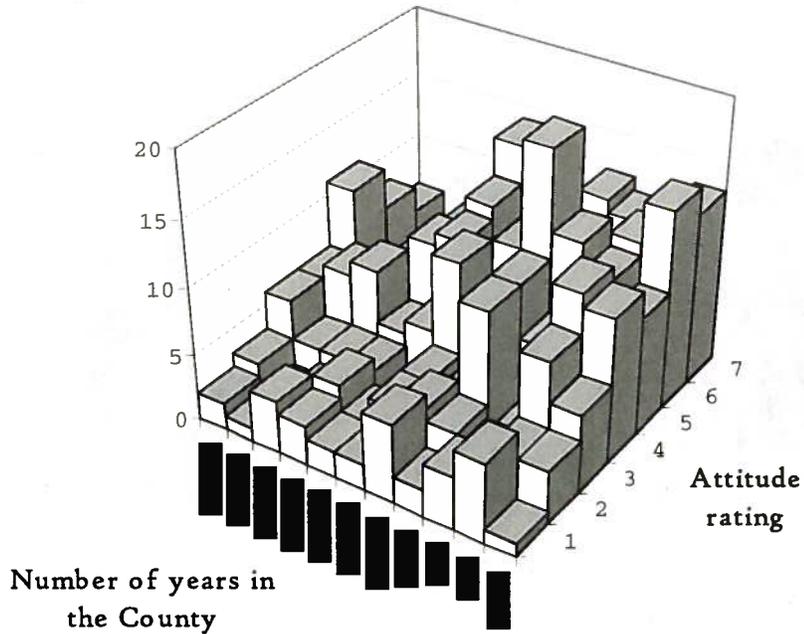
Attitude unrelated to education

Prescribed burning attitude by education
(California Sample)



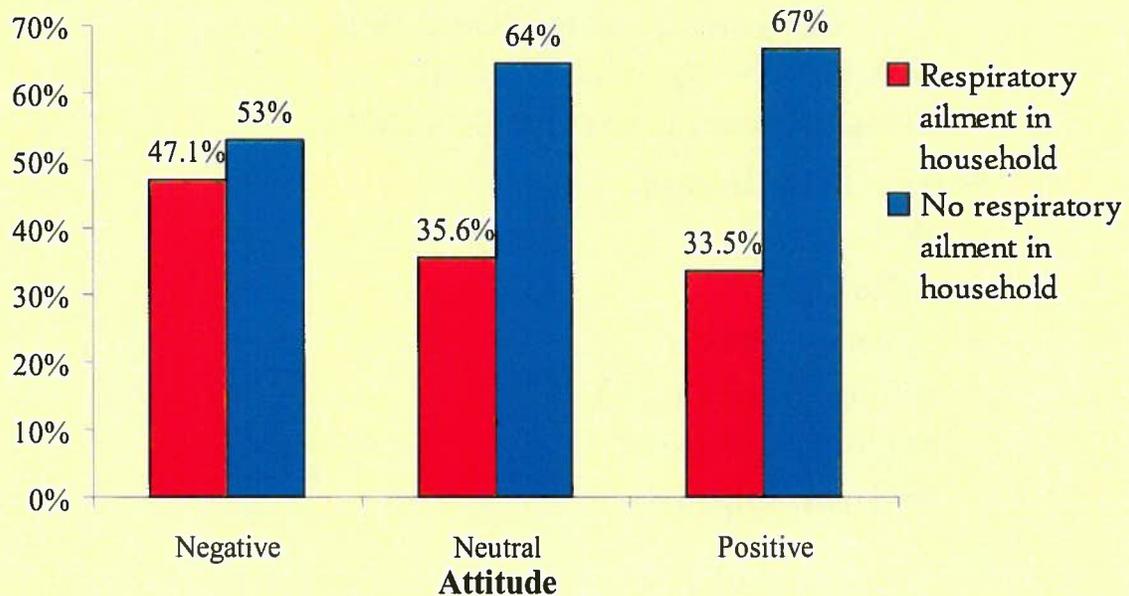
Attitude unrelated to tenure

Prescribed burning attitude by tenure (California)



