People, Forests, and Change:
Lessons from the Pacific Northwest
Edited by Deanna H. Olson and Beatrice Van Horne
Published by Island Press, 2017

Chapter 18

Enhancing Public Trust in Federal Forest Management

Michael Paul Nelson, Hannah Gosnell, Dana R. Warren, Chelsea Batavia, Matthew G. Betts, Julia I. Burton, Emily Jane Davis, Mark Schulze, Catalina Segura, Cheryl Ann Friesen, and Steven S. Perakis

The connections between social and biophysical sciences are being forged in new ways as researchers and practitioners of natural resources seek to understand how lands can be managed for the benefit of human societies and the broader biotic community. Increasingly, we recognize that social and physical systems are tightly integrated, with human actions and decisions both shaping and shaped by the ecological systems in which they are embedded (e.g., Carpenter et al. 2009). In this context, a variety of social actors, including scientists, managers, policy makers, and the public, are collectively playing a larger role in decisions about environmental governance (e.g., collaboratives, chap. 9), drawing upon an accumulating body of knowledge describing the dynamics of complex socioecological systems. Learning-based approaches using adaptive-management experiments (chap. 8) represent one particular type of formal tool that can be appropriated to this process of adaptive environmental governance.

Consideration of ethics is another important if underappreciated part of environmental decision making (Doak et al. 2008). Analysis of the implicit values and ethical frameworks underlying natural resource management can help us understand, for example, how the influence of science on environmental policy changes over time, or how the public response to management decisions may shift. In this chapter we consider the integration and feedbacks between social and biophysical data, providing ideas about how to more fully understand and design planning and implementation processes on public lands.

In the Pacific Northwest, current social and environmental changes (e.g., growing human population, changing land use, climate change) appear to be intensifying pressure on natural resources such as forests (Hays 2006; Spies and Duncan 2009; Spies et al. 2010). At the same time, public knowledge, values, and perceptions intersect in social goals and expectations for federal forests, at times even propelling movements to effect profound institutional change in the laws, policies, and science that govern federal forest management (Franklin and Johnson 2014; Winkel 2014). In these dynamic times, policy prescriptions can become confused, confusing, and even aberrant when they fail to thoughtfully engage with public attitudes, perceptions, and values. Potential outcomes include decreased stakeholder involvement, failure to address critical environmental or sociopolitical issues, and loss of trust in the process of natural resource management.

In particular, trust is an increasingly important factor underlying successful management of public forestlands. When the public trusts natural resource agencies, public approval of management decisions increases, resistance to planning efforts is minimized, and managers have more latitude to experiment and engage in adaptive management (Lachapelle and McCool 2012). By reducing social resistance to public forestland management, trust can also accelerate management actions and reduce total project cost. Conversely, without the trust of the public, social acceptability of active forest management on public lands tends to falter, creating delays and additional costs that generally impede management activities. Therefore active and effective management requires that the public, and key stakeholders in particular, trust land managers, granting them the latitude to pursue the management interventions most likely to maintain ecosystem health and resilience in light of changing social and biophysical conditions.

Trust can be defined as "a psychological state in which one actor (the trustor) accepts some form of vulnerability based upon positive expectations of the intentions or behavior of another (the trustee), despite inherent uncertainties in that expectation" (Stern and Coleman 2015). It is widely held that, beginning with controversies surrounding the logging of old-growth forests on federal lands, the cycle of trust (fig. 18.1)—with the public as trustor and forest managers as trustees—has broken down across the moist coniferous forest landscape of the US Northwest, resulting in a loss of social acceptability of many active forest-management practices on public lands (Spies and Duncan 2009). Thus this region offers a unique opportunity to explore trust in timber-harvesting practices, and more broadly, the cycle of trust around management of public lands.

