HOMEOWNER PERSPECTIVES ON FIRE HAZARD, RESPONSIBILITY, AND MANAGEMENT STRATEGIES AT THE WILDLAND URBAN INTERFACE

by

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Manuscript to be published in *Society and Natural Resources*
Submitted: 31 March, 1998.
Accepted: 16 November, 1998.

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ABSTRACT

Following a survey of forest homeowners in rural Michigan to assess the value of reducing the risk of damage from wildfires at the wildland-urban interface, focus group discussions were conducted with a subset of survey participants to learn about their perceptions concerning specific components of fire hazard (e.g., how fires start, fire control, fire damage), their understanding of how fire protection responsibility is allocated between government and individuals, and their understanding of and preferences for alternative fire management strategies.

Focus group data were analyzed using a framework based on behavioral economics and psychometric models of risk. Attributes associated with the fire risk help explain the relative popularity of different fire protection strategies. Because participants consider forest fires as inherently uncontrollable, and the resulting damage as essentially random, they are only weakly supportive of investments in firefighting infrastructure, unlikely to take all possible steps to safeguard their own properties, and resolute in their emphasis on solutions which reduce the number of fire ignitions. Their universally negative perceptions of prescribed fire may ultimately preclude its use as a risk management tool in Michigan's wildland-urban interface forests.

KEYWORDS

Fire management, prescribed fire, fire prevention

INTRODUCTION

The problem of fire management in the wildland-urban interface (WUI), where homes are built adjacent to or within vast tracts of flammable vegetation, has captured the attention of fire planners, land managers, social scientists, and the U.S. Congress (RFPA, 1994). Decision makers evaluating policies to reduce wildfire damage understand that their success will likely depend on the support of WUI homeowners, yet little is known about how homeowners in fire-prone areas perceive wildland fire, much less what policies they are likely to prefer and why. A recent local history of dramatic wildfire disasters provides opportunities to engage this public in a discussion about the merits, drawbacks, and risks of alternative strategies. Such a conversation can provide decision makers with a basis for choosing WUI risk management strategies that will succeed over the long run.

Fire protection planners have articulated their need to know: "Which risk reduction policies WUI homeowners are willing to accept." Because this phrasing implies that WUI homeowners are dissatisfied with current hazard levels, when in fact, some may have come to terms with the risk, it may be useful to separately consider the questions: (1) "How do WUI homeowners perceive wildfire risk?", and (2) "Which risk reduction strategies will they support (politically, behaviorally or financially)?" This would be consistent with the findings from psychometric research that risk perception and the acceptability of hazards such as destruction of homes by wildfire are related to attributes of the hazard and the magnitude of the risk. Slovic (1987), for example, proposed that people evaluate risk on the basis of controllability, voluntariness, catastrophic potential, and degree of outcome uncertainty. Perceptions of these characteristics affect preferences over policies designed to reduce hazard.

This paper reports an analysis of focus group data within a framework, developed from the

behavioral economics literature and psychometric models of risk by Kleindorfer and Kunreuther (1988), which explicitly accounts for the multi-attribute nature of risk. This qualitative approach can be viewed as complementary to traditional quantitative economic valuations of risk in that attributes associated with fire risk help explain differences in homeowner preferences over alternative fire protection strategies.

Drawing on the behavioral economics and psychology literature, three factors important in risk valuation and management were identified: (1) imperfectly informed consumers, (2) institutional arrangements, and (3) public versus private risk exposure. When individuals misperceive risks or rely on decision rules which fail to conform to the traditional utility maximization paradigm, their behavior may differ from what policy experts expect. The literature is replete with evidence that individuals routinely express biased probability estimates when confronted with hazards (e.g., Slovic, 1987; Kahneman and Tversky, 1979). Furthermore, the multi-attribute nature of risk complicates the analysis of individuals' intended or expressed behavior, even when they possess perfect risk information. For example, such risk attributes as voluntariness and controllability can have profound effects on whether individuals believe that it is worthwhile to take protective actions (Slovic, 1987).

Institutional arrangements – organizations, information channels, laws, regulatory enforcement mechanisms – influence how people think about and respond to risk. For example, an individual is more likely to build or purchase a home in a fire-prone location if he or she believes that the government will provide compensation when wildfire destroys that home. When weighing the merits of alternative hazard reduction policies, WUI homeowners must consider both *ex ante* costs of hazard reduction and the *ex post* consequences of a destructive wildfire.