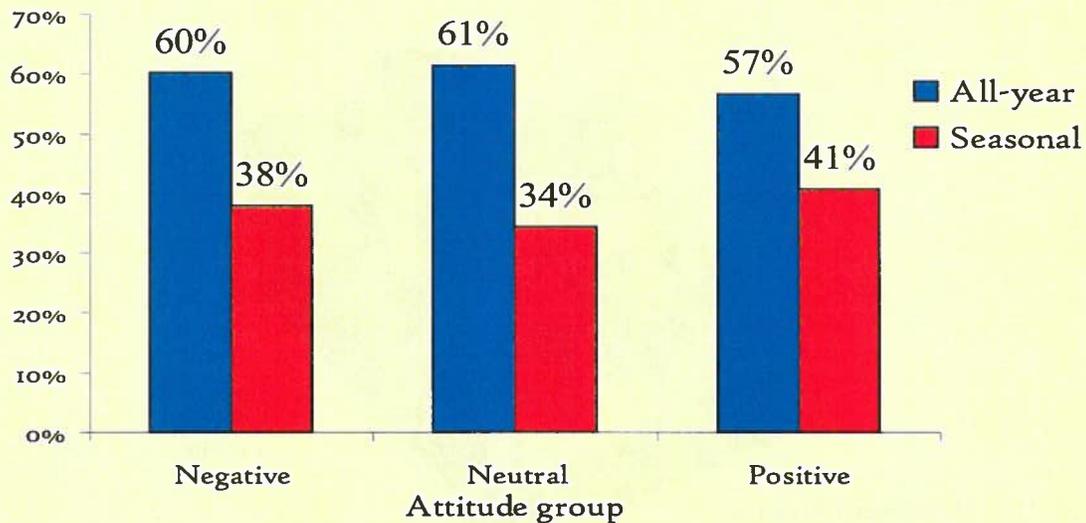
Attitude unrelated to health concerns

Prescribed burning attitude by respiratory ailment in household
Florida sample



Attitude unrelated to residence status

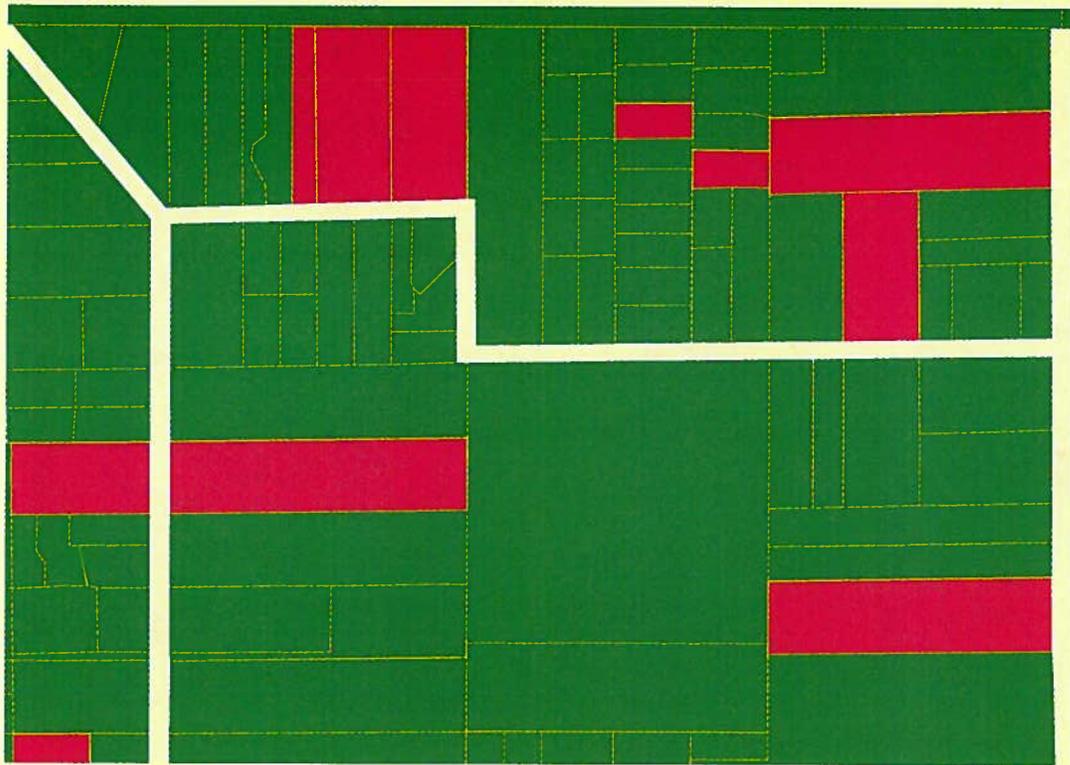
Prescribed burning attitude by residence status
Michigan sample



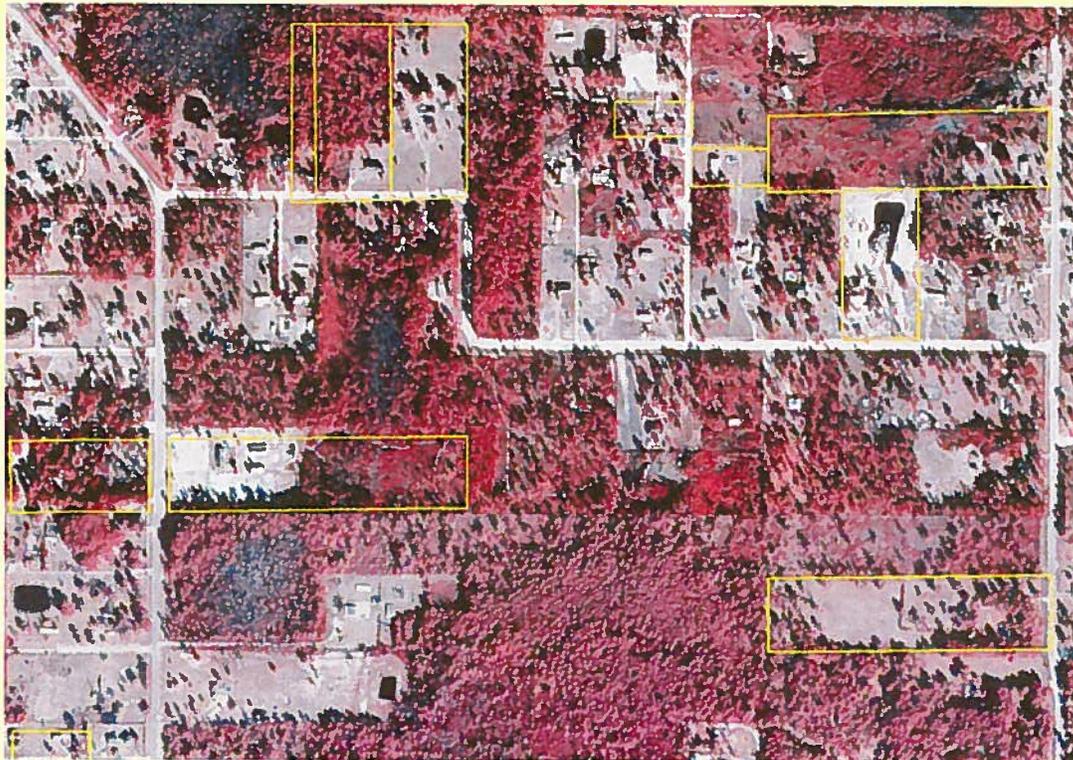
GIS database development

- ◆ House/Parcel Locations
 - ❖ Local Government Offices
 - Assessor's Office (FL, CA, MI)
 - Emergency Dispatcher's Office (MI)
 - ❖ Aerial Photographs (FL, CA)
 - ❖ Field Observations and GPS (MI)
- ◆ Ancillary layers
 - ❖ Fuels
 - ❖ Roads
 - ❖ Recent fires
 - ❖ Topography (CA)
 - ❖ Housing density
 - ❖ Ownership class

