

Public perspectives of fire, fuels and the Forest Service in the Great Lakes Region: a survey of citizen–agency communication and trust

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Abstract. Relative to the western United States, where fire and fuel management programs have received greater emphasis, few community-based studies have focused on the Great Lakes region. The present paper describes public opinion research from counties surrounding National Forests in Wisconsin, Minnesota and Michigan. Survey data address citizen perspectives on (1) fuel reduction practices and related risks, (2) confidence in the US Forest Service to effectively implement treatments, and (3) interactions between the agency and forest communities. Substantial support for prescribed fire and thinning treatments is evident, with few participants believing these practices should not be considered or are unnecessary. However, ratings of agency actions were weak at all three study sites; in particular, there is some skepticism that managers can safely implement prescribed fire programs. Overall, Minnesota residents had fewer concerns whereas Michigan respondents were more cautious. These results are discussed and compared with findings from the western US.

Additional keywords: citizen–agency interactions, fire risk, fuels reduction, public confidence, social acceptance.

Introduction

The ecosystem-based strategies that predominate in federal land management today require managers to account for both public and private lands in the fire management planning process. Resource agencies must work cooperatively with other (public and private) landowners to suppress fires and implement fuel management activities. This is particularly challenging in the Midwestern United States where forestland ownership is especially complex and diverse. In addition, generally smaller parcel sizes and pervasive intermix of public and private ownership patterns at the wildland–urban interface (WUI) in many ways make fuel reduction and fire suppression efforts in the region more challenging than on expansive, more contiguous western national forests. Yet, relative to the western United States, limited attention has been focused on wildfire danger and fuel management programs in the Great Lakes region.

Forest Service managers in the region who are building fire programs to reduce the fire hazard and improve ecosystem health need a better understanding of local public response to fuels management and outreach efforts. Public acceptance of fuels management programs will be critical to their successful implementation. Evidence from across the country indicates there is an inherent instability in resource policies that do not adequately integrate citizens' concerns (e.g. Cortner *et al.* 1998; Shindler *et al.* 2002). To be effective, fire managers will need to consider citizens' perceptions of fire risk, their opinions about specific fuel treatments and how to best communicate with local communities.

The present paper describes results from a study in the Great Lakes region that examined public opinion about fire management strategies and the primary agency that implements them. We conducted a mail survey with property owners in the counties surrounding the six national forests in Minnesota, Wisconsin and Michigan to understand (1) their preferences for fuel reduction practices; (2) confidence in managers to effectively implement these practices; (3) the quality of relations among citizens and the Forest Service; and (4) views on usefulness of different information sources. Because local residents are often the first to respond to management programs, especially fuel reduction treatments, the focus on communities directly adjacent to national forests is particularly relevant for agency personnel.

Research and management context

Although fire activity in the Lake States has been relatively limited in recent decades, the past several years have seen several fires in Minnesota, Wisconsin and Michigan that have had a substantial impact on both natural ecosystems and human populations. Current forest conditions in Minnesota, Wisconsin and Michigan suggest there is an increasing risk of major wildfires (Cardille *et al.* 2001; Haight *et al.* 2004). Many stands are vulnerable as a result of insect outbreaks, blowdowns, over-mature trees, or high stand densities (Miles *et al.* 2004; Hansen and Brand 2006; Perry 2006). The high-risk areas are characterized by mixed pine forests including jack pine (*Pinus banksiana* Lamb.), northern white pine (*P. strobus* L.), and red pine (*P. resinosa* Ait.) as well as local hardwoods (Haight *et al.* 2004).

Several human factors add to wildfire risk. In these three states, the human–wildfire interaction is even more tightly linked than in the western states: wildfires do not have to be very large or travel very far before they directly impact the human community. A recent review found that nearly all forests in the region are located within 25 km of densely populated communities (Radeloff *et al.* 2005). Further, public lands in the region are frequently characterized by a highly fragmented ownership pattern where small Forest Service or state-owned parcels are mixed with private property and rural neighborhoods. The large number of stakeholders and mixed ownerships create a complex dynamic for how the fire management problem is understood, what values are most at risk and citizen support for fuels treatments. Most fires in the region are of human origin; fewer than 3% result from lightning, the most common cause in the western USA (Cardille and Ventura 2001). Debris-burning, a practice commonly used to dispose of trash and debris from land clearing, is the likely cause of most fire starts. Arson is also a primary concern; more than half of fires over 40 ha in size are deliberately set (Cardille and Ventura 2001). A high number of incidental roads and lack of awareness (or disregard) of property boundaries increase the likelihood that fires that start on private property will carry over to public land.