Institutional legitimacy depends on demand for hazard reduction via government intervention,

and such demand is tightly linked to perceptions about property rights to the hazard. If the risk is regarded as public (because, for example, the magnitude of risk an individual faces depends on the actions of others), then those exposed to the risk will likely favor government intervention. The risk of injury associated with not wearing a seatbelt is usually considered private because an individual's own behavior determines the magnitude of the risk they face. Wildfire risk can be viewed as having both public and private components because permanent and seasonal residents, visitors, and public land managers all contribute to this risk and share, to varying degrees, in the consequences of destructive outcomes.

Fire planners and policy makers have considered a variety of risk reduction strategies (shown in italics below), some of which involve either a redistribution of rights and obligations and/or changes in the allocation of costs and benefits (Gardner and Cortner, 1988). Some policies realign rights and obligations such that some people may enjoy a risk reduction at no cost while others find their actions constrained but receive no benefits. For example, individual homeowners can be motivated to ***fireproof*** their homes voluntarily (i.e., without direct government involvement) or ***ordinances*** may be imposed requiring them to maintain a "defensible space" (a designated buffer cleared of shrubs and trees) around their home, or to pay special fire protection tax assessments for additional protection. State and federal fire prevention officers can disseminate ***educational*** messages on both ignition prevention and fireproofing homes via vegetation and site management. ***Zoning*** to exclude development from areas of high fire risk has been discussed but rarely implemented. Natural resource agencies can ***harvest timber*** and practice ***prescribed fire*** to reduce fuel loading, and ultimately, the intensity and spread potential of wildland fires.

None of these strategies can be considered a panacea. Historically, defensible space ordinances

have failed to generate appreciable risk reduction, due to political opposition and/or a lack of enforcement on the ground (NFPA, 1992). Public land managers are reluctant to utilize prescribed fire for fear of public reaction (USDA/DOI, 1995), and face societal demands and economic constraints which limit the use of harvesting for fuels management.

The acceptability of government intervention appears to be a critical factor in the formation of perceptions about risk reduction strategies. Institutional relativism – the theory that individuals will judge identical risks differently under alternative institutional arrangements -- has been proposed as an explanation for the observation that some risk reduction policies will be preferred to others, even if all provide the same degree of risk reduction (Kleindorfer and Kunreuther, 1988). When asked to value a specified reduction in the risk of fire damage, WUI homeowners in Michigan were highly sensitive to the method of financing (i.e., private investment in fireproofing vs. taxes to improve infrastructure so as to make a wildfire less likely) and perceived effectiveness of the risk reduction scenario (Fried, Winter and Gilless, 1998). Some sought reassurance that the scenario concerning infrastructure improvement involved a particular government strategy rather than another to which they objected, even though the risk reduction (and presumably the benefit) would be identical for both strategies.

Wildland fire management is a non-excludable public good in that it is a service that must be provided to everyone living in the WUI if it is provided to anyone. As with all public goods (goods and services which are simultaneously enjoyed by multiple consumers), there is a high likelihood that this service will be under-provided by markets, leading homeowners to demand hazard reduction via government intervention. For example, knowing that no one can be easily excluded from enjoying the benefits of fire protection, residents are unlikely to voluntarily pay for this service (a manifestation of the free rider problem); thus, potential private producers of fire protection see no incentive (e.g.,

potential profit) to provide this service (Gardner and Cortner, 1988).

Government intervention in fire management may also be called for when individuals and organizations fail to account for the impact their actions and policies will have on people not involved in the original transactions. These unintended consequences – which can be positive or negative – are referred to as externalities. Allocations of public funds to increased staffing or equipment upgrades clearly benefit all WUI homeowners because they reduce the frequency of fires escaping initial attack. Less obvious is that fireproofing an individual, privately owned parcel also has multiple beneficiaries because (1) it reduces the chance of fire being carried to adjacent properties, and (2) it is less likely to reduce (through diversion) the firefighting resources available for fire containment. Some argue that government intervention which reduces the risk of damage in WUI fires ultimately benefits everyone by reducing insurance company pay-outs (and presumably, premiums) and taxpayer funded disaster assistance disbursements.

Given such externalities, perceived responsibility for risk must surely play a significant role in determining which risks are ultimately reduced, and by whom. Although both individuals and government agencies have opportunities to reduce risk, the portfolio of risk reduction projects actually undertaken will be shaped in part by homeowners' perceptions of who bears primary responsibility for wildfire protection. Individuals who believe that they have no control over a risk may logically conclude that it makes no sense to take precautions and that it is better to rely on community based protection (Burton et al., 1993). Individuals who think of the risk they face as "fire" rather than "fire damage" are likely to follow this line of reasoning and be less likely to engage in risk reduction activities than they are to believe that government agencies should protect them.

