MANY VERSIONS OF A SINGLE STORY: WILDFIRE MANAGEMENT IN NEW JERSEY

Stentor Danielson
Department of Geography, Geology, and the Environment
Slippery Rock University
Slippery Rock, PA 15212

ABSTRACT: *Much has been written about environmental management issues that occasion heated controversy, including cases of conflicts over wildfire management. This research examines a case study in which little such controversy is apparent despite the existence of a similar environmental issue: wildfire management in the Pine Barrens of southern New Jersey. Two methodologies commonly used in high-conflict cases were applied: qualitative discourse analysis and Q method. Discourse analysis of interviews with "key players" in Pine Barrens fire management revealed a largely consensual viewpoint stressing the naturalness of fire, the unpreparedness of many at-risk residents (especially newcomers to the area), and the importance of individual homeowner fire safety actions. Q method confirmed the existence of this consensual perspective, but also revealed two distinct areas of emphasis among "key players": one set of people tended to focus on the importance of members of the public taking responsibility for their own safety, while the other emphasized the frustrations encountered by people in official managerial positions. This research demonstrates the importance of examining low-conflict case studies as a counterpoint to high-conflict ones and shows the usefulness of research approaches from the latter when applied to the former.*

Keywords*: Q method, wildfire, Pine Barrens*

INTRODUCTION

Contention over wildfire

In many parts of the world today, wildfire management is a highly contentious issue. Key stakeholders such as government officials, opinion leaders, and environmental activists take greatly diverging positions, and there is no love lost for their opponents. Consider, for example, Andrew George of the National Forest Protection Alliance, commenting on the Healthy Forests Restoration Act in the USA:

> The Bush administration's reckless plan will not stop wildfires or insect outbreaks in our national forests, and logging big trees and building roads will only make things worse. Commercial logging in national forests is the problem, not the solution. (Native Forest Network, 2003)

Ideologically opposed, but similar in tone, is a statement from Australia by *Sydney Morning Herald* columnist Miranda Devine:

> Four people were killed in Canberra when the 2003 firestorm escaped the national parks. … The consequences in human suffering of locking up vast national parks and doing nothing to maintain them should be obvious, if anyone in authority cared about anything other than green preferences. (Devine, 2006)

The initial goal of this research was to investigate whether similarly polarized viewpoints would exist in a case study area where the public face of controversy is not so visible: the Pine Barrens of southern New Jersey. By employing two methods that are commonly used to investigate high-controversy situations (qualitative discourse analysis and Q method), this research shows what those methods are able to reveal about a less conflictual situation.

Discourse analysis and Q method

Much research has sought to understand these sharply conflicting viewpoints. When tensions run high and participants stake out clear ideological affiliations, a variety of methodologies can probe the nature of the debate. Most common is qualitative discourse analysis. For example, Whitaker and Mercer (2003) analyzed debate in Victoria, Australia and found three sharply divided camps – a "conservationist" view concerned with the protection of nature, a "ruralist" view focusing on the rights and knowledge of rural people, and a "wise use" view that blamed

government conservation measures for fires. On the other side of the Pacific, Vaughn and Cortner (2005) analyzed the discursive strategies that the Bush administration used to box in its environmentalist opponents and secure public and legislative support for the Healthy Forests Initiative.

In recent years, Q method has been increasingly used to investigate controversial environmental issues (Danielson, Webler, and Tuler, 2010). In a Q method study, a small set of participants rank a series of statements about the issue in question according to how well those statements reflect their thinking. The rankings are then compared through factor analysis to identify a smaller set of shared discourses or perspectives (Brown, 1980). In a typical Q study, a set of perhaps 40-60 statements is culled from interviews or writings about the topic of interest, with the aim of representing the full breadth of things that people are saying about the topic. These statements are usually printed on small cards for in-person administrations (though several tools, such as Q-Assessor and Flash-Q, now exist for simulating this approach online). Respondents rank the cards (usually an incomplete ranking, placing statements into bins along a scale) according to how well the statements on them match their own thinking, a process referred to as "Q sorting." Each respondent's ranking of statements (their "Q sort") can then be inserted into a factor analysis as a "variable," with the resulting factors representing groups of respondents who sorted the statements similarly and therefore who hold similar views on the topic. The content of the factor – the average rankings of the statements by the people in this group – can then be analysed to reveal the content of the shared viewpoint of those respondents.

Q has been used to try to find commonalities and a way forward between opposing camps on topics ranging from large carnivore conservation (Mattson et al., 2006) to infrastructure development (Van Eeten, 2001) to contaminated site remediation (Danielson, Webler, and Tuler, 2010).

Several researchers have applied Q to wildfire management controversies. Burns and Cheng (2007) investigated the views of people living near Arapaho-Roosevelt National Forest in Colorado. They found three main viewpoints – one that said forests are unhealthily dense, one that emphasized compliance with environmental laws, and one that demanded more long-term studies to prove the benefits of fuel reduction. In Cape York, Australia, a Q study by Ockwell (2008) found four discourses. Residents of this area were divided into proponents of rational fire management, fire-free conservation, locally-controlled burning, and indigenous land management.