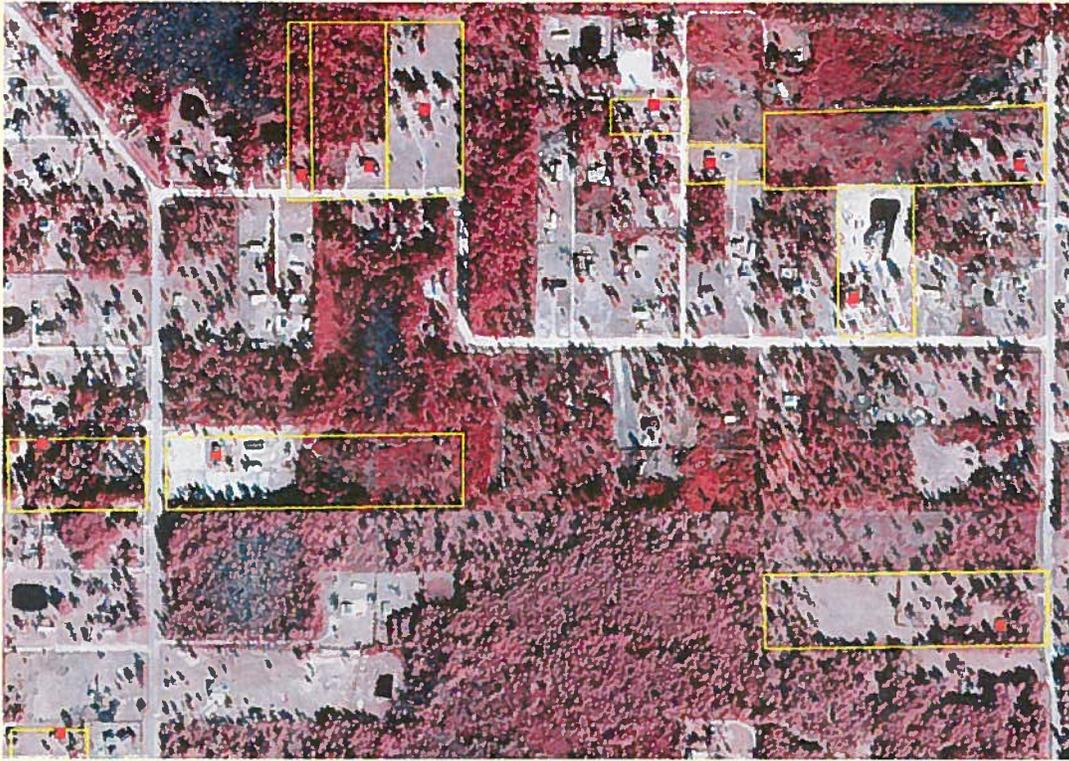
Parcels of respondents



Parcels in context



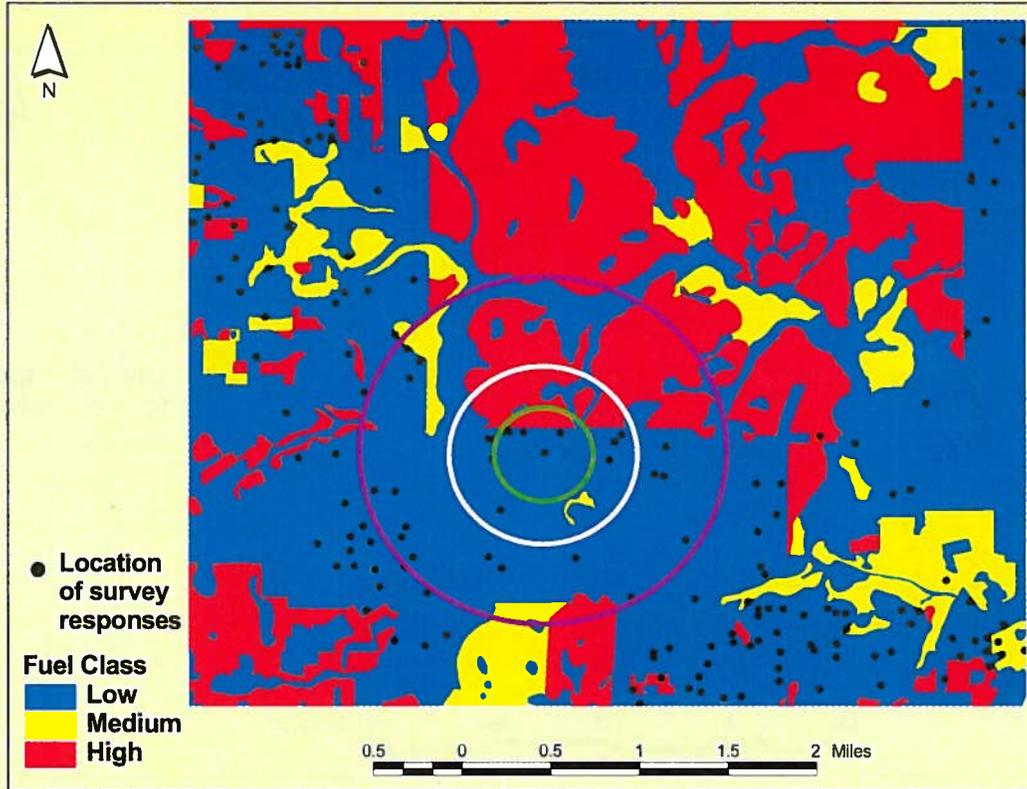
House locations precisely georeferenced



Geography doesn't predict acceptance

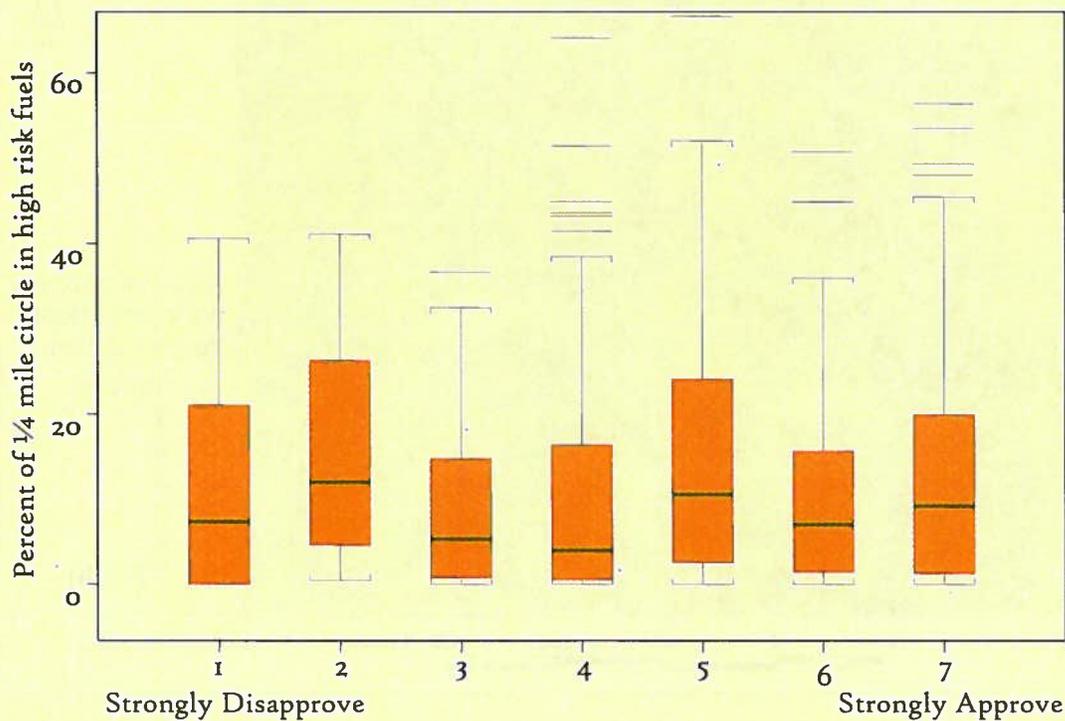
- ◆ Distance to low, medium, and high risk fuels
- ◆ Percent of low, medium, and high risk fuels (within 1/8, 1/4, 1/2, and 1 mile radius)
- ◆ Number of fires since owner acquired property (within 1/8, 1/4, 1/2, 1, and 2 mile radius)
- ◆ Number of large (>40 ac) fires (within 1/8, 1/4, 1/2, 1, and 2 mile radius)
- ◆ Distance to the perimeter of the closest large fire
- ◆ Distance to nearest road
- ◆ Road Density (within an 1/6, 1/3, 1/2, and 1 mile radius)
- ◆ House Density (within 1/8, 1/4, 1/2, and 1 mile radius)

