

Public Perceptions of Sagebrush Ecosystem Management in the Great Basin

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Abstract

Intact sagebrush communities in the Great Basin are rapidly disappearing because of invasion of nonnative plants, large wildfires, and encroachment of pinyon and juniper woodlands. Land management options, including the use of prescribed fire, grazing, herbicides, or mechanical treatments, can reduce the potential for wildfire and restore plant communities. Public acceptance of management actions, and trust in agencies to carry out those actions, is a critical component of developing and implementing successful long-term land management plans. This study examines citizens' opinions and perceptions about rangeland management in the Great Basin. In fall 2006 we conducted a mail survey of randomly selected households in three urban and three rural regions of the Great Basin, receiving 1 345 valid responses for a 45% response rate. Overall, respondents perceived that the environment is moderately healthy; however, they do recognize threats to sagebrush ecosystems. Public acceptance is relatively high for the use of prescribed fire, grazing, felling woodland trees, and mowing shrubs, but low for herbicide treatment and chaining. Although respondents indicated high levels of acceptance for some management actions, they expressed relatively low levels of trust in land management agencies to implement these actions.

Resumen

Las comunidades intactas de *Artemisia sp.* en la región del Great Basin del oeste de EEUU están desapareciendo rápidamente debido a la invasión de plantas exóticas, grandes incendios, y la invasión de montes de *Pinus sp.* y *Juniperus sp.* Existen opciones de manejo que incluyen el uso de fuego prescrito, pastoreo, herbicidas, o tratamientos mecánicos que pueden reducir el potencial de incendios y restaurar las comunidades vegetales. La aceptación por parte de la opinión pública de las acciones de manejo y su confianza en que los entes del gobierno puedan llevar a cabo dichas acciones, son componentes críticos en la generación e implementación de planes de manejo que sean exitosos en el largo plazo. Este estudio examina las opiniones y percepciones de los ciudadanos acerca de acciones de manejo de pastizales naturales en la región del Great Basin. En el otoño de 2006 condujimos una encuesta por correo de hogares seleccionados al azar en tres zonas urbanas y tres zonas rurales del Great Basin recibiendo 1.345 respuestas válidas que correspondieron a una tasa de respuestas del 45%. En términos generales, los encuestados perciben al ambiente como moderadamente saludable sin embargo reconocen que existen factores que amenazan los ecosistemas de *Artemisia sp.* La aceptación pública del uso de fuego prescrito, pastoreo, corte de árboles del monte, y desmalezado de arbustos es relativamente alta, sin embargo la aceptación del uso de herbicidas y control de leñosas mediante el uso de cadenas es bajo. Si bien los encuestados expresaron altos niveles de aceptación de algunas acciones de manejo, expresaron niveles de confianza relativamente bajos de que los entes del gobierno encargados del manejo de las tierras implementen dichas acciones.

Key Words: fuels treatment, restoration, social acceptability, trust, urban–rural

INTRODUCTION

Wildfires in the western United States are getting bigger and more destructive. The National Interagency Fire Center (NIFC 2009) reports the number of wild-land acres burned nationwide in the last decade has risen markedly since the 1990s, even though the total number of fires has decreased. Even when such fires burn sparsely settled rangelands they nonetheless kill livestock, destroy buildings, and fill downwind urban areas with smoke that diminishes air quality and affects people with lung ailments. Several factors have converged to cause this increase in wildfire

size and significance. In the Great Basin region, two of the most important are ongoing invasions of sagebrush-dominated rangelands by nonnative grasses such as cheatgrass and the expansion of woody species such as junipers (Shinneman and Baker 2009). Effects of these processes include altered fire regimes as the amount and flammability of fuels increase, changes in soil fertility, loss of forage production, and changes in wildlife habitat (Miller and Tausch 2001). In many instances, scientists believe degraded rangelands are crossing ecological thresholds (Rapport and Whitford 1999; Chambers et al. 2007).

About 70% of the area's remaining sagebrush habitat is under federal management; consequently the conservation and restoration of sagebrush lands are top priorities for the Bureau of Land Management (BLM) and the Forest Service (BLM 2002). However, these agencies traditionally have had mixed success in garnering public support for management programs (Satyal 2006; Wilmot and Brunson 2008). Effective restoration of rangeland ecosystems will require consideration of citizens in

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the region and their acceptance of specific practices, as well as confidence in the agencies that implement them. Because public acceptance of resource practices can be highly contextual to people and the places they care about (Stankey and Shindler 2006), resource managers need timely information about the communities they serve.