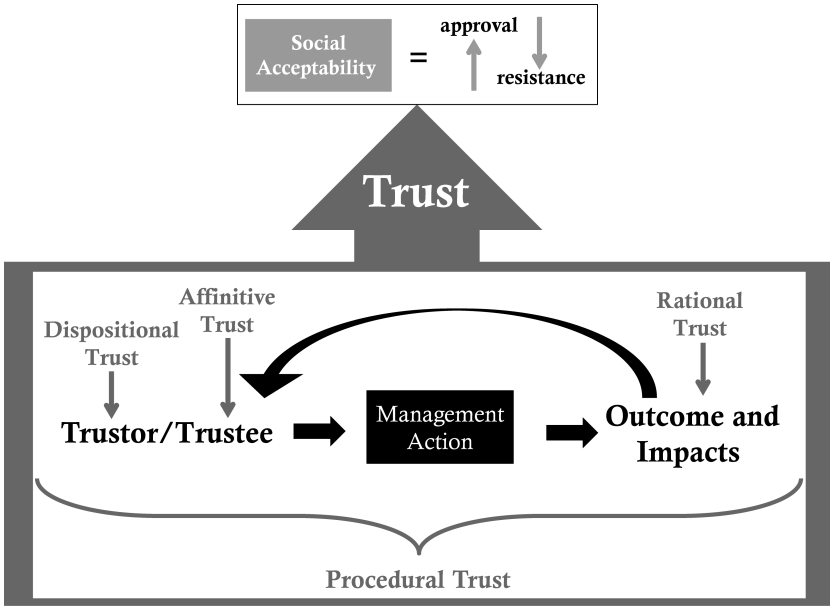

FIGURE 18.1. The trust cycle. Increased approval and decreased resistance generally follow from social acceptability. Trust is a necessary condition for social acceptability but can break down in a variety of ways—each in turn implying unique conditions for remediation. There are four components of the trust cycle: *Procedural trust* is based on the institutional structures regulating a management action. *Affinitive trust* is based on the character or qualities of the trustee. *Rational trust* is based on the calculated utility—outcomes and impacts—of a management action, as well as the trustee's ability to deliver those outcomes and impacts. *Dispositional trust* is the predisposition of a trustor to be trusting. In a natural resource context, these four dimensions of trust interact to influence management actions, the outcomes of which subsequently inform future trust dynamics. Cycles that foster trust generally reduce social resistance and increase social acceptability, while cycles that degrade trust or cultivate distrust do the opposite. Inspired by Stern and Coleman (2015).

Although many people believe public trust in federal agencies and land managers has diminished, the actual process by which the public has lost trust in federal land-management agencies remains unclear. That is, we currently lack a sophisticated scientific understanding of *why* the public does not trust federal stewardship and management. It stands to reason that, unless we know *why* public trust has diminished, we will fail to understand *how* public trust might be regained. Therefore we suggest the research

community needs to continue building upon a small but robust body of work on the social acceptability of different management approaches in the Northwest (e.g., Shindler et al. 2002). Researchers also need to develop and empirically verify theoretical frameworks explaining how different kinds of trust interact with one another to influence overall trust in federal agencies, in order to contribute to practical, policy-relevant solutions.

In the following sections, we review four types of trust and incorporate these into a conceptual framework—a *trust cycle*—allowing us to partition and explore where and how trust may be lost or regained in the management of public lands. We focus in particular on the extensive moist coniferous forests of the Pacific Northwest, providing an example of how the social dynamics of trust around federal forest management in this region could be integrated into an interdisciplinary adaptive-management experiment. The goal of this hypothetical experiment would be not only to describe the multidimensional construct of trust, but also to understand how trust might most effectively be restored, in an effort to improve and facilitate management of federal forests in the Northwest.

Dynamics of Trust

Trust is not a monolithic phenomenon. Instead, it can be conceived as an interplay among at least four components (fig. 18.1), each of which has dynamic elements (box 18.1). Based on research dating at least to the mid-1970s, managers and scientists have developed an understanding of the relationship between public involvement in the management process on the one hand, and trust, social license (social acceptance for different management actions and objectives), and management success on the other. Wengert (1976:23) framed this well: "Participation and involvement . . . may induce modifications of values and opinions and increase confidence and trust. . . . Group discussions and exchanges of ideas are said to minimize hostility and may permit constructive collaboration." Although in this chapter we focus exclusively on the positive role of trust, we also point out that *distrust* has been identified as a critical factor motivating people to engage with participatory management processes (e.g., Parkins and MacFarlane 2015). From this angle, trust may be seen not as a key to social acceptability and cooperation, but instead as a precursor to public complacency, counteracting broader initiatives to more fully democratize public land management (e.g., Parkins and Mitchell 2005). This distinction empha-

BOX 18.1. TYPES OF TRUST IN A MANAGEMENT RELATIONSHIP

Four types of trust can be discerned in management relationships (Stern and Coleman 2015).

1. *Dispositional trust.* Some people demonstrate a "predisposition to trust others" and accept higher levels of vulnerability. Although largely an innate psychological trait, dispositional trust also can be rooted in a number of contextual factors, including past or current interactions with agency managers; agency reputation; and other social or cultural norms.