Fuel risk within 1/4, 1/2, and 1 mile- Florida

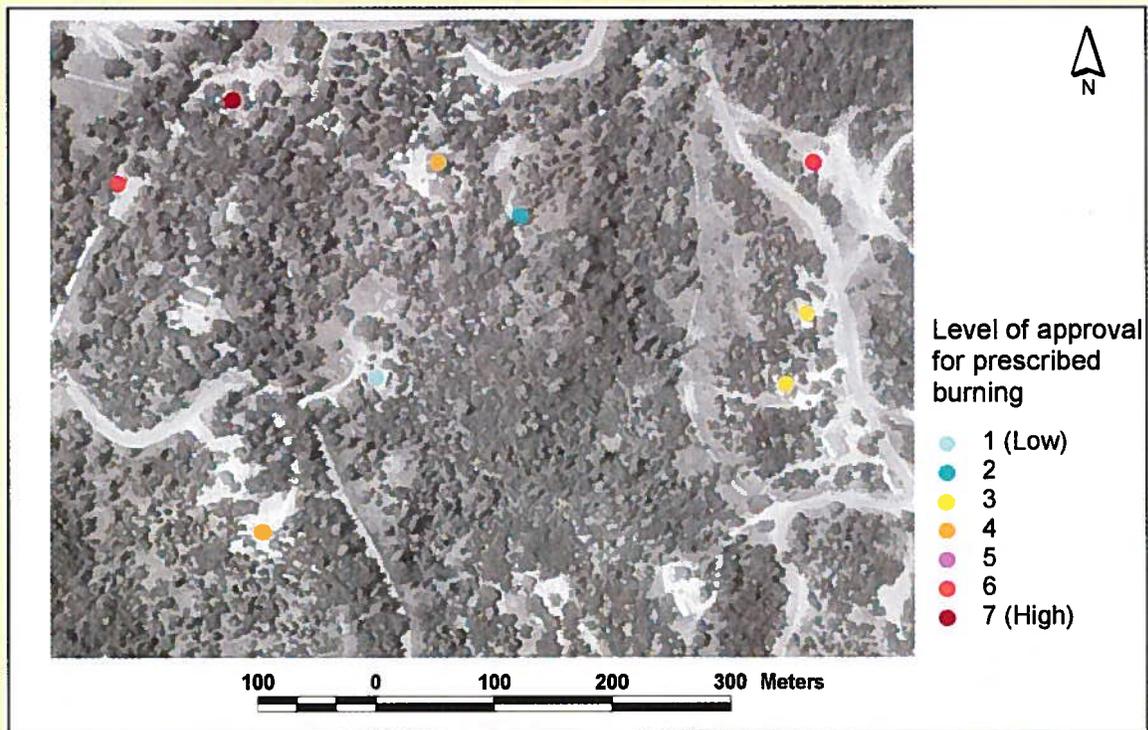


Approval unrelated to fuels

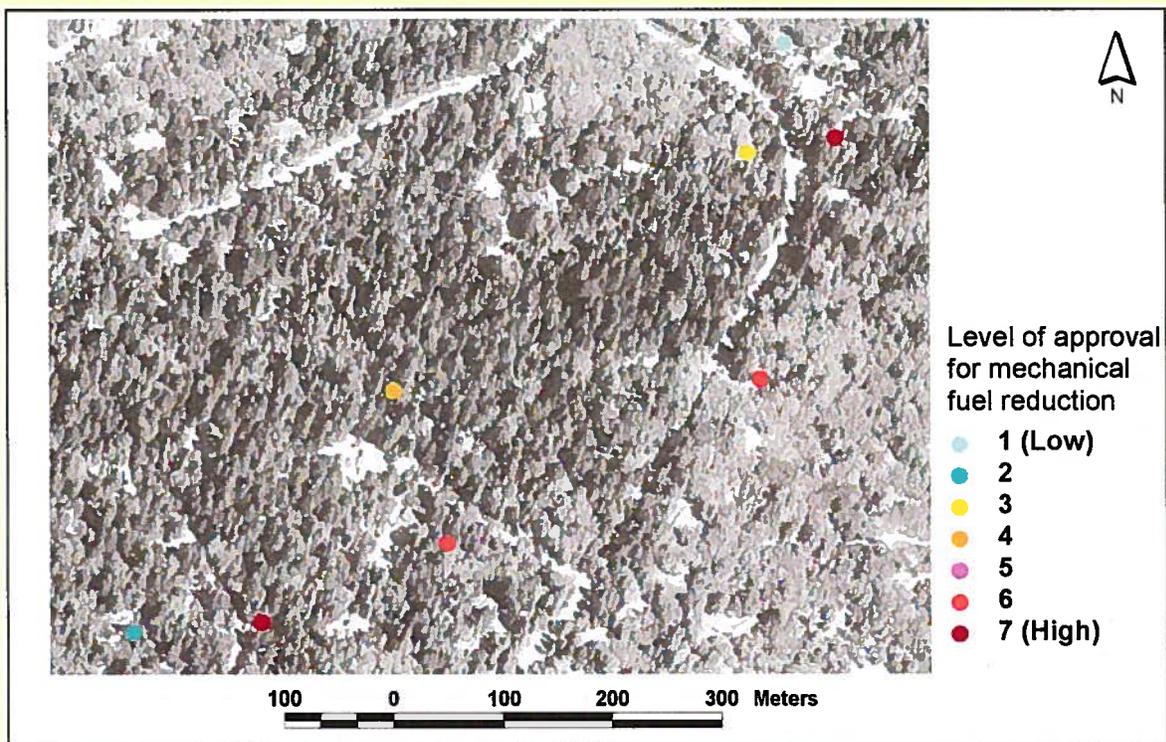
Mechanical treatment, Florida



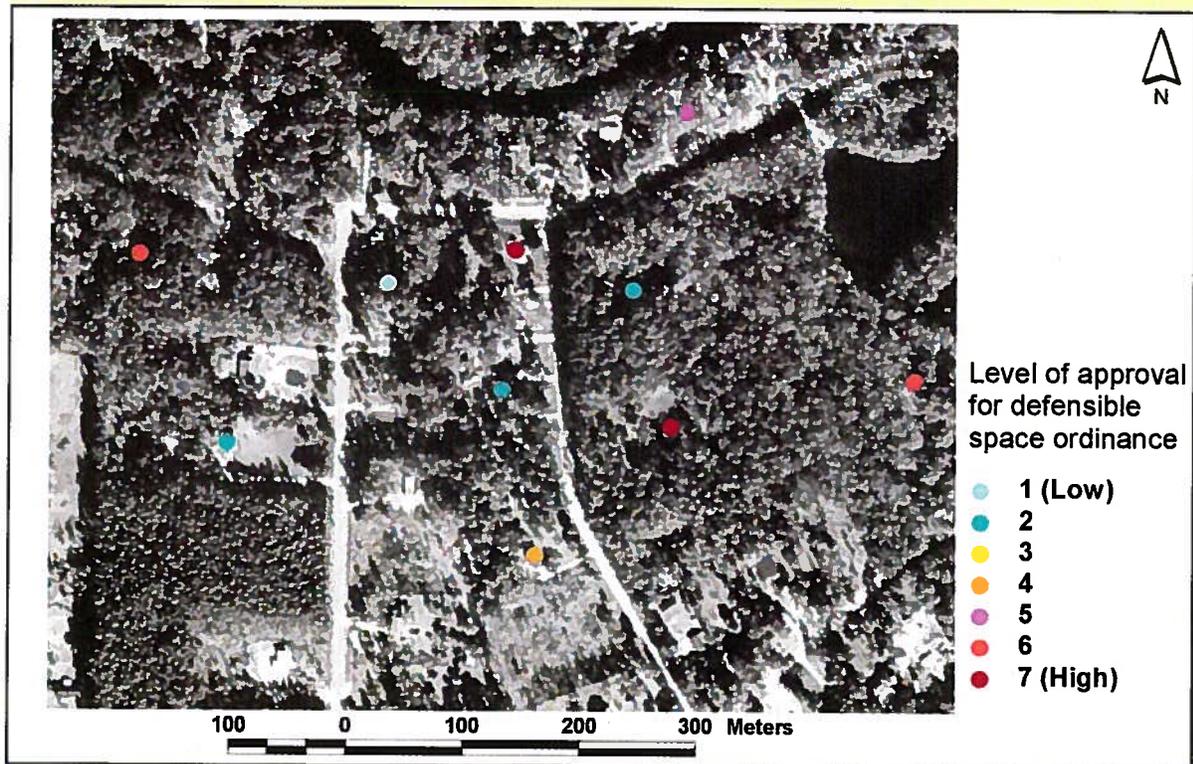
Approval unrelated to fuels in El Dorado