Fire protection agencies and land managers have increasingly looked to prescribed fire in recent

years as a mechanism for reducing vegetation fuels, and consequently, the risk of property damage during wildfires. Two of the biggest obstacles to this strategy are air quality management and the extent to which "the public" accepts prescribed fire as a legitimate and routine management tool (USDA/DOI, 1995; Cortner et al., 1990). It is evident that fire management practices, including prescribed fire, enjoy wide public support nationwide (Manfredo, 1990; Gardner et al. 1985), but less is known about the distribution of that support on a regional scale and among different segments of the population (e.g., permanent forest residents versus weekend hikers).

Few studies in the U.S. have addressed the issues of fire risk awareness and perception of the government's role. In San Bernardino County, California, Gardner et al. (1987) found that homeowners preferred policies that charge government agencies with full responsibility for hazard management. They were supportive of government strategies that physically alter the landscape or that require fire resistant building materials in home construction.

A more recent study of homeowners in another region found very different policy preferences. In Michigan's Crawford County, Winter and Fried (1997) conducted a personal interview based contingent valuation method survey of WUI homeowners to assess their willingness to pay for risk reduction. Responses to ancillary questions in that survey protocol revealed that most homeowners (75%) reported having taken steps to reduce the risk of wildfire damage to their homes. Most (80%) considered wildfire protection to be either an equally shared responsibility between homeowners and the government (54%) or primarily a responsibility of the homeowner (26%). Only 6% hold the government solely responsible for wildfire protection.

The finding that most forest homeowners are willing to pay for government sponsored risk reduction activities suggests that they believe they would benefit from policies which reduce the risk of

damaging wildfires (Winter and Fried, 1998; Fried et al., 1998). However, both perception of fire risk and the perceived importance of its reduction varied by demographic and economic characteristics. Ultimately, the survey generated new questions about the perceptions held by WUI homeowners about fire risk and the choices that they would make among hazard management alternatives.

The study reported here used focus groups to engage a sample of survey participants from the Crawford County study in more extensive discussions of fire management in the WUI and potential management strategies. The focus group approach has been successful in identifying beliefs and perceptions bearing on other forest resource issues (e.g., Kingsley et al., 1988). Our goal was to identify the attributes of both the fire hazard and alternative risk reduction strategies as perceived by WUI homeowners so as to better understand the formation of preferences concerning specific fire risk management strategies. In part, we were concerned about the extent to which policy preferences are affected by perceptions about (1) the hazard, (2) institutional arrangements, and (3) public versus private responsibilities. A secondary goal was to identify the differences in these preferences across three demographic groups: permanent residents, seasonal residents, and residents of any status who experienced fire losses. The information thus generated can provide valuable guidance in developing long-term solutions to the WUI fire problem which are more likely to enjoy public acceptance. The remainder of this article describes the data collection methods used, and summarizes the perceptions and beliefs of WUI homeowners about fire risk and possible management strategies, drawing on excerpts of focus group interviews to illustrate key findings.

METHODS

This study was conducted in Crawford County, a rural forested area in northern lower Michigan. Jack pine *(Pinus banksiana*, Lamb.), a fire adapted species that is native to the area, is the

most common land cover type and 70% of the land is owned by state or federal governments. Much of the public forest is managed as habitat for the endangered Kirtland's warbler songbird (*Dendronica kirtlandii*). In 1990 the Stephan Bridge Road (SBR) fire in this area destroyed 76 homes, burned nearly 6,000 acres of public and private forest (National Fire Protection Association [NFPA], undated). Under the auspices of the Kirtlands warbler habitat management plan, the US Forest Service (USFS) in 1980 ignited what was intended to be a 200 acre prescribed fire near Crawford County. Unfortunately, the fire escaped and burned 24,000 acres, 44 structures, and resulted in the death of one firefighter. The event, which occurred in an adjacent county, is known locally as the Mack Lake Fire. Both firesleft area homeowners with a variety of direct and indirect (e.g., via accounts by neighbors, friends, and mass media) wildfire experiences.