Although several studies have been conducted on such issues in western forest communities, where wildfire has been a long-term and continuing problem, less social science research has been undertaken in the Great Lakes region. In Minnesota, a 120 000 ha (300 000 acres) blowdown event along the Superior National Forest in 1999 resulted in abundant fuel for fires. In subsequent interviews of local homeowners, Nelson *et al.* (2004) found that participants were supportive of prescribed burning and some level of thinning. A key element shaping acceptance of prescribed burning was confidence in the ability of the individuals carrying out the burns to keep them under control. Those in support tended to be more familiar with agency managers, to have had past positive experience with prescribed fire, to be confident that prescribed fires can be controlled and to see prescribed burning as an effective management tool (Monroe *et al.* 2006).

Conversely, focus group members in three Michigan counties containing the Huron–Manistee National Forest had significant concerns about use of prescribed fire (Winter and Fried 2000). Study participants considered the use of prescribed fire to be ‘reckless’. According to the authors, two significant fires shaped these concerns. In 1980, the Mack Lake fire, a manager-ignited fire, escaped and burned 9600 ha (24 000 acres), destroyed 44 structures and left one firefighter dead. In a similar situation 10 years later, the Stephan Bridge Road fire destroyed 76 homes and 2400 ha (6000 acres) of public and private forestland. Subsequent survey data from the same study area found that residents’ primary concern regarding prescribed burning is the potential for ‘out of control fires’ (Vogt *et al.* 2005). A lack of trust in government agencies to make good decisions in using prescribed fire also was seen as a major influence (Winter *et al.* 2006).

In terms of mechanical understorey removal and thinning treatments, many participants in both the Minnesota and Michigan studies were supportive of some level of thinning; however, they expressed greater uncertainty with this method. Some Minnesotans opposed thinning on public lands because they feared the activity would open forests to indiscriminate

logging (Nelson *et al.* 2005). Many Michigan participants were concerned about negative impacts on scenery and natural forest conditions (Winter *et al.* 2006). Approval hinged largely on knowing that personnel had first-hand experience with mechanical restoration treatments and if citizens had trust in agencies to implement them properly.

The studies from Minnesota and Michigan point to trust as a primary factor in participants believing agency messages about fuel reduction measures (Nelson *et al.* 2004; Winter *et al.* 2006). The importance of familiarity with and trust in agency personnel points to the important role agency outreach efforts can play in building citizen acceptance. Effective communication with local communities is essential; in particular, programs designed to develop relationships between residents and agency managers can boost trust in personnel and provide experience with proposed treatments (e.g. Winter and Fried 2000; Toman *et al.* 2006). The difference between states in acceptance of prescribed fire demonstrates how local experience can influence acceptance; thus, there is a need to design both treatment and outreach programs for individual communities. Neither of the two referenced studies directly examined respondents’ opinions of the method of information dissemination and the credibility of sources, both of which can play an important role in forming support for management practices. As local management units begin to invest more resources in organizing their communication strategy for fire programs, insight into the specific forms of outreach preferred by citizens will be useful.

Methods

The present research was conducted in two phases. First, semi-structured interviews were conducted with 30 Forest Service fire and fuel management personnel on the Superior, Chippewa, Chequamegon–Nicolet, Hiawatha, Huron–Manistee and Ottawa National Forests. Interviews were conducted on-site and included field visits to provide context for discussions. Several management challenges emerged from these discussions; most centered on gaining the support and trust of local citizens.

In the second phase, a mail-back survey was developed based on a protocol that had been used by the research team in a similar four-state study (Oregon, Arizona, Utah and Colorado) (Brunson and Shindler 2004; Toman *et al.* 2006). Findings from the interviews were used to adapt the original survey to address local management strategies and concerns. The final mail survey included questions about participant perceptions of fire risk, preferences for specific fuel reduction practices, confidence in agency personnel to implement treatments and the quality of citizen–agency interactions and communication techniques.

