# Who Wants to Participate? Public Views of Wildfire Management in the New Jersey Pine Barrens

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Abstract

In recent years, there has been a push for more community involvement in wildfire management. Involvement can occur at the first level of individual action to make one's home more fire safe, or it can occur at a second level of participating in democratic planning for community-wide fire management. This paper uses Q method and a mail survey to examine the views of residents of the New Jersey Pine Barrens about wildfire management. It finds that while Pine Barrens residents are favorably disposed toward first-level involvement, interest in second-level involvement is weak. Yet overall outlooks on fire are not strongly related to actual behavior. These results suggest that the fire issue is "detached" from residents' ways of life. Detachment presents a challenge for fire managers wishing to increase the level of community involvement, especially at the second level.

Keywords: Wildfire, participation, New Jersey

## Introduction

In recent years, increasing attention has been given to participatory and community-based forms of wildfire management. In the United States, Firewise and related programs are busily certifying communities, while federal and state governments make funding available. The importance of communities arises from a dual process of ideological and geographical change. Ideologically, fire

managers and the public have been coming to recognize the limits of a technocratic approach to fire control (Machlis et al. 2002). Geographically, the expansion of the wildland-urban interface (WUI) – a zone of residential settlement abutting "wild" areas – places more people at risk while giving their activities a greater impact on the success of fire management (Radeloff et al. 2005, Vince et al. 2005). An emphasis on the involvement of the community brings with it a need to understand the perspectives of people living in fire-prone areas. It is crucial to understand the values and perceptions that residents have in order to design programs and expectations that effectively gain their support.

This paper employs Q Method and a mail survey to explore the viewpoints that residents of the New Jersey Pine Barrens hold with respect to wildfire. It provides a picture of the diversity of values proposed by the public, and suggests resulting challenges for designing a community-based fire management system.

## Fire Management and Public Values

A literature already exists documenting the history of fire management in the United States, detailing the country's choice of fire suppression in the early twentieth century, the downfall of that paradigm, and the contemporary search for a new direction (Busenberg 2004; Davis 2006; Kauffman 2004; Pyne 1982, 2004). The choice between suppression, prescribed fire, and mechanical thinning has been the most prominent (Pyne 2004), but other issues include the role of bureaucratic and judicial barriers (Davis 2004, Keiter 2006), landscape versus individual-property-focused approaches (Cortner and Gale 1990), the role of development and incentives (O'Toole 2006, Kennedy 2006), and structural versus social responses (Steelman and Kunkel 2004).

Central to this search for a new direction has been the role of the public. It is almost universally accepted in theory – albeit incompletely realized in practice – that public involvement will play a key role in determining how fire is managed (Beebe and Omi 2003, Carroll et al 2006, Cheng and Cortner

2003, DellaSalla et al 2004, Machlis et al 2002). This development parallels the push for public participation seen across the board in environmental management issues (e.g. Renn, Webler, and Wiedemann 1995, Webler and Tuler 2006).

In fire management, participation by the community occurs on two levels. On the first level, individual residents of the WUI care for their own homes, making fire-safety improvements that benefit themselves directly and other community members indirectly. On the second level, residents become actively involved in fire safety and fire management planning.

The rise of the wildland-urban interface as both a real phenomenon and an item on the policy agenda (Laughlin and Page 1987; Davis 1989, 1990; Vince et al. 2005) creates a role for extensive first-level involvement not seen in many other arenas of environmental management. The WUI is a region in which the movement of population from urban areas into the countryside leads to homes abutting or scattered among "wild" lands – often the most fire-prone wild lands (Kennedy 2006, Radeloff et al. 2005). Protecting these dispersed residences presents a challenge to firefighters (Sampson 1999). Meanwhile, the fact that one of the most effective fire safety strategies is for homeowners to take care of their own homes and yards (Cohen 2000) puts much of the power and responsibility in citizens' hands. Yet fire management officials remain frustrated by the public's reluctance to cooperate in fire management. This reluctance has been variously ascribed to lack of knowledge or mistaken understanding of risk (McCaffrey 2004), unsafe aesthetic preferences (Merrick and Vining 2006), non-interventionist environmental ethics (Bright and Burtz 2006), underestimation of the efficacy of protective action (Martin, Bender, and Raish 2007), lack of resources to implement protection (Collins 2005), too-high expectations of emergency services (Cortner and Lorensen 1997), blaming others for the disaster (Arvai et al. 2006, Kumagai et al. 2004), moral hazard (Berrens et al. 2007), or the collective action problem created because the condition of one person's property imposes positive or negative externalities on their neighbors (Steelman 2008, Winter and Fried 2000).

A few case studies have been conducted of successful second-level community involvement in

fire management (e.g. Farnsworth et al. 2003, Miller and Wade 2003, Sturtevant and Jakes 2007). Like the larger public involvement literature, these studies usually identify good communication, trust-building, and taking advantage of preexisting social and institutional networks as key factors in improving involvement.

## Study Area

While there has been much research on the social aspects of wildfire in the United States (see Daniel et al. 2007 for a summary), the study areas for that research have been primarily in the West, and secondarily in the Upper Midwest and South. One significant fire-prone area that has received almost no attention from researchers is the Pine Barrens of New Jersey.

The New Jersey Pine Barrens encompass most of Ocean, Burlington, and Atlantic counties, as well as parts of Camden, Gloucester, Cumberland, and Cape May counties (other areas of pine barrens are present in eastern Massachusetts and Long Island). The heart of the Pine Barrens is the Pinelands National Reserve, a district composed of both public land (State Forests and military lands) and private land (urban, rural, and agricultural) subject to planning by the state- and county-appointed Pinelands Commission (Mason 1992). This study focused on communities in, or adjacent to the outer boundary of, the Reserve.

The Pine Barrens exhibit a fire-prone WUI landscape (Luque 2000, Walker and Solecki 1999). As the largest patch of undeveloped land between Boston and Richmond, VA, settlement in the Pine Barrens is pressing in from three sides – primarily from New York City in the north, but also from Philadelphia in the west and the Jersey shore in the east. The population of the Pine Barrens grew at an annual growth rate of 2.12% in the 1980s, 1.16% in the 1990s, and 1.17% in the first half of the 2000s, outpacing the statewide growth rates of .49%, .85%, and .71% respectively[1] (U.S. Census Bureau 2007).

The region is “barren” insofar as its sandy soils have low nutrient content and poor water retention, making agriculture (aside from native species like blueberries and cranberries) difficult (Berger and Sinton 1985). The dominant ecosystem is a forest of pitch pine (*Pinus rigida*), shortleaf pine (*P. echinata*), and various oaks (*Quercus* spp.). These trees are able to resprout following a fire, quickly reestablishing the canopy (Boerner 1981, Boerner, Lord, and Peterson 1988). Serotiny is also exhibited by pines in the more fire-prone areas (Givnish 1981). A small sub-region known as the Pine Plains is composed of stunted, multistemmed pines maintained by higher fire frequencies (Buchholz and Good 1982).

There is some limited evidence that the region’s indigenous inhabitants, the Lenape, used landscape fire for a variety of purposes (Russell 1983). Early Euro-American settlement patterns were shaped by the risk of fire, as towns were located amidst fields or east (downwind) of swamps to reduce the danger (Berger and Sinton 1985). Successful fire suppression helped drastically lower the area burned after 1940, though a full-blown suppression policy was never successfully implemented (Forman and Boerner 1981). Fire management is currently carried out by the state Forest Fire Service, with help from local volunteer fire companies. The military also conducts fire management on its lands in the Pine Barrens (McKessey 2008). As of March 2008, eight communities in the Pine Barrens have been certified as Firewise (Firewise 2008).

The region’s biggest fire years in the last century were 1939 and 1963 (Berger and Sinton 1985, Hughes 1987), and most observers believe that it’s only a matter of time before another major conflagration strikes the region. The worst recent fire occurred in 1997, when a major blaze destroyed 52 homes in two retirement communities in Berkeley Township, while in 2002 a similar fire in Berkeley was stopped at the doorstep (Batcha 2005). Shortly after the completion of this study, a fire beginning on the Warren Grove Gunnery Range burned 17,000 acres (7,000 ha) and forced the evacuation of 6000 residents (Mathur 2007, Pais 2008).