Where there is no controversy

But not every environmental issue is the site of intense debate and public controversy. In some cases, a general consensus seems to have emerged, and different stakeholders have not staked out sharply different viewpoints or self-segregated into opposing camps.

It may seem on the surface that such areas of agreement are unpromising arenas for research – after all, there is no big controversy to resolve. However, the nature of non-contentious environmental issues is important to probe for two reasons. First, understanding how consensus emerges and is maintained is an important counterpoint for understanding processes of discourse formation and social issue management. Non-controversies give us important insights into how social forces push people into agreement or disagreement (Kahan, 2013). Second, non-controversies are not permanent. A shift in the underlying factors shaping discourse may lead submerged differences to erupt into controversy. An analysis that can identify and anticipate such differences can be valuable to practitioners and researchers.

Q method has also been suggested as a useful approach to teasing apart non-controversies. Q can identify the existence of differences in perspective that are not made salient in practice, but which may become significant fault lines in the future. For example, Danielson et al. (2012) examined a case of apparent consensus over the cleanup of Waukegan, Illinois' harbor. The differences identified in their Q study proved to match the opposing camps that emerged later when the city backed out of the previously agreed-upon cleanup plan.

This study examines one such area of apparent non-controversy with respect to fire management: the Pine Barrens of southern New Jersey. Qualitative discourse analysis demonstrates the apparent general consensus among a broad selection of stakeholders. Q method then probes these views to show underlying differences of emphasis between individuals.

CASE STUDY: THE NEW JERSEY PINE BARRENS

The Pine Barrens, also known as the Pinelands, comprise about 6,000 square kilometers (2,300 square miles) of pine- and oak-dominated forest in the southern part of the state of New Jersey (Forman 1998, McCormick and Forman, 1998). The barrens ecosystem (also found on Long Island and Cape Cod) is an adaptation to sandy soils deposited by glacial activity, which lose water quickly despite the region's humid climate.

A key aspect of the barrens ecosystem is its susceptibility to fire, boasting fire frequencies and severities often compared to the better-known chaparral of southern California. Estimates of the natural fire frequency range from 16 to 34 years (Lutz, 1934; Buchholz and Zampella, 1987). Dominant species in the region such as pitch pine (*Pinus rigida*), shortleaf pine (*Pinus echniata*), and several species of oak (*Quercus* spp.) exhibit a variety of adaptations to fire, including serotiny and resprouting (Buchholz and Good, 1982; McKessey, 2006; Little, 1998; Boerner, 1981).

The Pine Barrens remained largely undeveloped well into the 20th century, as a result of their agriculturally poor soil (hence the name "barrens"). Residents of the area, known somewhat disparagingly as "pineys," were viewed by outsiders as uncouth and inbred (Berger and Sinton, 1985; Hayes-Conroy, 2005). However, as suburbanization and exurbanization began to expand the nation's major metropolitan areas, the Pine Barrens saw a huge influx of development (Hayes-Conroy, 2005). The region was the largest remaining undeveloped area in the "megalopolis" stretching from Boston to Washington DC, pinched between the high-growth areas of New York City, Philadelphia, and the Jersey Shore. The population of the Pine Barrens grew at an annual growth rate of 2.12% in the 1980s, 1.16% in the 1990s, and 1.05% in the 2000s, outpacing the statewide growth rates of .49%, .85%, and .45% (U.S. Census Bureau, 2010). In 1978, the Pinelands National Reserve was established, creating a Pinelands Commission to regulate growth and development in the region (Mason, 1992).

The Pine Barrens have experienced a number of fires that have been extremely dangerous to human life and property over their history. The standard reference point is 1963, when 200,000 acres burned around Chatsworth, destroying 458 structures and taking seven lives (Hughes, 1987). More recently, the 2002 Jakes Branch Fire was stopped at the doorstep of a major retirement community in Berkeley Township (Batcha, 2003). Then in 2007, a stray flare from the Warren Grove Gunnery Range set off a fire that burned 17,000 acres and destroyed five homes in Barnegat (Mathur, 2007).

METHODS

This research proceeded in two phases: qualitative interviews and an on-line Q-sort.

Both phases involved using internet searches and snowball sampling to identify "key players" in wildfire management. That is, rather than homeowners or members of the general public, respondents were people with some influence over policy and practice with respect to wildfire in the Pine Barrens. They included local and county government officials, members of the New Jersey Forest Fire Service, and environmental leaders. Snowball sampling was used for two primary reasons. First, no simple sampling frame covering all "key players" exists, nor could one be constructed a priori. The understanding of who is a "key player" emerges through the conduct of the interviews – e.g. it was only during an interview with a Forest Fire Service staff member that the importance of private forestry consultants became apparent. Second, neither qualitative discourse analysis nor Q method require, or even benefit from, a random sample of respondents. The goal of both methods is to discover the internal nature of respondents' viewpoints, not to confirm external associations between views and other variables. It is therefore more important to ensure that respondents cover the full range of diversity of views that exist, without regard to whether respondents hold those views in the same proportions as the wider public (Bowen, 2008; Brown, 1980; Brown, 2009).