The Sagebrush Steppe Treatment Evaluation Project (<http://www.sagestep.org>) has been evaluating the effects of alternative management practices for rangeland restoration and wildfire risk reduction in the Great Basin. As part of this project, we studied citizen perspectives of different management options for the region's rangelands, as well as public trust in agencies to carry out these management options. Our purposes were (1) to identify perceived threats to rangeland health, (2) to examine support for a set of common management alternatives, (3) to identify influences on public acceptance of management practices, (4) to assess trust in resource managers and how citizens judge the nature of their interactions with resource agencies, and (5) to identify and characterize any differences between rural and urban residents who may have different expectations for management.

The ecological and economic stability of the Great Basin is increasingly at risk because of the expansion of fire-prone invasive species and the increase in wildfires (Pellant et al. 2004). Federal managers seeking to abate these threats often need the support of constituencies that know little about the inherent problems, as well as those who have an economic or personal stake in the outcomes. Resource managers have a variety of tools at their disposal to reduce the threat of wildfire—prescribed fire, woodland tree felling, shrub mowing, livestock grazing, etc.—but even with greater awareness among residents, they often face barriers to using them. Indeed, public acceptance of such activities can be low (McCaffrey 2006; Toman et al. 2006) and citizens have alternatives (e.g., litigation, political action, use of media) to slowing management plans or blocking them altogether. Often at issue are economic and environmental objectives, attitudes about specific practices, perceptions of risk, or lack of communication about potential solutions.

Complicating the task of understanding and gaining acceptance for proposed actions is that public opinion tends to vary geographically (Brunson and Shindler 2004). Human population in the Great Basin is concentrated in a few urban centers, whereas the people most closely affected by fuels and vegetation management decisions typically live in sparsely populated rural areas. Thus managers must respond to the immediate needs of rural citizens without ignoring the perspectives of more numerous urban stakeholders. Urban residents tend to be less knowledgeable about management activities and ecosystem processes than their rural counterparts, and more concerned about environmental than economic objectives (Buttel 1992; Brunson and Steel 1996). For people who live in a rural setting, the land is their home and often their livelihood; for people in the city, it is a place to play (Davenport and Anderson 2005). Farmers and ranchers often characterize themselves as stewards of the land; rural residents are more likely to perceive habitation and economic use of land as defining features of their home regions (O'Neill 2005). Studies of public perspectives on rangeland management in the Great Basin largely have been place based, focusing on residents' opinions in single states or

communities (e.g., Smith and Rebori 2001; van Kooten et al. 2006). No published study has described attitudes regarding natural resource management across the Great Basin nor compared the perspectives of rural and urban constituencies.

Proponents of scientifically based changes in management or policy often presume a knowledge-deficit model, which holds that lay opposition to a proposed action reflects a lack of scientific understanding, and thus citizen acceptance can be gained by well-designed education programs (Hansen et al. 2003; Kellstedt et al. 2008). Yet studies in ranching, forestry, and fishing communities show that public acceptance of management change depends on a suite of factors, including political costs of change, past relationships among stakeholders, beliefs about the appropriate relationship between humans and nature, and differing types of knowledge about the system being managed (Weeks and Packard 1997; Olsen and Shindler 2010). Although rejection of a simple knowledge-deficit model doesn't mean no such deficit exists (Miller and Tausch 2001), it does mean studies of public acceptance and understanding must consider other factors as well. Citizen trust in natural resource agencies is among the most significant elements in public support of or opposition to management activities (Winter et al. 2004; Liljebld and Borrie 2006), and is particularly relevant to understanding citizen perceptions of proposed actions to reduce rangeland wildfire hazard. Previous research in forest settings has shown that trust can be damaged by citizens' perceptions of prior management outcomes (Brunson and Evans 2005) and that acceptance of management practices is lower when trust is lower (Shindler and Toman 2003).

Citizen trust toward natural resource agencies and their activities is directly related to the history of interactions between managers and stakeholders (Schusler et al. 2003; McCaffrey 2006). A number of positive examples of agency-community collaborations, particularly around fire and forest health initiatives, have sprung up in recent years. Success is often attributable to relationship building that includes good leadership, interactive planning programs that involve citizens, improved agency communication and outreach, and genuine give-and-take among stakeholders (e.g., Burns et al. 2008; Toman et al. 2008). Few success stories of this type have been told about Great Basin communities, perhaps because other parts of the West have had a more severe fire history and, thus, more time (and greater need) for communities to come together. One objective of this study was to assess current citizen-agency relations in the region.

METHODS

Our research on citizen responses to management options includes two phases. The first involved interviews in July and August 2006 of members of stakeholder groups as well as land managers throughout the region (Brunson and Peterson 2007). Among the management challenges emerging from these discussions were the need for restoration, levels of support, and trust among local citizens, and agencies' willingness to incorporate local concerns into management (Brunson 2008). Themes identified during the interviews were used to develop a survey, administered in September–November 2006, which

elicited quantitative data about citizen perceptions across the Great Basin region.