# Phase 1: Q Method

## Methodology

The first phase of this research employed Q Method. Q uses factor analysis to examine similarities between individuals' overall viewpoints, grouping people who share similar ways of organizing the many ideas one might have about a topic (Brown 1980, McKeown and Thomas 1988, Dryzek and Berekijian 1993, Addams and Proops 2001. It thus enables the researcher to identify the major shared perspectives, or "discourses," expounded by study participants.

On the basis of 11 open-ended background interviews with individuals knowledgeable about fire in New Jersey and a second case study site (not discussed further in this article) in the state of New South Wales, Australia, as well as a reading of the scholarly and popular literature on fire, a sample of 56 statements was compiled that represented the breadth and diversity of things that are said about wildfire and its management.

Each participant in the study was presented with a set of cards bearing the statements, and asked to rank them into a quasi-normal distribution along a scale from "most agree" to "most disagree" (creating a "Q sort"). The Q sorts were factor, applying Principal Components analysis and Varimax rotation[2]. The factor analysis for Q method is "sideways" from the typical use of factor analysis, focusing on correlations between individuals' overall Q sorts rather than correlations between individual statements. Each resulting factor represents a discourse – a shared way of thinking and speaking about an issue. Each factor can be represented by an idealized Q sort formed by averaging together the Q sorts of the individuals who most clearly agreed with that discourse. These idealized Q sorts are then interpreted to give a picture of the core ideas in each discourse.

The number and selection of participants in a Q study is more akin to that in a qualitative interview or focus group study than a large-n quantitative survey. Because Q is not designed to establish the prevalence of the discourses it identifies, nor to correlate the discourses and other facts

about the participants, the set of participants need not be statistically representative of the population of interest. They must instead be selected to cover all of the possible perspectives. For this study, participants were identified in two ways. Sorts were completed by several "key informants" (such as professional fire managers and representatives of environmental groups) who are important players in wildfire management in the state. A set of "general public" participants was identified by contacting community groups such as churches throughout the study area and soliciting volunteers. A total of 26 individuals completed sorts, with one husband-wife couple collaborating on a single sort.

In the following discussion, references to Q statements are followed by the statement number and its rank in the factor in question – for example, "(27, +2)" means that statement 27 was ranked at +2 on a scale of -5 to +5 in this factor. A table of all of the statements and their rankings on each factor can be found in Appendix A.

## Results

### Discourse A: Responsible Managers

Responsible Managers are concerned with responsible control of fire through a traditional division of labor. If the fire services do their jobs, and residents follow common sense, the forest fire problem is tractable. This discourse aims at comprehensive protection for life, property, and the environment (53, +5; 54, +4; 55, +4). Responsible Managers place responsibility in the hands of the authorities and experts, disagreeing that all stakeholders should have a place at the table (44, -3), and holding that the Forest Fire Service should inform the public (20, +3) and hold educational programs (3, +2) while being indifferent to the Forest Fire Service learning from the public (4, 0). They feel that a bad fire could strike anywhere (26, +3), but it would be able to be stopped (38, -2).

Advocates of this discourse feel strongly that controlled burning should only be done under safe conditions (11, +4), which means escaped burns are not a major concern (10, -3). They reject letting nature take its course (40, -3) or following Native American practices (8, -3). They also advocate

detailed management plans for all wild areas (51, +2) that are tailored to the local situation (52, +2) and call for controlled burning in small patches (28, +2) applied across the whole environment (27, -2). Despite their preference for the authorities to take the lead, though, a number of statements that would a priori seem to fit a classic top-down worldview were not given importance by Responsible Managers – such as giving the Forest Fire Service complete control (35, +1) and centralized fire management (23, -1) – indicating that this is a preference for *local* authorities. And while advocates of this discourse agreed with the use of science, science is not at the top of their agenda (6, -2; 7, +2; 49, 0).

Responsible Managers couple a preference for the authorities to take the leading role with a view that residents should take a supporting role, believing that individuals should protect their own homes (22, +5; 16, +2). The main responsibility of residents is to follow Smokey the Bear's advice to avoid ignitions (47, +3; 48, +3), which goes along with a strong belief that arson is controllable (46, -5). This theme of individual responsibility is reinforced by the rejection of statements relating to individual *discretion* – in matters such as home building (29, -5), holding other priorities than fire safety (14, -4; 17, -2; 18, -4; 21, -2), and market-based incentives like differential insurance rates (1, -2). Media sensationalism is also rejected (2, -4). Advocates of this discourse feel very strongly that when a fire is approaching, residents should evacuate (34, +5), i.e., get out of the way, rather than staying to help protect their home (33, -5).

Discourse B: Community Planners

Community Planners place a high importance on explicit planning for fire safety. They favor focusing on protecting human life (53, +5) rather than property (54, -1) or the environment (55, -1), though they don't believe that such a focus will necessarily do great harm to the environment (56, +5). They are reasonably confident that a bad fire can be controlled (38 -2).

Those who agreed with this discourse put great emphasis on science (7, +4) – which is believed to be capable of adequate understanding of fire (6, -2) – and want to have clear plans for managing wild

areas (51, +5). They would keep politics (37, +4) and red tape (41, +3) out of fire management . They strongly disagree that nature should be allowed to take its course (40, -5), and advocate quickly suppressing wildfires (39, +3). They have confidence in their ability to manage anthropogenic ignitions, from both controlled burning (10, -4) and arson (46, -4). They do not think that fire management requires lots of state funding (48, -3).

Community Planners value residents' input as a supplement to expertise, as they agree with involving all stakeholders (44, +2) and conceptualize reducing the risks on one's own property as a responsibility to the community (16, +3) as well as to oneself (22, +2). Advocates favor building trust between firefighters and the community (36, +4) and tailoring fire management to the local situation (52, +3). Educating the public is important to them (3, +2), and they oppose media sensationalism (2, -3). Yet they do not trust people to be responsible with ignition sources (48, -3) or expect new residents to understand the fire risk (32, -2). They think residents need to accept that living in the Pine Barrens brings some risk of a fire (30, +2) and be prepared to evacuate (33, -5; 34, +1).

Advocates of Discourse B disagree with a libertarian approach to fire. They disagree that individuals should be able to weigh the costs and benefits on their own (21, -2), that other priorities might take precedence over fire safety (14, -1; 17, -4; 18, -2), and that houses should be able to be built anywhere (29, -5). They also reject the idea that farming or logging reduce the fire danger (13, -3).

Discourse C: Populists

Populists' concern is protecting the prerogatives of residents against the official hierarchy. They allow residents more discretion than other discourses, finding both evacuation and "stay and defend" to be eminently reasonable strategies (33, +5; 34, +5), and recognizing that people may have other priorities than fire safety (18, +2) and shouldn't have to change their lifestyles (30, -4) – though they do hold that individuals ultimately have a responsibility to the community to make their property fire-safe (16, +2). They emphasize the need to protect property (54, +4) in addition to human life (53, +5). They

are not interested in trying to change people's behavior through differential insurance rates (1, -2) or restrictions on off-road vehicles (45, -3). Populists think that residents have important knowledge to share with the fire service (4, +3) and want to be informed of the Forest Fire Service's doings (20, +2), but are less interested in the Forest Fire Service "educating" them about fire (3, +1). Populism is also a pro-science discourse (6, -4; 7, +3) and opposed to media sensationalism (2, -5), though they do not think collecting more data is important (49, -2).

Populists strongly oppose giving the Forest Fire Service complete control (23, -5), and are not interested in having lots of state funding (43, -3), restrictions on potentially fire-starting activities (47, -2), or centralized fire management (35, -2). Nevertheless, they do advocate some planning measures, such as restrictions on new housing developments (29, -4; 31, +3), and they do not think bureaucratic barriers need to be lowered (41, -3). Populists in general feel that the fire risk is not all that great, saying that while a bad fire could strike anywhere (26, +3), it would be possible to control it (38, -2).