The interviews were conducted in two waves. The first wave of interviews (n = 4) was conducted in 2006 in connection with an earlier multi-site project, then supplemented with a second wave of different respondents in 2010-11 (n = 8).

Interviewees were asked to describe their personal experiences with wildfire, their opinions on fire policy issues, their perceptions of other stakeholders, and their views of the major challenges involved in promoting the safety of the general public. Interviews were transcribed and analyzed using a grounded theory approach to identify major themes, commonalities, and disagreements.

The Q sort phase of the research drew on the interview transcripts to generate a set of 44 statements. The four worldviews of Grid-Group Cultural Theory (Thompson, Ellis, and Wildavsky, 1990) were used as a sampling frame to ensure representation of a broad variety of types of statements, though GGCT did not prove useful in further analysis and interpretation of the results. Statements were generally quotes or close paraphrases of things said by interviewees. Respondents sorted the statements into bins along a 9-point scale from "most like how I think" (+4) to "least like how I think" (-4).

The Q sorts were conducted through the online Q-Assessor tool (www.q-assessor.com), which has been validated to show that its results are equivalent to traditional in-person Q sorting techniques (Reber et al. 2000). An

initial wave of participants (n = 9) was solicited from the same pool of potential respondents as the interviewees, including many of the same individuals (since there are very few people in some key positions – e.g. some environmental organizations have only a single staffer who deals directly with fire issues). The resulting set of Q sorters was approximately half "old" interviewees, and half "new" non-interviewees. The respondents completed Q sorts in summer-fall 2012.

INTERVIEW RESULTS: A GENERAL CONSENSUS

The interviews demonstrated a general consensus about fire management. While individuals had different experiences to draw on in explaining their viewpoint, the basic conclusions they drew were generally similar. There were no discernable differences between the two waves of interviews, despite the intervening years (including one major fire). Three key themes stood out across the interviews: that fire is a natural part of the ecosystem, that the public doesn't care enough about fire safety, and that action by individual homeowners is key to fire safety.

Fire is a natural part of the ecosystem

Interviewees emphasized that fire is part of the natural ecology of the Pine Barrens. It is not something that can or should be eliminated:

> One of those impacts that could be considered both natural and unnatural is fire. That is a natural part of our ecosystem. Fires have been starting since the beginning of time and they are also escalated or elevated when humans interact. – Interviewee 5, July 2010

The naturalness of fire led to the conclusion that residents of the Pine Barrens ought to accept the inevitability of fire, rather than imagining that they can eliminate or escape it:

> It's just an inherent thing: you live here, you're gonna get burned out. It's just what happens. This is a fire tolerant species, it needs fire to keep going and fire occurs regularly and it will continue to occur as long as this pine barren fuel is here. – Interviewee 7, July 2010

Though fire is a natural part of the Pine Barrens ecology, interviewees did not prioritize environmental protection over human safety. Even those interviewees who represented environmental organizations emphasized that due to the density of human settlement in this region (as compared, for example, to the large wilderness areas of the American West), protecting people's lives and property is of primary importance:

> Here, the Pinelands is a mosaic of public and private lands, and even within the public lands there are inholdings with people living in them, sometimes in very isolated houses or settlements, sometimes in villages or towns that are embedded in the Pinelands, so it's not possible to pull that out for any wildfire to burn, and to burn itself out. ... And our theory is it's actually a situation where changes in practices could improve fire safety for people and their property, and also better replicate the natural wildfire regime to which the ecosystem is adapted. – Interviewee 3, April 2006

People don't care enough about fire safety

Interviewees were concerned with a perceived lack of knowledge and motivation on the part of typical residents of the Pine Barrens. The public was characterized in largely negative terms:

> People expect houses to burn, OK my house could catch fire if I do stupid things, but they never think about the wildfire part. And the problem with it in all my experiences many times I have walked in to talk to people and they say, "we have a Forest Fire Service? What do you guys do? There's no fires in Jersey." They really have no idea. Some of our own legislators even don't know. – Interviewee 8, July 2010

When pressed for more detail about public perceptions, interviewees tended to draw a distinction between longtime residents and newcomers. People who had lived their whole lives in the Pine Barrens were seen as

generally knowledgeable and responsible, while it was the large body of newcomers who put themselves at high risk because they lacked an understanding of the area's flammable ecology:

> ...the residents who have lived there their whole lives obviously are more familiar with wildfire as an issue and they are more comfortable with what the concerns are. The residents that are non-native there seems to be a large amount of variation in 1) how much they care about it, 2) how much it's gonna cost them and then how much their concern is to get involved … – Interviewee 7, July 2010