The geographic makeup of the region—large expanses of federal lands, interspersed with numerous small communities and far fewer, but significant, urban areas—helped direct the research design. A mail-back survey methodology was used following standard Dillman (1978) routines, including a three-wave protocol. An equal number of randomly selected households in three urban and three rural regions of the Great Basin were surveyed and included the cities of Boise, Reno, and Salt Lake City, and rural areas in Elko and White Pine Counties in Nevada, Lake and Harney Counties in Oregon, and Beaver and Millard Counties in Utah. The urban areas were chosen because they are the region's largest population centers.

The survey gathered data about perceptions of rangeland health and associated risks, attitudes toward specific sagebrush management practices, trust in management agencies, and interactions between local citizens and agency personnel. Measures of acceptance (an attribute of citizen perception) and acceptability (an attribute of the practices themselves) followed previous work by the authors (e.g., Shindler and Toman 2003; Brunson and Shindler 2004; Brunson and Evans 2005). Following Winter et al. (2004) and Flynn et al. (1992), we examined trust in terms of two primary dimensions: (1) confidence in an agency's competence, i.e., the ability of its personnel to implement desired practices safely and effectively; and (2) perceived sincerity, i.e., a perception that managers have undertaken genuine efforts to engage citizens in social interaction in order to inform management decisions. Measures of both dimensions were included in the survey, the former in references to management activities, the latter in the context of interactions with agency personnel.

Overall, 3 600 surveys were mailed, 600 within each of the six regions. For comparative purposes, results have been combined for the three cities and the three rural areas to highlight where differences exist. Because the study-area populations were not identical, results were weighted according to US Census Bureau population estimates for 1 July 2006, 2 mo before the survey was administered. Following Needham and Vaske (2008), weights used for each study area were calculated as the population percent (ratio of the study area population to the total population, either rural or urban) divided by the sample percent (ratio of study area response to total response). Results are reported at significant at $P < 0.05$ with the use of a χ^2 test unless otherwise stipulated. After accounting for 636 surveys that were undeliverable, 1 345 were completed and returned for an overall response rate of 45%. Study-area response rates ranged from 40% (Reno) to 55% (Millard/Beaver, Utah). Although response rates to natural resource surveys have been declining over time (Connelly et al. 2003), the level of response to our study is regarded as sufficient for a descriptive study of this nature (Needham and Vaske 2008).

RESULTS

Respondent characteristics were similar across all six study sites. Participants had a mean age of 57 yr, a figure equal to the mean age in the region for the over-18 age group who were potential respondents (US Census Bureau 2000). As is common

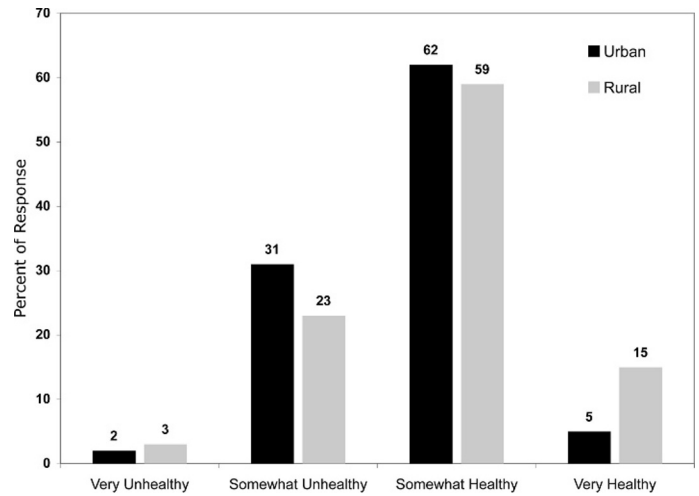


Figure 1. Respondents' assessment of the health of natural environments in the Great Basin. Values reported as weighted percentages. Urban and rural respondents' ratings differed significantly ($P \leq 0.001$; χ^2 analysis; $N = 1\ 100$).

for surveys in rural areas and on natural resource topics (Vaske et al. 2007), males were overrepresented (75%) in the sample. To test for possible gender bias we compared male and female responses and found few relevant differences, only that men were slightly more accepting of the use of prescribed fire and women preferred environmental preservation over economic uses for the Great Basin. Most participants were long-term residents of their community (25 yr on average). One primary difference in respondent attributes was educational level. Among the urban group, 58% had graduated from college, whereas 31% of the rural group had done so.