Populists think that nature should be protected (55, +2) (though human safety may have to take precedence (56, +1; 53, +5; 54, +4)) and that there should be management plans for wild areas (51, +4). Their view of environmental management is comparatively hands-off – nature should be allowed to take its course (40, +4) rather than suppressing fires (39, -5), farming and logging are not good fire control measures (13, -2), and controlled burning is too risky to be used all the time (10, +2) (though when it is used, it should not be done over large areas all at once (28, -3)). Risk reduction measures should focus on areas closest to homes (25, +2) – both to protect the people there and to protect the nature that lies farther out.

Discourse D: Accountable Citizens

The theme of Discourse D is an elevated sense of danger, to be addressed by individual residents taking action. Protecting human life (53, +4) is far more important than protecting property (54, -4) or the environment (55, -1), and the environment may need to be sacrificed for fire safety (56,

-3). Risk-reduction at the level of the individual household is central, as loaders believe that people's lifestyles need to be changed to accommodate fire (50, +5), that individuals should protect themselves (22, +4) and the community (16, +3), and that this protection should be enforced either by the authorities (19, +5) or the market (1, +4). They therefore oppose letting homeowners make their own cost-benefit calculations (17, -2; 21, -5; 29, -3) or relying on farming and logging (13, -4). They are the most favorable group toward the idea of a little media sensationalism to get people's attention (2, +2), though they recognize that people have other things on their minds (14, +2). In this discourse, the role of the official sector is comparatively subdued, beyond agreement that there should be educational programs (3, +3) and building codes (15, +2). Thus red tape is not seen as a major concern (41, -2).

Keeping fires under control is an important issue for this discourse. Unplanned fires should be quickly suppressed (39, +3), arson can be stopped (46, -3), and controlled burning should be done safely (11, +2). While people should be strictly liable for making mistakes while conducting a controlled burn (9, -5), fear of escaped burns should not be a major limit on controlled burning (10, -3), and fire should be applied across large areas at once (28, +2). Environmental concerns (12, -2; 27, -4) are not considered important factors in deciding where and how to burn. Accountable Citizens lean toward favoring evacuation (34, +2; 33, 0), though it isn't a major concern for them.

In contrast to the procedural focus of the Community Planners, Accountable Citizens don't devote much attention to questions of participation or information flow between the public and the authorities (4, +1; 20, +1). They reject both centralization (23, -5) and politicization (37, +5). This is the only factor that is ambivalent about the ability of science to fully understand fires (6, +1), which doubtless adds to their sense of being at risk, and they advocate monitoring (49, +3) so that we can keep up-to-date on the risk level. They are the only discourse to think that we have something to learn from Native Americans about fire (8, +2).

Discourse E: Scientific Environmentalists

Scientific Environmentalists' priority is protecting the environment through the application of scientific expertise. It emphasizes protecting the environment (55, +4), which is not seen as being at odds with human safety (53, +5; 56, +3), though protecting property is less important (54, +1). Scientific Environmentalists advocate a scientific (6, -2; 7, +5) approach to fire policy and monitoring of environmental conditions (49, +2), without trying to learn from Native American practices (8, -2). Planning should be tailored to the local situation (52, +2), including detailed plans for wild areas (51, +3). In their opinion, politics (37, +5) and red tape (41, +3) must be kept out of the way.

Advocates of this discourse would prefer that controlled burning mimic the natural fire regime (12, +4) by being applied to large areas at once (27, -2; 28, -2), and that nature be allowed to take its course where possible (40, +4). This can be achieved by focusing risk prevention work on the areas closest to people's homes (25, +3) and stopping arson (46, -3). They are optimistic about the control of fires, both wild (38, -2) and prescribed (10, -5). Thus they feel that people who burn responsibly should not be sued if there is an accident (9, +2).

Scientific Environmentalists reject the usual suite of libertarian proposals (17, -4; 18, -4; 21, -3; 31, +2), as well as any reliance on farming or logging (13, -3) or local control of management (24, -3). Instead, they prefer regulations on homeowners and developers (15, +2; 29, -5). However, they do not put a great deal of importance on residents making fire safety improvements to their homes (16, 0; 22, +1). They favor evacuation (34, 0) over staying put during a fire (33, -5), and education from the Forest Fire Service (3, +2) over media sensationalism (2, -4).

## Phase 2: Mail Survey

### Methodology

Though Q method is a powerful way of examining how people think about an issue, it is weak when it comes to explaining who thinks what, and why they think that (Danielson forthcoming). To

explore these questions, a questionnaire was sent out to a random sample of people living in the Pine Barrens.

The survey was sent out to households drawn from the property tax records for four randomly selected municipalities in or bordering the Pinelands National Reserve: Bass River Township, Egg Harbor City, Lakehurst, and Waterford Township. The survey technique was based on Dillman's "Tailored Design Method" (Dillman 2000). Each respondent received up to four mailings: an initial letter describing the purpose of the survey and alerting them to the impending arrival of the questionnaire, a questionnaire, a reminder postcard one week later, and a replacement questionnaire three weeks later. The initial questionnaire mailing included $2 as a token incentive, which the respondent could keep even if they did not complete the survey.

The initial mailing went out to 400 individuals. After removing those that turned out to be invalid addresses, the true sample size was 375. The overall response rate was 47.2%, or 177 completed surveys – a reasonable response rate for this type of study (Connelly et al. 2003).

## Results

The most basic way to measure what people think about fire is to ask how much of a risk they believe fire presents: "In general, how high do you feel the risk of forest fire is to residents of your community?" ("risk to community") and "...to you and your household?" ("risk to self"). Respondents were generally concerned about forest fires, rating the risks to both their communities and their selves as 5 and 4 out of 7, respectively. However, this number should be taken with a grain of salt, as it is a prime candidate for nonresponse bias or social desirability bias in the context of a survey specifically about fire management. Protecting human life was unsurprisingly rated the highest priority (nearly a perfect 7), with protecting property and protecting the environment slightly lower (6.0 and 6.1 out of 7). Human life was also seen as the most successfully achieved of the three goals, and environmental protection the least (6.2, 5.7, and 5.1 out of 7). A satisfaction index – computed from the average rating

for how well each of the three values was protected, weighted by the relative priority given to it – showed positive (5.6 out of 7) satisfaction.

The survey asked about set of potential barriers to fire safety: lack of money, lack of time, lack of knowledge, concern about the environment, concern about affecting the beauty and value of one's home, local laws, and lack of cooperation from neighbors. All of these had an average rating of between 2 and 2.5 on a Likert scale where 1 is "not a barrier" and 7 is "a barrier," except for lack of knowledge, which averaged a 3.

The five discourses were measured by presenting short summaries of each discourse as quotes from hypothetical residents of the Pine Barrens (the text of these quotes can be found in Appendix B). The survey asked each respondent four questions about each discourse: how much do they agree with it, how reasonable or unreasonable do they think it is, would they trust the hypothetical speaker if they were the respondent's neighbor, and how many people in the respondent's community think like that.

Table 1 presents the results of the agreement question in two ways: "full agreement," in which any respondent who rated the discourse a 1 on the 7-point agree-to-disagree Likert scale is assigned to that discourse, and "top discourse," in which each respondent is assigned to the discourse that they agreed with most strongly. The significant degree of overlap suggests that respondents did not find the discourses to be mutually exclusive. In sum, Responsible Managers (Discourse A) were the most common, followed by Scientific Environmentalists (Discourse E), while Populists (Discourse C) were rare.