Action by individual homeowners is the key to fire safety

The interviewees in this study were mostly people in positions of official power, such as local government leaders and members of the New Jersey Forest Fire Service. They did not disclaim responsibility for carrying out their jobs and doing everything they can to protect the public. Nevertheless, they felt that the nature of the fire problem entails that the most important steps to reduce the risk to people from fires are in the hands of the public:

> They can't just rely on the fire department or Forest Fire Service to protect their home. Because if their house is in a really dense forest area with a lot of ladder fuels close to the home, and their driveway's not very accessible, there's some significant issues there with trying to protect that home. So that's probably the biggest thing. – Interviewee 2, April 2006

Interviewees generally expressed hope that education would be a good route to enhancing the public's role in fire safety:

> Education. Unfortunately, not necessarily for today's folks, just like recycling you have to have education for the young people and get that message out. A long time from now we don't want to wind up skipping a generation or so in the mix. Smokey the Bear does come around every now and then to different festivals, he comes to ours. There is some awareness with that type of thing, what the message is. – Interviewee 11, July 2010

Q RESULTS: CONSENSUS AND BIFURCATION

Q sort data were analyzed using the free PQMethod program. Principal Components Analysis and Varimax rotation produced a 3-factor solution that seemed to most parsimoniously capture the variation in viewpoints. PCA is preferred over any form of factor analysis (in the strict sense) because a component is a summarization of a tendency in the data, whereas a factor posits a really-existing underlying construct, and the former is a better match to what Q method aims to do in identifying shared ways of thinking (Schmolck, 2012). Varimax rotation is appropriate when there is no specific theory about what viewpoints are likely to emerge, as it distributes variance across the factors and approximates a simple structure (Watts and Stenner, 2005). Re-analysis using centroid factor analysis and hand rotation, which are preferred on theoretical grounds by some Q methodologists, produced similar results. Because the third factor was defined by only a single individual and thus does not necessarily represent a shared viewpoint, it is not further discussed here.

The two principal Q factors, labeled F1 and F2, showed a large area of consensus. Table 1 shows a selection of consensus statements, that is, statements which were not ranked significantly differently by the three factors.

The consensus statements reflect the same concerns that were included in the consensus view of fire management derived from the interviewees. Q sorters agreed that homeowners' responsibility for protecting themselves is important (statement 5), but that they aren't doing everything they should (6). And they emphasized that the Pine Barrens are a naturally fire-prone ecosystem (20).

Nevertheless, the Q analysis did produce two distinct multi-person factors (correlation of only .23), indicating that there was not complete consensus. The differences between the factors reflect differences of emphasis or focus more so than stark disagreements of the sort canvassed in the introduction to this paper.

Factor F1: Emphasis on personal responsibility

Participants who loaded on F1 put their focus on the responsibilities of individual residents and homeowners to ensure fire safety. Their perspective on the current habits of these residents tended to be a bit cynical or jaded. Thus they felt that homeowners had an unrealistic expectation that their homes would be protected from

wildfires by the government (32), and did not reject the idea that one irresponsible homeowner may be endangering their neighbors by failing to make their own property fire-safe (24). This group was more optimistic about the possibility of education changing the situation (11).

Factor F2: Emphasis on managers' problems

Loaders on this factor tended to focus on the problems, challenges, and frustrations facing managers and others in positions of leadership and authority. They don't trust the forest to take care of itself (37), and they reject fatalism about fire safety (9). Instead, they worry about such concerns as arson (3) and political manipulation of fire policy (19). This group draws a clearer distinction between old-timers, who know the environment well and practice good fire safety (18), versus newcomers who are more irresponsible and ignorant (3).

It is notable that these two factors did not have strong demographic correlates. While the sample size is far too small for an R-method statistical test, there was no noticeable relationship between the sorter's role (e.g. fire service, environmental leader, etc) and their loading on one factor or the other. There is thus no evidence that would support theories of institutional influence or positionality (e.g. the previously mentioned Grid-Group Cultural Theory, Thompson, Ellis, and Wildavsky, 1990) as simple explanations for participants' views.

DISCUSSION

Comparing the results of the two research methods produces a consistent picture of the views of "key players" in New Jersey about fire management, with each methodology making distinctive contributions to this picture.

There is an overarching consensus that 1) fire is a natural and unavoidable part of the Pine Barrens ecosystem, that 2) average residents – especially those who are new to the area – are poorly prepared for the danger of fire, and 3) action by individual homeowners is the key to fire safety. In interviews, respondents from a variety of positions (Forest Fire Service, the private sector, environmentalists, and others) were eager to present a united front and to downplay ideological conflicts with other interest groups.

The elements of the consensus view were confirmed by the consensus statements within the Q method analysis. Q was able to further reveal two differences of emphasis within the set of "key players." Some respondents were primarily concerned with the behavior of individual homeowners in high-risk areas, being at the same time more pessimistic about their current situation and more optimistic about the possibilities for change. Other respondents focused on the institutional barriers and frustrations facing people (like themselves) in positions of significant responsibility for fire management.