Perceptions of Environmental Conditions and Threats to Rangelands

Figure 1 shows that, overall, respondents believe the region's rangelands are moderately healthy but rural residents rate conditions as significantly better than do those from urban areas. Despite the overall positive assessment, substantial numbers of respondents recognized threats to sagebrush ecosystems (Fig. 2), especially from invasive species, development, impacts to riparian systems, off-highway vehicles (OHVs), overgrazing, and wildfire. Rural participants were more likely to perceive threats that are attributable to ecological processes, such as juniper encroachment, overly dense sagebrush, or wild-horse overpopulation. On the other hand, urban residents are more likely to attribute threats to human activities such as development, OHV use, poorly managed livestock grazing, and mining activities.

Environmental vs. Economic Trade-Offs

Many range management issues involve difficult decisions that include making trade-offs between maintaining environmental conditions or favoring economic considerations. Respondents showed their preference on a seven-point scale that indicated their priority for one option even if there were negative consequences for the other (Fig. 3). They could also select a midpoint that gave equal priority to environmental and

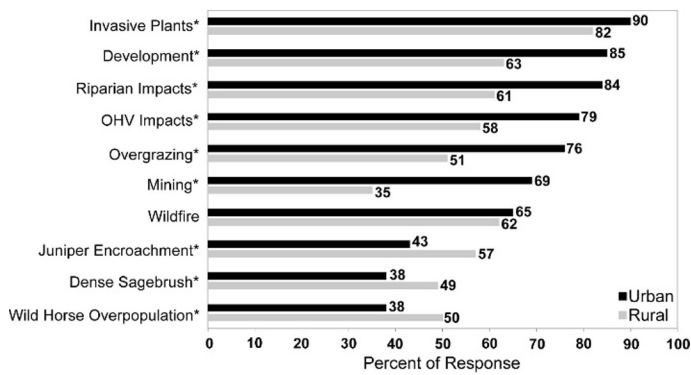


Figure 2. Perceived threats to rangelands. Response options were on a four-point scale from *strongly disagree* to *strongly agree* with a *don't know* option. *Strongly agree* and *agree* responses are combined for presentation purposes. *Don't know* responses were minimal and removed for this analysis. Values are weighted percentages. *Indicates a significant difference between urban and rural responses ($P \leq 0.05$; χ^2 analysis; $N = 1345$ and varies slightly by question).

economic factors. Ratings show that urban residents are far more concerned with preserving natural conditions with little interest in economic consequences. Not only were the rural residents more evenly distributed in their views, the majority favored giving both factors equal consideration.

Acceptance of Management Practices

Resource managers have a number of options for restoring ecosystems and reducing fuels that can lead to large wildfires. To determine public acceptance of practices respondents were asked their opinion about the use of six commonly used methods for changing conditions on rangelands (Table 1). Overall, public acceptance is relatively high for managing conditions via prescribed burning, grazing, woodland felling, and shrub mowing. If we consider responses of citizens who offer at least minimal levels of acceptance—those who believe a practice can be used widely and those who believe it should be used sparingly (the common form of agency implementation)—a majority of citizens in both rural and urban areas support some use of these practices.

Rural residents expressed a higher level of support for grazing and felling, but these practices were generally acceptable to both groups. This is not the case for spraying herbicides or chaining (i.e., removing juniper trees by dragging a heavy chain between two bulldozers). Both practices are moderately acceptable to rural residents, but not to urban residents, where many more judged each of these as unacceptable (by choosing the “should not be considered” or “is unnecessary” option).

Trust and Interactions with Agencies

In a separate question respondents used a four-point scale (*none, limited, moderate, full*) to answer the question, “How much do you trust federal agencies like the BLM or Forest Service to use these practices on rangelands in the Great Basin?” These ratings were less positive than the acceptance responses. When trust scores are placed side by side with acceptability scores for treatments (Fig. 4) the differences are