Approval unrelated to fuels in Placer



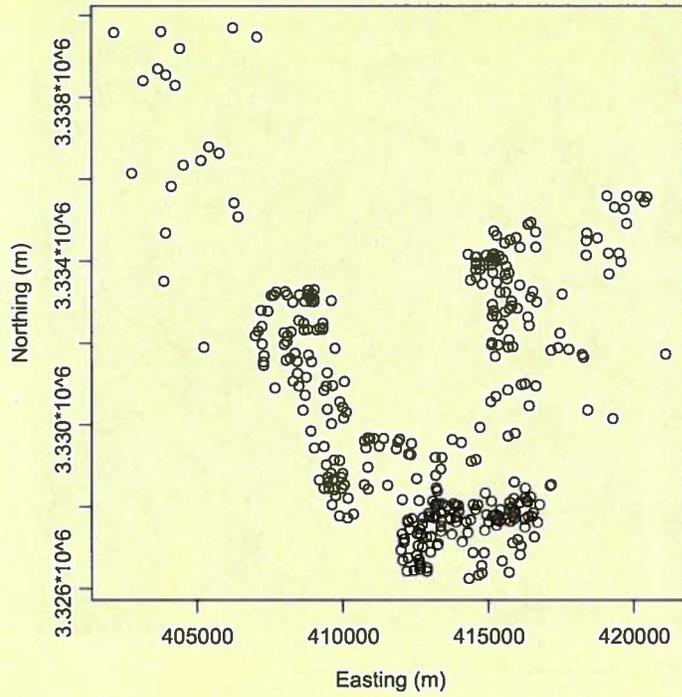
Approval unrelated to fuels in Clay



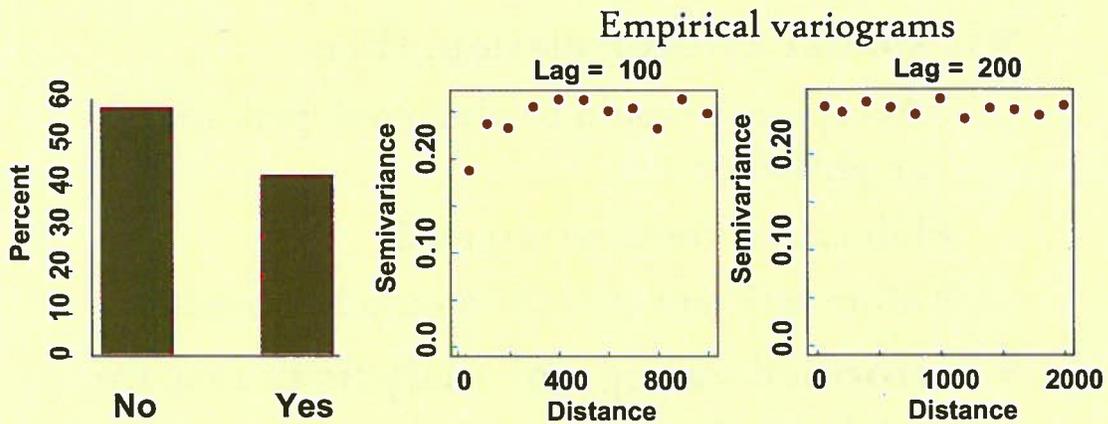
Tests of spatial continuity

- ◆ If spatial autocorrelation, then
 - ❖ Acceptance would be clustered, perhaps by neighborhood
 - ❖ Education could be targeted
 - ❖ More efficient surveys would be possible
- ◆ Performed variogram analysis to test for spatial continuity on every survey question
 - ❖ Ordinal scales required use of indicator variograms (conversion to binary variables)

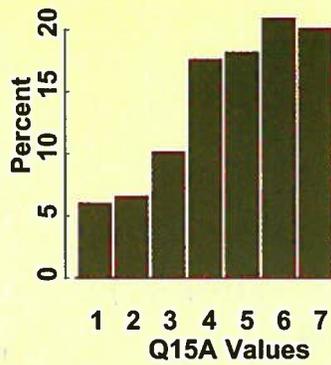
Semi-variance calculated by lag



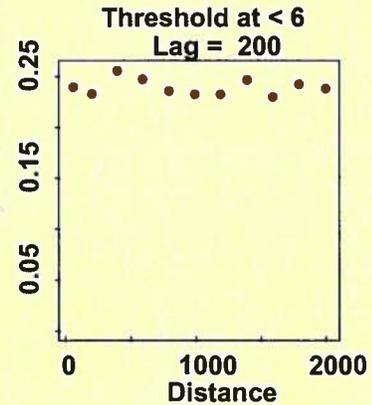
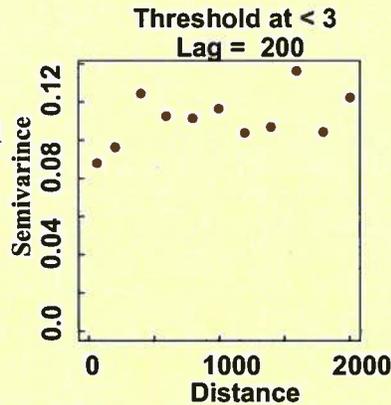
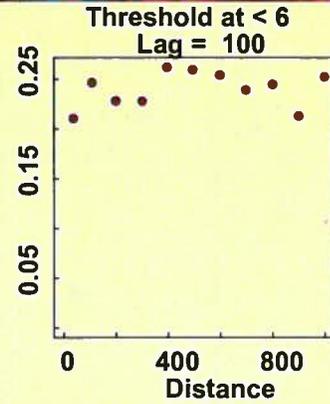
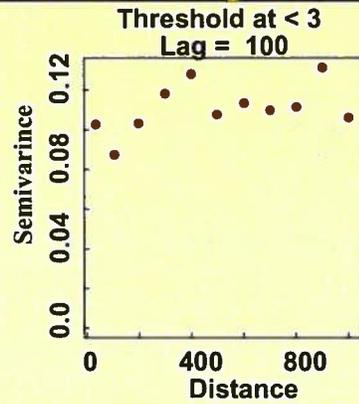
Vote for defensible space, FL



Approval of prescribed burning, CA



Q15A: How would you rate your level of approval toward prescribed burning?
(Strongly disapprove [1] – Strongly approve [7])



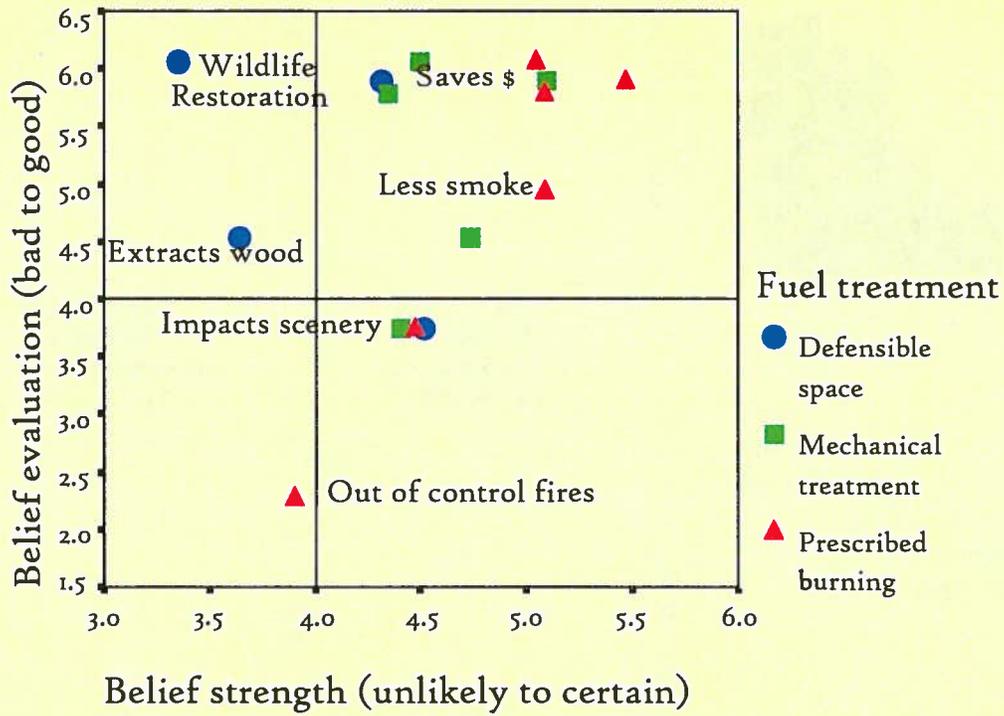
So what relationships DID we find?