2. *Affinitive trust.* Affinitive trust deals with a trustor's willingness to accept vulnerability based on an assessment of the trustee's character or qualities, such as benevolence or integrity. Basically, if members of the public do not trust managers as people or do not believe managers have their best interests at heart, trust is likely to falter. Like dispositional trust, affinitive trust can be based on a number of variables, including past experiences with managers and beliefs about the manager's values.

3. *Procedural trust.* The structures surrounding and supporting a management action or direction form the basis for procedural trust. Largely a function of perceived legitimacy and credibility, procedural trust can be influenced by factors at a number of scales, from specific outreach and engagement efforts in local agency districts to trends in national politics. For example, recent scholarship reveals a perception by a large majority of agency scientists that political pressures are inappropriately influential in federal agencies (Goldman et al. 2015). This view likely contributes directly to the participating scientists' procedural trust (or lack thereof) in agency management.

4. *Rational trust.* This cognitive dimension of trust is based upon a trustor's calculation of the utility of a particular action, as carried out by the trustee. Rational trust is based not only on an expectation of beneficial outcomes but also on beliefs about the competence of the trustee to deliver those benefits. Thus members of the public may believe variable-retention harvest can be used to maintain late-successional habitat for endangered species, but if they do not believe agency personnel are capable of designing and executing relatively complex variable-retention harvest prescriptions, they may lack rational trust. Rational trust inherently requires sound information about likely outcomes, so the trustor has sufficient information to compare actions.

sizes the complexity of trust and the need to better understand it in shades and subtle nuances rather than broad strokes (Stern and Coleman 2015).

Genuine forms of citizen participation in planning, modifying, and even executing management actions appear to be critically linked to trust

and social license (e.g., Gray 1989). The qualification that participation be "genuine" is worth highlighting: people are more satisfied with public involvement processes when they believe their input actually informs management decisions (Daniels and Walker 2001). On the other hand, the public is likely to become disillusioned (and distrustful) if they feel the outcomes of participatory processes are not meaningfully incorporated into management decisions (Irvin and Stansbury 2004).

It is important to understand the multivariant nature of trust (box 18.1), because each component of trust is promoted by different efforts and different agents. Unless we understand where in the cycle (fig. 18.1) trust breaks down, we will not understand how to maintain or restore it. For example, if distrust is motivated predominantly by a lack of faith in the system, remediation likely requires a modification of that system to enhance its perceived trustworthiness. If distrust arises primarily out of the trustor's assessment of a trustee's character, that trustee might have some outreach or character-building work to do. If distrust arises because of the public's uncertainty about ecological impacts associated with a proposed action, certain research questions may warrant investigation, with results communicated through concerted education and public engagement efforts. In short, anyone interested in building social license to pursue active forest management by restoring public trust in federal land management must first identify the specific sources and implications of both trust and distrust.

Building Trust in Management: A Social-Ecological-Ethical Study

Having established trust as a powerful dynamic affecting management of federal forests in the Northwest, we provide an example of how a hypothetical social-ecological-ethical study could be tied to an adaptive-management experiment or pilot demonstration and be used to examine and potentially improve trust relationships.

General Experimental Design

Large-scale silvicultural adaptive-management experiments or demonstrations in Northwest forests carry high credibility among scientists, managers, and other stakeholders, including collaborative groups (chap. 9). These

studies, conducted at operational scales, are used to test the approaches that might be used across a spectrum of timber-harvest operations. While such studies often examine a forest's vegetation and structural components, such as down wood and snags, they vary in the degree to which other variables are measured and monitored. Social perception, in particular, is included in only about one-third of these experiments (Poage and Anderson 2007).

Large-scale silvicultural experiments have other limitations as well. For example, it may take a long time (on the order of decades) to amass interpretable data. Disturbances such as fire or disease can unevenly affect replicates or otherwise confound results. Treatment plots can be damaged or studies discontinued owing to fluctuating budgets, lack of agency commitment, or loss of personnel. As with any field study, results may not be generalizable, especially if site selection is biased or if there are not enough sites included in the experimental design for robust statistical analysis. Still, the credibility of such studies is heightened by common agreement that they address important questions; conform to many real-world constraints; are conducted at practically relevant scales; and have high degrees of inclusivity—for example, by involving both scientists and managers in study designs. They also serve as demonstration sites where people can openly view treatments and the resultant stands. Overall, large-scale silvicultural experiments have high potential to contribute to adaptive-management processes (Poage and Anderson 2007).