The current study targeted citizens in forest communities who are most directly affected by proposed agency plans and, most likely, the first to judge the outcomes. The survey was distributed to a random sample of residents in counties adjacent to the six National Forests in Minnesota, Wisconsin and Michigan. Potential participant lists were obtained from local tax assessors and telephone books. Survey implementation followed the ‘total design method’ (Dillman 1978), using a series of mailings to encourage participation. Of the 1125 people contacted, 593 returned completed surveys, resulting in a 53% response rate. Although response rates to natural resource surveys have

Table 1. Public opinion about legitimacy and implementation of fuel reduction practices

Respondents rated the three treatments individually. Significantly more Minnesota respondents believed prescribed fire was a legitimate management tool ($P < 0.05$). Significantly more men believed thinning was a legitimate management tool ($P < 0.05$)

The use of fuel treatments on public forests is . . .	Prescribed fire	Mechanical vegetation removal	Thinning
a legitimate tool that resource managers should be able to use whenever they see fit.	38%	50%	59%
something that should be done only infrequently, in carefully selected areas.	44%	26%	28%
a practice that should not be considered because it creates too many negative impacts.	3%	3%	1%
an unnecessary practice.	3%	4%	3%
I know too little to make a judgment about this topic.	12%	17%	9%

been declining over time, a response at this level is regarded as sufficient for a descriptive study of this nature (Lehman 1989; Needham and Vaske 2008). To test for non-response bias, 10% of non-respondents in each locale were randomly selected to receive a shorter telephone version of the survey. Differences between respondents and non-respondents were minimal. Thus, non-response bias was not considered to be a problem (Vaske *et al.* 2002). Respondents were divided nearly evenly between Minnesota (202), Wisconsin (201), and Michigan (190). χ^2 tests were used to identify significant differences between states. Very few differences were found; thus, data are presented in aggregate with exceptions noted in the tables.

Findings

Respondent characteristics were similar across states. Participants had a mean age of 58 years, a figure equal to the mean age in all three states for the over-18 age group who were potential respondents (US Census Bureau, available at <http://quickfacts.census.gov/qfd/index.html>, accessed August 2006). Three-fourths of the respondent group was male. Although it is common for males to be overrepresented in surveys conducted in rural areas (e.g. Brunson and Shindler 2004; Vaske *et al.* 2007), we tested our responses for bias based on gender. Correlation analysis showed the only significant difference between gender groups was that men were more supportive than women of thinning as a fuels reduction measure.

Most respondents (96%) lived in a rural area or small town and were long-term residents (30 years on average). Regarding proximity of their residence to a natural area where a wildfire might burn, nearly half indicated they were directly adjacent to a forested area while another 35% were within 8 km (5 miles). In rating the condition of their local forests, three-fourths believed them to be 'healthy'; however, respondents were far less certain when asked about overcrowding (too many trees) on these same lands. On this issue, participants were evenly split between agreement, disagreement and 'don't know' responses.

Acceptance levels of fuel treatment options

Respondents were asked their opinion about the use of three management activities for reducing fuels on federal forests. To ensure a common reference, the following definitions were provided on the questionnaire:

- Prescribed fire – Also called controlled burning, this practice can involve (1) letting a naturally caused fire burn under close

and careful watch; or (2) intentionally setting fires in ways that can be controlled to produce desired conditions.

- Mechanical vegetation removal – Managers can use chainsaws, mowers, or other specialized machines to reduce the number of shrubs and small trees where they are so numerous that they increase the risk and size of wildfires.
- Thinning – In some high-risk areas with numerous trees, the trees are too big for mowing machines but can be thinned out using chainsaws or other harvesting equipment.

After these descriptions, participants selected from five response categories to voice their opinion about the legitimacy and implementation of each separate treatment in public forests. Table 1 displays these responses.

A substantial majority of respondents indicated that all three treatments were acceptable in some or all situations. At least three-fourths believed each practice is either a legitimate tool or something that should be done infrequently in carefully selected areas. These sentiments generally reflect management approaches already followed on National Forests. Very few people believe these practices should not be used or are unnecessary. However, participants appeared more willing to grant managers greater discretion to use mechanized treatments for vegetation removal and thinning, while indicating prescribed fire should be used more sparingly. Among the three states, Minnesotans were the most liberal about the use of prescribed fire.