Focus group members were randomly selected from a pool of approximately 70 volunteers generated from a random sample of area homeowners previously chosen for a risk reduction valuationsurvey. A total of 39 homeowners participated in the focus groups. To capture the full range of responses to the question protocol while enhancing within group homogeneity (Krueger, 1994; Morgan, 1988), four focus groups of eight to ten individuals each were formed. Three population strata were identified as possibly having different perceptions of the fire risk and of the management strategies most frequently proposed for reduction in the risk of fire damage: (1) permanent residents whose homes were destroyed by the 1990 SBR fire (focus group **B**), (2) permanent (year-round) residents whose homes were not directly affected by the SBR fire (focus groups $\mathbf{P_i}$ and $\mathbf{P_{ii}}$), and (3) seasonal residents not directly affected by the SBR fire (focus group **S**). Assuming consistency with the findings of Cortner and Gale (1990) and McKay (1985), members of **B** were expected to hold different perceptions about fire risk and appropriate risk reduction policies than the other groups by virtue of

their own, sometimes traumatic experiences with wildland fire. Seasonal homes account for over 40% of the housing stock in Crawford County. Because of low occupancy rates during spring (Stynes et al., 1997) when most forest fires occur, members of **S** would be expected to be less likely than year-round residents $\mathbf{P_i}$ and $\mathbf{P_{ii}}$ to have either had direct experience with wildfire or received educational or warning messages from fire protection agencies. Furthermore, Burton et al. (1993) found that urban residents face extreme hazards with a greater likelihood of occurrence than the natural hazards of Crawford County and are therefore likely to discount the latter.

The focus group facilitator commenced sessions with a verbal preamble:

> This series of focus group interviews is sponsored by the Michigan Department of Natural Resources. Agencies that manage public land and provide forest fire protection want to know what you think about strategies that have been suggested as ways to improve forest fire prevention and protection. As residents and property owners in this area, you are an important part of management decisions. Your recommendations are the focus of today's discussion.

Orally presented questions[1] aimed to (1) identify perceived attributes of the fire hazard, (2) obtain a deeper understanding of perceptions concerning the division of responsibility for risk reduction, and (3) characterize the preferences for various fire management strategies and the perceptions of the attributes of these strategies which cause some to be favored over others. After being asked to describe the responsibilities of homeowners and of the government, participants were asked to discuss the "pros and cons" of specific strategies for more efficient allocation of risk, such as regulations (e.g. laws restricting open burning, zoning and land-use ordinances); landscape modification (e.g. land uses that act as fuel breaks); and government investment in fire suppression, preparedness, and prevention programs (e.g., equipment, prescribed fire, and homeowner education).

All focus group discussions were tape-recorded, and the tapes transcribed and coded to identify

themes that emerged during group discussions prompted by the interview protocol. Transcripts were analyzed twice by a single coder to develop and refine the code list, and to ensure that participant comments that reflected codes developed late in the initial coding were properly coded.

RESULTS

The essence of these focus group discussions was distilled into three broad themes: perception of the fire hazard, responsibility for risk reduction, and perception of fire management strategies. Within each theme, specific points raised by participants are summarized, and where appropriate, focus group transcript excerpts illustrating key findings are included. Excerpts involving statements by multiple members are coded to distinguish members (e.g., an interchange among three members of **B** might be transcribed with individual statements tagged as B1, B2, or B3).

Perception of the Fire Hazard

Perceptions of fire behavior inform opinions about the probability of success of risk reduction alternatives. Comments recorded during the contingent valuation survey to the effect that wildfire is an awesome, uncontrollable force against which suppression activities are futile were echoed in all four focus groups. Individuals in **B** were particularly forceful on this point – perhaps because characterizing the destruction as inevitable helps them cope with the issue of personal responsibility for their loss.

B1: “Would top notch equipment have helped in that last forest fire?”
B2: ”No”
B1: ”See, but, you know, so should we put a whole bunch of money into the latest technology and top notch equipment when in that last forest fire…”
B2: “…they couldn't keep up with it”
B3: “That's what I hear, nothing would have worked.” (B)

[1] Available at http://jeremy.msu.edu/pubs/snr98/

> And there's nothing, once it starts, there's no stopping [it]. There's nothing you can do. You can't throw enough water at it. (B)

Many who witnessed the 1990 SBR fire saw dramatic examples of extreme fire behavior which may have forever changed their perceptions of wildland fire. Contrary to their expectations, some homes surrounded by 300 foot wide defensible space buffers were destroyed, making destruction appear random and casting doubt on the efficacy of maintaining a defensible space.

> "The fire came up to the back of that woodshed and burned right up to it and the woodshed didn't even catch fire. So, you know, there's no rhyme or reason why what burns and what doesn't." (B)

> "There were two examples [two properties named] that were cleared almost all the way around [the house] for a hundred yards yet each of those burst into flame with no flames coming near it." (B)

Responsibility for Wildfire Protection

Focus group participants were asked to identify the specific responsibilities of homeowners and fire protection organizations. They viewed homeowners as responsible for fireproofing their property and for being careful when using fire (e.g., to burn yard debris), and government as being principally responsible for maintaining a ready firefighting force, regulating and monitoring backyard burning of yard waste during peak fire danger, and elevating peoples' awareness of fire danger. The reality that wildfire will burn indiscriminately across ownerships led some to declare that fire protection is *everybody's* responsibility.