[TABLE 1 ABOUT HERE]

Agreement with a given discourse was strongly associated with seeing that discourse as reasonable, trust-inspiring, and common. Table 2 shows the correlations of each discourse's agreement with the other three questions about it. The correlation between agreement and reasonableness is as

expected. The strong agreement-trust correlation lends some support to Earle and Cvetkovich's "social value similarity" theory of trust (Earle and Cvetkovich 1995), according to which we trust those with similar values to ourselves. The strong correlation between agreement and seeing the discourse as common in one's community is more surprising. This is likely due to assuming that one's neighbors think similarly to oneself (Wilson, Arvai, and Arkes 2008), since if it were due to the objective prevalence of the discourses, then the correlation would be weaker for the less common discourses. There were no significant results when the absolute value of the difference between a respondent's agreement with a discourse and their belief that it's a common view were correlated with their responses to the question about talking to their neighbors about fire – that is, failing to talk to one's neighbors did not systematically lead to assuming they think similarly (or differently).

[TABLE 2 ABOUT HERE]

Socio-demographic variables showed only sporadic relationships to agreement with the discourses. Respondents with larger households tended to agree with Discourse B ($r=.220$, $p=.005$), men were barely more likely to agree with Discourse C (T test $p=.052$), and Discourse E was popular among richer respondents ($r=.183$, $p=.025$). Length of residence was negatively correlated with agreement with Discourses A and B ($r=-.210$ and $-.201$, $p=.006$ and $.009$). Exposure variables – past experience with fire and living near forests – showed almost no relationship to agreement with the discourses. Self-rated knowledge correlated mildly with Discourse E ($r=.184$, $p=.018$).

The survey measured four general cultural worldviews, based on Grid-Group Cultural Theory (Thompson, Ellis, and Wildavsky 1990, Grenstad and Sundbeck 2003). A Fatalist orientation – characterized by feeling that life is capricious, unfair, and uncontrollable – was negatively associated with Discourse A ($r=-.222$, $p=.003$) and positively with Discourse C ($r=.160$, $p=.041$). A Hierarchical orientation – emphasizing the value of order and social rank – inclined respondents to dislike Discourse

C (r=.156, p=.046) and like Discourse D (r=-.117, p=.043). An Egalitarian orientation – characterized by a desire for equality and solidarity among people – and Individualism – emphasizing personal initiative and free markets – were both associated with agreement with Discourse B (r=.246 and .169, p=.001 and .027). All of these correlations make sense based on the content of the discourses, though they are not strong enough to fully explain who agrees with which discourse.

The survey asked respondents whether they or another member of their household had done, or intended to do in the next couple years, each of a series of nine fire safety actions around their home. This list was compiled by looking at recommendations from the NSW Rural Fire Service and the U.S. Firewise program (so that the same list could be used in the New South Wales study as well). Respondents were given an option to check "N/A" if they could not possibly do the action – so that, for example, if their home had already had a tile roof when they moved in, they would not be treated as having failed to take that action, nor credited for it. The actions surveyed were: 1) trim all trees and shrubs, and clean up other flammable material, within 10 yards of your home, 2) trim all trees and shrubs, and clean up other flammable material, within 30 yards of your home; 3) create an explicit emergency plan for your household in case of a forest fire; 4) install a sprinkler system; 5) talk to your neighbors about working together to make your community safer from fire; 6) put screens over windows, vents, eaves, and other places that embers could enter the house; 7) clear leaves and other debris from roof and gutters; 8) conduct a hazard reduction burn on your property; and 9) replace wooden shingles with metal or tile roofing.

Respondents' households had done an average of half of the fire safety actions possible at their homes, with an intention to do an average of an additional half an action more within the next couple years. Only two households had not done any of the available actions. The most popular actions were clearing the gutters, and removing flammable material within 10 yards of the home. Figure 1 shows the number of respondents who had done each fire safety action.

[FIGURE 1 ABOUT HERE]

The relationship between risk-reducing actions and other variables was tested as correlations and T-tests using the overall proportion of possible actions (total actions minus those marked "N/A") the respondent had done, and again using the proportion of possible actions the respondent intended to do in the next couple years (counting "N/A" as well as actions already done by the respondent or another member of their household as not possible).

Men reported doing significantly more risk-reducing actions than women (p=.000). Respondents had done more risk-reducing actions if they had more formal education (r=-.182, p=.023) and if they were older (r=.293, p=.000, and controlling for length of residence at their current home left the correlation at r=.238, p=.008). Experience with fire within the last five years was also strongly related to the number of actions taken (r=.234, p=.002). Ratings of barriers to fire safety were associated with risk-reducing actions – the average strength of all barriers (r=-.196, p=.014), as well as lack of time (r=-.171, p=.034) and lack of knowledge (r=-.282, p=.001) specifically, inhibited doing actions.

Those who saw the risk to the community as high did more actions (r=.203, p=.009), as did those who saw the risk to themselves as high – though the latter relationship was weaker (r=.177, p=.023). Respondents who were satisfied with current fire management had taken significantly more fire-reducing actions (r=.260, p=.001).

Those who agreed with Discourse B had done more risk-reducing actions (r=.189, p=.016), while proponents of Discourse C had, unsurprisingly, done fewer (r=-.185, p=.020). Other discourses were not associated with differences in the number of actions done. Among the cultural orientations, Hierarchists were slightly more likely to do more actions (r=.163, p=.039).

There were practically no relationships between the above-mentioned variables and intentions to do more actions in the next couple years. Only four variables showed significant correlations –

women intended to do more (p=.038), those who felt fears of aesthetic damage are a barrier intended to do *more* fire safety actions (r=.217, p=.014), and Hierarchical and Egalitarian cultural orientations were associated with greater intentions (r=.274 and .185, p=.001 and .025). Notably, the correlation between actions already done and actions intended was a scant -.008.

ANOVA tests on individual actions produced almost no significant differences in risk perception, satisfaction, or discourse agreement between respondents who had done, intended to do, or did not intend to do each action. The exception was that those who had made an emergency plan or talked to their neighbors about fire had higher perceived risk.

## Conclusion: Who Wants to Participate?

Pine Barrens residents are generally favorable to the idea of taking responsibility for the fire safety of their own homes. The Q results show a general tendency for all residents of the Pine Barrens to emphasize first-level involvement, with the Responsible Managers (Discourse A) and Accountable Citizens (Discourse D) making it most central. Only the Community Planners (Discourse B), who made up only a small portion of the survey sample, wanted significant second-level community involvement. Concerns about property rights, distrust of authorities, or anti-interventionist environmental views (represented most clearly by the Populists, Discourse C) are held by only a small minority. Compliance with recommended fire safety actions around the home was moderate overall and quite high for some interventions (though note that this result is based on self-reporting in response to fairly general questions, not an expert assessment of the condition of actual homes). On the other hand, a mere 20% of survey respondents had even talked to their neighbors about fire – the first step in second-level participation.

Much of the research on attitudes and behaviors toward fire management (both approval of agency actions and participation) has drawn on generally rationalistic psychological models, such as

protection motivation theory, that focus on factors such as perceived risk and perceived efficacy of actions (e.g. Martin, Bender, and Raish 2008, McCaffrey and Kumagai 2007). Such models have some value, but they make two critical assumptions that may not always hold: that fire management is a self-contained issue, and that people have coherent views of such questions as the risk of fire (though see McCaffrey 2008 and Nelson et al. 2004).

I propose a "detachment hypothesis" to account for the results of this study (though it requires further testing – hence the label "hypothesis"). The detachment hypothesis proposes that having a detailed, coherent view on an issue – much less investing resources or time in doing something about it – is costly and competes with other concerns, and thus will be done only when the issue is highly attached to a person's way of life. Attachment can be generated both by utilitarian needs as well as by concern for maintaining one's social relationships and establishing one's identity. Issues that are not taken to be of utilitarian, social, or identity significance are "detached" and shifted to a sort of back burner of the mind. When an issue is detached, views and behaviors relevant to it are driven not by a well-developed issue position, but by situational cues and other, more attached, concerns that overlap onto its territory. Expressed preferences are "constructed" on the spot (Arvai et al. 2006, Lichtenstein and Slovic 2006). I propose that for a large proportion of residents of the Pine Barrens, the issue of wildfire is relatively detached from their way of life.