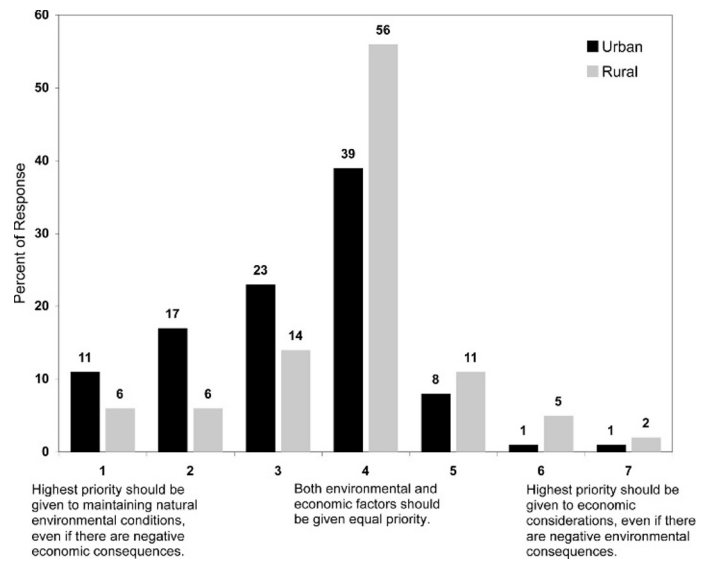


Figure 3. Respondent evaluations of the trade-off between environmental and economic factors when making decisions about Great Basin rangelands. Values represent weighted percentages of responses on a seven-point scale. Urban and rural responses differed significantly ($P \leq 0.001$; χ^2 analysis; $N = 1194$).

easily seen. Trust levels are substantially lower for all six practices. Looking closer at the differences between the two groups, rural residents expressed higher levels of confidence in federal agencies to manage livestock grazing as well as herbicide and chaining treatments. However, they showed less confidence in managers when it came to using prescribed fire, perhaps because they are more directly affected if a prescribed fire gets out of control.

We probed the second and broader dimension of trust—belief in the sincerity of interactions with agencies—by asking respondents to characterize their interactions and experiences with local personnel from the BLM or Forest Service. Research has demonstrated the importance of positive citizen–agency interactions in developing support for management activities (Winter et al. 2004; Olsen and Shindler 2010). Response choices for a set of statements included a four-point scale (*strongly disagree* to *strongly agree*) and a *don't know* option. Table 2 reports percent of those who agree or strongly agree as well as those who selected the *don't know* response.

Overall, respondents were critical of agency actions (Table 2). The weak level of agreement with the first three statements where respondents could speak in favor of agency planning processes suggests citizens are not satisfied. Both participant groups gave agencies particularly low marks for trust building and their use of public input. At the same time, they saw few opportunities to participate and were skeptical of the information provided by agencies. A majority acknowledged that restrictions at the national level often constrain local agency staff from doing their jobs. A rather glaring feature of this table is the number of respondents who answered *don't know* to individual statements—particularly urban participants—a situation that makes responses between the two groups significantly different for all items and, consequently, more difficult to interpret overall. In any case, this level of *don't know* responses

Table 1. Acceptability of management options for fuel hazard reduction and sagebrush ecosystem restoration. Values are weighted percentages.

This practice...	Prescribed fire		Livestock grazing ¹		Felling trees ¹		Mowing shrubs and grass ¹		Herbicide application ¹		Chaining trees ¹	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
Is a legitimate tool that land managers should be able to use whenever they see fit	39	41	48	63	22	42	27	35	11	24	11	31
Should be done infrequently, only in carefully selected areas	45	40	31	18	42	31	34	35	34	36	24	33
Should not be considered because it creates too many negative impacts	6	8	8	5	14	9	11	8	24	17	24	11
Is an unnecessary practice	4	5	4	4	9	9	9	11	20	14	23	13
Don't know	7	6	10	10	14	9	19	11	12	10	19	12

¹Indicates a significant difference between urban and rural responses ($P \leq 0.05$; χ^2 analysis; $N = 1345$ and varies slightly by question).

suggests a lack of exposure to management agencies, particularly among urban residents.

Correlation Among Factors

To understand which factors play a role in respondents' acceptance of specific management practices for the Great Basin, a correlation analysis was conducted with the use of six factors: (1) respondent's assessment of the health of Great Basin rangelands, (2) perceived threat of wildfire to rangelands, (3) preference for maintaining natural conditions or economic considerations, (4) respondent education level, (5) the quality of citizen–agency interactions (based on composite scores for the statements shown in Table 2), and (6) trust in managers' competence to use a specific management practice. For each correlation, the dependent variables were acceptance of

prescribed fire, livestock grazing, felling, mowing, herbicide application, and chaining (Table 3).

Among both rural and urban residents, positive assessment of conditions in the Great Basin is correlated with greater acceptance of grazing but not with acceptance of other vegetation-change practices. A striking rural/urban difference pertained to the influence of perceived threat from wildfire. For rural residents, *lower* levels of perceived threat indicated greater acceptance of prescribed fire and chaining, whereas among urban residents a *higher* perceived threat was associated with greater acceptance of grazing. Respondents who weighed economic considerations over environmental concerns tended to have greater acceptance of grazing, felling, herbicide application, and chaining within both groups. Among urban respondents this relationship also held true for mowing. A higher level of education was positively correlated with greater acceptance for most practices (prescribed fire, felling, mowing, chaining), but only among rural respondents; there was no correlation between education and acceptance for urban residents. Positive interactions with federal agency personnel were significantly related to greater acceptance of prescribed fire, grazing, felling, and mowing among urban residents; but for rural residents these interactions only accounted for greater acceptance of prescribed fire. Finally, trust in agency competence was the most highly correlated factor in acceptance of each practice. The robust scores indicate that in all cases higher levels of trust among both urban and rural populations translated to greater acceptance of management practices.