Shared responsibility

> "I think a forest fire doesn't care. When a forest fire starts, it's gonna burn anything in the way. It's not gonna say, 'Well, this is government land--I'm goin' around it.' It's gonna burn. So, I think it's *everybody's* responsibility." (P_i)

Government responsibility

Theme A: Improve access to information about fire danger and homeowner protection measures.

> "I think that, uh, when it comes to the firefighting part of it, it's the government's [responsibility]. But prevention is the major part that [homeowners] have to deal with because a lot of times it's the people that start the fire, you know, and a lot

of times it's carelessness and we have to, you know, educate ourselves better on things and the government can help us educate too." (S)

"Right when we first moved into a wooded area, at least I know I didn't know everything that should be done living in a forest to protect myself." (B)

The high proportion of public forest land in the area and the well-known propensity of the predominant forest cover (jack pine) to burn lead homeowners to view two public land management objectives – enhance fire safety and replant jack pine for endangered warbler habitat – as in conflict with each other.

Theme B: Manage land for fire safety

"But, I think the government has a responsibility to set up a procedure that will… enable fire-fighters to contain a fire. And I think that's an area that they have neglected. If you go back in time, roads such as Stephan Bridge Road, Wakely Bridge Road, Bald Hill Road on the north side of F-32 were originally *fire lanes!"* (P_i)

"On the way here I was thinking about the type of reforestation they do around here. It seems to me they find a lot of jack pine and jack pine has to have a forest fire to germinate; and what's the point of planting something like that that propagates with a fire? Why not plant a white pine, a red pine, or something like that." (B)

Homeowner responsibility

Homeowners saw their own responsibility as limited to (1) being careful with fire (a clear recognition of their awareness of the potential externality that could result from their actions should they fail to do so), and (2) protecting their own property from wildland fire damage. Despite #2, many appear to believe that the amenities offered by fire-prone aspects of landscaping and building materials (e.g., aesthetics of a wooded lot or shake roof) are worth more than the safety they would enjoy in a more fire-resistant house and yard .

Be careful with fire

"The trash around the house is the biggest culprit when it comes to grass fires; then you got a trash fire, then you got a house fire--then, you got another Border Fire." (P_i)

"I think it's basically the homeowner. It's their place, they need to look after it and see that fires don't start there to go somewhere else." (B)

Self protection

> "Maybe I should be spraying fire retardant on my cedar chip roof, maybe I should be cutting the branches off but, I'm reluctant to destroy the look of the property by doing all of that cutting and trimming," (S)

Perception of Fire Management Strategies

While discussing fire management strategies, WUI homeowners clearly recognized damage from wildfire ignitions as an externality – hence their call for government intervention to protect them from the people who engage in unsafe burning. Discussions of risk reduction strategies frequently evolved into speculation about the efficacy with which their government was capable of implementing such strategies. For example, burning regulations emerged, overall, as a preferred strategy, yet participants commented on the "cons" of this approach twice as often as they expressed the "pros" (Table 1). This was primarily a result of their assessments of past enforcement and the ability of government to adequately enforce the regulations in the future. Nevertheless, when asked to prioritize strategies at the end of focus group sessions, burning regulations and their enforcement emerged as a preferred strategy.

Burning regulations

There are two categories of regulations related to fire safety: (1) local and state ordinances which restrict open burning during high fire danger periods internalize the social cost of risky behavior by individuals; and (2) building codes which require homes be built with fire-resistant materials, zoning which restricts development in areas with high fire risk, and ordinances which require a defensible space, all attempt to protect the homeowner (and to a lesser extent, society) from his or her own actions. WUI homeowners in this study support the first type of regulations and their strict enforcement, but see the second as unwelcome infringements on their personal freedom. They prefer

voluntary over coercive strategies and see education campaigns targeted at visitors and homeowners as acceptable substitutes to this second category of regulations.

Theme A: Burning restrictions are necessary to protect homeowners from careless neighbors and area visitors.

This theme emerged as clear evidence of the perceived externalities associated with living in a hazardous environment. Careless people were typically portrayed as ignorant tourists or seasonal residents who visit from "down-state" urban areas.