1. Beliefs
2. Personal importance
3. Trust in agency

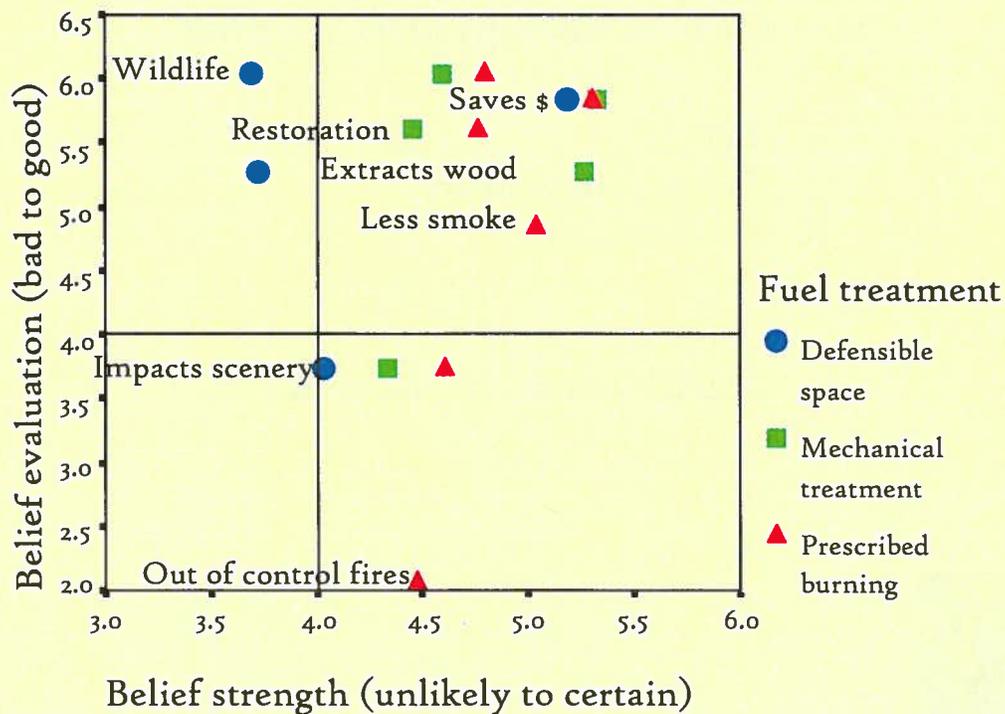
...and what do they mean?