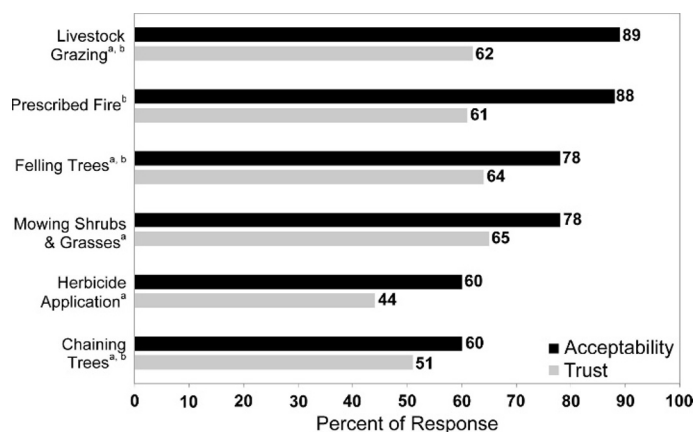


Figure 4. Acceptability of practices and trust in agencies to implement them. Values represent weighted percentages from full respondent sample ($N = 1345$). Acceptability scores are combined percentages from first two categories shown in Table 1. Trust scores are based on a four-point scale (no, limited, moderate, or full trust) of federal agencies to use specific practices on rangelands in the Great Basin. Percentages for moderate and full trust are combined for presentation purposes. *Don't know* responses were minimal and removed for this analysis. ^aIndicates a significant difference between urban and rural responses about the acceptability of a practice ($P \leq 0.05$; χ^2 analysis). ^bIndicates a significant difference between urban and rural responses about trust in agencies to carry out a practice ($P \leq 0.05$; χ^2 analysis).

DISCUSSION

Rangeland restoration and management require consideration of the biological and social factors bearing on management of range ecosystems. We examined the social acceptability of different vegetation management options for Great Basin rangelands, as well as public trust in agencies to carry out these management options. We surveyed randomly selected households throughout the Great Basin, focusing on both urban and rural communities. This last distinction is critical because our findings demonstrated the region's urban and rural residents are two relatively different groups of stakeholders. This point is important to federal land managers who are entrusted with making decisions for the "public at large," but

Table 2. Agreement with statements about interactions with land management agencies. Response options were on a four-point scale from *strongly disagree* to *strongly agree*, with a *don't know* option. *Strongly agree* and *agree* responses are combined for presentation purposes. Values are weighted percentages. Significant differences in response frequencies were noted between urban and rural residents for all statements ($P \leq 0.05$; χ^2 analysis; $N = 1\,345$ and varies slightly by statement).

Statements about interactions	Percent agree (don't know)	
	Urban	Rural
Agency information about projects usually provides a good explanation of options and consequences.	43 (38)	46 (25)
Federal managers use public input to help make decisions.	20 (40)	27 (20)
Federal managers effectively build trust and cooperation with local citizens.	17 (38)	21 (20)
There are few opportunities for citizens to participate in the agency planning process.	52 (32)	59 (18)
I am skeptical of information from federal management agencies.	51 (23)	61 (14)
Local agency staff are constrained from doing their jobs by government restrictions at the national level.	53 (37)	61 (28)

most often must implement plans in locations close to rural communities where the stakes are higher, and certainly more visible, for local residents. The complexities of restoring lands for such a diverse public make understanding these audiences an essential part of the management job. This task is exacerbated by the second major theme that emerged from our findings: relatively low levels of public trust and confidence in federal management agencies throughout the Great Basin. Yet, these elements are probably the greatest single factor in determining public support for programs targeting restoration and wild-land fire management (McCaffrey 2006; van Kooten et al. 2006). Under the umbrella of these major themes, our study reveals several additional noteworthy findings.

First, a number of influences upon Great Basin rangelands are perceived as threats by a majority of both urban and rural respondents. These include biological processes (nonnative plant invasions, riparian degradation, wildfire) and anthropogenic processes (home development, OHV use). However, except for wildfire and invasive plants, there remain differences in the *degree* to which these are perceived as threats, with urban residents more likely to see risks posed by human activities and rural publics more likely to perceive risks from biological processes. Thus there is likely to be substantial disagreement between publics about which aspects of those processes produce the threat, and how those can be mitigated. Even so,

the widespread recognition of threats suggests that it may be possible to build consensus about which high-priority issues managers should tackle first, or even to find areas of common ground.