By effectively gauging public responses to new and existing demonstrations of active management, managers and scientists may be able to develop a better understanding of the trust dynamics underlying social acceptance on public lands. Silvicultural treatment plots can demonstrate a range of existing or proposed management prescriptions for more extensive implementation on federal forests in the Northwest. For example, restoration thinnings designed to accelerate development of late-successional forest attributes have already been widely employed on federal lands throughout the region (e.g., Manning and Friesen 2013). More recently, managers and scientists have become interested in implementing variable-retention harvests on federal lands, often to create early-seral, pre-forest conditions (e.g., Johnson and Franklin 2012). (Variable-retention harvest retains dispersed or aggregated live trees, and dead trees, to create environmental values associated with structurally complex forests [Franklin et al. 1997].) Demonstrations of these various approaches could create a spectrum of forest types at the broader landscape scale, which could then serve as a valuable backdrop for an interdisciplinary social-ecological-ethical research project.

Measurement of Biophysical Response Variables

Variable-retention harvests have been proposed as a method to create complex early-seral habitat in landscapes where decades of fire suppression and plantation establishment have reduced its occurrence (Takaoka and Swanson 2008). Such treatments are postulated to increase diversity, as compared with no treatment or a relatively uniform thinning, by encouraging the development of complex early-seral vegetation and habitat structure while retaining shade-tolerant, late-seral species. A number of plant and animal species depend upon early-seral habitat, including several migratory songbird species currently experiencing population declines (Betts et al. 2010). However, while the potential benefits to some biota and ecosystem processes are increasingly well understood (e.g., Mori and Kitagawa 2014; Seidl et al. 2014), variable-retention harvest is still controversial in the Northwest, at least in certain social circles where it is perceived as just a "sloppy clearcut" (e.g., Kerr 2013).

Creation of early-seral habitat could be a good candidate for adaptive-management experiments. However, even establishing scientific experiments to evaluate the effects of creating early-seral habitat requires public trust—as evidenced by the recent controversy surrounding pilot projects designed to demonstrate variable-retention forestry in western Oregon (Johnson and Franklin 2012). Trust in the conservation objectives of this type of management treatment is likely to be influenced by people's beliefs about whether there is a real need to create early-seral habitat in addition to that produced by wildfire and industrial forest management, as well as their acceptance of claims that variable-retention treatments do in fact produce "high-quality" early-seral habitat. Including a biophysical component is essential, with data collection on a suite of variables that will allow for integrated assessment of feedbacks and linkages. Key variables for assessment include *vegetation* (e.g., overstory and understory composition and densities); *legacy forest structure* (such as standing and down dead wood); *forest soils* (standing stocks at a minimum, and potentially including nutrient dynamics and processing rates of important elements, such as carbon); associated *aquatic environments* (discharge, water chemistry, water temperature, and nutrient processing rates; see box 18.2 on research needs for water resource management); and the *biota* that occur in both terrestrial and aquatic areas across the forested landscape.

Quantifying a response in biota may be particularly important, because the maintenance and restoration of biodiversity in the context of ecosystem management may lie at the heart of many public trust concerns. Research-

BOX 18.2. WATER RESOURCES AND TRUST

There are substantial concerns among stakeholders regarding the effects of forest management on water resources (Barten et al. 2008), but although many stream-reach studies have been undertaken, the effects of forest-management treatments at larger spatial scales are still poorly understood (chap. 15). Hence there is a pressing need for watershed-scale studies, perhaps best achieved through replicated, entire-watershed comparisons. Although small watersheds would be most feasible to study, knowledge gaps around water resources in larger streams are important to address as well. At minimum, paired watershed studies should be used to test one treatment against a control riparian management area, with additional watersheds incorporated to test the effects of additional treatments. As with biodiversity, there are many aspects of the aquatic ecosystem that can be measured. However, three key measurements are relatively easy and inexpensive to monitor: (1) water temperature; (2) turbidity (associated with erosion and sedimentation); and (3) nitrate concentrations. These three metrics begin to address the question of how water quality will change in response to treatments such as variable-retention harvest and other riparian management alternatives, which might in turn be critical in influencing public perceptions of and trust in active forest management.

ers could use a number of information sources (including a Q-method study of the sort discussed below) to elucidate trust dynamics surrounding questions about management effects on species of concern and their habitat. Unfortunately, complete assessment of treatment impacts on biodiversity is often cost prohibitive. A common practice is to focus on a single taxonomic group as a biotic indicator and to evaluate changes in abundance and composition within that group. For example, birds could be an effective group for this method, as most species are easily surveyed and bird communities span the range of ecological associations, from early-seral to old-growth obligates; however, when birds are used as a response variable, larger treatments are generally required to detect potential treatment signals.