Several pieces of evidence from the present study suggest the presence of detachment. First, while participants in the Q study produced clearly distinct discourses, there was a great deal of overlap among discourses in the survey. The detachment hypothesis would explain this pointing out that Q sorters had an hour to focus on building up a coherent concept of fire management (and were forced to do so by the quasi-normal distribution they had to sort the statements into), while survey respondents were reacting quickly to short vignettes, several of which may easily sound good to a person without a strong preexisting viewpoint to test them against. The relatively low correlations between agreement with the discourses and other variables can also be explained by detachment. People may assert

agreement with a discourse calling for more involvement in fire management, but that agreement isn't really integrated into their way of life and hence doesn't result in risk-reducing behaviors, while on the other hand such ad hoc agreement is not strongly constrained by their experiences and social position. The poor correlations between intentions to take fire safety action and other variables – including those significantly related to past action – suggests that respondents generally lack well-defined concepts of fire management from which they could produce reliable expectations for their future activities. Finally, though lack of time and knowledge did correlate with fire safety actions, the relatively low ratings of the various barriers suggests that action is not being stymied by recognizable hurdles so much as it is simply not coming to mind as a thing to do.

Fire managers thus face the challenge of making the fire issue attached to residents' ways of life. Past research has hinted at two avenues for this task. First would be to exploit the high interest in fire issues immediately after a major fire. A crisis such as a damaging fire leaves social relationships and norms open to reconstruction in new ways (Gunderson and Holling 2001). The successful recovery effort after the Cerro Grande fire in New Mexico appears to fit this pattern (Burns, Taylor, and Hogan 2008). Two cautions apply to this strategy. First, the time frame for doing this is short (Cortner and Gale 1990). Second, larger structural or cultural patterns may act as a sort of flywheel, using the fire crisis as an opportunity to reinscribe themselves and thereby driving out efforts to produce a more fire-safe system (Carroll et al. 2006, Kumagai et al. 2004, Niemi and Lee 2001).

Alternatively, second-level participation may be able to drive attachment that results in first-level participation as well. For example, Sturtevant and Jakes (2008) describe the ability of a stakeholder-based collaborative effort to generate new community norms and produce key individuals who can act as "change agents" who spread a revision of a way of life to the rest of the community.

Finally, it is important to recognize that creating attachment is difficult to do at the local level (where participation occurs) alone. Support by state and federal-scale institutions is important in providing resources and tools for local efforts. Additionally, because cultures are not purely local, state-

and national-scale fire policy and discourse can contribute to the above-noted "flywheel" effect, dampening moves toward attachment and participation at the local level. One example here is the emphasis of the current US fire management debate on wildland firefighting and fuel reduction. While conservative and liberal interests may disagree strongly about the choice among mechanical thinning, controlled burning, suppression, and wildland fire use, there is an implicit meta-consensus that fire management is largely about the actions of the Forest Service and other land-management agencies and their contractors on large stretches of land (Davis 2004, Keiter 2006). If the debate were instead reframed to emphasize the role and responsibilities of homeowners and developers (see Druzin and Barker 2008 for a recent attempt in this direction), then the tendency exhibited by most Q sorters in this study to frame fire policy as a responsibility of official agencies – and hence as detached from their own way of life – would not be encouraged so much.

## Notes

1. The statistics for the study area are based on the municipalities of Absecon, Barnegat, Bass River Township, Beachwood, Berkeley Township, Berlin, Berlin Township, Brick, Buena, Buena Vista, Chesilhurst, Chesterfield, Clayton, Clementon, Commercial Township Corbin City, Dennis Township Eagleswood Township Eastampton Township, Egg Harbor City, Egg Harbor Township, Elk Township, Estell Manor, Evesham Township, Folsom, Franklin Township, Galloway Township, Gibbsboro, Glassboro, Gloucester Township, Hainesport Township, Hamilton Township, Hammonton, Jackson Township, Lacey Township, Lakehurst, Lakewood, Laurel Springs, Lindenwold, Linwood, Little Egg Harbor Township, Lumberton Township, Manchester Township, Maurice River Township, Medford Lakes, Medford Township, Millville, Monroe Township, Mount Holly, Mount Laurel, Mullica Township, New Hanover, Newfield, North Hanover, Northfield, Ocean Township Pemberton Township, Pine Hill, Pine Valley, Pitman, Pleasantville, Plumsted Township, Port Republic, Shamong,

Somers Point, South Toms River, Southampton, Springfield, Stafford Township, Stratford, Tabernacle Township, Toms River, Tuckerton, Upper Township, Vineland, Voorhees Township, Washington Township (Burlington Co.), Washington Township (Gloucester Co.), Waterford Township, Weymouth Township, Winslow Township, Woodbine, Woodland Township, and Wrightstown.

2. Q methodologists (e.g. Brown 1980) often recommend Centroid analysis and judgmental rotation. Centroid analysis was attempted on this data set, and the results were substantively similar to the PCA results. Judgmental rotation is useful when one has a specific hypothesis about which sorts will correlate, or wants to look at how one particular sort relates to the others. When, as in this research, one does not have such a hypothesis, judgmental rotation aims at clustering the sorts onto distinct factors – a procedure achieved more efficiently with Varimax (Watts and Stenner 2005).

## References


Addams, H., and J. Proops (eds.). 2001. *Social discourse and environmental policy: An application of Q methodology*. Northampton, MA: Edward Elgar.

Arvai, J., R. Gregory, D. Ohlson, B. Blackwell, and R. Gray 2006. Letdowns, wake-up calls, and constructed preferences: People's responses to fuel and wildfire risks. *Journal of Forestry* 104, 173-181.

Batcha, B. 2003. Fire hazard. *The New York Times*, December 14, 8.

Beebe, G. S., and P. N. Omi 1993. Wildland burning: The perception of risk. *Journal of Forestry* 91, 19-24.

Berger, J., and J. W. Sinton 1985. *Water, earth, and fire: Land use and environmental planning in the New Jersey Pine Barrens*. Baltimore: Johns Hopkins University Press.

Boerner, R. E. J. 1981. Forest structure dynamics following wildfire and controlled burning in the New

Jersey Pine Barrens. *American Midland Naturalist* 105, 321-333.

Boerner, R. E. J., T. R. Lord, and J. C. Peterson 1988. Prescribed burning in the oak-pine forest of the New Jersey pine barrens: Effects on growth and nutrient dynamics of two *Quercus* species. *American Midland Naturalist* 120, 108-119.

Bright, A. D., and R. T. Burtz 2006. Creating defensible space in the wildland-urban interface: The influence of values on perceptions and behavior. *Environmental Management* 37, 170-185.

Brown, S. R. 1980. *Political subjectivity: Applications of Q methodology in political science*. New Haven, CT: Yale University Press.

Buchholz, K., and R. E. Good 1982. Density, age structure, biomass and net annual aboveground productivity of dwarfed *Pinus rigida* Mill. from the New Jersey Pine Barren Plains. *Bulletin of the Torrey Botanical Club* 109, 24-34.

Burns, M. R., J. G. Taylor, and J. T. Hogan 2008. Integrative healing: The importance of community collaboration in postfire recovery and prefire planning. In W.E. Martin, C. Raish, and B. Kent, (eds.), *Wildfire risk: Human perceptions and management implications*. Washington DC: Resources for the Future.

Busenberg, G. J. 2004. Wildfire management in the United States: The evolution of a policy failure. *Review of Policy Research* 21, 145-156.

Carroll, M. S., L. L. Higgins, P. J. Cohn, and J. Burchfield 2006. Community wildfire events as a source of social conflict. *Rural Sociology* 71, 261-280.

Cheng, T., and H. J. Cortner 2003. Policy, political, and institutional dimensions. In H.J. Cortner, D. R. Field, P. Jakes, and J. D. Buthman (eds.), *Humans, fires, and forests – social science applied to fire management*. Flagstaff, AZ: Ecological Restoration Institute.

Cohen, J. D. 2000. Preventing disaster: Home ignitability in the wildland-urban interface. *Journal of Forestry* 98, 15-21.

Collins, T. W. 2005. Households, forests, and fire hazard vulnerability in the American west: A case

study of a California community. *Environmental Hazards* 6, 23-37.