Several survey questions specifically addressed concerns about the use of prescribed fire. Using a four-point scale (*none, slight, moderate, great*) individuals rated their level of concern about 10 items. Percentages reflecting *moderate or great concern* are in Table 2. By a wide margin, the greatest concern among all respondents was the risk of prescribed fire going out of control. Most other potential effects were rather mid-level concerns. Where significant differences exist, Michigan residents were the most concerned in each case.

Trust and confidence in agency personnel

Participants were asked how much they trusted the Forest Service to make *good decisions about wildfires and fire prevention*. On a four-point scale (*none, limited, moderate, full*), 72% responded they had moderate to full trust in the agency. Confidence in agency personnel to *implement specific treatments* was another matter. Using the same four-point scale (plus a *no opinion* option), participants responded to the question, 'How much confidence do you have in the Forest Service to use the following practices as part of a responsible and effective fuel management

program in your area?’ Fig. 1 indicates that in each case, a majority expressed (moderate to full) confidence in agency use of the treatment. Respondents were the most positive about thinning. Although encouraging at first glance, a simple majority expressing confidence in agency managers may be an insufficient level of public approval. This appears particularly true for prescribed fire, as fully one-third of participants indicated they had limited or no confidence in agency managers for its use.

Table 2. Concerns about potential effects of prescribed fire

Potential effect	Moderate or great concern
Risk of fire going out of control	70%
Increased soil erosion ^A	48%
Loss of wildlife and fish habitat ^A	46%
Damage to private property	45%
Increased levels of smoke	43%
Reduced scenic quality ^A	42%
Economic loss of useable timber	41%
Deteriorated public water supply	38%
Effects on recreation opportunities ^A	35%
Lower traffic safety	21%

^AMichigan residents were significantly more concerned about these effects at $P < 0.05$.

Agency interactions with local communities

Research has demonstrated the importance of positive citizen–agency interactions in developing support for fuel management activities (Shindler and Toman 2003). Accordingly, respondents were asked about their experiences and how the Forest Service interacts with local communities. Table 3 provides responses to a series of statements that reflect possible interactions. The scale used was a five-point Likert type (*strongly agree* to *strongly disagree*) and also included a *no opinion* category. The sets of agree and disagree scores are collapsed for presentation purposes.

Overall, it is notable that a high number of individuals chose the ‘no basis for opinion’ or ‘neutral’ response for many of the statements. It is clear that many people have had little or no experience with their local Forest Service personnel. This suggests there is plenty of room for agency staff to reach out to these individuals in the future and shape relations. For those with an opinion, respondents were divided about how well the Forest Service interacts with communities in the region. Approximately the same proportion agreed and disagreed with statements that the agency does a good job of providing information, is open to public input and builds trust and cooperation with citizens. The two statements where more respondents agreed than disagreed were in terms of feeling that the federal government hinders local staff in doing its job and that the Forest Service should play a strong leadership role in the community.

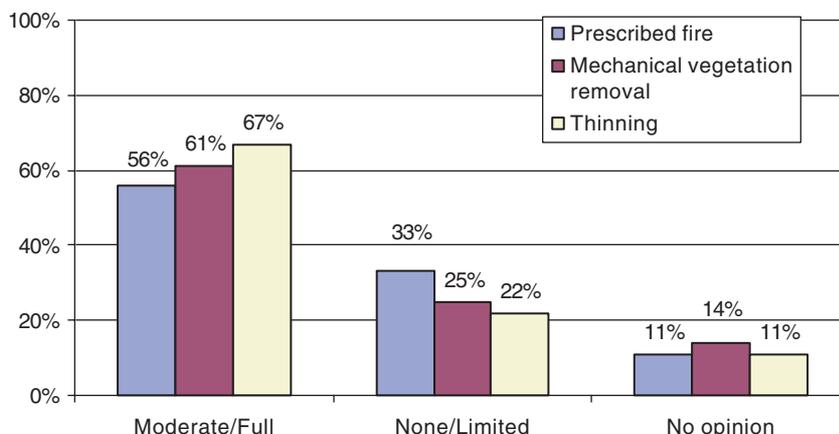


Fig. 1. Confidence in the Forest Service to use fuel management practices in a responsible and effective manner.