> "We had an incident this summer where people from downstate bought property up here and they came in and first thing they did was have a nice bonfire. In the middle of the woods and we ended up calling the township supervisor -- we didn't know who else to call." (P_{ii})

> "I think [we need] an overall ruling, no burning of brush or anything like that from the beginning of what could possibly be a dangerous season, as you pointed out, early in the year rather than later, to well into the season -- maybe December 1st; no fires of brush or any of that thing is allowed, period." (S)

> "When you're drunk and don't live here, you don't care." (P_i)

Theme B: Enforcement

Participants in every focus group viewed enforcement of current burning regulations as lax and likely to result in noncompliance.

> "Nobody is enforcing the problem either, so everybody is just doing it. You're not held accountable." (S)

Building codes, safety ordinances, and zoning

Fire management strategies which restrict property rights were far less popular than regulating burning. Unhappiness with these strategies centered on lack of opportunity for voluntary compliance, detraction from aesthetic and convenience aspects of their homes, and the perception that they are unnecessary given existing and potential insurance markets.

Theme A: Prefer voluntary measures over coercive methods; infringes on property rights; unfair

> "I don't think it should be regulated, or I don't think it should be something that you *have* to do -- it's only protection for your own home." (P_i)

> "Make 'em aware of the fact that if you clean needles up off of your property three times a year you're reducing your chance of fire by 70 percent or whatever it is. People with any kind of common sense at all I think listen to those kind of suggestions, where if you stick your finger up their nose and start pushing, you know, they get nasty in a hurry." (B)

Theme B: Aesthetic and convenience disutility

> "And the other thing about these restrictions, it depends upon what size of cleared area you're talking about. If you say, 'Well, you gotta have 4 square acres, or an acre or two acres' -- whatever it is. That may not meet their idea of living in the north woods." (P_{ii})

> "I've got spruces growing up right under, literally, under the deck. Now, I know they shouldn't be there, but I was a little hesitant to cut them but I also know the risk involved." (P_i)

Theme C: Insurance market mechanisms

> "I'm not sure that people would go for that, for changing the building codes. There could be something though where maybe changes in house insurance premiums, like if your home is constructed of fire resistant materials, possibly there could be a reduction in your homeowners insurance premium." (B)

> "If you build there and it burns you rebuild there. That's between you and your insurance company, or whoever." (S)

<u>Investment in suppression infrastructure</u>

Fires are perceived as impossible to control; therefore, investment in additional firefighting equipment is like throwing money away that would be better spent on prevention. Nevertheless, homeowners generally believe that the government has a responsibility to respond to fires that do occur and that the firefighters must be well-equipped for their own safety.

> "There's no getting around that we need the equipment if there's gonna be a fire. And someone made the statement earlier; by the time you get there, it's really burnt, but you got to have something to suppress it, and the better the equipment -- step up the radio equipment, whatever it takes -- you're gonna have to spend money on it." (P_{ii})

<u>Landscape modification</u>

Homeowners view landscape-scale modification of vegetation far more favorably than regulations which would mandate that they modify vegetation on their own property. Fuel breaks and

planting of less fire-prone species on public lands are some of the most popular government-implemented actions suggested by homeowners, perhaps because they qualify as prevention (prudent) rather than suppression (futile) strategies, and because homeowners would themselves bear no direct costs or disutilities.

Landscape modification offers the possibility of leveraging other public land management goals such as managing browse and habitat for game species, and gaining revenue from the harvest of commercially attractive tree species. But inherent in the multiple use concept is the potential for conflicting forest uses.

Although homeowners find landscape modification acceptable at a conceptual level, some view public land management as unsuccessful (if not irresponsible) in terms of fire safety given the emphasis on planting jack pine to create and extend habitat for the endangered Kirtland's warbler. These homeowners believe that stand densities which constitute suitable warbler habitat are inconsistent with a fire-safe landscape and believe that there must be more of a balance between fire management and species recovery.

P_i1: "If you have 50 acres, you plant it all in jack pine for the warblers, and you get a fire in there and you lose all 50 acres, you haven't saved any jack -- or any warblers."
P_i2: "That's true."
P_i1: "But, if you can cut it down so you only lose 25 acres, ahh, now you've helped out the warbler." (P_i)
"I can't see why so much money is spent on a bird that's bent on extinction, at the risk of private property." (P_i)

Prescribed burning

Most homeowners were suspicious of prescribed burning as a fire management tool. The Mack Lake fire, left an indelible imprint on the homeowners' memories. This, and recollections of other prescribed burns which escaped (whether based on fact or rumor), has soured their attitude toward

prescribed fire.