Connelly, N. A., T. L. Brown, and D. J. Decker 2003. Factors affecting response rates to natural resource-focused mail surveys: Empirical evidence of declining rates over time. *Society and Natural Resources* 16, 541-549.

Cortner, H. J., and R. D. Gale 1990. People, fire, and wildland environments. *Population and Environment* 11, 245-257.

Cortner, H. J., and T. Lorensen 1997. Resources versus structures: fire suppression priorities in the wildland/urban interface. *Wildfire* 1997, 22-33.

Daniel, T. C., M. S. Carroll, C. Moseley, and C. Raish (eds.). 2007. *People, fire and forests: A synthesis of wildfire social science*. Corvallis, OR: Oregon State University Press.

Danielson, S. forthcoming. Q method and surveys: Three ways to combine Q and R. *Field Methods*.

Davis, C. 2006. Western wildfires: A policy change perspective. *Review of Policy Research* 23, 115-127.

Davis, J. B. 1989. The wildland-urban interface: What it is, where it is, and its fire management problems. *Fire Management Notes* 50, 22-33.

Davis, J. B. 1990. The wildland-urban interface: Paradise or battleground? *Journal of Forestry* 88, 26-31.

Davis, J. B. 2004. The healthy forests initiative: Unhealthy policy choices in forest and fire management. *Environmental Law* 34, 1209-1246.

DellaSala, D. A., J. E. Williams, C. D. Williams, and J. F. Franklin 2004. Beyond smoke and mirrors: A synthesis of fire policy and science. *Conservation Ecology* 18, 976-986.

Dillman, D. A. 2000. *Mail and internet surveys: The tailored design method*. New York: John Wiley and Sons.

Druzin, H., and R. Barker 2008. Are the ways fires are fought and prevented firewise? *Idaho Statesman*, July 20.

Dryzek, J. S., and J. Berejikian 1993. Reconstructive democratic theory. *American Political Science Review* 87, 48-60.

Earle, T. C., and G. T. Cvetkovich 1995. *Social trust: Toward a cosmopolitan society*. Westport, CT: Praeger.

Farnsworth, A., P. Summerfelt, D. G. Neary, and T. Smith 2003. Flagstaff's wildfire fuels treatments: prescriptions for community involvement and a source of bioenergy. *Biomass and Bioenergy* 24, 269-276.

Firewise 2008. Firewise Communities. http://www.firewise.org.

Forman, R. T. T., and R. E. Boerner 1981. Fire frequency and the Pine Barrens of New Jersey. *Bulletin of the Torrey Botanical Club* 108, 34-50.

Givnish, T. J. 1981. Serotiny, geography, and fire in the Pine Barrens of New Jersey. *Evolution* 35, 101-123.

Gunderson, L. H., and C. S. Holling (eds.). 2001. *Panarchy: Understanding transformations in human and natural systems*. Washington DC: Island Press.

Hughes, J. 1987. New Jersey, April 1963: Can it happen again? *Fire Management Notes* 48, 3-6.

Kauffman, J. B. 2004. Death rides the forest: Perceptions of fire, land use, and ecological restoration of western forests. *Conservation Biology* 18, 878-882.

Keiter, R. B. 2006. The law of fire: Reshaping public land policy in an era of ecology and litigation. *Environmental Law* 36, 301-385.

Kennedy, R. G. 2006. *Wildfire and Americans: How to save lives, property, and your tax dollars*. New York: Hill and Wang.

Kumagai, Y., J. C. Bliss, S. E. Daniels, and M. S. Carroll 2004. Research on causal attribution of wildfire: An exploratory multiple-methods approach. *Society and Natural Resources* 17, 113-127.

Laughlin, J., and C. Page 1987. *Wildfire strikes home! The report of the National Wildland/Urban Fire*

*Protection Conference*.

Lichtenstein, S., and P. Slovic, eds. 2006. *The construction of preference*. Cambridge: Cambridge University Press.

Luque, S. S. 2000. The challenge to manage the biological integrity of nature reserves: A landscape ecology perspective. *International Journal of Remote Sensing* 21, 2613-2643.

Machlis, G. E., A. B. Kaplan, S. P. Tuler, K. A. Bagby, and J. E. McKendry 2002. *Burning questions: A social science research plan for federal wildland fire management*. Moscow, ID: University of Idaho.

Martin, I. M., H. W. Bender, and C. Raish 2008. Making the decision to mitigate risk. In W.E. Martin, C. Raish, and B. Kent (eds.), *Wildfire risk: Human perceptions and management implications*. Washington DC: Resources for the Future.

Mason, R. J. 1992. *Contested lands: Conflict and compromise in New Jersey's Pine Barrens*. Philadelphia: Temple University Press.

Mathur, S. L. 2007. Rain again aids firefighters; blaze called "under control". *Asbury Park Press*, May 21.

McCaffrey, S. 2004. Fighting fire with education: What is the best way to reach out to homeowners? *Journal of Forestry* 102, 12-19.

McCaffrey, S. 2008. Understanding public perspectives of wildfire risk. In W.E. Martin, C. Raish, and B. Kent (eds.), *Wildfire risk: Human perceptions and management implications*. Washington DC: Resources for the Future.

McCaffrey, S., and Y. Kumagai 2007. No need to reinvent the wheel: Applying existing social science theories to wildfire. In T.C. Daniel, M. S. Carroll, C. Moseley, and C. Raish (eds.), *People, fire and forests: A synthesis of wildfire social science*. Corvallis, OR: Oregon State University Press.

McKeown, B., and B. Thomas 1988. *Q methodology*. Beverly Hills, CA: Sage.

McKessey, A. N. 2006. Effects of fire management on Pine Plains vegetation at Warren Grove Air

National Guard Range, New Jersey. Philadelphia, Drexel University. PhD dissertation.

Merrick, M., and J. Vining 2006. Characteristics people consider when evaluating forest landscape attractiveness: Fuel management implications. In S. McCaffrey (ed.), *The public and wildland fire management: Social science findings for managers (USDA Forest Service General Technical Report NRS-1)*. Newtown Square, PA: USDA Forest Service North Central Research Station.

Miller, S. R., and D. Wade 2003. Re-introducing fire at the urban/wild-land interface: Planning for success. *Forestry* 76, 253-260.

Nelson, K. C., M. C. Monroe, J. F. Johnson, and A. Bowers 2004. Living with fire: Homeowner assessment of landscape values and defensible space in Minnesota and Florida, USA. *International Journal of Wildland Fire* 13, 413-425.

Niemi, E., and K. Lee 2001. Wildfire and poverty: An overview of the interactions among wildfires, fire-related programs, and poverty in the western states. ECONorthwest.

O'Toole, R. 2006. Money to burn: Wildfire and the budget. In G. Wuerthner (ed.), *Wildfire: A century of failed forest policy.* Sausalito, CA: Foundation for Deep Ecology.

Pais, M. 2008. A nightmare that lasted two days. *Asbury Park Press*, May 15, 2008.

Pyne, S. J. 1982. *Fire in America: A cultural history of wildland and rural fire*. Princeton: Princeton University Press.

Pyne, S. J. 2004. *Tending fire: Coping with America's wildland fires*. Washington DC: Island Press.

Radeloff, V. C., R. B. Hammer, S. I. Stewart, J. S. Fried, S. S. Holcomb, and J. F. McKeefry 2005. The wildland-urban interface in the United States. *Ecological Applications* 15, 799-805.

Renn, O., T. Webler, and P. M. Wiedemann (eds.). 1995. *Fairness and competence in citizen participation: Evaluating models for environmental discourse*. Dordrecht: Kluwer.

Sampson, R. N. 1999. Primed for a firestorm. *Forum for Applied Research and Public Policy* 14, 20-26.

Steelman, T. A. 2008. Addressing the mitigation paradox at the community level. In W.E. Martin, C. Raish, and B. Kent (eds.), *Wildfire risk: Human perceptions and management implications*. Washington DC: Resources for the Future.