This research does not allow us to definitively demonstrate why this general consensus has emerged in New Jersey while wildfire remains a source of sharp conflict elsewhere. However, one hypothesis – worthy of further research – suggests itself on the basis of comparison between this research and similar investigations of high-conflict cases (Burns and Chen, 2007; Ockwell, 2008; Vaughn and Cortner, 2005; Whitaker and Mercer, 2003). We can call this hypothesis the cultural hypothesis.

A number of studies have suggested that controversies over environmental issues are at root controversies over preferred ways of life (Douglas, Thompson, and Verweij, 2003; Kahan et al., 2007; Rayner and Malone, 1997; Thompson, Ellis, and Wildavsky, 1990). Certain environmental problems (e.g. climate change) present particular threats to certain ways of life rather than others, while certain proposed solutions to those environmental problems (e.g. strict regulation of carbon emissions) present threats to other ways of life. People will tend to be especially sensitive to those events and policies that would threaten their preferred way of life, both because of the objective danger it poses to them and because of the importance of fitting in with their cultural group by endorsing the same views as those around them. Grid-Group Cultural Theory, mentioned above, is one operationalization of this cultural perspective, which goes on to posit a specific typology of ways of life that would emerge in such situations.

If we take Whitaker and Mercer's (2003) study as an example of a high-conflict wildfire situation, we can easily see how the cultural hypothesis might attempt to explain the conflict. People with the "conservationist" view see wildfire as a perfect demonstration of the folly of interference with nature, and resist policies like controlled burning that would subject the nature that they love to extensive human manipulation. Meanwhile the "ruralist" camp is committed to an ideal of small-town rural life that would be validated if traditional controlled burning practices, carried out by themselves and their neighbors, proved to be the most effective means for managing fire – while conservation laws that restrict human interference with the forest would make it harder to maintain their small-town society and extractive economy.

If the cultural hypothesis is true, a low-conflict situation is one in which wildfire and its management has not come to be seen by any cultural group as a threat to its way of life. One way that this might happen is if there is a single shared culture among all erstwhile disputants. Southern New Jersey certainly has a diversity of ways of life. Among the interviewees and Q sorters in this research were career bureaucrats, dedicated environmentalists, proud small-town residents, and free-market entrepreneurs – groups which most applications of GGCT would posit follow very different ways of life. And indeed, it may be that these individuals hold opposing views on other, more globally high-conflict, environmental issues, such as climate change or hydraulic fracturing ("fracking").

However, there was an alternate cultural identity that united all of the respondents in this study, and which was closely tied to views of wildfire: being from southern New Jersey. In interviews, respondents repeatedly positioned themselves as southern New Jerseyans, and contrasted their views not with other interest groups within the state, but with purported outsiders – residents of other states and newcomers to South Jersey who had not fully assimilated to the locality. Assent to the consensual storyline about fire risk then functions as a way of demonstrating that one belongs in South Jersey and truly understands the place.

Note that the functionality of this view is in no way in conflict with any claim about its truth – indeed, the fact that the consensual view is a good general description of the landscape of the Pine Barrens is likely one reason that it is effective as an affirmation of insider-ness for residents of the area.

As stated above, the cultural hypothesis remains just a hypothesis. It requires further research to test its applicability to both high- and low-conflict situations (with respect to wildfire and other environmental issues). Nevertheless, the ability to formulate this hypothesis helps to demonstrate the fruitfulness of studying low-conflict situations and provides an illustration of the avenues of research opened up by the approach taken in this article.

CONCLUSION

This study demonstrated that fire management in New Jersey is characterized by general consensus among key stakeholders. Leaders and managers agree that fire is a natural part of the ecosystem, and that residents need to take responsibility for ensuring their own fire safety – though they haven't done as well as these leaders would like. Nevertheless, this public appearance of consensus conceals a bifurcation between those leaders whose principal concern is residents' responsibilities, and those who emphasize the frustrations and barriers facing officials. If a change in underlying conditions or a major focusing event (such as a huge fire on the scale of 1963) were to happen, these divisions could come to the surface and become the seed for more intense controversy.

This study further demonstrates the usefulness of Q method as a complement to qualitative discourse analysis. Q cannot replace qualitative analysis, any more than it can replace quantitative surveying (Danielson, 2009; Baker et al., 2010). Qualitative analysis is useful in examining how individuals rhetorically position themselves, hearing the precise words they use to describe their views, and giving a realistic replica of discourse in practice (Ockwell, 2008). Q, on the other hand, can probe the internal structure of viewpoints and reveal differences that are not consciously exhibited in public discourse (Danielson et al., 2012). Researchers and practitioners should find Q useful regardless of the level of controversy they are dealing with.