Second, we found solid evidence that citizens can support the use of several practices for sagebrush rangelands in the Great Basin, particularly prescribed fire, livestock grazing, felling, and mowing. Even if respondents say treatments should be done infrequently and only in carefully selected areas, this nonetheless suggests they endorse the validity of active management approaches as used by federal agencies. Yet it is important to note that among those who find these practices acceptable, rural residents tend to hold those views more strongly. It is likely they have become more familiar, and thus more comfortable, with the use of prescribed fire over time and more readily see the need for removing woodland species as they encroach on rangelands. Because many of these individuals also have a greater stake in grazing activities, it is no surprise they are more willing to give managers full discretion to use this particular practice over any other.

Third, when acceptability scores are paired directly with trust in managers to use these same practices (Fig. 4), we see that willingness to accept a practice based in concept does not equate to confidence in federal agencies to implement that practice safely or effectively. Much research has already

Table 3. Correlations between acceptance of management practices and selected variables. Acceptance was treated as a ranked ordinal variable (see Table 1), with the *legitimate tool* response in the highest position, the *infrequent use* response in the middle position, and the *negative impacts* and *unnecessary* responses combined in the lowest position. The interactions with federal agency personnel scale includes all six items from Table 2 (with responses to the last three statements reverse-coded to reflect a positive directionality).

Correlation variable	Acceptance of...											
	Prescribed fire		Livestock grazing		Felling trees		Mowing shrubs and grasses		Herbicide application		Chaining trees	
	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural	Urban	Rural
Positive assessment of natural conditions in the Great Basin	-0.003	-0.029	0.191 ¹	0.136 ¹	0.023	0.029	0.099	0.011	0.019	-0.021	0.054	0.067
Perceived threat of wildfire to health of rangelands	-0.032	-0.139 ¹	0.142 ¹	0.002	0.024	-0.071	0.064	0.025	0.087	0.037	-0.014	-0.085 ¹
Preference for natural conditions or economic considerations	0.033	0.012	0.268 ¹	0.246 ¹	0.176 ¹	0.120 ¹	0.193 ¹	0.068	0.287 ¹	0.146 ¹	0.227 ¹	0.192 ¹
Respondent education level	0.022	0.128 ¹	-0.054	-0.088 ¹	0.079	0.124 ¹	-0.029	0.103 ¹	0.030	0.067	-0.006	0.086 ¹
Interactions with federal agency personnel (scale)	0.231 ¹	0.179 ¹	0.179 ¹	-0.087	0.205 ¹	0.036	0.165 ¹	0.059	0.097	0.066	0.126	0.037
Trust in agencies to use specific practice	0.351 ¹	0.446 ¹	0.370 ¹	0.271 ¹	0.364 ¹	0.427 ¹	0.435 ¹	0.409 ¹	0.489 ¹	0.464 ¹	0.456 ¹	0.482 ¹

¹Indicates a significant correlation ($P \leq 0.05$; Spearman; $N = 1\,345$ and varies slightly by question).

focused on trust in managers to use prescribed fire. Lack of trust can stem from simple unfamiliarity with a practice (Shindler et al. 2009); competence factors such as negative effects of smoke (Brunson and Evans 2005) or fear of fire getting out of control (Winter et al. 2004; Brunson and Evans 2005); sincerity factors such as poor communication between agencies and the local community (McCaffrey 2004); or a more general perception that the agencies do not share citizens' goals, thoughts, or values (Vaske et al. 2007). In our study, levels of trust in managers to use grazing, felling, and mowing treatments were similar to that of prescribed fire, with only minor differences among the urban and rural groups. Given that the risk to humans from the latter practices tend to be less than those from prescribed fire, it appears that trust in specific practices is not solely a function of perceived competence, but is more likely due to an interaction of multiple influences.

The Great Basin is not a monolithic community where citizens all agree on issues. For example, researchers recently reported a decline in relations among Nevada ranchers and the Forest Service and BLM (van Kooten et al. 2006). On the other hand, a longitudinal study (2002–2008) of fire-prone communities by Shindler et al. (2009) reported an increase in confidence among residents in Salt Lake City and nearby suburbs regarding the use of prescribed fire, due mainly to improved relations with local land managers. Reasons for lack of trust can be different for each practice and isolated by setting or demographic group. Whether it is from a previous negative experience with a particular treatment (i.e., an escaped burn) or suspicion about a federal government program, trust is variable and complex. Once reasons are identified, as in a study of this type, managers can start to address these individual concerns.