Steelman, T. A., and G. F. Kunkel 2004. Effective community responses to wildfire threats: Lessons from New Mexico. *Society and Natural Resources* 17, 679-699.

Sturtevant, V., and P. Jakes 2008. Collaborative planning to reduce risk. In W.E. Martin, C. Raish, and B. Kent (eds.), *Wildfire risk: Human perceptions and management implications*. Washington DC: Resources for the Future.

U.S. Census Bureau 2007. Census Bureau Home Page. http://www.census.gov/.

Vince, S. W., M. L. Duryea, E. A. Macie, and L. A. Hermansen (eds.). 2005. *Forests at the wildland-urban interface: Conservation and management*. Boca Raton, FL: CRC Press.

Walker, R. T., and W. D. Solecki 1999. Managing land use and land-cover change: The New Jersey Pinelands Biosphere Reserve. *Annals of the Association of American Geographers* 89, 220-237.

Watts, S., and P. Stenner 2005. Doing Q methodology: Theory, method, and interpretation. *Qualitative Research in Psychology* 2, 67-91.

Webler, T., and S. P. Tuler 2006. Four perspectives on public participation process in environmental assessment and decision making: Combined results from 10 case studies. *Policy Studies Journal* 34, 699-722.

Wilson, R. S., J. L. Arvai, and H. R. Arkes 2008. My loss is your loss, sometimes: Loss aversion and the effect of motivational biases. *Risk Analysis*.

Winter, G., and J. S. Fried 2000. Homeowner perspectives on fire hazard, responsibility, and management strategies at the wildland-urban interface. *Society and Natural Resources* 13, 33-49.

| | A | B | C | D | E |
|---|---|---|---|---|---|
| A (Responsible Managers) | 22 | | | | |
| B (Community Planners) | 38 | 5 | | | |
| C (Populists) | 14 | 7 | 2 | | |
| D (Accountable Citizens) | 45 | 23 | 12 | 3 | |
| E (Scientific Environmentalists) | 52 | 25 | 15 | 40 | 12 |
| *Total by full agreement*[a] | 100 | 46 | 21 | 59 | 77 |
| *Total by top discourse*[b] | 122 | 59 | 18 | 70 | 94 |

Table 1: Combinations of discourses agreed with by full agreement and by top discourse Diagonal contains the number of individuals agreeing with that discourse alone by full agreement.

a. Note that columns do not sum to total because 29 respondents agreed with three discourses, 17 agreed with four, 4 agreed with five, and 41 agreed with none, by full agreement.

b. Note that columns do not sum to total because numerous respondents gave an equally high rating to several discourses – specifically, 51 respondents agreed with two discourses, 37 respondents agreed with three discourses, 15 agreed with four, and 4 agreed with five.

| | A | B | C | D | E |
|---|---|---|---|---|---|
| reasonable | .779 | .907 | .855 | .936 | .967 |
| trust-inspiring | .686 | .827 | .709 | .839 | .845 |
| common | .464 | .600 | .540 | .613 | .570 |

Table 2: Correlations between agreement and other questions about each discourse For all correlations in the table, p=.000.

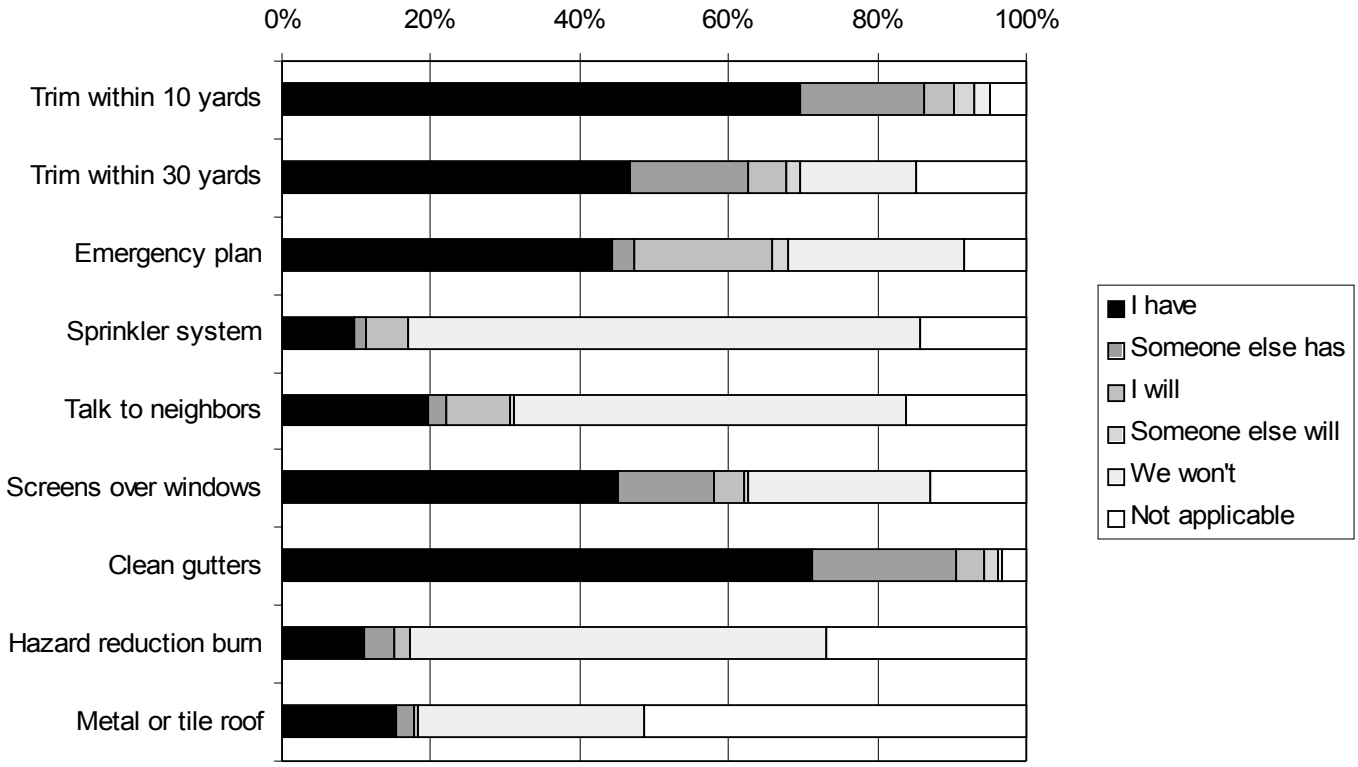


Figure 1: Fire safety actions of survey respondents. Answers were chosen from “I have done this,” “Someone else in my household has done this,” I have not done this, but I plan to in the next couple years,” “Someone else in my household plans to do this,” “We do not plan to do this,” and “N/A.”

Appendix A: Q statements and factor scores

Values in the tables represent the ranks of each statement in an idealized Q sort representing that factor. Statements were sorted into a quasi-normal distribution as follows:

| Value: | +5 | +4 | +3 | +2 | +1 | 0 | -1 | -2 | -3 | -4 | -5 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Statements: | 3 | 3 | 4 | 6 | 8 | 8 | 8 | 6 | 4 | 3 | 3 |