Table 3. Opinions about Forest Service interactions with local communities

	Agree	Neutral	Disagree	No opinion
The Forest Service does a good job of providing information about its management activities.	27%	22%	26%	25%
The Forest Service is open to public input and uses it to shape management decisions.	25%	19%	22%	34%
Federal forest managers build trust and cooperation with citizens so that people feel the agency is acting in their best interest.	23%	22%	26%	29%
Local Forest Service staff are prohibited from doing their job because of national restrictions and regulations.	31%	17%	12%	8%
The Forest Service should provide a stronger leadership role in the community.	46%	21%	40%	25%

least one-third felt the same about interpretive centers, brochures and newsletters, and school programs. The general sources of university researchers and mass media were also rated at approximately the one-third level. In sum, although not as many people have prior experience with agency information sources, those who did tended to see them as more trustworthy and more helpful than general information sources.

Discussion

In the present study, we surveyed residents in the Great Lakes states where fuels management practices are proposed or under way. Findings are generally consistent with those from the western study locales (Brunson and Shindler 2004; Toman *et al.* 2006) as well as the findings of the few studies previously undertaken in the region. However, a few differences are noteworthy and are referenced where appropriate in the discussion below.

Many participants across the region believed that prescribed fire, mechanical vegetation removal and thinning should be part of the discretionary tool kit for fuel management on federal lands. Thinning is the treatment of choice, which may bode well for managers who need to reduce overstocked stands before attempting to use prescribed fire. It is noteworthy that very few participants believe these practices should not be considered or are unnecessary. Respondents tended to be a bit more wary about prescribed fire and were more likely to say it should be used only infrequently. Like Winter *et al.* (2002), we found geographic variation in respondents' concern about the use of prescribed fire. Minnesota residents had fewer concerns about the use of fire, possibly because they have seen it used effectively after a severe blowdown event in 1999 (Monroe and Nelson 2004). In Wisconsin and Michigan, residents may be more watchful as treatments are employed.

Each of these findings is comparable with these same measures studied in the western USA (Brunson and Shindler 2004); a notable difference was the higher number of individuals in the Lake States who felt they did not know enough to make a judgment. This is likely an artifact of the more prevalent use of these tools in the west. For example, Winter *et al.* (2006) noted that in California, where prescribed fire and mechanized treatments are more established practices, residents were much more supportive of these actions than Michigan homeowners.

Concerns about use of prescribed fire indicate that risk of managers losing control of a burn was the greatest concern among respondents (70%), much more so than soil erosion, loss of habitat, increased smoke and so on, where fewer than half viewed these as risks. Levels of concern for these latter items are similar to studies in other states (Shindler and Toman 2003; Brunson and Shindler 2004); however, the number fearing fires going out of control is much higher. Michigan residents, who seem to have a greater concern for many of the potential effects from prescribed fire, are likely to scrutinize this practice more closely. As Winter and Fried (2000, p. 33) described respondents in their study: 'Their universally negative perceptions of prescribed fire may ultimately preclude its use as a risk management tool in Michigan's wildland-urban interface forests.' To further cloud the issue in Michigan, most homeowners there assume that visitors and campers are responsible for most fires; however,

studies show that 80% of ignitions are caused by permanent residents (Winter and Fried 2000).

One of the most important findings of the present study involves the Forest Service's relationship with citizens. This is a central concern in that substantial research indicates that feelings of distrust and disenfranchisement in communities can forestall agency efforts to initiate its programs (e.g. King 1993; Kramer 1999). Trust among parties may be the single most important factor in working together effectively. In the present study, trust in the Forest Service – to make good decisions about wildfires and fire prevention – was roughly the same (72%) relative to other states where this question was posed (Brunson and Shindler 2004). This rating may reflect the agency's recognized role in fire suppression and the resources the Forest Service can bring to bear on a fire event. However, when we asked about confidence in the Forest Service to use specific fuel management practices in a responsible and effective manner, the results were less positive. Citizens expressing moderate to full confidence about implementation of these treatments, 56% in the case of prescribed fire, is sufficiently low to be a concern among fire management personnel. In other regions, the Forest Service enjoyed a higher vote of confidence from their communities (Brunson and Shindler 2004), probably because of the longer history of implementation in these locations. This suggests that when these strategies are new to an area, more upfront discussions explaining the process and purpose of the practices to the local community may be necessary. Small-scale, local examples can help provide evidence that management objectives can be achieved, thus reducing fears over treatment risks as well as skepticism that the agency can deliver on its prescribed fire program.