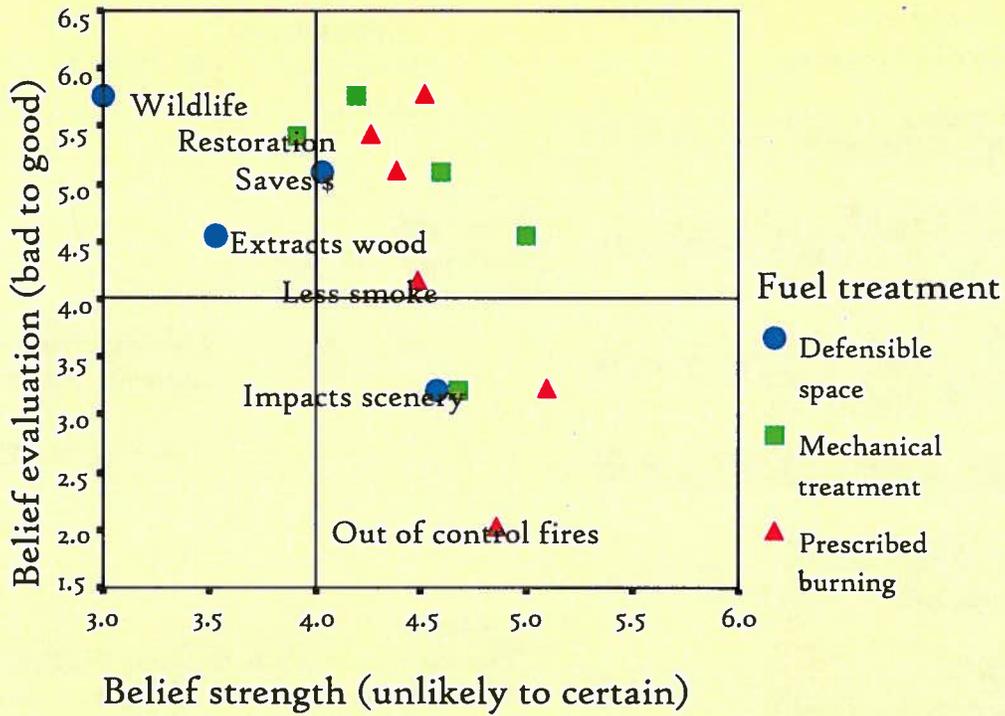
Florida beliefs



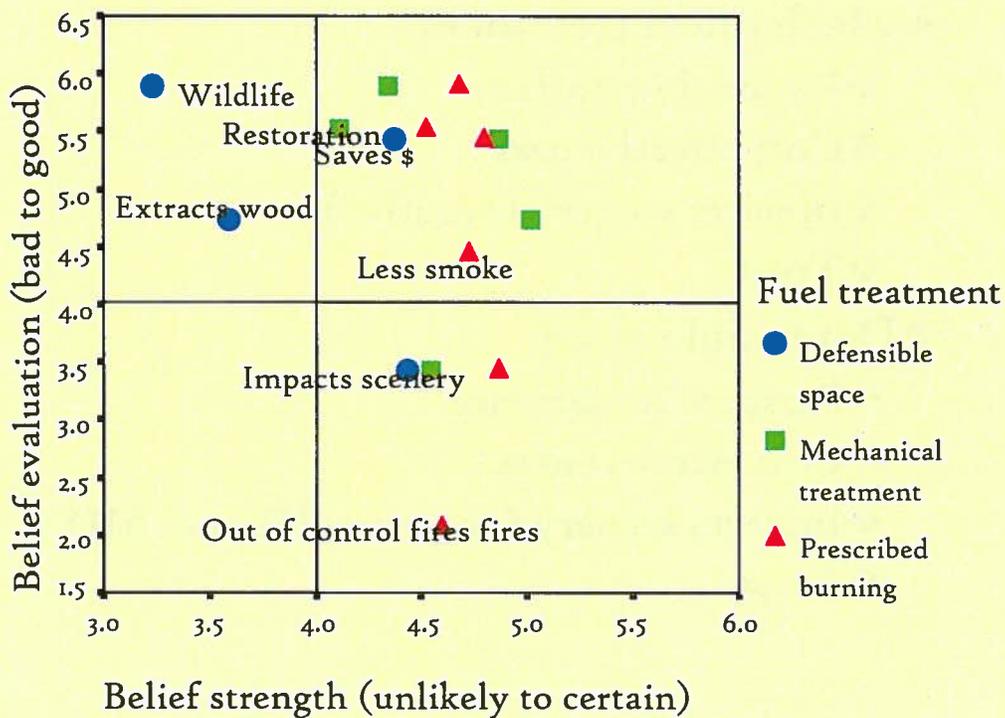
California beliefs



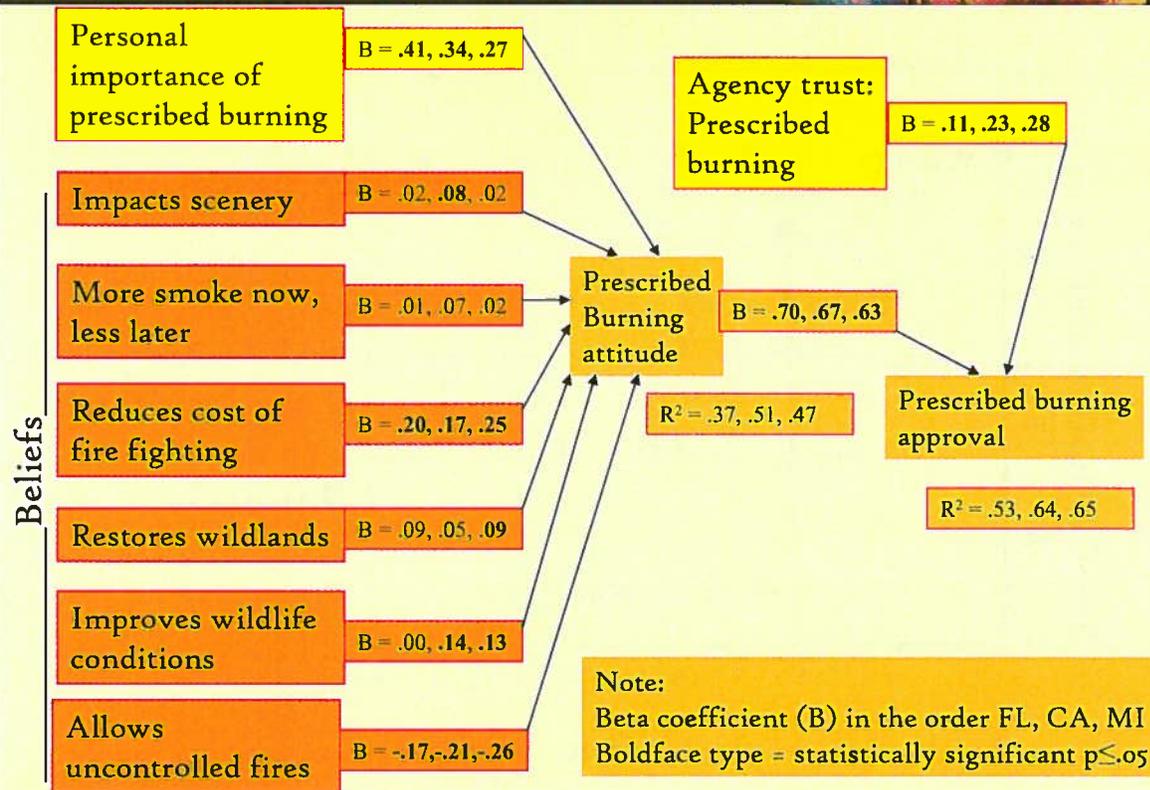
Michigan beliefs



Beliefs across all sites



Conceptual model, prescribed burning



Consistently predictive factors

- ◆ Mechanical treatment
 - ❖ Personal importance
 - ❖ Cost effectiveness
 - ❖ Impacts scenery (negative)
 - ❖ Trust
- ◆ Defensible space
 - ❖ Personal importance
 - ❖ Cost effectiveness
 - ❖ Impacts scenery (negative) (FL and MI)
 - ❖ Trust

Mean trust on a 7-point scale

"I trust the gov't to..."	Clay, FL	El Dorado/Placer, CA	Oscoda/Ogemaw/Crawford, MI
...make proper use of prescribed burning	4.5	4.1	3.3
...notify public about prescribed burning	3.6	4.0	3.4
...make proper use of mechanical fuel reduction	4.1	4.2	3.5
...enact and enforce defensible space	3.6	3.9	3.0
...do a good job managing public land	4.1	3.9	3.5
...do a good job communicating about forest issues	3.7	3.6	3.0
...do a good job protecting private property from wildfires	4.9	5.2	3.9

Agency trust referent

Which agency were you thinking about?
(percent; multiple answers allowed)

	Clay, FL	El Dorado/Placer, CA	Oscoda/Ogemaw/Crawford, MI
Local	71	50	39
State	62	73	86
Federal	29	66	54
Don't know	4	3	3

Percent in blue where exceeds 50%

You have to ask

- ◆ No shortcuts to predicting acceptance
- ◆ Need to learn local context via qualitative approach
- ◆ Need to administer shorter form of survey to assess acceptance and related info that may help target educational message
- ◆ Wise to begin with approach that is most widely accepted, then lead populace along to more effective methods if necessary

Products delivered

- ◆ Web site (**www.fire-saft.net**)
- ◆ Fuel Treatments at the Wildland-Urban Interface: Common Concerns in Diverse Regions- *Journal of Forestry* 2002
- ◆ Summary results from surveys (on web)
- ◆ Phase II Project Report (on web)
- ◆ Abridged survey instrument (on web)
- ◆ Formal Presentations (6 to date)

Products to complete in 2003

- ◆ Journal article #2: interpret survey results via conceptual model
- ◆ Journal article #3: geographic and spatial analyses
- ◆ Article targeted at fire and fuel managers

Any questions?