REFERENCES

Baker, R., van Exel, J., Mason, H., and Stricklin, M. 2010. Connecting Q and surveys: three methods to explore factor membership in large samples. *Operant Subjectivity* 34 (1): 38–58.

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

Berger, J., and Sinton, J.W. 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 (2):321–333.

Bowen, G. A. 2008. Naturalistic inquiry and the saturation concept: a research note. *Qualitative Research* 8 (1):137–152.

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

Brown, S. R. 2009. Q technique, method, and methodology: comments on Stentor Danielson's article. *Field Methods* 21 (3):238–241.

Buchholz, K., and Good, R.E. 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 (1):24–34.

Buchholz, K., and Zampella, R.A. 1987. A 30-year fire history of the New Jersey Pine Plains. *Bulletin of New Jersey Academic Science* 32 (2):61–69.

Burns, M., and Cheng, A.S. 2007. Framing the need for active management for wildfire mitigation and forest restoration. *Society and Natural Resources* 20: 245–259.

Danielson, S. 2009. Q Method and surveys: three ways to combine Q and R. *Field Methods* 21 (3): 219–237.

Danielson, S., Tuler, S.P., Santos, S., Webler, T., and Chess, C. 2012. Three tools for evaluating participation: focus groups, Q Method, and surveys. *Environmental Practice* 14 (2): 101-109.

Danielson, S., Webler, T., and Tuler, S.P. 2010. Using Q method for the formative evaluation of a public participation process. *Society and Natural Resources* 23 (1): 92-96.

Devine, M. 2006. A high price for a measure of stupidity. *The Sydney Morning Herald*, Dec. 23, pp. 27.

Douglas, M., M. Thompson, and M. Verweij. 2003. Is time running out? the case of global warming. *Daedalus* 132 (2):98–107.

Forman, R.T.T. 1998. The New Jersey Pine Barrens: an ecological mosaic. In *Pine Barrens: ecosystem and landscape*, ed. R.T.T. Forman, pp. 569–585. New Brunswick, NJ: Rutgers University Press.

Hayes-Conroy, A. 2005. *South Jersey under the stars: essays on culture, agriculture, and place*. Madison, NJ: Fairleigh Dickinson University Press.

Hughes, J. 1987. New Jersey, April 1963: can it happen again? *Fire Management Notes* 48 (1): 3–6.

Kahan, D. 2013. Don't select on the dependent variable in studying the science communication problem. *Cultural Cognition Project*. http://www.culturalcognition.net/blog/2013/11/19/dont-select-on-the-dependent-variable-in-studying-the-scienc.html (last accessed November 20, 2013).

Kahan, D. M., D. Braman, J. Gastil, P. Slovic, and C. K. Mertz. 2007. Culture and identity-protective cognition: explaining the white male effect in risk perception. *Journal of Empirical Legal Studies* 4 (3):465–505.

Little, S. 1998. Fire and plant succession in the New Jersey Pine Barrens. In *Pine Barrens: ecosystem and landscape*, ed. R.T.T. Forman, pp. 297–314. New Brunswick, NJ: Rutgers University Press.

Lutz, H.J. 1934. Ecological relations in the pitch pine plains of southern New Jersey. *Yale University School Forestry Bulletin* 38:1–80.

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.

Mattson, D.J., Byrd, K.L., Rutherford, M.B., Brown, S.R., and Clark, T.W. 2006. Finding common ground in large carnivore conservation: mapping contending perspectives. *Environmental Science and Policy* 9(4): 392–405.

McCormick, J, and Forman, R.T.T. 1998. Introduction: location and boundaries of the New Jersey Pine Barrens. In *Pine Barrens: ecosystem and landscape*, ed. R.T.T. Forman, pp. xli–xlviii. New Brunswick, NJ: Rutgers University Press.

McKessey, A.N. 2006. *Effects of fire management on Pine Plains vegetation at Warren Grove Air National Guard Range, New Jersey*. PhD Dissertation, Drexel University.

Native Forest Network. 2003. Bush signs so-called "Healthy Forests" bill. Press release. http://www.nativeforest.org/press_room/hfi_12_4_03.htm (last accessed April 3, 2013).

Ockwell, D.G. 2008. "Opening up" policy to reflexive appraisal: a role for Q Methodology? a case study of fire management in Cape York, Australia. *Policy Sciences* 41: 263-292.

Rayner, S., and E. Malone. 1997. Zen and the art of climate maintenance. *Nature* 390:332–334.

Reber, B.H., Kaufman, S.E., and Cropp, F. 2000. Assessing Q-Assessor: a validation study of computer-based Q sorts versus paper sorts. *Operant Subjectivity* 23 (4): 192–209.

Schmolck, P. 2012. PCA vs. centroid. Post to Q-METHOD listserv, June 2 2012. https://listserv.kent.edu/wa.exe?A0=Q-METHOD (last accessed June 13, 2014).

Thompson, M., Ellis, R., and Wildavsky, A. 1990. *Cultural theory*. Boulder: Westview Press.