Because short-term responses of biotic, hydrological, and other ecological variables are likely to shift over time (in theory generating parallel shifts in social trust as well), it is crucial to host such an experiment in a location that can draw upon long-term measurements. This will require long-term commitment of funding, agency resources, and personnel. A citizen-science approach, involving public groups in rapid assessments of

select key biophysical factors through multiparty or collaborative monitoring not only cuts costs, but allowing the public to participate in data collection and analysis has been shown to build social capital (and cultivate trust) among participants (e.g., Wagner and Fernandez-Gimenez 2008). Along with providing data and engaging site visitors, these rapid assessments would provide an opportunity to evaluate the effectiveness of quick assessment methods and to gauge the extent to which they correlate in a broad sense with more rigorous research outcomes.

Measurement of Social Response Variables

Along with information about the forest's biophysical response to management actions, people may also draw upon more fundamental perceptions of reality and the values they associate with the natural world (collectively known as their *worldview*) in forming opinions about forest management. It is reasonable to assume that these various worldviews are correlated in important ways with other variables influencing trust in forest management. If this is the case, understanding the worldview of relevant stakeholders becomes critical for restoring trust and earning social license. Although traditionally the purview of philosophy, theology, and ethics, worldviews can also be studied empirically by employing the tools of social science (e.g., Vaske and Donnelly 1999; Gore et al. 2011). We might theorize that differences in worldview among certain individuals or groups will be linked to other variables, such as their willingness to accept certain forms of active management or to trust the agent of a management action. For example, it seems reasonable to hypothesize that more morally inclusive groups will be less willing to accept risk or trust management actions (i.e., groups that attribute intrinsic value to more things may perceive more to be at risk, and so be more reluctant to trust). With careful research design, this is a hypothesis that can be tested.

A Q-method design could be used to investigate the interplay between public trust and active management, and more broadly, to describe the current discourses around environmental governance with greater precision (box 18.3). Empirical data from the biophysical assessments discussed above could also be incorporated into focus-group study design in a controlled way, allowing researchers to begin disentangling the influence and interplay of the various dynamics of trust (box 18.1). Information derived from these empirical data would enable richer discussions of trade-offs and

BOX 18.3. USING THE Q-METHOD FOR UNDERSTANDING THE TRUST RELATIONSHIP

The Q-method is used to collect qualitative and quantitative data about subjective viewpoints and is a powerful tool in environmental social science. It highlights major differences and agreements among social perspectives, and the underlying philosophical arguments used to justify claims, without imposing biases of structured survey questionnaires (Robbins and Krueger 2000). The Q-method could be used to develop a nuanced, multifaceted understanding of the "landscape of beliefs" surrounding active management in the Pacific Northwest. This rich understanding could then be used to inform and facilitate meaningful dialogue with stakeholders by those seeking to cultivate or restore a cycle of trust.

The Q-method has four main steps. First, researchers identify the "concourse" of possible feelings or reactions related to a particular domain (e.g., active forest-management project). Usually this includes archival analysis and informal interviews. Archival analysis could focus on newspaper editorials, published debates and reports, and websites of regional organizations that address forest management. Researchers can conduct informal interviews with organization representatives, relevant scientists, agency personnel, and local residents. These interviews may explore cognitive and affective antecedents that might influence trust in active management, including disposition; past experiences with agency personnel, policies, and management actions; social memory; and vulnerability to risks related to management actions. Interviews could focus on questions addressing three related topics that may bear importantly on trust or distrust of active management (table 18.1). Answers could shed light on the types of information that might be salient to rational trust, affinitive trust, and procedural trust.

Second, participants are recruited for a sorting exercise. Participants would sort quotes drawn from the "concourse" discussed above, from "most agree" (+4) to "most disagree" (–4). This process would be paired with open-ended interviews eliciting explanations for sorting responses. Third, sorted data are analyzed. Finally, researchers identify distinguishing statement sets per significant factor from the results (Robbins and Krueger 2000). Follow-up semistructured interviews would be conducted with a subset of the original sorters to validate the researchers' preliminary interpretations of factors. The Q-method analysis could be followed by field trips and focus groups with the original interview participants, building toward a rich theoretical understanding of trust while simultaneously working to rekindle trust among key players in the Pacific Northwest.