| Statement No. | A | B | C | D | E |
|---|---|---|---|---|---|
| 1. Insurance rates should be higher for people whose homes are not fire safe | -2 | 0 | -2 | 4 | -1 |
| 2. The media should sensationalize forest fires a bit, in order to get people's attention | -4 | -3 | -5 | 2 | -4 |
| 3. The Forest Fire Service should hold educational programs | 2 | 2 | 1 | 3 | 1 |
| 4. The Forest Fire Service should talk to residents to get their knowledge and perspective | 0 | 1 | 3 | 1 | 1 |
| 5. Scientific information about forest fires should be easily available, so that people can make up their own minds about the risks | 0 | 0 | 0 | -1 | -1 |
| 6. Science will never fully understand forest fires | -2 | -2 | -4 | 1 | -2 |
| 7. Fire policy should be based on the best science available | 2 | 4 | 3 | 1 | 5 |
| 8. We should learn from Native Americans how to manage fire | -3 | 0 | 1 | 2 | -2 |
| 9. People who do controlled burns responsibly should not be able to be sued if there is an accident | 0 | -2 | 1 | -5 | 2 |
| 10. Controlled burning should be avoided because burns often escape from control | -3 | -4 | 2 | -3 | -5 |
| 11. Controlled burning should only be done under the safest conditions | 4 | 0 | -1 | 2 | 0 |
| 12. Controlled burning should try to mimic the natural fire regime of the area | 0 | -1 | -1 | -2 | 4 |
| 13. Farming, logging, and other land use can be relied on to reduce the fire danger | -1 | -3 | -2 | -4 | -3 |
| 14. I shouldn't be expected to spend all my time worrying about fire, because I'm busy with other things that are important to me | -4 | -1 | 0 | 2 | -1 |
| 15. There should be building codes that require homes to be fire-safe | 1 | 2 | 1 | 2 | 2 |
| 16. People have a responsibility to the community to reduce the fire risk on their property | 2 | 3 | 2 | 3 | 0 |
| 17. Fire safety shouldn't come at the expense of lowering the value and beauty of my home | -2 | -4 | -1 | -2 | -4 |
| 18. I shouldn't have to spend so much time and money on making my home fire-safe | -4 | -2 | 2 | -2 | -4 |
| 19. If someone's property presents a fire risk to their neighbors, the authorities should make them fix it | 1 | 1 | -1 | 5 | 0 |
| 20. The Forest Fire Service should inform the public about what they're doing and why they're doing it | 3 | 1 | 2 | 1 | 2 |

| Statement No. | A | B | C | D | E |
|---|---|---|---|---|---|
| 21. Individual property owners should have the right to decide how to balance the risks and costs of fire safety | -2 | -2 | -1 | -5 | -3 |
| 22. It's smart to prepare your own home and family for a fire, rather than relying on other people | 5 | 2 | -1 | 4 | 1 |
| 23. Fire management in this state should be centralized | -1 | -1 | -2 | -5 | 0 |
| 24. Fire management should be coordinated at the neighborhood or town level | 0 | 1 | 0 | -2 | -3 |
| 25. Measures to reduce the fire risk should focus on areas closest to people's homes | 1 | -1 | 2 | -1 | 3 |
| 26. Nobody in this region should assume that because of where they live, they're safe from fire | 3 | 1 | 3 | 1 | -1 |
| 27. Some parts of the environment should be protected from any fires | -2 | 1 | 0 | -4 | -2 |
| 28. Controlled burning should be done in small patches, rather than burning large areas all at once | 2 | 2 | -3 | -2 | -2 |
| 29. People should be able to build houses wherever they want | -5 | -5 | -4 | -3 | -5 |
| 30. If you live in this area, you just have to accept a certain level of risk from fires | -1 | 2 | 0 | -1 | 0 |
| 31. New housing developments should be restricted in order to reduce the fire risk | -1 | 0 | 3 | -1 | 2 |
| 32. People should understand the fire risk before moving to this region | 0 | -2 | 0 | 1 | 0 |
| 33. You should stay in your house when a fire is nearby to help to save it | -5 | -5 | 5 | 0 | -5 |
| 34. When a fire is approaching, you should evacuate quickly | 5 | 1 | 5 | 2 | 0 |
| 35. Once a fire breaks out, the Forest Fire Service should have complete command of the situation | 1 | -1 | -5 | 0 | 1 |
| 36. Trust between firefighters and the rest of the community should be encouraged | 1 | 4 | 0 | 0 | 1 |
| 37. Fire management should not be political | 1 | 4 | -1 | 5 | 5 |
| 38. Even with the best policies and practices, it's impossible to stop a really bad fire once it's burning | -2 | -2 | -2 | -1 | -2 |
| 39. Unplanned fires should be quickly suppressed | 0 | 3 | -5 | 3 | -1 |
| 40. Nature should be allowed to take its course without human interference where it's feasible | -3 | -5 | 4 | 1 | 4 |
| 41. Bureaucratic and legal barriers that inhibit fire management should be lowered | -1 | 3 | -3 | -2 | 3 |
| 42. People should be able to rely on the Forest Fire Service to protect their home and the environment | 1 | 1 | 1 | 0 | 0 |
| 43. The state should provide lots of money for fire management | -1 | -3 | -3 | -1 | -1 |
| 44. All stakeholders should be involved in making decisions about local fire management | -3 | 2 | 0 | -1 | -1 |
| 45. Off-road vehicles should be restricted, because they can cause fires | -1 | 0 | -3 | 0 | -1 |
| 46. There's no way to stop arsonists – they're just crazy | -5 | -4 | -1 | -3 | -3 |
| 47. During fire season, activities that might start a fire should be banned or require a permit | 3 | 0 | -2 | 0 | 1 |

| Statement No. | A | B | C | D | E |
|---|---|---|---|---|---|
| 48. We should be able to count on people in this region to be pretty responsible when it comes to handling things like campfires that could start a forest fire | 3 | -3 | 1 | 0 | -2 |
| 49. It's important to gather data on the condition of the land and the success of fire management | 0 | 0 | -2 | 3 | 2 |
| 50. People should change their lifestyles to accommodate our naturally fire-prone environment | -1 | -1 | -4 | 5 | 1 |
| 51.Detailed fire management plans should be in place for all large wild areas, such as State Forests | 2 | 5 | 4 | 1 | 3 |
| 52. Fire management should be tailored to the specific local situation | 2 | 3 | 1 | 0 | 2 |
| 53. Protecting human life should be a priority | 5 | 5 | 5 | 4 | 5 |
| 54. Protecting property should be a priority | 4 | -1 | 4 | -4 | 1 |
| 55. Protecting the environment should be a priority | 4 | -1 | 2 | -1 | 4 |
| 56. Human safety and environmental health should not be at odds in fire management | 1 | 5 | 1 | -3 | 3 |

## Appendix B: Factor narratives from survey

Discourse A: “When it comes to forest fires, I try to just use common sense and be responsible. Everybody has to keep their own house in order -- cleaning up the yard and so forth. It’s really important, too, to make sure that people don’t carelessly start a fire by, say, letting a campfire burn unattended. I think we ought to have good communication with firefighters, since they’ve got the experience to know what to do about fires. If the fire company came around and said we needed to evacuate, I’d definitely get out of there.”

Discourse B: “What we really need is good, detailed planning for how to handle forest fires. We need to make our decisions based on the best scientific information. I think the public should also be involved in deciding what to do, since it’s our homes and backyards that are affected. If regular people get educated about how fires happen, we’ll be able to take care of our own neighborhoods. That way firefighting won’t get politicized or bogged down in red tape. I’m also worried that some people want to take too much of a “hands off” approach to nature, because I don’t think that good plans for keeping

people safe are going to hurt the environment."

Discourse C: "I worry sometimes that the people in charge, like the Forest Fire Service, aren't really in tune with what regular people living in this region want. We need to make sure that they're listening to our concerns -- like how expensive and time-consuming it can be to follow all the recommendations for fire safety -- and letting us know what they're doing and why they're doing it. I also worry that we interfere with nature too much when we try to control fires."

Discourse D: "Forest fires are a big risk in this area. We need to focus on keeping people safe, even if that means sacrificing someone's property or doing something that environmentalists might not like. I know people have other things to worry about too, but it's still really important for everyone to make sure they're not creating a fire risk to their neighbors. Otherwise the authorities might have to step in, or maybe their insurance rates should go up. The main thing, though, is to make sure that every fire -- whether it's a natural one, an accident, or a controlled burn -- is under control."

Discourse E: "The environment in this region is naturally fire-prone, and that's got to be the main consideration. We should use the best science at our disposal in order to figure out what kind of impacts we're having on the landscape, and to create good plans. That way we can mimic the natural fire regime, while still reducing the risk to areas where there are homes. We also have to be concerned about unrestricted development -- if people are out there building houses without thinking about fire safety, it makes it tougher to protect them without sacrificing the ecology of this area."