U.S. Census Bureau. 2010. Census.gov (last accessed April 3, 2013).

Van Eeten, M. 2001. Recasting environmental controversies: a Q study of the expansion of Amsterdam Airport. In *Social discourse and environmental policy: an application of Q Methodology*, ed. H. Addams and J. Proops, pp. 41–70. Northampton, MA: Edward Elgar.

Vaughn, J., and H.J. Cortner. 2005. *George W. Bush's Healthy Forests: reframing the environmental debate*. Boulder: University Press of Colorado.

Watts, S., and P. Stenner. 2005. Doing Q methodology: theory, method, and interpretation. *Qualitative Research in Psychology* 2:67–91.
Whittaker, J., and D. Mercer. 2003. The Victorian bushfires of 2002-03 and the politics of blame: a discourse analysis. *Australian Geographer* 35 (3): 259–287.

Table 1: Selected consensus statements

No.	Statement	F1	F2
5	It's your responsibility as a homeowner to do everything you can to protect your home from forest fires.	3	1
6	People in the severest fire areas have tremendous clearances around their homes, up to three times as much land cleared as the lot they sit on.	-3	-4
10	If you see smoke then get out of there. Fires can move unbelievably fast.	4	3
20	It's certainly a public safety issue, but it's also an ecological system that requires fire in order to persist. And so we actually have to look at it in both senses.	3	1
39	History is going to repeat itself. It's only a matter of time before we have another huge fire like in 1963.	-1	1
40	You never know exactly why one house survived a fire and another didn't – it's a big mix of luck.	-1	-3

Table 2: Selected distinguishing statements for F1

No.	Statement	F1	F2
32	There is an expectation among these residents that their house is going to be protected and that includes the expectation that somebody is going to come and protect them from wildfire.	3	-1
7	The insurance companies would say that if it is a serious fire risk on someone's property then we just won't insure them.	2	-2
3	With more people living in the Pinelands there is increased pressure to make sure that fires are put out, and perhaps less room to think about prescribed fire as an ecological tool, because the demands for safety are always going to come first.	0	3
24	You have a problem when the next-door neighbors have a pig sty but yours is nice and clean: "I did my job but my house still burned down because of the guy next-door."	0	-3
11	Education isn't very effective. If you went to the average person and gave them a brochure, I don't think they are going to go out tomorrow and make their homes fire safe.	-2	1

Table 3: Selected distinguishing statements for F2

No.	Statement	F1	F2
18	The residents who have lived there their whole lives obviously are more familiar with wildfire as an issue and they are more comfortable with what the concerns are.	2	4
19	The idea that clearing or thinning is a legitimate tool to address the fundamental challenge of fire safety is used by people who want an excuse to cut down trees.	-4	2
3	With more people moving in, there are more hooligans and renegades who are in any area who are likely to set a fire out there.	-2	2
37	The forest comes back. Go down to where the fire was two years ago and you wouldn't know the place burned in some sections, it's greened up and everything is back up looking good.	2	-3
9	It's just an inherent thing, if you live here you're going to get burned out. It's just what happens.	-2	-4

Appendix A: Q analysis results

No.	Statement	F1	F2	F3
1	The lack of development in the core of the Pinelands is why we have a lot of forest and a lot of potential for forest fires.	-4	-4	3
2	It all depends on the power of the wind, and the wind is one of the major factors that you can't control. It's next to impossible to control that.	3	0	1
3	With more people moving in, there are more hooligans and renegades who are in any area who are likely to set a fire out there.	-2	2	-3
4	Human beings have tried to suppress fire, and also set a lot of fires. So people are really responsible for changing the kind of fire we're dealing with and making it a risk for safety and for the ecosystem.	0	1	0
5	It's your responsibility as a homeowner to do everything you can to protect your home from forest fires.	3	1	3
6	People in the severest fire areas have tremendous clearances around their homes, up to three times as much land cleared as the lot they sit on.	-3	-4	-2
7	The insurance companies would say that if it is a serious fire risk on someone's property then we just won't insure them.	2	-2	-3
8	Forestry activities can be used to reduce fuel buildups, with thinning and putting in defensible space and putting in fuel breaks.	1	-3	0
9	It's just an inherent thing, if you live here you're going to get burned out. It's just what happens.	-2	-4	0
10	If you see smoke then get out of there. Fires can move unbelievably fast.	4	3	3
11	Education isn't very effective. If you went to the average person and gave them a brochure, I don't think they are going to go out tomorrow and make their homes fire safe.	-2	1	1
12	Very little prescribed burning is done across the Pinelands in terms of acreage. Very little land is burned each year compared to the size of contiguous forest in the Pinelands.	-1	3	3
13	Scientific research is proving what all the old time fire wardens used to say is right. That has been a big help because before all we had was the fire warden's opinion.	-3	-1	0
14	The town is determined that if someone's yard gets to be a public hazard then someone has the right to remove that hazard. The town can pass an ordinance.	3	-3	2
15	Wildfires should be put out – they have to be, because there are people scattered around the Pinelands. The government can't make a decision to allow the fire to burn over vast areas like out west.	4	4	-4
16	Fire is included in our county and local master plans so we are addressing the issue.	-3	0	-4
17	Firewise is geared at educating homeowners that this is what you have to do in each of your homes, and you can do it cooperatively. It's grass roots so that everybody in that neighborhood decides that we want to be fire safe.	-1	1	1
18	The residents who have lived there their whole lives obviously are more familiar with wildfire as an issue and they are more comfortable with what the concerns are.	2	4	1
19	The idea that clearing or thinning is a legitimate tool to address the fundamental challenge of fire safety is used by people who want an excuse to cut down trees.	-4	2	-2
20	It's certainly a public safety issue, but it's also an ecological system that requires fire in order to persist. And so we actually have to look at it in both senses.	3	1	4