"A few years back they had prescribed burns and they got away from them. Now that put the fear of God in me -- when I think they might be burning across the road from me." (P_{ii})

"I was ready to dive in the river to stay alive in that one fire. It was a prescribed burn." (S)

"I'm going to get real scared if I see smoke in the air and there's some government person out there saying, I'm your friend, I'm watching this over here." (B)
"I'm suspicious of it, I mean, we talked about that when they burned -- under very controlled conditions -- they burned down that area over by Mio for the Kirtland Warblers [the Mack Lake fire] and they lost…it was almost as clinical as you can get in the wild, you know, clinical situation, but nevertheless here it is, absolutely they knew what kind of trees they were burning down, they know what kind of equipment they've got, they know how to do it and a man gets killed in the process because the fire got out of control. So using that as the ultimate controlled situation what about all the uncontrolled situations. So really what I'm saying is that that's a very dangerous thing to engage in." (S)

Education

Participants were overwhelmingly favorable towards education programs designed to reduce fire ignitions. As stated earlier, participants generally believe homeowners are responsible for fireproofing their homes; however, there was relatively little discussion of education programs designed to teach homeowners how to maintain a defensible space. They see human action as the cause of most forest fires and place most of the blame for fires on visitors and newcomers who are ignorant of the fire danger. They refer to outsiders as "down-staters" as they come primarily from the Detroit metropolitan area in Southeast Michigan.

"I think that the people who need educating don't live here." (B)

"The worst forest fire danger we all know up here is in April and May. They have a moratorium on burning. If you ask a lot of people downstate what the worst time of the year for fire is they'll say, 'June, July and August,' and that is patently not true." (S)
"I live east of the campground and we can have a no-fire condition in effect up here and every camper's got a campfire going and the campers know absolutely nothing." (P_i)

"That's [why we need] advertising for downstate people that come up here they is the ones that really need to be notified." (Pii)

DISCUSSION

As expected, these discussions yielded valuable information about homeowners' fire management policy preferences. They also provided cogent insights into how homeowners' assessments of a given remediation strategy are influenced by their perceptions of the wildfire hazard and by characteristics of the strategy. Although homeowners receive some fire hazard information from official sources such as DNR fire prevention campaigns, our findings suggest that their direct and indirect (e.g., via accounts by neighbors, friends, and mass media) experiences with wildfire are more influential in perception formation and reinforcement.

Strategy preference was clearly affected by the perception that forest fires are uncontrollable. Apparently, recollections of the few instances in which prescribed fire operations resulted in escaped fires and the devastation that resulted from the 1990 SBR fire loomed large in homeowners' memories relative to the vast majority (>99%) of fires that are successfully suppressed by state and local firefighting agencies. A lack of media coverage of successful fire suppression operations may partly explain this misperception.

More ominously from the standpoint of motivating people to take proactive steps to safeguard their homes and properties, strategy preference was also influenced by the perception that forest fires cause random destruction. There is a developing consensus among researchers investigating the WUI fire problem that losses of homes and properties in WUI fires can only be reduced if homeowners take actions which serve to "fireproof" their homes (e.g., maintaining a defensible space) (e.g., Foote, 1992; Wilson and Ferguson, 1986). Yet having witnessed the bizarre patterns of home destruction during the 1990 SBR fire – seemingly fireproofed homes destroyed while clearly vulnerable homes remained unscathed – many homeowners believe their fireproofing efforts will be futile.

Based on their fire experiences, and their beliefs that: (1) visitors are ignorant and careless with fire, and (2) that the government does not adequately enforce burning regulations, homeowners displayed negative attitudes towards strategies based on investments in fire suppression effectiveness and expansion in the use of prescribed fire. They were more positively inclined towards strategies involving education to reduce ignitions and stricter enforcement of burning regulations. Homeowners' assessments of campers and their fires as a primary risk is at odds with DNR statistics which list backyard debris burning (not recreational fires) as the number one ignition source both in the study area and statewide (Michigan Department of Natural Resources 1997).

Perceptions About Fire Protection Responsibility

Three themes concerning fire protection responsibility emerged during the focus group discussions:

- The government is responsible for educating residents and visitors about the fire hazard, and for managing public land for fire safety.
- Homeowners are responsible for fireproofing their property and for being careful when using fire.
- Because forest fires behave unpredictably and are uncontrollable, everyone is responsible for some aspect of fire protection.

Because over 70 percent of Crawford County is controlled by state or federal government, homeowners viewed public land management as a key factor influencing wildfire hazard. Public land management's current emphasis on providing endangered species habitat and producing timber (both of which perpetuate the flammable jack pine forest type) was viewed as contrary to their objective of a fire-safe landscape. Homeowners expressed the desire that government agencies change their land management practices so as to prioritize fire management goals.