In many areas of the country, a critical finding about the Forest Service has been its inability to adequately involve local citizens and to show good faith in using their input in management decisions (e.g. Cortner *et al.* 1996; Smith and McDonough 2001). Similarly, the agency received weak ratings in these areas in the present study. There also was little recognition of the agency's ability to build trust and cooperation with citizens or provide information about its management activities. Again, these findings are largely consistent with those from other regions. A key difference in the Lake States is that many individuals held either a neutral opinion or had no opinion. This suggests they had limited interactions with agency personnel, which highlights an opportunity for improving outreach programs about fire management practices. Stakeholders repeatedly say that developing trust is more likely when resource professionals articulate their reasons for involving the public and then make good on their commitments (Shindler 2000).

As has been discussed elsewhere (see Shindler *et al.* 2002), it is likely sentiments about trust and confidence are influenced by general public dissatisfaction with national politics and Forest Service policies on a broad level. Citizens frequently express trust in their local forest managers, but also worry whether the larger agency will allow these individuals to do their jobs. Approximately a third of our respondents believe that local personnel are hindered by national restrictions and regulations and many more simply have no opinion on the matter. However, there is substantial sentiment for the Forest Service to provide more local leadership, perhaps reflecting opinions expressed in other regions where communities recognize the need to attend to forest

health and have expectations of their local agency to lead the way (Shindler *et al.* 2002).

Directly related to relationship building is the priority placed on communication by forest agencies. In the present study, fewer people were familiar with the communication formats used by the Forest Service than they were with mass media and other general sources. But among those who were, agency information sources were given generally high marks for trustworthiness and usefulness. Overall, Michigan residents would seem to benefit most from outreach programs. These respondents were the least familiar with almost every information source included in the survey. However, residents in Minnesota and Wisconsin also appeared to have much less interaction with agencies like the Forest Service than their counterparts in the other regional studies. As found in other studies, more interactive programs such as guided field trips and conversations with agency personnel were most highly rated (e.g. Monroe *et al.* 2006; Toman *et al.* 2006). These forums appear particularly useful because they provide opportunities for discussion about forest conditions and fuels management, often in places where people can evaluate real-life scenarios before broad-scale implementation.

Conclusion

Today, the roles that agency personnel are being asked to play are much different than in the past, when citizen participation was minimal and technical expertise was the dominant theme. In this new role, greater public acceptance will be achieved by personnel being aware of, and responsive to, the suite of intertwined ecological factors and community circumstances affecting forest management. Our results show that, although perhaps not as highly as in western states where fire is a more dominant topic, residents near National Forests in the Great Lake states are aware of the fire risk and generally supportive of agency actions to reduce the risk. However, results also suggests there is room for fostering even greater support and that interaction with agency personnel can play a key role in the process.

Increasing resident knowledge through public outreach is a solid investment. A central theme in numerous studies is that the more people understand about the use of fuel reduction treatments, especially prescribed fire and the diminished risk from its use, the more acceptable these practices become (see McCaffrey 2006). Effective dissemination of useful information is essential in helping develop awareness about management options and agreement about their application. More informed individuals tend to support fuel reduction practices. Research also shows that another direct benefit of increased citizen understanding is greater confidence in the Forest Service to implement a fuel management program (Shindler *et al.* 2002). Even when people are uncertain or have concerns about a management practice, trust in agency personnel can help mitigate these fears.

As suggested by Winter *et al.* (2006), different outreach activities many prove effective in different places. Local publics want to know how proposed fuel treatments will affect them and their forest community. Thus, the adoption of one-size-fits-all communication programs seems unwise. Specific program content and its implementation need to take into account local conditions and incorporate a mix of outreach activities into communication strategies (Monroe *et al.* 2006; Toman *et al.* 2006). An interactive

approach provides greater flexibility to address participant questions and concerns, and then tailor management practices to the local context.

Many technical tools of information dissemination are available to resource professionals. However, the successful implementation of a communication strategy often comes down to how well personnel attend to public process. Providing opportunities for people to adequately evaluate the range of information, including the risks and uncertainties of various alternatives, brings them much closer to lending support to the eventual decisions (Yankelovich 1991). Under these circumstances – where people are given a chance to learn about and deliberate the choices, even ones that are limited or imperfect – they will often choose the lesser of the two evils and accept it (Ehrenhalt 1994). It is the process of working through the choices together that also leads citizens to be more trusting of the decision maker.

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