21	It's almost a Catch-22 – environmentalists put all these restrictions on fires, but that endangered species is probably there because of past disturbance or past wildfires.	-3	3	2
22	If it doesn't cost them very much out of pocket people are going to be more wiling to participate in some type of a wildfire protection program.	4	4	-4
23	There is no limit on landowners' liability in conducting controlled burning. Even if their burning activities are done in the right way, they can still be sued if something goes wrong.	0	2	3
24	You have a problem when the next-door neighbors have a pig sty but yours is nice and clean: "I did my job but my house still burned down because of the guy next-door."	0	-3	4
25	Some people don't want to evacuate. You couldn't pry them out regardless if you told them that they were going to lose their life – they stay anyway.	0	-2	0
26	People don't exactly know what they could do or what they should do to be safe from forest fires.	2	0	-1
27	If you mention forest fires, people say, "we have a Forest Fire Service? What do they do? There's no fires in Jersey." They really have no idea.	2	-1	-1
28	People have a number of other things at home to take care of, broken washer or the house needs painting or a new deck. It's not a high ranking priority like, "let's go out and see what we can do this weekend to get this place fire safe."	1	0	-3
29	The Forest Fire Service can't conduct a prescribed fire against a property owner's wishes – even if a big landowner has left a large parcel and done nothing, so over several decades an enormous amount of litter has collected on their property.	-1	3	-1
30	Nobody likes taxes, but if you want that level of protection from fires you have to be willing to pay for it, and people in Jersey don't want to pay for it.	1	-1	2
31	Forest fires aren't a high priority issue for officials in other departments like land conservation. It's not in their purview.	-2	-2	-3
32	There is an expectation among these residents that their house is going to be protected and that includes the expectation that somebody is going to come and protect them from wildfire.	3	-1	-1
33	New homeowners that have come from up north don't quite understand the severity of the fire hazard. I think it's one of those things that you have to see it and be a part of it to really understand it.	1	2	-1
34	People don't want to clear fuel around their house because they don't want to lose the trees: "Oh, I love my tree, I love my shade."	1	0	-3
35	Developers are good at getting around the regulations that different agencies have made that are supposed to promote fire safety.	1	-2	-2
36	With more people living in the Pinelands there is increased pressure to make sure that fires are put out, and perhaps less room to think about prescribed fire as an ecological tool, because the demands for safety are always going to come first.	0	3	4
37	The forest comes back. Go down to where the fire was two years ago and you wouldn't know the place burned in some sections, it's greened up and everything is back up looking good.	2	-3	2
38	The loss of timber, trees, to a fire is a waste.	-4	-1	1
39	History is going to repeat itself. It's only a matter of time before we have another huge fire like in 1963.	-1	1	0
40	You never know exactly why one house survived a fire and another didn't – it's a big mix of luck.	-1	-3	-2
41	Scientists looked at it and said that prescribed burning has definitely reduced fire severity. That is one of the things we are relying on, we are doing a lot more scientific studies.	0	-2	2

42	It’s only because the firefighters are too good at their jobs and put the fires out that it doesn’t become a bigger issue.	-2	2	-1
43	The problem is that the controlled burning techniques that they use don't closely match the natural fire regime at all. They burn very very cool fires, under the absolute safest conditions. And it doesn't have the same effects as a hotter wildfire.	-3	-1	-2
44	It's unfortunate that more people don't get involved in the volunteer fire company these days.	-1	0	1

Appendix B: Table of correlations between Q-sorts

	A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**
A	100	5	57	21	13	-3	39	24	19	32
B	5	100	10	22	36	7	0	18	20	21
C	57	10	100	27	31	15	16	24	11	29
D	21	22	27	100	3	-18	24	21	32	35
E	13	36	31	3	100	-6	-3	14	28	15
F	-3	7	15	-18	-6	100	6	7	14	23
G	39	0	16	24	-3	6	100	6	31	28
H	24	18	24	21	14	7	6	100	18	34
I	19	20	11	32	28	14	31	18	100	47
J	32	21	29	35	15	23	28	34	47	100