TABLE 18.1. Topics with bearing on trust or distrust of active forest management, and relevant questions to be asked during stakeholder interviews during implementation of the Q-method to examine social viewpoints

Topic	*Description*
Environmental knowledge regarding forest dynamics	How do interviewees (both trustors and trustees) understand forest dynamics related to landscape pattern and process in general and seral stages in particular? Which forest-health indicators are meaningful to them? What kind of management (e.g., active vs. passive) do they believe is necessary to ensure a healthy forest? If active management is desirable, which specific interventions or treatments are viewed as most effective?
Perceptions of stakeholders	How do members of the public characterize federal land managers? What key characteristics do they believe render (or would render) them trustworthy as decision makers? On the flip side, how do land managers perceive the public? To what extent and on what basis do they value and trust public opinion as a guide for management decisions? Are there key historic interactions that have significantly influenced or altered public perceptions of managers, or vice versa?
Institutional preferences	What sorts of governance arrangements do people believe can most effectively ensure management of healthy federal forests? Who are the necessary actors (e.g., who should authorize, oversee, and carry out treatments), and which rules and behaviors should guide the process (e.g., what kind of environmental review is necessary, and is the National Environmental Policy Act process adequate)?

synergies in managing public forest landscapes for a diversity of seral stages and forest products and could provide a nexus around which trust might begin to be restored.

Integration and Trust

As we hope is clear by now, an exploration of trust in forest management is highly interdisciplinary, requiring inputs from both ecological and social sciences and drawing insights from the humanities disciplines of philosophy and ethics. Typical multidisciplinary projects operate by creating a disciplinary division of labor, wherein each discipline operates autonomously alongside some other set of autonomously operating disciplines on a question of common interest (sometimes jokingly called interdisciplinarity by stapler). In contrast, a broadly interdisciplinary experiment (including aquatic ecology, philosophy and ethics, soil science, hydrology, outreach, plant ecology, social science, biodiversity, landscape ecology, and forest management) comes together as a matter of necessity when the phenomenon to be studied (e.g., public trust) not only allows but indeed *requires* the participation and collective wisdom of many disciplines. For example, it is reasonable to believe—and consistent with the concept of trust portrayed in Stern and Coleman (2015)—that the ecological response of a system undergoing active management is highly relevant to public perception and rational trust (fig. 18.1). Hence, in natural resources arenas, one cannot adequately understand the social phenomenon of public trust without understanding the ecological response of a system. Likewise, while dispositional trust, affinitive trust, and procedural trust likely vary significantly among individual members and larger groups of the public (fig.18.1), we anticipate that this variation could be categorized according to discrete sets of variables studied by (among others) social psychologists, sociologists, political scientists, and ethicists. In short, we suggest that the complex and multifaceted concept of trust can best be understood through an analysis and synthesis of its various components, a process that is inherently, comprehensively interdisciplinary in nature. An adaptive-management experiment offers an excellent opportunity for such an analysis.

Conclusion

Much effort is expended in conceptualizing, planning for, and justifying various management actions. This is perhaps especially true for moist temperate forests in the Northwest, given the iconic status of old-growth forests, strong social connections with forests, and the relatively recent history of highly contentious forest-management approaches. Recognizing

that any proposed approach will be enacted only if met with approval by a relevant public, researchers can incorporate social dynamics (such as trust) into their theoretical frameworks and conceptual models as they continue to think about future management in these forests. The process by which that relevant public deems a particular forest-management approach appropriate or inappropriate is complex—certainly more complex than we have recognized in the past—and likely responds to a number of ecological, sociological, and philosophical variables and their interactions.

Although researchers have attended to some of the ecological variables in the past, they have spent far less effort understanding and accounting for the sociological and philosophical variables that influence trust and therefore social license. At present, they have only a generalized understanding of public trust, and it seems apparent that it may be easily lost among key social demographics, contributing to an unraveling of management partnerships. As efforts to remediate this situation proceed, it may befit managers and researchers to partner in designing multidisciplinary adaptive-management projects, which might allow them to begin making efforts to restore public trust not on the basis of guesswork and intuition, but rather on the basis of the best available social and ecological science.

Acknowledgments: Support for this work was provided by the H.J. Andrews Experimental Research Program, funded by the National Science Foundation's Long-Term Ecological Research Program (DEB 1440409), US Forest Service Pacific Northwest Research Station, and Oregon State University.

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