A fourth and closely related component is our findings about respondents' interactions and experiences with land management agencies. These are among the lowest ratings we have measured for citizen–agency interactions anywhere in the United States (e.g., Shindler et al. 2009, Olsen and Shindler 2010). Some of this, no doubt, is an artifact of the large number of individuals who simply have not had been exposed to agency personnel. However, the scores still indicate citizens are not happy with the type of information they receive or the role they have in planning and decision processes. The first situation may present an opportunity. There is a large segment of the public, especially in urban areas, who have yet to interact with agency personnel and receive messages about restoring the Great Basin—from understanding the relevant issues to seeing implementation of restoration activities. Outreach programs seem an important method for communicating with and influencing this segment of the public.

The second situation—skepticism about agency information and access to planning processes—is certainly more problematic, yet the stability of the Great Basin is dependent on people learning to work together and coming to agreement about solutions (Pellant et al. 2004). Findings from previous research provide clues on how managers can begin to build these relationships. Residents often seek opportunities and locations (e.g., demonstration sites, field trips, small workshops) where they can truly interact with resource professionals, especially if they are able to have give-and-take discussions that include listening on the part of managers (Toman et al. 2006; Shindler et al. 2009). However, if a management organization is perceived as ineffectual and not fully committed to participatory processes,

then little satisfaction is achieved. Similarly, participation in collaborative efforts that participants find to be divisive can lead to a loss of trust (Wagner and Fernandez-Gimenez 2008). A rift between the public and an agency only deepens when citizens do not feel they are really heard or that their time has been wasted. Nonetheless, in other locations throughout the West, where management units have fully committed to engaging citizens, interactive forms of communication are paying dividends (e.g., McCaffrey 2004; Toman et al. 2008).

Another outreach mechanism that seems to be important for residents is programs that come through local initiatives rather than as mandates from Washington, DC. The ability to address rangeland problems at the local level makes sense, especially for individuals who identify with particular places and have a history with the land. This approach also can allow problems to be solved while they are still relatively small rather than when they become landscape-level concerns (Pellant et al. 2004).

Finally we sought to identify specific influences on public acceptance of management practices. Results of this analysis were not always easily interpreted, but several factors stood out. Most notably, trust in agencies was the most highly correlated factor with acceptance by both rural and urban respondents for all six treatment options. Thus, confidence in managers—more than concerns about range conditions or risk perception—plays an important role in acceptance of management actions. When relations are already strained, the complexities of building trust are numerous and may seem insurmountable. But when trust-building is viewed as a continual process encompassing a suite of attributes—ones that will not necessarily produce a quick fix, but rather become a normal way of doing business—then the goal of *trustworthy relations* (Shindler et al. 2002) is realistic. Part of the answer must come from demonstrating the ability to employ these practices confidently (Brunson and Evans 2005). However, a truly interactive planning philosophy can also be critical. The freedom to try new ideas, give citizens a legitimate role in the planning process, and adapt as outcomes are evaluated requires both a shift in management culture and an enduring organizational commitment (Cortner et al. 1998). Success will come as agencies install an adequate support system, encourage departures from standardized public involvement processes, and recognize the good work of those who are being asked to take their place on the front lines.

IMPLICATIONS

The traditional National Environmental Policy Act process is frequently cited as an insufficient means for involving citizens in land management planning, in part because it emphasizes one-way communication methods that do not fully incorporate citizens' needs and concerns (Shindler et al. 2002). More recently, the Healthy Forests Restoration Act of 2003 has specifically directed federal agencies to work collaboratively with communities. It is important to note that when researchers have asked citizens how they would like agencies to communicate with them, the consistent response is interactive forms of communication that involve methods for genuine give-and-take discussion (Toman et al. 2006, 2008). Our findings further underscore this message.

Certainly solutions in the Great Basin, as elsewhere where forests and rangelands are threatened, are complex and dynamic. Stankey and Shindler (2006) note that public acceptance of management actions is a function of technical understanding *and* personal experience. With (at least) two distinctly different audiences in the Great Basin, managers will have to pay close attention to their local constituency while also considering those further afield. Recognizing differences can lead to considering different methods for interactions with urban and rural groups. Nelson (2002) asserts these will need to include both economic and cultural differences. In the short term, however, property values, job opportunities, recreation activities and places, and communities that view themselves as stewards of the land are all common interests that can bring people together. In rangeland settings O'Neill (2005) suggests limiting planning activities to smaller areas to avoid major conflicts, at least until a few successes have been achieved that can be built upon. For managers, a practical initial step could be to take the information from studies such as this and engage local citizens to discuss whether this is an accurate picture of their community. From this discussion, managers and citizens can work together toward agreeing on the rangeland values that are most important to maintain or restore. Providing opportunities for people to assess information about places that are important to them, including the risks and uncertainties of management alternatives, can bring them closer to lending support to eventual decisions.

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