Conscious of the hazard attributes described above, most homeowners also see a role for themselves in fire protection. Although the government manages most of the County's forests, homeowners acknowledge that the responsibility for reducing fire ignitions lies with individuals, both residents and visitors. In addition to being careful with fire, most homeowners also feel a responsibility for fireproofing their homes, although many admit that they have not taken such steps to date. This belief is not universal; some homeowners believe that their responsibilities relative to wildfire risk are fully discharged by maintaining insurance coverage on their home and personal property.

Types of Fire Management Strategies

Reactions to strategies raised in the focus group discussions suggest a classification of fire management strategies (classes are italicized below). Participants in all four focus groups deemed ***education*** of residents and visitors about fire and enforcement of strict ***burning regulations*** as the most acceptable and effective fire management strategies. Other forms of regulation – ***safety ordinances and zoning*** measures – were almost universally rejected as unworkable and infringing on private property rights. The perceived hazard attributes and past fire experiences led most of the participants to reject ***prescribed burning*** as a landscape modification tool because it was viewed as a reckless strategy given past failures. Such experiences also galvanized support for stricter enforcement of burning regulations. Homeowners' views of fire ***suppression investment*** were mixed: in $\mathbf{P_i}$ and $\mathbf{P_{ii}}$, there was very little discussion beyond a common opinion that, despite the uncontrollable nature of fire, the government should have a ready firefighting force; in **S** and **B**, discussion was dominated by a few individuals with technical knowledge of firefighting tactics and equipment. Homeowners generally support the government's maintenance of suppression forces but have very little to say about further investment, perhaps because most lack knowledge about the technical aspects of fire suppression.

Homeowners' views of visitors as ignorant about fire and likely to pose a hazard by their carelessness are consistent with their strong support for fire prevention education efforts. Such views of "outsiders" were remarkably consistent across groups, including the one consisting solely of seasonal residents—themselves considered outsiders by many permanent residents.

CONCLUSION

Despite diverse backgrounds and values, WUI homeowners of Crawford County expressed remarkably similar preferences concerning fire protection policies. While this homogeneity suggests that some initiatives to reduce damages from WUI fires may be accepted (e.g., prevention-oriented strategies such as education and enforcement of burning regulations), it does not auger well for implementation of other management strategies deemed most effective by researchers and professional fire managers. Prescribed burning is universally viewed by the participants as reckless and investment in suppression infrastructure is considered misguided because wildfires are seen as uncontrollable; zoning and safety ordinances are viewed as unacceptable infringements on the right to use private property as they see fit.

Before attempting to implement management strategies which will not be welcomed, policy makers may wish to engage in information campaigns to change widely held misperceptions about the fire hazard and the efficacy of specific strategies designed to counter it. For example, by publicizing the success of suppression efforts as fires occur throughout the fire season, a fire protection agency could demonstrate their ability to control most fires while at the same time providing evidence of a return on the public's investment in fire suppression infrastructure. A focused and compelling information campaign to counteract the impressions left on homeowners by their past experiences with intentional burns which escaped will be needed before prescribed fire can be considered a viable option in

Crawford County. There are also opportunities to clear up misperceptions about the source of fire ignitions: while most homeowners assume that visitors and campers are responsible for most fires, statistics show that 80% of ignitions are caused by permanent residents.

Despite ubiquitous misperceptions, most homeowners appear to have learned from experience that the environment which they have chosen for their home (or second home) can be a dangerous one. This realization ultimately generates strong support for education and strict enforcement of burning regulations.

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ACKNOWLEDGEMENTS

The authors gratefully acknowledge funding from the Michigan Department of Natural Resources Forest Management Division (MDNRFMD) and the Michigan Agricultural Experiment Station. The study would not have been possible without the assistance and cooperation of Don Johnson, MDNRFMD, and Michigan State University graduate student Georgia Peterson. We are indebted to the citizens of Crawford County, Michigan for their participation.

Table 1. Participant comments on fire management strategies by pro/con dichotomy

		S	B	P1	P2	Total
Burning regulations						
	Pro	4	1	1	3	9
	Con	6	6	6	5	23
Building codes						
	Pro	0	0	0	2	2
	Con	7	8	11	2	28
Infrastructure						
	Pro	1	0	5	1	7
	Con	0	7	8	0	15
Landscape modification						
	Pro	6	1	6	5	18
	Con	4	0	3	0	7
Prescribed burning						
	Pro	0	0	1	0	1
	Con	8	7	10	11	36
Education						
	Pro	8	0	3	1	12
	Con	3	9	0	0	12
Safety ordinances						
	Pro	1	1	0	2	4
	Con	7	19	6	5	37
Zoning	**Pro**	1	0	0	0	1
	Con	6	6	4	5	21